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Technical Institute for Pittsburgh.

Another splendid gift has recently been added to the lengthening list of princely benefactions made by Andrew Carnegie to the cause of education. His latest donation, announced a short time ago at a dinner to the members of the Carnegie Institute in Pittsburgh, is in the form of a school for the furtherance of technical and manual education in that city. In a letter to the Mayor of Pittsburgh Mr. Carnegie remarked that he had for many years nursed the desire to present a technical institute to the city, fashioned upon the best models, being convinced that there was no institution which Pittsburgh, as a great industrial center, so much needed. This need has been long recognized in that quarter, and it was a recent action of the Board of Education in asking the city of Pittsburgh for $100,000 to begin a technical school that impelled Mr. Carnegie to come forward and offer to establish the work on a much larger scale than had been contemplated. Provided the city will give a site adequate to the present and future needs of such an institution—a stipulation that has already been fulfilled—he promises to furnish the necessary funds for building and equipping a school of technology on a large scale, and, further, to endow it with $1,000,000 in 5 per cent. gold bonds, yielding a revenue of $50,000 a year. The men who have made the Carnegie Institute so successful have been requested to become trustees of the new institution, a sufficient guarantee that the scheme will be intelligently carried out to its best development.

Importance of Trade Education.

The primary idea of the proposed institution, apparently, is to provide to a number of young men the opportunity to become acquainted with the technique of trades and industries rather than to establish a seat of scientific learning. The wisdom of this plan is obvious. There are already about enough institutions, attached to colleges and universities or of an independent character, which offer the higher scientific training. What are most pressingly called for in our great centers of population are technical and trade schools which will be available for the great mass of young Americans. To be entirely successful, such schools must be conducted by men of broader views and sounder practical judgment than are usually found associated with high scholarship and ripe pedagogic experience. The professional teacher has, as the rule, no conception of what such a school of applied mechanics should be. He deems it his duty to teach the pupil what books contain, rather than to show him how to use books and to avail himself of the rules, tables, formulæ and deductions which are the keys to unlock every closet in the storehouse of knowledge. In every branch of science the pedagogic standard is ability to conduct original investigations; in practical work, which is a failure if not pecuniarily profitable, the capacity for rapid and accurate generalization from available data is worth a great deal more. In a word, the knowledge of how to use books is what the great mass of technical students with a purpose in life most need. There will always be plenty of book makers. The schools which impart this knowledge most successfully will be those conducted by broad minded business men with the assistance of teachers who are not ambitious of professional chairs in the universities, and are perhaps unfitted for them. It is such schools as these that are most needed to strengthen the industrial forces of the country and enable it to hold its leading position among the great manufacturing and producing nations of the world. As Joseph H. Choate well remarked recently, when presenting the prizes to the students at a Mechanics' Institute in England, "the future national conflicts will be in the fields of industry and commerce." And to insure victory in this struggle the youth of this country must be properly equipped for their work by a sound and thorough industrial training, such as the projected Pittsburgh Institute promises to provide. It is to be hoped that Mr. Carnegie's gift to Pittsburgh will result in stimulating interest in the subject of industrial education in other parts of the country.

A Novel Business Structure.

We understand it has been definitely decided to erect upon the site of the old Windsor Hotel, Fifth avenue, between Forty-sixth and Forty-seventh streets, a unique style of business structure, to which brief reference was made in these columns some months ago. The building will be only three stories in hight, but of such a design and character as to prove an architectural ornament to that section of the city. In fact, it is the intention, so far as possible, to have it express both in design and plan the local spirit more strikingly than anything heretofore created in the way of mercantile construction. The elevation shows an arcade structure in the style of the French Renaissance, two of the stories extending up to a highly ornamental balustraded cornice, supported by Corinthian columns 30 feet high, while the third story is of Mansard design, with copper copings. The main structure will be built around three sides of a central court, facing the street and avenue. The principal entrance will be through an arch that rises through two stories in the middle of the avenue *façade*, and extends through an arcade to the court mentioned. A very ornamental feature of the new building is found in the open arcade facing this central court, which carries the extended walls of the two upper stories and providing a covered colonnade inclosing the court on three sides. The main floor is to be used for stores, the second floor for stores and offices, while the third floor, with 18-foot ceiling and numerous skylights, is well adapted for studios and architects' offices, where an abundance of bright light is required. Another most interesting feature in connection with this building is the arrangement of the plot of ground it is intended to occupy. This consists of a space fronting 200 feet on Fifth avenue and 180 feet deep on either street, with a driveway running across the rear from street to street. There is to be a monumental column arising from the central point of the high wall, which will define the easterly line of this private street, and facing the latter will be a central paved court 52 feet wide and 70 feet deep. In the center of this court will be a large conservatory of metal and glass.

A Franklin Institute for Boston.

At length the long discussed question of the disposal of the Franklin Fund in Boston seems to have been definitely settled, and that city is to have a Franklin Institute modeled in a general way after the Cooper Union of New York. It will be remembered that a sum of five thousand dollars was left in 1794, by Benjamin Franklin's will, the accumulations of which for one hundred years were to go for the benefit of the people of the city of Boston, with special regard to the instruction of young mechanics. For six years the use of this fund, which now amounts to nearly four hundred thousand dollars, has been a matter of dispute. The Boston Board of Aldermen, who are its trustees, were unable until quite recently to agree upon the disposition of the money. Some of those interested in the matter wanted the money devoted to a great lecture hall, while others desired its use for public baths and gymnasiums. At one time it was thought likely that it would be used to found a trade school. But all these differences are now ended in an agreement to build a Franklin Institute on the site of the old Franklin school house. The land is to be given by the city, and a branch of the free public library will be established in the institute. Classes and lectures of various kinds will be provided, much on the lines followed at Cooper Union. Probably this is the most useful disposition that could be made of the fund and one that will be pretty closely in line with the educational ideas of the former testator. The trade school question, fortunately, has been taken up in a practical way by the Massachusetts Charitable Mechanic Association, so that the pressing need of an institute of that kind is in course of being met. The only question in regard to the new institution seems to be in connection with its title. If it is to be called the Franklin Institute, it may become confounded in the public mind with the time honored institution of that name in Philadelphia, which is really national in its scope.

Annual Convention of Architects.

As we go to press the American Institute of Architects are holding their thirty-fourth annual convention in the Arlington Hotel in Washington, D. C. A large representation was present at the opening session, when the address of welcome was made by the president of the Board of Commissioners of the District of Columbia and President Robert S. Peabody delivered his annual address. The main feature of the first day's proceedings was the consideration of resolutions relating to the proposed construction of an addition to the Executive Mansion. A committee was appointed to formulate and present to Congress for passage a bill providing for the appointment of a committee to consider and recommend a comprehensive plan for the architectural improvement of the National Capitol.

At the morning session of the second day a paper on the "Progress of Architectural Design in the United States in Recent Years" was read by Walter Cook of New York. A resolution was adopted requesting Congress to authorize the appointment of a commission to artistically group the public buildings of Washington, and the convention also adopted resolutions relating to the enlargement of the White House after the most approved architectural ideas. Another matter was the adoption of a code for the conduct of competitions for the selection of an architect.

The officers elected for the ensuing year were: President, Robert S. Peabody of Boston; first vice-president, W. S. Eames of St. Louis, Mo.; second vice-president, Frank M. Day of Philadelphia, and secretary and treasurer, Glenn Brown of Washington, D. C. The Board of Directors consists of John Carrere of New York, James McLaughlin of Cincinnati and R. C. Sturgis of Boston.

Pittsburgh's New Office Building.

The plans have recently been drawn for an office building to be erected in Pittsburgh, Pa., which when completed will be one of the finest of its class in that section of the country. The structure will be put up by H. C. Frick, the well-known iron magnate, and will be about 20 stories in hight, although the exact number has not been definitely settled. The cost will probably not be less than $1,000,000, and it is hoped that the structure will be ready for occupancy by April 1, 1902. The main elevation will front on Grant street and will be of exactly the same width as the Court House, opposite which it will stand, that is, 210½ feet. The architect is D. H. Burnham of Chicago, Ill.

The Albright Art Gallery in Buffalo.

When the building indicated by the title of this article is finally completed, Buffalo will have a most beautiful art gallery, the gift of J. J. Albright, a liberal patron of art, whose only conditions were that the city should furnish a site, and that the Fine Arts Academy of Buffalo, which is made the custodian of the property, should raise a maintenance fund of $100,000. The city promptly deeded the site requested, which is just within the limits of Delaware Park. The Fine Arts Academy has complied with the terms of the gift as they applied to the maintenance fund, and the building will be hurried to completion as rapidly as conditions will permit. The structure will be used as the art palace of the Pan-American Exposition and thereafter become the permanent home of Buffalo's art collections.

The building will cost upward of $350,000 and will be 250 feet long by 150 feet wide, the principal *façade* loking toward the east. It will stand upon a broad terrace 35 feet above the level of the park lake, which lies but a few rods below and to the eastward. The principal approach will be by a beautiful monumental flight of steps, the contour of the ground giving opportunity for stately embellishment. The terrace walls are to be of heavy granite blocks. Statuary, fountains, formal floral displays and lawns will complete the ornamentation of the terrace.

The style of architecture chosen is the classic Greek, both the eastern and western *façades* showing rows of rich, graceful columns. The style is Ionic. A semicircular colonnade forms the central figure of the west front. The building has broad wings at the extreme northern and southern ends, terminated by porches which will be reproductions of famous architectural works of ancient Greece. The highest peak is only 45 feet above the ground. The portico of the Erechtheum of Athens, famous for its caryatides, will be one of the works to be thus reproduced. The Erechtheum was an ancient temple and is one of the most interesting of the ruins of the Acropolis at Athens. It was rebuilt after the Persian invasion, about 400 B. C.

The building will be strictly fire proof, the materials being white marble, of which it is said 25,000 cubic feet will be required, steel beams, brick, cement and stone. The architects are Green & Wicks of Buffalo.

Cleveland's Trade School.

The agreement for the establishment of a trade school in Cleveland, Ohio, which was adopted about six months ago by the Builders' Exchange of that city, is said to have met with sharp opposition in certain quarters, notably from the labor unions. So strong was the opposition that a committee of the exchange was appointed some time since to consider the advisability of nullifying the agreement. The result of the action seems, however, to have infused new life into the trade school movement and enlisted the enthusiastic support of a large majority of the members of the Builders' Exchange.

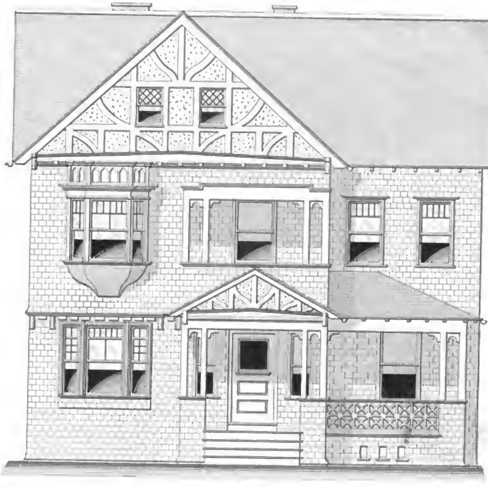
Recent advices from Cleveland indicate that the school will undoubtedly be established at an early date. It will start in a modest way with evening classes, and will extend its scope gradually. A committee made up of J. A. Reaugh, chairman; Col. C. C. Dewstoe, F. H. Palmer, E. H. Towson and Parker Shackleton have charge of the project. They will meet shortly to complete the details of the plan. It is very generally recognized in Cleveland that a trade school for the benefit of the young artisans is a prime necessity, and generous financial support is looked for by the promoters of the scheme.

AN ENGLISH COTTAGE AT EAST ORANGE, N. J.

THE design which we have selected for illustration this month is that of a cottage embodying many features of interest, both as regards the architectural treatment of the exterior and the disposition of the space within. Picturesque effects are found in the timbered gables, with their rough cast or plastered panels; the oriel window projecting from the chamber over the reception room; the balcony directly over the front door; and the treatment of the exterior from grade line to roof with shingles. The latter are stained a light brown, while those of the roof are of a dark moss green. The plaster work of the gables is left in its natural state—a light gray. The remaining trimmings, such as the piazza posts, casings, timber work, &c., are finished in *portières* of a color to harmonize with the hall decorations. At one side of the stairway in the entry hall is a convenient feature in the shape of a closet of sufficient hight to hang coats and to serve as a receptacle for umbrellas, rubbers, &c., while the top of the closet forms a place for pieces of *bric-à-brac*. At the left of the staircase hall is the reception room, finished in pine and painted white, the entire decoration being light in effect, to harmonize with the usual dainty furnishings of a room of this character.

Beyond the reception room is the library, of rather unusual size, owing to the fact that it is practically the living room of the house, sometimes designated as a sitting room. Much attention has been given by the ar-

Section.



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

An English Cottage at East Orange, N. J.—F. R. Comstock, Architect.

ivory white, while the chimneys are laid up in dark red brick. Starting the shingles from the grade line gives opportunity to omit the stone underpinning, which reduces to some extent the cost of the house, and is often done in buildings of this class. If so desired, the first story could be built of brick, or even stone, at its proper increase of cost, and still maintain proper proportions in the design of the exterior. The appearance of the finished cottage is shown in the picture forming our supplemental plate, which is a direct reproduction of a photograph taken especially for the purpose.

The front piazza is 8 feet wide and from this one enters the staircase hall, which might also be designated as an entry, for it is small in size, yet gives through broad doorways of attractive design ready access to the other rooms on the first floor. The box stairway directly opposite the front door, being situated between the dining room and library, gives an excellent opportunity for introducing the open spindle work form of hand railing. Midway to the second story is a mutual landing, forming a combination stairway from the kitchen, the arch opening on this landing being curtained off with chitect in securing all possible effect from the treatment of the stairs opening into this room, with the open spindle hand rail and the landing, a detail of which appears on page 7. The wood work of this room is oak stained a dark green, the staircase hall being finished in the same style. The library is wainscoted with Lincrusta Walton in two shades of green, the upper portion of the wall being finished in a cartridge paper in a shade of green, which forms an excellent background for the usual furnishings of such a room. The bookcases at the right and left of the bay window are built in, while over them are leaded art glass windows, making another very attractive feature of this side of the room. The dining room is finished in oak stained a warm brown, and the walls are covered with English tapestry paper of floral design. The sideboard is located in the alcove, with a turned spindle partition over it opening onto the stair landing and into the hall.

The architect has given special attention to the arrangement of the kitchen, embodying many details of convenience in order to simplify the customary duties of housekeeping. It will be noticed from an inspection of the floor plans that the room is well lighted and convenient to the rear hall, in which is located the ice box. The latter is so placed as to be easy of access by the ice-man, as well as for servants and the occupants of the library. Opening from the rear hall is a toilet room—an arrangement far preferable to the customary position of this room in the cellar. The pantry is compact and includes the necessary counters, cupboards and shelves, together with a place for the flour barrel. The kitchen, as well as the bathroom, is wainscoted 4 feet high.

The second and third floors are treated in cypress, natural finish. On the second floor there are four sleeping rooms, with ample closets, and a bathroom of convenient size. The attic has space for several rooms which may be used for servants' quarters and storage. The laundry and heating apparatus, with bins for coal, &c., are provided for in the cellar.

According to the specifications of the architect, F. R. Comstock of 124 West Forty-fifth street, New York City, the timber employed in the construction of the frame is spruce. The bearing beams are 8 x 10 inches; sills, 4 x 6 inches, halved and lapped, with the joints well spiked together; the girt, cut into the studding, 1⅛ x 6 inches; the first and second floor timbers, 2 x 10 inches, and the attic floor timbers, 2 x 8 inches, all placed 1 foot 4 inches on centers; plate, with lapped joint, 4 x 5 inches; the main rafters, 2 x 8 inches; hips, valleys and ridges, 2 x 10 inches; bearing beams of piazza, 6 x 8 inches, and piazza floor timbers for first and second stories, 2 x 8 inches, placed 1 foot 8 inches on centers. The piazza ceiling and roof timbers are 2 x 6 inches, also placed 1 foot 8 inches on centers. The exterior wall studs are 2 x 5 inches and the partition studs 2 x 3 and 2 x 4 inches, set flatways. The house is heated by hot air furnace and is piped for gas.

The exterior of the house is designed after the early English style of cottage and is pleasantly located on Eighteenth street, near Park avenue, East Orange, N. J. It was erected for Leon Morgan in accordance with plans prepared by the architect named above, the builder being Joseph Davis of East Orange.

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

An English Cottage at East Orange, N. J.

Oil Paints on Cement.

The perishableness of oil coating on cement is the subject of incessant complaints by painters and customers alike. In almost every number of pertinent trade papers are inquiries regarding this matter. The uncertainty is always whether in a given case an oil paint coating can be applied on the cement without having to risk its destruction. That a cement surface must stand for some time before oil paint can be put on with impunity is generally known, says Prof. J. Spennrath in the *Maler Zeitung*, but for how long a time the cement had to effloresce or mature is a question on which opinions vary considerably. The answers received to inquiries made by me ranged from one-half a year to five years.

The following arguments, based on exhaustive experiments, will, I hope, shed some light on the darkness.

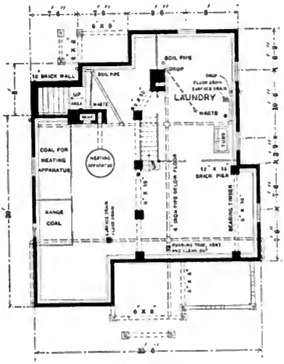
If a cement wall in a closed room is kept damp for some time, preferably by allowing ground moisture to enter, white efflorescences of peculiar shape will be noticed on it. These consist of fibrous structures, which combine into beards of fiber and reach a hight of 5 cm. and more. Whoever is not acquainted with the matter will take them for colonies of fungi. The threads consist of small crystals which have congregated like fibers. If the efflorescences are carefully scraped off upon a piece of stiff paper held underneath, and put in a little rain water, they dissolve clearly and completely. A little acid, say hydrochloric or sulphuric acid, being added to a sample of the solution, it effervesces—that is, gaseous carbonic acid escapes from it. If a second sample of the solution is agitated in a suitable vessel with a little linseed oil or any other vegetable or animal oil, a white emulsion results at once; in other words, the oil is saponified.

The same result will be obtained if a fresh cement plate or a piece of cement is laid for about 24 hours in just enough rain water to cover the piece. If the above experiments are now made with the water, the same phenomena will be observed. The liquid effervesces with acid and saponifies animal or vegetable oils, including, of course, linseed oil.

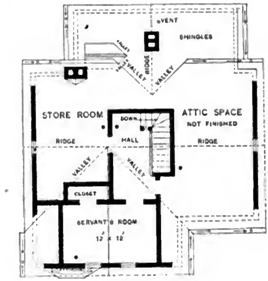
The body which effloresced from the cement, or lixiviated from it by the water, is carbonic alkali, mainly soda. If the cement did not contain these elements it would not have any chemical and consequently no destructive action on the oil paint. It is obvious that the possibility of a chemical action must cease at the moment when the last remainder of the carbonic alkali is out of it. From this it follows that every cement wall by ground moisture and such which, once dry, will receive no more water subsequently. The former will stand an oil paint coat only when all carbonic alkalies are out of it; on the latter the coating may be applied without danger as soon as they have become dry.

The dried non-lixiviated cement walls, it is true, all contain soda and retain it permanently. But this is perfectly harmless. The dry soda may safely come into contact with the oil. It does not act upon it so long as water does not have access simultaneously. Only a soda solution is capable of saponifying oils, but not firm soda or any other anhydrous alkali.

It seemed valuable to irrefutably establish this car-

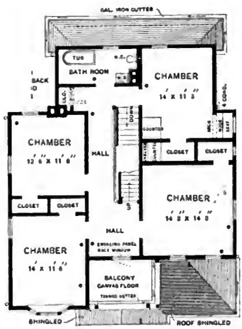


Basement.



Attic.

First Floor.



Second Floor.

An English Cottage at East Orange, N. J.—Floor Plans. Scale, 1-16 Inch to the Foot.

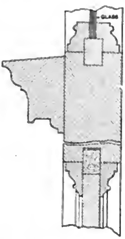
out of doors will, in time, be suitable for an oil paint application, and this will occur much earlier the more it is struck by rain. Toward the weather side, therefore, the cement will be ripe sooner than toward the other direction.

In the open air the soda efflorescences on fresh cement are, as a rule, not perceived, because the rain rinses them off and dissolves them. But even there they are not seldom seen. When we have to answer the question whether in a certain given case a cement grounding may be provided with an oil paint coat, we must first distinguish between cement walls which are exposed to saturation either by atmospheric downfalls or dinal point of the matter. For this purpose I have ground pulveralent calcined soda with linseed oil into an oil paint and applied the mixture on different metallic and wood surfaces in the ordinary manner. The coatings dried smoothly like any other oil paint coat, and are to-day, after months have elapsed, faultlessly firm and hard. The mixture being applied on porous wood, all the oil had entered the wood on the next day and the soda powder lay as a white layer on the surface. Hence, a saponification of the oil was out of the question. Again, a piece of solid caustic soda was added to a sample of boiled linseed oil. Even after weeks no change whatever was noticeable. Oil and alkali remained two separate things, and there was no trace of saponification. The latter took place, of course, as soon as a little water was added to the mixture.

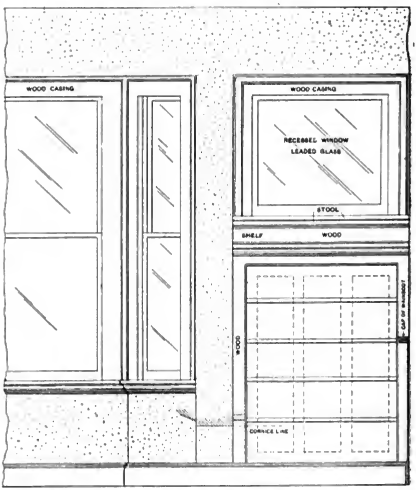
These experiments are qualified to prove that with oil paint, in the dried coating, pigment and binder are separate bodies, and that a chemical combination of the constituents does not take place. Nobody will seriously assert that the basic carbonate of lead, known under the name of white lead, could have a chemical action on the linseed oil, when it is proven that soda and even caustic soda under like conditions have no effect.

Consequently the fresh cement may receive an oil paint coating after a few days, provided it has become dry and remains dry. I have had plates of pure Portland cement cast, drying them immediately after setting for three days at a temperature of about 60 degrees C., and put on the oil paint. The coating is now several

Section through Plastered Front Gable.—Scale, 1½ Inches to the Foot.

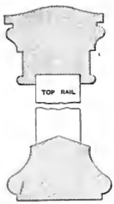


Detail of Veneered Front Door.—Scale, 3 Inches to the Foot.



Partial Elevation of Library Bay Window and Bookcases.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of English Cottage at East Orange, N. J.



Base. Sections of Top and Bottom Rails of Piazza.
Scale, 3 Inches to the Foot.

months old, but faultless. When, however, a painted plate was laid in water, back downward, or only placed with the edge in water—in short, when it was placed in contact with water sufficiently to enable it to absorb water, owing to its porosity—the previously dry coating was saponified and destroyed in three days at most. On the other hand, it should be known that a cement wall which is exposed to saturation and lixiviation will, even after ten years or even a longer period, destroy an oil paint covering if through some unforeseen or accidental occurrence it should receive a soaking. Time does not remove the soda from the cement, but water does.

Hence there will be no difficulty to decide, in a certain case, whether, in the interior of a building, a cement surface may be coated with oil paint. It is more difficult, however, to give an opinion as regards a cement wall which is exposed to an occasional supply of water, specially with regard to oil coating upon cement in the open air. But the matter is comparatively easy.

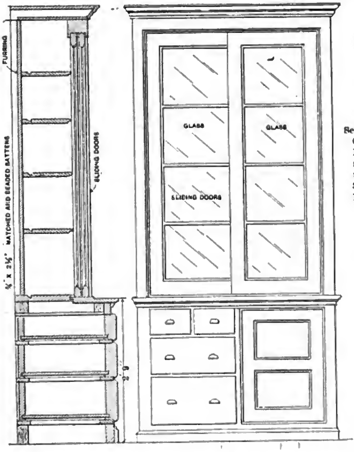
If to the solution of an alkali, hence including one of soda, a few drops of a solution of phenolphtalein in alcohol are added, the liquid at once takes on a bright fuchsine shade of red. This can be utilized to test whether a cement wall has lost its alkaline soluble constituents, and hence whether it is ripe for a coating of oil paint or not. This is accomplished by moistening the dry surface at any desired place plentifully with water. The water enters the porous mass. When this has taken place sufficiently, put a few drops of the phenolphtalein solution on the wetted spot at any point. If no more soluble soda is present, the spot remains uncolored; if soda or some other constituent saponifying the oil is still present, it takes on a distinct red coloring in a few moments. In order to make assurance doubly sure, it is well to leave the wetted place alone for an hour and to let it dry somewhat, then adding a little more water if necessary. The result is that any soda which might yet be present in the interior of the cement ground is brought to the surface in consequence of the evaporation of the water occurring at the outside, thus rendering the red coloring more perceptible. The reaction, however, is so distinct and pronounced that an error is impossible. I have tried it on fresh and on old cement walls in a closed room, the result being always a strong red coloring. On old cement walls, in the open air, no coloring could ever be produced.

Phenolphtalein is comparatively cheap. By dissolving 10 grams in 1 liter of alcohol a stock of solution is obtained, lasting for years. Any druggist will prepare the solution. The substance is insoluble in water, but dissolves readily in alcohol.

Good Composition in Architecture.

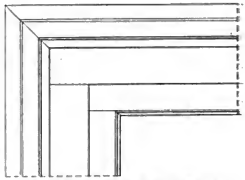
Another lecture in the Trowbridge course at the Yale School of Fine Arts, New Haven, Conn., was recently delivered by Prof. Alexander B. Trowbridge, dean in the College of Architecture at Cornell University, who took for his subject " Architectural Appreciation." In the course of his address the speaker said:

Good composition in architecture is very similar to good composition in literature and music. There must landscape painter, if he be an artist, feels the right balance, the right harmony, the right movement of line and mass in his picture. Architecture is much more



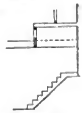
ection and Elevation of Case in Butler's Pantry.—Scale, ¼ Inch to the Foot

Section through Corner Block in Kitchen, Bath-room, Pantry, &c.-Scale, 3 Inches to the Foot

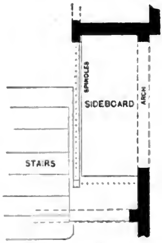


Detail of Inside Trim at Corners.—Scale, 3 Inches to the Foot

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



Section through Back Stairs and Counter.

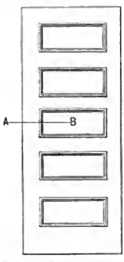


Plan Above Closet in Staircase Hall, Showing Spindles, &c.—Scale, ¼ Inch to the Foot.

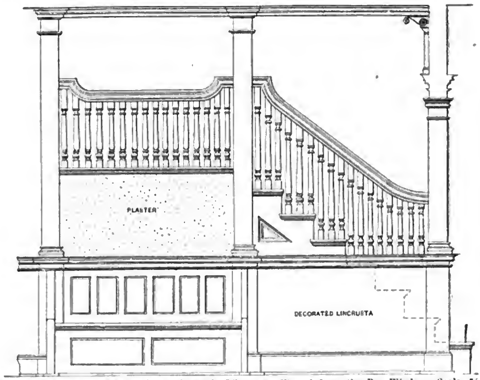
Section of Casing in Dining and Reception Rooms and Staircase Arch.—Scale, 3 Inches to the Foot.

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

Section through Door on Line A B.—Scale, 3 Inches to the Foot.



Elevation Showing Style of Doors on Main Floor.—Scale, ⅜ Inch to the Foot.



Side Elevation of Staircase, Landing and Seat in Library as Viewed from the Bay Window.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of English Cottage at East Orange, N. J.

be a principal thought, about which other things are grouped in such a manner as to produce unity. A perfect hang together is most carefully sought. The exact than art. Its laws are founded upon the immutable laws of gravity and harmony.

Good architectural character should, like good human character, possess truth, consistency and strength. It might also be called "architectural dress," and is a synonym for appropriateness. In this country it is violated more often than any other elementary quality. Its importance may be measured by contemplating what occasionally occurs—a design entirely successful as an artistic composition yet a flat failure in appropriateness. I have seen churches which looked like railroad stations. Also consider a design which is good in character but lacking in one of the other qualities, and one would not call the building a flat failure. There is no definite rule, but we may study the best things which have been done in the world and that will assist us in finding the reasons why they satisfy this requirement of character.

Symbolism is of great assistance, yet good character may be obtained without it. That a court house, a bank, a jail, in a greater or less degree, should be heavy and massive in appearance, whereas a casino, a restaurant, a ballroom and a group of exposition buildings should be gay and light in effect, for obvious reasons, is proper. The authorities who base their estimate of a building upon the correctness of its architectural style rather than its harmony with fundamental principles have had a pernicious influence upon our architects.

The idea that good composition should be the first consideration and that archæological correctness is entirely secondary is just becoming understood in this country. Men forget that Greek architecture passed from a period of heavy, dumpy, columns, with a coarse, almost brutal scale of details, through the period of perfection reached by the Parthenon, Erecthem and the Theseus, to a degraded and degenerated style of work. Yet men have imitated and copied old work in the tranquil belief that they were doing the best that could be done. It is true, however, that the mass of people in the United States have benefited greatly by this imitative work.

A very consistent architecture for any country is that which is developed from indigenous material. I can best explain this statement by asserting that modern colonial architecture for New England and modernized Spanish architecture for Florida and California are in some respect appropriate and consistent styles. In each locality the remains of early building give a local color which makes the modern work referred to seem quite in harmony. In a few years we shall see springing up in the Hawaiian Islands, in the Philippines and in Cuba doubtless, a number of European incongruities. Perhaps poor old China will suffer from the styles of all nations.

If the profession is at fault, where must the public stand in its attitude toward architecture? People are glad to take time to stop and admire a successful effort in building, but when patriotism and municipal pride are demanded of them to put down the prevalent methods of constructing buildings erected by the city or State they are too busy or they do not see the application of the word patriotism. To most men patriotism consists in defending their country against foes from without. They forget the enemies at home, the aldermaniac architectural committee which is responsible for many of the aberrations that ruin our cities' streets; or the honest but equally ignorant committee of business men who, accustomed to engage the highest skill in matters relating to law, medicine and engineering, nevertheless feel themselves capable of passing upon the merits of carefully studied architectural designs.

I make these assertions knowing well that there is a great deal of activity in many communities in the line of architectural study. It is said that ex-President Cleveland favored the idea of appointing a secretary of fine arts for the supervision of art and architecture. A very great step for the better was made when Secretary Gage opened to public competition the plans for Government buildings.

THE SCIENCE OF HANDRAILING.

By C. H. Fox.

THE geometrical principles of handrailing have not been explained in a thoroughly practical manner in the printed works of the teachers of the tangent system school of handrailing, a fact which may have been noted by those who have tried to get an insight into this rather intricate science. The principal object of teachers should be not only to ask of the student to draw certain lines and projections, but to also explain the why and wherefore of these lines. The key to the whole subject is geometry, and a thorough knowledge of the geometrical principles by which we are guided in our projections is indispensable to the practical handrailer. It is the present intention to explain as clearly as may be the practical application of the science of geometry to our subject. The problems most essential are sections of cylinders, prisms, intersections and angles between planes and the development of solids.

In these papers the writer intends explaining the construction of a series of cardboard representations of solids, which will illustrate in a practical manner the method by means of which the several templets and face molds are developed, together with the practical application of the geometrical figures upon which the tangent system of handrailing is founded. Two sides of the solid will at each example represent planes tangent with the points at the center curve at which joints are desired. The intersection of these with the oblique top surface of the solid will show the application of tangents in the projection of face patterns and in determining the position or intersection of the joint planes with that of the section plane of the face mold. The true inclination and position of the oblique planes, both of the face and joint surfaces, are shown, as are also the development of the right sections found at the planes. These show the actual shape the surfaces take when placed in proper position over the plan.

This is an intricate problem not yet shown in any of the printed works of the tangent system school. In the models shown and explained in the works in question, and which are supposed to illustrate the geometrical principles upon which the tangent system of handrailing is founded, the center curve section has been the only one heretofore shown or projected, no attempt having been made to indicate the projections of the joint surfaces, or of the plumb bevels or right sections which belong to the joint surfaces, as projected in their own planes. It is usually considered to be one of if not the most difficult operations connected with the science of handrailing to project correctly the plumb bevels, as required at the joint surfaces to enable the operator to square the wreath. There are many methods in use by handrailers to obtain these bevels geometrically, but after the bevel is constructed a question arises as to its proper application, for the simple reason that the bevels have not been projected at the representations of the points in the drawings at which they are to be applied; that is, they are not projected in their own plane.

In general, the constructions are made on the plan or in an auxiliary vertical plane, but the bevels having to be applied to the joint surfaces, the operator, unless an expert, is always in doubt as to the manner of applying them. To show that this difficulty is recognized by the writers of the tangent system school, special rules are at all times laid down for the guidance of the operator to assist in determining the proper position at which to apply the bevel. We may, to prove this, be allowed to use the words of an authority upon the tangent system of handrailing, who, in a work recently published, when speaking of the means to be employed to overcome this difficulty, requests the reader " to take the wreath piece in his hand and place it in the position it would naturally occupy over its plan; the manner in which to apply the bevel will then be seen."

This may be all right when the operator is an expert, but we know from practical observation that to the beginner this is an operation very difficult of application. We might use quotations of other writers, bnt the rules given to overcome the trouble are just as difficult of application. The real trouble seems to consist not so much in the constrnction of the bevels as in their proper application. The writer having recognized this great stumbling block, it led him to investigate the matter and see if some method could not be employed by means of which the bevels and sections which belong to the joint surfaces may be developed at the actual representations of the points at the drawings at which they are to be applied, and thns remove all possible doubt as to their proper application.

The methods to be described for this purpose are the result of observation and practical application, and we believe their simplicity and practicability will be admitted by all who take the trouble to examine them impartially.

We will now explain first the construction of a cardboard representation of a solid, which will show the application of the intersections of prisms and cylinders to our subject. Handrailing should be founded upon the following geometrical principles, that if a cylinder be cut in any direction except parallel with its axis the section will be an ellipse. If cut parallel with its axis the section will be a rectangle. If cut parallel with its base the section will be a circle.

Let us suppose a quadrant of a cylinder, as 2 4 of Fig. 1, to be inclosed in a square based prism and the prism to be cut by a plane. If we can find the true section of the prism we may easily find the curve lying on the plane. The curve has the same relation to the section as the qnadrant has to the sqnare base of the prism. For a better understanding of the problem the students are advised to make the drawing npon bristol board,

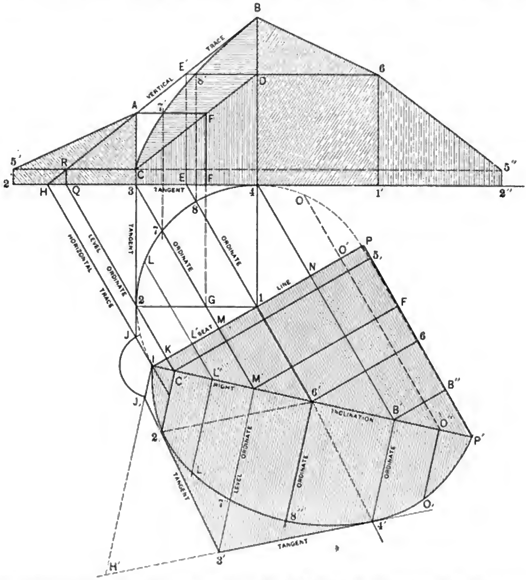


Fig. 1.—Diagrams for Constructing a Cardboard Representation of a Solid Showing the Application of the Intersection of Prisms and Cylinders to Handrailing.

The Science of Handrailing.

then, cutting the drawing as directed, the drawing may be folded to represent the solid.

In Fig. 1 let 1 2 3 4 represent the plan of a square based prism, and 3 A 4 B its elevation; let it be cut by an oblique plane whose vertical, A B, and horizontal traces, H I, are known. Now let it be reqnired to show the elevation of the cut surface: Take corner 2 as a point lying on the oblique plane. From point 2 draw a line, 2 Q, parallel with H I, meeting the base line 4 3 produced in Q; square up from Q, meeting the vertical trace B A prodnced in R. Then, parallel with the base line, draw 5' R 5" indefinitely; and parallel with H B draw C D. Now, parallel with the base line draw A F' and D E'. These are the projection of level lines lying on the oblique surface of the prism. Now, parallel with B 4 draw 8' 8, 7' 7 and F' F G. A curve traced through C 7' 8' B will give the elevation of the cut surface of the prism. The curve line gives the vertical projection of the intersection of the quadrant 2 4 of the cylinder with the oblique surface of the prism.

In order to find the true shape of the section we have to first find the true or right inclination of the oblique surface. To do this proceed as follows: Through 1 square with H I draw I P, this being termed the "seat line," as it is the horizontal trace of a vertical plane which is intersected with the right inclination of the oblique plane. Now, with 1 as center draw the curve of the plan to meet the seat line; then square with I P draw 1 6', equal in length to that of 4 B above. Joining 1 6' gives the right inclination of the oblique plane. Now parallel with H I draw 4 N B', 3 M M' and 2 K C'; then square with the right inclination 1 P draw C' 2, M' 3 and B' 4'. Now, by joining 6' 2, and 3' 4', we may obtain the true section of the prism.

To find the curve is simply the finding of a curved line lying on the surface of the oblique plane that shall be truly perpendicular over the curve of the plan. It may be noted in the elevation of the prism first drawn that the lines A F' and E' D are termed "level," as they line 3 2', then to point 5' and around the outline of the figure to point 4; then from 4 to 1, 1 to P, P to P' and follow the curve of section to point 4'. Then from 4' to point H', and from H' to point I. Now at 3 A, 4 B, 1' 6 and at the line 3 4 of the upper portion of the diagram, and at the lines 1 1 and 1 P' below, cut about half through the board. This will permit of that portion of the diagram above the line 3 4 being turned with the lines on the exterior around 3 4 as on a hinge; then the sides 2' 5', A 3, &c., may be placed exactly over the square of the plan. This done, fold the lower portion of the drawing first around the seat line I 1 until it coincides with the angle 1' 6 of the square; then the section plane may be folded over into its proper position. The tangents on its surface will fall exactly over the tangents of the plan, the line H I over the horizontal trace and the elliptical curve immediately over the curve of the plan. In this simple manner may a practical illustration be had of this important problem.

The reader may now clearly see the meaning of the terms "vertical planes," "tangent planes," their "traces" and their intersection with the surface of the "oblique section plane;" or the sides of the prism may be taken to represent vertical planes, of which the lines 1 2 3 4 of the plan are their horizontal traces. The sides over the tangents 2 3, 3 4, are termed "tangent planes," as their "traces" are tangent to the curve at the points 2, 4; so also are the planes tangent to the curve of the ellipse at the points 2, 4'. The sides 4 1, 1 2, together with the

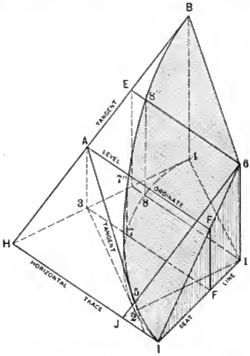


Fig. 2.—An Oblique Projection of the Solid.

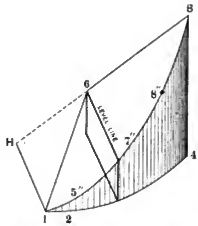


Fig. 3.—An Oblique Projection of that Portion of the Cylinder Embraced within the Ground Plane of Base 3 4 of Fig. 1.

The Science of Handrailing.

are drawn parallel with the base line 3 4. If, in the plan, lines as E 1, 3 M, &c., are drawn parallel with the horizontal trace H I, we may obtain the plans, or, to be more nearly correct, the horizontal traces of the vertical planes which intersect the oblique surface, as shown in the lines A F', E' D of the elevation. The lines just drawn are termed "plan ordinates," and they form one of the most important projections made use of in the science of handrailing. It is to their direction that the length of the ordinates of the section plane are obtained. The student will be better able to follow this in the model. Now, having produced the plan ordinates to meet I P', in the manner shown in the diagram square over L" L 6' 8", &c., making the length of these equal to that of the corresponding ordinates of the plan. Place pins in the points given in I 2, 4', &c., and bend a flexible strip around them and trace the curve, which will give the section of the cylinder at its intersection with the oblique plane of the prism.

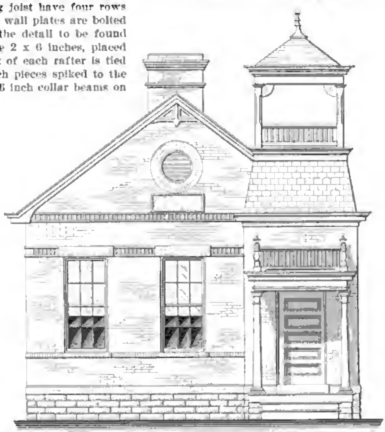
The drawing being made upon cardboard, a representation of the solid may be obtained as follows: Produce tangents 3 4 in either direction; then set off 3 2', 4 1' and 1' 2", each equal to three-quarters the length of the square side of the base. Then square up 2' 5', 1' 6 and 2" 5", equal respectively with Q R and 4 D. Join 5' A, B 6 and 6 5". Now take a sharp knife, and commencing, say, at point 3, cut clear through the board at the base triangle I P P', are termed "auxiliary vertical planes." The line H I is termed the "directing plan ordinate," and, as explained above, to its direction is determined the position of all level lines both at the plan and section planes. Its position is at all times determined by producing the pitch over the upper tangent, as that shown in A B, to meet the ground line or plane, as shown in point H. This gives one point of its trace; the other is determined by the point I, in which the seat line meets that containing the right inclination of the oblique section plane. This point is one to which the student should pay close attention. Notice that the inclinations 5 A, E B, in which the oblique plane intersects the tangent planes, are unequal; that is, the inclination A B is more acute than that of 5 A. These are termed the "pitch" or inclination of the section plane over the tangents, while the inclination I P' over the plane passing through the point 1, or any plane parallel with this, is termed the "right inclination" of the section plane, and its horizontal trace, I P, the seat line, is at all times drawn at right angles with the directing ordinate. In the diagram, Fig. 2, is shown an oblique projection of the solid; the letters of reference made use of correspond to those of the corresponding points of Fig. 1. In Fig. 3 is shown an oblique projection of that portion of the cylinder included within the ground plane of the base 3 4 of Fig. 1 and the oblique section plane.

DESIGN FOR BRICK SCHOOL HOUSE.

THOSE of our readers who have been making inquiries with regard to plans for small school houses are likely to be interested in the design illustrated by means of the elevations, floor plan and details of construction appearing upon this and the pages which follow. It is a one-room brick building with stone foundations, and is of a character well calculated to meet the requirements of the smaller villages and towns as well as for erection in the rural districts. There is more or less cut stone work used, embracing a water table running across the front and returning on the sides, window sills and window caps, door sill, &c. The brick walls are 12 inches thick and laid up in bond, every seventh course being a heading course.

The lumber used throughout the building is of well seasoned yellow pine, the floor joist being 2 x 12 inches and the ceiling joist 2 x 10 inches, all spaced 16 inches on centers. Both floor and ceiling joist have four rows of 1 x 3 inch cross bridging. The wall plates are bolted to the brick walls, as shown in the detail to be found on another page. The rafters are 2 x 6 inches, placed 16 inches on centers, and the foot of each rafter is tied to the ceiling joist with 1 x 6 inch pieces spiked to the sides. The rafters also have 1 x 6 inch collar beams on each pair. The rafters are covered with sheathing and 16-inch red cedar shingles laid 4¾ inches to the weather.

Section.



Front Elevation.—Scale, ⅛ Inch to the Foot

Design for Brick School House.—George W. Barkman, Architect, Hamilton, Ohio.

The floor is double, the lower one consisting of rough boards laid with close joints, while the top one is of strips of 3½-inch yellow pine, secret nailed every 16 inches, and having a layer of good felt between the two. The porch floor is of 1⅛ x 4 inch white pine, with paint between the joints. The floor in the belfry and the porch roof are laid with shiplap, over which is a covering of tin. The belfry has a trap door 3 x 3 feet, and there is also a trap door in the ceiling of the vestibule of the same size. The partition studding are 2 x 4 inches, placed 16 inches on centers, the studding being doubled at all door openings, and bridged horizontally through the centers with 2 x 4 inch blocks. The belfry is anchored to the under side of the wall plates with ½ x 2 inch iron strap anchors, one being used at each corner post, as shown in the detail on another page. The base of the belfry, where shown, is covered with dimension shingles, which were dipped in green stain before being put on. The porch has round columns 6 inches at the top and 8 inches at the base, the columns resting on iron dowel plates so as to raise them about ½ inch above the floors.

All inside finish and jamb casings are of yellow pine in plain Eastlake style. The class room, wardrobes and vestibule are wainscoted 3 feet high with narrow beaded yellow pine flooring, finishing with a neat cap, the latter hollowed out on top at the rear end of the building to serve as a chalk holder. The front door is made to swing both ways and is therefore hung with double acting spring hinges. All window sash are hung and balanced with cast iron weights and braided sash cord, and the fitted with Ives' patent sash lock and lifts, made by H. B. Ives & Co., New Haven, Conn. Each cloak room has 24 strong hooks. The walls and ceilings in the class room, cloak rooms and vestibule are plastered with two good coats of brown mortar and one coat of white skim, the plastering in all cases running to the floor.

All outside wood work is painted with three coats of pure white lead and linseed oil, and all iron and tin work is treated with two good coats of paint. The ceilings of the porch and belfry are varnished three coats. All inside finish has one coat of filler and two good coats of varnish. The pulley stiles and floor are treated with two coats of linseed oil. Two vent registers are placed at the base of each vent flue about 6 inches above the floor, the registers being 12 x 16 inches, and of Tuttle & Bailey's manufacture.

The brick school house here shown was erected in Sater, Special District No. 2, Hamilton County, Ohio, in accordance with plans prepared by George Barkman, architect, of Hamilton, Ohio.

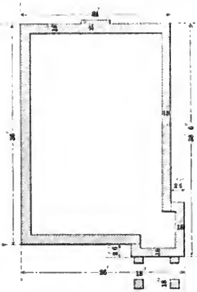
"In building a modern house too much time and thought are devoted to appearances and conveniences, and not enough to sanitary conditions," says a doctor in the Northwest, who was discussing the question of dampness in cellars and basements. "A man will usually insist on the most approved sanitary plumbing throughout his house, to be sure, but the chances are that he will be satisfied with a cellar in which mildew forms at all seasons of the year. A damp and unwholesome cellar is much more dangerous from a sanitary standpoint than a leaky roof."

Some Hints on Foundations.

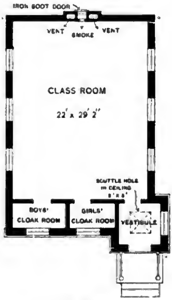
It is probably safe to say that more cracks and failures in buildings can be traced to defective foundations than to any other cause, from which it will be seen that the foundation plays a most important part in the construction of a building whatever may be the purpose for which it is intended. The builder, therefore, cannot be too careful in putting in the foundations and should use every precaution to have them substantial and sufficient to carry the load intended to be placed upon them. For ordinary two story brick buildings, such as would likely be erected for domestic purposes, there should be no trouble whatever in putting down a foundation sufficient to carry it, unless the ground be a swamp or a swall. For a building of the kind named if the bottom is sand, gravel, shale or sandy loam, footings 2 feet wide and 5 or 6 inches thick should be ample to carry a 14-inch wall two stories high.

The footings should be of good sound quarried stones, and should be laid below the frost line. On these footings build a good rubble wall not less than 1 foot 6 inches wide and as high as required. If the earth is of clay, the builder must exercise his judgment in the matter, for if it is a soft, yielding clay his footing will have to be much wider than 2 feet. Indeed, it may be that he may have to lay oak or cedar planks under the footings, making a foundation of 5 or 6 feet wide at the bottom, this, however, depending on the nature and dryness of the clay. For dry, a width of 2 feet will be ample, but if wet or moist, the width and depth should be increased accordingly.

It is quite safe to build on any kind of rock without extra footing, as the softest rock, if not shaley, is as good as the best earthy bottom. When building on a

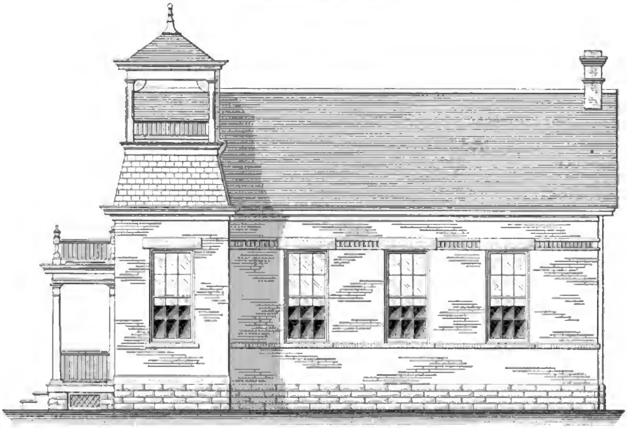


Foundation.



Main Flooor.

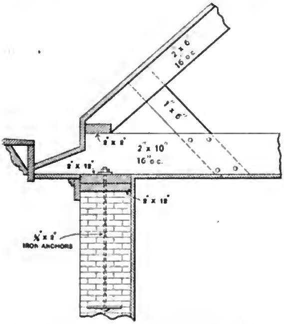
Scale, 1-16 Inch to the Foot.



Side (Right) Elevation.—Scale, ¼ Inch to the Foot.

Design for Brick School House.

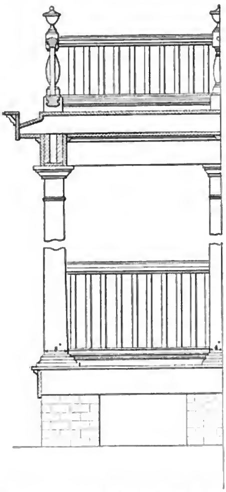
rock bottom, some measures must be taken to allow of water flowing away from under the foundation, as it cannot soak through the rock as it would through soil. Builders living in certain localities should make it a point to discover the sustaining power of the soil in their several neighborhoods, and then they could build with a certainty of having their structures stay where they were put.



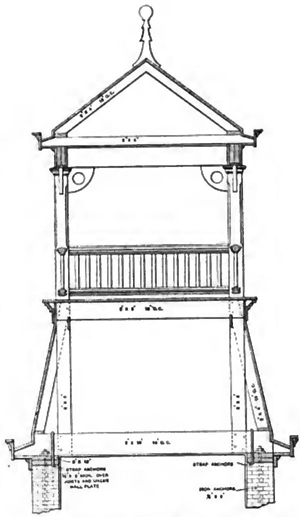
Detail of Main Cornice.—Scale, ¼ Inch to the Foot.

Detail of Inside Finish.—Scale, 3 Inches to the Foot.

Detail Showing Framing of 6 x 6 Tower Post.—Scale, ¼ Inch to the Foot.



Detail of Front Porch.—Scale, ⅜ Inch to the Foot.



Vertical Section through Tower.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Brick School House.

The French Method of Scaffolding.

The French method of scaffolding differs in many points from that in use in this country or England in that it is entirely of squared timber and put together with bolts and nuts. Instead of ladders the builders go to the extreme of constructing regular stairs in different parts of the scaffold itself. From this it will be seen that a convenient means of ascent and descent appear to be points of first importance in France. Another is the substitution, in a great degree, of manual labor for mechanical in raising material to do work. To such an extent is this carried that in the construction of a wall 50 feet in hight, the stones of which it was composed were handed up from man to man by men placed on a ladder and along part of the scaffold, and 20 were constantly so employed.

IT it stated that the high price of ebony has led American piano makers to use dogwood, stained, oiled and polished, as a substitute for the black keys. The wood is cut into strips and piled up cobhouse fashion out of doors until thoroughly seasoned for use.

WHAT BUILDERS ARE DOING.

The building trades of Atlantic City, N. J., are reported in a prosperous condition, and the outlook for the new year is very encouraging. Several large hotels, a new city hall, many private cottages, as well as a brick plant are in course of erecton. Architects are said to have a goodly number of plans on their boards, which indicate preparations for an active season.

Boston, Mass.

Judging from the activity of many of the architects, there is a busy season ahead for builders in Boston and vicinity. We understand that the increase in the business of some of the architects has recently been such as to cause them to largely increase their office force, and preparations are under way for improvements in the way of new buildings, which, in the aggregate, will reach considerable proportions. A fair degree of the stimulus given to the projection of building enterprises will be devoted to apartment houses, although there will be a considerable volume of operations in private dwellings and business structures.

The figures for the month of November show a slight falling off as compared with the previous month, there having been 40 permits issued for brick structures and 71 for frame buildings, as compared with 59 and 72 respectively for the month of October. The figures for the 11 months of the year show permits for 402 brick buildings and 707 frame, as against 629 brick and 1081 frame for the same months in 1899. While there is nothing to show that the record for December will be much of an improvement over that of November, the indications for the ensuing year are promising.

Buffalo, N. Y.

The report of Superintendent Reynolds of the Bureau of Buildings shows that more permits were issued in Buffalo during the month of November, 1900, than for the corresponding month in many years past. The total number of permits issued was 77, and the contracts for buildings represented $890,550. The record for the same month the year before was 104 permits, representing only $228,464 in contracts. Of course, the Pan-American Exposition has had no little to do with this, for it is stated that the total amount of contracts arising out of the Exposition buildings is about $445,000. Among the larger permits issued in November were those of the Albright Art Gallery, $370,000; the Larkin soap factory, $178,000; an addition to the Buffalo General Hospital, $30,000; the new Emergency Hospital, $65,000, and Stewart Brothers' store, $70,000.

Chicago, Ill.

The results of the late Presidential election seem to have given a decided impetus to building operations in and about the city, and the feeling prevails among architects that the opening of spring will witness a degree of activity which has not been seen for some time past, some going so far as to intimate that the volume of operations will exceed anything since 1892. The record for October, 1900, showed an increase of 230 per cent., while November showed a gain of something over 50 per cent., as compared with the corresponding months of the previous year. This unusual increase is ascribed by architects and builders to two causes, some claiming that it is due to a restoration of confidence nationally, while others put it down to the practical suspension of building during the summer by reason of the local labor troubles.

The labor situation, however, is still such as to cause a number of building projects is to be held up until the outlook is more definitely determined. Among the largest of these may be mentioned the $1,500,000 block of Marshall, Field & Co., to be erected on State street; the $500,000 block of Hibbard, Spencer, Bartlett & Co. in Michigan street; a music hall and office building for W. H. Bush, to cost $225,000, and a spice and coffee mill for W. F. McLaughlin & Co., also to cost $225,000. It is estimated by the vice-president of the Builders' Exchange that the settlement of the labor strife will bring to Chicago an era of building industry unknown in the city for ten years, and that the improvements in the down town district alone will amount to $10,000,000.

Cleveland, Ohio.

The feeling among architects, contractors and builders is that the coming spring will witness a decided increase in building activity in and about the city. Several large enterprises which have been hanging fire are now taking more definite shape, and the builders are making preparations accordingly. It is said that while there are no plans at the Builders' Exchange rooms for unusually large buildings, there are more for apartment houses, residences, factory and foundry additions than there have been for several years past.

It is said that prominent members of the Builders' Exchange contemplate forming a political organization for the purpose of taking a hand in the spring campaign and trying to secure the election of good men to the city council.

Columbus, Ohio.

The members of the Builders' and Traders' Exchange have decided to keep open house all day December 31, and a committee composed of E. A. Hildreth, F. H. Nichol and B. S. Stevenson have been appointed to prepare for the day's entertainment. A committee consisting of J. J. Marvin and W. H. Phillips was recently appointed to draft resolutions on the death of E. B. Fox, a prominent architect, whose death occurred a short time ago.

The election of officers of the exchange will be held the first Monday in January, and we understand that a committee of five will place two tickets in the field, probably not later than December 19.

Honolulu, H. I.

Building matters in Honolulu are still in a somewhat chaotic state. It appears that material men are resorting to various combinations and schemes in order to preserve the monopoly which they enjoyed before the tariff between the islands and the mainland was eliminated. The lumber trust and the plumbing trust are being blamed by the papers for exercising a restraining influence on building. It is claimed that while they do not interfere seriously with the large brick and stone business structures, for which materials are usually imported from San Francisco, they act as a practical prohibition in the matter of small residences suitable for homes for laboring people.

On November 14 the master builders of the islands assembled in Honolulu and organized the Master Builders' Association of the Territory of Hawaii with the following officers: President, J. Ouderkirk; vice-president, J. Lucas; treasurer, F. Wilhelm; secretary, A. Harrison; auditor, W. Mutch. It is hoped that the organization will be able to establish a more equitable system of dealing and a greater uniformity in commercial usages.

Portland, Oregon.

The building trade in Portland is rather quiet, but since the election there have been a number of significant transfers in valuable real estate, and this is generally supposed to presage a lot of building before long. Architects and contractors report a considerable amount of new work to be let shortly, but there will probably be no great activity before spring, when builders expect a veritable boom. Business and residence buildings are scarce and rents are showing an upward tendency. This, in conjunction with an abundance of money and a falling rate of interest, is expected to lead to extensive building operations.

San Francisco, Cal.

Advices under date of December 6 are that building operations in San Francisco have been quiet during the past month, but are showing an improving tendency. There is considerable activity in the real estate market, and contractors predict that this will be followed by increased business, several things having combined to put the building trade on a good footing. About the middle of November California was visited by a good drenching rain, which served to improve agricultural prospects as well as general business. This has not yet had its effect on building, but is sure to be felt ere long in San Francisco, Los Angeles and surrounding country. The millmen's strike, which is still on, has about disappeared as a restraining factor in building. New union mills have opened until practically all the strikers are now employed. The non-union mills are also turning out a good deal of work, which seems to find a market in spite of the boycott. Altogether the outlook for the trade is favorable.

Spokane, Wash.

Building operations in Spokane have lately taken a strong turn to big and costly structures. Public buildings and large business blocks, with an aggregate cost of $700,000, are now either under construction or have just been completed. The two fine fire proof Clark buildings are the largest. They are now nearing completion, and other large ones are expected to be finished soon. So far Spokane has been comparatively free from labor troubles, and in general the building trades are well supplied with labor, though there are very few idle workmen.

St. Louis, Mo.

The Building Material Manufacturers and Dealers' Association of St. Louis completed the details of permanent organization on November 30, when a constitution and by-laws were adopted. On December 5 the election of officers was held, resulting in the choice of E. R. Darlington, president; F. P. Hunkin, first vice-president; George W. Jones, second vice-president; Lee Hadley, third vice-president; Frank W. Choisel, secretary, and John G. Hewitt, treasurer.

The affairs of the association will be managed by the president and a board of 12 directors. We understand that upward of 50 of the largest building material firms in the city were represented at the meeting, and a number of others who were unable to be present have signified their intention of joining the association.

The members of the Master Builders' Association held a meeting November 26, when nominations for officers and trustees for the ensuing year were made. The election will be held on Monday, December 17.

Notes.

The record of building operations in Seattle, Wash., for the month of November shows that permits were issued for 336 structures, as compared with 180 in the same month of the year previous. It is reported that the members of the carpenters' union have decided to accept the $3.50 per day wage scale offered by the Builders and Traders' Exchange, to go into effect January 1. This is a compromise, as the present wages are $3, annd the demand was for $4.

Contractors and builders of Peoria, Ill., report a more active fall and early winter than for many years past. Some of them are said to have found difficulty in securing enough carpenters to carry on the work they had under way. Several large buildings are in contemplation, and architects and contractors are looking forward to a very active year during 1901.

There is a good deal of activity in Seneca Falls, N. Y., where a number of new buildings are under way and others are in process. It is said that the building movement has been greatly stimulated by the construction of Gould's power pump works on Oak street.

THE ART OF WOOD TURNING.—XIII.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THE foregoing, which is a fair translation of Bergeron's description of the rose engine, tallies with descriptions of the same machine given in the Penny Cyclopedia, and in Rees' Cyclopedia of the Industrial Arts, which, along with other works on turning, I have before me, and I may say that the latest and most modern machines of the kind now in use differ but little from the engines described therein.

It will now be in order to describe and illustrate some of the work that can be executed on this machine as now prepared. The design shown in Fig. 90 is called the watch case pattern, and is quite a common one. The method pursued in turning it will suffice to illustrate the working of the rose engine, and we again follow Bergeron, who says, as an introduction: "It is not enough to know the general construction of the rose engine. It is necessary to know thoroughly the particular one in use—*i.e.*, as regards the details of its construction, the slight defects or imperfections it may chance to have, and the means whereby they may be lessened or corrected. It is necessary, in addition, to know well and to have at hand the numbers of each rosette, or, at any rate, to have a table of them, which can readily be referred to.

"It is equally necessary to recognize at a glance the various sets of divisions on the division plate, for which purpose, and that no mistake may be made, such numbers ought to be engraved upon each. The same holds good with regard to the slide rest, and, in addition, practice should be frequent upon boxwood or other inexpensive material, by which the turner may have made himself perfect in the several combinations possible and the various effects producible by the rosettes and different shaped tools over which he has control. It is thus by actual experiment only that the turner may become acquainted with the power of his own lathe and apparatus, and thus only, after working out the patterns already executed, will he be in a position to design new ones, and to work with ease and certainty."

The advice given in the foregoing is excellent and, it it may be added that, at the start, there will be discouragements and failures, but these should not, by any means, slacken the efforts of the learner. If intelligence and determination are brought into play, success will most assuredly be attained in a reasonable period.

Rose engines are usually fitted with tools of variously shaped cutting edges, such as shown at A, B, C, Fig. 88, and by their use patterns of some width and of great variety may be produced at once, and by one rosette. In the following, however, a tool with a single point, as shown at C, is to be used for ornamenting the work after it has been made ready for such in the usual manner. This simple design, Fig. 90, is supposed to be on the cover of a box, or other plain surface, and it is evident that the movement or oscillation required of the mandrel is that at right angles to the bed of the lathe. To obtain this movement, when the rubber is fixed in its clamp, on the side of the workman, as it is necessary that the rubber should press against the rosette, through the medium of the spring, the handle of the lever, Fig. 86, must be drawn forward toward the operator, and kept in place by a pin as described, passing through it and the tail piece of the mandrel frame. The tension must not be too great, especially if the rosette to be used is deeply indented, and care must be taken to free the frame from the action of the stop P, Fig. 87, by removing its wedge, before making any attempt to try the pressure by removing the mandrel.

The design under consideration is produced from the rosette marked 2 in the drawing, and in fixing the rubber care must be taken that it does not bear against the adjacent rosette. Choose a rosette of 48 teeth or undulations, and as the second circle of ornamentation exactly intersects the first, the raised part of the one falling under the depression of the other, and, as it were, halving it, the set of divisions on the division plate to be used will be twice 48, or 96. Place the rest parallel to the face of the work and so that the forward motion of the tool shall be perpendicular to it.

By means of the leading screw of the rest place the tool near the edge of the work, and level with the center, and gently moving it forward, and putting the lathe in motion, commence the cut. After having made a light cut, without moving the tool, stop the lathe and judge of the depth of the cut, and if sufficient, screw up the top screw of the slide rest, to insure all the following cuts penetrating to the same depth. Observe the position of the tool as marked by the graduations on the slide rest, and then withdrawing it from the cut, move the division plate one notch, which will divide exactly in half the several undulations of the rosette. By the rest screw move the tool toward the center of the work, and mark the number of divisions passed over, so that the circles of undulations may be equidistant, and cut a second. Now, for the third, go back or advance on the disk plate one division, for the position of the undulations in the third is precisely that of the first circle.

It is indeed immaterial whether an advance or retreat of one notch is made in this case, but now is evident the reason for not dividing the plate equally all round, five or six teeth being ample for each division. If there are eight rosettes the plate should first be divided into eight parts, and each rosette having a different number of undulations, these eight parts should be divided into degrees proportionate to the numbers on the rosette, the one being a multiple of the other. In working the side of a cylinder, that of a box for example, the longitudinal movement of the mandrel is required, the poppet being retained immovable by the wedge and stop The tool is

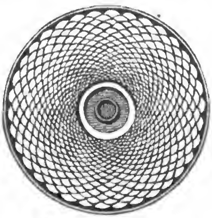


Fig. 90.—Box Cover or Watch Case Pattern.

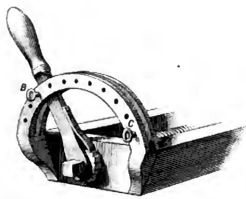


Fig. 91.—View of Slide Rest.

The Art of Wood Turning.

to be placed at right angles to the side of the work, the rubber brought to bear on the face of the rosette.

The method of working is self evident, after the description already given. It is impossible in brief papers of this kind to go into details of the various patterns referred to and illustrated by Bergeron. One or two which are, nevertheless, of great beauty, may be referred to, that are executed with the aid of the eccentric chuck, mounted on the mandrel of the rose engine. There is, however, a different class of work, which may be taken up later, which is executed by aid of a simple slide rest, which does away with the necessity of counting the number of divisions upon this engine, when used as directed in the foregoing.

The slide rest referred to, and which is used by artists when designing the most intricate work, is almost identical in form with one figured and described by Bergeron. It is necessary that the tool holder should have a circular motion, somewhat similar to that of a spherical rest, in order to reach the sides and curved surfaces of the articles to be engine turned; hence the tool receptacle and its bed work upon a central pin. The pin, here called the bed, is usually a flat brass plate of a quadrant form, the central pin being at the apex, and carrying on its face the guides for the tool receptacle. The pin on which it turns is a reversed truncated cone, rising from a similar flat plate, which itself forms the sole of the rest, or traverses the lower frame as usual. When the tool is beyond the central pin it will ornament conical surfaces, and *vice versa*. On the edge of the arc is a racket part, and a tangent screw works into it. The tool is moved to and fro by a lever, as usual, the depth of cut being regulated by a stop screw.

These details have been treated of when describing slide rests and chucks, and need not be more especially explained; but a contrivance for regulating the traverse of the upper part upon the frame underneath is ingenious and serviceable, and will therefore be described. The end of the leading screw is fitted with a ratchet wheel of the same construction as those used in ratchet drills, to which in the same way a handle and spring are attached, as shown in Fig. 91. The handle rises between two semicircular plates drilled in the face with holes for the reception of stop pins B and C. These regulate the traverse of the handle, and thence of the screw. If the former, therefore, is thrown over till the left stop is touched, and then pulled forward to the other stop, between each cut of the tool, the latter will leave equidistant spaces upon the work, without need of counting divisions at each cut. As a traverse of 1 inch or more of the lever handle at the place of the stop pins only moves the screw a very minute quantity, the holes for the pins need not be very close together, even for fine work. This is a very simple contrivance and perfect in action, enabling the operator to work with ease and certainty and with great speed.

The size of this little attachment will depend largely on the size of the lathe it is intended for. The operator will have no trouble in determining this, but it should not be made so large as to interfere with other attachments of the lathe when several are in use at one time.

It may not be amiss at this point to remind the reader that any of the various chucks described in these papers are equally applicable to the rose engine, and when the eccentric or elliptical chuck is used the power of ornamentation by the combined machines becomes almost unlimited. Indeed, the ingenious operator can so adjust his machine when he possesses all these attachments that almost any known, and many unknown, ornaments can be executed on flat or cylindrical surfaces.

THE National Iron League of the United States, whose headquarters are in Chicago, is making a strenuous protest against the so-called "general contractors" on Government work and is making an appeal that such work as brick and stone masonry, iron and steel work, carpentry, fire proofing, sheet metal work, roofing, marble work, plumbing, gas and steam fitting, heating and ventilation, plastering and painting and decorating be put in separate proposals. A petition addressed to the Chairman of Committee on Public Buildings and Grounds has been signed by all the prominent building trade associations and is to be laid before the present Congress.

A National Convention to Discuss Strikes.

Strikes and arbitration for their settlement are to be made the study of the National Civic Federation in a conference to be held in Chicago just as this issue of *Carpentry and Building* goes to press. The federation has invited all the best known experts in the settlement of industrial disputes, and in the two days' session it is expected that much valuable information and instruction can be gathered. In its announcement of the conference the Civic Federation gives an outline of the field of discussion. The statement accompanying the invitation is as follows:

No phase of our modern industrial development is more interesting than the study and observation of the methods of conciliation and arbitration applied during recent years to the adjustment of difficulties and grievances that constantly arise between labor and capital.

Strikes and lockouts are perhaps a greater waste of human energy and responsible for a greater loss of wealth to society as a whole than any other obstructive factor connected with modern industrialism.

Public opinion itself has been indifferent and uninformed as to the requirements of this new age with its rapid and wonderful development in every department of our industrial life. Recognizing the new claims arising from modern industrial conditions, the National Civic Federation will hold a conference in Chicago December 17 and 18 to consider in all its bearings the principles of conciliation and arbitration.

It is the object of the National Civic Federation to make the coming conference as practical as possible by bringing together both the labor leaders and captains of industry who are the most directly concerned and without whose good will no system can be imposed.

The experience of the past will be drawn upon and a critical examination of all methods for conciliation and arbitration at present in vogue will be made.

Among those who will represent Chicago in the conference are Franklin MacVeagh, chairman; Frederick Driscoll, commissioner American Newspaper Publishers' Association; Herman Justi, commissioner Illinois Coal Operators' Association; H. W. Hoyt, vice-president National Founders' Association; Adolphus C. Bartlett, wholesale hardware merchant; James H. Bowman, president International Printing Pressmen's Union; A. M. Compton, wholesale dry goods; T. J. Hogan, secretary National Association of Stove Manufacturers; George A. Schilling, ex-secretary bureau of labor statistics of Illinois, and Mark Crawford, former president International Typographical Union.

That the discussion will cover a wide field is shown by the names of those who have accepted the invitation. Among them are the following:

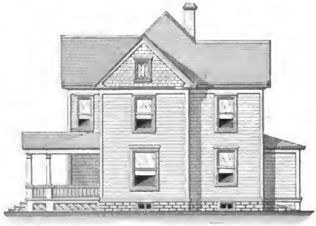
Carroll D. Wright, United States Commissioner of Labor.
E. Dana Durand, secretary United States Industrial Commission.
J. M. Gilbert, chairman New York State Board of Arbitration.
C. H. Wolcott, ex-chairman Massachusetts State Board of Arbitration.
Hugh H. Lusk, former member Parliament for New Zealand.
Samuel Gompers, president American Federation of Labor.
T. J. Shaffer, president of Amalgamated Association of Iron, Steel and Tin Workers.
John Mitchell, president United Mine Workers of America.
Frank P. Sargent, grand master workman of Brotherhood of Locomotive Firemen.
E. D. Kenna, first vice-president and general counsel Atchison, Topeka & Santa Fe Railroad.
Weller Fieldhouse, secretary and treasurer Association Western Manufacturers.
D. Douglas Wilson, vice-president International Association of Machinists.
James M. Lynch, president International Typographical Union.
Walter L. Pierce, president Metal Trades Association.
William H. Sayward, secretary National Association of Builders.
Samuel B. Donnelly, ex-president International Typographical Union.
Peter J. McGuire, general secretary of United Brotherhood of Carpenters and Joiners of America.
William H. Pfahler, representative National Foundrymen's Association.
D. A. Hayes, president Glass Bottle Blowers' Association of United States and Canada.
Charles B. Going, managing editor *Engineering Magazine*.
Thomas O'Donnell, secretary National Spinners' Association.
John B. Lennon, general secretary Journeymen Tailors' Union.
H. M. Eaton, general secretary-treasurer Boot and Shoe Workers' Union.
E. E. Clark, grand chief conductor Order of Railway Conductors of America.

CORRESPONDENCE.

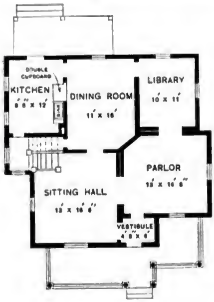
Design for Two-Story Frame Cottage.

From W. S. Wylie, *Washington, Iowa.*—I send, under separate cover, blue prints showing plans and elevations of a house which may interest some of the readers of the paper. I erected a house here from these plans with slight modifications, during the last season, and then made the plans for Thomas McClement, from which he had a house built in Morning Sun, Iowa. In this connection it may perhaps be interesting to state that some of the suggestions for the plans were taken from a design published in *Carpentry and Building* not long ago and executed in Butler, Mo. The house built here with good white pine or cypress finish would be classed as a $1500 dwelling, and I think would be the equal of some of the prize designs. Our houses here are comparatively plain, but roomy, and well built, giving more room for the same money than is represented by many published designs.

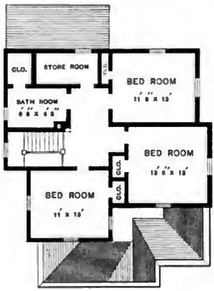
Front Elevation.



Side (Right) Elevation.



First Floor.



Second Floor.

Design For Two Story Frame Cottage.—Scale, 1-16 Inch to the Foot.

Natural Gas Engines for Small Power.

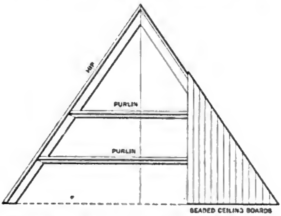
From J. E. D., *Chicago, Ill.*—I desire to lay before the readers of the paper a few questions, and shall be glad to have them give for publication the results of their experience in the use of gas engines for small power. Experience is far better than theory or guess work, and, as carpenters are using power of some kind to a greater extent, perhaps, than ever before, I feel sure that what they might say would prove interesting and valuable. According to my way of thinking, a gas engine is the most economical power which can be used for small establishments, and at the present time, while the engines are of an improved type and reasonable in price, yet many who have had them put into their shops have failed to make them sucessful. Books fail to tell where the trouble is, and they do not answer the questions which one would like to ask—at all events, I cannot find them. I have a 2½ horse-power gas engine of the Raymond pattern, which seems to be in good order, but sometimes it will not go and at other times it seems all right. I use natural gas, and I would like to ask what is the experience of the readers with their gas? What is the right pressure in Chicago? Is the pressure uniform? Do the gas users obtain as good results in winter as in summer? Is it the best gas for engines and what amount of gas should a 2½ horse-power engine use for running eight hours? Are the fittings the same for gas as for gasoline? What should be the size of the supply pipe at the engine? Have all gas bags a regulator and what effect has the gas bag on the gas engine running? My gas bag or regulator seems never to be full.

Hanging Glass Doors.

From F. B. E., *Bennington, Vt.*—I note with interest the answer of "G. L. McM." of Tacoma, Wash., to the inquiry of "E. D. G." in the September number of *Carpentry and Building*. I have made doors for a number of years that were used in this section of the country, and it has always been customary, with one exception, to hang them putty side out. This exception was store doors and fronts, which are always hung and the sash set with the putty side in, to prevent any one from removing the putty and thereby gaining entrance to the building in that way. It is also customary to put raised moldings on the outside.

Finding Down Bevels of Purlins on Hip Roof.

From LEARNER, *Paterson, N. J.*—I would like to know if some of the readers can tell me how to obtain the down bevel of a purlin running between hip rafters and



Finding Down Bevels of Purlins on Hip Roof.—Sketch Submitted by "Learner."

setting square with the pitch of the roof? I want the joints to fit as neatly as possible, as they all show when finished. The material used is planed yellow pine, oil finished. The sketch which I send shows what is wanted.

Trouble with Belts and Pulleys.

From J. E. D., *Chicago, Ill.*—I would be glad to have some one help me out of the difficulty in which I find myself with regard to a belt. I have a rubber belt 3 inches wide running from a 6-inch wheel to a fast and loose pulley, the latter being overhead. The belt seems to run all right on the fast pulley, but has to be forced to the loose pulley, and runs on only with a great deal of friction. I want the experts to tell me if the trouble is in the shaft or in the pulleys. I also have an upright belt, which is of leather 2½ inches wide, and which runs on the side of both wheels.

Constructing a Pentagon Upon a Given Side.

From J. ERNEST G. YALDEN, *Superintendent Baron de Hirsch Trade School, New York City.*—The problem of constructing a pentagon upon a given side, by "F. L. T.," published in the December number of *Carpentry and Building*, is inaccurate in some respects. It is ⅛ inch wrong if the radius of the circumscribed circle is 5 inches and 1½ inches wrong if the same is measured in feet. I therefore offer the following correction and analysis of the problem, as the contributor says he has not demonstrated its accuracy, but believes the construction to be correct. In any event, it may prove of interest to the readers and at least prevent mechanics from using the method given, which is really no simpler than the correct method which I give:

Assuming the construction presented by "F. L. T." as correct, let us look at his diagram, shown in Fig. 1. The angle $E\ O\ A$ must equal $\frac{360^\circ}{5}$, or 72° $\therefore$ angle $A\ O\ X = \frac{72^\circ}{2} = 36^\circ$ $\therefore$ angle $O\ A\ X = 54^\circ$.

Now if construction is correct, by trigonometry $\frac{O\ X}{A\ X} = \frac{4}{3} = \tan. 54^\circ = 1.3764$ should hold true; but $\frac{4}{3} = 1.3333$, $\therefore$ triangle $A\ O\ B$ has not the correct proportions for one of the five inch triangles of a pentagon.

The formula for the side of a pentagon in terms of the radius of the circumscribing circle is: Side $= \frac{r}{2}\sqrt{10 - 2\sqrt{5}}$, which gives when $r = 1$: Side equals 1.175.

Referring again to the figure, we see that $A\ O = r = 5$, $\therefore$ side $A\ B$ should equal $5 \times 1.175 = 5.875$; but by construction given $A\ B = 6$, or 0.125 too long—*i. e.*, ⅛ inch if $A\ O$ or $A\ B$ are measured in inches, or 1½ inches if $A\ O$ or $A\ B$ are measured in feet.

A correct method of solving the problem is as follows: Referring to Fig. 2, let A B be the side given.

1. Draw D E prependicular to A B.
2. Divide A B in half at C.
3. Make A D equal A C, D E equal D B and A F equal A E.
4. Extend A B to G, making B G equal A F.
5. Draw isosceles triangle A H B on A B for a base, and sides equal A G.
6. With points A, B and H as centers, and with radius equal to A B, find points I and J; then draw sides A I, I H, H J and J B.

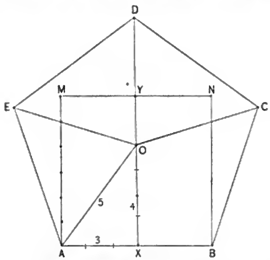


Fig. 1.—Modified Diagram of "F. L. T."

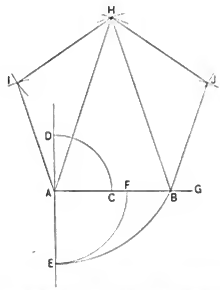


Fig. 2.—Diagram Showing Correct Method of Solving the Problem.

Constructing a Pentagon Upon a Given Side.

Tool Chest Construction.

From W. C. A., *Detroit, Mich.*—In the December number of *Carpentry and Building* "C. C. S." has introduced the subject of tool chest construction, and in order to try and save it from the fate of former inquiries on that subject I will give the readers of *Carpentry and Building* my ideas of this phase of carpenter work. With the ordinary sliding tray or "Grandpa" chest only one side of the chest can be utilized; or, if both sides are used, then the tools must be dumped out on the floor every time one of the trays is moved. The only solution of the problem is to put in drawers. In the September number for 1896 "D. T. C." illustrates this, as well as "N. H.

D." in the August number for 1897. The latter correspondent has been requested to send drawings of his improved large chest, but so far as I can discover he has not done so. In the May number for 1898 "Down South" says he has some original ideas on tool chest construction, and, although he has been asked, still, he has not sent his plans for publication. In behalf of about 75 per cent. of the wood butchers of the United States, all of whom are going to build the best chest in the world some time, I ask that both "N. H. D." and "Down South" send in their plans.

I send a sketch, Fig. 1, of an idea that I am slowly developing as to what I consider a tool chest ought to be. It is to be noticed that there is one large drawer at the bottom and two smaller ones just above it. The cover is made deep enough to hold the saws, squares and level. One tray and several partitions in the top should accommodate the planes and larger tools. A chest constructed on such a plan as this will have no waste room, and it will make a small, compact chest. I have planned this chest to be 18 x 30 inches inside, with paneled ends and cover. The details of construction and partitions I leave for discussion. I hope the readers will take up the subject and not drop it until a perfect chest is the result.

Note.—The suggestion of our correspondent is a good one and opens the way for a most excellent discussion of the subject of tool chest construction. We hope our practical readers will devote a part of the long winter evenings to preparing letters and sketches showing their ideas of what constitutes a satisfactory tool chest.

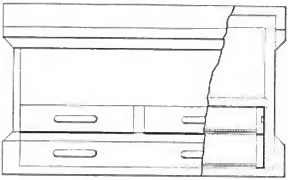


Fig. 1.—Sketch of Chest Contributed by "W. C. A."

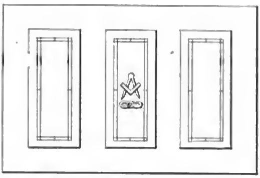


Fig. 2.—View of Top of Cover of "G. H. J.'s" Chest.

Fig 3.—View of "G. H. J.'s" Chest with Cover Raised, Showing Position of Tools.

Tool Chest Construction.

From G. H. J., *East Woodstock, Conn.*—In answer to "C. C. S." of Kansas City, Mo., I send photograph and sketch of a chest which I made of black walnut, dovetailed, and it may prove of interest to the correspondent in question. The chest is 20 x 30 inches and 18 inches deep, inside measurement. It has three drawers at each end, and the front side is a saw till 5 x 30 inches, outside measurement, which lifts out. The drawers are 10½ x 15 inches and 2 inches deep, so partitioned as to suit the tools. The cover shown in Fig. 2 is 1½ inches deep inside; the top has raised panels inlaid with 26 different kinds of wood. The panels have a border ¼ inch wide and 1 inch from the edge all around. It is put in on a miter and has an emblem in the center of the middle panel, as shown. Fig. 3 is a photographic view, showing the chest with the cover raised and indicating the position of some of the tools.

Cypress for Outside and Inside Finish.

From A. O. C., *Lake Charles, La.*—In reply to "A. E." of Elmore, Ohio, in the November number of *Carpentry and Building*, regarding cypress for inside and outside work, I would say that I was born and raised in the home of the cypress—Louisiana—and, having worked at the trade of carpenter for the last ten years, I think I may venture an opinion as to the qualities of the wood. Referring to outside work, I would say that if I was building for myself and could afford it I would for several reasons have nothing but cypress.

1. Because it is as long, if not longer, lived than any wood used in building construction. It should, however, be thoroughly seasoned for any kind of work, as it shrinks very considerably if the least bit green or wet.

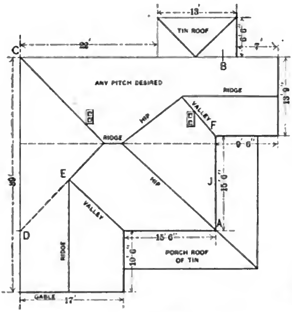
2. Because it does not check like yellow pine, and, being soft and spongy, it absorbs and holds paint well. I have seen taken from old roofs cypress shingles which had been on so long that where the water dripped off the butts of the shingles onto those next below the latter were worn down to ⅛ inch in thickness, and yet the shingles were as sound as the day they were put on. For water tanks and fence posts cypress is second only to cedar.

For interior work cypress is all right, but for good work it should be thoroughly seasoned, as in shrinking it will leave unsightly cracks. After it is finished in oil a door with the stiles and rails of ordinary cypress and the panels of black or red cypress is "a thing of beauty and a joy forever." Cypress makes first class sash and 100 per cent. better than white pine. Curly cypress when finished in oil is equally as handsome as curly pine, but it is very scarce. I have seen it used but once in my experience. Black or red cypress makes pretty panels. All cypress takes a fine finish.

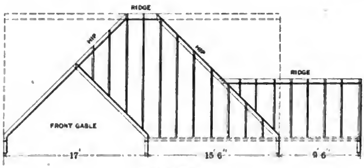
In reference to the blinds made for the customer referred to by the correspondent in question, I think the latter is safe in guaranteeing them. They will stand with entire satisfaction and will last longer than white pine. For outside work of any kind cypress is as good if not better than any other wood.

From J. H. FUHR, *Macomb, Ill.*—I have had considerable experience with cypress wood, and desire to say, in reply to the correspondent recently inquiring about the matter, that it is used extensively in this part of the country, both for inside and outside finish, but more especially as an inside finish. Cypress wood is the nearest substitute for white pine as an outside finish of any wood with which I am acquainted, referring, of course, to the red cypress which grows in swamps. The upland or white cypress is not so good, as it is more inclined to warp and will not stay in its place like the red cypress. For outside finish, however, it should be carefully selected where paint is to be applied. I wish to say right here that I was very much pleased with the article taken from the *Lumber Trade Journal* relating to finishing cypress and which was published in the November number of *Carpentry and Building*. The use of the sealer and not the filler is the correct method of finishing cypress for inside work. Now, for finishing outside paint work the sealer should also be used, but the formula should be changed somewhat.

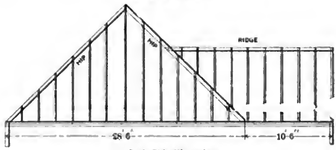
I have no doubt that the first experience with cypress of the Ohio correspondent will cause him more or less trouble, but I venture to say the longer he uses it the better he will like it. In my opinion it is the finest wood that we have for building construction, provided it is carefully selected for the various parts of the structure where it is to be used. I do not think the correspondent will have any trouble with his outside blinds not staying to their place if they have been made of the right kind of cypress.



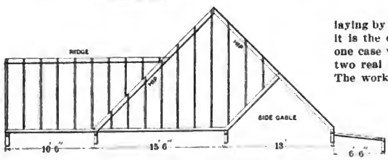
Plan of Roof.



Front Elevation.



Left Side Elevation.



Right Side Elevation.

Roof Plan for Cottage.—Suggestions Offered by "J. W. S.," Paterson, N. J.

Roof Plan for Cottage.

From J. W. S., *Paterson, N. J.*—I inclose some sketches which may be of interest to "I. H. L." of Keene, Ohio, who asked in a recent issue for something of the kind. The plan shows two gables with everything so clearly indicated that very little explanation would seem to be necessary. If "I. H. L." should wish to have more room in his attic floor, he could carry the ridge through as indicated by the dotted line and thus have two large gables from A B and C D, doing away with hips as marked on the plan, and putting in a valley as shown by the dotted line from D to E. He could also dispense with the valley at F. He would then have one large gable, two smaller ones and one half gable, as at J. The elevations here presented still further show my idea.

Measuring a Slate Roof.

From Brownville Maine Slate Roofing Company, *Worcester, Mass.*—The phrase, "'driving' a roof by the square" in a contract, as mentioned by the correspondent in a recent issue of *Carpentry and Building*, strikes us as rather vague. We feel like quoting the old maxim, "A thing within the intention is within the law, though not within the letter." It would seem probable that by "square" the roofer meant a square of slate, not a square of roof. That being so, if say 50 squares of slates were used it would seem that he should be entitled to payment for 50 squares, even though he did not "drive" that small portion of the slates that were broken or wasted in cutting.

In the rare instances where contracts are made for laying by the square in this part of the country we think it is the custom to specify "roof measure." We recall one case where a customer slated 60 or 70 buildings for two real estate men in one of the suburbs of Boston. The work was all done by the square and the contract specified "roof measure." In that case, of course, there was very properly no allowance for waste in laying hips and valleys, and the roofer was paid for the number of square feet there were in the roof, not for the number of squares of slate used. The only case in our experience that we recall of slates being laid by the square, where no reference to measurement was made, was a large building in Pennsylvania. We believe that about 190 squares were used, and the roof probably measured about 185 squares. In this instance the roofer was paid for the 190 squares.

From S. W. L., *Mt. Jackson, Pa.*—In answer to "R. J. H." of Dubois, Pa., in the November issue of *Carpentry and Building*, I would say that the rule is as follows: Eaves, hips, valleys and cutting against walls are measured extra 1 foot wide, their entire length, extra charge being made for waste of material and increased labor in cutting and fitting. Openings less than 3 feet square are not deducted, but all cuttings around them are charged extra.

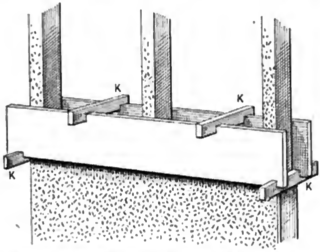
Drawing an Ellipse by Intersection of Lines.

From J. D., *Rossland, British Columbia.*—I am a reader of *Carpentry and Building*, and would like to know through the columns the correct way to draw an ellipse by the intersection of lines.

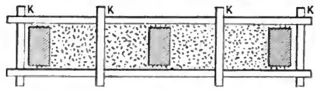
Answer.—Our correspondent will find an answer to his inquiry, fully illustrated and described, on page 171 of the issue of *Carpentry and Building* for July, 1897.

Filling in Between Studding.

From H. A. F., *Fort Antonio, Jamaica.*—I notice in a recent issue the inquiry of "A. E. R." relative to building up a wall between the studding. I would say, in reply to this correspondent, that the frame can be built in the same way as an ordinary frame house, but must be well braced. The studding and braces should be 1 inch less in thickness than that of the wall which is to be built, and nails should be driven into the posts and then bent so as to form a tie to the wall, and also to prevent cracking along the line of the posts. So far as I have had experience, good lime mixed with two parts of sharp sand will answer the purpose very well. I would also suggest to the correspondent that he use cement mixed to the color of bricks on the outside of the wall, and then gauge with a straight edge for blocking in the shape of bricks. If this work is done as described it will look well and last almost a lifetime. If, however, "A. E. R." does not take care to brace and tie the studding properly with nails, he will have ugly cracks all through his house. With regard to placing his boards, I would suggest that he make keys for them instead of nailing them, as this will enable him to move the boards readily and without the expense of nails. I would also state that all posts and studs should have a coat of coal tar before the wall is built. The sketches which I send will give a good idea of how the boards and keys are placed in building up the wall, while at the same time they indicate the nails which are driven into the studding in order to hold the cement in place.



General View Showing Method of Arranging the Boards and Keys.



Horizontal Section through Wall and Studding.

Filling In Between Studding.

Who Puts on the Iron Roof?

From J. P. K., *Worcester, Mass.*—In regard to "W. J. M.'s" dispute mentioned in the November issue, I do not see where he has anything to do with putting on the iron roof, except there be wood work in the way which he would be supposed to cut out or remove. As the contract, however, defines his work as the carpentering work only, I should say that, if no other reason, lets him out of it. We might also say that he is not supposed to have tools for that kind of work. It would seem to me just as reasonable for a steam fitter or some one else to deliver his goods at the building and call to the carpenter to put them in place.

From J. H. F., *Macomb, Ill.*—I would say that if the correspondent "W. J. M." of Reedsburg, Wis., has a contract for the work complete he is the man to put on the iron roof. Of course, a great deal depends upon what kind of an iron roof it is. Some iron roofs require special tools to apply them, which belong to the tin shop, and with such tools carpenters are not familiar or are not accustomed to handling them. In such cases the work would belong to the tinners' or iron men's trade, and the contractor should employ a tinner to do the work. If, however, it is simply a plain corrugated or crimped roof the carpenters can do the work, and it is as much in their line as in that of the tinners or iron men.

Setting Corrugated Skylight Glass.

From PUTTY, *Vermont.*—In answer to "W. T. F.," Gloversville, N. Y., in the December issue of the paper, I would say that I was always taught to put in common window glass with the convex or belly side up, as there is nowhere near the danger of breakage in tinning in there is when the glass is put in concave side up. I have heard another reason, which is that it brings the concave side in so that to a person looking out things appear more natural than would be the case if looking from the convex side. Now as to corrugated skylight glass, I have never set any, but I have always set rolled glass, which is rough on one side, with the smooth side out, and I think that would be the proper side for skylight glass.

Finishing Cedar Chests.

From A. H., *Winchester, Iowa.*—I have made two cedar chests for a friend and he has asked my advice as to the manner in which he should have them finished. He would like to varnish them, but is afraid to do so, for fear it will affect the odor of the cedar. Will some of the readers who have had experience with cedar chests give me their views through the columns of the paper?

Coloring Copper Work Green.

From G. N., *Boston, Mass.*—Will you kindly inform me what is the best solution to put on copper bay windows to make them turn green of an even color and durable? I have 11 copper bay windows that I want to turn green that have already been treated with oil, acid and sal ammoniac, which has not taken effect.

Answer.—The opinion in the trade is that it is better for the sake of workmanship to allow the green color to come with age. However, for the benefit of "G. N." we reprint the following from a Boston correspondent: "The gradual turning of copper work to a greenish tint is a very slow process if left to nature. In many instances the deep brown color is preferred, and to preserve it the work is washed so as to remove all traces of acid and then it is oiled with boiled linseed oil to which a little liquid drier has been added to help it dry quickly. It is put on with a brush the same as paint, and when dry I am inclined to believe it will prevent the work from ever turning green. Now as to the means of turning copper green: The one method which is most generally used is a solution of sal ammoniac and water. Add about 1 pound of powdered sal ammoniac to 5 gallons of water. Dissolve it thoroughly and let it stand 24 hours at least before use. Apply it to the copper with a brush just as paint would be applied, being sure to cover every place. Let it stand for one day at least, then sprinkle it with water carefully with a brush, for if too much water is put on it will run the color and streak it. The next morning will show the desired green. The same effect may be produced by using ½ pound of salt to 2 gallons of vinegar. After the color is once produced time and rains will only more firmly fix it."

From this it may be seen that oiling the bay windows has prevented the rapid appearance of the color that "G. N." desires. It is probable that frequent applications will destroy the oil and enable the treatment to produce the green.

ARCHITECTURE OF PAN-AMERICAN EXPOSITION.

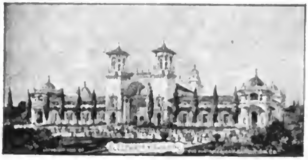
ONE of the notable events of the year upon which we are entering will be the Pan-American Exposition to be held in Buffalo, N. Y., from May 1 until November 1, 1901. While it will be on a somewhat smaller scale than the exposition held at Chicago, it is intended to make it in many ways far more unique and attractive. Its architecture will be of a most interesting character, and with a view to affording our readers an idea of it we present herewith illustrations of some of the more important buildings, together with brief reference to their leading features. The first picture shows the Electricity Building, and in the way of electrical features the exposition will probably surpass anything of the kind ever undertaken. The structure is 500 feet from east to west and 150 feet wide, giving an exhibition space of 75,000 square feet. The building is long, low and inviting. The design of the *façades* shows artistic grouping. The openings of the *pergola* like *loggias*, placed at frequent intervals, present a delightful effect, showing more and more of the details of the pilasters and openings as the eye travels to the end of the building furthest away from the observer. There is a pleasing ending at each corner of the structure, with a low domed pavilion tower, and the *façade* is interrupted at the center by a double towered entrance. This entrance, wide and high, is spanned by an ornamental arch and supported on each side by columns.

The Machinery and Transportation Building, shown in the second picture, is 500 x 350 feet, with a central court 100 x 175 feet. Its location is on the west side of the main group, opposite the Court of the Fountains. It is built in the type—as are all the other principal buildings—of the Spanish Renaissance, modified to suit the conditions of the exposition. The work is far more ornate, however, with roofs laid in red tile and the cemented walls brilliant with color. The colors are to be of reds and yellows in light tints. The *façades* present an arcaded effect, with broad overhanging eaves, in imitation of the old mission buildings found in California and Mexico. Each *façade* is broken by an important architectural feature, and each corner flanked with low pavilions, the design giving large plain surfaces for color, while the eaves give deep shadows. The loggias, balconies, pavilions and other places are to be ornamented with shrubs, vines and flowers, blending with the coloring of the building. The openings are grilled with specimens of wrought iron "rejas," or grill screens, such as are seen in examples of Spanish architecture of the sixteenth century.

The New York State Building is of stone and of a substantial character, the architect being George Cary of Buffalo. The structure covers an area 130 x 82 feet, the north front being 20 feet less than the south. Fire proof materials are used throughout the building and there will be no wood except the mahogany doors on the first and second floors and birch in the basement. All the door casings, inside column covering and cornices are of plaster. All bases are marble and cement. The floors are marble, concrete, granite and wood blocks laid in asphalt, the stairways being of marble and iron.

After the exposition the building will become the permanent home of the Buffalo Historical Society, whose large collection of pioneer and other historical relics will be placed therein. Over 10,000 square feet of floor space is provided for museum purposes. There is also an assembly hall with seats for 300 persons, and a library 37 x 52½ feet. Offices, cloak and other rooms make the total floor area 31,803 feet.

The Temple of Music, designed by Esenwein & Johnson of Buffalo, covers a plot of ground 150 feet square and will be treated architecturally after the style of the Spanish Renaissance. It will be octagonal in shape, with octagonal pavilions at each corner. Each of the *façades* of the main building will have a richly ornamented colonnade. Between the columns will be large window openings and ornamental panels, each bearing a portrait bust of some famous musical composer. The cornice, frieze and balustrade of the main building are designed in a florid adaptation of the Spanish Renaissance, and the balustrade will carry tablets bearing the names of noted musicians and composers and at intervals will have posts surmounted by flag staffs. On the corners above the pavilions will be groups of statuary



The Electricity Building.

Machinery and Transportation.

New York State Building.

Temple of Music.

Architecture of Pan American Exposition.

representing music, dancing, &c. The auditorium will seat 1200 persons, and in addition the restaurants and balconies will give further seating accommodation to 1600 people. The flat domed roof of the auditorium will be supported by eight massive piers. Between the piers will be large arches opening into the galleries, to the main entrance, and leading to the stage. Over each of the eight large arches will be a *cartouch* bearing an inscription indicating one of the grand divisions of music —oratorio, grand opera, symphonic music, lyric music, &c. The lighting will be through star shaped windows, passing through eight ceiling lights, each having 320 square feet of glass. The front of the galleries will be decorated with a frieze of singing cherubs.

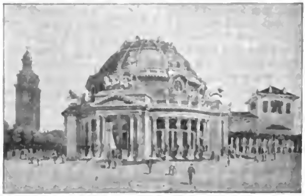
The Service Building was completed in 32 days and was the first erected on the grounds. It is on the west side of the grounds and is 95 x 145 feet, two stories high. A broad arched driveway on the north side leads to an inner court. To the right and left of the driveway are entrances to the corridors that open into the various rooms of the building.

The Ethnology Building is circular in plan, with four main entrances connected by a continuous colonnade which is 7 feet above the level of the Esplanade, forming a *loggia* which will be adorned with a broad frieze above the windows and with other mural decorations, statuary and plants. Above the colonnade is a terrace with balustrade and statuary figures representing the ethnological types of the five different races. Over each of the entrances is a pediment or low gable with the Pan-American seal forming the decorative motive of the tympanum or triangular space of the gable. Back of and above each pediment is a sculptured group of horses. The roof of the building is a large dome like that of the Pantheon at Rome.

The grand centerpiece of the exposition is the electric tower, 375 feet in hight, having a base 80 feet square to a hight of 200 feet. This base is flanked on the east and west sides by colonnades 75 feet in hight, semicircular in form, which curve toward the south, forming a clasp setting for the great basin of the electrical fountains. Abundant streams of pure water, transparent while the light of day lasts, will be transformed at the approach of darkness into all the colors of the rainbow.

The last picture represents the Propylæa, which will mark the northern boundary of the Plaza and the extreme northern limit of the Grand Court. This elaborate architectural ornament will serve the purpose of a colossal screen, shutting out from the exposition the noisy and smoky reminders of the toil and care of our everyday life. The Propylæa is a handsome creation, treated with fine artistic skill. The combined work is 500 feet long, consisting of two massive arched entrances or gateways at the extreme eastern and western ends of a long, gracefully curved colonnade. These gateways are 36 feet wide and 54 feet high. Two open towers surmount the sides of each arch, and above the 20 tall Ionic columns that form the colonnade is a *pergola* or arbor over which growing vines will wind their delicate tracery of green.

Service Buildin,.



Ethnology Building.

Electric Tower

The Propylæa.

Architecture of Pan-American Exposition.

IN commenting upon some curious facts concerning trees it is stated that a single oak of good size lifts 123 tons of water during the months it is in leaf. This moisture is evaporated, and rises to form rain clouds. From this estimate of the labor of a single oak we can gain some idea of the immense force which the forests exert in equalizing the evaporation and precipitation and preventing the periods of inundation and drought.

THE plans were recently filed with the Building Department for a 16-story and basement hotel of fire proof construction to serve as an annex to the Hotel Martinique, in West Thirty-third street, New York City. The plans, as drawn by Architect H. J. Hardenbergh, call for a structure covering an area 32 x 86 x 75 feet and costing $250,000. It will front on Broadway, extending through to connect with the hotel named.

ORNAMENTAL TREATMENT OF BRICK AND IRON.

AT a recent meeting of the Engineering Association of New South Wales a paper read by James Nangle, covering the ornamental treatment of brick and iron, contains much that is of general interest to those engaged in the building trades and allied industries and we therefore present copious extracts herewith:

The modern building is a structure reared under widely differing conditions from that of the ancients, not only on account of the difference in domestic, political, religious and commercial circumstances, but also because of the fact that, whereas the range of choice in materials, both in kind and quality, then was extremely limited, in modern times the field is much wider. All this notwithstanding, it is the habit to work the brick and iron by all possible means, and at times no little ingenuity is used in attempts at ill-advised imitations of the old work. It will surely be conceded by all that the architect or the engineer does but little justice to himself and to his work when he hides the elaborately thought out piece of iron and steel work, or perhaps brick work, in a modern edifice by a clothing of trumpery deception in imitation of a Greek or Roman temple, the original of which was in marble. The Grecian development of the orders, which are now so basely copied, commenced at the building of the wooden hut, with its ungainly trunks of trees as support, but the absurdity was not perpetrated of cutting in stone, when such came to be used, a replica of even the bark and knots that hung to the wooden supports; on the other hand, accepting the general characteristics of the wooden building as a mere foundation to work on, they rapidly improved and suited the design to the more pliable and suitable but still very different material, stone, and the results they achieved are world renowned. The glorious result would never have been had they continued to imitate only. It is in the production of a harmonious suitability of the design to the improved and modern materials and construction that the future of our buildings, as far as appearance is concerned, lies. And the architect or engineer will have to thoroughly understand the requirements of these materials when working them up to give an ornamental result. On account of brick and iron having such a great deal to do in the general formation and construction of our buildings, and, moreover, as there is every possibility of the use greatly increasing, some attention might with very great advantage be paid to their careful and considerable distribution and treatment.

Bricks.

Brick, unlike iron, is an old building material, evidence existing that it was used in the time of the Egyptians, though at present little other than traces of Roman work exist. The early Egyptians and Greeks used stone in all works of a prominent nature where permanence and durability were aimed at, and the bricks by them were used more generally for smaller works. The brick of to-day has, however, changed very much, both in the method of production, and especially in quality; and, again, we moderns find it so well suited to grapple with considerations in construction which were never thought of by the ancients; hence we may fairly consider it a modern article, if not in itself, at least in the manner in which it is constructively treated. The Romans used the brick to form a body to their walls, and then covered the surface with marble or other stone slabs or tiles, and here began the system which is carried to such extremes at present. Brick work reached a very satisfactory condition in the Middle Ages, and some of the works of that period show that careful consideration was paid to the preparation of suitable designs; however, neither the treatment adopted by the Egyptians, Romans, nor any of the mediæval work is safe to imitate at the present, because naturally, as time goes on, convenience and different requirements in setting out the buildings vary so much.

The abominable practice of covering the edge faces of the brick work with a rendering of cement stucco has obtained a great hold, and too much cannot be said in severe condemnation of the practice; and it is by the aid of this habit that result the cases of wretched deception before referred to. In many buildings it is a common method to cover a really good and thorough brick work execution with this cement jacket, and mark out with all the joints and other attendant features of solid stone, and plant on everywhere possible overdone cast cement ornament, and in some cases the deception is enhanced tenfold by painting and sanding in direct imitation of stone. All this then tends to debase brick work, for when the knowledge exists that the outside is to be covered and hidden but little attention is given to the facial appearance of the bricks and the method of laying them. When the general advantages of exposed brick surfaces are considered it is surprising that more attention is not given to their adoption. The impervious and vitriolized surface of a hard, well burnt brick is very little affected by the acidulating action of smoke and other fumes peculiar to cities and by the wearing effects of the weather, against all of which both ordinary stone and stucco are weak as a defense. And again the brick is a material that is eminently suited for construction on account of the facility with which it lends itself to the awkward complications and broken up nature of our modern buildings, nor can it be doubted that brick in conjunction with terra cotta will be a large factor in the buildings of the future. As far as expense is concerned, bricks exposed are much less than stone, and very little more than stucco. It should therefore be the duty of the designer to make the external appearance and the surface suitable to and in harmony with such construction. Boldness of form in which the brick is collectively considered should be relied upon rather than a frivolous ornamentation in which the brick is more individually apparent. The builder has at his command such improved methods of economically operating in late years, and as there is every chance of its improvement, it would seem that there is nothing to deter the designer from exercising more courage in setting ont bold features, the economical execution of which in olden times would have been a deterrent consideration.

The Romanesque.

The Romanesque would seem to be a good model on which to found a design embracing a more characteristic use of the brick. There is in this style something which is strikingly bold, and by making the arch features more apparent, piers rather than columns, together with rejection of the smaller detail ornament, which crept into the late examples, and by a judicious unity in execution, at the same time making all materials—as, for instance, iron—fulfill their part in a harmonious manner, something more simple and more just to ourselves might be produced.

(To be continued.)

THE marble palace erected many years ago by the late A. T. Stewart at the corner of Thirty-fourth street and Fifth avenue, New York City, has recently changed ownership, and we understand that the dwelling will be torn down in order to make room for a business structure. The mansion was finished soon after the Civil War and Mr. Stewart lived there until he died in 1876. In 1891 it was leased by the Manhattan Club, who occupied it until two years ago, since which time it has remained vacant. The "marble palace," as it was known, was one of the sights of the city for 30 years.

WHAT is said to be the largest single block of marble ever quarried in this country has recently been shipped from the quarries at Marble Hill, Ga. It is a pure white mass of mineral 27 feet 2 inches long by 4 feet 4 inches by 4 feet 3 inches. It is stated that the largest previous single stone ever quarried at the place named weighed 60,000 pounds, while the present block of marble is nearly double that in size. Georgia marble is extensively used throughout the country, having great strength, and is said to be proof against weathering.

MAKING WOOD PATTERNS.—XVII.

BY CHARLES J. WOODSEND.

THE pattern which is taken as the subject of this article is one frequently required in some kinds of mill work. It is a box for a large journal, and is intended to be cast in brass. The hole for the journal is to be bored out and should have an allowance for finish of ⅛ inch. Where the cap and bottom of the box come together it is intended that the parts shall be planed, and 1-16-inch finish will be about right. The box is to be let into the wood to the depth of the square piece upon the bottom; keyed into place and bolted down by bolts or lag screws at the four corners. The holes for these bolts will be drilled, also the holes for the bolts to keep the cap in place.

The first thing required to be done is to lay down (draw) the pattern upon the drawing board to the shrinkage rule, allowing all finish as required, the draft in all cases to run in the direction of the arrows shown in the illustrations. A plan and end view of the bottom part of this box is represented in Figs. 124 and 125. After the pattern is laid down, the next thing is to make the square base, the loose pieces not being taken into account at this time. In making the base the grain of the wood is to run at right angles to the journal—in other words, across the box. Plane to the proper thickness and the required width, square off the ends and give the proper draft.

Now prepare the upper part to go on to the base, and plane to the required thickness, rejecting for the present journal. Wire brads may be used for dowels, as they draw out freely and project about 1½ inches, thus permitting them to be withdrawn after the pattern is partly rammed up.

It may not be out of place at this time to give some idea of the manner in which this part of the pattern will be molded. The whole pattern, so far as described, will be molded in the drag. The pattern will be placed upon the board and the drag turned over it and partly rammed up, then the pins (dowels) in the loose pieces will be drawn out and the ramming up finished. The drag will then be turned over, the parting smoothed off, the cope placed upon the drag and rammed up, after which the main portion of the pattern will be drawn out, leaving the two loose pieces in the sand to be drawn afterward. It will be noticed that no part of the pattern projects into the cope; this is the reason why the draft is all one way.

Attention will now be given to the cap. The material should be of sufficient thickness to take in the whole, with the exception of the projecting portion of the oil gate. The grain of the wood is to run the same way that the journal will lie. Mark the piece by the templet this time on the under side, or, in other words, the side

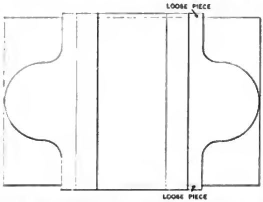


Fig. 124.—Plan of Bottom Part of Box, Showing Loose Pieces upon the Ends.

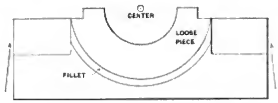


Fig. 125.—End View of Box, with Arrows Indicating the Direction of the Draft.

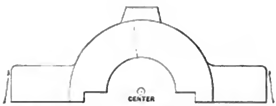


Fig. 126.—End View of Cap of Box, the Dotted Lines Showing Draft in Oil Gate.

Making Wood Patterns.

the projections forming the rebate. These will be planted on afterward. Bear in mind that the grain of the wood for the piece being prepared is to run lengthwise of the box—that is, the same way that the journal will lie. After this piece is to the required thickness, it will be as well to take a mold of very thin stuff to conform to the shape of the piece, and it may be full size, or only one-half, as desired. If the half is used, a neat center line will be necessary. After the mold is ready, mark the block neatly, and saw out a little away from the lines just enough to give the draft. It is understood that the mold should be applied to the top of the piece. Clean up nicely, then glue upon the base, taking care to keep the glue a little away from the outer edges in order to save trouble in cleaning it off again. A few wire brads may be used, if desired, to hold the pieces firmly together. The two pieces forming the rebates may now be worked out, glued and nailed in their places, the draft upon the edges to be as before stated.

The next think is to work out the hollow where the journal will lie. The semicircle may be struck upon each edge with sharp compasses and the interior worked to the lines by a straight edge. This should be done neatly, but a little irregularity is of small account. Next prepare the stuff for the two loose pieces forming the projections upon the ends of the box. There is a fillet worked upon the lower edge of these pieces, as shown by the two lines in Fig. 125. This fillet runs out, as it nears the center of the box, upon either side of the

which will come toward the lower part of the box. Saw out a sufficient distance from the lines to clean up and no more, making the draft in the direction of the arrows. Next, work out the rebate, then work the top part. The circular portion may be struck upon each end with the compasses and worked off to a straight edge, care being taken to work out the fillets where the round part merges into the lugs, as shown in Fig. 126. Next, work the hollow for the journal, and note particularly upon which line the center is shown, as this is very important.

The next thing to claim attention is the oil gate. This is to be a green sand core, the draft being shown in Figs. 126 and 128. In Fig. 127 is shown the opening of the gate, as seen, where it touches the journal. The gate may be laid off carefully upon both sides and worked out. This should be done very clean, so that there will be no roughness or irregularities.

The projecting pieces may now be prepared, fitted and nailed on. It is not at all necessary to miter these pieces at the angles, as butt joints are better under the circumstances. The two end pieces being fitted on and nailed, the side pieces are then slipped in between, after which the whole may be sandpapered smoothly, and then shellacked and finished in the manner already described.

THE November fire loss of the United States and Canada is computed by the New York *Journal of Commerce* at $8,518,000, as compared with $7,107,000 in October, 1900, and $11,857,600 in November of last year. The total fire waste for the 11 months ended November 30 falls just below $152,000,000, or nearly $30,000,000 in excess of the loss for the corresponding period of 1899 and $46,000,000 larger than that of 1898. The fire underwriters are looking forward to very discouraging annual statements for 1900.

Mortar Required for Laying 1000 Bricks.

In the early part of the volume for last year we presented a communication from a correspondent who raised the question as to the quantity of materials required to lay 1000 bricks. Accurate information based upon practical experience is of inestimable value to those actively engaged in masonry work, and we should be glad to have a more general expression of opinion regarding the quantities in question. It is a field for study in which thousands are deeply interested and the subject presents an opportunity for a broad intelligent discussion. As throwing light upon one phase of the question we present herewith some comments by a well known writer in a recent issue of the Canadian *Architect and Builder*, touching the quantity of mortar required for laying 1000 bricks. He states at the outset that this amount will vary with the size of the bricks used, and with the thickness of the joints.

With the standard size of bricks, which should be 8¼ x 4 x 2¼ inches, a cubic yard of brickwork laid with ½-inch joints will require from 0.35 to 0.40 cubic yard.

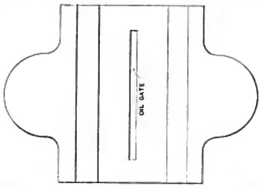


Fig. 127.—Plan of Cap of Box as Seen from the Underside.

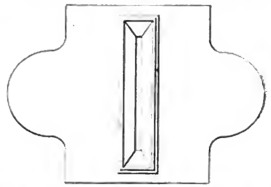


Fig. 128.—Plan of Cap of Box as Viewed from Above, the Oil Gate being in the Center.

Making Wood Patterns.

If the joints are ¼ to ⅜ thick, a cubic yard of brickwork will require from 0.25 to 0.30 cubic yard of mortar; or 1000 bricks will require from 4 to 5 cubic feet of mortar. If the joints are ⅛-inch thick, as for pressed brickwork, 1000 bricks will require from 1½ to 2 cubic feet of mortar. This being known, it should not be difficult for an estimator to be able to tell exactly the cost of the materials required to build up 1000 bricks in a wall, having the cost of bricks, sand and lime at hand, including hauling, with the above data before him.

It is a little difficult to tell exactly how many bricks a man will lay in a day of ten hours, as conditions vary, and some men are much more expert than others; but if well supplied with material, and no scaffolds to adjust, and a long wall to work at, from 1500 to 1600 may be considered a pretty good day's work. If, however, there are many openings to fit around, or neat facing to do, from 1000 to 1200 will be a good average day's work. In good ordinary street fronts, from 800 to 1000 is a good day's work; but in the finest front work, when there are numerous angles, doorways, belting courses, or cornice work, from 200 to 400 is a fair day's work. In large works, such as factories, warehouses or similar buildings, or where walls are very thick and the work coarse, a good man will lay from 1700 to 2000 bricks a day; this, however, is rather the exception than the rule, and the lower figure is the safest to estimate upon.

A good laboring man will mix mortar and carry it and bricks for three bricklayers, if mortar and bricks are not more than 25 feet from the building, and provided he does not have to carry water or climb a ladder. In all cases, however, the lime must have been slaked and is in a putty state, and this is an item the estimator must consider. To slake lime and run it off, and have it ready for the laborer to make into mortar, as a matter of cost, depends on the quantity made at each slaking. As the brickwork of a building rises so also does the cost. Whatever may be the figures obtained as the cost of laying 1000 bricks for the first story, 5 per cent. should be added to it for laying the bricks of the second story, and 12½ per cent. for the third story, and a corresponding percentage for the work laid in higher stories. Getting the figures giving the cost *in situ* of brickwork is one of the easiest problems in estimating, yet, how seldom two estimators give in figures alike?

Remarkable Causes of Fires.

The *Railway Review* of London publishes some curious examples of the way in which fires may be started. In one instance, where some waste, which had been used with mineral oil, had been thrown into a safe place, an insect crawled through it, and then, carrying some pieces of the oily fiber sticking to his body, made his way to a gas jet. The cotton fibers which adhered to him caught fire, and he dropped blazing to the floor, setting the building on fire. In another case, a quantity of waste was supposed to have been ignited by an electric spark which passed from a belt running close to it to some conducting substance through the cotton, which it ignited on its way, as sparks of frictional electricity can very easily do. In two cases destructive fires are said to have been caused by water. In one of these a flood caused the water to rise high enough in a factory to reach a pile of iron filings. The filings, on contact with the water, oxidized so rapidly that they became intensely heated, and then set fire to the neighboring wood work, and the building was destroyed. In the other case the water from the engines, during a fire, found its way into a shed containing quicklime, and the heat generated by the slacking of the lime set fire to the shed, and this to other buildings. Glass globes, which act as lenses, often cause fires, and it has been recently claimed, on high authority, so it is stated, that the convex glasses used in pavement lights are dangerous, and should be abandoned in favor of lights with flat tops.

Plans are being made for an elaborate enlargement of the Union Station on Canal street, between Madison and Adams streets, Chicago. For several years the five great railroad systems entering this station—viz., the Pennsylvania, Panhandle, Alton, Burlington and St. Paul—have been cramped for room, and the congestion increases steadily. The project involves the purchase of the entire block and possibly two or three on the west side of Canal street and the erection of a new depot, costing in the neighborhood of $2,000,000.

Instead of the iron fire proof curtains generally used in French theaters, one made of sheet aluminum has been adopted for the Opera House at Besançon. It is one-fifth the weight of an iron curtain of equal dimensions.

New Publications.

FURNACE HEATING. A practical and comprehensive treatise on warming buildings with hot air, by William G. Snow, with an appendix on Furnace Fittings. Size, 9 x 6 inches, 170 pages. Cloth bound. Published by the David Williams Company, 232-238 William street, New York. Price $1.50.

Reliable literature devoted to the subject of heating houses is not plentiful, and the important branch of furnace heating is practically untouched. With a view to meeting the requirements of the situation the present volume has been compiled from a series of articles originally appearing in *The Metal Worker*. The author has the double advantage of practical experience and technical education, and he has worked out the problem with great carefulness, the result being a book that will prove of inestimable value to the trade.

Mr. Snow begins the subject by describing different types of furnaces and tabulating their measurements. Chapter II treats of house heating and tells about the setting of furnaces, chimneys, cold air boxes, the size of air pipes, &c., with tables giving information concerning the sizes of pipes in a condensed form for easy reference, while many small cuts illustrate the text and show how connections are made. Chapter III deals with the combination system of heating, the subject being treated in a simple but exhaustive manner. Leading up to the subject of ventilation, there is a chapter on air, covering some eight pages. Heating and ventilation of school buildings occupy Chapter V, while public buildings, churches and stores are similarly treated in Chapter VI. Examples are given of buildings warmed by the furnace system. Information for laying out plants is presented, together with sectional and other drawings illustrating all difficult points. Chapter VII deals with the combination fan-furnace system. Temperature control is briefly treated in Chapter VIII, while Chapter IX deals with the important subject of estimates and contracts. The final chapter gives miscellaneous information concerning fuels, as well as many valuable tables and other data, such as tables of areas of registers, of temperature records in different localities, &c. The remainder of the volume—some 50 pages—is an appendix treating the subject of furnace fittings and is a republication of the series of articles that appeared in *The Metal Worker*, written by a practical furnaceman, and dealing with all the minor details of handling sheet metal and furnace pipes, making offsets, elbows, shoes, &c. The book throughout is profusely illustrated, and while it is addressed primarily to the furnaceman it will also be of great value to the architect, and even the house owner can read it to advantage, as it will give him an intelligent idea of furnace heating.

Not many years ago some enthusiasts in other lines of domestic heating thought that the hot air furnace had reached its limit of usefulness and would gradually be supplanted by other methods of warming, but the record of recent years has not borne out that prognostication, and instead of a declining trade the furnace manufacturers are finding that the demand for their goods is steadily growing. Furnaces are being put in cheap houses, and they are also being put in the most expensive class of residences, and everything indicates that their use will go on increasing. It is gratifying, therefore, to know that the subject has been properly exploited and that a book has been issued which may be taken as a reliable guide by the practical furnaceman and as a text book by whoever may wish to learn about this method of heating.

MODERN PLUMBING ILLUSTRATED. By R. M. Starbuck. Size, 6½ x 9¼. 50 plates. Price $3.

This work consists of 50 blue prints suitably fastened together, showing the correct method of connecting different plumbing fixtures in various ways, and in arranging the waste and vent pipes properly for a plumbing system. It is virtually a revision and improvement of the Starbuck plumbing charts, which have had a large sale. The present charts are twice the size of the old charts, and many new and more practical plates have been added. In addition to the charts showing the method of connecting fixtures, they also show sewer connections, closet connections and elevations of the entire plumbing systems in residences, business blocks, engine houses, railway stations, hotels, gymnasiums and factories. This series of plates, showing properly arranged pipes and fixtures, are alike valuable to the plumbing inspector, master plumber, workman or apprentice, and in addition to illustrating how work should be done, give suggestions to many which will be of value in explaining what is necessary for good plumbing to prospective purchasers. The charts give the proper size for every pipe and the proper hight for setting all kinds of fixtures.

Some Hints Regarding Colored Cements.

Colored cements are no novelty in the sense that they have never been produced before. There has always been more or less objection to the use of cororing materials in the making of cement mortar or concrete for the reason that unless great care is taken in the choice of coloring material the cement is very greatly weakened. While many engineers and contractors use lamp black in their cement mortar to give it a better wearing color, others object to it on the ground that it is apt to "run" or fade and will soften the mortar. There is undoubtedly some truth in this, says one of our contemporaries, for lamp black is an impurity in the cement that does not increase its adhesive power and it has been proven by experiment, we believe, that the tensile strength and also especially its compressive strength are lessened by the addition of this coloring material.

It is a safe rule to follow that no coloring material should be used except an oxide, and this should be as pure as it can possibly be obtained. It must, above all things, be free from sulphur. In preparing the mixture for a colored cement mortar no more than 8 or 10 per cent. of the coloring material should ever be used, and the more the per cent. falls below this mark the stronger will be the work. Great care should be taken to thoroughly mix the neat cement and the color before any other mixture is made.

If these rules are carefully followed no trouble need be feared from the use of colored cements. As the ordinary color of cement mortar can be easily regulated by the kind of sand used for the work, and as pure colors are expensive, it is not probable that colored cement mortars will ever gain much of a foothold except for decorative work.

Measurements of Brick Work.

It is curious to observe how considerably the method of measuring brick work varies in different parts of the country. In many localities the custom is to measure it by the number of bricks contained, but this system possesses a serious disadvantage, says a correspondent of the *Clay Worker*. 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 may be approximately ascertained by deducting one-tenth for the volume of mortar.

Condition of Tenement Houses in New York City.

The investigations which have recently been made in this city by the Tenement House Commission, authorized by the State Legislature and appointed by Governor Roosevelt, reveal a condition of things not flattering to the city Building Department or the municipal administration responsible for the acts of that department. It appears that out of 330 tenements in process of construction the inspectors of the Tenement House Commission found only 15 in which there were no violations of the existing law in regard to tenement houses. Out of 286 tenements, 282 were being put up in contravention of the regulation which provides that only 65 per cent. of a building lot may be occupied by new houses. The law relating to air shafts was violated in 36 per cent. of the tenements in process of construction, while in 96 out of 144 tenements the public halls were constructed entirely of wood. Moreover, it was shown that thousands of tenements in the city are not provided with fire escapes. The officials of the Building Department, who were examined at a hearing of the commissioners this week, could give no explanation of this state of things, except that the inspectors of the department must have failed to make proper reports. In other words, a tacit confession of inefficiency, if not worse, was entered for the Building Department of New York.

A Southern Trade School.

The thirty-second annual report of the Hampton Normal and Agricultural Institute of Hampton, Va., just issued for the year 1900, shows that excellent work in the line of trade education is being carried on in that well-known institution for the training of Indian and colored youths of both sexes. The opening, in 1897, of the Armstrong and Slater Memorial Trade School, at Hampton, seems to have given a strong impetus to this branch of the Institute's work. At the present time instruction in mechanical drawing and in eight trades is being given to 170 young men. The school is equipped with the best facilities for enabling negro and Indian youths to become thoroughly trained mechanics, who shall in turn become teachers of trades and leaders in industrial enterprises among their people. The trades taught include carpentry, blacksmithing, machine work, bricklaying, plastering, steam engineering, wheelwrighting, tailoring and harness making, and the products of the pupils in the various departments are in good demand throughout the South.

All the pupils are taught in the most practical manner the principles underlying their trades, so that their training may be as complete as possible in both theory and practice. The statement is made that of the colored students who have learned trades at Hampton since 1885, about 70 per cent. are either teaching trades or working at them, while many have opened shops and are conducting successfully businesses of their own in the various Southern States. The instructor at the head of the trade school expresses his belief in a great future in the South for metal workers, especially for machinists and foundrymen, and desires that as soon as possible a foundry be established at Hampton.

Lack of Heat Causes Suit.

A question that is likely to receive the attention of the heating trade is presented in the following from the Chicago *Tribune*, where a landlord has been sued because he failed to heat a building as agreed to in a lease:

A Chicago tenant has sued his former landlord for $5000, alleging that one of his children died as the direct result of the landlord's failure to provide sufficient heat in his flat. In some respects the suit is unique, and it is likely to be followed closely by renters and property owners throughout the city. The failure to heat a flat properly in cold weather when steam heat is one of the lease conditions will thus be tested, and along with this test will naturally go the other mooted question, whether damages can be collected when death results from the presence of bad plumbing and sewer gas.

The direct point of the case has to do with the heating problem; the failure of the janitor to supply steam heat during the night of February 19, when the thermometer stood at 22 degrees above zero in the second flat of 6158 Ingleside avenue. Harry C. Mordue is the plaintiff, and he brings the suit against Rudolph Rosenthal, landlord of the flat building. The declaration has been filed in the Superior Court and every effort will be made to press the suit.

The declaration alleges in substance that Mr. Mordue rented the flat in March, 1899, from Mr. Rosenthal, agreeing to pay therefor $30 a month. The lease provided that steam should be furnished for heating the flat from October 1 to May 31. On February 19 last Mr. Mordue's three year old boy lay ill in one of the rooms of the flat, dangerously near the point of death. He was suffering from some pulmonary trouble and the physician of the family said that unless he was kept in a well heated room he probably would not survive the night. At 10 o'clock on the night of February 19, the declaration alleges, the janitor of the building shut the steam out of the flat despite the fact that Mr. Mordue had notified him that he would endanger the life of the sick boy if he did so. The shutting off of the steam, the declaration alleges, caused the temperature of the flat to lower until the thermometer stood at 22 degrees above zero, and so aggravated the pulmonary trouble of the boy that he died at 6 o'clock the next morning. Through this death the parents maintain that they have sustained an irreparable loss and they seek $5000 damages from Rosenthal, whom they hold responsible.

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FRAME COTTAGE ERECTED FOR MR. LEON MORGAN ON EIGHTEENTH STREET, EAST ORANGE, N. J.

F. R. COMSTOCK, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1901.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

FEBRUARY, 1901

A New Astor Hotel.

New York City is to have another apartment hotel which in its construction and equipment will embody features which are entirely unique in their way. The new structure will occupy a site at the corner of Fifth avenue and Fifty-fifth street, and will be 16 stories in hight, thus being the tallest building of its kind in the city. The first three stories will be of granite and the shaft of the building of Indiana limestone. On a level with the fourteenth floor a heavy granite coping will break the straight lines of the shaft, and the dormer windows in the chimney-like masonry of the roof will to a large degree neutralize the box shape which so generally characterizes the ordinary apartment house. The plans have been drawn by Trowbridge & Livingston, and while no official figures have been made public, it is estimated that the structure will cost in the neighborhood of a million and a quarter of dollars, which, with the land where the building will stand, brings the total investment very close to two million dollars. The main floor will be used as a large public dining hall and café, with a palm garden in the rear L, together with private reception rooms for the friends of guests. On the second floor will be private dining rooms for guests, also libraries and reception rooms. The remaining 14 floors will be arranged in suites of two, three, four, nine and 18 rooms, the last named exceeding in floor space, it is said, that of a five-story American basement dwelling. Among the unique features of the building will be "movable pantries" in the shape of two high speed electric elevators, fitted with electric heated tables, which will convey food from the kitchen to the top floor in the space of one and a half minutes; also an artesian well to supply all water, a refrigerating plant, as well as a complete electric lighting and telephone service. All of the large apartments will have servants' rooms, a servants' bathroom and sitting room. It is now expected that the building will be ready for occupancy on or before September 1 of next year. Some idea of the extent to which iron and steel are now used in building operations may be gathered from the fact that the contract for the structural iron work of the hotel calls for 4000 tons.

Right of Employers to Discharge Workmen.

Considerable attention has of late been given to the manner in which labor organizations have succeeded in incorporating in the statutes of numerous States enactments intended to increase the privileges of workmen belonging to unions and to correspondingly restrict the rights of employers. The leaders of the labor organizations have not relied upon the power of their unions to secure advantages for them through the usual channels of union action, but have used their political power in framing legislation. The fact has been pointed out that much of this legislation, if not all of it, is of a character which brings it in the category of class legislation, and that consequently when the constitutionality of such enactments is brought into question the courts have usually nullified the legislation. A case of this character has just come up in the State of Illinois. It appears that in 1893 the Legislature of Illinois passed an act entitled "An act to protect employees and guaranteeing their right to belong to labor organizations." The statute has been in force since that time without its constitutionality being challenged until this year. A contractor and builder was fined $25 and costs on a charge of violating the statute, the complaint being brought by a carpenter. The carpenter had been employed by the contractor at a time when he was not affiliated with any organization. While in the contractor's employ the carpenter joined a local union and was discharged. In passing on the case, the Illinois Supreme Court recites that under the Constitution a man cannot be deprived of his life, liberty and the pursuit of happiness without due process of law; that the rights of liberty and property include the right to acquire property by labor and by contract; that if an owner cannot be deprived of property without due process of law he cannot be deprived of any of the attributes that are essential to his personal rights. The act of 1893, the Court declares, deprives an employer of the right to terminate a contract with an employee, but the Constitution accords him this right the same as it allows an employee to terminate his contract with his employer. This decision seems to be in strict accordance with common sense, as well as with the ethics governing the relations of individuals. It is claimed by labor leaders that any man working for another has a right to quit his employment or to strike at any time he pleases. This is a man's privilege. If his right to do this is conceded, and it seems to be conceded by all authorities, then, on the other hand, an employer must have the right to discharge an employee for any reason whatever. His liberty of action in this matter cannot be interfered with, even if an attempt is made to do so by the Legislature. It is possible that in the course of time enough of the enactments which have been made in the interest of labor will be adjudicated to plainly define the limits beyond which legislation cannot go in building up class privileges.

Fire Loss in 1900.

The year 1900 will be marked in the fire insurance annals of the United States as an exceptionally disastrous season, and it is likely that many companies will show heavy losses as the result of the year's operations. According to a compilation of the carefully kept records of the New York *Journal of Commerce*, the fire loss of the United States and Canada last year reached the unprecedented total of $163,362,250. This is an increase of more than $26,500,000 over the figures for 1899, which was regarded as a most unfavorable year for fire underwriters. In comparison with 1898 the increase was $43,700,000; with 1897, $52,500,000, and with 1896 nearly $57,000,000. Thus, in spite of all the modern improvements introduced in the fire fighting equipment of American cities, the annual fire waste has made a progressive increase in the past five years. In 1896 the average monthly loss from this cause was $8,810,000; in 1897, $9,150,000; in 1898, $9,970,000; in 1899, $11,400,000, and in 1900, $13,600,000. During the past year there were 24 fires each of which involved a loss of over half a million dollars. At the head stands the great conflagration which wiped out a large part of the twin cities of Ottawa and Hull in Canada, at a cost of over

$12,000,000. The disastrous fire at Hoboken, N. J., destroyed $5,350,000 worth of docks, ocean steamers, storehouses and cargoes, and between $1,000,000 and $1,800,000 worth of property each was lost in fires which occurred in Newark, N. J.; Pittsburgh, Pa.; Bloomington, Ill.; Prescott, Ariz.; Santa Rosa, Cal.; Ashland, Wis., and Constable Hook, N. J. The fires in 1900 exceeding $10,000 in destructiveness numbered 2400. Under the circumstances it is not to be wondered at that the fire underwriters are contemplating action looking to higher rates for insurance during the present year.

New York's Tallest Building.

It is proposed to add another to the already very creditable list of towering office buildings in New York City and to make it the tallest in the country, if not in the world. A site having a frontage of 118½ feet on Broadway and about 98 feet on Thirty-third street has been secured by a company, upon which it is stated a 30-story building will be erected, overtopping the one on Park row, heretofore the tallest by considerably more than 50 feet. Measured from the level of the curb to the tip of the iron ornament of the roof gives a hight of 455 feet. The lower part of the structure is to be of granite, the middle shaft of brick, with red granite trimmings, surmounted by a roof with lofty dormer windows. It is expected that the building will cost about $2,500,000, of which $1,500,000 probably represents the value of the land. If the leases of the tenants now occupying the property can be satisfactorily arranged, it is thought that ground will be broken some time the coming summer.

Modern Heating and Ventilation.

The new office building of the Armour Packing Company on the Kansas side of the State line at Kansas City, Mo., says the *Star*, has a system of heating and ventilation heretofore unknown in the West. There are a few buildings in the East and one in Chicago which have the same system, but it is new even there, and this is the first building west of the Mississippi River that has it.

In the whole building there is not a movable window. The glass is set solid and can neither be raised nor lowered. There are a few transoms that can be moved, but they won't be opened often, for the only purpose they can serve will be to let in the odor which belongs to the packing house district. Fresh air comes in another way.

The temperature and atmosphere of the building are manufactured down stairs in the basement and will come to the office through open registers in each room. Two huge chimneys, each 8 feet square, rise above the building so high that they will escape the greater part of the smoke that fills the atmosphere of the West bottoms. In the basement are fans run by electricity which draw the air down through these chimneys and long alleys at the bottom with a force that will take a man's hat off. The current is like the wind before a severe summer storm.

At the foot of the chimney the current turns and runs through a brick conduit that extends the length of the building. First it goes through a spraying room where a hundred sprays are throwing water in fine rain. The water is hot or cold according to the season. In hot weather it is cold and in cold weather it comes from the boilers. This water is expected to wash the air. It takes out of it particles of coal and dust that may be flying and precipitates these atoms. It literally washes the air and goes a long way toward purifying it besides, changing the atmosphere a few degrees, according to the season.

After passing the sprayers the air rushes through a series of spiral tubes which dry it, taking out the moisture that came from its recent washing. Then over the big electric fan it goes and past coils which heat or cool it as the conditions require. These coils are so well controlled by valves and connected with the hot air chambers and cold blast that it is possible for the air when it leaves them to have a uniform temperature the year round, no matter whether the temperature outside is 105 in the shade or 26 degrees below zero. There is an automatic thermometer connected with a device in compressed air that can hold the temperature exactly to order.

With the two machines running normally the air in the building will be changed every ten minutes. It will always be fresh air, free from dust or smoke particles and of the temperature that is most comfortable in season.

Comparative Hight of New York's Tall Buildings.

The movement which is under way looking to the erection of a 30-story office building near Herald square, in New York City, by the Ætna Real Estate Company, and which, it is claimed, will be the highest structure in the metropolis, directs attention to the number of feet which some of the sky scrapers already erected rise above the level of the street. The figures available show the following:

Building.	Stories.	Feet
Ætna	30	455
Park Row	29	382
Manhattan Life	*22	348
St. Paul	26	308
American Surety	21	306.1
American Tract	23	306
Empire	20	293
Home Life	16	280
Washington Life	19	273
Gillender	16	273
Bowling Green	19	272.6
Bank of Commerce	20	270
New York Life	12	270
Standard Oil	15	263
Commercial Cable	21	255

* Tower.

From the table it will be seen that the proposed structure will be considerably higher than even the Park Row Building, which heretofore has held the palm.

Architects Win Competition for Public Building.

Another award of a public building to architects selected after competition under the Tarsney law was made in Washington on January 17 by the Secretary of the Treasury. Eleven sets of drawings were offered in response to the advertisement calling for designs for a Post Office and Custom House building at Indianapolis.

A commission, consisting of H. Langford Warren of Harvard University, Edward B. Green of Buffalo, J. R. Marshall of Washington, James Knox Taylor, the Supervising Architect of the Treasury, and D. H. Burnham of Chicago, considered the plans, and having thrown out one because it was marked in a manner to distinguish it and because an effort was made to secure approval of it, they decided in favor of the design offered by Rankin & Kellogg of Philadelphia.

The new building will be 320 x 155 feet in dimensions, rectangular, with a long façade presenting a colonnade of 14 Ionic columns. The entrances are to be in flanking pavilions, and the design calls for groups of statuary as a part of the decorative scheme.

A plaster model of the New York Public Library, Astor, Lenox and Tilden foundations, has recently been placed on exhibition in the Governor's room at the City Hall, in this city. This library, as previously pointed out in these columns, is to occupy the site of the old reservoir at Fifth avenue, between Fortieth and Forty-second streets, and will cost when completed in the neighborhood of $3,000,000.

ACCORDING to the report of the State Educational Department 152 school buildings were erected in Minnesota the past year, making a total of 7303 in the State, with accommodations for 400,000 pupils.

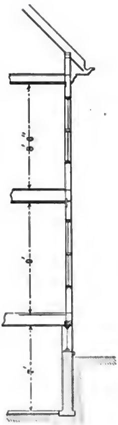
COLONIAL HOUSE AT ROSELLE, N. J.

WE have taken for the subject of our supplemental plate this month a dwelling house so built as to secure a square effect, with hip roof and dormers and somewhat of the "colonial" order in its external architectural treatment. The floor plans here presented show the manner in which the interior space has been utilized, the miscellaneous details indicate the construction and finish, while the half-tone plate, made from a photograph taken especially for the purpose, gives the reader an excellent idea of the building as it stands completed. The foundations are of hard brick, laid in cement mortar, and the outside of the walls is cemented from the bottom to the top. The bottom of the cellar is of concrete. The frame of the building has sills 4 x 6 inches laid flat, first and second story beams 2 x 10 inches, the third floor beams 2 x 8 inches; the main and porch roof rafters 2 x 6 inches, the hip and valley rafters 2 x 8 inches, doubled; the porch floor beams 2 x 10 inches, the studding 2 x 4 inches and all timbers around stairs and chimneys to be doubled and framed together in the usual way. Iron joist hangers are used throughout where timber is framed. All the floors and partitions are bridged and all partitions have sill and plate. The frame is covered with sheathing boards, on which is laid building paper. This in turn is covered with white cedar shingles, which from the water table to the belt course are stained green, while those from the belt course to the cornice are of a light brown color, the roof shingles being red cedar. All outside trim is painted white, thus giving that bold yet pleasing contrast indicated in the picture.

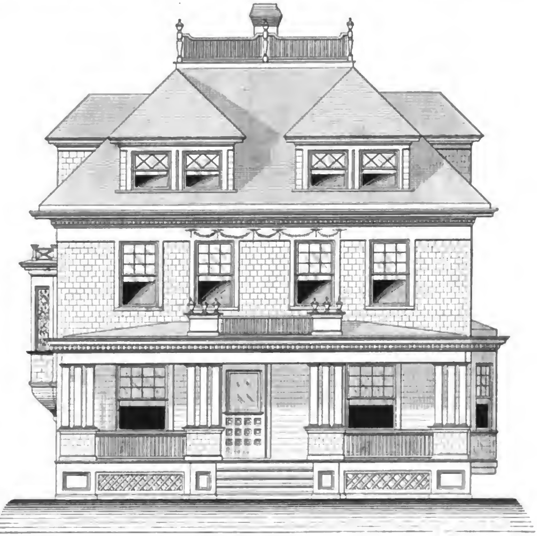
The belt course is built to intersect with the porch cornice and the shingles to spring out over it. The roof shingles are laid on 1 x 2 inch hemlock shingle lath and the valleys and gutters are lined with hemlock.

The veranda floor is of white pine, 1¼ inches thick, and joints leaded. The front elevation shows the piers under the porch as cased in forming molded panels, while the front steps are built between the paneled bulkheads, but in the course of construction all this was changed, as indicated in the picture constituting our supplemental plate. The festoons on the front elevation are formed of plastic composition, being fastened in place with nails.

All inside finish is of cypress, and the floors are double. The lower one is of rough hemlock and the top one of comb grained North Carolina pine, with double thick paper between.



Section



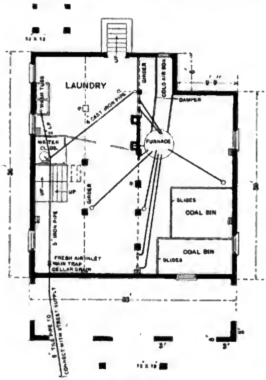
Front Elevation.—Scale, ⅛ Inch to the Foot.

Colonial House at Roselle, N. J.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

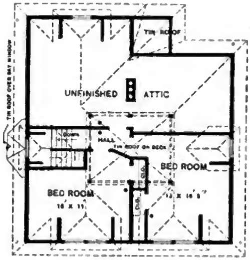
The window frames are made in the usual way, with pockets, pulleys, parting strips, 2-inch sills, sub-sills and 1¼ x 4½ inch outside casings, the tops of which are on a line with the bottom of the fascia boards. The door frames have oak sills and 1¼-inch jambs. All inside jambs are of cypress, ⅞-inch thick. The sash throughout the house are 1½ inches thick, glazed with double-thick glass, all sash being painted white in order to show off the small glass in the top sash and make them more prominent. All the inside doors are of cypress, those on the first floor having five cross panels and those on second and third floors four panels.

The openings between the parlor and hall and the hall and dining room are treated with paneled columns having molded base and plastic composition Ionic caps, which are stained and made to look like cypress. The grill between the columns, while not elaborate, takes away the heavy appearance and tends to give a finished effect. It will be noticed that the columns in the opening between the parlor and dining room are shorter, and rest on paneled pedestals which extend back far enough to allow the casings to lie on top of them. All windows in parlor, dining room and hall have panel backs under the stool, these being molded to match the doors. The are also paneled and have plastic composition caps, stained to match the cypress finish. The rails, balusters and newels are of ash.

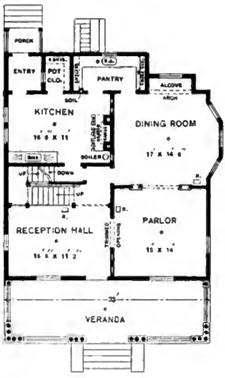
The pantry is fitted with china closet, cupboards and drawers, with a counter shelf, in which is a butler's sink. Cellar is partitioned off for laundry and has two washtubs, also servants' closet in cellar. The kitchen and bathroom is lined off on the white plaster to a hight of 4 feet 6 inches from floor, in imitation of tile, with ⅛-inch joints. The tile blocks are 4 x 6 inches and the joints show bonded. This tile work has a molded strip on top which intersects with the wall molding. The tile is treated with three coats of paint and a coat of cream enamel. All the plumbing work is open, and all exposed pipes in bathroom are nickel plated. There is in the bathroom a white porcelain lined tub, a marble



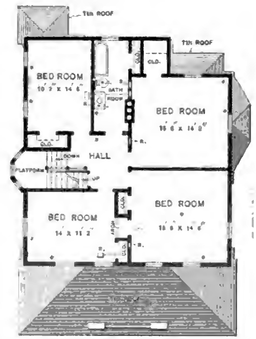
Foundation.



Attic with Outline of Roof Plan



First Floor.



Second Floor.

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

other windows throughout the house have stool, with mold and apron under. All the hardware throughout the house is bronzed metal, and all knobs are of oak, turned to oval shape. The trim throughout is treated with a cap, the wall mold running up to butt it. The stairs are built with cypress risers and strings and panel work, while the treads are comb grained Georgia pine. The hall is separated from the stairs by panel work and grill, the columns resting on high newels, which lavatory and embossed closet. All the wood work throughout the house is finished natural and has a coat of liquid filler and two coats of Flood & Conklin's "crystal" varnish, which gives wood work a very bright gloss, and then, being sand papered before it is filled, shows off the grain of the wood to advantage. The floors have a coat of filler and two coats of floor varnish. All walls throughout the house are treated with several shades of tinting. The house has an electric light system and is also piped for gas, the fixtures being of combination type.

The residence here illustrated is located on Third avenue, Roselle, N. J., and was erected for Charles Birdsall in accordance with drawings prepared by J. A. Oakley & Son, architects, of Elizabeth, N. J.

Church Ventilation.

Official inspection finds Chicago churches, says the *Chronicle*, uniformly defective in means of purifying the air. That germ diseases may be widely disseminated through places of assembly is a fact so well established that it is incumbent upon all ecclesiastical authorities to take note of it. In plague times prohibition of pilgrimages and dispersion of caravans has been the first indispensable to extirpation of a scourge. It is a pathetic commentary on the supposed advance of the building arts that in places of religious worship there should be uniform and complete lack of ventilating appliances other than doors and windows.

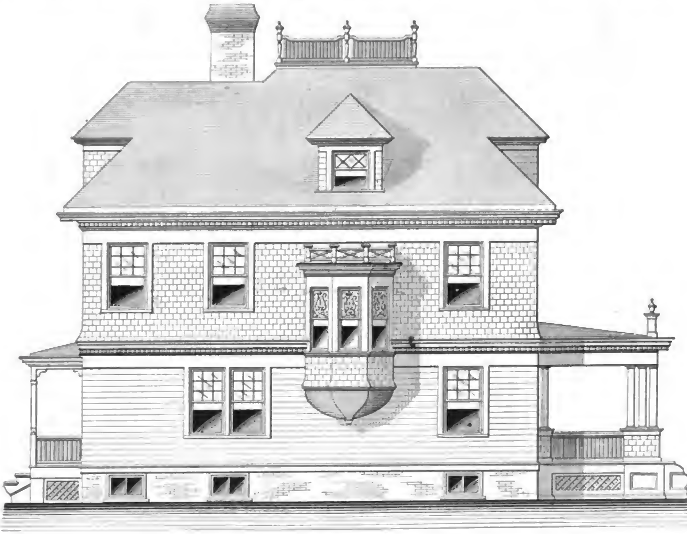
After a sexton has started furnace fires in a church he is expected, as a rule, to avoid waste of the heat thus expensively produced. Whether a congregation be rich or poor or composed of various categories of good fortune, it contributes reluctantly to the support of its church. Pastors are under the general stress to save money by not spending it, and no class of men are subjected to more anxiety as a rule than they in finding the revenue wherewith to maintain property intrusted to their care. They naturally but mistakenly object to opening doors and windows of places of religious meeting during the cold weather. People are always to be found to complain if a church be cold, others if it be warm. Pastor and sexton alike try to meet an average standard by starting the furnaces none too soon and sealing up the edifice for the day after combustion begins to raise the temperature.

For these reasons, for which neither sexton nor pastor should be held blameworthy, the air in most churches is noxious during winter.

Air is especially liable to be exhausted or corrupted in the most popular churches where more than one service is held in a day. A thousand people gathered together within walls anywhere will throw off enough animal heat to raise temperature, and, in many cases, will throw off unavoidable morbid germs caught up in the swirl of a town or developed in unsanitary homes. Ventilation of churches and schools ought to be deemed of paramount importance in a great city, where of necessity all manner of people are compelled to have closest bodily contact with every other maner of people, juvenile, adult and senile, bathed and unbathed.

This necessity is aptly illustrated in an incident which happened in a public school since the arrival of frost this year. A kindergarten teacher undertook to loosen the jacket of a boy in order that he might more comfortably participate in gymnastic exercises. "Please don't," gently protested the lad. "I'm sewed up for the winter."

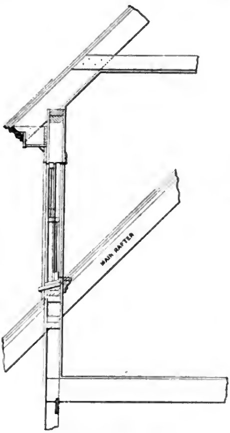
A complete change of air ought to be effected by throwing open all the windows and doors at least before and after each church service. Ventilation of school rooms should be accomplished with corresponding frequency and thoroughness.



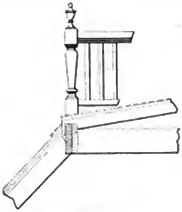
Colonial House at Roselle, N. J.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

THE Empire Building, which is now in process of erection in the city of Atlanta, Ga., will be 14 stories in hight and will require, it is stated, 33,000 square feet of marble mosaic and tiling.

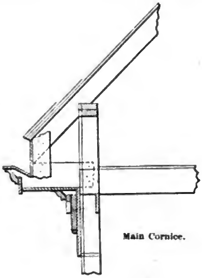
A RECENT consular report shows that there are 25 apprentices' schools in different parts of Japan, which by means of courses of study, extending from six months upward, are designed to prepare the pupils for work in various handicrafts.



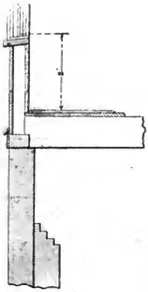
Detail of Dormer Cornice.



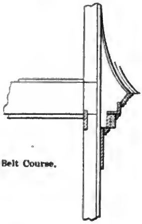
Detail of Deck Roof.



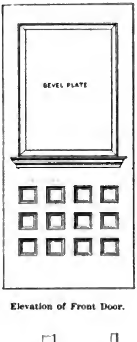
Main Cornice.



Water Table.

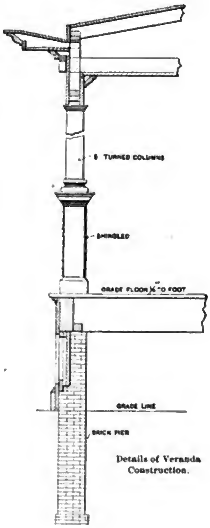


Belt Course.

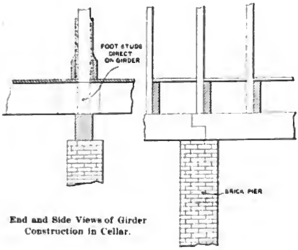


Elevation of Front Door.

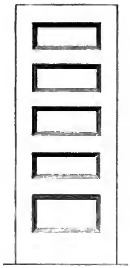
Section through Jamb of Partition Doors.—Scale, ½ Inch to the Foot.



Details of Veranda Construction.

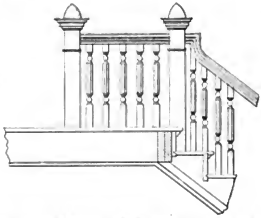


End and Side Views of Girder Construction in Cellar.

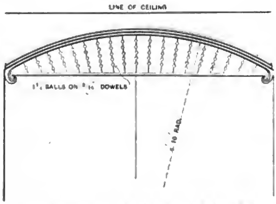


Style of Door Used on First Floor.

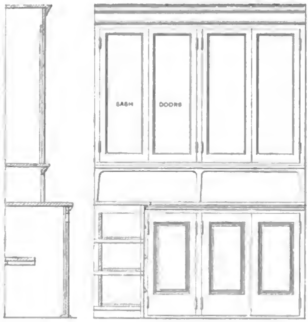
Miscellaneous Details of Colonial House at Roselle, N. J.—Scale, ⅜ Inch to the Foot.



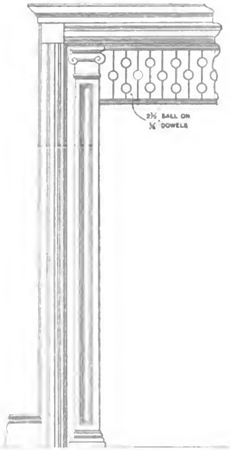
Detail of Stairs at Second Landing.—Scale, ⅜ Inch to the Foot.



Detail of Arch over Alcove in Dining Room.—Scale, ⅜ Inch to the Foot.

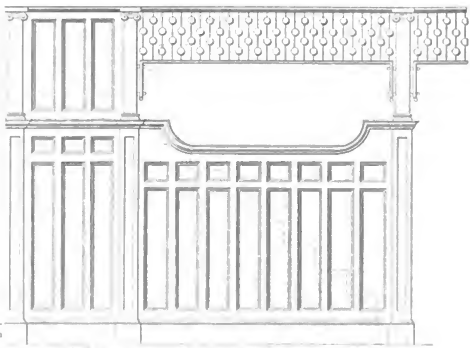


Section and Elevation of China Closet in Pantry.—Scale, ⅜ Inch to the Foot.



Detail of Trimmed Opening between Hall and Parlor.—Scale, ½ Inch to the Foot.

Section of Trimmed Opening between Parlor and Dining Room.—Scale, ½ Inch to the Foot.



Side Elevation of Staircase, Showing Panel Work and Grille in Hall.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Colonial House at Roselle, N. J.

THE SAW-TOOTH TYPE OF FACTORY.

A FORM of building which is growing in favor in many sections of the country for manufacturing purposes is known as the "saw-tooth factory," so called from the resemblance of its roof to the shape of the teeth of a saw. It is what may be termed a one-story building, which receives its light from the roof by the arrangement of a series of small glazed roofs shaped like saw teeth. The side of each saw-tooth roof, which is vertical or nearly so, is placed toward the north and contains the glass, so that it admits north light only all through the building. This is not especially new, as the same principle of roof construction was long ago used in England in weaving sheds, and has since been copied in this country and others for the same kind of buildings. The old saw tooth roof, however, was a very small and crude affair compared with the modern construction; it was usually of wood, with little or no ventilation, and adapted for little else than weaving. The modern saw-tooth roof is a development of the old wooden saw tooth, and is now built with light steel trusses, and well adapted to American conditions and climate for almost any kind of manufacturing business. In construction the roof consists of small iron trusses ranging from 20 to 30 feet span, each truss being made in the shape of a triangle and supported at each end by a small iron column. The short side of the triangle is vertical, or nearly so, and is filled with glass, facing the north; the other side of the triangle or roof truss being covered with plank or tile as a base for the finished roofing material. These triangular roof trusses extend over the entire building and form a roof the section of which resembles the shape of saw teeth so much that the building has received the name of the "saw-tooth building."

The light, then, comes through the vertical sides of each "saw-tooth" truss. The glass in the vertical side is made from 5 to 11 feet high, so that for every roof truss which covers a floor space from 20 to 30 feet wide there is a corresponding window in the roof above it that is from 5 to 11 feet high. By having the glass surface face the north the sunlight is excluded and only the pure white light from the north is admitted.

Floor Construction.

The floor of the building is constructed directly upon the ground, and all spaces under it are filled solid with cinders or concrete, so that there are no air spaces under the 3 inches of solid wood composing the top finish of the floor. Because of the great strength of the floor it is economical and usual to make the partitions of a "saw-tooth" building of fire clay tile, and rest them directly on the top of the floor. This provision cuts off the possibility of fire traveling from one department to another. The roof is the only part of the building that is not usually made absolutely fire proof. It is usually made of mill construction instead, which is the construction recognized by the fire underwriters as a "slow burning" one and next in fire resisting qualities to the fire clay tile. There is no reason, however, why the roof cannot always be made of fire proof materials, with wire glass in the skylights. Mill construction is commonly adopted because it is usually required to keep the expense of the building within the usual amount allowed for the ordinary factory.

Heating and Ventilation.

In discussing the heating and ventilation of a building of this type in the *Construction News*, architects Simmons & Fellows, who have made a careful study of the development of the "saw tooth" factory in its relation to American conditions and requirements, say:

With the "saw tooth" type of building it is possible to maintain a temperature of 70 degrees throughout winter and summer. This is accomplished by means of a combined heating and cooling apparatus; that is to say, the same apparatus which is used to heat the building in winter is also used to cool it in summer. The system used is the underground blast of heating and ventilating. This system may also be used for the ground floor of any building, and is applied to some manufacturing buildings very successfully. It is not claimed that it is exclusively adapted to the "saw tooth" building, but the claim is made that the "saw tooth" building adapts itself perfectly to the requirements of an ideal blast system of heating and ventilation. In the "saw tooth" building it is possible to build the heating ducts under the floor of brick and concrete and deliver the air through these from a central fan system to every part of the plant. The peculiar form of the roof and the ridge ventilators placed along the ridges of the "saw tooth" are means by which direct ventilation can be secured over the entire floor area. The natural tendency of the air in a "saw tooth" roof is to rise to the apex of each truss, and with a continuous ventilator at that point the air escapes to the outside of the building and causes a gentle current of air from the floor to ceiling. In summer the action of the sun on the roof warms the air near the ceiling, and as the ceiling is on a slant and as there is an opening at the highest point of each roof, the air is set in motion and produces a current upward over the entire building; the tendency of this current is to draw new air from the doors and windows of the side walls, if no other supply of air is furnished. The heating ducts under the floor, however, supply this demand, and cold air in summer and warm air in winter.

Velocity of Air Currents.

In addition to this natural tendency of an upward current of air in the building, the heating system delivers the air into the building with a velocity which puts it under pressure, and all the more accelerates this natural upward current in the building. In fact, the heating apparatus is so calculated and constructed as to change the air in the entire building every 15 to 20 minutes by forcing the air out of the ventilators. The apparatus is made so that any desired temperature may be maintained throughout the year. The steam pipes or coils which heat the air in winter are so arranged that cold water may be run through them in summer. The large fans in connection with the heating apparatus suck the fresh air over the heating or cooling pipes, as the case may be, and blow it along under the floor in the brick ducts to all parts of the building. Vertical branches are taken off of the underground ducts to deliver the air into the various rooms and departments. The result of this system is that the building is continually filled anew with fresh air warmed or cooled to the desired temperature.

The cost of this system of blast heating and ventilation is also very much cheaper to install and operate than the old system of direct radiation from steam coils or radiators distributed throughout the building.

There are two great benefits to be derived from a system of perfect heating and ventilating. The first is the improved health of the employees, and second is less liability to damage in material aud machinery.

In this connection it might also be mentioned that the well equipped modern plant does not stop here in its provision for the health and welfare of its employees. In addition to perfect heat, light and ventilation the complete plant will also have wash basins provided with a stream of fresh running water for each employee, individual ventilated lockers for lunch boxes and coats, lunchrooms equipped to heat coffee and warm food, hospital rooms for the sick and injured, and perfect sanitary plumbing convenient for every department of the plant. All of these features have also been added at a moderate cost in the principal "saw tooth" plants recently built.

PRESIDENT GOMPERS of the American Federation of Labor, in his annual report presented recently, points out that although a considerable number of strikes have occurred in this country during the year, they were not of a defensive character, but were rather for higher wages aud a shorter workday. During the year 688 strikes were reported, involving 213,190 persons. Of this number 455 were successful, and 106 unsuccessful; 74 were compromised, and 53 are still pending. Of the workers affected by the strikes 217,493 persons are said to have been directly benefited in the result, while 11,257 were involved in loss.

THE SCIENCE OF HANDRAILING.

By C. H. Fox.

WE present in Figs. 4 and 5a another example of the intersection of prisms and cylinders, the inclination of the oblique plane having been taken equal over the tangents—that is, the rise of the wreath piece is made equal over each tangent. This is one of the simplest of the problems met with in practical handrailing, for the reason that the developed falling line is a perfectly straight one. In problems other than this the falling line is a curved one.

In order to obtain a representation of the solid the drawing must be again made upon cardboard, then cutting and folding this as directed, the student may obtain not only a correct representation of the solid, of the given problem, but also a cardboard representation similar to that which may be made in accordance with the directions given by teachers of the Tangent System School for the problem in question.

We will then give the directions for forming another representation of the same problem, only in this we shall explain the method as taught by the writer by means of which the projection may be obtained of the oblique surfaces which belong to the section planes of the face and joint surfaces. The student, having then the two representations before him, will be in a position to form an opinion as to which is the better one as a means of illustration and instruction in enabling the learner to understand the several intricate points connected with the science of handrailing.

Let us suppose a quadrant of a cylinder, as B-5-D of Fig. 4, to be inclosed in a square based prism of which A-B-C-D is the plan of its base, and the prism to be cut by a plane whose vertical, G-J, and horizontal traces, J-B, are known. Let it be required to form a representation of the solid of the prism, showing the projection of the intersection of the oblique plane with the surface of the cylinder. In Fig. 4 draw the square and produce the sides in either direction, then with A as center and the length of one of the sides, as A-B, as the radius, draw the curve of the plan of the cylinder. Now set off the desired hight of the prism, as shown in D-G, and divide it in F' into two equal parts. Then parallel with D-C draw F'-F'''; join G-F'''. Now, with C as center, rotate F''' into F,, and joining F,-B, we may obtain the pitch of the oblique plane over the tangents B-C-D of the plan. Now repeat the operation at the opposite sides of the square. To find the true shape of the section proceed as follows: First, on the plan draw the diagonal A-C; if the drawing is correct the student will find, if he produces the pitch line G-F''' to meet the side D-C produced in J, and then joins J with B, the line A-C just drawn is parallel with the horizontal trace J-B. Understanding this, he can with G and F''' of the pitch as centers, and the length G-F''' as radius, draw arcs in H-I. Then with F''' as center and the length A-C of the ordinate of the plan as the radius, cut the arc first drawn in H. Then with H as center and G-F''' again as radius cut the arc in I. Join G-H-I-F''' and we may obtain the section of the prism.

To find the curve proceed as follows: First, on the plan draw the diagonal D-B, then divide the curve as shown in D-2-5, &c., into any number of parts, and through each point draw lines, as 3-2-3', &c., parallel with A-C. Then parallel with D-G and C-F, draw 3,-3 and 8,-8. Now at the section plane draw the diagonals

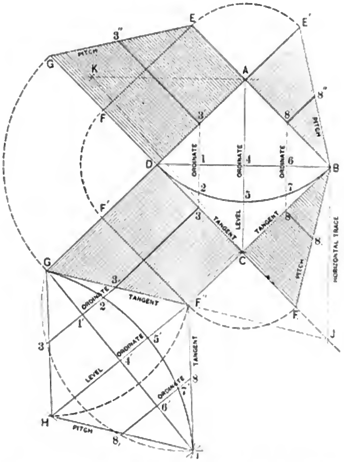


Fig. 4.—Diagrams Illustrating Another Example of the Intersection of Prisms and Cylinders.

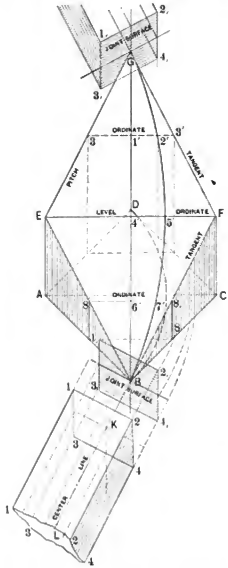


Fig. 5a.—Diagrams Showing an Oblique Projection of the Solid.

The Science of Handrailing.

F'''-H and G-I; set off F'''-8 equal with F,-S,, of the pitch line; and from the points given in 3,-8 draw lines parallel with F'''-H. Now set off 1'-2', 4'-5', &c., respectively equal to the length of the corersponding points of the ordinates of the plan, and place pins in the points given in G-2'-5', &c. Bend a flexible strip around them and trace the elliptical curve, which will complete the drawing. Now take a sharp knife and cut clear through the board at the outline of the drawing; then at the lines A-D, D-C, C-B, B-A, at the base; and at the pitch line G-F''' cut about half through the board. This done, turn up the four sides, leaving the lines on the exterior; then fold over the section plane into its proper position. The student may now find, if the drawing has been made correctly, that the sides of the section plane fall exactly over the sides of the prism, and on trial he may find the curve of the section plane to be perpendicular over the curve of the plan.

In Fig. 5*a* is shown an oblique projection of the solid. We shall have occasion in explanations which follow to call attention to this diagram. In relation to the application of this example to the subject matter of these chapters, we may state the curve line of the plan may be taken to represent the center line of a rail, which has a uniform rise over its plan—that is, the rail in covering say that portion B-5 of the plan will rise a vertical hight equal with C-F,, the rail in covering that portion of the plan 5-D equal with B-5, will again rise a vertical hight F'-G, equal with the rise, C-F, over the lower half of the curve of the plan.

(To be continued.)

COMPULSORY ARBITRATION OF LABOR DISPUTES.

SO much has recently been published about compulsory arbitration of labor disputes that the address of Hugh H. Lusk, ex-member of Parliament of New Zealand, before the Arbitration and Conciliation Conference held at Chicago in December is of unusual interest and importance. Among other things Mr. Lusk said:

The main features of the law now in force are:

1. That it rests upon the voluntary basis of associations, so that no individual, whether workman or employer, can invoke the assistance of the law unless in his capacity as representing an organization duly registered under the provisions of the law. Thus trades unions are made in New Zealand the basis of compulsory arbitration.

2. That before compulsion is resorted to every effort must be made to bring about an agreement by conciliation applied by a board equally representant through freely elected delegates, workers and employers.

3. That, failing an agreement through the agency of the Conciliation Board, either party may, but neither is compelled to, appeal to the Arbitration Court for a final decision.

4. That an appeal to the court acts as a stay of all other proceedings whatsoever in dispute—that is to say, that no employer shall close his works or dismiss his workers, and no workers shall strike against the employers, in connection with the matters in dispute, until the question has been dealt with by the court, on pain of being treated as being in contempt, and subject to fine and imprisonment.

5. That the Arbitration Court itself shall consist of three members, one representing the workers and one the employers' associations, while the third, and president of the court, shall be one of the judges of the highest court in the country.

There are many other provisions, providing for detail of working, such as the time limit within which a case must be heard and dealt with by the court; the publicity of all proceedings in the court; the appointment of skilled assessors in each case; and the powers of the court to compel the production of all such evidnce as is considers necessary—or, failing such production, the power to assume that it is wholly adverse to the side refusing or delaying its production. All these, however, as well as the provisions for reducing the cost of appeal to the court to a nominal sum, and for reducing the cost of procedure by excluding lawyers from either party, may be looked on as secondary to the main principles of the system.

The trial, in externals at least, is less formal than one in the Supreme Court; yet the powers of the Arbitration Court are in some respects even greater. It is not bound by the same hard and fast rules of evidence as prevail in the Supreme Court; and it is specially authorized to exercise a discretionary power not given to the more strictly legal court in several directions. The object of this latitude of procedure is to enable the court to arrive at a conclusion not only just but politic in many cases of dispute, where strict justice might become oppressive to one or other of the parties, or might fail to protect the public interests involved in the dispute. The court, indeed, is emphatically one of equity in its broad rather than its legal sense; and thus it has been found not only wise, but necessary, to vest large discretionary powers in its judges.

One or two principles which lie at the very foundation of the system cannot be ignored in considering its applicability to any other country than that in which it began. The most important of these is the principle that the interests of every class in a community are regarded by the political reformers of New Zealand as secondary to those of the people as a whole. It is no answer at all, in New Zealand, to a complaint that manufacturers are growing very rich while workmen continue poor, that it is the inevitable result of inequalities of position in the social scale which give one man capital and training in business and many men only their hands and natural intelligence. The reply there is that it is not good for the people at large that such disparities should be encouraged, and therefore, if the capitalist is making too much out of his business in proportion to the workers' share, the public thinks itself not only justified but bound to step in and assist in remedying the evil.

I have studied with deep interest for several years, and with a good deal of misgiving as to the future, many of the social and industrial conditions of this great country. I have admired, with no stinted admiration, its enterprise and energy, and the marvelous results which these have secured in so short a period. What I have not admired has been the social and political evils that seem to me to be proceeding with a growth that is quite as vigorous as the development of the country in other and more worthy directions. The root of these evils seems to me to be found in the rapidly widening gulf between the classes of the rich and the poor—or, in other words, between the capitalist and the workman. There was a time, apparently not so long ago, when the line that divided these classes was one which was not hard to pass, and thousands of the capitalists of to-day have undoubtedly risen from the ranks of the workers. Conditions, as you must all know, have changed, and are changing still more; and if things go on as they are now going, the time cannot be distant when the line will be as hard to pass in America as it has long been in Europe. It appears to me that few greater misfortunes could befall this land and its people than this.

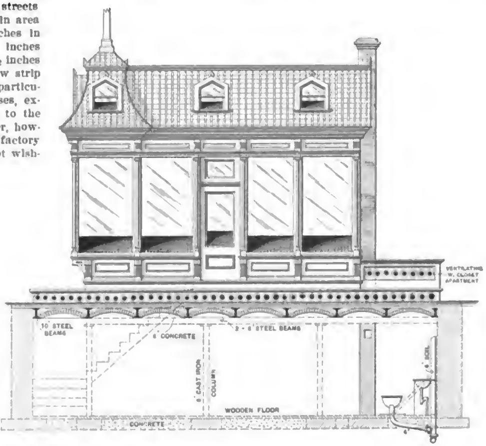
THE granite wall of the new State Reformatory Administration Building, in course of construction at St. Cloud, Minn., which was recently discovered to be some inches out of alignment with the other buildings, was straightened without the labor and expense of tearing it down and rebuilding it, and without injury to the masonry. Fifty jack screws were secured, and by means of these and the inmate labor the builder moved the wall 3 inches at one end and 20 inches at the other without damaging it.

A NOVEL WORKSHOP AND DWELLING.

Circumstances and local conditions often render unique many of the problems in building construction which architects are called upon to solve, and doubtless a description of some of them would make interesting reading to a large class engaged in the building business. Such accounts would likely show peculiar phases of design and construction, tell how the difficulties encountered were overcome, and at the same time afford the builder suggestions which may prove valuable in the future. A case involving the solution of a rather curious problem, but one that can hardly be fully appreciated except by those living in communities where ground space commands a high premium, has recently been brought to our notice. Through the widening of the streets a corner lot was so reduced in area as to leave it 93 feet 6 inches in length, but only 4 feet 1½ inches deep at one end and 2 feet 4½ inches at the other end. This narrow strip at first appeared to be of no particular value for building purposes, except perhaps as an addition to the adjacent property. The owner, however, meeting with no satisfactory offer for his property, and not wishing to remove to another section of the city, owing to the fact that he had established his business at that particular corner, before the streets were widened, decided to build upon a portion of the strip a workshop and dwelling, provided he could find an architect to carry out his plan.

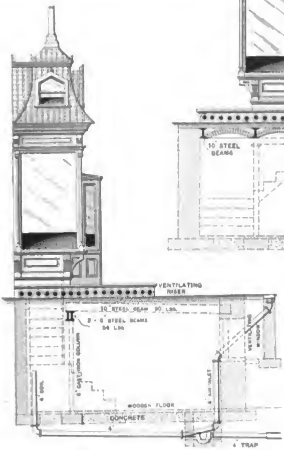
This was the problem which was presented to Louis Falk, architect and construction superintendent, of 2785 Third avenue, New York city, who describes as follows how he did the work:

It was necessary, by reason of the widening of the streets, to place the building to the new line, where the depth of the lot was only 3 feet 6½ inches. At first I thought it was impossible to give satisfaction to the owner, but the drawings which I send show how I succeeded in giving him a dry underground workshop and living rooms. The foundation walls are 20 inches thick, built of stone and with every stone grouted in cement. The rear or west wall is built of brick 12 and 8 inches thick, laid in Portland cement mortar. It required a special permit for a modification of the present building law to allow me to build the stair break 8 inches instead of 12 inches, as the law requires. This was done in order to make the stairs as wide as possible, and give access to the vault. The outside and inside of the stone walls were treated from the bottom of the foundation to the top with cement, to a depth of ½ inch, and then cement was washed over the entire surface. The floor was concreted in the usual manner and a wooden floor placed on top of it. The inside walls were furred off with 1 x 2 furring strips placed 16 inches on centers and the regular three-coat plaster finish.



Front Elevation with Section through Rooms Below Grade.—Scale, ⅛ Inch to the Foot.

A Novel Dwelling and Workshop.—Louis Falk, Architect, Borough of Bronx, New York City.



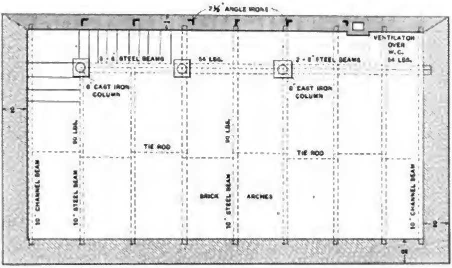
End Elevation on 161st Street.—Scale, ⅛ Inch to the Foot.

The frame above the curb line is constructed of 2½ inch angle iron framed, braced and anchored to the foundation in such a manner that is is impossible to blow over. The west or rear wall is only 3½ inches thick including the studding, siding and inside sheathing. The floor above the store is reached by a movable ladder, which when not in use is folded into the show window. A folding bed is provided similar to the beds used in a Pullman car.

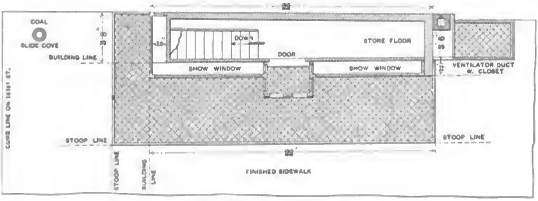
Light and ventilation are obtained through the vault light, and also through the movable risers in the stoop and window near the curb, as shown in the sectional view. The roof over the vault—that is, the workshop and living rooms—is constructed of iron I-beams with brick arches, with concrete over them for the sidewalk finish. The work cost when completed $3000, which includes the vault space.

Plaster and Good Accoustics.

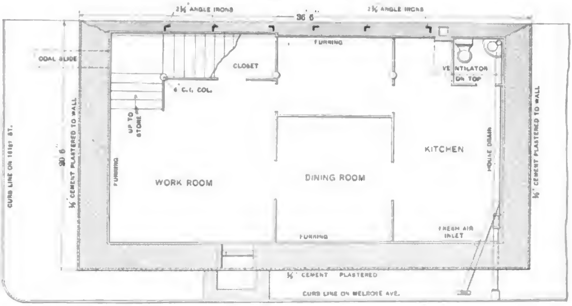
Prof. Charles Nussbaum calls attention to the fact that in cases where good acoustics are required immediately on completion of the room the choice of the ceiling and wall plaster is of not a little importance. The fully smoothed, so as to avoid all roughness and irregularities. It is found that plaster of paris made of gypsum, burnt to white heat and prepared without sand, is specially adapted for this purpose. The strongly elastic, delicate surface of this plastering has a peculiar quality of reflecting the sound waves and thus producing a soft timbre. For the transmission of heat this plaster is also highly recommended, but in the matter of drying both it and the masonry underneath it more time must be allowed than for plaster of mixtures of lime and sand, or lime, cement and sand. On the other hand, paint or coverings of veneer, fabrics, wall paper, &c., can be applied immediately after the drying, while the alkalis of the lime, and especially those of the cements, often cause great mischief through the insistent dampness of the plaster. This may be brought about by the formation of sweat, even where all other causes of dampness are carefully provided against.



Plan Showing Iron Work Below Grade.



Plan of Story Above Grade.



Foundation Plan, Showing Rooms Under Ground

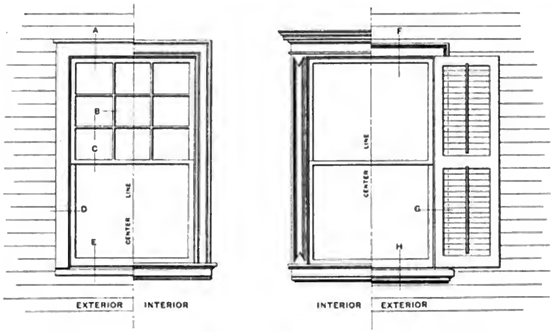
A Novel Dwelling and Workshop.—Floor Plans.—Scale, 1/8 Inch to the Foot.

desirability of care in this matter is even greater where a soft tone color is desired. This is the reason why in concert halls admixtures of lime and sand or cement should not be used as a plastering. Only a mortar of plaster of paris will give the smoothness and richness of tone desired. Sand should not be added to the upper layers of this mortar, and the surface should be care-

Reports from various parts of the country show that the recent drop in the price of structural steel and of other materials that enter into building has imparted a considerable stimulus to building operations. In many cases plans which were checked early in the year by the high prices then ruling have been put into action and the outlook among builders generally is much more satisfactory than it was a month or two ago.

DOUBLE HUNG WINDOWS IN FRAME WALLS.

LETTERS received from various sources during the past year indicate a desire on the part of the writers for some articles illustrating details of building construction which will tend to aid them in reading architects' drawings with which they are not altogether familiar. More or less difficulty seems to be encountered by many mechanics in properly interpreting just what is meant by the blue print or tracing from which, it may be, they are expected to work, and it is with a view to affording such workmen valuable suggestions along this line that we present herewith some details, carefully executed, showing, for example, the construction of double hung windows in frame walls. It will be observed that the work is carried out in such a way as to clearly indicate the various parts of the window frame and sash, and that where the name of anything pertaining to the work is not obvious at a glance, it bears a figure with an arrow, which is fully explained in the accompanying text. We present this matter as the first of a short series of articles which we trust will by careful study aid those who now find difficulty in understanding architects' drawings.



Flevations of Windows from which Sections are Taken.—Scale, ¾ Inch to the Foot.

Double Hung Windows in Frame Walls.

The details here shown are all designed for frame walls using 4-inch studs, with which no sash thicker than 1½ inches can well be used. The sizes of the windows and the design of trim, outside architrave and other molded work in connection with same are entirely optional, but the thickness of outside architrave should always be at least 1⅛ inches, or better, 1⅜ inches, to receive clapboards or shingles.

The lines marked alphabetically upon the elevations on this page indicate the cut from which the various sections are taken. The sections A to E show a simple method of construction, which, however, has not as many good features as those shown in the other sections; but it is less expensive and well adapted for use in cheap work.

Section A is taken through the head of the window and could be improved upon by setting grounds upon the studs, to which to nail inside finish. The tops of all windows on exterior are most always exposed to the weather and, as indicated in this case, should be well flashed with tin.

Section B shows the construction of sash bars and section C that of meeting rails.

Section D is taken through the jamb of the window and with the addition of either a ground or a ground casing is also used in medium grade work. If this casing is omitted, as shown in the drawing, the trim must be wide enough to get a nailing into the stud.

Section E is taken through the sill of the window and the method of forming the stool, though simple, may also be used in the best grade work.

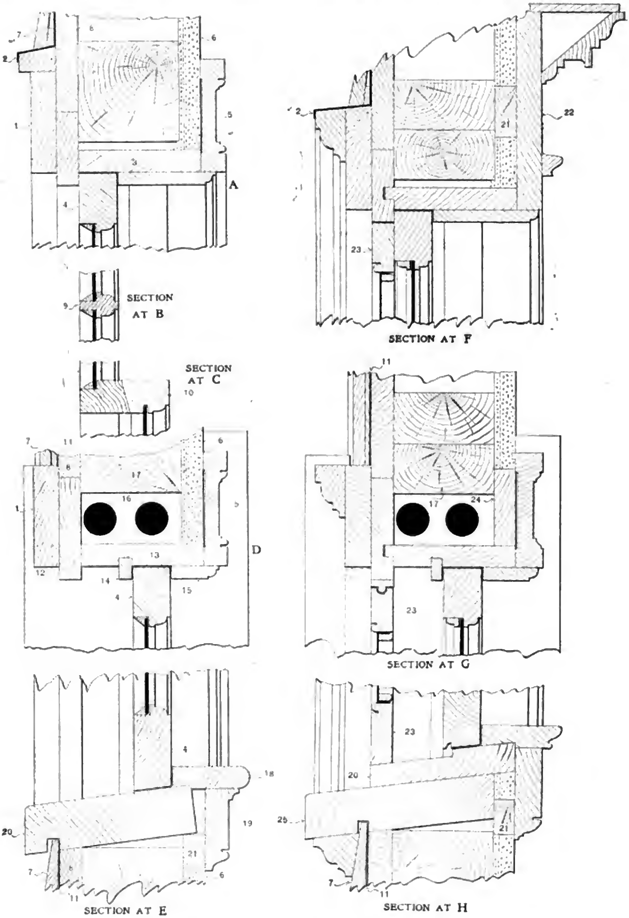
The construction of sections F, G and H is much better than that of the preceding examples and is used in the best grade of work. The flashing at heads of windows in this grade is either copper or sheet lead. A mosquito screen, though not shown in the elevations, is here introduced, and instead of putty and tacks to hold the glass in position, as shown in the preceding drawings, a bead is substituted. Also instead of a single sill, as is used in cheaper work, a sill and sub-sill are provided, same receiving a coat of white lead at joint before being put together. The water nose at bottom rail of sash prevents water from entering under same.

The dotted lines in section G show how blinds might be built outside of the screen; though, owing to the space being so narrow, it would be necessary to cut the screen out a little bit at the bottom to allow for blind catches when blinds are closed. This, however, is not as good as the arrangement shown in the section on page 43, which is especially designed to allow the use of both mosquito screen and blinds upon the same window, outside of the sash, which is very satisfactory. The casing is set outside of the sheathing, thereby giving enough extra width to the pulley stile to allow ample space for blind fixtures.

The use of a strip dividing the weight box, as shown in this detail, makes a more thorough job.

The terms applied to the various members, indicated by the figures on the drawings, are as follows: 1, outside architrave; 2, flashing; 3, yoke; 4, sash; 5, inside architrave or trim; 6, lath and plaster; 7, clapboards or shingles; 8, sheathing; 9, sash bar; 10, meeting rails; 11, sheathing paper; 12, outside casing; 13, pulley stile; 14, parting strip; 15, stop bead; 16, sash weights; 17, stud (one 4 x 4 inches or two 2 x 4 inches); 18, stool; 19, apron; 20, sill; 21, ground; 22, cap of trim; 23, mosquito screen; 24, ground casing; 25, sub-sill; 26, outside blind.

A COMPANY, who were organized last April, have just taken the first steps toward carrying out a plan for the establishment of a model factory town, designed for the social and industrial betterment of working people. With this object, the town of Belle Meade, N. J., is now in process of erection. A plant for the manufacture of separate and will stand in a plot of ground large enough to provide a flower garden in front and a vegetable garden in the rear. The company plan to erect in the spring a large building for the use of the community, containing



Vertical and Horizontal Sections Taken at Points Indicated on the Elevations.—Scale, 3 Inches to the Foot.

Double Hung Windows in Frame Walls.

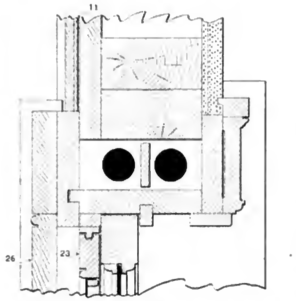
candles has already been completed and arrangements have been made for the addition of other industries in the early spring. Operations have also begun on the erection of homes for the workers. Every house will be a library, public baths, public laundry and hall and meeting places for societies and lodges. Drs. Josiah Strong and W. H. Tolman of the League for Social Service, New York, have entire charge of the enterprise.

Attic Space for Sleeping Rooms.

The tendency to make use of a portion at least of the attic space in dwellings of the present day for sleeping rooms has developed some adverse criticism, which a writer in the *American Contractor* outlines as follows:

To fill all requirements the modern dwelling must combine elegance in the largest attainable measure, cost being taken into account, with practical utility. In the plain residences of generations past the latter of these considerations was given the foremost place, symmetry and architectural effects being of secondary importance. At present these conditions have largely been reversed, style and attractiveness being the prime object aimed at, variety, as a rule, being considered before health and solid comfort. While elegance of design and beauty of construction are of great importance, the ultimate end of a dwelling—a healthful, comfortable and happy home—should not be lost sight of or sacrificed to the almost universal desire to make a fine appearance.

Sloping roofs of many kinds and designs are decidedly artistic and have become quite the vogue, even in the moderately priced and cheap class of houses. The Chicago *American* recently awarded a prize in a public competition to a lady for a design falling under this general class. Without criticising the finding of the committee of architects that made the award, the instance may be referred to as illustrating the tendency to encourage art at the expense of utility. People who occupy a house costing $1500, the supposed value of the structure in question, are seldom in a financial condition to warrant the leaving of a considerable portion of it uninhabited, yet rooms inclosed between sloping roofs are scarcely fit for occupancy during the heated months of the year, as he who has attempted to sleep in such apartments in July and August has clearly and definitely learned.



Horizontal Section through Frame, showing Construction well Adapted for Using Mosquito Screen and Blinds upon Same Window Outside of the Sash.—Scale, 3 Inches to the Foot.

Double Hung Windows in Frame Walls

On general principles, I regard this form of construction as a mistake, particularly in dwellings designed for the middle and poorer classes. There is small excuse for a form of construction that entails lack of sleep and other forms of discomfort during the heated term. The difference in the cost is trifling, almost insignificant, and ought not to cut a figure. Rooms between sloping roofs are always uncomfortably warm, frequently stifling in the summer season, and the architect knows no way of practically overcoming the difficulty.

Sometimes there is reason in this style of construction. By building the walls above the first story a little higher, the expense of which is trifling, a storage space can be provided, which later on can be finished into bedrooms and made, in a pinch, to supply the demands of a growing family. On general principles, however, I do not look with favor on this form of construction.

As a matter of fact, these superheated chambers are assigned to the servants, if the family employs any, and to children. This is decidedly wrong; people who work hard and growing children, particularly, require sleep of a character that cannot be secured in a room against the very ceiling of which, almost, the sun has been mercilessly beating during the long hours of a summer's day.

Considerations of humanity, if not of self interest, ought to weigh with those who are contemplating the building of a home and provide, without any considerable increase of cost, rooms comparatively free from the effects of the sun and susceptible of proper ventilation. Attic apartments are not only excessively warm in summer, but are extremely cold in winter. Thus, to a certain picturesqueness, real or supposed, many people deliberately sacrifice comfort and health and detract at the same time from the selling qualities of their dwelling. The rich and fanciful may indulge in architectural effects—if they provide their servants with proper quarters—but persons of moderate means can scarcely afford to sacrifice to them the comfort and happiness of their households.

Working Drawings of the Ancients.

Anything resembling the working drawing of modern times is not to be discovered, says an English architectural exchange. The archives of Durham Cathedral have been carefully searched for architectural plans, but without success. A manuscript commentary upon the Prophet Ezekiel, belonging to the Dean and Chapter of Durham, written apparently in the eleventh century, contains some curious pen and ink delineations in the Norman style of Ezekiel's temple, such as ground plans, elevations, &c., which prove the architectural skill of the commentator and the fact that it was no unusual thing to commit to parchment illustrations of this nature. "Patterns in paper," "portraictures," "patterns in timber," are referred to in the contract for the Beauchamp Chapel at Warwick in 1439; but during the earlier centuries of our national architecture it is likely that models in wood, or drawings upon wooden tablets, were in general adopted as specifications by the contracting parties and referred to during the progress of the work. Admitting this to have been the case, length of time and the nature of the material may account for the present non-existence of records which would have been so interesting.

A mutilated figure in stone, some years ago removed from a niche or housing on the tower of Durham Cathedral, holds in its hands a church, carved in the same material upon a small scale, and of the Norman period. This figure may either represent the bishop who planned the work, or the mason who carried it into execution, but in either case we have here a proof that our ancestors practiced the art of modeling upon a small scale, the point for which we are contending. Again, what is still more important to our object, there is in Worcester Cathedral, according to Carter, in the spandrel of an arch, a representation in stone of an architect presenting the design of a building to a superior personage, who is examining it with attention. Fully agreeing with Carter as to the general purport of this valuable memorial, his explanation overlooks an important fact. The drawing on tablets is in the hands of an ecclesiastic, but instead of having just received it for his approbation from the builder who is sitting near him, we believe him, after having designed it himself—for it could be easily proved that our early architects were in general ecclesiastics—to be in the act of proposing it to the builder as the pattern to be imitated in the contemplated work. At all events, the drawing is on tablets—another proof of our general theory that wood or some such material was preferred to parchment.

CORRESPONDENCE.

Finding Down Bevels of Purlins on Hip Roofs.

From L. G. K., *Kansas City, Mo.*—In the January number of *Carpentry and Building* "Learner" of Paterson, N. J., asks how to obtain the down bevel of a purlin running between hips and setting square with the pitch of the roof. In Fig. 1 of the sketches which I inclose is shown the manner of finding cuts for purlins in rectangular roofs of equal pitch. In order to comply with "Learner's" request, the side A B of the purlin is placed square with the pitch of the roof, but this method may be applied to purlins with their sides placed at any required angle. The object is to be able to cut the ends of the purlins so that they will fit a vertical plane, regardless of the pitch of the roof, or whether the purlin is to fit against the hip or valley, or against the beveled end of another purlin.

Referring to the drawing, the lines A B and B M must be drawn square with each other, and the purlins must be square cornered. Draw the line A B at the required pitch of the face side of the purlin, and draw B M square from A B. Now through B draw a vertical line, as B D, and draw A D square with B D.

To lay off the bevels proceed as follows: Draw A F square from A B. Take A D as a radius and draw the arc D F. Now draw B F and the angle at F gives the bevel for the face side of A B. The next step is to take B D for a radius and draw the arc D M. Draw A M, and the angle at M will give the cut for the miter on the side B M.

To find the figures on the steel square to lay off the bevels proceed as follows: The four lines, A B, B M, B D and A D, are all that will be required. Take A B on the blade and A D on the tongue and use the bevel of the tongue for the face side A B. Now take A B on the blade and B D on the tongue and use the bevel of the tongue for the miter of the side B M.

In Fig. 2 is shown the same method applied to a purlin having its top side placed at an angle to the pitch of the roof. "Learner" will observe that this method is correct only when the building is square cornered and the roof is of equal pitch.

From G. L. S., *Temple, Ind.*—Replying to "Learner," Paterson, N. J., relative to cutting purlins against hips where the former set square with the roof, I wish to again call attention to the necessity in such problems of constructing or figuring the inverted imaginary roof below the plate. Very few mechanics are using this method of framing, principally because most of our cornices are what are known as "box" cornices—that is, the planceer sets level and the fascia and crown mold perpendicular to the plates, &c. In the construction of roofs of this

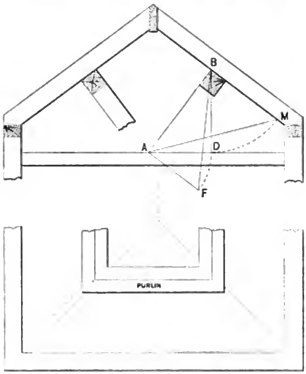


Fig. 1.—Plan and Elevation, Showing Manner of Finding Cuts for Purlins in Rectangular Roofs of Equal Pitch.

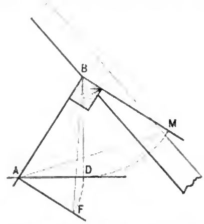


Fig. 2.—Purlin Having its Top Side Placed at an Angle to Pitch of Roof.

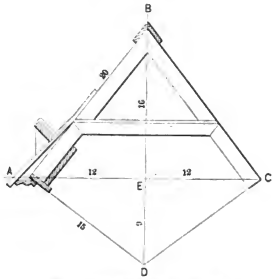


Fig. 3.—Sketch Submitted by "G. L. S."

Finding Down Bevels of Purlins on Hip Roofs

kind but little use is made of the problem under consideration. With the raking cornices, however, the conditions are quite different, and the mechanic who is reasonably proficient in the former may be, and frequently is, very weak in the latter.

As these roofs are becoming very popular through the writings of architects in the South and West, it becomes important that the young chip, as well as many of the older ones, should understand the fundamental principles of their construction. Monckton, Gould, Bell, Hodgson, Hicks and many other writers have passed this subject by and gone directly into descriptive geometry to develop these cuts and lay out these angles. All of these lines, angles, points, &c., become very confusing to the average mechanic, and the writer, after considerable experience, has adopted the method illustrated in Fig. 3, preferring to use the steel square in the execution of such work.

From an inspection of the sketch it will be seen that the purlin here spoken of occupies the same relative position that the fascia board does when the end of the rafter is sawn square, and is therefore identical with the problem demonstrated by the writer in the issue of the paper for September, page 232. By an extension of the faces of the purlin or fascia an inverted roof or hopper is formed below the plate. Now all angular surfaces and bevels found in the surface of this roof are marked out with figures taken from the roof, while all the angles or bevels to be made on surfaces in the imaginary roofs must be made by taking corresponding figures from that roof; thus the top edge of this purlin is beveled by taking the length of the common rafter and run of same, while the side or broad face of the purlin is marked by taking the length of the common rafter of the imaginary roof and the run of same.

It will be seen from the sketch that not only is the purlin thus cut, but the planceer, fascia, gutter board, saddle boards and sheathing were broken over the hips and in the valleys, as well as the hopper work, and last, but by no means least, the cuts on side and top of miter box for cutting crown mold for buildings of this character. If "Learner" finds any difficulty in figuring the rise of this imaginary roof, he can make his drawing accurate and scale the same, which will give him results close enough for all practical purposes. To be sure, he must take into consideration that his timber must be straight and out of wind and the building absolutely square, conditions which seldom ever prevail; hence he must not be surprised if he has to use the block plane just a bit.

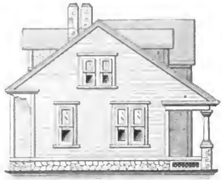
I would call attention to the fact that as "Learner" gave no pitch nor figures in his problem, I have assumed the same figures as employed in my former problem, which gives two-thirds pitch. The width of building is 24 feet, the rise of roof 16 feet and the rise of imaginary roof 9 feet. From the top cut of purlin use 20 x 12 and side cut of purlin 15 x 12; cut by 12.

From O. L. W., *Dallas, Texas.*—If "Learner" of Paterson, N. J., will use the length of the common rafter and its rise on his square, the rise will give the down bevel for the purlin, and by using the run in place of the rise he will have the top bevel. This applies only where the hips make angles of 45 degrees with the plate. A rule that would be applicable in all cases is as follows: Take the length of the common rafter and its distance from the hip, measuring on the plate line for the top bevel, and for the down bevel use the same distance on plate line, and the quotient obtained by multiplying the length of the common rafter by its run and divided by its rise. This last is simply the length of a rafter having the same run and the same pitch as the face of the purlin, and may be obtained by making a drawing, which, however, I seldom do when I can avoid it.

Plan for Second Floor.

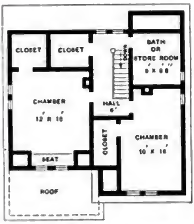
From E. W., *Kansas City, Mo.*—I send a second-floor plan in reply to the correspondent "A. J. B." making inquiry in the December issue of *Carpentry and Building.* I also send a front and side elevation representing my idea of what would look well in connection with a plan of this kind. The front porch may be widened or it may be left as it is at present. The drawings also include a detail of the main cornice showing the construction at the eaves.

Front Elevation.

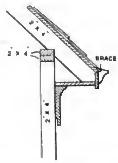


Side (Left) Elevation.

Scale, 1-16 Inch to the Foot.



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



Detail of Main Cornice.—Scale, ¼ Inch to the Foot.

Plan for Second Floor.—Contributed by "E. W.," Kansas City, Mo.

Thinning Liquid Glue.

From L. H., *Hoquiam, Washington.*—Will some reader of the paper tell me what to use to thin liquid glue which is only used occasionally and which becomes thick from long standing?

Note.—Cabinet makers often thin the glue which they use by adding a very little vinegar or acetic acid.

What Is One-Quarter Pitch ?

From C. W. B., *Reading, Pa.*—I wish you would publish in the Correspondence Department my idea of one-quarter pitch as applied to roofs, and the method I have observed in my travels. There seems to be a wide difference of opinion as to the method of finding the pitch of roofs, but I would say that I have never seen any other way than that described by "H. K. R." of Larned, Kan. Using the protractor is all right so far as degrees go, but it is not customary in this part of the country, or where I have been, to use it, but rather the square, which is the main part of a carpenter's kit. The idea of taking one-quarter, one-third or one-half the width of a building, according to the pitch desired, is, I think, as practical a method as can be had. I am anxious, however, to hear further on this subject, as it is possible we may all learn something more about it.

Trouble with Belts and Pulleys.

From D. C. HUGHES, *Buckhannon, W. Va.*—In compliance with request of "J. E. D.," Chicago, concerning the difficulty he has in use of certain belts and pulleys, I will offer a few suggestions which may help him to solve the problem. There are so many things to take into consideration in the use of belts that it is difficult to determine the cause of his trouble without having more data than he gives.

When belts are straight, pulleys true on face and shafts parallel, there will be no trouble in running belts, unless they are overloaded, when the best will fail to give satisfaction. In case of the rubber belt spoken of, I suspect the tight pulley is crowning, or the end of shaft on which the pulley runs is closer to the driving shaft than the opposite end, as a belt will always run toward the end of shaft nearest to line shaft. Belts, to shift easily, must run on straight face pulleys, both edges of which must be the same diameter; if one edge is larger than the other, and the shafts parallel, the belt will run to the high side of pulley.

The leather belt being inclined to run on the edges of both the driving and driven pulleys is caused by shafts not being parallel or the edge of one or both pulleys being larger in diameter on one edge than the other. Pulleys must be in line to work well. Belt shifters should be placed on part of belt running onto the driven pulleys and as near to the pulleys as practicable.

From F. B. E., *Bennington, Vt.*—In answer to "J. E. D." of Chicago, Ill., who complained of trouble with his belts and pulleys, I notice that he says he is running from a 6-inch pulley, but he does not state whether he means it is a 6-inch face or diameter. I will, however, offer a few suggestions, and perhaps he can work it out himself. There are several things which would cause his pulley to run unsatisfactorily. In the first place, his driving pulley should have a face as wide as the tight and loose pulleys combined; then, if his pulleys are of wood, they may be worn out of true, which would make some difference; then, again, his belt must be straight, and, most important of all, the shafts must be parallel. Now, let him see that the face of the driving pulley is true and as wide as the tight and loose pulleys together and the belt straight. Sometimes the belt has been used for a cross belt and becomes stretched more on one edge than on the other; it is hard work to make such a belt give satisfaction. The edges of the driving pulley and the tight and loose pulley must be in line. If the belt does not work, loosen the boxes of the countershaft, or, if very slow, move the countershaft one way or the other, until the belt is perfectly straight on the pulleys. If, after getting the countershaft to run all right, "J. E. D." belts to some other pulley which he may have thought out of true, he must, if such is the case, adjust that to the countershaft. The same treatment will remedy the upright leather belt. I would here remark that the face of the driving pulley should be flat—that is, not crowning—while the driven pulley should be a little crowning. I have sometimes turned out the center of the face of a driving pulley when of wood and crowned each side, the same as if two pulleys were put side by side. The belt will work very well on one fixed that way. All shafting should be level.

Measuring a Slate Roof.

From H. R. R., *Philadelphia, Pa.*—In answer to the inquiry of "R. J. H." of Du Bois, Pa., in the November issue, about the measuring of slate roofs, I give the following rule, which can be traced back to the time when roofs were first put on. In work of this kind the area of a roof is found by multiplying the length of the ridge by the girth from eave to eave. Allowance must be made for the double row at the bottom. In taking the girth the line is made to ply over the course of slates and returned upon the under side until it meets the wall or eaveboard. On hips and valleys an allowance of 6 inches is made on each side as extra measurement. No deductions are made for chimneys, windows or skylights. There is another rule which allows 12 inches wide extra at the ridges, 6 inches extra at the eave, multiplied by their length, 6 inches around the chimneys, dormers, &c. No deductions are made for chimneys, &c. This rule and the one above are used in both this and the old country and are legal, unless a bargain to the contrary is made.

Drawings Wanted of Store Counters.

From J. G. B., *Southport, N. C.*—Will some reader furnish a plan for a grocery counter 20 feet long, intended to be used in a general merchandise store, also one of the same length for dry goods? The walls will be of yellow pine, and both shelving and walls will have a hard oil finish. All work is to be done by hand, as there are no planing mills convenient. I am only a young chip, and would greatly appreciate the kind assistance of some of the older hands at the business.

Short Method of Estimating Buildings.

From A. M. K., *Elkhart, Ind.*—I would like to ask of some experienced brother carpenters if there is any way of obtaining the figures on large buildings such as storerooms, churches, &c., without the necessity of making a bill of material and getting the figures in the usual way?

Note.—There is no royal road to knowledge, and we fear our correspondent will find no "short cut" in estimating large work upon which it would be wise to base bids. A practice sometimes followed in obtaining preliminary figures is to estimate by the cube—that is, find the cubical contents of the structure by multiplying the length by the width and this by the hight measured from the foundation up to half the elevation of the roof. The final result is then multiplied by some fixed amount according to the style and nature of the building. This at best gives only an approximate estimate of the cost and is not a method to be recommended.

Sweating Chimney Flues.

From C. C. H., *Brookville, Pa.*—I desire to ask the practical readers a question or two about sweating chimney flues. I have been doing a great deal of work for a man who owns the property, and who has had trouble with the flues of the chimney sweating. We first thought the flues leaked about the roof, but I flashed it once or twice, and the tinsmith flashed it and soldered up the corners; still it was wet in the attic and the plaster has fallen off several times, so this last summer I had the flue taken down and rebuilt. I laid the flashing 2 inches in the cement joints and then flashed up against the flue, turning down over the roof, flashing that which I had laid in the cement. I also had a hood made to set over the flue top, with two ends open for draft. Notwithstanding all these precautions, it still gets very wet under the roof; so I am inclined to believe that it must surely result from sweating or dampness of some kind. No one has lived in the house since I did the work, so the heat has nothing to do with it. I know of a case of the kind in our town and the occupants decided that the dampness was due to sweating, and I think they made a hole in the flue in the cellar. In the case of the flue I speak of, however, there is no cellar under that part of the house. I would be glad to have some readers experienced in matters of this kind offer suggestions as to a possible remedy. I am sure there is no leak in the roof, and it seems to me it must be due to sweating. If not, what causes the trouble, and what can I do to prevent it? The size of the flue is about 2½ brick by 3 brick, with one flue hole, the flue setting in the middle partition and not on the outside wall.

Making Mortars for Tuck Pointing.

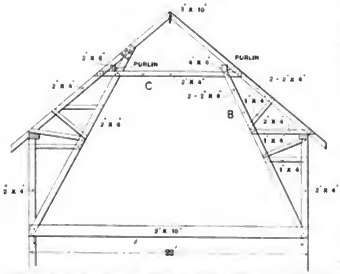
From J. O. L., *Kokomo, Ind.*—In the December issue of the paper, page 342, I notice a description of a mason's tool for tuck pointing, also on page 346 an article dealing with cement mortar. I would like very much to see published some information as to making tuck pointing mortar.

Design for Bookcase.

From D. F. M., *Syracuse, Neb.*—Will some member of the fraternity forward for publication a plan for an attractive bookcase?

Criticism of Truss for Barn Roof.

From J. F. H., *Treesbank, Manitoba.*—I inclose herewith sketch of truss intended for roof of barn. The trusses are placed 10 feet apart and the object of the construction indicated is to give an open space for the hay. I would like very much to have the opinion of F. E. Kidder as to the strength of the construction which I have shown.



Criticism of Truss for Barn Roof.—The Left Side of the Truss is a Reproduction of "J. F. H's" Drawing, while the Right Side Shows the Construction Recommended by Mr Kidder.

Answer.—The sketch of our correspondent was submitted to Mr. Kidder, as requested, and we have the following reply:

The general principle of construction is correct, and I expect the roof would stand under favorable conditions, but the 2 x 6 purlins would hardly be safe in a heavy snow storm or gale. The purlins should be at least 4 x 6 inches, and I would recommend using two 2 x 4's for B instead of one 2 x 6, and also doubling the rafters opposite the trusses. The collar beam C and the braces can then be spiked between them. The strut B is about 14 feet long, and as it is not braced sideways a 2 x 6 may buckle under the load. Two 2 x 4's would be much stronger. In the sketch submitted herewith the left side shows the construction indicated by the correspondent making the inquiry, while that at the right shows the construction which I would recommend. A good example of this form of truss on a larger scale is illustrated in *Carpentry and Building* for 1898.

Covering Hot Air Pipes.

From E. O. B., *Martinsburg, Pa.*—I would like to know the best way to apply asbestos paper to hot air pipes. Is there a special paste made for this purpose? Is it customary to cover the heating pipes that go in the walls of wooden buildings? Is there any danger of fire from these pipes if they are not wrapped and go up between the studding?

Answer.—In covering hot air furnace pipes with asbestos paper paste is sometimes used, but securing the paper to the pipe by means of wire is looked upon with greater favor. In case of the necessity of taking the furnace down for repairs it is a simple matter to unwrap the wire and take the paper off the pipe, while if it had been fastened on with paste the labor of removing it is more difficult, and when replaced, there being no laps to secure with paste, it becomes necessary to fasten it with a wire.

It is not only customary to wrap the heater pipes which go up in walls of wooden buildings, but in many cities the laws require that the pipes shall be covered and the studding protected so that the possibility of fire is absolutely done away with. In New York it is necessary to wrap the pipe, and the lath from stud to stud wherever hot air stacks are run shall be made of sheet metal or wire. In addition the studs exposed must be covered with sheet metal, leaving a ½-inch air space for further protection. If this is not done the regulations require that the hot air stacks shall be made of two pipes—an inner hot air pipe and an outer protecting pipe. If sheet metal lath are used over the pipe and the face of the studding protected by sheet metal, with an air space, there is little need of wrapping the pipe with paper. Instances are on record where fires have been started by uncovered hot air pipes running up in partitions where wooden lath have been used. In the opinion of some, fire under such conditions is due to spontaneous combustion induced by heat. That fires have occurred is a fact and that they are avoided by the precaution mentioned is equally true. Another advantage of covering pipes is more effective house warming, due to the prevention of the loss of heat in transit.

Tool for Truing a Grindstone.

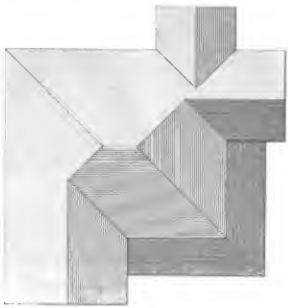
From A. I. F., Provincetown, Mass.—As a reader of the paper I would like to ask through the columns, if any one of the many patrons can tell me of any known mechanical device for truing a grindstone, or turning it down to take out a hollow which has worn in the face of the stone from its having been chipped? Where can I find or buy such a device as will serve the purpose? I operate a power grindstone and have great difficulty in keeping the stone true, owing to the fact that so many people use it.

Cut Nails vs. Wire Nails for Shingles.

From A. T. B., *Lafayette, Ind.*—What will be the result of using cut nails for shingles instead of wire nails? In this section wire nails soon rust off between the shingles and roofing boards, so I have gone back to cut nails. What say my fellow workmen?

Roof Plan for Cottage.

From C. O. M., *Shelbyville, Ind.*—Please find inclosed a sketch of roof plan which I send in reply to "I. H. L." of Keene, Ohio The plan suggested by "H. K. R." in the issue for November last is incorrect. At the place where there is an angle he has no valley rafter shown on the roof plan, but two hip rafters resting on a straight wall. If the wall plates are of the same hight, his plan as shown by the sketch is impossible. I hope other interested readers will discuss the question.



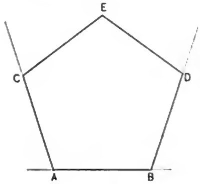
Roof Plan for Cottage Suggested by "C O. M."

The Use of Tarred Paper.

From M. A. B., *Newfield, N. Y.*—I would like to ask through your valued paper why tarred paper is not used more in houses? It is certainly more nearly moisture and vermin proof than the building paper that is generally used in this section. I have sometimes had to run a furnace pipe under floors where there was no cellar and have used tarred paper for the last or outer covering, and if there is any objection to it I have not discovered it.

Constructing a Pentagon Upon a Given Side.

From D. H. MELOY, *Waterbury, Conn.*—On page 18 of the January number of *Carpentry and Building*, J. Ernest G. Yalden criticises the construction of a pentagon as given by "F. L. T.," and in turn presents a



Constructing a Pentagon Upon a Given Side

method which he claims to be correct, while at the same time more simple. In demonstrating the two methods given I find that neither is absolutely correct and that there are more errors in Mr. Yalden's method than in that of "F. L. T.," although both are as nearly correct as any ordinary mechanic would be likely to make them by either of the two methods. But why insist on making so many lines, divisions, &c.? A pentagon is simply five obtuse angles of 72 degrees each, and five sides equal in length, formed as follows: Referring to the diagram inclosed, let A B represent the given side. From the points A and B mark obtuse angles of 72 degrees each, or 3½ inches and 12 inches on the steel square, which is the same as 72 degrees. Make the distance from A to C and from B to D equal to A B; then with the compasses and C and D as centers describe arcs cutting each other at E; mark the lines C E and D E and the construction is complete.

Tool Chest Construction.

From E. C. N., *Boston, Mass.*—In answer to "C. C. S.," Kansas City, I inclose sketches of chest which has been in constant use for 30 years, and for the purpose designed I have yet to see its equal. There is no patent on it. It does not leak in any part and has been shipped as freight. When full, it requires about three men to handle it, and it is in perfect condition to-day. The arrangement of the interior is such that every tool can be reached instantly. When built I owned a farm, and all repairs as well as new work on wood, iron, harnesses and ordinary soldering and plumbing were done. The chest contains tools for doing work of this kind and for working iron cold. The front of the chest shuts between ends and fastens with spring catches at the top, and then pins are dropped through, as shown in Fig. 1 of the sketches, a lock fastening everything tight. When the front is laid down it slides off the loose butts, which are indicated in the sketch. The corners of the opening have heavy wrought angle irons to let in, while the corners of the chest are brass bound. All drawer runs are solid, so that if the chest is turned upside down the contents cannot get out or mix. The drawer pulls are sunken so that the front shuts solid against the drawers. The latter can be arranged in any size or manner, according to the tools the owner may have. The drawers on the right are ½ inch shorter than those at the left, in order to allow for the steel square blades which drop down at A of Fig. 2, the slot being of sufficient size to hold the blades of two squares.

Referring to Fig. 1 of the sketches, the compartments Nos. 1, 2, 3 and 4 are 8½ x 5¾ x 1½ inches; Nos. 5, 6, 7, 8 and 9 are 6¾ x 5¾ x 1½ inches; No. 10 is 6 x 13½ x 2 inches; Nos. 11, 12 and 13 are 6 x 19 inches; No. 14 is 23½ x 13½ x 2 inches; No. 15 is 23½ x 19 x 5½ inches; No. 16 is 22½ x 19 x 3½ inches; No. 17 is 6 x 13 x 2 inches; No. 18 is 6 x 18½ x 3¼ inches, and Nos. 19 and 20 are 6 x 18½ x 2¾ inches. The vertical partitions shown extending from the loose butts are ½ inch thick, and all others ¼ inch.

Referring to Fig. 2, which represents a plan view of the top of the cover raised, the compartment B is intended to hold ten saws, full size, although mine has 14 of various sizes. The compartment C is intended for a large iron miter box, plow, match plane, bead plane, filister and all molding tools, stop chamferer, drawing knives, level and rabbet planes. Compartment D is 9½ inches long and is intended for chalk, water stones and saw sets. Compartment E, which is 9½ inches long, 5¾ inches wide and 2½ inches deep, is intended for oil stones and cold chisels, while compartment F, which is 15½ inches long, 5¾ inches wide and 2½ inches deep, is intended for stock and riveting hammers and 15 and 8 inch monkey wrenches. The bottoms and partitions of the compartments running lengthwise are of ½-inch material, while those running crosswise are of ¼-inch material.

The chest has a capacity about equal to two fitted with sliding tills. If any one has a better design I should be glad to see it published. If "C. C. S." wants to carry a broad axe, adze, &c., he can do so by making one large drawer at the bottom.

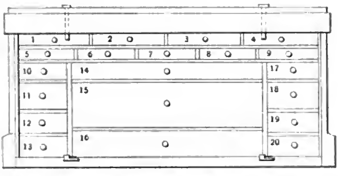


Fig. 1.—Elevation with Front Removed, Showing Various Drawers.

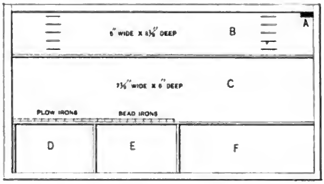


Fig. 2.—Plan of Top of Chest.

Tool Chest Construction.—Sketches Accompanying Letter of "E. C. N.," Boston, Mass.

Elevator for Raising Masons' Materials.

From M. T. Q., *New Iberia, La.*— Will some of my brother readers kindly give me an idea of the construction of an elevator for raising masons' materials on new buildings, using a horse or mule as motive power?

WHAT BUILDERS ARE DOING.

ALL things considered Baltimore had a good year in the building line, there having been permits issued for 1351 new buildings and 503 improvements. Building Inspector E. D. Preston states that not as many two-story brick buildings were put up, nor as many buildings in the aggregate as in 1899, but the larger structures erected represented more capital and have increased the valuation of the surrounding property on which they were built. The impression seems to prevail that the ensuing year will be a busy one, as the plans which are now being prepared by the leading architects represent a large amount of capital to be invested.

The twenty-sixth annual meeting of the Lumber Exchange of Baltimore was held in the rooms of the Builders' Exchange Building in December, when the following officers were elected:

President, Lewis Dill.	Vice-President, Henry P. Duker.

Treasurer, Joseph Owens.

MANAGING COMMITTEE,

Francis E. Walters,	Jas. L. Gilbert,
Richard W. Price,	Henry P. Duker,
S. P. Ryland, Jr.,	Norman James,
Wm. M. Burgan,	Geo. Schumacher,
G. W. Elsenbauer,	Saml. D. Helfrich,
Ridgway Merryman,	George E. Waters.

Atlanta, Ga.

The past year has shown a larger volume of building operations in the city of Atlanta than during any corresponding period in recent years. The annual report of Building Inspector F. A. Pittman shows that the total number of permits issued was 2079, involving an estimated expenditure of practically $2,000,000. A number of important building operations are either under way or contemplated, and the outlook for the ensuing year is most encouraging. One of the important enterprises under way is the construction by a syndicate of 150 new houses, which are estimated to cost $500,000. The new ten-story hotel which is to be put up on what is known as the "Alexander" property is estimated to cost about $300,000.

In concluding his report, Inspector Pittman recommends the passage of an ordinance compelling the placing of composition flooring in basements, and that where wood floors are used, requiring at least 12 inches of air space from the ground to the bottom of the timbers, with proper ventilation. The reason for this is that when wood floors are laid on the ground they become damp and rot, thus producing a very unsanitary condition.

Boston, Mass.

While the value of building operations as gauged by the number of permits issued was somewhat less in the year just closed than in 1899, the amount of capital involved showed a considerable increase, being nearly $2,000,000 in excess of 1899. This grew out of the fact that the quality of the buildings put up the past year was superior in many respects to those of the year before. The most encouraging feature in the operations for the past year was the rapid approximation of brick buildings to frame construction. In 1900 permits were issued for 442 brick and 767 frame buildings, as against 661 brick and 1215 frame in the 12 months previous.

The outlook for the coming season is rather more encouraging, and there seems to be at present tendency toward the erection of apartment houses, particularly those equipped with electric elevator service. There is also a considerable volume of building under way, or in contemplation, in many of the beautiful suburbs of which the "Hub" can boast, and in the aggregate there should be plenty of work for those engaged in all branches of the building business.

At the annual State convention of the Society of Master Painters and Decorators of Massachusetts, held in Boston the second week in January, the following officers were elected: President, William F. Gilbert; vice-president, William H. Naylor; secretary-treasurer, William E. Wall.

Executive Board: Carl Forsberg, C. F. W. Hanson, R. R. Rose, Frank White and George B. Gilbert.

Chicago, Ill.

It was hardly to be expected that the record of building operations for 1900 would be equal to that of the year previous, owing to the protracted strike which had almost paralyzed many branches of the building industry. The statistics available, however, show that a fair amount of work was accomplished, and that the difference between the figures of the two years is not so great as might have been supposed. During the year just brought to a close permits were issued for 3554 improvements, involving an expenditure of a trifle over $19,000,000, these figures comparing with 3794 permits for buildings in 1899, estimated to cost $21,000,000.

The outlook for 1901 is most encouraging. Architects are busy getting up plans and specifications for all classes of structures, from stately office buildings and apartment houses to innumerable dwellings of all descriptions. A suggestion of the magnitude of the improvements awaiting the opening of the building season is contained in the statement made on good authority that in the spring foundations for 500 flat buildings will be laid within a radius of a few blocks in one street of the Twenty-eighth Ward.

The Carpenters' and Builders' Association held their annual meeting at 115 Munroe street early in the year, when the following officers were elected:

President, Abraham Edmunds.	Secretary, William J. Ryan.
Vice-President, John Bick.	Treasurer, T. J. Hodgson.

DIRECTORS (for two years),

John F. Neagle,	John S. Findlay,

Joseph Cormack.

ARBITRATION COMMITTEE,

John A. Wiseman,	Joseph Haigh.

The Chicago Architectural Club held their usual Christmas celebration on Saturday evening, December 29, at the rooms of the club in the Art Institute. The rooms were appropriately decorated and presents of an amusing nature were exchanged. At a meeting held on January 14 the third set of drawings in the scholarship competition were submitted, the subject being "Plans and Elevation of a Residence."

Columbus, Ohio.

The Builders' Exchange held their election on Monday, January 7, from 3 to 8 p.m., resulting in the following choice: President, J. F. Blair; first vice-president, R. A. Edgar; second vice-president, Fred. E. Reeves; secretary, R. J. Gardiner, and treasurer, E. L. Harris.

The holdover directors are F. H. Nichol, F. C. Ferris, William Brust, B. S. Stevenson and E. T. Ewers.

The newly elected directors are E. T. Bingham, I. T. Coe, M. P. Street, A. F. W. Huffman and A. M. Magrew.

The annual reception was among the most successful which the exchange has ever held, while the reports of the secretary and treasurer showed that the exchange closed the most successful year in its history, having a larger membership and more cash on hand.

The feeling among architects and contractors is of a most hopeful nature, and the outlook for the year is for plenty of work for everybody.

Fall River, Mass.

At the annual meeting of the Master Builders' Association, recently held at Fall River, the principal business was the election of officers for the ensuing year. John Dickinson was elected president; Robert Nicholson, vice-president; John Dinnie, secretary, and A. K. Hunter, treasurer. The Auditing Committee chosen consisted of William H. Smith, Otis E. Gifford and William Grant.

Following the election of officers the members sat down to a bountiful turkey supper, served by Caterer Mills. The supper was tendered by P. J. McQuillon and Samuel J. Benoit to the members of the association in recognition of the aid extended them in the recent fight which they made against an eight-hour day law for men employed on municipal buildings. These men were contractors on school houses, and an effort was made to force them to give an eight-hour day to their employees. They took the matter to the courts, and the decision was rendered in their favor. During the recent fight they had the hearty support and co-operation of the members of the Master Builders' Association of the city. After the supper President Dickinson made an address, during the course of which he congratulated the members upon the splendid condition of the association. The membership is strong and the finances in good shape.

Los Angeles, Cal

Building operations are still active. The fiscal year closing December 1 showed a substantial increase in the amount and value of new buildings, notwithstanding the fact that the country tributary to Los Angeles was badly affected by drought. The good rains of November stimulated all branches of industry and contractors are expecting a substantial increase in building operations in the early part of this year. The unionizing of the mill and wood workers of the city, which was effected a few weeks ago, has so far had no evil effects.

G. S. Holmes, proprietor of the Knutsford in Salt Lake City, Utah, intends to build a large hotel in Los Angeles. He has interested Eastern capital in the project and be expects to have the new hostelry upon for business by Christmas, 1901. He says the hotel will be erected on the corner of Spring and Fourth streets, and will cost $800,000 The structure is to be eight stories high, constructed of brick and stone and fire proof in every respect. All modern conveniences and equipment are to be installed, so that the hotel will be thoroughly up to date. The interior will be marble.

Milwaukee, Wis

The prospects for a successful year in the building line in Milwaukee are reported as very bright, architects having a great deal of work on their tables which will be ready for figures in the course of a few weeks There is a considerable amount of heavy construction in prospect, such as large shops and factory additions, which was laid over from last year, owing to the erratic rise in prices of material, and which will be carried forward to completion in the near future. Taken altogether, there is promise of plenty of good work and fair compensation. The amount of building done in 1900 was not up to the usual standard, there being 1196 permits issued for structures involving a cost of $3,112,258, as against 1408 permits issued in 1899, involving an estimated expenditure of very nearly $4,000,000. The impression prevails among the trade that the only possible drawbacks to a large business during the present year are labor troubles, although at present there are no serious indications of any occurring.

The Builders' and Traders' Exchange had their annual election with the accompanying stag party and entertainment on January 9. The election bids fair to be memorable in the history of the Exchange, as, contrary to custom, the regular ticket was defeated by a close vote. The officers elected for the ensuing year are as follows:

President,	Second Vice-President,
L. Griewisch.	F. J. Pipkorn.
First Vice-President,	Treasurer,
Louis Hoffmann.	John Langenberger.

Secretary, Jos. A. Meyers.

DIRECTORS FOR THREE YEARS.

P. L. Petersen,	E. J. Roberts.
Chas. B. Kruse,	C. A. Sercomb.

At the annual meeting a number of valuable suggestions for the benefit of the Exchange were presented and laid over for action by the new board at its first meeting, when it is probable they will receive favorable consideration.

Minneapolis, Minn.

At the annual meeting of the Master Builders' Association held the latter part of December, the following officers were elected:

President,	Secretary,
H. N. Leighton.	Robert Cheney.
Vice-President,	Treasurer.
Angus MacDonald,	George Cook.

EXECUTIVE COMMITTEE.

Angus MacDonald, F. G. McMillan, C. F. Haglin.

The association was reorganized about a year ago, and has now on its membership roll about 70 per cent. of the contractors in the city.

Montreal, Canada.

At the annual meeting of the Builders' Exchange, held in Mechanics' Institute in the latter part of December, the following directors were elected: H. R. Ives, N. T. Gagnon, John Wighton, James Paton, and Joseph LeMarche. The Board of Directors organized by electing C. T. Williams, president; J. W. Hughes, vice-president, and George J. Sheppard, secretary and treasurer.

The report of the secretary and treasurer showed the Exchange to be in a flourishing condition.

Nelson, B. C

Returns as to buildings erected here during the year show a total expenditure in this respect of about $300,000, or approximately a like amount to that of 1899. This year has seen a large increase in the number of new residences built, not so much of the total outlay being represented by business blocks as was the case of the previous twelvemonth.

New Orleans, La.

At a meeting of the builders in New Orleans, held in the board room of the Mechanics, Dealers and Lumbermen's Exchange, an organization was perfected, known as the Builders' Protective Association, which has for its object mutual interest and co-operation not only among builders, but of all persons directly or remotely interested in the building business. The officers elected were: A. Darcontel, president; Thomas Cary, vice-president; H. T. Heinrichs, secretary; W. H. Krone, treasurer, and Arthur Leibbe sergeant-at-arms. At the suggestion of the president, a committee of three was appointed to confer with a like committee to be appointed by the New Orleans Architects' Association, for the purpose of considering the matter of a revision of the city building laws.

Oakland, Cal.

The Master Builders have formed an association for the future protection of the building interests of the city against such events as the present mill strike. They claim to have secured the co-operation of about 85 per cent. of the master builders of Oakland. A. W. Pattiani is chairman of the advisory council.

Philadelphia, Pa.

The amount of building projected during the year just closed in the city of Philadelphia does not vary materially from that of the preceding 12 months, a difference of about 2 per cent. being in favor of 1900. The total number of permits issued was 8434, involving an outlay of $20,777,970, as against 8431 permits in 1899 for buildings aggregating in cost $20,377,980. Of last year's total, one-third was spent in building 3148 dwellings at a cost of $7,397,000, while the industrial and commercial activity of the city was increased by 91 new factories and extensions made at a cost of $1,414,840. Among the principal improvements may be mentioned the new buildings of the Philadelphia Tapestry Mills Company, $130,000; Baldwin Locomotive Works, $160,000; Croft & Allen, $120,000; J. B. Stetson Company's additions, $125,000; J. P. Mathieu & Co.'s new morocco plant, $100,000; Cramps' Shipyard, $100,000; Pencoyd Iron Works, $100,000; Wolff Process Leather Plant, new buildings, $85,000; J. S. Thorn Company, $60,000; Lippincott Publishing Company, $93,000; Alfred T. Moore, $90,000, and George Bisler, new paper factory, $45,000.

It is stated that the total sum expended in building operations in the city during the last ten years was $246,577,483.

The first week in January the T-Square Club gave an interesting exhibition of some fine work which the architects are turning out.

Portland, Oregon.

Building operations in Portland have not particularly altered within the month ending January 5. New building has dropped off a little as the end of the year approached, but there is still a great deal of activity. A scarcity of house-finishing lumber is seriously hampering the completion of some of the larger buildings. One or two owners have been obliged to send East and to San Francisco for supplies in this line. The new mill of Crone Bros., at University Park, is, however, expected to remedy the matter.

The building record for the year 1900 shows that a great deal more building was done than the year before. The records show that about 400 building permits were issued during the year. While a great many cottages were erected, the record shows an unusually large number of costly residences as well as many substantial brick business blocks. Alterations to old buildings have added greatly to the appearance of the city.

San Francisco, Cal.

The building situation is chiefly characterized by efforts to straighten out the labor situation. The contending factions have each made some new moves, but the most promising action is that taken by contractors and builders of the city. They met at the Builders' Exchange on December 22, and after a thorough consideration appointed a committee to look into the matter and report. It is believed that the contractors have some grounds for thinking that their intervention will be well received by both the mill owners and their men. In the meantime the scarcity of milling material is being overcome. The big Labor Union Mill began work early last month and has helped to keep up the supply of materials.

The building record for San Francisco for the year proves to be disappointing. Estimates based on the returns of the San Francisco Building Bureau place the total value of buildings for the year at less than $5,000,000.

Some sort of a combination of the concerns controlling most of the lime used in the State was effected a few weeks ago. It is anticipated that a raise in prices will result.

Scranton, Pa.

The Builders' Exchange of Scranton held their annual election on the evening of Tuesday, January 8, the result being as follows: President, Edwin S. Williams; vice-president, E. W. Smith; junior vice-president, H. R. Sykes; secretary, B. F. Laudig; and treasurer, George W. Finn. The board of directors to serve for two years consist of Peter Stipp, Conrad Schroeder, Luther Keller, J. B. Woolsey, E. S. Peck, P. F. Hawley, E. L. Merriman, John Colligan, and John Nelson.

After the routine business had been completed the members and their guests marched to the Elks' lodge room on Franklin avenue, where they enjoyed a bounteous collation served by Landlord Ziegler. During the evening a number of addresses were made, E. S. Williams serving as toast master. Among the speakers were Mayor Moir; City Inspector Vosburg, Plumbing Inspector Monies, F. J. Johnson, of the Master Painters' Association; M. P. Judge, representing the carpenters, and John Mulherin, representing the plasterers. The speeches were well received, and the evening was altogether an enjoyable one.

St. Louis, Mo.

The Master Builders' Association of St. Louis held its annual election of officers and trustees in the Turner Building, 304 North Eighth street, in December, just after our January issue went to press. There were two candidates for the office of president, four for the office of vice-president, three for second vice-president, two for that of treasurer, and one for the office of secretary.

The results of the balloting showed Morris Eyssell to have been elected president, Edward A. Steininger vice-president, Edward Ward second vice-president, Charles D. Morley secretary, and George Raterman treasurer. The trustees chosen were Daniel Evans and Jacob Schenck.

St Paul, Minn.

During the latter part of December an organization was effected in the city, known as the St. Paul Builders' Exchange. Temporary quarters were secured in the Ryan annex, and the Exchange starts off with excellent prospects and a strong corps of officers. Thus far over 60 members have been enrolled. At the election of officers, William Porten was chosen president, J. W. L. Corning as vice-president, J. M. Carlson, second vice-president, Willam Rhodes of the Scribner-Libby Company, secretary, and A. V. Williams, treasurer. The board of directors consists of Walter Butler, George J. Grant, William Porten, J. M. Carlson, and W. H. Elmer.

Washington, D. C.

The Builders' Exchange of Washington have recently disposed of their building, and we understand that the organization will meet until a new place has been selected in the office of the president, L. J. McCarthy, at 1419 G street.

The total number of building permits issued during 1900 was 5607, as compared with 4764 the year before, the estimated cost of these being $6,003,528, as compared with $5,597,943. There were 460 new brick buildings erected and 118 frame structures. Among the permits issued were 54 for apartment houses, for which there seems to be a growing demand, 19 stores and 6 warehouses. The largest apartment house commenced last year is the "Iowa," for which T. F. Schneider, well known to some of the older readers of *Carpentry and Building* from his connection with early competitions, was the architect.

Officers of the Washington Chapter of the American Institute of Architects have been elected as follows: President, James Rush Marshall; vice-president, W. M. Poindexter; treasurer, Robert Stead; secretary, F. B. Pyle; committee on admission, James G. Hill, Joseph C. Hornblower, and Paul J. Pelz.

Worcester, Mass

The general feeling among architects, contractors and builders in Worcester is that the ensuing year will be a busy one in the building line. The weather thus far has been remarkably favorable for builders to complete their contracts, and a few structures which were started late in the season will be completed during the winter.

At the annual meeting of the Builders' Exchange, held on January 9, in the Knowles Building, 518 Main street, the retiring board of officers were re-elected, with the exception that Willie E. Griffin was chosen as a trustee for one year, to serve the unexpired term of John Kingston, resigned.

The Exchange have just issued, with their compliments, a diary for 1901, which will be found of great convenience to general contractors and builders. It gives a great deal of information in shape for ready reference while the size of the diary is such that it can be easily carried in the pocket. The edges are finished in gilt, and the book closes with a flap on which in gilt letters appears the inscription "Compliments of Builders' Exchange, Worcester, Mass." The right hand pages are divided into spaces for four days each, while the facing pages carry general information of value to contractors and builders, together with advertisements of concerns engaged in the building line. Other features are tables of wages by the day of nine hours, and also by the week, rates of postage, a table giving the number of bricks to construct a wall of given dimensions, together with miscellaneous memoranda, &c. The diary consists of 206 pages and is illustrated with a general view of the Knowles Building, together with several interiors. The closing pages give a list of members of the Exchange, also associate members, all being arranged according to the line of business in which they are engaged. The work is issued in neat and attractive form, and is the work of the secretary of the Exchange, H. W. Sweetser.

Youngstown, Ohio.

The past season has been an extraordinary one in the building line and every indication seems to point to the fact that the ensuing year will equal, if not surpass it. There is a great amount of work in sight for this season, and the outlook among leading architects and builders is that the volume of business will be a record breaker.

The Builders' Exchange held their annual election of trustees on Monday, January 7, resulting in the election of A. S. Miley, Henry Niedermeier, Louis Heller, Charles F. Sharp, Arthur G. Young, John R. Squires, George F. Hess, C. J. Little, Christ. Mauser, James D. Gibson and Richard Hughes. The trustees then organized by electing A. S. Miley president, Henry Niedermeier vice-president, Arthur G. Young treasurer, Richard Hughes secretary, and H. W. Calvin active secretary.

Reports at hand are to the effect that the membership has been increasing steadily, and that during the last quarter there were 20 names added to the rolls, with two more since the first of the year. After election the members partook of a banquet, when a number of the members made short adresses. Kemp's orchestra rendered some delightful music during the evening, and there were games of different sorts, card playing, &c. The members have been holding a series of debates recently which have attracted a great deal of interest.

Notes.

We understand that Wichita, Kansas, is enjoying a degree of activity in the building line that is highly satisfactory. Mechanics of all classes are busily engaged and in some lines there is a scarcity of men. There is said to be an especially good opening for a planing mill man to start a planing mill, sash and door factory.

The outlook in Trenton, N. J., is for something akin to a boom in the building line the coming spring. A number of important projects are contemplated, as well as the erection of many new houses.

During the past year there were 2265 permits issued in Albany, N. Y., for the erection, construction, alteration and repairs to buildings.

The report of the fire marshal in Syracuse, N. Y., shows the cost of new buildings and additions during the past year to have been $1,600,000 as compared with $1,250,000 in 1899.

During the past year the number of private residences erected in Richmond, Va., was greater even than in 1899, which was the best year in the last decade. The outlook for 1901 is very flattering and it is stated that enough work has already been let or will soon be to keep every mechanic in the city busy for the coming 12 months.

It is stated that the City Council of Passaic N. J., will soon pass an ordinance prohibiting wooden ceilings in all buildings erected after the act becomes a law.

Hamilton, Ohio, is enjoying a large degree of activity in the way of building operations, and in the estimation of Architect George W. Barkman, the present year will witness a large volume of business. The tendency at present seems to be toward increased construction of flat buildings.

A number of improvements in the way of new buildings contemplated at East Hampton, Mass., leads to the belief that the coming season will prove a most active one. The volume of business during the year just closed is said to have been such as to exceed anything heretofore in the history of the town.

ORNAMENTAL TREATMENT OF BRICK AND IRON.

THERE have been recently erected in Sydney two notable examples of exposed brick surfaces, and one in particular has a most disappointing appearance; the whole effect is oppressively flat and monotonous, brought about by the entire absence of any boldness of proportion, especially the moldings of the strings and cornices, which are so ill proportioned as to be hardly perceptible on the opposite side of the street. There can be no doubt that failures such as these have a very bad influence on the progress of the use of bricks. The work throughout was all that could be desired, as will be understood when it is stated that the facing joints did not exceed ¼ inch, and the bricks were not gauged or rubbed, but hard, double pressed, as they had left the kiln. To an observer interested the lesson given by this example points out that if an effective result is desired it is most necessary that the design shall not rely upon small and insignificant molds (good work notwithstanding), but rather upon the shaping of parts of the actual building into such forms as will insure effect in proportion, as will be seen in the case of the other building referred to, which has been treated in a bold manner by an execution in Romanesque. The piers and the fine arches, together with striking breaks and formations in the wall surfaces, and the attention given to color harmony, cause one when looking at it to forget the brick as an atom and think only of the magnificent whole formed by its use. The knowledge is present to the most simple that it is brick, but there is, co-existent, the impression that the effect is excellent. In this case the architect has given some considerable attention to detail, of course rendered necessary by following closely the style, but it is not too much to say that had most of the detail been omitted the design would not have suffered.

The nature of the modern brick, on account of its hard and finished surface, renders its necessary to impress the mold before being burnt; and so far so good, for it is most desirable that the whole surface, plain and otherwise, of the buildings should be uniform, which would be a matter of impossibility were the attempt made to carve cut, or rob any particular portion, for which bricks less hard would have to be provided. But in this method of previous impression, advantage is taken of the easy method of production to indulge in excess, and the abomination of small and insignificant moldings is the result. Moldings which cannot be seen are abortive and useless in any material, and in this case what can be got in the brick itself cannot be carried out when laying it, and nothing looks worse than lines of molding not perfectly straight and horizontal. The only remedy that remains when such occur is to straighten up as much as possible by the aid of tuck pointing. The only logical method of using bricks for moldings is to treat them as part of or one member of the mold, rather than to endeavor to get two or three members in each course of bricks. All attempts at the execution in brick work of the classic orders with columns and entablature should be avoided, and the massive detail rendered necessary by the adoption of the Renaissance renders failure certain unless a plentiful mixture of stone is used, which is not always possible.

Color is a question that requires a great amount of attention when designing, and some of the huge mistakes which almost every city can complain of in the way of glaring examples of red walls lavishly interspersed with bands and all kinds of geometrical patterns in white bricks should certainly be things of the past. There can be no doubt that in this particular some advance will have to be made in a general manner by the manufacturers; but it is very certain that none will take place till a firm demand is made by the designer—in fact, none can be expected if the user is content to manage with the result of a loose system, which, as far as color is

Continued from page 21, January issue.

concerned, depends merely on what the clay likes to give. It must be confessed that the advance made in controlling the color return has been nothing compared with what has been done in the fast production of a hard and well shaped brick, and yet each is equally important, and the end will not be reached till such is universally accomplished. By the aid of a little chemical science the clay might be treated in a manner capable of producing any of the ordinary tints, and there is no doubt that if the makers were convinced that the production of such was in their interests the want would soon be satisfied. It should always be remembered that those who help to make a city dull and oppressive by smoke covered stone and somber and crumbling stucco, and fail to take advantage of the chance to liven and beautify by the use of inviting colored material, are to a great extent responsible for that absence of artistic feeling among the lay portion of the people which is so depressing. Nothing could give greater pleasure than tastefully selected and harmonious colors in architectural work, and it would be difficult to find a better means of artistically educating the people.

Iron.

Iron, however, much more than brick, on account of its new and different nature, has great cause to be dissatisfied with the mode of ornamental treatment it has received. Its special qualities as a building material have conferred such general advantages that it is a matter for regret we do not pay the attention to its appearance that we give to it in its purely useful capacity. The generous aid which it lends to us in the solution of our building difficulties and the manner in which by its use we are enabled to do so much that was hitherto impossible surely demand that its worth shall cease to be covered by imitative and unsuitable designs. Who is the engineer or architect that has not had reason to be thankful for its aid, perhaps as a girder in getting over a troublesome span where intermediate supports would have been objectionable, or by its use as columns in the little lateral space taken up in proportion to the work done, and where by reason of its bulk stone would have been inadmissible? And yet in return the mean action is taken of covering up the iron girder with wood and cement, and by painting and sanding making it look like a stone lintel, which could never have done the work. Or in the case of a column by molding it after a classic model, totally ignoring the very palpable fact that by its lean shaft all the proportions of the model are lost. On no account should any of the classic columnar orders be applied to it, for if enough of iron is used to retain the usual proportions waste of material is bound to occur, and, on the other hand, if the use is made economically the ratio of thickness to hight is sure to result in a sickly and lean effect. The advantage of iron is that it enables us to do the work required with much less bulk than if stone, brick or wood were used; therefore it is contended that it is contrary to the ethics of good design to make it appear like those materials when doing its superior work. In the case of the girder or truss surely there can be no logical objection to their straightforward exposure. The rivets and the L irons could easily be left to make a presentable appearance. An example of a girder exposed is to be found in the front of a recent large building erection in Sydney, and it must be admitted that its calm, dignified, and straightforward appearance is not unpleasing. The flanges and L irons have been carefully worked, and the heads of the rivets left very clear; but beyond this there is nothing in the way of ornamentation, and none is wanted, for where it has to do laborious work a simple but effectual appearance is the best, and it would be entirely out of place to fancifully ornament it. Deference must, of course, be paid to the necessity of sheathing the iron columns and girders with fire resisting material; but this is not always necessary, for there have been one or two examples of iron columns and girders so constructed and arranged that by means of a fusible plug in case of a fire a continuous stream of cold water will circulate throughout them, provision also being made that all cradles and seatings should have similar benefit.

Wrought Iron.

Wrought iron is capable of lending itself to very delicate and artistic treatment, and recourse to it should always be taken to give the necessary contrast to the heavier and more substantial construction. Gates, grilles, railings, finials, &c., are excellent chances to treat in a light way, and the most beautiful results can be obtained. Wrought iron also enables the architect to do much in the way of roof effects. Every designer can appreciate the addition to the proportions of a building which a raised and curved roof makes, and the strength and pliability of wrought iron in every way conduces to the easy attainment of such roofs. Sir Gilbert Scott, in "Gothic Architecture, Secular and Domestic," expresses the opinion that "there can be no doubt that the iron roof is susceptible of exquisite beauty." And it would indeed be difficult to prove the contrary. But unfortunately it is seldom that even an attempt is made to gain such a result. It is, however, in its cast state that most of the anomalies exist. At the present there is a term "cast iron impudence," which is freely used, and actually it might be suggested that it had its origin in the glaring and impudent manner in which cast iron ornament is plastered over our buildings. It is not going too far to say that almost 80 per cent. of recent erections in the colonies have in some way been made to rely on this stuff for appearance, and yet at the same time it would be impossible to find more than about six different designs among the whole. In every city and town is to be found the cast iron shop, the keeper of which has set out on the walls the same monotonous display of specimens to be found in every other place of a like nature. He calls each design by some fanciful but totally inappropriate name. He sells it by the foot, it is put up by the foot, and the result is a never ending array of yard after yard of cast iron, so utterly bereft of any variety or beauty as to be positively offensive to a tasteful eye and totally stamp out even a spark of regard for cast iron. It is not only the want of variety or beauty in the design, but also the roughness of the casting, no care being taken to preserve a good surface or sharp edges, and the casting very often appears a confused mass of dots and lumps. It must not be thought that the purpose of this paper is to entirely condemn the principle of treating it for ornamental purposes; but some improvement might be made with advantage in the habit of making in cast iron an attempt to resemble, for instance, ferns or other vegetable forms. Cast iron should not be used for purposes of ornamentation only, but rather primitive, meeting a necessity, and then ornamented to make it presentable. As an instance might be taken a column in a store, the plain shaft of which, together with a simple and unostentatious cap merging into a cradle with bracing studs, is far better and more in place than to have an elaborate thing in Corinthian style put in somewhere in the front, with no other reason for its existence than that it is intended to make a nice appearance; or, again, would it not be far better to just have a little, but suitable, wrought iron work, judiciously used, than all the cast iron fringes, crests, brackets and finials which are so unmercifully used? Cast iron is best used only when compressive strain is to be resisted, and in such cases it should be very unostentatiously beautiful. If used only for ornamental purposes, the greatest care should always be exercised not to indulge in an excess which is so tempting on account of the ease with which such is produced. All materials which allow of being molded or cast, and thereby easily multiplied, conduce to quantity in large proportion to trouble in production, and human nature is so fond of display that the inevitable result is overbearing and debased ornamentation, not so much the consequence of itself in its parts being bad, as because of being in direct violation of the rule "that of the best we may have too much."

What is said to be the second highest chimney in Europe has just been constructed at Hoboken, near Antwerp. The chimney, which belongs to the silver works, is 406 feet high, the diameter at its base being 25 feet and that at its summit 10 feet.

THE ART OF WOOD TURNING.—XIV.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THERE is another chuck, called the straight line chuck, whose duty it is to ornament cylindrical and square work in the direction of their lengths. This is shown in Fig. 92. The square frame A A is fastened to the two arms of the head stock by bolts and wedges. B B is a slide connected with the nose of the mandrel, either by a chain, or, what is better, a rack and pinion. On the face of the slide are disk and screw plates, and a nose to receive the chucks, as in the eccentric and elliptical chucks.

This chuck, with the slide rest parallel to its face, is very similar to the positions of other chucks when set for face work, and in this position straight, curved, wavy or zigzag lines may be made on the faces of stuff attached to the chuck.

The patterns produced by the straight line chuck offer the simplest means of explaining the manner in which they are componnded from the simples waves on the rosettes. A number of designs formed by the straight line chuck are shown at Fig. 93. A, in the wave of which the patterns B C and D are composed. B is produced by taking one division of the slide rest screw after each wave is cut. After cutting the first wave of C, take one notch with the click and two divisions of the slide rest screw for each successive wave. For D place the disk in a set of notches three times as close to each other as those used for C, and for each wave take one notch and one division of the rest screw, reversing the direction of pointed screw at the bottom. The tool is set exactly opposite the center of the work, and the divisions are taken by turning the mandrel of the chuck instead of the rest screw.

Cutting the rosettes or shapes is an operation of considerable nicety, as the waves are mostly very shallow and the rosettes large—say, 6 to 10 inches diameter, to make them work smoothly—and the slightest fault in a wave will be repeated through the whole work. They are generally placed upon a lathe and the indentations cut out with a circular cutter, larger or smaller, according to the length and depth of the wave. Sometimes a straight cutter is used, which passes through a square hole in the center of a piece of iron, that swings in a forked shaped stock, and can be set to any required radius and fixed by a screw. The face of the cutter is angular, and is slowly drawn by the rest screw across the width of the rosette. A little only is cut at a time, and the rosette is gone over several times until the waves meet each other, or are cut up.

This is a slow process, but when carefully conducted produces a beautifully smooth rosette. The waves pro-

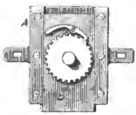


Fig. 92.—View of Straight Line Chuck.

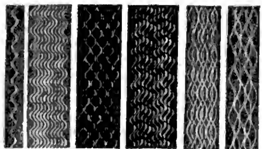


Fig. 93.—Examples of Work Done by a Straight Line Chuck.

The Art of Wood Turning.

the disk at every third wave. For the last two patterns a rosette with only half the number of waves is employed. E is produced by laying the second wave upon the first, but alternating. This is done by taking the disk, without moving the rest screw, one division on the screw for the third and the disk only for the fourth; then, taking two divisions on the screw for the fifth, proceed as before. For F place the disk in a set of notches of double fineness. Take one notch and one division of the screw for the second wave, two notches only for the third, and one notch and one division for the fourth.

These specimens will serve to show the immense number of patterns which may be produced with 20 or 30 rosettes and their combinations. Many curious patterns are produced by using two rosettes, one fixed to the mandrel and other on the sleeve. The former, not being affected by the disk, will always lay the waves in the same position, while the latter may be shifted as above described, and by having one of the rubbers to advance and recede, the relative quantity of the two waves may be varied at pleasure.

The number of adaptations, on account of the various and irregular shapes of the different pieces of work to be engine turned, is very large, and would take up far too much space to describe, so I will only mention one for holding small cylinders, such as pencil cases, on the straight line chuck, as this, perhaps, is somewhat difficult. The work is placed on a steel mandrel, which fits it tightly, and is rubbed over with a little sealing wax, to prevent the work shifting its position. This mandrel is held upright in a chuck, which has a small dividing plate and screw with a square hole at the top and a duced by both these methods are divided from each other by a sharp line, which, except for rosettes of the highest numbers, must be rubbed down with great care, either by polishing or working very gently in the engine against a rough rubber. Rosettes of few waves may be copied, or engine turned, by means of an original guide placed upon the nose of the engine.

The operator should be able to make his own rosettes. Those intended for much work had better be of brass, but very durable and effective ones may be made of the harder woods. Indeed, rosettes for any special purpose, that may not be used again, may be made from some of the medium woods. The thickness of the rosettes will depend somewhat on the space allotted for them and the kind of materials employed in their make up. These are matters the operator will soon learn to determine when once he begins to use his lathe and appliances.

The lathe as now equipped is capable, under skillful supervision, of turning out the most elaborate ornaments, either on the surface of cylinders or on surfaces having elliptical sections, or circular and elliptical disks, and in order to stimulate the desire to produce beautiful forms I reproduce herewith a couple of designs of simple construction, yet pleasing and effective in outline. Fig. 94 shows a very beautiful ornament, suitable for many purposes. It is formed entirely of circles, with the exception of the center, which is formed of arcs struck from a common center. Fig. 95 shows another style of ornament, which is composed entirely of circles, the smaller ones on the outer edge being arranged so as to exhibit a circular Greek fret. These examples are chosen from among a large number that are published in the

"Manuel du Tourneur," par L. E. Bergeron, 3 vols., 4to. Paris, 1816, the most complete work on the lathe and turning obtainable.

What is a Modern House?

An old builder, in the city of Columbus, discussing the question of house construction as practiced at the present day, and as compared with many years ago, expressed the following views:

"It's a debatable question whether the term, 'modern dwelling,' used in referring to a majority of residence buildings, projected or in course of construction, means anything better than the dwellings built a generation or two ago.

"This is an age of progress in almost every department of industry, except in building construction. In heating and sanitation there have been desirable improvements, but in construction I think we are progressing backward, and the so-called modern dwellings will not be in as good condition 25 years hence as those erected 25 and 50 years ago are to-day.

"Columbus has as many handsome dwellings as any city of its size in the country, the architects will compare favorably with their professional brethren in other cities, and the builders are as competent as can be found anywhere; the fault is with the homeseeker, who wants a stylish dwelling in a stylish neighborhood at the least possible expense, and never gives a thought to the subject of construction until the plaster begins to crack and fall off and the wintry winds whistle through the cracks around the casings. With the higher grade brick and stone dwellings modern conveniences and solidity are combined; the same is true generally of business and public buildings. I refer only to the moderate priced dwellings, from $1500 to $2500, and the cheap flat buildings, where style is sought at the expense of solidity and comfort.

"Two-by-four studding, poor hemlock sheathing, a layer of building paper and then siding on the outside, and a couple of coats of plaster on the inside, make indifferent protection against the cold of a severe winter or summer heat; the shrinkage of the sheathing tears the paper, making it practically worthless as protection; the frost on the outside and the heat from the furnace or stove within soon destroy the plaster; add to this the jarring and vibration of the frail structure, and that they are habitable for 10 years is creditable to the care exercised in the construction. Twenty years ago no builder would think of using anything less than 2 x 6 for studding, even in a cottage.

"About 30 years ago I built a dwelling, with studding 2 x 6, joist 2 x 10 and 2 x 8. On the sides of the studding flush with the outer edge were nailed 1 x 2 inch strips, and after the sheathing and siding were put on lath was nailed on those strips between the studding from sill to crown plate, and one coat of good mortar was laid, covering the whole outer wall, including around the window and door casings. After the under floor was laid, the interior was lathed and plastered and finished in the regular order. Thirty years this dwelling has been occupied and is in excellent condition at present; the floors and porches wore out and had to be replaced, but the plastering is as sound as when it was put on. The air chamber between the outer and inside coats excluded frost, hot and cold air come through the door and windows and could be regulated to suit, the saving in fuel alone saved many times the cost of the extra plastering, without taking into consideration the comfort side of the account.

"Brick veneering, except for the sake of appearance, is no better than ordinary sheathing and siding. Common brick is porous, and all brick is a good conductor of heat and cold. A solid frame dwelling with two air chambers, constructed as the one I speak of, can be made as comfortable as the most expensive brick and stone residence, at a small advance over the present cost of construction."

The Ancient Door Knocker Revived.

A writer, dealing with the revival of an old custom, presents the following interesting comments:

It is the mode these days to fasten a knocker on one's front door, whether that door opens to the dark and sinuous corridor of a city flat or the spacious hall of a big country house. Furthermore, the knocker that hangs over the threshold must be a thing of beauty, or curiosity, or intrinsic value as an antique, and it is strictly against the rule to hang a Roman knocker on a Dutch door, or a colonial door, or, worse yet, a big, beautiful bronze Venetian knocker on a fair white door of the Washington period.

Fine bronze knockers from Italy are now difficult to find, so closely does the Italian Government guard against the exportation of treasures, but beautiful copies are made in this country and sold at a high price, and one of the most popular and charming patterns is that of a Pompeiian knocker, showing a woman's head in high relief on a bronze disk, and below this a ring that strikes upon a nail head when let fall. Another fashion in door decoration is to fasten a brass or bronze ribbon scroll just above the knocker, wheron, in Latin, or old English or medieval German, a welcoming sentiment is engraved.

Next after Italian knockers those most highly prized come from Flanders, and have been ruthlessly torn from the doors of old abbeys or convents. These are gorgeous affairs of wrought iron, and one of the finest specimens in this country decorates the front door of Biltmore. The Flemish knockers are a little too ponderous for any but the biggest, heaviest doors, and with the revival of colonial styles the elegant brass knockers from Holland and England.

Latest and strangest of door ornaments is the double knocker. A lion's mouth grips a ring, and this is fas-

Fig. 94.—Pattern Composed of Circles and Curves.

Fig. 95.—Pattern formed wholly of Circles.

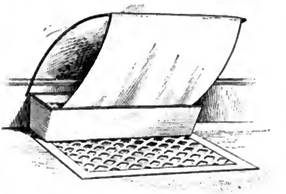
The Art of Wood Turning.

tened on the outside of the door, while on the inside of the wood panels is a replica of this, and the strange idea is an adaptation of a custom in old European cities when streets were narrow and doors opened outward. Then it was necessary for a person about to issue from his house to rap thrice with his inside knocker and warn pedestrians to get out of the way of the opening door, else a mighty blow would be delivered at some unfortunate passerby and a duel or a scuffle ensue.

Moistening Air From Registers.

While all may not agree that the warm or hot air from an indirect radiator or furnace needs any artificial supply of moisture, some may be interested in a method of moistening, herewith described, that has been in satisfactory use for some time. It has the advantage of being applicable to either floor or side wall registers when the register is near the base board. It is so simple that the tinsmith can readily furnish the equipment so that any body can apply it, and the picture shows the moistener as it is used. In this case a 10 x 14 register is in the floor near the base board and a long, narrow tin pan, 3½ inches deep and 3½ x 10 inches on top, is set close to the base board and extends over the register face to the air openings. Two holes are made in the base board, 1 inch beyond the pan, at each end, and the ends of a wire frame bent to form three sides of a square are inserted to support a towel which has its lower end in the water in the pan.

The wire frame extends so that at the top it is about



Moistening Air from Registers

1 foot above the register and runs out from the wall about 8 inches, so as to bring the damp towel over the current of air flowing from the register. The towel is doubled over the support and has two ends in the water, which is drawn up and keeps the towel wet to a distance of from 4 to 8 inches above the pan, according to the temperature and velocity of the hot air current.

The air will carry from the moistener from 1 quart to 3 pints of water in 24 hours. Since this moistener has been used in a sitting room connected with a library by a large double door always open, it has been noticed that there is less of the dust that was formerly carried in with the cold air supply and deposited everywhere. This dust is now arrested by the damp towel and makes less work for the duster. The variation in the hight of the line of moisture in the towel is clearly marked by the accumulation of dust up to this point and the cleaner appearance of the towel above it. If the towel is continued in use with the furnace run to suit mild and cold weather the dust and moisture lines will show clearly at different hights.

The same apparatus is used in a sleeping room where one window is full of growing plants, but in this room the register is on the side wall. Here the water pan is hung so that the top is even with the bottom of the register, and the frame holds the towel in front of the register about 8 inches from it at the top. The air from the register strikes the damp towel and the dust or moisture line is as clearly marked as with the floor register. When the moistener is in operation the plants clearly show that they do not need watering so freely, and the occupants of the room can readily tell by the dry feeling of the air when the water pan has not been refilled.

With the mercury at 10 degrees below zero there was no excessive frost on the windows, though more than a quart of water disappeared daily. Another point is that those who wish the moisture in any particular room can have it where there is no interest to provide it for the whole house. The towels can be washed as often as necessary, and their appearance will suggest that it be done frequently.

New Publications.

The Builders' Handbook. By A. Roberts, architect. Size, 4 x 6½ inches. 218 pages. Numerous illustrations and tables. Bound in flexible covers with gilt side title. Published by A. Roberts & Co. Price, $1.50.

This little work was compiled for the purpose of serving as an aid to the village carpenter or builder, who often finds it convenient to have ready at hand a little volume of "reminders" touching the line of work in which he is engaged. In fact it is designed especially as an elementary treatise on building for beginners, or for house owners, as well as for those thinking of building, who desire to know just how the work should be done. Attention is given to a few geometrical problems, prominent among which are methods of describing ellipses; the steel square, and some of its many uses; foundations, limes and cements, construction of stone walls, brick work, including arches, the cost of the same, plastering in all its various phases; after which is told how a frame house should be built. There is a chapter on the strength of timber, with numerous tables, after which attention is given to trussed girders, various forms of roof trusses; a chapter on mill construction; another on roofs and roofing, including asphalt and pitch compositions; some remarks on the subject of painting, followed by a chapter giving memoranda concerning outbuildings, such as stables, carriage houses, silos, ice houses, &c. The construction of grain bins forms the basis of another chapter. In the way of miscellaneous matter there are tables showing joist, scantling and timber reduced to board measure, weights of lumber, weights of windows, dimensions and weights of steel wire nails, steel cut nails, nail tests; tables showing weights and sizes of wire, sheet metal, square and round bars; also those showing strength of columns, beams; weights and measures; dimensions of furniture; spaces occupied by plumbing fixtures; pressure and flow of water; areas and circumferences of circles, and rules of the mechanical powers.

Cassell's Cyclopedia of Mechanics. Edited by Paul N. Hasluck. Size, 7¼ x 10¼ inches. 384 pages. 1200 illustrations. Bound in heavy board covers. Published by Cassel & Co., Limited. Price, post paid, $2.50.

This work contains in form convenient for reference and everyday practice a large number of recipes, processes and memoranda for workshop use, contributed by a staff of skillful and talented writers, upon whose practical experience and expert knowledge the information is based. Among the great mass of matter presented will be found much that is of interest to wood workers and building mechanics, dealing as it does with framing, cabinet work, joinery, roof construction, construction of paneled doors, finding bevels of rafters, strength of concrete, setting out of elliptic arches, Dutch barn construction, stair work, rules for circle on circle arches, centering brick work, perspective drawing, mitering cornice moldings, construction of pulpits, tenons of entrance gates, tuck pointing, brick work, forming concrete window sills and heads, working circular moldings, dove-tailing, elliptical headed door frames, together with many other subjects relating to the building and allied interests. An idea of the scope of the work may be gathered from the index, which covers 8500 items. This is so arranged as to provide a means by which each separate detail of any kind dealt with in the volume may be traced and referred to with the least amount of trouble. The index also brings together every reference to the same subject, however widely scattered, and all varied notes included under one head, each properly analyzed and re-grouped with kindred topics.

Opening of the Twentieth Season of the New York Trade School.

The formal opening of the day classes of the twentieth season of the New York Trade School took place in the auditorium of the school at Sixty-seventh street and First avenue, New York, on December 18, the exercises consisting mainly of a welcome to the scholars on the behalf of the school by R. Fulton Cutting, president of the Board of Trustees. Mr. Cutting extended a cordial greeting to the young men, and in his remarks stated that he was glad to see so many hearty young Americans willing to make the sacrifices that were necessary to ground themselves in the first principles and handicraft of the trade as a means of earning a livelihood, and take their parts as citizens in this progressive country. He warned them against the temptations of a large city and advised them to devote the time, which in after years they would look upon as all too short, to the acquiring of all possible information on all the details of the trade they had selected. He pointed out that the school had been founded by Colonel Auchmuty to give the young men of the country a chance to learn a trade, and that preceding classes had improved the opportunity, and now throughout the country there were a number of competent artisans who reflected credit on the school through the excellence of their work. He explained that the experience with the pupils of former classes had qualified the superintendent, Mr. Brill, and the trustees to answer the many and varied questions which would naturally come up to the young men, and cordially invited them to present their inquiries to the officers and instructors, assuring them that in case of sickness or trouble of any sort the best possible advice and assistance would be freely given.

At the close of his remarks he introduced John Beattie, who has ever been a popular speaker to the Trade School scholars, and while he never fails to remind them that he is a painter, and proud of it, they always derive benefit and receive good advice when he addresses them in his kindly manner.

The opening of the present season is marked by the addition of a new class devoted to sheet metal work and cornice construction. This class has heretofore been conducted in the evening with remarkable success, and it is to be regretted that so few scholars have enrolled in it, as the school has capacity for a much larger number. The course of instruction, including, as it does, pattern cutting, has been found of exceptional value by those who have completed it in the evening class. The day plumbing class, as usual, is filled and it was found necessary to turn away some who had applied.

An Expensive Log Cabin.

A log cabin which is estimated to cost, when completed, in the neighborhood of $100,000 is being erected on an island in Penobscot Bay, Maine, by a Philadelphia manufacturer, Nathan Folwell, 3d, who will use it as his summer home. The island lies 40 miles south of Bangor, rising high above the bay and commanding a fine view of the Camden Mountains. It is said that the idea of building a cabin originated with Mr. Folwell's father, who died some months ago. On his deathbed he urged his son to complete the task, and to make the dwelling a summer residence for the family. The work of construction was begun in September, 1899, and it is expected to have the cabin ready for occupancy early the coming fall.

The cabin has a frontage of 60 feet, and, when completed, will be two stories in hight, with gable ends and dormer windows. No lathing, plastering or paper will be seen in the interior, the logs being brought to a fine finish and highly polished, so as to bring out the beautiful markings of the native woods. The entire front of the cabin will be taken up with a hall or living room, 60 x 30 feet in size. In this room is a fire place 9 feet wide, the cap stone, it is said, weighing 2 tons, on which are cut in bas relief the words, "How Beautiful the Mountains." This is intended to call the attention of visitors to the magnificent view of the Camden Mountains to be had from the cabin windows.

Proportion of Mortar in Brick Work.

A well-known writer in discussing the question of proportions in connection with brick work states that in estimating for the latter a knowledge is necessary of the proportion of mortar required to lay the bricks. While this cannot be given with positive accuracy, it can be sufficiently approximated to serve as the basis of an estimate. The better the brick work, the less mortar will be required, for good brick work means fine joints and little mortar, while coarse brick work means many joints and wide spaces. With bricks 8¼ x 4 x 2 inches, the following are the quantities of mortar as compared with the whole mass, and the number of bricks required for a cubic yard of massive work:

Size of joint.	Amount of mortar in mass.	No. of bricks in cubic yard.	No. of bricks in cubic foot.
1/8	1/10	638	23.63
1/4	1/5	574	21.26
3/8	3/11	522	19.33
1/2	1/3	475	17.60
5/8	5/13	433	16.04

From the foregoing the bricklayer can easily figure out how much mortar he will want for each 1000 bricks laid, knowing the price of lime and cement, for often he may be called upon to lay his bricks in cement.

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COLONIAL RESIDENCE OF MR. CHARLES BIRDSELL, THIRD AVENUE, ROSELLE, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1901.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
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MARCH, 1901

Local Building Operations in 1900.

The figures contained in the report of the Commissioner of the Department of Buildings, covering operations in Greater New York for the year ending December 31, 1900, and made public February 11, afford a most striking contrast when compared with those of the preceding 12 months, indicating, as they do, a skrinkage of nearly 50 per cent. It is to be remembered, however, that the year 1899 witnessed an unusual degree of activity in the building line in this city, and that the estimated cost of the new structures for which permits were issued reached a figure far in excess of anything previously recorded for a similar period. While, therefore, the report shows a remarkable falling off in the estimated cost of the projected buildings, the total is considerably above the average and represents a very creditable amount of work. The applications filed for new buildings and alterations last year reached a total of 15,504, estimated to cost $88,462,174, as compared with 21,571 buildings involving an outlay of $167,618,664 in 1899. The number of new buildings commenced last year was 6548, and the number completed 6552, as against 9685 and 7426 respectively in 1899. The new buildings in process of construction on December 31 last were 6365 and the alterations in progress at that date were 1978. Of the total estimated cost of new buildings, $29,337,000 were for flat houses, costing over $15,000 each; $5,084,800 for tenement houses costing under $15,000 each, while dwelling houses of other kinds called for about $9,500,000. The amount of capital put into new office buildings aggregated only $2,686,025; school houses, $3,716,000; stores of all kinds, $6,050,294; manufactories and work shops, $5,578,644; frame dwellings as distinguished from those mentioned above, which presumably refer to brick and stone construction, $6,870,045. The boroughs of Manhattan and the Bronx, of course, take the lead, the estimated cost of their new buildings being $58,123,263. Brooklyn ranks second, with operations costing $16,499,582, and the boroughs of Queens and Richmond come last, with $3,668,699. The cost of alterations to buildings in the various boroughs during the year aggregated $9,661,098. The outlook for the ensuing year, judging from the permits for buildings already issued, is for a season of activity somewhat in excess of last year.

A Plea for Public Trade Schools.

In his annual report, just made public, William H. Maxwell, Superintendent of Schools of New York City, makes a strong plea for the establishment of trade schools in connection with the public school system. He contends that the manual training high school, as it has been developed in this country, does not go far enough and that there is a crying need for schools which will give a definite trade training. In the crowded tenement house districts there are thousands of boys who must leave school the moment the compulsory education law allows. They have the rudiments of an English education, but they are sadly at a loss as to how to earn a decent living. The education the boy has received has been sufficient to create in him a desire for things higher and better than those which he finds in his sordid surroundings, but it has not gone far enough to give him any art by which he may earn a living. As the old apprenticeship system no longer exists, Mr. Maxwell sees no hope for the average boy who wants to learn a handicraft except in the provision of well organized and equipped trade schools. And this advantage, he says, could be provided without adding a year to the boy's schooling, as he could be taken out of the elementary school when he has finished the sixth year and be allowed to spend the next two years, or until he is fourteen, in learning not only history and composition, but some trade whereby he could go out in the world equipped to earn a living. The establishment of such schools, Mr. Maxwell believes, would not add much, if anything, to the cost of the public schools of the city, while the city would be amply repaid for any expense attending their maintenance by the increased supply of skilled workmen they would produce and they would, moreover, bring untold benefits to the poorer classes who are unable to give their children a proper trade training. The idea applied to trade schools is an excellent one and there are many who would rejoice to see it carried into practice. but Mr. Maxwell, apparently, has not taken into the account the opposition any such plan would inevitably meet with from the labor unions, whose interests lie rather in the direction of restricting the opportunities for boys to enter trades than in increasing the supply of skilled tradesmen.

An Apartment House for the Wealthy.

There is now in course of erection upon a commanding site on Riverside Drive, in this city, an apartment house, which, when completed, will take a leading place among dwellings of this class which so thickly dot the best residential sections of the upper west side. The structure covers a plot fronting 116 feet on the Drive, 126 feet on Eighty-ninth street, and will be seven stories above the sidewalk, not counting those in the turrets from which the building takes its name. Granite, Indiana limestone, terra cotta and brick will be used in the treatment of the exterior, while the internal features will include many that are novel, and which indicate in some measure, on the part of the architects, H. S. Harde and R. Thomas Short, a striving for superior effects and attractions that mark current progress in apartment house construction. Features decidedly out of the ordinary will be a large marble swimming pool in the basement, a gymnasium and a billiard room for the free use of the tenants; a large ballroom with banquet hall, together with accommodations for storing and charging automobiles, not to mention cold storage system, electric lighting, telephone service, safes for silver in the paneling of the dining rooms, &c. The apartments will be in suites ranging from ten rooms and three baths to 20 rooms and six baths, a suite of the latter size occupying an entire floor and affording, it is stated, more room than is to be found in the average five-story private house. The walls and floors of the kitchens and bathrooms will be of white marble, and mirrors will be placed in the panels of all chamber doors. The servants' quarters will be in a wing apart from the main structure. It is said that the rents for the apartments will range from $2000 to $10,000 per year, from which it will be seen that they are intended only for people in very comfortable circumstances financially.

A Year's Fire Waste.

The year 1900 will be marked in the fire insurance annals of the United States as an exceptionally disastrous season, and it is likely that many companies will show heavy losses as the result of the year's operations. According to a compilation of the carefully kept records of the New York *Journal of Commerce*, the fire loss of the United States and Canada last year reached the unprecedented total of $163,362,250. This is an increase of more than $26,500,000 over the figures for 1899, which was regarded as a most unfavorable year for fire underwriters. In comparison wtih 1898 the increase was $43,700,000; with 1897, $52,500,000, and with 1896 nearly $57,000,000. Thus, in spite of all the modern improvements introduced in the fire fighting equipment of American cities, the annual fire waste has made a progressive increase in the past five years. In 1896 the average monthly loss from this cause was $8,810,000; in 1897, $9,150,000; in 1898, $9,970,000; in 1899, $11,400,000, and in 1900, $13,600,000. During the past year there were 24 fires each of which involved a loss of over half a million dollars. At the head stands the great conflagration which wiped out a large part of the twin cities of Ottawa and Hull in Canada at a cost of over $12,000,000. The disastrous fire at Hoboken, N. J., destroyed $5,350,000 worth of docks, ocean steamers, storehouses and cargoes, and between $1,000,000 and $1,800,000 worth of property each was lost in fires which occurred in Newark, N. J.; Pittsburgh, Pa.; Bloomington, Ill.; Prescott, Ariz.; Santa Rosa, Cal.; Ashland, Wis., and Constable Hook, N. J. The fires in 1900 exceeding $10,000 in destructiveness numbered 2400. Under the circumstances, it is not to be wondered at that the fire underwriters are contemplating action looking to higher rates for insurance during the present year.

Report of Illinois Board of Examiners of Architects.

In view of the present agitation of the question of licensing architects in New York State it is interesting to note some of the results recorded in the biennial report of the proceedings of the Board of Examiners of Architects of the State of Illinois, where a license law has been in force for several years past. According to President N. C. Ricker the board has granted 773 licenses to practice architecture in that State, of which 663 are now in force and 140 have been revoked or expired by the death of the holders, only one being revoked for cause.

During the period covered by the report there were 106 applications for examination, 27 being architects of experience and for the most part from other States; 62 were examined in classes, of which 36 passed and received certificates, and 26 were rejected. Examination licenses were issued to the number of 54.

Many applications were received from civil and mechanical engineers who had occasionally, in the practice of their profession, designed buildings as well as other work. These applicants were versed in the principles of construction in general, but did not have many of the other qualifications of a professional architect, such as the knowledge of sanitary science and economical planning. Many of them did not wish to enter the profession, but, being in the employment of corporations, desired to enjoy the privilege of an architect's seal for the advantage their employers might obtain. The question was referred to the Attorney-General, and in his reply he stated that certificates could not be issued to specialists.

Within the past two years the board has had occasion to act in three cases, in two of which charges of dishonest practices were made. The specific offense was the use of a licensed architect's seal on plans not made by himself and for the benefit of other persons. In the first case the fact was proved, but the board did not consider that a dishonest act had been committed, because no consideration was shown. The architect was dismissed with a reprimand and a warning. In the second case the license was revoked and in the third case a charge of incompetency was made by a contractor against an architect but could not be substantiated.

The New York Public Library.

It has now been decided as a result of a recent meeting of the Board of Estimate and Apportionment to use marble in the construction of the new Public Library, Astor, Lenox and Tilden foundations, which is now in process of erection on the site of the old distributing reservoir at Fifth avenue and Fortieth to Forty-second streets, in this city. The idea is to make the building a lasting monument to the city, and the authorities seem to feel that under the circumstances marble is the preferable material for the purpose. An issue of bonds by the city to meet the cost of the structure has recently been authorized, the total outlay being now estimated at about $3,500,000 and the time to complete the work about three years.

The Duquesne Library Building.

The contract for the erection of the building presented by Andrew Carnegie to Duquesne, Pa., for library purposes has recently been awarded to William Miller & Sons, the amount approximating $300,000. The work will be commenced as soon as possible, and it is expected that the structure will be completed within a year and a half. We understand that the building is to be very nearly a duplicate of Mr. Carnegie's gift to Homestead, which was completed about two years ago by the same contractors. The Duquesne structure was designed to provide all the healthful recreation that the mill men and their families could desire, and aside from providing them a great library, the building will be in the nature of a splendid club house for their convenience. It will have a swimming pool, gymnasium, billiard hall, bowling alley and music hall. The floor dimensions of the building will be 232 x 136 feet and the hight will be three stories and basement. The exterior will consist of an attractive blending of stone, brick and terra cotta, with red tile roof, while the interior will be finished with marble, oak and other hard woods.

A PLAN for arbitration of labor difficulties in New Haven, Conn., is of interest, not because of its novelty, but because of its evidence of a widening appreciation of the belief that industrial waste through strikes should be prevented. The scheme provides for co-operation in the creation of a Board of Arbitration by the Chamber of Commerce, the State Business Men's Association and the labor organizations. It would not be compulsory arbitration, of course, but the belief is that public sentiment would force a resort to arbitration by one party to a controversy if the other party favors that method of settlement. The proposition has received the indorsement of many employers of labor in New Haven, and has been favorably commented on by the wage earners. If the plan works well in New Haven it could be extended readily over the state, particularly as one of the associations interested is a State organization.

It is expected that the outcome of a movement now on foot in which several capitalists are interested will be the erection of an 18-story hotel on the site of the old Hotel Brunswick, at Fifth avenue and Twenty-sixth and Twenty-seventh streets, New York City. The building will be fire proof throughout, contain 900 rooms, and be put up in accordance with plans prepared by Architect Henry Ives Cobb. It is stated that $4,750,000 will represent the total investment in land and building.

IT is stated that plans have been prepared for a new hotel to be erected at the corner of Chase and Charles streets, Baltimore, Md., at a cost of $1,000,000. It will be 12 stories in hight and constructed of Indiana limestone and light brick.

BRICK RESIDENCE IN A CINCINNATI SUBURB.

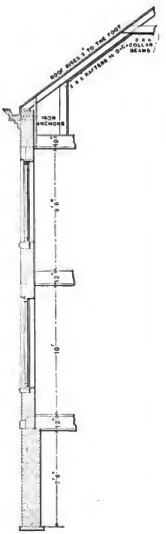
We present for the consideration of our readers this month a modern two story brick residence, pleasantly situated on Academy avenue, Price Hill, one of Cincinnati's most desirable suburbs. In its architectural treatment and arrangement of rooms, there are many points of interest to the readers, whether they be architects, builders or prospective house owners. The elevations and miscellaneous details clearly indicate the construction, while the floor plans show the disposition of the various rooms.

The foundation walls are of limestone bedded in cement mortar and pointed on the exterior exposed face work with colored cement mortar. The walls of the building are of hard burned brick laid in lime mortar, the exterior face of the front wall being of first-class Akron pressed brick, while the faces of the sides and rear are of Mitchell's best quality red face brick, all bound together with blind headers every seventh course. The trimmings are of blue Rockcastle stone.

The joist for the first and second floors are 2 x 12 inch yellow pine, and for the third floor 2 x 10 inch, all spaced 16 inches on centers and bridged with 1 x 3 inch strips every 5 feet. All joists are well anchored into the brick walls with 1½ x ¼ inch iron anchors 2 feet in length and placed 8 feet apart. The rafters are 2 x 6 inches, spaced 16 inches on centers, and secured to a 2 x 12 inch wall plate, which is anchored to the brick wall by means of ¾-inch round iron anchors 3 feet 6 inches long and placed 8 feet apart.

The roof is sheathed with strips of yellow pine 6 inches wide, tongued and grooved and covered with Buckingham black Virginia slate 9 x 18 inches, laid with a 3-inch lap on Sackett's No. 2 waterproof building paper, each slate being secured with steel wire slating nails. All exterior mill work is of the best quality white pine, including the floors of the porches, which are composed of 2 x 8 inch joist supported on 4 x 8 inch wood beams resting on stone piers. The flooring of the porches is of white pine 1⅛ inches thick and 2¼ inches wide, laid with pure white lead joints, and blind nailed to each joist, the latter being spaced 16 inches on centers. The porch rafters are 2 x 6 inches, also placed 16 inches on centers. The ceilings of the porches are of beaded yellow pine, while the roofs are sheathed and covered with slate.

The floors throughout the house are of yellow pine ⅞ inches thick, 3¼ inches wide, and blind nailed to each joist. The inside finish is in selected yellow pine and treated with three coats of Murphy's transparent inside varnish, as are likewise the stairs and interior mill work. All outside wood work is painted three coats, while all tin and galvanized iron work has three coats of metallic paint. All tin was painted with one good coat of the under side before being put on the roof. The plastering is three coat work, gauged with hard white plaster of paris. The plumbing is first class throughout, embracing the latest improved sanitary appliances and up to date fixtures. The house is heated by a hot air furnace made by the Peck, Williamson Heating & Ventilating Company, the position of the registers being indicated on the floor plans. The bath room is heated from a wall register opening under the wash basin, while a register



Section.

Front Elevation.—Scale, ⅛ Inch to the Foot

Brick Residence in a Cincinnati Suburb.—John P. Stryker, Architect, Cincinnati, Ohio.

on the other side of the partition heats the approach to the closet. The house is wired for electric gas lighting, has speaking tubes leading to the kitchen, and in the cemented cellar is placed the laundry.

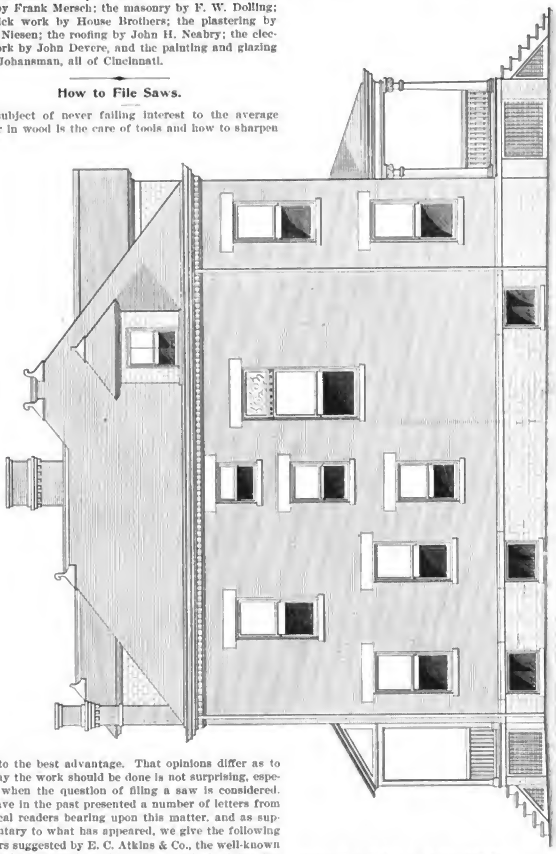
The house was erected for J. E. Sandou, in accordance with plans prepared by John P. Stryker of 96 Perrin avenue, Cincinnati, Ohio. The contract for the carpentry work was executed by F. & H. Peters; the cut stone work by Frank Mersch; the masonry by F. W. Dolling; the brick work by House Brothers; the plastering by Frank Niesen; the roofing by John H. Neabry; the electric work by John Devere, and the painting and glazing by F. Johansman, all of Cincinnati.

How to File Saws.

A subject of never failing interest to the average worker in wood is the care of tools and how to sharpen them to the best advantage. That opinions differ as to the way the work should be done is not surprising, especially when the question of filing a saw is considered. We have in the past presented a number of letters from practical readers bearing upon this matter, and as supplementary to what has appeared, we give the following pointers suggested by E. C. Atkins & Co., the well-known saw makers, regarding the proper method of keeping hand and rip saws in order:

It does not necessarily require any great skill, as many people suppose, to file and set their saws, but there are a few essential points which should be observed if you wish to get the best results. These observations are the result of long experience and careful study and it is earnestly hoped will prove of benefit.

The first operation should be what is commonly called jointing. It is better to take a flat mill file and rub the teeth down until their length is uniform. For instance, in a straight breasted saw, if you should put a straight edge along the teeth every one should just touch it. Then comes the setting. Use, if you have one, a regular setting block, and care should be used in preparing said block not to have a shape edge where the tooth bends down, as it is apt to cause breakage. Do not set your tooth too far into the saw. A turning of the point is sufficient and is far better for the saws. The teeth should be set alternately right and left. A highly tempered saw which will hold the edge best must be carefully handled or you will lose many teeth in this operation. Do not put any more set than just enough to clear nicely. At this point it might be well to use the flat mill file, and do what is commonly called side filing the teeth.



Brick Residence in a Cincinnati Suburb.—North Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

This is to guard against any uneven setting, and will be appreciated in the finished saw.

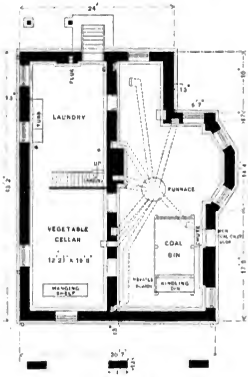
Your saw is now ready to file, and you will find it advisable to select your files carefully. For a six and seven point saw use a 7-inch slim paper. For eight and nine points use 6-inch slim taper, and for ten, eleven and twelve point use a 5-inch slim taper. After placing your saw securely in the vise, commence to file at the point and progress toward the butt or heel. Always file the teeth which are set away from you, and as to the amount of beveling, it is entirely at the discretion of the carpenter. It is essential, however, that the bevel be placed on the front of the tooth. When through with one side, reverse the saw and proceed as before.

To prepare rip saws proceed as in hand saws, except always use 7-inch slim taper, and if the saw is intended to cut hard lumber a slight bevel is advisable, but if for ordinary and soft wood it is best to file straight across.

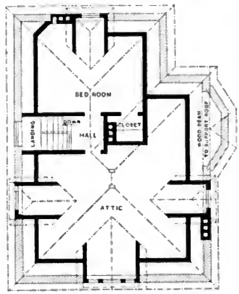
With these points carefully in mind we see no reason why you should not be a success in the care of your own saws.

EGG-SHELL gloss in paint work may be prepared by a number of coats carefully rubbed down between each, and by using plenty of turps and a little oil in the last coats—not sufficient, however, to render the job glossy, and yet enough to prevent it from drying entirely flat.

AN ancient Roman country house has recently been unearthed at Boscoreale, on the slope of Vesuvius. It contains 24 rooms, which were completely empty, but the walls were covered with 70 extraordinarily well preserved frescoes. In these figures of life and more than life size are painted, being the first ancient pictures of such proportions. One represents a guitar player, twice the size of life; another an old gladiator talking to a woman. The frescoes have now been carefully removed from the walls. They are ascribed to the period of the late republic—a hundred or two hundred years earlier, that is, than the Pompeii pictures.



Foundation.



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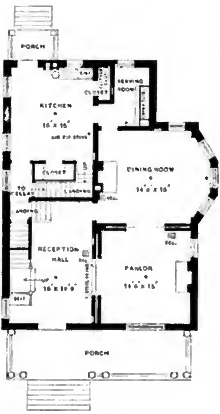
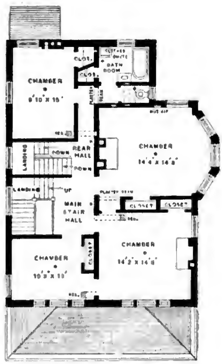
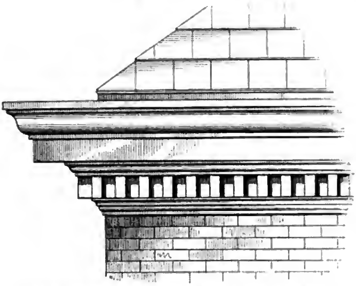


First Floor.

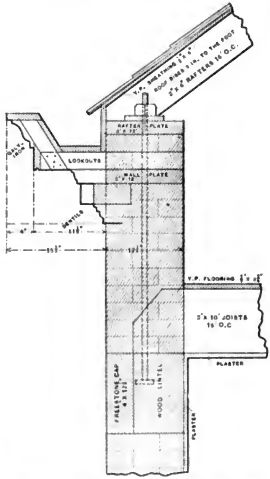


Second Floor.

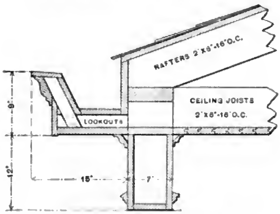
Brick Residence in a Cincinnati Suburb.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*



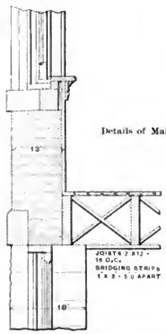
Partial Elevation of Main Cornice.—Scale, ¾ Inch to the Foot.



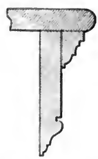
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



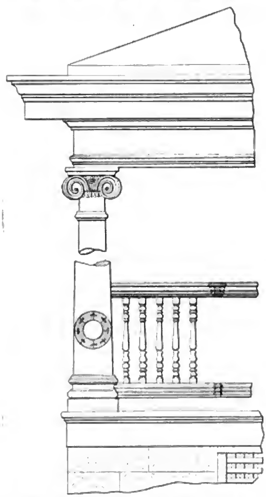
Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.



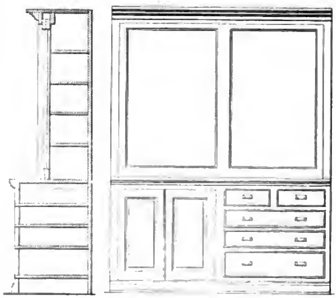
Details of Water Table with Sections through Window Sill and Floor Joist.—Scale, ½ Inch to the Foot.



Detail of Window Stool and Apron.—Scale, 3 Inches to the Foot.



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



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

Miscellaneous Constructive Details of Brick Residence in a Cincinnati Suburb.

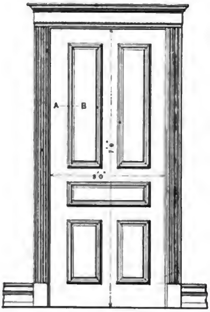
Some Suggestions in Planning Houses.

In a recent lecture upon the subject of "Houses and Grounds" R. Clipston Sturgis, the well known architect, emphasized the possibilities of small lots and advised his hearers before purchasing a building lot to consider what the house was going to be, the exposure of rooms, the approach, what to do with the grounds, whether a flower or vegetable garden was most desired, in fact, to consider carefully to what the purchase would lead.

The plan of the house, he said, was the keynote to the whole problem, and the first consideration was whether one was going to build for his own comfort or for his friends. From the English and Continental point of view, privacy was the great desideratum. The comfort of the family was the first thought, then good provision was made for the comfort of guests, insuring for them also some privacy. The point of view in New England seemed to make guests part of the family, and to plan houses suitable for entertainment rather than for the daily home comfort of the family. The architect's point of view lies between these two.

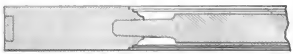
As to the exposure of the house it was suggested that such a plan should be adopted as would give sunshine in every room which was to be occupied during the day, in which people planned to sit and live, keeping the less desirable exposure for the approach or for such rooms as were used only in the evening.

After deciding this question, the next was in regard to the grounds; this matter should be settled before starting on the plans. In England the fore court, or front yard, is made part of the architecture of the house, and is kept clear of any ornamentation which cannot be taken in at a glance. As the back yard is absolutely for use, it should be enclosed as much as possible, but care should be taken not to shut out air and sun. As to vegetable gardens, the lecturer differed in his opinion from the majority of people, who consider them unsightly, and believed that they could be made almost as attractive as flower gardens and recommended, where space was limited, a combination of both. No place is so small but what a portion of it should be reserved for grass, as without grass a place would not be interesting.



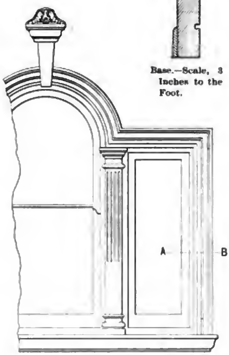
Elevation Showing Style of Door Used on First Floor.—Scale, ¾ Inch to the Foot.

Base.—Scale, 3 Inches to the Foot.

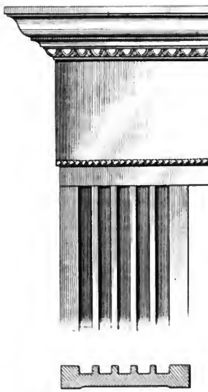


Section through Door on Line A B.—Scale, 3 Inches to the Foot.

Vertical Section through Center of Second Story Front Windows —Scale, ¾ Inch to the Foot.



Partial Elevation of Second Story Front Windows. —Scale, ¾ Inch to the Foot.



Detail of Casing and Head.—Scale, 3 Inches to the Foot.

Section through Architrave at A B.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Brick Residence in a Cincinnati Suburb.

As to shrubs, which may serve an absolutely good purpose as screens or shields, the lecturer did not consider them ornamental when used singly, and the same thing applied to trees. It was almost always a mistake to have single specimens. In contrast with the growing tendency of recent years to abolish fences, Mr. Sturgis advocated marked boundaries, and thought no place looked well without them and that their absence destroyed all privacy.

THE SCIENCE OF HANDRAILING.

BY C. H. FOX.

WE will next consider the construction of a cardboard representation of a solid showing the actual inclination and position, together with the development of the sections which belong to the face and joint surfaces of a rail, the plan of which is a quarter circle, the rise of the section plane of the face mold being taken equal over the plan tangents. In applying the above to stone work it may be taken as referring to a piece of coping or a string piece.

In Fig. 5 is given the plan, the center curve A-3'-C, inclosed in the square O-A-B-C, being a *fac-simile* of that given at the plan of Fig. 4, and may be drawn in the manner there explained. We have here, in T-3"-U, and V-3,-V', introduced the plan curves respectively of the convex and concave faces of the rail. These, as may be noted, are drawn with the center O. Two sides of the square drawn in the plan in this example are taken to represent the position of joint lines. The opposite sides, as A-B, B-C of the square, are again taken as the horizontal traces of "planes" tangent with the center points A-C, at which the joints are desired. The student, having drawn the plan curves, the joint lines and tangents, and produced them in either direction in the manner shown on the drawing, will join the intersection B of the tangents with the center O with which the curves may be drawn, which will give the directing ordinate of the plan. Then square with this through O draw the seat line H-H'. Now parallel with B-O, through any number of points, as C-2', &c., at the plan curves, produce lines above the seat line indefinitely.

In order to show the section which belongs to the lower joint surface over A, we have in a manner to raise the plane of the plan above that of the seat line H-H', or, as may be noted in the model constructed in Fig. 4, the center point of the joint surface represented in A will meet the ground plane at the point A of the plan. From this it will be seen that only the portion either of the face or of the joint sections comprised within Z-A-A' of Fig. 6 may be projected. This important point has been neglected in the models of other writers, for, as shown in Fig. 5*a*, the point B meets and remains in the plane of the plan of the base, while the point G meets the angle, or, rather, is the intersecting point of the angle, formed by the intersection of the two planes forming the sides of the model. In order to show the joint surface over A all that is really necessary is to raise the ground plane a hight sufficient to allow the joint section to be developed. Here, in order to make the construction as clear as possible, the ground line has been raised more than is required. It is shown in the lines P-G, G-X, X'-A', of Fig. 6, and in the lines G-D,, D'-D", of Fig. 5.

The student having determined upon any hight corresponding to that of A'-A of Fig. 6, will draw A-G indefinitely and parallel with the seat line. Then produce the ordinate through A of Fig. 5, to meet the tangent C-B produced in E'. Square up E'-10' equal with A'-A of Fig. 6. Now draw 10'-F-H, making it a right angle. Then through 10' draw 10'-G. This intercepts the line O-F in D. Divide D-F in E into two equal hights, and parallel with H-B draw I-E-E,. Now with B as center rotate D,-E, into D'-E', and joint E'-D", which gives the pitch of the oblique section plane over the tangent A-B; that over the upper tangent B-C is, of course, given in the line E,-F, first drawn. Now square with E'-D" draw D"-5, which completes the two sides of the model forming the tangent planes. The vertical rise of the rail is given in D'-E' over the lower, and in the equal hight E-F over the upper tangent.

Now to find the right inclination of the section plane of the face mold proceed as follows: In Fig. 6 set off C'-C at the vertical through C of the plan, equal with C-F, and A-A equal with A-D" of Fig. 5; joining A-C gives the right inclination. Now square with C-A through the points given in C-2-B, &c., at the right inclination draw the ordinates of the section plane. Set off B-B', C-C' and A-A' equal respectively with O-B and A'-A of the plan. Then, joining A'-B'-C', the projections of the tangents of the section plane may be obtained. Now square with A'-B', B'-C' draw Z-T and T'-Y. These are the projections of the joint lines as required at the face mold to give the direction for forming the joint surfaces of the rail.

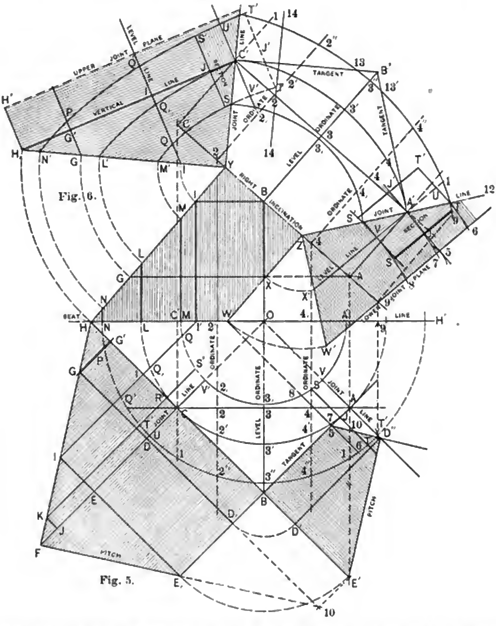
Now set off A-1, 4-4, 4-4'-4", etc., equal with A-1, 4,-4-4'-4", &c., of the plan, which gives in 1-4"-3", &c., the points through which to trace the elliptical curves of the section plane. The student may experience some difficulty in finding the points as required at the joint lines through which to draw the curves of the convex and concave faces. This may be obviated in the following manner: Through the point given in T' of the plan at which the joint line which belongs to the lower joint surface meets the convex face curve draw an ordinate, as T'-9; then square over at the section plane the ordinate 9'-9 equal in length to that of the ordinate T'-9 of the plan. This gives a point in 9 through which to draw the curve. Having drawn, first, the convex face curve, set off A'-S' of the lower joint line, and T'-C'-C'-S of the upper joint, respectively equal with A'-T, which gives S'-T'-S', the required points at the joint lines through which to trace the curves.

Now to construct the representation of the joint surfaces, and develop the curves of right section in their own planes, proceed as follows: First, take that of the lower joint surface over A. In Fig. 5 draw 5-W parallel with the joint line O-A. Then in Fig. 6, square with the right inclination draw Z-W and Y-H. Now parallel with the tangents draw Z-W' and Y-H,, and with Z as center rotate X-W into X'-W'; join X'-A', and we may obtain the projection a level line lying on the surface of the joint, when this may be placed at its proper position over the plan. Now with W' as center and W-5 of the plan as the radius draw an arc in 5; then with A' as center and D"-5 of Fig. 5 as the radius cut the arc in 5, draw W'-5 through 5, and we may obtain the line in which the joint surface meets that of the plan. Square with W'-5 draw 5-A', and we may obtain the line in which the joint surface intercepts the tangent plane over the lower tangent A-B of the plan. This gives in 5-A'-12 the "plumb bevel," as required by the workman in order to "square the wreath." This being constructed in its own plane at the representation of the point at which in practice it may be applied, no difficulty can possibly be experienced even with the beginner as regards the proper application. Now to develop the right section, which belongs to the joint surface, set off D-10 in Fig. 5 equal to the half thickness of the rail; then parallel with the joint line through 10 draw T-10-S. Now in Fig. 6 set off J-A', A'-J', each equal with the half thickness of the rail, and parallel with X'-A' draw S-J-T, S'-J'-T' equal with S-J-T of the plan. Then set off V-A'-U and 8-7-5-6 of Fig. 6, respectively equal with T'-A-V and 8-7-5-6 of Fig. 5; tracing the curves as shown in the diagram through the points given in T'-U-T-6, &c., and the right section of the joint plane may be obtained.

To project the representation of the upper joint surface we will parallel with the tangent B-C draw Y-H', and with Y as center and Y-H as radius draw an arc in H. Then with C' as center and the length F-H of Fig. 5 as radius cut the arc in H'; joining C'-H' gives the projection of the line in which the joint surface intercepts that of the tangent plane over the upper tangent B-C of the plan. This, when in its proper position over the plan, is a line which falls perpendicular over the line C-H of the tangent line B-C produced of the plan, and the angle contained in H,-C'-Y is that of the plumb bevel required at the upper joint surface of the wreath, to enable the operator to determine the proper position at which to apply the face mold and joint section. On trial this will be found equal with the angle contained in 12-A'-5 of the lower surface.

Now to develop the right section which belongs to the surface, set off J-C' and C'-J', each equal with the half thickness of the rail. Then with Y as center rotate the points I-M-L, &c., into the corresponding points of the joint surface; now square with C'-H, draw T'-J'-T, V'-C'-U', S'-J-S, &c., equal with the length of the corresponding points of the plan. The lines I-Q'-I', G-G', &c., drawn parallel with the joint line O-C of the plan, may very properly be termed as the ordinates of the joint surface, as they are horizontal traces of lines lying level upon the surface in question, the plan ordinates being in like manner the horizontal traces of level lines lying upon the oblique surface of the section plane. Through the points given in T'-U'-S'-Q', &c., trace the curves as shown in the diagram, which will give the contour of the right section of the surface. Now take a planes will then fall into their proper position without any trouble.

The student may now find the vertical or "plumb lines," C'-H, of the upper and A'-5 of the lower joint surfaces, to fall exactly over the lines F-H and D"-5 of Fig. 5; and, of course, if the tangent planes have been placed in their proper position—viz., perfectly perpendicular—the lines in question will of necessity fall over the lines of the plan. In order to test correctly the accuracy of the projections it will be well for the student to form another plan, duplicate of the one already made in Fig. 5. The curves, tangents and joint lines are all that are required; then, placing the model over the plan



Figs. 5 and 6.—Construction of Cardboard Representation of a Solid, Showing the Actual Inclination and Position, together with the Development of the Sections which Belong to the Face and Joint Surfaces of a Rail, the Plan of which is a Quarter Circle, the Rise of the Section Plane of the Face Mold being taken Equal Over the Plan Tangents.

The Science of Handrailing.

sharp knife, and commencing, say, at point 5 of the tangent plane, cut clear through the cardboard at the outline of the drawing around to point H' of the upper joint surface; then from H' to T' may be cut, as shown; then follow the direction given by the curve of the section from T' to 13, then at the tangent from 13 to 13'; then follow the direction again as given by the curve to point T. Cut through at the lines 6-W', W'-X'-Z, Z-X-W. Now at the lines T'-Y, Y-Z, Z-T and H-W of Fig. 6, and at 5-B, B-H of Fig. 5, cut about half through the board; then fold the three sides into their proper vertical position, with the lines at the exterior, which will permit of the section plane being revolved around the line of right inclination into its oblique position. The joint just made, the whole of the constructions may be tested in a very ready manner, especially if the curves of the right section are cut to the contours as projected at the joint surfaces; the student will then, on trial, find them to be perpendicular over the plan curves. There are many methods which will suggest themselves to the student by means of which the several surfaces may be held in their desired position; common pins and liquid glue will be found useful for the purpose.

Now let the student construct two full size sections, similar to those given in T'-T-S-S' of Fig. 6, and place them in their proper position at the joint surface of the model. Then also cut a duplicate of the face mold, as given in S'-T-T'-S of Fig. 6. He may then be enabled to obtain a practical demonstration of their application as would obtain in practice at the bench. To enable the beginner to thoroughly understand the explanations which are now to be given, we may be allowed to state: "In working to the tangent system of handrailing the face molds are constructed upon an imaginary central plane, parallel with the plane (generally named as the working surface) upon which the face mold may be applied to give the direction for forming the joint surfaces and cylindrical sides of the rail." This central plane of the face mold is that represented in the oblique top surface of the model. Also, "at the tangent system the joint surfaces are at all times made at right angles with this central plane and with the tangents on its surface." If the reader will procure a small square he will find these conditions to obtain at our model; that is, he will find the surfaces of the joints to be not only at right angles with the surface, but also with the tangents A'-B'-B'-C' of the section plane. Now let us for a moment consider the practical "squaring of the wreath piece" at the bench. We may assume the working surface to be ready for the application of and the marking of the face mold to its surface. Then, having cut the joint surfaces "square with the working surface" and to the direction as given by the joint lines of the mold, we are ready to find the direction of the plumb line, as required, in order to give the proper direction at which to apply the joint sections and face mold, so as to obtain the direction at which to form the cylindrical sides of the rail.

Up to this point the student has doubtless had no difficulty, but it is here that his real trouble commences, for he is in doubt after he has squared through the center lines as given by the points A'-C' of the face mold, and found the center points, as A'-C', of the joint sections, as to the application of the bevel. It seems to him just as reasonable to have the acute angle of the bevel placed at the convex side of the upper joint line as at the same position which obtains at the lower joint line of the problem now before us. Or, take again as an example a problem in which an acute angle obtains at the concave side of each respective joint surface; that is, an acute angle obtains similar to that of S-C'-J of Fig. 6 at both the upper and lower joint surfaces. This problem has often given trouble to others than the beginner. The workman has perhaps up to the present met only with wreath pieces at which the bevels may be applied in the manner as shown in the model, but here a new condition presents itself; he is in doubt as to the application of the "plumb bevel" and applies it in a direction other than the right one and so spoils the wreath piece. Why? Simply because the bevels are constructed at the plan, or at an elevation plane other than at the representation of the points in the drawing at which they are to be applied in practice. Such a condition cannot possibly obtain if the system of projection as here explained be made use of, for the projections, as may be noted, are made at the representations of the actual joint surfaces, and the workman if in doubt has only to refer to the drawing and he instantly sees the proper manner in which the bevels may be applied.

The principal object of any construction similar to that of cardboard representations of the solids of handrails, in our opinion, should be as a means of enabling the beginner to get a thorough insight into the intricacies of the problems, and to show him clearly the actual position and inclinations together with the sections of each oblique plane of the solid, without having to construct the actual solid of the problem in order to obtain the representations required. This latter has of necessity to be done in order to obtain the actual representations of the surfaces of the solid, if the model of Fig. 4-5*a* be made use of as a means of illustration, for no beginner can possibly conceive the actual positions, &c., of the joint surfaces from an examination of the model.

Now turn again to Fig. 6. Having constructed the two joint molds and placed them in their proper position at the joint surfaces of the model, take the duplicate face mold and place it vertically over the section of the oblique top surface of the model, taking note that the center points, as A'-C' of the mold, are perpendicular over the points A'-C' both of the section plane and of the plan. The mold requires also to be placed in such a position that it is perfectly parallel with the surface of the top. This position may readily be obtained by cutting two small pieces of cardboard, the hight of which may be obtained by simply drawing through the point T of the upper joint section of Fig. 6 a line, as 14-14, parallel with the joint line Y-T'. Touching the edges of these with glue, one of them may be placed to the upper joint surface, the other over the ordinate 4,-4", placing it in a vertical position; that is, square with the surface of the top. The face mold section may then be placed upon these in the position desired. It may now be noted the face mold projects over the arris of the top joint mold, but falls short of the arris of the lower joint section. This is the condition which obtains in the actual forming of the wreath piece; that is, at the second application of the face mold after the joint surfaces may have been formed the mold projects over the upper joint surface, and falls short, or, in other words, does not meet the arris of the lower joint surface, in the manner the duplicate face mold falls short at the model. The same remark applies to the application at the under working surface, only there it may be found that it is at the lower joint that the mold projects over the arris, while at the upper arris it is found to be short. The student having the model before him may clearly see the reason of this. The face mold, as before explained, is projected upon the central plane of the wreath piece, and not, as it should be, upon the representation of the plane upon which in practice it may be applied.

(To be continued.)

Red Stains for Wood.

In reply to the question of a correspondent relative to the production of red stains for wood, the *Allg. Tischler Zeitung* gives the following directions, which may not be without interest to some of our readers: Since the stains have, as a rule, a bleaching action on the wood, the latter may generally be colored red without special preparations. If, however, the wood to be stained is not light colored, it is advisable to bleach it previously. For this purpose lay the wood for about one-half hour in a bath of 2 parts lime chloride, 1 part crystallized soda and 48 parts water. After the bleaching lay the wood, to remove the adhering traces of the chloride, in a solution of 1 part sulphurous acid, in 10 to 12 parts water and wash it off with clean water. Now place the wood in a solution of 1 part Marseille soap, in 54 parts water, or rub it with it and apply aniline red (fuchsine) in a sufficiently diluted state so as to produce the desired shade. Fuchsine (crimson), coraline (high red) and eosine (amaranthine), belong to the aniline colors which are dissolved either in alcohol or water.

According to the Bulletin of the United States Department of Labor for January of the current year there are only five States that have enacted laws the special purpose of which is to make it obligatory upon directors of building and construction work to take certain precautions against accidents. These States are New York, Ohio, Maryland, Missouri and Pennsylvania. It would, however, be a mistake to consider the laws of these States as all the legal regulations that exist for the purpose of preventing accidents in building operations. The building regulations of the various cities, though not directed to the prevention of accidents to employees, undoubtedly in many cases contain provisions having this effect. The fact remains, however, that up to the present time the States have far from taken the steps needed to insure that builders take every possible precaution for the security of their employees.

An authority suggests that in finishing white maple, only one coat of varnish be used, in order that the wood shall retain its whiteness; and let this be the lightest copal, of good body.

CORRESPONDENCE.

Address Wanted.

If the correspondent signing his letter of inquiry "D. S. N.," Dayton, Ohio, will furnish the editor with his full name and address we will endeavor to give him the information he desires.

We have frequently called attention in these columns to the desirability of all correspondents signing their letters with full name and address, so that in case of necessity the editor may reach them directly by mail. The neglect of writers to conform to this requirement will often account for a seeming lack of attention on the part of those to whom the communications are addressed.

Tool Chest Construction.

From C. E. W., *Kansas City, Mo.*—I inclose sketches of a tool box in reply to the correspondent recently making inquiry in regard to work of this kind. This box has, in my opinion, one advantage over all others, as a man can get any tool from it without moving any other. There is no waste room; the chest is light and strong and can, therefore, be readily moved about. The drawers can have faces made of hard wood and carved, if desired, as they are protected by the sliding panel in front.

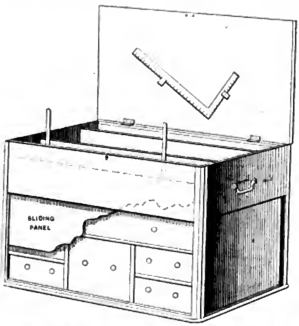


Fig. 1.—View of Box with Sliding Panel Partially Raised and Broken Away, Showing Fronts of Drawers.

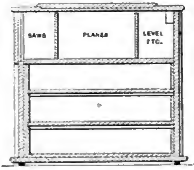


Fig. 2.—Vertical Cross Section.

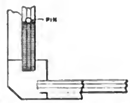


Fig. 3.—Top View of One of Front Corners.

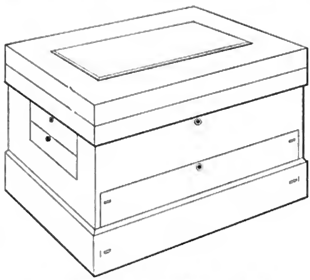


Fig. 4.—General View of Chest Built by "D. F. M."

Tool Chest Construction

When the lid is raised the panel can be pulled up so that the drawers will open. A pin in the top of the panel flush with the top of the box securely locks the panel down when the box is closed. The box should be made of trunk stuff—that is, three pieces of wood glued together with the grain running different ways. Each piece should be ⅛ inch thick, thus making a total of ⅜ inch, which is sufficiently heavy. Slides for the drawers are glued to them on the inside, and the corners, of 1⅛-inch oak, are plowed so as to let the front panel slide. The top cap is cut in ½ inch and glued. Fig. 1 shows a general view of the box with the lid raised and the front panel partially broken away, showing the front of the drawers. Fig. 2 is a vertical cross section taken through the middle of the box, while Fig. 3 is a top view of one of the front corners

From D. F. M., *Syracuse, Neb.*—I am interested in tool chest construction just now, and send my plan, shown in Fig. 4, for the boys to comment on. It rests on casters and the bottom drawer is 9½ inches deep inside. Under the lid at the front is a saw rack, while at the back is a similar space for plans, details, &c. In the center is a solid tray, with two of the same size beneath, which slide out at the ends each way and can be made full length or cut in two. The ends are made with rail and stile like a door. The drawers are held solid with flush bolts. A strap of iron or brass extends through to the outside and catches the bolt. The lid can be made deep enough for a drop leaf and makes a nice place for paper, T square, &c The owner of a chest can put as much work on it as he desires.

Articles on Pattern Making.

From C. J. H., *Cleveland, Ohio.*—I have read with much interest the articles on pattern making by Mr. Woodsend, as it has happened that work of the character indicated has fallen to my lot in connection with my position as carpenter in a factory. I hope the series will be continued, especially if the author would give some up to date kinks as to core work and how to arrange for drafts in molding. A practical pattern maker does not need them so much as young chips like myself, for we want to know the whys and hows that are apt to be overlooked by an expert yet at the same time are puzzling to a novice. *Carpentry and Building* is a most valuable paper and every carpenter should have it, as no one is too old to learn or to exchange ideas with a view to mutual benefit.

Making Mortars for Tuck Pointing.

From F. J. G., *Fort D. A. Russell, Wyoming.*—Answering the inquiry of "J. O. L." in the February issue relative to tuck pointing mortars, I would say that Portland cement in two parts of sand makes a good combination for the purpose, but the sand should be sharp and fine. If it is desired to have the mortar work quite smooth the addition of a little lime putty will help it and thus require less cement, but the joint will show up lighter in color according to the amount of putty used.

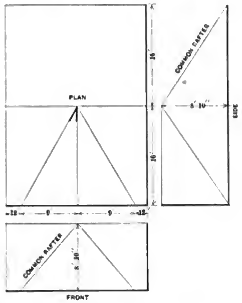
A good red pointing mortar can be made with lime putty, red oxide of iron (red mineral) and a fine grade of coarse sand. Plenty of red mineral should be used to give the joint a pleasing color, and when dry will be very hard. A very little drop black in oil will give a much darker color to the mortar.

Drop black in oil, fine coarse sand and lime putty will make a very fine black mortar for pointing.

The exact proportions in mixing need not be followed, as one soon learns what is best. Some limes are richer than others and sand will be found of different degrees of sharpness. The whole should be thoroughly incorporated and mixed in small quantities so that mortar will work well under the pointing tool. In warm weather the stone work should be well wet with water. All joints should be well raked out to give a good key to the pointing mortar.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From LEARNER, *Paterson, N. J.*—Will some of the practical readers tell me how to get the bevel of valley



Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

rafters in a roof of two pitches, as I fail to find anything about it in books on the steel square or on the rafter gauges we hear so much about. They are all right when the roof is of one pitch, but not when there are two or more different pitches in one roof. What I want is the side bevel where the valley cuts against the ridge. The diagrams which I send will, I think, make my meaning clear.

Note.—Our correspondent will find some valuable suggestions relating to the problem in question on page 65 of the issue of *Carpentry and Building* for March, 1898. It is probable, however, that some of the readers may have different methods of solving the problem, and we lay the inquiry before them so that they may express their views upon it.

Plans Wanted for Farm House.

From D. L. P., River, Ind.—Will some of the architectural friends of the paper furnish the editor a few plans of attractive farm houses with eight or ten rooms, and costing in this section of the country not in excess of $1500? The first floor should have a bedroom and pantry and the second floor hall and closets with open stairway. I should also like to see published with the drawings a plan of the roof. I am living in the country and the plans which have appeared in the paper do not exactly suit the farmers, and it is pretty hard to adapt them owing to the fact that there is not at least one bedroom and bathroom on first floor.

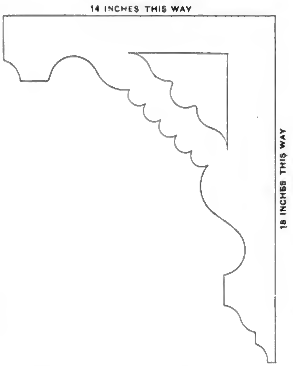
From H. W. L., *Climbing Hill, Iowa.*—I would like to ask some of the practical readers of *Carpentry and Building* to send for publication plans of a cheap seven-room farm house, having a southern and eastern frontage. The issues of the paper which I have received contain no such plans as would seem to meet these requirements, and there is too much hall in the city buildings. If readers will furnish something meeting the requirements stated, they will doubtless be serving others as well as myself.

Some Comments on Handrailing.

From RED OAK, *Rochester, N. Y.*—Being a reader of your very valuable paper and taking an interest in everything appearing in it, I desire to offer a suggestion or two. The articles on the "Science of Handrailing," by C. H. Fox, are very good, but as he is trying to get at the root of the science and start all learners aright, as he says by way of preface, I for one think he should tell the learners that he is using projection and thus far three planes. I also think he should tell what these planes are and how to use them. In other words, I think he should give a few simple lessons on descriptive geometry before he goes further and show how the three planes work together. This I think is very important, and at the same time very interesting, as I have good reasons to believe, for nearly 20 years ago I completed a four years' course of mechanical schooling, and after getting my diploma, which I am very proud to possess, I was employed as an assistant instructor. It was in this capacity that I learned thoroughly a knowledge of descriptive geometry. While a pupil I learned more real good from the projection of shadows than from any other study. I believe that these lessons which have been given, or will be given before these sugegstions can reach Mr. Fox, should be dropped for a while, and a few lessons in projection presented, using all the planes, or the horizontal, vertical and oblique, as they will appear in the lessons given and to follow. This, I feel sure, will set many a young mechanic right and at the same time teach him the principles which underlie the science of handrailing, and without which he cannot hope to be first class, while in many cases he will get no understanding whatever. I believe that Mr. Fox and many others will agree with me in the above.

Position of Bracket.

From A. T. C., *Long Lake, N. Y.*—Inclosed find sketch of a piazza bracket, and would be glad to have you mark which side of the bracket goes against the post. I have



Position of Bracket—Sketch Submitted by "A. T. C."

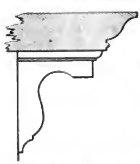
asked several carpenters here, and they do not agree as to which is the top and bottom.

Note.—It is generally regarded that the longer part of the bracket should be placed perpendicularly, and, therefore, in the present instance it would be the part which should rest against the post. There are, however, conditions under which the short portion might be so placed, but as drawn in the sketch submitted by our correspondent and reproduced herewith the 18-inch way should occupy a vertical position.

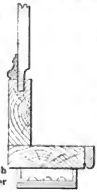
Combination Sideboard and China Closet.

From A. W. JOSLIN, *Boston, Mass.*—I send herewith a scale drawing with full size details of a combination sideboard and china closet, which I designed and have had built for my own use. My dining room being too small for a regular sideboard and having no china closet I designed this piece of furniture so as to take up very little floor space, while at the same time it provides a large amount of room and makes a rather attractive appearance. I trust it may interest some of the many readers.

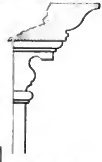
I peruse the paper each month with a great deal of interest, and have often wanted to express an opinion on many of the matters appearing in the correspondence columns. Usually, however, I am so busy that before I reach it the next issue of the paper is out and some of the many readers have answered the questions asked.



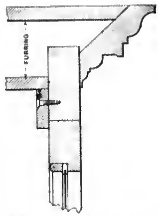
Section through Shelf, with Side Elevation of Center Bracket.



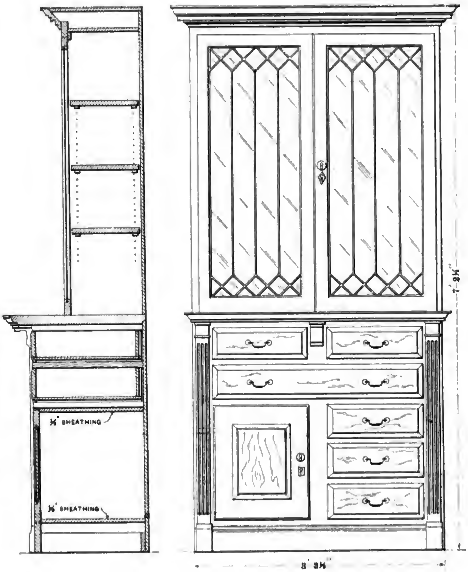
Horizontal Section through Corner.



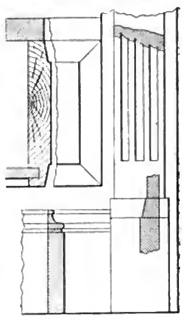
Small Bracket at Outer Corners.



Section through Main Cornice.



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



Section and Elevation of Base, Plinth, Pilaster and Drawer. Scale, 3 Inches to the Foot.

Combination Sideboard and China Closet.—Contributed by A. W. Joslin, Boston, Mass.

Constructing a Refrigerator for a Butcher Shop.

From F. A. M., *New Cumberland, Pa.*—I would like to see published in the columns of the paper the best method of constructing a refrigerator for a butcher shop or slaughter house. I have one to build in a shop, but have never had any experience in this line of work. I would, therefore, be thankful if some of my brother chips would send the editor for publication their plans, showing the best and simplest mode of construction. I feel sure that a good many others like myself would be benefited, and at the same time it will open up a channel for discussion of the subject.

Note.—It is possible our correspondent may derive some valuable suggestions from the illustrated article descriptive of a refrigerator building with meat cutting room which appeared in our issue for May, 1898, the details showing very clearly the methods of insulation and general construction. We trust our readers will discuss the subject in the light of the specific requirements mentioned.

Finding Down Bevels of Purlins on Hip Roofs.

From M. T., *Washington, D. C.*—I inclose sketches in reply to "Learner," who asked in the January number for information how to obtain the bevels on a purlin running between hip rafters. Referring to Fig. 1, let A B C represent the corner of a building, D E and B E the seat of the common and hip rafters respectively, then B F and D G will represent the hip and common rafters. Draw a section of the purlin square with the pitch of the roof, as shown at W. Project the four corners parallel with A B until they meet the line B E, as shown at K M O R, and draw the line P K at right angles to them. After this has been done square around the timber, as shown at K^1 L^1 P^1 N^1 of Fig. 2, and make L^1 M^1, N^1 O^1 and P^1 R^1 equal to L M, N O and P R respectively of Fig. 1; cut to the line K^1 O^1 M^1 R^1.

From D. C. H., *Buckhannon, W. Va.*—In the January number of *Carpentry and Building* "Learner" of Paterson, N. J., asks for instructions in obtaining bevels, for purlins cut between hip rafters, the purlins to be placed square with pitch of roof. Suppose the pitch of roof to be 16 inches rise to 12 inches run. Referring to Fig. 4, draw line B F equal to run, 12 inches; A F equal to rise, 16 inches, and perpendicular to B F; extend toward C indefinitely. Now from B draw B C perpendicular to A B to intersect the vertical line A C at C. Upon A B at A erect a perpendicular, A E, equal to run,

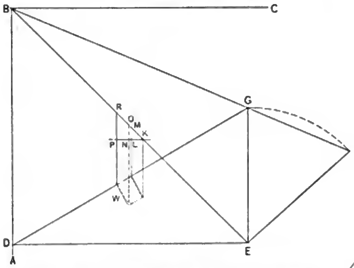


Fig. 1.—Plan of Corner of a Building, with Section of Purlin.

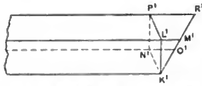
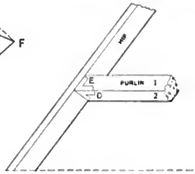
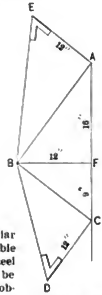


Fig. 2.—Showing How to Get the Bevel.





Figs. 3 and 4.—Contributed by "D. C. H."

Finding Down Bevels of Purlins on Hip Roofs

12 inches; draw the line from B to E, and the angle A E B will give the bevel for the top of purlin, as shown at E of Fig. 3. In a similar manner draw the triangle B C D, and the angle B D C will give the cut D of Fig. 3. To obtain the cut with a steel square take the diagonal distance from 12 inches on the tongue to 16 inches on the blade of the square; take the distance thus found and place it on the blade and 12 inches on the tongue, and the tongue will give the bevel at E, Fig. 3.

To find the bevel at D, Fig. 3, determine the distance from F to C, by squaring the run, 12 inches, and dividing by the rise, in this case 16 inches, which gives 9 inches; then take 12 inches on the tongue and 9 inches on the blade of the square, take the diagonal distance from 12 inches on the blade to 9 inches on the tongue, and with the distance thus found place it on the blade and 12 inches on the tongue. The tongue will give the bevel at D, Fig. 3. The length of the line F C can always be found in the same manner, no difference what the rise of roof may be, if the square of the run is divided by the rise. This involves the principle in geometry that the line B F, Fig. 4, is a mean proportional between the lines B F and F C.

From J. F., *Delightful, Ohio.*—In the January issue of the current volume "Learner" of Paterson, N. J., desires to know how to obtain the down bevel for purlins running between hip rafters and setting square with the pitch of the roof. There are several ways of accomplishing this, but I think the easiest and best way for a right angled roof, is to take 8 inches on the tongue and 14 7-16 on the blade and apply the square to the side of the plate. The tongue gives the cut. The above is for roofs of one-third pitch. The cut can be found for any pitch by taking 1 foot for the run and finding the length of the rafter and perpendicular hight for that run. Take the length of the common rafter on the blade and the perpendicular hight on the tongue, and the tongue gives the cut. These figures will make a good fit.

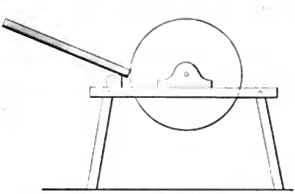
From G. J. S., *Millersburg, Iowa.*—In answer to "Learner" of Paterson, N. J., I will give my method of obtaining the bevel for a purlin set between hip rafters and resting square with the pitch of the roof. A moment's reflection will show "Learner" that this bevel is the same as that used in obtaining cuts of sheathing boards running parallel with the side of a building on a hip roof. My method is to take the rise of the hip rafter on the tongue of the square and the length of the hip rafter on the plate, and the tongue gives the cut. I would advise "Learner" to obtain a copy of some of the works treating on the steel square and its uses, such for example as that compiled by Mr. Hodgson, or a copy of "Art and Science of Carpentry," by E. Bell. These are practical books, and from a thorough study of them the correspondent may become familiar with that ingenious and indispensable tool known as the carpenters' steel square, on the face of which may be found any and all figures used in obtaining those mysterious angles and bevels absolutely necessary in executing a scientific job of roof framing. In these progressive days of this twentieth century it is not enough to have attained to the stage of a good workman only, that is, working neatly and correctly under the directions of others, but the workman of to-day must, or should, understand the principles of his trade and be able to apply them understandingly when conditions so demand. A practical workman knows beforehand what his work, when finished, will look like, while the bungler is constantly making errors and blunders. I believe the day is not far distant when good workmen and workmanship will be appreciated more than in the past. It should, therefore, be the desire of every young and ambitious mechanic to become thoroughly competent in his chosen vocation. This he can do by studying books and reading trade journals published in the interest of his profession, and thus combine the knowledge of others with that of his own, which is a sure and safe road to advancement.

Device for Cutting Sandpaper.

From C. E. G., *Frederick, Md.*—I would be glad to have some one suggest a good way to cut sandpaper. We buy our sandpaper in rolls, 24 inches long, and it is necessary to cut it in circular pieces 8 inches in diameter, this being the size of the disk on the sander. We have tried cutting in different ways, but none of them is entirely satisfactory.

Tool for Truing a Grindstone.

From E. E. D., *Wilson, N. Y.*—In reply to "A. I. F." of Provincetown, Mass., whose letter appears on page 47 of the February issue, I would say that the only tool necessary for truing up his grindstone is a piece of common gas pipe 3 or 4 feet long and about 1¼ inches in diameter outside measure. With the stone in motion turn on a stream of water slowly and let this run until the face of the stone is soaked from one-half to three-fourths of an inch deep, after which shut off the water. Next place a solid block across the frame of the stone so that it will clear the stone about an inch. Fasten the



Tool for Truing a Grindstone Suggested by "E. E. D."

block so that it cannot move, and have the block so that the top of it will be about on a level with the shaft. Rest one end of the pipe on the block while the other end is raised at about an angle of 25 or 30 degrees. Hold the pipe firmly and push it slowly toward the stone until the top edge of the pipe makes a thin cut from the fullest part of the stone. Now gently roll the pipe to the right or left, as may be necessary, as it will make just a narrow cut at each revolution of the stone. After cutting across the fullest part, proceed as before, making another cut across, and so continue until the tool has cut clear around. If the stone is much out of true it may be necessary to wet it two or three times before finishing the job. I inclose herewith a rough sketch of the stone with the piece of pipe shown in position.

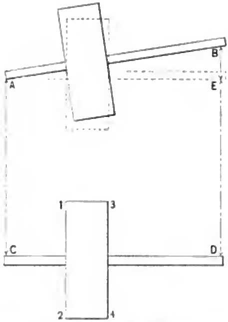
From F. T. H., *Collingwood, Ont.*—The question of "Truing up a Grindstone," asked by the correspondent, "A. I. F.," Provincetown, Mass., is one that has often been submitted by carpenters whose grindstones have worn out of true, and it is a pertinent one. The truing up of a grindstone is a simple matter when the principle involved is known. If the stone is well hung, place a hard wood plank across the edge, having it shaped like the rest of a turning lathe—an iron bar is better if available. Place this rest as close to the stone as may be, just allowing space enough to admit of the stone revolving without scraping the rest. The top of this rest should be about level with the center of the stone, or as near so as possible. Having prepared the rest and made it secure on the frame of the stone, the next thing is to provide the tool. This should be a piece of cast steel ⅜ or ½ inch square. It should be left soft or untempered, and here is the point where many carpenters and others make the greatest mistake in attempting to true up a stone—namely, in trying to true it up with hardened steel tools or old files; stone turns off best with a soft tool. The steel bar should be left long enough to form its own handle, but when it wears short it may be put in a wooden handle. The method of using the steel bar or cutter is to have the stone revolving toward the tool quite slowly, and the tool should be advanced toward the stone until the most prominent part of the stone grazes the tool. The tool must present one of its arms to the stone—not a flat side, and it should be held in a horizontal position to obtain the best results. The cuts taken on the stone must not be too large, and the tool must be traversed along the top of the rest and parallel with its length. When the corner of the tool wears blunt—which it will soon do—it must be turned over and another corner presented to the stone, when it will be seen that the wearing out of one corner sharpens up another, so that the tool is always ready for use with one or more of its corners. After one thickness of the projecting stone has been removed, start another cut, going through the same process, and continue until the face of the stone is trued up sufficiently. Where a steel bar, such as I have described, is unavailable, a good substitute may be made of a piece of small caliber gas pipe, say ½-inch pipe. This will answer fairly, and by continual turning over will always present a sharp edge to the stone. In other words, like the steel bar, the wearing off of one portion sharpens up another, so that the operator always has a cutting edge at his command. No water must be used when truing up a stone. As a matter of fact, the truing up of a stone is not done by cutting, as we understand the term, but by abrasion, or breaking away, and the application of water during the operation would tend to make the job difficult, and might cause the stone to chip on the edge.

From S. F. L., *Ellinger, Texas.*—In answer to "A. I. F." of Provincetown, Mass., I will say that the Charles A. Strelinger Company of Detroit, Mich., have a device for truing a grindstone which the correspondent will find to give entire satisfaction.

From H. K. R., *Larned, Kan.*—Replying to "A. I. F.," Provincetown, Mass., I would suggest that he secure a short piece of iron gas pipe 1¼ inches in diameter, which he will find an excellent tool for truing his grindstone. Hold the pipe with moderate pressure end on against the stone and there will be little difficulty in bringing the stone to a true grinding surface.

Trouble with Belts and Pulleys.

From L. G. K., *Kansas City, Mo.*—Believing that the object of "J. E. D.," whose letter of inquiry appeared in the January issue, is to learn the ordinary causes of belts not running properly, and with a view to correcting the errors, I offer the following suggestions and remedies: The most common cause of the trouble is that the shafts are not parallel—that is, the distance between them is



Trouble with Belts and Pulleys.

greater at one end than at the other, as in indicated in an exaggerated form in the sketch which accompanies this letter. With pulleys in this position the belt would run toward A C, but by moving the end B of the shaft back to C the two shafts would be parallel and the belts should run fair on both pulleys. A belt should run to the shortest side regardless of the direction, for the belt will run toward the edge of the pulley it first touches. The principle is precisely the same as that of setting a roller over which to run a piece of timber. When one edge of the pulley is larger than the opposite edge the belt should run toward the larger edge. Thus, in the diagram, if the edge 1 2 is larger than that of 3 4, the belt should run toward the former, provided the shafts are parallel.

The best remedy for a pulley of this kind would be to have the face turned off to the proper form, but as a makeshift the smaller edge is sometimes built up to the required size by pasting or gluing strips of stout paper around the face of the pulley. Where a belt is crooked—that is, where one edge is longer than the other, the short edge will run toward the center of the pulley. To counteract this tendency the pulley is sometimes papered under the short edge of the belt to hold it in place until the belt is stretched to proper shape. I trust this may assist to blaze the way for "J. E. D." out of the woods.

From S. E. T., *Newton Highlands, Mass.*—In reply to "J. E. D." of Chicago, Ill., in the January issue, I would say that loose pulleys are often made with a slightly smaller diameter than tight pulleys, so that the belt will run slacker when idle. When this is the case it is harder to ship the belt from the tight pulley to the loose pulley than in the other direction. The trouble in the case mentioned is probably with the shipper. This should be located close to the tight and loose pulleys so as to catch the side of the belt running toward these pulleys. If this belt runs true on the tight pulley and does not run true on the loose pulley, the bore of the latter is worn.

Finding Area of Segment of Circle.

From M. T. Q., *New Iberia, La.*—Will the editor kindly publish the formula for obtaining the area of the segment of a circle ?

Answer.—In finding the area of a segment of a circle when it is less than a semicircle, it is first necessary to compute the area of the sector having the same arc as the segment and then ascertain the area of the triangle formed by the chord of the segment and the radii of the sector. The difference between these areas will be the result desired. From this it will be seen that before the area can be computed it is necessary to know the length of the chord, the rise or versed sine of the segment and the radius or diameter of the circle.

In cases where the segment is greater than a semicircle some of the architects' pocket books give the following method to be pursued: Ascertain by the rule just given the area of the lesser portion of the circle, subtract it from the area of the whole circle and the remainder will be the area of the segment desired.

In this connection it may be stated that to compute the area of a sector of a circle when the length of the arc and radius are given the following method is suggested: Multiply the length of the arc by one-half the length of the radius and the product is the area.

When the degrees of the arc and the radius are given the area of a sector of a circle is computed by the following rule: Multiply the number of degrees in the arc by the area of the whole circle and divide by 360.

Hight of Bridge Truss as Compared with Span.

From F. R., *Coalville, Utah.*—What is the method generally employed for determining the hight of bridge trusses for varying span? Does not the span govern the hight of the truss ? I would like to hear from the craft on this point.

Note.—It is usual in the case of wooden trusses to make the hight between the center of upper and lower chords some fraction of the span, depending upon circumstances. The higher, however, the truss, the less will be the strain on the chords.

Cut Nails or Wire Nails for Shingles?

From F. W. M., *Medina, N. Y.*—In answer to "A. T. B.," Lafayette, Ind., regarding cut or wire nails for shingles, I would say that the carpenters in this locality have not used wire nails for three or four years, and the result is that they do not have nearly as much patching from shingles blowing off, and I never yet saw a carpenter who really liked to patch a roof.

From "Workman," *Newark, N. J.*—"A. T. B.," Lafayette, Ind., is doing the proper thing in using cut instead of wire nails for shingling. Even when wire nails are "blued" or oxidized, they will persist in rusting when used in outside work of any kind. It is very unfortunate that wire nails have the tendency to rust, as they possess many good qualities which workmen appreciate, but this fault of corroding so readily is a great drawback to them. Many architects in their specifications forbid their use for shingling, for framing, and for laying lower floors, and justly so, for when dampness gets at them their lives are made short. Another thing: Carpenters building outside scaffolds which are likely to remain in use for a year or more should avoid using wire nails. While stronger than a cut nail when first used, their strength is soon reduced by rust or corrosion.

Double Hung Windows in Frame Walls.

From Hee H. See, *Montreal, Canada.*—I have been much interested in the detail drawing of double hung windows in the February number of the paper, especially as I observe some difference as compared with the method generally followed here, notably in the stop bead at the head of the window. The practice here is to run the parting strip across the head of the window and to make the stop bead the same width all the way round. Is the method shown the one generally followed in the United States? The details are very good so far as they go, but the two most important details are left out—namely, the joint between the pulley stile and the sill and the joint between the pulley stile and the head.

Answer.—The method of construction shown in the drawings presented in the February issue represents what may be designated as the old practice, but is adhered to in many sections of the country at the present day. At the time when it was the custom to work out stuff by hand this form of construction saved the plowing of the head jamb for the parting strip, and some workmen took the position that the method here shown was the better, owing to the fact that it enabled them to make a closer fit at the head of the upper sash, and thus more surely exclude the weather. When, however, there began to be used a certain style of sash locks, which when the lower sash was raised would strike against the stop bead running across the head of the frame and thus mar it, a change was made so as to overcome this alleged objection. The whole question, however, appears to be largely one of individual preference.

It is the usual practice to gain the sill and head into the pulley stile, but there may be sections of the country where this practice does not prevail, and we shall be glad to have our readers take up the matter and discuss it in the light of their own experience.

Hand Machine for Pointing Pickets.

From A. F. H., *Washington.*—Kindly allow me space in the Correspondence columns of your valuable journal to ask of the readers who have had experience in such work how to make a hand machine with which to point off 1 x 4 inch flat or square pickets.

Proportion of Portland Cement to Sand in Building Bridge Abutments.

From F. R., *Coalville, Utah.*—What proportions of Portland cement and sand should be used to make a good job in building stone abutments for bridges ? Opinions probably differ on this point, but I trust readers who have had experience in this line of work or with heavy masonry will express their views.

Construction of a Round Silo.

From C., *Colchester, Conn.*—I would like to ask some questions about the proper method of building round silos.

1. The staves being 2 x 6 beveled to 10-14 feet circle, what is the best way of setting them up ?

2. How many and what size studs should be set up around a 10, 12 and 14 foot silo to support round hoops of say ⅝ or ¾ inch rods ?

3. How far apart should hoops be placed for a silo 20 to 30 feet high ?

4. What is the best maner of making and covering the roof ?

MAKING WOOD PATTERNS.—XVIII.

BY CHARLES J. WOODSEND.

THE subject for consideration at this time is a standard such as is used for draftsman's boards. A side view is shown in Fig. 129, a front view in Fig. 130, while Fig. 131 is a view looking down from the top. If these views are closely studied and examined, the methods described will be the more easily followed. The standard may be described as a long and somewhat slender shaft with a broad base, the latter hollowed out, and the lower part of the shaft pierced by an oblong hole rounded at its top and bottom ends. The upper part of the shaft carries a circular disk, A, upon the top of which project two lugs, designated by the letters B B. To one side of the standard and opposite the lugs projects an arm, C, having a bulb or boss, D, upon one side, while through the lower end of the shaft are two projections, E E, these being for the purpose of obtaining a base to which to secure a foot rest. These letters as used throughout this of the pattern should be shellaced and finished as already explained before being taken out of the lathe.

Upon the completion of this we will proceed to make the projecting arm C. Referring to Figs. 130, 131 and 133, it will be noticed that one side of the arm is in line with the parting of the pattern. Some time before it was mentioned that it was advisable, whenever possible, to have the greatest amount of metal in the drag, and it thus follows that this arm be put upon the half of the pattern opposite to that with the dowels in it. The arm should be worked out and let into the shaft, as shown by dotted lines in Figs. 133 and 134. Glue and nail securely. Next make the small boss D for the side of the arm. This is to have two small dowels and is to be left loose, the dowels to be in the boss. The lugs B may now be taken in hand.

It may not be out of place at this point to state that

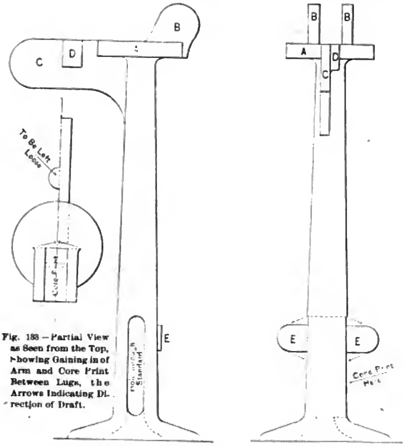


Fig. 133.—Partial View as Seen from the Top, Showing Gaining in of Arm and Core Print Between Lugs, the Arrows Indicating Direction of Draft.

Fig. 129.—Side View of "Standard."

Fig. 130.—Front View.

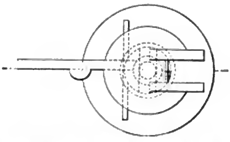


Fig. 131.—View of Standard Looking Down Upon the Top.

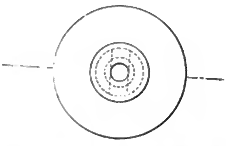


Fig. 132.—Partial View Looking Up From the Base.

Making Wood Patterns.

article will refer to similar parts to those indicated in connection with Figs. 129 and 130, the broken line where shown indicating the parting of the pattern.

In making this pattern the shaft will be the first part to claim our attention. This being parted longitudinally we must make it in two pieces, held together at the ends by screws, putting in dowels and plates at the ends for the lathe centers, as described in connection with previous pipe patterns. This shaft being slender, the pieces will have a great tendency to flying apart in the center of the length while being turned, and in order to prevent this either drive in a couple of dogs across the joint or else put in a good stout screw, which should be counterbored. The hole can be plugged up after the pattern is otherwise finished. The base and the disk at the top are to be put on the shaft in the same manner as was explained for flanges upon pipes, the material to be thick enough for the fillets to be turned out of it. The core print projecting past the base is shown in Fig. 136, and is to be turned from the same piece as the shaft. This part it is advisable to shellac the work one or two coats as it proceeds, for it assists greatly in keeping the pattern clean, especially when there is so much handling and so many parts to add at different stages of the work. Now in regard to the lugs B B, they should be worked out to the proper size and shape; then the core print may be made. This is to be in halves. Note the parting, as shown in Fig. 133. Reference to this figure and also to Fig. 134 shows the shape of this core print. Half of the core print may be let into the disk A, glued and nailed fast, then one lug may be fastened to it and to the disk. There should be a little draft upon both the core print and the lugs in the direction of the arrows. We will now give attention to the pieces which are to have a little draft in the direction of the arrows and should have a heavy fillet upon the side next the shaft. Glue and nail fast. Next make the core print for the hole through the shaft. The print for the side upon which we are at present working will be the only one nearly straight, there being only a little draft given in the directions indicated by the arrows shown in Figs. 136 and 138. After this print is nailed onto the pattern it makes this half complete; the other half will be a repetition, excepting that there is no arm and the core print for the hole through the shaft is to be conical, as shown by the conical print in Figs. 136, 137 and 138. This completes the pattern.

Attention will next be given to the core boxes, Fig. 135 being an isometrical view of the core box for the core between the lugs B. A careful examination of this figure will show that at the lower left hand there is a bevel. This bevel is to cut the disk A, as will be noticed by the dotted lines in Figs. 129 and 134. Its position is also indicated in Fig. 131 by two lines and in Fig. 133 by two dotted lines. The size of the box is equal to the core print in Fig. 134, and the thickness is equal to the space between the lugs B. The manner of putting this box together is distinctly shown in the view. Two of the corners may be nailed fast and the other two may be held in place by screws. The corners that are screwed should come apart quite easily. The screws should have a black mark around the head, as previously described, to indicate that they are, or rather may be, drawn out. In this view it will also be noticed that on the side nearest are three holes marked for wire. These holes should be 3-16 inch in diameter, and are for the molder to insert wires into the core, for the purpose of strength.

The core for the base and the one through the shaft will be made separate. Three views of these cores are given in Figs. 136, 137 and 138, the first showing the core in its position relative to the pattern, being at right angles to the parting, while Fig. 137 is a view looking down upon the conical print, and Fig. 138 an end view as seen from the smaller end. In making the boxes for this core it is advisable to construct the core in two parts and join them in the flask. We will first make the part for the base. Figs. 139 and 140 represent plan and end views respectively of the half of this box. The two halves of the box may be gotten out and the dowels put in, after which it may be put into the lathe and turned to the required shape. It will not be necessary to use a large mold, there being nothing very particular in it more than to reduce the amount of metal. After the turning and shellacing are completed, remove the box from the lathe, part it, and with a Forstner auger bit bore a hole of the required size and in the position shown by the solid and continued dotted lines. Bore well into the box and then make a neat round plug and put it in, dress off even with the parting of the box, shellac and complete.

We will now take the box for the core through the shaft, Fig. 141 being a plan view of one-half of the box and Fig. 142 a side view of same. Each half of the box is made in two pieces, the dotted line in Fig. 141 showing the dividing line. In making the box, prepare the two largest pieces, one for each half, face the parting, joint the edges and put in the dowels. Next lay off the size of the core, and where the centers for the ends come square across; then to these squared lines run in a saw kerf, very slightly nicking the surface; then put the two halves together, place them in a bench vise or put onto a strong handscrew. Now with a nice sharp auger bit of the same size as the core is to be bore two holes; the worm will follow the saw kerf if left free to do so. Then take the pieces apart and work out the surplus material. If the bit is sharp, a little sandpaper will be all that is necessary to clean the round ends. The pieces for forming the beveled part of the core to fit the conical print, after being taken to the required size, should be properly laid off and worked with a gouge and chisel. When neatly cleaned up, nail fast to the other piece, shellac and finish as usual.

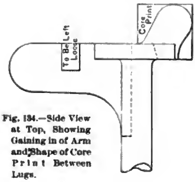


Fig. 134.—Side View at Top, Showing Gaining in of Arm and Shape of Core Print Between Lugs.

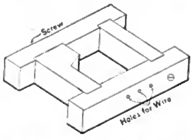


Fig. 135.—View of Core Box for Core Between Lugs.

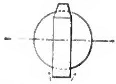


Fig. 138.—View of Same Core as Seen from Small End.

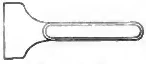


Fig. 137.—View of Same Core Looking Down on Conical Print

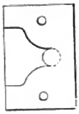


Fig. 139.—Plan View of One-Half of Core Box for Core of Base.


Fig. 141.—Plan View of One-Half of Core Box for Core Piercing the Shaft.

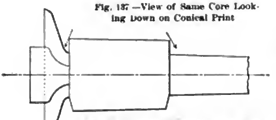


Fig. 136.—Partial View of Lower Part of Standard, Showing Shape of Cores for Base and for Piercing Shaft; also their Relative Position in Regard to Parting of the Pattern.


Fig. 140.—End View of Same.


Fig. 142.—Side View of Core Box Shown in Previous Figure.

Making Wood Patterns.

To Intensify Blue Prints.

In a recent issue of the *Photographisches Wochenblatt* is an article advocating the use of peroxide of hydrogen for giving greater intensity of color to blue prints. It will be remembered that a blue print is not as intense on leaving the washing water as it is after some 24 hours' exposure to air, an effect assigned to oxidation. To remedy this, it is suggested that a few drops of peroxide of hydrogen be added to the water, to increase the rate of oxidation. The scheme is also useful when the paper is old and gives veiled prints. In case the sensitized paper has turned a greenish blue, it should be over printed until a decided image is visible. Then a little washing soda solution should be added to the washing water, but it should be used sparingly. The washing should be repeated until the whites are clear, and then the prints should be given a final wash in water to which a small quantity of peroxide of hydrogen has been added.

HISTORY OF CHICAGO'S BUILDING TROUBLES.

WE present herewith a brief history of the building troubles which have existed in the city of Chicago for more than a year past, the article having been prepared by one having exceptionally good opportunity for obtaining the inside facts in the case:

It is probable that February 5, 1900, will long be remembered by the building contractors of Chicago, as on that day was inaugurated the greatest strike in the building line Chicago and perhaps the world has ever seen, a strike involving nearly 3000 contractors, in every branch of the building line, and 40,000 mechanics directly, and it is safe to say almost as many more who were engaged in the manufacture of material for which there was no demand. On February 6 last, just one year and one day later, the final termination of the great strike was announced by the acceptance of an agreement by the Brotherhood of Carpenters, which was the last of the larger unions to concede that they were beaten and formally surrender to the building contractors. It is now nearly two years since the

Building Contractors' Council

was formed in Chicago, composed of from two to five delegates from every trade organization in the building line. They formed a compact organization, with a determination to attempt to adjust the many wrongs and abuses they were compelled to tolerate by reason of the different trade unions being affiliated with the central labor organization, known as the Building Trades Council. This organization, powerful by reason of having all the unions in its ranks, by the use of the sympathetic strike was enabled to compel the individual contractor or contractors' association to comply with any demand they might choose to make. Its uniform success in forcing its demands made it power drunk, and the conservative element of the unions was gradually shifted to one side and the unscrupulous and worst element was left in control. This element soon began to use the organization as a means to advance its own personal ends, the result of which was that arbitrary demands were made upon contractors, architects and owners, legitimate unionism was thrown aside and those most active in the ranks of the organization were constantly using its influence for their own selfish ends, financially, socially and politically. Agreements were made with employers and broken at will. Agreements were made up by the unions and the employer was told to sign or get out of business. So powerful was the organization that one year ago not a single apprentice was allowed to learn any trade in the building line in Chicago, and in many unions they made the membership fee so large that it practically barred any man not in the union from working at his trade even if he desired to become a union man. In fact, in one or two instances unions made rules prohibiting the admission of any new men for two or three years.

Cornering the Labor Market.

Having the market cornered on labor they then began the restriction of the use of machinery. In the cut stone union they passed resolutions refusing to work for any contractor who used machinery in his yard, the result being that for two years prior to February 5, 1900, the cut stone contractors of Chicago were compelled to let lay idle and rust in their yards $110,000 worth of machinery. Finding themselves successful in this demand they reached out a little further and next went for the man who was doing too much work in eight hours. They began by restricting the plumber to so many fixtures a day, the gas fitter to so many feet of pipe a day, and the lather to so many bundles of laths a day. In these three lines the capacity of the man was cut down to more than one-half a usual day's work. This was illustrated very forcibly in the plumbing line at the Merchants' Loan Building, where one boss plumber, according to the union rules, did in eight hours' continuous labor for · days' work.

The condition of affairs had become such that it was no longer possible for a man to tell after he started a building when it would be finished, as the unions would strike upon the smallest pretense and all hands upon the building would be compelled to quit until the real or fancied grievance was adjusted. The Montgomery Ward Building was over one year in the course of construction and has a record of over 20 sympathetic strikes during that period. Sympathetic strikes were inaugurated upon buildings because the mason spread his mortar with a shovel instead of a small trowel; because the soft stone cutter did hard stone cutters' work; because the carpenter did the iron man's work; because the carpenter sharpened his tools in his own time instead of the boss's; because a boiler was made in a non-union shop; because material was not union made; because the boss hurried his men along; because the gas fitter cut his pipe in the shop instead of on the job; because the employer discharged an incompetent man; because the employer would not put on more men; because the employer would not pay railroad fare out of town; because the employer was late on pay day; because he sometimes paid off in checks, and many other causes so small that none but the most radical would care to notice them. But this organization ruled with an iron hand and to refuse to obey its mandates meant a release from the cares of business in Chicago.

The Battle Begun.

This was the condition of affairs when the Building Contractors' Council was discussing ways and means to advance the building interests of Chicago and restore confidence in that line in the minds of the investor and building public. Chicago, in 1899, constructed about $20,000,000 worth of buildings, when if the conditions were right she should have reached nearer $50,000,000. The contractors resolved to attempt to adjust their grievances with the different trades and tried to arrange for a conference with the Building Trades Council. After much delay that organization finally consented to recognize the contractors' association and appointed a committee to confer with a similar committee from the contractors. After spending ten days in session an agreement was reached and submitted to the two organizations for ratification. The Contractors' Council took immediate action and signed the same. The Building Trades Council after much delay finally admitted they did not propose to sign it and intimated that they were prepared for a struggle. They fully believed, and past experience was their guide, that the contractors could not hold together and that it would all be over in a few weeks. The battle was then begun; the contractors announced that they would only employ men under their own rules after February 5, and upon the following conditions:

"That there shall be no limitation as to the amount of work a man shall perform during his working day.

"That there shall be no restriction of the use of machinery or tools.

"That there shall be no restriction of the use of any manufactured material except prison-made.

"That no person shall have the right to interfere with the workmen during working hours.

"That the use of apprentices shall not be prohibited.

"That the foreman shall be the agent of the employer.

"That all workmen are at liberty to work for whoever they see fit.

"That employers shall be at liberty to employ and discharge whoever they see fit."

Never in the history of Chicago had such an organization as had the contractors been formed. Heretofore one organization would fight, and eventually be beaten, but now they were all bound together in a common cause and it was to the interest of all to stick and fight it out to the finish. The union men refused to work under the rules submitted by the contractors and a general strike was immediately inaugurated among all the trades. Work was absolutely stopped in the building line in Chicago, both sides believing that the other would give way in a few days. After waiting several weeks to see what the result would be and not finding any weakness among the unions, the contractors now thoroughly organized and determined to begin operations upon all buildings with help other than that affiliated with the Building Trades Council.

The Industrial Trades Union.

The Industrial Trades Union was organized by a number of non-union men of all trades and they endeavored to supply the demand for labor made by those contractors who were desirous of proceeding with their work. Immediately after resuming with this kind of help a reign of terror was inaugurated by the practically locked out union men. Non-union men were assaulted on the job and going to and from their work, necessitating the contractors engaging a large force of special police officers to protect the men, the local police on account of politics not giving freely the protection the law said they should give to all citizens following their usual vocations in a lawful manner. Men arrested for committing assaults were let off with a small fine and then the fine was remitted.

'Buses and other conveyances were engaged by the contractors to take the men to and from the jobs, in many instances cots were installed in large buildings and the men quartered there, meals being provided from a neighboring restaurant. Mobs of union men surrounded the various jobs and threatened and beat any non-union men who dared to leave the buildings, following them home at night and trying to intimidate them. Notwithstanding all this the contractors continued with their work, protection being assured the non-union men. The city was flooded with them and all classes of mechanics could be secured, at one time over 6000 of them being at work upon buildings in course of construction. Numerous attempts were made by all kinds of committees and all classes of citizens, from the Mayor down, to get the contractors to recede from their demand that no agreement could be made with a union until it had withdrawn from the Building Trades Council. They were determined that this organization, having been the cause of all the trouble, must cease to exist.

The End Near.

The unions finally permitted their members to go to work under any rules and began to realize that the contractors were determined to win out. Slugging immediately ceased, the police force became more active and few assaults were committed. The bricklayers were the first to give in, they signing an agreement with the Masons' Association in August, and their men went back to work. Their withdrawal from the Building Trades Council, numbering over 3000 men, spread consternation in the ranks of the council. They tried hard to recover from the blow, but when the plasterers, plumbers and steam fitters signed with the bosses and withdrew they began to realize that the end was near and since November last they have been falling over one another to get in line. The last organization of any importance left in the council was the carpenters, and now they have come to the conclusion to follow the rest of the trades and help along a revival of the building interests of Chicago.

The Building Trades Council February 5, 1900, had a membership of nearly 40,000 men; to-day there are less than 4000 in it, and it is only a question of a few days when it will permanently disband. The contractors, recognizing the necessity of unions, have insisted upon the associations affiliated with it making agreements with the union of their respective trade. They concede the right of the unions to also have a central organization, but insist that it must be composed of mechanics only and shall not be the present Building Trades Council, and that it shall have no rules that shall conflict in any way with the agreement entered into between organizations. All grievances are to be submitted to a joint board of arbitrators, whose decision is final, and pending which no strike of any kind can be inaugurated.

The scale of wages adopted by the Building Contractors' Council, and which has been incorporated in all agreements, is as follows:

Bricklayers	$4.00	Marble setters	$3.50
Plumbers	4.00	Sheet metal workers	3.40
Stone cutters	4.00	Carpenters	3.40
Gas fitters	4.00	House drainers	3.28
Steam fitters	4.00	Iron workers	3.20
Plasterers	4.00	Painters	3.00
Engineers	4.00	Gravel roofers	3.00
Tile setters	4.00	Plasterers' laborers	2.40
Iron setters	3.60	Laborers	2.00

A Prosperous Outook.

The final adjustment of the difficulty, which has been disastrous alike to the contractor and the mechanic, is hailed with joy by all. Business men, real estate men, architects and owners all agreed with the contractors during the struggle and are gratified that the building interests of the city will not in the future be jeopardized by the acts of irresponsible men, or hampered by obnoxious rules of labor organizations. In the opinion of many the value of real property will advance and capital be drawn again to the city as the spring approaches. Evidences of an unprecedented season in the building line are seen. Fully 20 large buildings, many of them sky scrapers, are already announced and are being figured, preparatory to beginning operations as soon as the weather permits. In three of the leading architects' offices there are at the present time on the boards or being figured buildings to be erected this year aggregating in value nearly $6,000,000. In 1900 there were constructed in Chicago buildings to the value of $20,000,000. This was during all of the labor troubles, when conditions were such that they would not warrant the careful investor proceeding with much work. The conditions now in the labor market and the reduction in the cost of material lead many of those best qualified to judge to predict that buildings to the value of $50,000,000 will be constructed in Chicago this year.

The contractors intend maintaining their present organization, in order to see that they have no trouble in the future and to see that the agreements are kept by both the associations and the unions. They purpose to provide for a defense fund to meet any exigency that may arise, and there is some talk, on account of the complete victory which they have won in Chicago, of making it a national organization and having councils of a similar character in all the large cities of the country.

Swedish Brick Work.

Sweden is a country of forests, and until recently the domestic buildings were constructed almost entirely of wood. Time after time, however, the towns have been laid waste by fire, and from the ashes there are now rising towns of brick and stucco. The bricks are usually larger than those employed in this country, measuring about 12 x 6 x 3 inches, but the size varies in different districts. For exposed brick work header bond is generally adopted, the angles being formed with three-quarter bricks laid alternately along each return. At Upsala Cathedral, however—which, by the way, has been restored till it looks as if it were built yesterday instead of 500 years ago—the bond is somewhat curious, and varies in different parts of the building. Most of it is a modification of the so-called Flemish bond, and consists of two stretchers followed by a header. The effect is far from displeasing. A few modern buildings in Stockholm are faced with rock faced wall stones, shading in color from yellowish brown to purple. The courses vary in depth and in width of bed, so as to bond with the brick work behind.

ACCORDING to expert medical opinion a model schoolroom should be from 32 to 38 feet in length, 26 to 30 feet wide and with ceiling 12 to 16 feet high. The light should be admitted only from the left side of the pupil. A school house should never be more than three stories high, with wide, straight and well lighted corridors. Doors should open out, so as to permit ready exit in time of danger. The inside walls of the rooms and corridors should be tinted a neutral gray, light blue or green, while the ceilings should be white. These should not be painted but lime coated.

MAKING JOINTS IN BRICK WORK.

A WRITER who has given no little attention to the subject presents in a recent issue of an English paper some interesting comments relative to the finishing of the joints in brick work, remarking that there are two ways of doing the work—either by jointing or by pointing. The author states that in jointing the rough joints as left after bedding the facing bricks are merely trimmed up in one of the following ways:

Flat joint, as indicated in Fig. 1 of the trimmings, is made by pressing the joint flat with the face of the bricks without any trimming or cutting, and would only be used when the wall was going to be colored or whitened over. The next joint, shown in Fig. 2, is also a flat joint, being very similar to the last except in being indented all along with a tool called the jointer. This is an S-shaped piece of iron, and is run along a straight edge, called a jointing rule; sometimes, however, a trowel is used instead. The struck joint, shown in Fig. 3, should be formed by pressing or striking back the upper part of the joint while the mortar is moist, so as to form a bevel to throw off any wet that may trickle down the wall, and then the jointer is run along the lower edge.

This struck or weathered joint is very often made upside down, as shown in Fig. 4, and the moisture collects on the bricks at bottom of joint, and in frosty weather causes the edges of the bricks to be burst off. This joint when properly executed as the work proceeds forms the most durable joint that can be made, and is to be recommended as being far better than any other. There is, however, another joint that runs it very closely, and that is the mason's joint, Fig. 5, which is more suitable for masonry and is very seldom if ever used in brick work. Where the bricks are exceptionally good ones a joint, Fig. 6, that has been used on buildings in London can be employed, but from its form it necessitates that the bricks have clean and sharp arrises and that they are able to stand a severe frost. This joint accentuates the bricks in a very marked degree.

All the foregoing joints vary between $\frac{1}{4}$ and $\frac{3}{8}$ inch in thickness, while for gauged work the joint should vary between 1-10 and 1-16 inch, and only a flat joint, Fig. 7, is very much used. Sometimes the brick work is to be plastered over, in which case the expense of jointing is not necessary, and all that requires to be done is to leave the bricks with joints, as shown in Figs. 8 and 9.

The joints of brick work when executed in inferior mortar often decay and leave the work in an unsightly condition. This is remedied by pointing in one of the following ways: The joints are raked out, as shown in Fig. 10, to a depth of $\frac{3}{4}$ inch, the space thus provided may be filled up by using cement mortar and finishing in any of the ways previously described.

When, however, the edges of the bricks have become broken, recourse is had to tuck pointing, Fig. 11, which consists of filling the joints up with colored stopping and then rubbing over the face of the work with a piece of soft brick till the bricks and the joints are the same color. A small groove is then formed along the center of the joint, after which the mortar is allowed to set a little. Then white lime putty, made of pure lime slaked in water, the water being allowed to evaporate till the mixture is about the consistency of cream, is mixed with three parts of silver sand or marble dust, and worked into the groove with a flat jointer so as to form a raised portion, the sides of which, while still soft, are cut with a pointing knife, so as to make a parallel line $\frac{1}{8}$ inch wide, and thus give the brick work the appearance of being finely jointed.

Another method of pointing is known as bastard tuck pointing, Fig. 12, in which the raised portion is from $\frac{1}{4}$ to $\frac{3}{8}$ inch wide. Both of these forms of tuck pointing, though having a very fair appearance, are costly and short lived, the first sharp winter probably destroying them, the rain or moisture being caught on the projecting part and led into the joint, and then the frost causes the moisture to expand and burst the joint, carrying a large portion of it away. Instead of merely rubbing the face of the work with a soft brick, solutions of coloring matter, according to color desired, are sometimes applied and make the work have a very new look, thogh not suited to stand the atmosphere of our large towns.

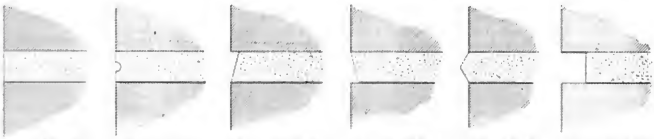


Fig. 1.—Flat Joint. Fig. 2.—Flat Joint Indented. Fig. 3.—The "Struck" Joint. Fig. 4.—The "Struck" Joint Reversed. Fig. 5.—The Mason's Joint. Fig. 6.—Joint Often Used on Buildings in London.

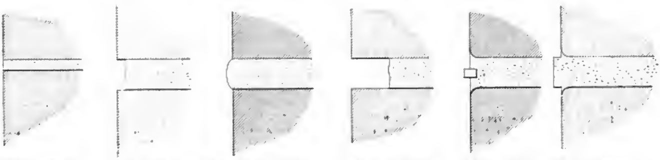


Fig. 7.—Joint for Gauged Work. Figs. 8 and 9.—Joints where Brick Work is to be Plastered. Fig. 10.—Joint Raked Out. Fig. 11.—Tuck Pointing. Fig. 12.—Bastard Tuck Pointing.

Making Joints in Brick Work.

The elevator shaft of a building is generally the weak spot as far as fire is concerned, and in case of fire the top of the shaft is exposed to great heat, owing to the fact that the shaft itself acts like a chimney and supplies the draft which causes the fire to spread. If the top of this shaft can be made fire proof the danger is greatly lessened. This may be accomplished by building a wire cage on the roof, over the shaft, and covering it with several layers of cement, which is then allowed to harden.

THE CONTRACTOR AND HIS ESTIMATES.

FOR some time past our attention has been called to the wide difference in the amounts of the highest and lowest bids received in competition for the erection of many buildings, and it has occurred to us that a most interesting and instructive discussion could be developed, based upon the question of the contractor and his estimates. Why such great differences should exist may perhaps be explained in many ways, but with a view to throwing all possible light on the subject we shall be glad to have those interested forward for publication letters giving the reasons for or against the present system of competitive estimates, or taking the ground that architects do not make complete plans showing all of the minor details in large scale drawings such as would enable the contractors to estimate intelligently; that the specifications are not absolutely complete, and that when called upon to estimate the contractors have no opportunity of seeing the full size details, owing perhaps to the fact that the architect has not had time to make them, or will not make them, and the contractor is therefore obliged to use his best judgment, in many cases guessing what the finish is to be.

Bearing upon this important phase of the building business, we present herewith a communication from a well informed member of the profession, whose views we doubt not will find an echo in the experience of many contractors in the country. He handles the subject in a most interesting manner and touches upon points which cannot fail to strongly appeal to those practically engaged in the building business. We trust that what he has to say will draw out expressions of opinion from contractors in all parts of the country.

Scheme for Securing More Complete Drawings.

In a certain city in the Middle States the contractors formed an organization known as a Board of Trade, got up an agreement that hereafter they would not estimate on any building unless the drawings, &c., were complete as to items, with the result that the architects in that locality have been compelled to produce more complete plans and better specifications for the erection of buildings, and it was supposed that portions at least of the problem were solved. A few weeks ago the writer had occasion to visit the city during the awarding of a contract for a six-story fire proof building, and learned that the local contractor who was awarded the contract signed it for $32,000 less than the lowest estimate, without knowing the amounts of the higher competitors. Estimates were also opened for a two-family house, which included two copper bath tubs, three water closets, two wash bowls and kitchen boilers and sinks, gas piping of the house, with connections to the sewer and water, approximately 25 feet from the front of the building, and for these the estimate was $192. The heating contract, embracing a hot water system with six radiators on each floor, was given for $325, all remaining bids for heating and plumbing ranging from 50 to 75 per cent. higher, and it was remarked at the time that there was an opportunity for some people to learn more about estimating.

A short time ago, in a competition for a public building in Connecticut, the difference between the highest and the lowest contractor for doing the work, according to plans and specifications submitted, was a trifle over $30,000 on about a $30,000 contract, and we do not know of any difference in amounts that has elicited more attention from the general public.

Again, our notice was drawn to the bids for a public institution where the contract was awarded for $52,000 lower than the highest estimate of 17 different contractors, the contract approximating $120,000, and within a few months we have seen the estimates opened on a chapel where there was a difference of $5000 between three contractors on a $12,000 job.

Not only does the public note the difference in the public buildings, but the building public in its domestic work has reached the point where it looks for these great differences in estimates, so as to get the building erected as cheaply as possible, and oftentimes one will hear a client say, "It ought to be built for $6000, but I will get a large number of estimates and I will build it probably for $4000." And the most remarkable thing in the statement is the fact that he gets it done, for we heard only recently of the contract of a two-family house being awarded to out of town parties for $3200, where the highest local contractor was $1500 above that figure. Last year a friend of the writer obtained drawings and specifications for a single house and submitted the drawings in competition to five masons, seven carpenters and the usual number of subcontractors, and the lowest combination was $5600 and the highest $11,000.

We could go on and recall many circumstances of like nature, but the foregoing list is sufficient to show the actual difference in many of the competitions. What is the cause of it? What is the reason that two men will take the same set of plans, specifications and details and be $5000 apart on a small contract? One might ask this question of some contractors and they would say that it is the difference in the completeness of plans and specifications. One set you can drive a horse and cart through and the other states specifically what kind and quality of material is to be used, yet that same contractor will criticise the architect if he puts everything in his specifications and explains everything carefully; he is apt to say the specifications are too long. Certainly contractors ought to appreciate the fact that the more complete the specification is the more it tells him what is expected, and consequently the longer that specification must be. The mere fact that a specification "covers the floors with good quality spruce boards," as some of them are written, is rather vague and a source of misunderstanding to the clause that calls for "7/8 x 5 inch matched, first quality, spruce flooring, laid in long lengths," &c.: and again, picking up a specification a few days ago, reading under the heading of hardware that "the contractor shall furnish and put on proper hardware for the entire building," is vastly different from the man who will give the number and trade name of the various fixtures, so that each and all can estimate on the same quality of goods. It has been suggested that if two men estimate on certain plans and specifications where the kind and quality of every bit of material is mentioned, sizes given, &c., each go out into market and get their estimates and the prices of the material amounts to the same, it is a question of judgment who will get out of it at the least possible expense.

Good vs. Poor Management.

One contractor can take a body of men and handle them to a great deal better advantage than another. One contractor works with his men and only takes the amount of work that he can personally attend to, while another will take a large amount of work which requires expensive foremen and time keepers, requires a carriage in which to visit the work, and somebody must pay for his time in superintending the work. In this case it is a question of personal expense one over the other. It stands to reason that the man who works with his men can produce buildings at a lower margin than the man who is compelled to employ superintendents. One man is satisfied with obtaining days' wages out of a contract, with from 2 to 5 per cent. profit on the entire job. The second contractor could not possibly live at this rate. These circumstances must be one reasonable answer to the question.

Some time ago we saw different detail statements made by various contractors of quantities of material taken off from a given set of drawings. Each took about the required length of time to get the statement from the drawings, all contractors saw the same drawings and specifications, and yet there was a difference of 25 per cent. between the total amounts of material as taken off by these men. The contractor who obtained the contract was asked to keep a record of the number of brick used for that particular job, and it was noted down the various amounts taken by other men. When the contract was completed it was found that it took 20,000 more brick than the man who had obtained the contract estimated it would, and that was approximately 10 per cent. higher than the highest man. From this statement and from knowledge of the usual system of estimating, it seems strange to say that there are very few contractors who can estimate accurately the required amount of material for a building.

In answer to a question put to a contractor some time ago how he arrived at the number of brick in a building, he replied that he built a building for John Jones last year about that size and he bought so many brick, and this is something like it, so he supposed it would take about the same number. Is it surprising that this man lost money on the contract ?

The guessing at quantities and cost has considerable to do with the wide difference, for in speaking of the question to a contractor recently, he said: "One night when I got home there were seven sets of plans at my house for estimates, and as I had been out on the buildings all day and many of the estimates were required to be in by the morning, I sized them up and gave a guess figure on all seven, comparing it with my other work. Strange to say I did not get one of them." In answer to the inquiry, "Would it not have been better to have selected one that you wanted and given that careful and conscientious estimating, so as to make a strong endeavor to get one of the jobs ?" he replied that it would have been of no use, for the whole system of competitive estimating to-day was a lottery—the man that can guess the nearest gets the job—and he said: "Many times I have been influenced by seeing an article in the paper that so and so was to build a house to cost so many dollars, and I would look the plans over, put in my guess, and sometimes I would hit it."

List of Prices to Govern Estimates.

Against the contractor who cannot take off proper quantities and the guessing man is put the contractor who has made a list of prices to govern his estimates—that is to say, he has got a detailed statement of all the items that go into the building, with a schedule of prices. Once in a while it is changed, but usually it lasts for six months or a year, and no matter what the condition of the market is our friend always uses his schedule. He has figured a small profit on each item; no matter whether brick cost $6 per 1000 or $9 per 1000, he always charges $15 per 1000 to lay them; no matter whether the plaster is one, two or three coats, it is always 40 cents, and everything in proportion, and when he gets his estimate all done according to his schedule he will add a percentage for what he does not see and a percentage for profit, and then he will submit his estimate and stand back and grumble with the rest, "the man who got that contract is losing money," and the invariable rule is that the man who grumbles the most and always sends the other fellow to the poorhouse estimates this way.

Anybody can see that he is getting a profit on a profit, and it is strange to see how many contractors figure this way. He is like the plumber who estimates his work at list price, which we saw done within three months, and then charges a percentage of profit on that, after giving the total of material and labor, and it is not to be wondered at that his price was about three times the amount for what the contract was let.

In various parts of the country the system of estimating is vastly different. In Northern and Western New York State contractors always get legitimate subestimates on a given list from the mill men or material men, &c., on every contract; also in the larger part of the country, outside of Connecticut, all contractors stand on their own department. Everything is let differently. The mason work goes to the mason and the carpenter work to the carpenter, and so on down through the job. Perhaps it is not as convenient as to deal with one man, who knows nothing about the other trades outside of his own and who charges you 5 to 10 per cent. for doing your business, and he making all he can off the subcontractors, for no man is going to do your work for pleasure; there certainly must be a dollar in it.

In Connecticut the subcontracts are usually awarded the last thing, so as to get the advantage, if possible, of a fall in the market, and it is the practice in the majority of cases to wait for a house to be lathed and plastered and cleaned out before the sizes and measurements are taken for the inside trim. Recently we asked a contractor why this was so, and he replied that sometimes the market price of material and labor went down, and then they always deferred ordering the material, for perhaps the owner might want to make some changes and he would not want to pay for material twice.

On the other hand, a New York contractor recently said that inside of 24 hours from the signing of a contract he had awarded every subcontract on the job, turned over all the details on the contract and contracted when it was to be done. Then it was off his mind and he had an opportunity to look for other work, for they were to take charge of their own subcontracts.

That is one of the principal reasons why work can be erected in other States much more rapidly than in Connecticut. We heard recently that a certain mill man would fill orders in, say, four weeks from local factories with work and material, whereas if eight to ten weeks were allowed him he would furnish the same work and material from his Western factories at something like 25 per cent. less. This should be an additional reason for ordering work promptly, but how many contractors take advantage of this, and it is the prime reason why it takes six to nine months to build a $6000 house in Connecticut against three to five months in New York State.

Different Methods of Estimating.

We have seen contractors take estimates both on the cost per square foot of the ground floor and the cubical contents of the building—of course having kept records of their work and experience on other buildings, and thoroughly understanding the conditions and perhaps a knowledge of the work of the architect—but what sort of a chance does the conscientious contractor stand against all these contractors, when he sits down and laboriously takes off each item, each quantity of material, gets his subestimates from the mill, adds the total cost of the material in the building with their quantities in one column, figures out as accurately as possible his labor account, his insurance account, cartage and incidental account, and knows to a certainty that to do the job as it should be done will cost him a certain amount of money ?

Now comes in the question of his own time, and he figures the amount of personal attention that will be required of him and adds that, then considering his time and the money with its interest and the risk, and what he is satisfied with for a straight profit—and he has a choice of wide margins here—and it is the balancing of this column of profit and loss that sustains the man in business. A few years ago it was the custom and privilege of many of our contractors to ask 10 per cent. for their profit on any contract, but the wide difference between the highest and lowest estimates shows the profits run from 10 per cent. down to 1 per cent., and we have heard where it was totally ignored in the sum total. This, no doubt, is why the columns of the financial papers give such an extensive list of failures and assignments, and at the bottom of the page note the disappearance of numerous contractors.

Contractors have been obliged to estimate on this principle, and why ? Because the general public are estimating closer, people who can afford to pay a fair living price want to cut it down as low as possible, and whereas they know you can "live and let live" at $10, make day wages at $8 and just exist at $6, will continually crowd you to the $6 point. The result has been that the contractors to get any work at all have been obliged to estimate as close as possible and trust to luck and chance or the possibility of skinning the job to get a fair living out of the work. The owner and client employs an architect, not according to his ability or to his honesty, but simply from the fact that he works cheap; and when he employs an architect to supervise his house he only does so that he can get a man to stand over the contractor who has taken the job too cheap to see that he cannot possibly skin it. When the contractor fails to live up to the standard of the specifications, which he cannot do for the price, then our owner and client falls on the architect and says he is not doing his duty in not making the contractor live up to his contract. We know of cases where if the contractor were obliged to live up to the full letter of the specifications he would fail in 24 hours.

Owners and clients are many times at fault and the cause of their own dissatisfaction with contractors and their work, and many times for their being cheated. The one point in view always seems to be "how much," and many people are familiar with the incident where an out of town contractor bid for work in a city and obtained five or six contracts; he certainly was lower than the local man. Who he was and what he could do was not in it; it was not a question to be considered against the price. To be sure he started the buildings and reached the roof and inclosed them, for about then two payments were due, which were made, and is it to be wondered at that to-day there are a number of people looking for that man? In some cases the houses are completed, usually at the "expense of the owner" and sometimes at the expense of the material men. You will rarely hear the owner say how he got caught on that deal, but he will always tell you "how cheap he got it."

Is it the fault of the competitive sysem? Is it the fault of the general public in not appropriating more money? Or is it the inability of the contractor to make a proper estimate? Who can tell?

Making a Straight Edge.

Those who have occasion to employ a straight edge and are desirious of making one for themselves will doubtless find the following description of the process full of interest and value. Three pieces of mahogany, or rather hardwood, about 3 feet long by ¼ inch thick, are planed up as truly as possible, the planed surface of all the three being from time to time applied to one another in order to judge of the trueness to which the surfaces are being reduced. When any one of three prepared surfaces will lie on the prepared surface of either of the other two without allowing any light to pass through the line of junction the edge may be considered sufficiently true to admit of their being used in the production of a metallic straight edge. To this end three similar strips of steel, of the size desired, are smoothed or cleaned upon their sides on a grindstone or with a file. They are then laid one upon the other and a hole drilled at each end, a rather tight fitting pin or rivet being run through each hole to keep the three bars together. In this state they will appear as one thickish bar. The compound bar being placed in the vise and clamped on each side with sheet lead or zinc, the edges are filed level, beginning first with a rough file, and gradually increasing in fineness. Every now and then the edge being produced is tested against one of the wooden edges above described, which should be previously rubbed over with red chalk, &c., to render prominences visible. When the eye no longer detects any differences in level on the application of the wooden straight edge, the steel pieces are to be removed from the vise and pins extracted. They must now be tested against one another until, by careful filing and repeated comparison with one another, it is found that the edges of all three will unite closely without any irregularities being perceptible. A good way of ascertaining whether any such exists is to place two edges in contact and rub them together with some force; the prominent portions will by this treatment be somewhat burnished and will render themselves apparent by their superior luster. The reason why three edges should be prepared simultaneously will be sufficiently evident on reflection. It will be readily understood if A and B were two strips of steel, that A might be slightly concave and B correspondingly convex without the eye being able to detect any fault, as no light would pass; but if a third strip, C, having the same convexity as B were applied against the latter, the fault would immediately become apparent, and on correcting the faults of B and C, and applying them to A, the concavity of this latter would also be rendered visible.

Manual Training at Girard College.

The department of manual training at Girard College, Philadelphia, Pa., is one of if not the most important feature of the educational system of the institution. The mechanical department was established a number of years ago, and has been enlarged from time to time until it now comprises seven different subdepartments—namely, mechanical drafting, carpentry and pattern making, metal working, blacksmithing, foundry work, plumbing and electrical mechanics.

The wood working department is equipped with all the conveniences of a modern shop, and very creditable work is performed by the older boys. Exhibits are shown of stair building, advanced pattern making and even to the construction of a model two-story house, in which all the work, making of the doors, windows, sashes, frames, &c., has been performed by the older boys.

The metal working or machine department is supplied with the best and newest tools. Lathes, planers, slotting and milling machines, drill presses and other tools are provided for the varied uses of the boys in the performance of the work in hand. A fully equipped tool room is maintained, and a steam test table is provided for the testing of engines, &c., built by those undergoing instruction in this department.

The plumbing department, although less than five years old, is thoroughly equipped with all the appliances for teaching practical and sanitary plumbing. It has a gallery divided into three sections, each representing the kitchen and bathroom of a small dwelling house. These have been fitted up by the more advanced pupils with the usual plumbing fixtures. One division represents a modern city kitchen and bathroom, with water coming from the street main. The second division represents a country kitchen and bathroom, with the water supply coming from a well or cistern, a pump conveying the water to a tank on the third floor. Stationary washtubs and piping for hot and cold water are also supplied. The third division represents a house that has never had hot or cold water, and in which the boys are instructed to pipe and fit, with the least damage to the wood work, joists, &c. The boys are instructed how to put a water back in a range, set a boiler and pipe a house for hot and cold water. Among the things made by the pupils in this department are a siphon basin, a hydraulic ram and an overshot wheel.

In the department of electrical mechanics the work has kept pace with this rapidly advancing science. It is equipped with all the latest and best apparatus and appliances. One of the features in this department is a working model of an electric street railway or trolley system, complete in every detail and containing about 150,000 pieces. There are also complete models for demonstrating the construction of arc lamps, both open and inclosed; complete models for demonstrating the making of incandescent lamps and the telephone, and the construction and operation of the electric motor and dynamo.

In the blacksmithing department the boys are instructed in all branches of the art—welding, forging, tempering and the manufacture of various tools commonly used.

The foundry department is situated in a separate building, especially designed for its purpose and complete in every detail. It is equipped with sand tubs and arranged for classes of 24 boys each. A core room is located at one end of the building and arranged the same as the foundry. It is here that the boys are taught the rudiments of molding, beginning with simple straight cores and advancing to the more complex ones. They learn here the use of molders' tools and the care necessary for good workmanship. They advance from this department to green sand molding, bench work alone being performed, and, beginning with simple forms, progress to more difficult ones—three-part flask work and artistic molding for brass and white metal castings.

THE ART OF WOOD TURNING.—XV.

(second series.)

By Fred. T. Hodgson.

THERE are many other devices for performing rose engine work in part, known to professionals, that do certain kinds of work equally well with the engine described, but they are limited in range, and certain kinds of work performable on the rose engine cannot be made on the incomplete machines. One or two of these machines, however, deserve special mention, as the cost of making them is much less, and they are less cumbersome. One, invented by Holtzapffel & Co. of London, is an ingenious adaptation of the principle of the rose engine, and is worth describing here. It works like the ordinary eccentric and other cutters, by a cord from the overhead motion.

In Fig. 96 the main part of the machine is exhibited. A is a shank fitting the receptacle of the slide rest, and drilled to receive a hardened spindle, at one end of which is a worm wheel, turned by a tangent screw, B C, an end view of which is shown in Fig. 98. By this are turned the parts beyond N—namely, the frame D, carrying the tool, as in the eccentric cutter, and adjacent parts, S representing chamfered bar, P back plate and N, which is a round piece in one casting with the back plate and having a hole through it for the coiled spring being kept in place by a small key or feather, same as described for rose engine proper, and are secured by a screwed ring or ferrule, seen at L, Fig. 96, the edge of which is milled. At F, in Fig. 97, is seen a short stop or set screw, the head of which is divided into 10 degrees. By this the rubber is prevented from penetrating to the bottom of the undulations on the edge of the rosette, and if it is allowed only just to touch the summits of them, the tool will cut a circle. Thus, as the screw stop can be accurately set, one rosette will produce at pleasure graduated waved lines, the waves growing less and less undulated as the center or circumference of the work is approached, giving a most delicate and chaste pattern.

Another variation of the pattern, producible from any rosette, results from the frame of the tool holder being extended beyond the axis of the spindle in both directions. When the tool is on that side of the axis nearest to the rubber pin the undulations of the rosettes will be so followed as to produce their exact counterpart on the work. When the tool holder is on the other side of the axis the undulations become reversed, the raised parts of the rosettes producing hollows, and *vice versa*. It may here be mentioned that in the case of the rose cutter, eccentric and universal cutter and similar apparatus, the screw heads carry ten chief divisions and

Fig. 97.—Under Side of Cutting Device.

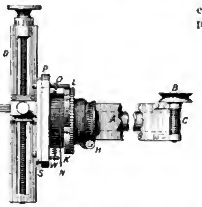


Fig. 96.—Side View of Rose Cutting Device.

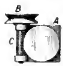


Fig. 98.—End View of Cutting Device.

Fig. 99.—Shapes for Rosettes.

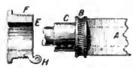


Fig. 100.—Detail of Rose Cutting Device.

The Art of Wood Turning.

seen between O and W. All these are secured to the spindle and revolve together as one piece with it.

Fig. 97 is a front view of these parts. P is the back plate of brass, with steel chamfered bars, S S, on its face, as in the eccentric chuck. Between these slides the plate E, to the face of which is attached the long steel frame D, carrying the tool holder. It will be noticed that a slot is cut in the back plate at the top, through which projects a hard steel pin, screwed into the back of the sliding plate E. This is seen at O, Fig. 96, and is attached to one end of a coiled spring, the opposite end of which is screwed to a pin, W, fixed on the back plate, near the bottom. The pin O is thus kept in contact with the edge of the rosette, or pattern plate, K, and as the whole revolves with the spindle, while the rosette is fixed, the pin or rubber is compelled to follow the undulations of the pattern, the motion being, of course, communicated to the tool. An examination of Fig. 100 will show the arrangement of the part on which the rosettes are fixed, and which is capable of turning, but does not, unless the tangent screw H and wheel B are brought into requisition, as will be explained.

The end of the main shank of the instrument is round, as seen at C, the worm wheel B being screwed fast by four small screws to the end of the square part of the shank. Upon this rounded end C fits a sleeve, E, to which is fixed the tangent screw H, and on which also are placed the rosettes. The latter have a large central hole, as shown in Fig. 99, and fitting closely beyond the screw thread F of the sleeve, and which do not revolve, ten minor divisions. The screws are cut with ten threads to the inch, so that one turn advances the slide, or the tool, or wheel, as the case may be, 1-10 inch. One large division, therefore, produces a movement equal to 1-100, and the smaller divisions, 1-200 inch. If the screw is small it is generally cut with a double thread equal to 1-20 inch. It is evident that in addition to the movements of the various parts of the rose cutter the turner has in his power those of the slide rest, and of the division plate on the lathe pulley, by one or both of which further complications become possible. Six modifications of pattern produced from one rosette are shown in Holtzapffel & Co.'s work, from which much of this description is taken, and these may be much further multiplied, according to the taste and skill of the operator.

It is not possible to apply a rapid movement to this rose cutter, as the rubber would probably miss touching the rosette in places, hence the tangent or worm wheel is used to give motion to the central spindle. The object of the other tangent screw is to move the sleeve and therewith the rosette at pleasure, so that the higher parts of the undulations in the second cut may, if desired, be arranged to meet the lower parts of the same in the first cut, or to fall intermediately. The effect of the gradual shifting of the rosettes in this way is perfectly marvelous. The centers of the circles cut by this tool will be always regulated in regard to position by the slide rest, because these centers are always in a line with the center of the spindle.

Hence, to place a circle in any desired position it is only necessary to determine its center, and, after drawing back the tool by means of the screw till its center runs truly, turn the screw of the slide rest until the point touches the required spot, when the cutting may commence.

For fine work on this machine only the hardest woods should be employed, as the slow motion necessary to work over the rosette precludes the possibility of making clean cut work on the softer woods.

WHAT BUILDERS ARE DOING.

A CONSIDERABLE amount of building in the aggregate is in prospect in and about the city of Baltimore and architects and contractors generally look forward to a season of growing activity. The building commission for the new Maryland Court of Appeals and library building to be erected at Annapolis, held a meeting on the 7th of February, and selected from the competitive designs submitted those of Baldwin & Pennington of 40 South street, Baltimore. Local architects are much gratified at the decision of the commission for having opened the competition solely to members of the profession in Maryland. The new building will be 100 x 120 feet and will be fire proof throughout. It will contain all the vaults necessary for the storing of records and the library will have a capacity for 150,000 volumes. The style of the building is classic in its architecture, and its simplicity is entirely in harmony with the Colonial architecture by which it is surrounded.

Revised plans for the Fifth Regiment Armory will soon be completed by the architects, Wyatt & Nolting, when new bids will be taken.

The design submitted by Douglas H. Thomas, Jr., and J. H. Parker, has been accepted for a handsome 12-story hotel to be erected in the wealthiest and most fashionable part of the city. The style of the building will be French Renaissance and the plans embrace the most advanced ideas in hotel construction. Working plans will be ready for bidders in about three months.

Boston, Mass.

If one may judge from the permits issued the first month of the year, the coming season is likely to witness a considerable degree of activity in the building line in and about the city. According to the figures given out by the office of the building commissioner, there was an increase of more than 100 per cent. in permits for brick construction as compared with January, 1900, while those for frame buildings show an almost equal increase. In and about the suburbs of the city there is more or less building in progress, and in the opinion of architects and builders a large amount of work in the aggregate will be undertaken during the year.

The Master Builders' Association have taken up the Copley square restriction law and have voted to support the petition in the General Court in favor of limiting the hight of buildings in that square to 100 feet. It will be remembered that last year the authorities voted to make no exception in the case of the Westminster Chambers from the operation of the restriction law which, if carried into effect, would result in serious injury to the appearance of this building. Now that the matter has been brought up again the Master Builders' Association, through Secretary William H. Sayward, have submitted a statement defending the owners of the buildings from the charges which they say have been freely made to the effect that they "proceeded knowingly in violation of the law" in constructing the ornamental cornice of the building beyond the 90 foot line.

Bridgeport, Conn.

The Master Builders' Association held a meeting on the evening of February 2, at which the following officers were elected: President, William A. Disbrow; vice-presidents, William McLellan and James Burns; secretary, D. C. Mills, and treasurer, W. L. Savage.

Action was taken with a view to bringing the association into closer relationship with the municipal government, and also affecting the internal workings of the organization. A committee was appointed to wait upon the mayor and urge him to appoint a member of the association on the new Municipal Buildings Committee; also to hereafter select men from the association when a carpenter was to be appointed on the Board of Building Commissioners.

The agreement between the master carpenters and journeymen will expire on May 1, and there seems to be a rather general opinion that some objection to its renewal will develop.

Butte, Mont.

Butte seems to be entering the new century with a building boom. This condition is largely due to the fact that a great part of the business and residence portion of the former mining camp were built as temporary structures. As long as the extent of the copper deposits about the city was doubtful capital did not care to invest in permanent structures. Now these old houses have to be replaced and new ones added. During the year 1900 over $1,000,000 was expended in buildings and the outlook is for still more during the present year. Among the big buildings now under way or about to be erected are: The Hirbour estate office building at Broadway and Main streets, to cost $150,000; the Montana apartment house on West Broadway; the Washington block on West Park street; the new Federal building, to cost $200,000, on Main and Copper streets; the Sutton Theatre, to cost $100,000 or more; the MacFarland Opera House, to cost $100,000, on Granite and Wyoming streets, and over 20 smaller business buildings. During the year just finished, over 300 residences were built in the city and many are now in process of erection.

Chicago, Ill.

In another part of this issue we present a somewhat extended review of the labor troubles which have existed in Chicago for something more than a year past, and which are now practically at an end. The agreement which has been reached between the Arbitration Committee of the Carpenters and Builders' Association and the Master Carpenters' Association on the one hand, and the Arbitration Committee of the Carpenters' Executive Council, representing all the unions of the Brotherhood, and the Amalgamated Society of Carpenters on the other, is to be effective until April 1, 1903, and becomes operative after the carpenters withdraw from the Building Trades Council. It provides for Saturday half-holiday and a wage scale as follows: Until April 1, 1902, the rate shall be 41½ cents per hour, and after that date 45 cents per hour, with a weekly pay day. No interference with workmen during working hours is to be allowed; apprentices may be employed; the foreman is to be regarded as the agent of the employer; all workmen are to have the right to work for whom they please, and all employers to have the right to employ whom they please. The men are not to work with non-union men at their own trade, and are not to work for any employer in Cook County for less than the regular scale. All disputes are to be settled by arbitration.

The practical settlement of the labor troubles encourages the hope that the ensuing year will be one of greater activity in the building line in the city than for many years past. In fact the number of permits issued during the month of January was in excess of the record for the same month since 1894. Permits were taken out for the construction of 302 building improvements, involving an expenditure of $1,912,165, this being a marked increase of 135 buildings and over $1,000,000 in cost as compared with the corresponding month of the previous year.

The annual election of the Builders' Club of Chicago was held at their rooms in January, when the following officers were elected for the ensuing year:

President,	Secretary,
Charles W. Gindele.	Edward Kirk, Jr.
Vice-President,	Directors:
Jefferson Hodgkins.	Elliott W. Sproul,
Second Vice-President,	Charles B. Sears,
T. Frank O'Connell.	Alexander McLachlan,
Treasurer,	Julius J. Pleas,
Robert Vierling.	J. Harvey Wilce.

At the annual meeting of the Cut Stone Contractors' Association of Chicago, held at the Builders' and Traders' Exchange the latter part of January, the following officers were elected: President, R. E. Harrsch; vice-president, W. L. Kerber; secretary, Henry Struble; treasurer, John Tait.

Detroit, Mich.

At the annual meeting of the Builders' and Traders' Exchange, held at their quarters in the Peninsular Bank Building, 40 Fort street, West, the following officers were elected:

President, Richard Helson.
Vice-president, W. J. Stapleton.
Secretary, Charles A. Kaichen.
Treasurer, Frank N. Cooper.

Directors:

E. M. Harrigan, Robert Hutton,
William S. Piggins, George H. Clippery,
F. R. Holmes.

Des Moines, Ia.

At the annual meeting of the Des Moines Builders' Exchange, held the latter part of January, it was decided to hold social sessions on Wednesday evenings during the balance of the winter season. Reports were received indicating that there will be no serious difficulty with the labor organizations at the opening of the spring season.

The election of officers resulted in the selection of W. F. Mitchell for president; J. E. Tusant for first vice-president; William Singer for second vice-president; R. M. Coleman for secretary, and C. H. Martin for treasurer.

Joliet, Ill.

According to the reports of architects and builders there is more work in prospect at present than for any season for a number of years. The plans which the architects have on their boards are not confined to any particular class of structure, but include residences, flat buildings, stores, factories and the like.

Kansas City, Mo.

At the annual meeting of the Master Builders' Exchange, held in their rooms in the Postal Telegraph Building, officers for 1901 were elected as follows: J. T. Patterson, president; M. Bridges, vice-president; A. S. Rankin, secretary and treasurer. Trustees: James Taylor, C. R. Hunt, A. F. Roddy, J. A. Otes, S. Sutermeister, D. B. Rudy.

The Exchange have been making some improvements in their headquarters which are calculated to render them more popular than ever. The location and other advantages have been the means of rapidly building up the membership, and H. H. Moore, the assistant secretary, is authority for the statement that there are from 10 to 15 names on the waiting list most of the time. A decision recently rendered by Judge Slover upholds the Exchange in the expulsion of a firm from the membership, because of alleged underbidding of another firm of contractors, also members of the Exchange.

Among the contemplated improvements in the city is a church for the Second Church of Christ, Scientists, the building to be entirely of stone and designed in the classic style of architecture. It will cover a plot 104½ feet square and the auditorium will seat on one floor 1163 people. The preliminary sketches have already been approved and it is expected that work will be commenced within a short time. The building will be erected under the superintendence of Architect F. R. Comstock of New York City, and will be first-class in all its appointments.

Los Angeles, Cal.

The building situation in Los Angeles could hardly have a better prospect. The unusually heavy rains of the past month or two give promise of the best agricultural season in years. The estimate of the orange crop is constantly becoming larger. The harvesting of a good fruit and grain crop is sure to be followed by a still greater increase in building operations. The building of the Salt Lake & Los Angeles Railroad, which will soon be commenced, is already having a good effect on building. As a direct result, G. S. Holmes, of Salt Lake City, has already awarded the contract for building an $800,000 hotel at the corner of Spring and Fourth streets.

Minneapolis, Minn.

The outlook for the building business is regarded as very encouraging and preparations are being made for a fair aggregate of work.

In giving the list of officers of the Master Builders' Association last month the vice-president should have read B. Cooper, and the sergeant-at-arms J. O'Donnell. In the Board of Directors or Executive Committee, M. E. Pike was elected a member instead of Angus MacDonald, as printed.

Mobile, Ala.

A meeting of the leading builders and contractors of Mobile was recently held at the office of Simmons & Young, which resulted in the organization of what is known as the Builders and Traders' Exchange, the object being to bring together for mutual benefit and protection the contractors and builders of the city.

The officers elected at the meeting referred to were: H. C. Fonde, president; Charles L. Simmons, vice-president; a Mr. Ewing, second vice-president; John Young, secretary, and N. Phelan, treasurer. The Exchange start with a membership of 22, which number it is expected will be increased to 40 or more by the next meeting.

Newark, N. J.

The Builders' and Traders' Exchange of the city have recently entered a protest against the awarding of work to out of town contractors by city boards. It seems there has been much dissatisfaction at the indiscriminate way in which work has been given out, and this action of the Exchange was taken with a view to protecting local architects and builders, more especially as it was known that some municipal buildings are about to be erected.

At a meeting of Master Carpenters held on February 1, C. M. Russell was elected president; George Varley as vice-president; Frederick Kilgus, second vice-president; H. J. Schaedel, treasurer; E. H. Harrison, financial secretary, and A. J. Crowder, recording secretary. A pleasant feature of the occasion was the presentation by E. B. Vliet on behalf of the members of a very handsome Morris chair to the retiring president, James Taafe.

Oakland, Cal.

Labor troubles are again prominent in the city. The present trouble grows out of the millmen's strike, which has been in progress in San Francisco and Oakland for months and was thought to be in a fair way to be settled. All the workmen on the Public Library Building were called off about the first of February because the contractor was using "unfair" lumber.

The Building Trades Council of Oakland elected officers on January 25 as follows: President, J. T. Kearns, Plasterers' Union; vice-president, J. P. Burke, Lathers' Union; recording secretary, Frank M. Dreishach, Millmen's Union; financial secretary, W. J. Baccus, Bricklayers' Union; treasurer, J. Scully, Painters' Union; business agent, J. H. Mullen, Cement Workers' Union.

Philadelphia, Pa.

The annual meeting of the Master Builders' Exchange was held at the rooms of the organization the latter part of January, President Stevens occupying the chair. His report showed that there are 195 members and that the financial condition of the Exchange was much better than the preceding year. In his address President Stevens expressed regret at the closing of the trade school, owing to the fact that no appropriation had been made by the last Legislature, but he stated that he had assurances from members of the Legislature that they would support and the Governor sign an appropriation bill for this purpose if requested by the Exchange. Among the business transacted was the adoption of resolutions indorsing the Ship Subsidy bill now before Congress.

The following were elected directors to serve three years: Charles P. Hart, George Watson, J. S. Stevens, David H. Watts, William B. Irvine, Cyrus Borginer and C. F. Dillingham, while George M. Lewis and William Conway were elected to fill unexpired terms of two years.

Quincy, Mass.

A meeting of the business men of the city was recently held in the Quincy Savings Bank Building for the purpose of forming a Master Builders' Association. It is intended to include in the membership builders, carpenters, plumbers, painters, and, in fact, representatives of all trades engaged in the building business. It is thought that such an organization will lead to the enactment of building ordinances which would be of benefit, and at the same time prove of advantage to the business men of the city. The meeting was presided over by George H. Field, and it was expected that at the following meeting officers would be elected.

St. Louis, Mo.

The Building Material Manufacturers' and Dealers' Association held a meeting and reception the latter part of January in their new quarters on the fifth floor of the Union Trust Building, this being the first general meeting of the association since its organization in December last. Speeches were made by a number of those present, Henry W. Ellot pointing out in the course of his remarks the advantage of organization, and declared that the advent of the work of the World's Fair necessitated a closer tie among builders for protection. He declared that the mechanics' lien law was good so far as it went, but no material dealer desired to go to law to collect a bill, and that it was as important to collect promptly as it was to sell goods at a profit. He was of the opinion that adverse legislation could be prevented and favorable legislation enacted only by concert of action. After the business there was a lunch served to the members. The affair was presided over by E. R. Darlington, while W. Choisel acted as secretary.

Present indications point to an active season in the building line and the outlook is favorable for a record which will exceed any of the last few years. Many old buildings are being torn down, either for business purposes or because of their unsafe condition, and several large office structures will be erected. The Bank of Commerce will put up a modern eight or ten story structure on the site of the old Insurance Exchange Building, at Broadway and Olive street, which is now being demolished.

The builders of Venice, Madison and Granite City, which may properly be designated as suburbs of the city, recently held a meeting at Madison and decided to form a Builders' Exchange for the east side. The association will be known as the Tri-City Builders' Exchange, the temporary officers being John Biehl, chairman, and H. H. Gardner, secretary. We understand that the leading builders and material men of the east side have been invited to join.

Salt Lake City, Utah.

The year opens in this city and in Ogden with unwonted activity in the building trade. Besides present work, it is to be noted that all the leading architects are busy with plans. Those for the new college building for All Hallows College, as well as for the new St. Mary's Cathdral, are ready and the contracts will be let soon. In Ogden, the contract for the Healy Hotel has already been let. A new building for the Presbyterian church in the same city and a large canning factory at Uintah are also to be built at once. Residence building is expected to be active as soon as spring opens.

The report of Building Inspector Ulmer for the year 1900, recently filed with the City Recorder, shows permits to have been issued for 465 buildings, 344 of which were for new structures estimated to cost $845,600, and 121 permits for alterations and repairs to cost $98,305, making a total of $943,905.

San Francisco, Cal

The new year seems destined to be one of big buildings for San Francisco, says our correspondent, writing under date of February 6. With February only begun, there are already plans on foot for something like a dozen large fire proof buildings. Among those which have either been commenced or for which definite plans have been made may be mentioned the eight-story James L. Flood building on the site of the old Baldwin Hotel, at Market, Eddy and Powell streets; the five-story Crock building on Mission street, between First and Fremont streets, to cost $320,000; the new five-story building of the Pacific States Telephone & Telegraph Company on New Montgomery street, between Minna and Natoma streets, to cost $280,000; the St. Dunstan seven-story apartment house on Van Ness avenue and Sutter street, to cost $130,000; the City Warehouse Company's building on Lombard and Battery streets, to cost $55,000; the new building of the Union Iron Works on Second and Folsom streets, to cost $60,000; the Mercantile Cold Storage building on Montgomery and Lombard streets, and the San Francisco Novelty & Plating Works building on Mission street, near First, to cost $50,000. These buildings are, in general, to be steel, granite, terra cotta and pressed brick structures. The most important is the Flood building, which will occupy one of the very best sites on the coast. The lot has a total frontage of 620.6 feet on the best retail and business streets in the city. The building to be erected will be eight or nine stories, of steel, iron and terra cotta construction. The ground floor will be devoted to stores and the upper floors to office rooms. The cost has not yet been made public.

New Publications.

PRACTICAL CARRIAGE AND WAGON PAINTING. By M. C. Hillick. Size, 6½ x 9½ inches. 162 pages. Profusely illustrated. Bound in stiff board covers. Published by the Western Painter. Price, $1, post paid.

This is a treatise on the painting of carriages, wagons and sleighs, embracing full and explicit directions for all kinds of work, including painting factory work, lettering, scrolling, ornamenting, varnishing, &c., together with many recipes and formulas likely to be found of interest to the painter. While especially intended for the carriage painter, there are many bits of information which the painter engaged in other lines of work might find useful, in the way of suggestions. That part dealing with lettering is especially valuable, giving as it does various styles of letters, together with some interesting facts on monograms and how to design and paint them. One of the chapters deals with the materials which are used in painting, quality of colors in general, together with some reference to the question of adulteration. The subject of varnishing is also considered in a way to interest and instruct those having occasion to make use of this matter in a practical way.

Painting Brick Work in Flat Finish.

In response to a correspondent making inquiry with regard to the best material and method for producing a flat job on brick, in red, also the best kind of size for new common brick, and the best size for new plastered walls that are to be painted in oil, a recent issue of the *Painters' Magazine* contains the following, which may not be without interest to some of the readers of this journal:

The best way to paint a new brick wall in red is to use a good Venetian red in oil, thinned with pure raw linseed oil and a little liquid drier only. Have this priming thin and flow it on freely, brushing it well into the brick. Give plenty of time for drying, then putty up. For the second coat use at least 25 per cent. pure white lead with the Venetian red and thin it with three parts raw linseed oil and one part turps, adding the necessary drier. Have the paint for this coat of good body, and rub it out well and even.

For the third or finishing coat use a fine, stiff ground Venetian red of the proper shade, and if necessary for light red brick, add some French ocher to obtain desired shade; thin this with plenty of brown japan and turpentine to a thin wash and apply quickly, avoiding laps. If it does not flat immediately, it will do so in a very short time. Should it dry too flat or lack binder, add a little boiled oil. The best plan, however, is to purchase the flat brick red offered by paint manufacturers and thin and apply as directed by them. If the brick front is to be lined white, use white lead thinned with turps; for black use lampblack in oil, thinned with japan and turps. When you undertake to paint brickwork always see to it first that the brick is dry. If you paint immediately after heavy or driving rains or where there are leaky roofs or cornices, from which the bricks become damp, you run a heavy risk, as your paint will surely scale sooner or later. If you find the wall is not in proper condition for painting, call the owner's attention to it, and if he persists in having the job done without first remedying the defects, do it at his risk only.

The best size for new common brick that is to be painted is an oil priming, as noted above. The pigment to be used in this priming may be white lead, yellow ocher, Venetian red, mineral brown or any other mineral paint that may be suitable or allow succeeding coats to cover well. No other size or material is suitable for first coating exposed brick work, new or old. As to a size for new plastered walls, we do not approve of a size directly on the plaster, but recommend a thin wash of white lead, thinned with pure raw linseed oil and a little turpentine to make it penetrate well into the wall. Unless the wall is very hot this will neutralize whatever causticity there may be in the plaster, and when the priming is dry a coat of glue size may be given, which will save several coats of paint. When a new wall is still very hot—that is, when the lime in the plaster has not had an opportunity to become neutralized, it is best to give a wash of vinegar before priming.

A Slate Consolidation.

The Genuine Bangor Slate Company, recently incorporated under New Jersey laws with a capital of $150,000, will, it is reported, consolidate with the Bangor Excelsior, American and Star companies in the Bangor region, Pennsylvania, and Albion, at Pen Argyle, controlling in all about 250,000 squares a year.

The following officers have been elected: President, R. S. Brown of Easton, Pa., who is also president of the Bangor Excelsior Company; vice-president, William Jay Turner, president of the American Slate Company; secretary, E. R. Armstrong, secretary of the Bangor Excelsior Company; treasurer, M. W. Catchings, treasurer of the American Slate Company. The new corporation will have their main office in Easton, with branch offices at Pittsburgh, Columbus, Kansas City and other cities to be selected in the future.

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BRICK RESIDENCE OF MR. J. E. SANDOU, ON ACADEMY AVENUE, PRICE HILL, CINCINNATI, OHIO.

JOHN P. STRYKER, ARCHITECT

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1901

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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APRIL, 1901

The Pan-American Exposition.

The Pan-American Exposition, which is to be held at Buffalo, N. Y., from May to November of this year, promises to be one of the most interesting and important expositions ever held in this country. The enterprise, as its name indicates, is designed to bring into closer trade relations with the United States the countries of South and Central America, as well as Canada. The exhibits will be limited to products native to the Western Hemisphere, the only exceptions to this rule being the admission of exhibits from our new possessions in the South Pacific and the Orient. Included in the exposition will be exhibits by the Federal Government and the various States of the Union, from Canada, Mexico, the West Indies, Brazil and every South and Central American State. It is confidently expected that it will result in bringing about a better understanding between the peoples of this continent, and thus prove a means of stimulating international trade. The preparations for the exposition that have been undertaken are on a scale commensurate with the comprehensive ideas of its promoters. The extent of the grounds, their attractive location near Niagara Falls, and the skill with which they have been laid out and adorned are supplemented by the magnitude, beauty and number of the buildings. The principal structures are the United States Government Building and the buildings devoted to art, forestry and mines, agriculture, manufactures and liberal arts, machinery and transportation, electricity, &c. The electrical features, crowned by the great electric tower, 375 feet high, will, it is promised, surpass all previous efforts of the kind. Nothing appears to have been neglected that will help to make the exposition a success, and the fact that 40,000,000 people reside within a day's journey of Buffalo promises a sufficiently large attendance to insure it being a financially profitable venture.

New York's New School Buildings.

In order to provide adequate accommodations for the constantly growing school population the municipal authorities of Greater New York have completed within a year in the boroughs of Manhattan and the Bronx six school buildings having a seating capacity of 11,580, and have now in process of erection in the same boroughs eight new buildings, costing $1,895,776, and with a seating capacity of 14,885 pupils. In the borough of Brooklyn there are also under way 15 new buildings with a capacity for seating 16,800 pupils; in the borough of Queens there are being built eight school houses with a seating capacity of 5550, and in the borough of Richmond one school house capable of seating 2000 pupils, thus giving a grand total of 32 in the way of new school buildings in progress of erection in the five boroughs, furnishing accommodations for 39,235 scholars. To these figures must be added the Commercial High School, which is to cost $302,600, and furnishing accommodations for 1500 pupils, and the Peter Cooper High School, which with its equipment will cost $469,383 and provide accommodations for 2365 pupils. In their architectural style and the manner of construction the buildings differ materially. In the borough of Manhattan, wherever possible, the school houses take the form of the letter H, in order to give plenty of light and ventilation to the class rooms, and also to provide two inner courts for each school. The average frontage in such cases is 150 feet, depth, 200 feet, and hight, five stories, with provision for 50 class rooms. The material up to the second story is limestone, above which light colored brick is used. An asphalted playgronud is located on the first floor, with gymnasium, manual training rooms and library on the fifth floor. Some interesting computations with regard to the relative cost of school houses in this and other large cities have been made by Mr. Cameron of the Building Bureau of the Board of Education, who finds that in spite of unfavorable conditions the school buildings of New York have cost only 19 cents per cubic foot, and that the fire proof structures of to-day cost little, if any, more than those crected ten years ago.

A Compulsory Arbitration Law.

So much has been said of late for and against compulsory arbitration of labor disputes that the recently published report of United States Consul Dillingham, at Auckland, New Zealand, on the operation of the compulsory arbitration law in that British colony, is of more than passing interest. At the outset the Consul expresses the doubt whether the New Zealand law, which was expressly enacted for the purpose of encouraging industrial association and facilitating the settlement of trade difficulties, has succeeded in accomplishing these results, whereas its provisions have admittedly opened the way for some glaring abuses. The act in question provides that any association may bring a dispute before the proper board of conciliation, and if that board fails to effect a settlement the dispute may be referred to the Court of Arbitration, whose award is enforceable in the same manner as an award of the Supreme Court. It appears that in making its award the Arbitration Court has been in the habit of including therein a clause compelling employers to give trade union men the preference for employment. This is strongly objected to by some of the employers' associations, and a short time ago certain master plumbers and gas fitters in the southern part of New Zealand instituted a suit in the Supreme Court for the purpose of testing the validity of the preference order. The judges decided that the Arbitration Court had a perfect right to make such award, the Chief Justice announcing the opinion that non-unionist workmen were altogether outside of the act and had no status before the courts. In other words, the non-union workman of New Zealand has no legal rights in respect of employment or wages. He is at liberty to sell his labor if he can get an employer to run the risk of encountering vexatious and expensive legal proceedings instituted by some union for engaging a non-union man instead of a unionist. Few employers, however, are found willing to run this risk. They find it less expensive to submit to the law and employ only union workmen, even though they be less competent than the non-union men, rather than to fight the matter in the courts. In theory, as the Consul observes, the employer need only employ the union man if he be equally capable, but as the proof of the equal capability involves a law suit, the theory does not work out well in practice. As a matter of fact, experience has proved that the New Zealand arbitration law has not prevented abuses, and it is generally deemed capable of considerable improvement and amendment in order to make it equitable for both employers and employees.

Convention of Brick Manufacturers.

According to programme, the fifteenth annual convention of the National Brick Manufacturers' Association was held at Old Point Comfort, Va., February 13 to 16, the meeting being one of the most successful in the way of attendance and interest developed in the history of the association. Owing to the number of points of interest in and about Fortress Monroe the visiting members spent a considerable portion of the time in making short trips, which were greatly enjoyed by the many ladies present.

In carrying out the regular order of business the first thing was the annual address of the president, which was well received, and the report of the treasurer, showing a substantial balance on hand.

The next business was the election of officers for the ensuing year, which resulted in the selection of the following: President, W. H. Hunt of Cleveland, Ohio; first vice-president, C. A. Bloomfield of New York; second vice-president, James A. Davis of New Haven, Conn.; third vice-president, C. H. Yohe of Alexandria, Va.; secretary, T. A. Randall of Indianapolis, Ind., and treasurer, J. W. Sipley of Birmingham, Ala.

During the various sessions of the convention a number of interesting papers were presented, followed by a discussion in which the members generally participated. Brick pavements was a topic with which many papers had to do, while among others may be mentioned "Business Methods in Brick Making," by George H. Albertson; "Twentieth Century Brick Making," by W. S. Ravenscraft, and "Fire Clay and Fire Brick Manufacture of To-day," by Lemon Carter. Probably the most interesting paper from the standpoint of the readers of this journal was that by Mr. James Blackall, entitled "How to Reach the Architects." According to him the best way to incite people to use more bricks is to bring to their attention the fact that bricks are used well; he suggesting that the goods be presented to the architect not in their least attractive light—in the shape of sample bricks—but in the shape of photographs of executed work, and as the architects most desirable to reach are usually very busy men the speaker urged his hearers to show their buildings through their chosen mediums, and above all things, when photographs of executed work are wanted, secure an artist to make them. "Don't imagine," he said, "that an architect or owner will be interested in photographs simply because a camera has shot itself off against a brick wall, but choose a brick wall which is an integral part of a successful building; which is coupled with an attractive design and has the appearance of being well built. Present that with a few facts as to cost, condition of the market, &c., and you will not lack a ready listener."

One of the important features of the convention was the usual association banquet, held in the dining room of the Hotel Chamberlain, and at which a number of toasts were proposed and responses made.

Some interesting experiments have lately been made by the Paris fire brigade with the view of ascertaining what building materials offer the greatest resistance to fire. A square building made of armored cement was built and provided with three doors. One of these was of iron, the second of non-ignitable wood, and the third of glass cast on a certain metal. The building was then set on fire. It was found that the armored cement offered complete resistance to the flames, as also did the door faced with glass. It took an hour to burn the wooden door, but the door of iron was quickly warped, and cases of wood placed 3 yards behind it were destroyed by the fire.

A Novel Church Building.

A rather novel scheme of church design is about being carried out by the Episcopal Church of the Archangel, in the upper part of New York City, at the junction of St. Nicholas and Ninth avenues. The idea is to combine on the same plot of ground and under one roof a church and guild house. The front of the building will be five stories in hight, with a projecting Gothic porch, suggestive of the combined uses which the structure is designed to serve. Back of this building will be the body of the church, with ample provisions for light and air. The material used will be washed brick with limestone trimmings, the interior of the church proper being finished with brick, having plastered panels, and with wood. The roof will be of slate, supported by open frame work, traced and finished from below.

In the basement will be the living rooms of the janitor, heating plant, gymnasium, several club rooms and a hall having a seating capacity of 400 people. On the first floor will be the main entrance to the church itself, the offices of the building and all its several undertakings, private and public hallways, and back of these the auditorium of the church itself, seating about 700 people. On the second floor will be rooms for the rector and his family, and on the third floor three bedrooms and two large rooms, one measuring 16 x 18 feet and the other 18 x 25 feet. The latter two can be thrown together, forming one large room for social purposes.

A Novel Co-operative Scheme.

A novel co-operative experiment which was proposed a year ago in Boston is now about to be put to a practical test. It is confined to members of labor unions and aims to provide work for them when they are out of regular employment. The scheme is that those who are out of work shall put in their time at their trade in constructing and fitting up buildings needed by the workers at large. They are to receive labor checks in payment, and these checks are to be "convertible into any form of goods which the property or the organization may ultimately represent."

Apparently capital must be provided first to buy the land and material. If this is done and if the labor checks are accepted even moderately among dealers, the plan may be feasible. It has good backing among some men of experience, and it is said that a society has already asked to have a building put up for its use for which it will take a permanent lease at a rate sufficient to yield 6 per cent. on the cost, and that a department store has offered to take labor checks at their face value for goods up to $10,000.

Officers of House Painters' Association.

At the seventeenth annual convention of the National Association of Master House Painters and Decorators of the United States, held in Buffalo, N. Y., February 19, 20 and 21, the following officers were elected: President, Alexander T. Grant, Providence, R. I.; vice-president, R. T. Miller, Pennsylvania; secretary and treasurer, W. E. Wall, Summerville, Mass.

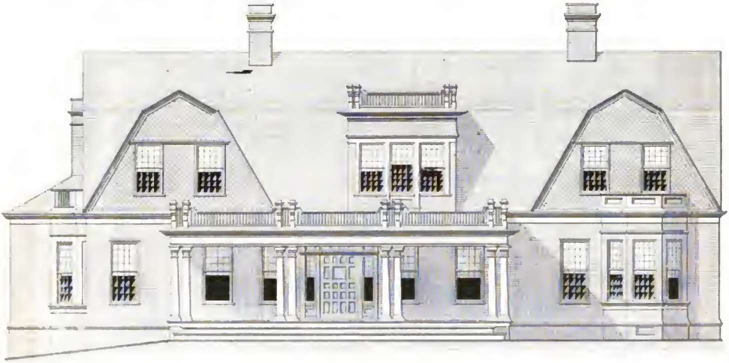
The chairman of the Committee on Publicity and Promotion of the Architectural League of America has recently issued the proceedings of the second annual convention of the league, held in the Art Institute, Chicago, on June 7, 8 and 9 of last year. The proceedings make a volume of over 150 pages and give in addition a list of the officers and committees of the Architectural League for 1900-1901, together with a synopsis made by the secretary of the reports of the various clubs for the year ending June 6, 1900. The clubs reporting are those in Cleveland, Chicago, Cincinnati, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, Toronto, Washington, and the Architects' Club of the University of Illinois, at Urbana, that State. Some very interesting papers are to be found in the proceedings, and the volume cannot fail to prove a very desirable addition to an architect's library.

A WINTER HOME AT SOUTHERN PINES, N. C.

THE desire of many Northern people to reside in the South for a portion at least of the disagreeable winter months is becoming so prevalent as to result in the building by them of a number of attractive homes which are to be found scattered through those sections where the climate is most beneficial and healthful. This is particularly true of the piney regions of the Carolinas, where high altitudes in combination with the healing qualities of the resinous pine have caused many members of New York society to locate their winter homes. In this connection it is interesting to note the new residence just completed for E. M. Fulton of New York City, at Southern Pines, a winter resort in the long leaf pine and sandhill region of North Carolina. A front and rear view of the house form the basis of our supplemental plate this month, while the plans, elevations and details here presented show the arrangement of the rooms and the general construction employed. The building is Colonial in its style of architecture, and occupies a prominent position on a ridge overlooking the town.

The foundations are laid up with hard burned brick in cement mortar, while all exposed walls and chimney tops are of selected hard burned brick of uniform color, laid in red mortar. The basement, except the servants' rooms, is paved with concrete, the servants' rooms having wood floors. The framing timbers are of Southern long leaf pine, the sills and girders being 6 x 10 inches, the joist 2 x 10 inches and the studding 2 x 4 inches, placed 16 inches on centers. The rafters are 2 x 4 inches, placed 2 feet on centers, and the collar beams 1½ x 6 inches. The frame is of the usual balloon construction, with side walls and roof covered with ⅞-inch surfaced pine sheathing put on diagonally, closely driven up and strongly face nailed. On this is placed water proof sheathing paper, which in turn is covered with first quality resawed pine weather boarding laid 4¼ inches to the weather. All weather boarding is mitered at the corners, no corner casings being used. The roof is covered with first quality 4 x 16 heart cypress shingles, laid 5 inches to the weather, the same quality of shingles being also used for the gables. The outside finish lumber is No. 1 heart pine, except the outside turned work, which is heart yellow poplar. The balconies are covered with Merchant's roofing tin, with slat floors on top constructed of ¾ x 1½ inch strips placed ½ inch apart.

All inside floors are double, the sub-floor being of surfaced ⅞ x 6 inch sheathing, while the finished floors are of No. 1 pine flooring ⅞ x 2½ inch face, laid over one thickness of deafening felt. The floors in the principal rooms and hall are hand smoothed, scraped and sand papered, then waxed and polished with a weighted brush. The bathroom floors have three coats of water proof floor paint. All interior finish is selected Southern bright pine, hand smoothed, scraped and sand papered before it is put up. The hall, parlor and dinging room are wainscoted 3 feet 6 inches high, with worked wainscoting cap and base. The main hall has paneled beams overhead, and the hall and parlor have paneled pilasters above the mantels, with beam and quarter circle as ceiling. The library is fitted with open bookcases, having removable shelves. The first floor rooms and hall have open fire places with mantels of brick and terra cotta. The parlor is finished in five coats of white enamel. The hall, dining room, library and den are treated with Harrison Brothers & Co.'s interior decorative stains, and finished in one coat of liquid filler and three coats of varnish, the last coat being rubbed to an eggshell gloss. The bedrooms, bathrooms, dressing rooms, &c., are painted three coats flat white. The kitchen is wainscoted 3 feet 6 inches high, and the bathrooms 5 feet high. All apartments not wainscoted have molded base with cap and shoe. The bedrooms have wood mantels with tile hearths and facings.



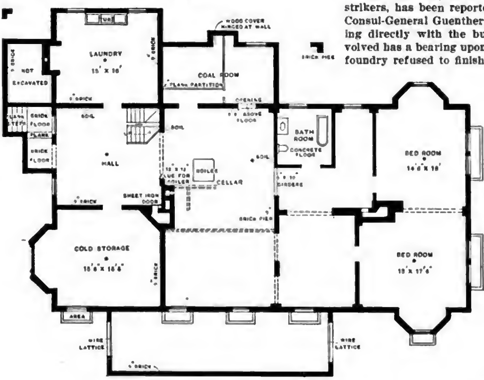
Front Elevation.—Scale, 3-32 Inch to the Foot.

A Winter Home at Southern Pines, N. C.—Barrett & Thomson, Architects, Raleigh, N. C.

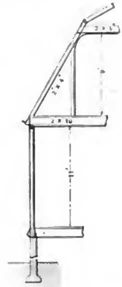
Each bathroom is provided with a 4½-foot porcelain enameled tub, with 3-inch enameled roll rim, compression valves with brass supply pipes and Imperial bath waste. The fittings are polished and nickel plated. The closets are of the plain siphon jet type, with cabinet finished oak seat and cover, and oak siphon tank. The brackets, chain and pull are nickel plated, as well as the supply and flush pipes. There are also Standard open lavatories 20 x 30 inches, countersunk marble slab, having 10-inch back and 15 x 19 inch oval basins. The bathroom fixtures, laundry tubs in the basement, &c., were made by the Standard Mfg. Company of Baltimore, Md.

The exterior of the building is painted three coats of Dayton's ready made colors in pure linseed oil, the color used being Colonial gray with white trimmings. The tin work has three coats of mineral paint. The plastering throughout is two-coat work, the ceilings being tinted in water colors and stippled. The side walls are papered with imported material in Colonial designs.

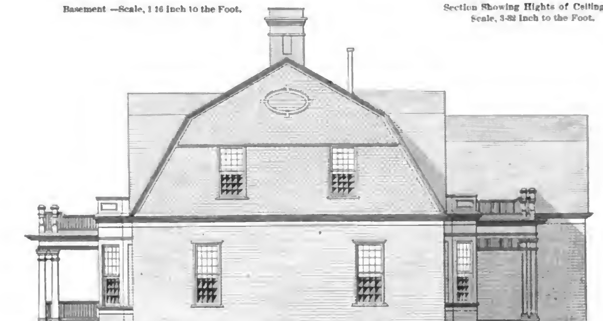
The house is provided with all the modern conveniences, including electric bells, speaking tubes, electric lighting, &c. The heating is by hot water from a No. 1 Mercer sectional hot water boiler made by the H. B. Smith Company, Westfield, Mass.



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



Section Showing Hights of Ceilings.—Scale, 3-32 Inch to the Foot.



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

A Winter Home at Southern Pines, N. C.

The residence here shown was erected in accordance with plans prepared by Barrett & Thomson of 115½ Fayetteville street, Raleigh, N. C.

The plans have recently been prepared for a seven-story brick and lime stone elevator apartment house, to be erected in 116th street, near St. Nicholas avenue, New York City, which was designed by Architects Neville and Bagge, and which will accommodate 37 families, and will have two bachelor apartments. The cost of construction is placed at $200,000. Among other improvements contemplated is a ten-story brick and terra cotta mercantile building, which will be erected in West Thirty-first street, from plans prepared by Israels & Harder of this city.

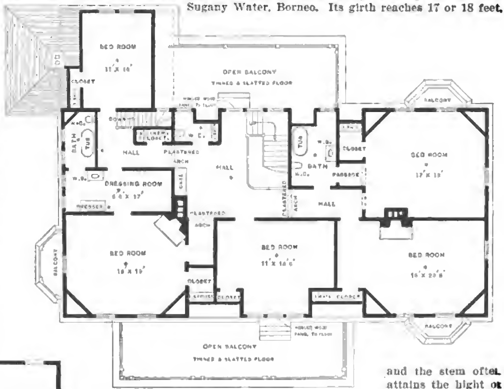
German Labor Law Decision.

An interesting decision rendered by the Supreme Court of Germany, affecting the right of workmen to aid strikers, has been reported to the State Department by Consul-General Guenther at Frankfort. While not dealing directly with the building trades the principle involved has a bearing upon it. Twenty molders of an iron foundry refused to finish some models which had come from a foundry where there was a strike. They were discharged without the usual notice and their employer brought suit for damages. The court rendered judgment in his favor for 2034 marks, holding the defendants jointly and separately liable.

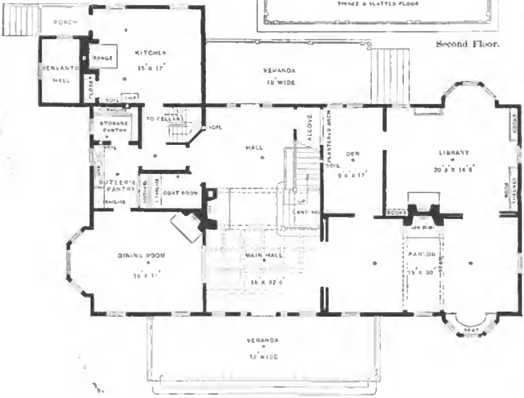
The decree was confirmed upon an appeal to the Supreme Court, which held that the defendants had been guilty of breach of contract. It was held, further, that the law cannot expect the employer to yield to the unlawful refusal of his employees and that the defendants acted in premeditated concert, with a malicious purpose to injure the plaintiff.

Camphor Wood.

The camphor wood boxes brought from China and the East are well known for their strong preservative odor and found useful for keeping away moths from woolens and furs. The China and Japan camphor tree *(Cinnamomum camphora)*, *Camphora officinarum*, belongs to the laurel family, but that of Sumatra and Borneo is the *Dryobalanops aromatica*. Even the leaves and fruit smell of camphor. In Sumatra this tree is abundantly met with on the west coast, chiefly in the extensive bush, but seldom in places more than 1000 feet above the level of the sea. The tree is straight, extraordinarily tall, and has a gigantic crown which often overtops the other woody giants by 100 feet or so. The stem is sometimes 20 feet thick. The barus camphor in this island is the most esteemed of any, and it is for this drug, obtained in but small quantities—seldom more than ½ pound to a tree—that it is ruthlessly destroyed. The tree, when felled, is divided into small pieces, and these are afterward split, upon which the camphor, which is found in hollows or crevices in the body of the tree, and above all in knots or swellings of branches from the trunks, becomes visible in the form of granules or grains. An essential oil also exudes from the tree in cutting, which is sometimes collected, but is scarcely remunerative. On the west coast of Formosa there are forests of camphor wood, and a great deal of crude camphor is shipped thence to Amoy and other Chinese ports. Large quantities of the wood are sawn into planks. Tables and cabinets are then made of it, and it is also turned into platters and washing basins. Only a small portion of the vast camphor forest of Formosa has been reclaimed from its wild inhabitants, and this consists of fine tall trees, the growth of ages. When a tree is felled, the finest part of the wood is sawn into planks, the rest chopped small and boiled down for the camphor. Camphor wood *(D. aromatica)* grows in abundance in the mountains of Santerborg, Marang, Sunda, and Sugany Water, Borneo. Its girth reaches 17 or 18 feet, and the stem often attains the hight of 90 or 100 feet to the first branches. The wood contains a quantity of oil, is tough, durable, and owing to its strong scent withstands the attacks of the worm, so destructive in those seas. Hence it is much valued for shipbuilding. It takes metal fastenings well from being oily, and iron has been found not so liable to rust in it.



Second Floor.

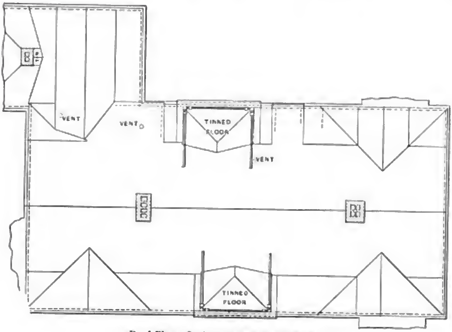


Main Floor.

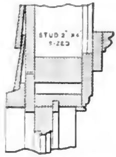
A Winter Home at Southern Pines, N. C.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Finishing White and Yellow Pine.

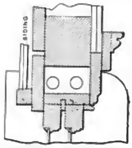
One of the best, though perhaps not the cheapest, way to finish white pine is to see that the work is well sandpapered with the grain, then thoroughly dusted. Give it at least one coat of white shellac varnish and one coat of inside varnish. Should this prove to be too expensive, substitute liquid filler for the shellac. For hard or yellow pine finish apply one coat of orange shellac varnish and one or two coats light hard oil finish, or omit the shellac and apply hard finish instead. A filler is not required for this wood. In every instance, however, whether shellac varnish, liquid filler or hard oil finish is used, care must be taken that the first coat is thoroughly dry and hard before applying the succeeding coat, or the latter is liable to sink in, causing lack of luster.



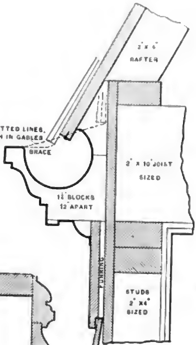
Roof Plan.—Scale, 1-16 Inch to the Foot.



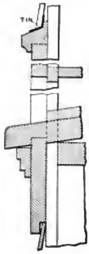
Vertical Section through Window Head.



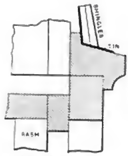
Detail of Window Jamb.



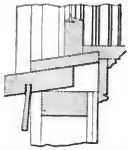
Detail of Main Cornice.—Scale, 1½ Inches to the Foot.



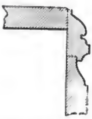
Section through Finish on Bay Windows.—Scale, 1½ Inches to the Foot.



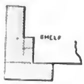
Detail of Molding Across Gables Above Windows.—Scale, 3 Inches to the Foot.



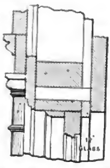
Detail of Window Stool and Sill. Scale, 1½ Inches to the Foot.



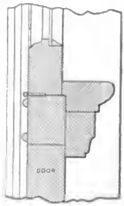
Detail of Base Mold and Bottom Book Shelf.—Scale, 3 Inches to the Foot.



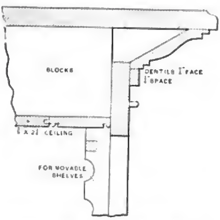
Corner of Book Shelf.—Scale, 3 Inches to the Foot.



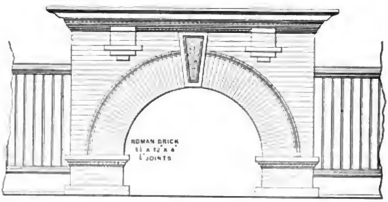
Head Casing for Entrance Door.—Scale, 1½ Inches to the Foot



Detail of Transom Bar for Doors on Second Floor.—Scale, 3 Inches to the Foot.

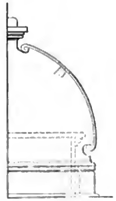


Cornice for Built-in Book Shelves.—Scale, 3 Inches to the Foot.

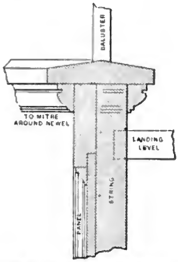


Elevation of Press Brick Mantel in Hall and Parlor.—Scale, ¾ Inch to the Foot.

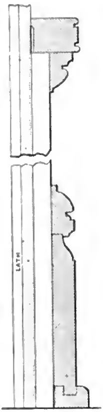
Miscellaneous Constructive Details of a Winter Home at Southern Pines, N. C.



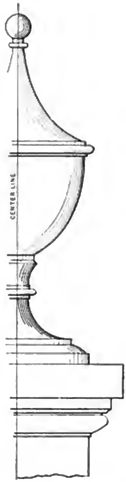
End View of Seat Against Staircase in Main Hall.—Scale, ½ Inch to the Foot.



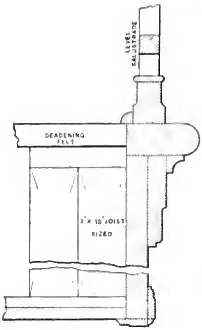
Detail of Finish at First Landing of Front Stairs.



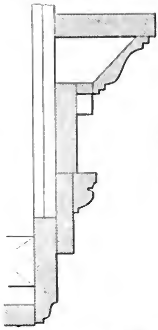
Detail of Wainscoting in Hall, Dining Room and Parlor and Base for all Principal Rooms



Detail of Newel Post.

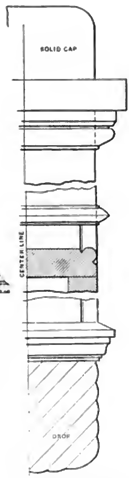


Detail of Well Hole Finish.—Scale, 3 Inches to the Foot.

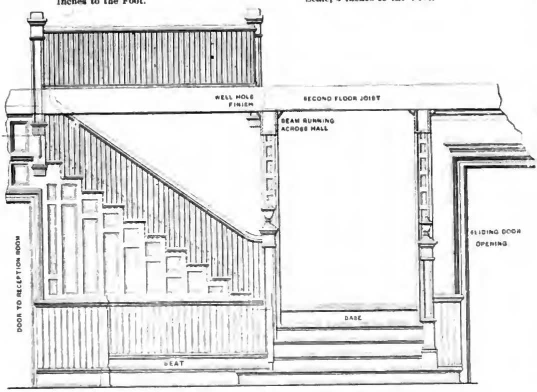


Detail of Head Casing.
Scale, 3 Inches to the Foot.

Hand Rail.



Detail of Angle Post.
Scale, 3 Inches to the Foot



Elevation of Staircase in Main Hall.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of a Winter Home at Southern Pines, N. C.

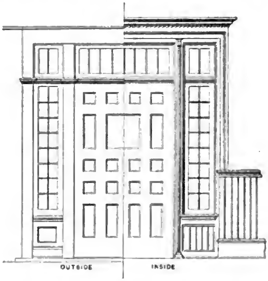
Finishing Hard Wood Floors.

So much of the beauty of a hard wood floor depends upon the care with which it is finished that the following suggestions, taken from a recent issue of the *Painters' Magazine*, cannot fail to interest many of our readers: In all cases see that the floor is clean, well planed and dry, and then put on a coat of three parts boiled oil, one part turpentine and one part japan, which may be colored, if desirable, with such coloring matter as will give the proper effect, but only enough coloring should be given to produce a stain, not a paint, so as to permit the grain of the wood to appear. When this is dry, apply a coat of paste filler, also colored, when desirable, thinned with turpentine, and remove the surplus before it sets too hard, by wiping across the grain. When dry, rub smooth with sand paper and putty up with putty of the proper color and hardness.

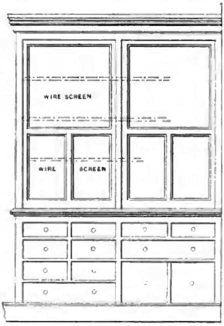
So far this method should be followed, no matter what finish is desired, whether the floor is to be waxed or varnished. If it is to be varnished, one coat at least of shellac varnish is given, followed by more coats of shellac or good hard drying floor varnish, according to choice. The gloss of the varnish may be dulled by mossing or hairing with pumic and oil.

When a floor is to be waxed the wax may be applied directly over the filler, or over an intervening coat of shellac varnish with a brush and polished with a large brush especially adapted to the purpose. The floor wax is prepared by melting in a water bath pure yellow beeswax and turpentine, but good floor wax polishes are offered ready made by many manufacturers.

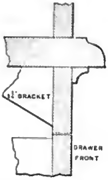
When the floor is fairly smooth and the wood of close grain the paste filler may be dispensed with, but a coat of shellac varnish should be given, whether the floor be waxed or varnished.



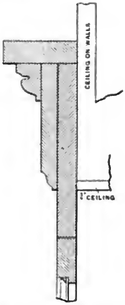
Elevation of Front Door and Side Lights.—Scale, ¼ Inch to the Foot.



Elevation of Cupboard in Butler's Pantry.—Scale, ⅜ Inch to the Foot.



Detail of Counter Shelf for Cupboard.



Detail of Cornice for Cupboard.

Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of Winter Home at Southern Pines, N. C.

Mediation and Arbitration.

In their report to the Legislature the commissioners of the New York State Board of Mediation and Arbitration state that their experience leads to the conviction that two of the most common causes of strikes are unwillingness on the part of employers to recognize trades unions and a lack of cordiality on the part of employers toward their employees.

Workingmen believe that a union of individual interests is necessary unless they are to remain at a decided disadvantage in their demands for what they consider their rights. To be successful both sides must meet on a common basis at short range, imbued with a desire for fairness and candor, and a determination to reach fair conclusions. It is the opinion of the commissioners that these conditions can best be met through the medium of industrial agreements by which all disputes shall be referred to boards of conciliation and arbitration, made up in part of employers and in part of employees. This system has proved very satisfactory in England, and in this country many employers either individually or through associations have adopted this method of securing industrial peace.

During the past year there were 547 strikes and lockouts, the greatest number of any year since the creation of the board, but in reality fewer serious or disastrous labor troubles than usual. The board gave attention to 25 disturbances and in most cases the strikers gained all or at least a portion of that for which they contended. Of the more important strikes during the year the report gives in detail the correspondence and action taken in 16 as indicating the nature and scope of the work performed by the board.

The contracts have just been awarded for the erection at Englewood, N. J., of the First Church of Christ, Scientist, the structure to cover an area of 33 x 76 feet and have a seating capacity of 120 people. The Sunday school room will be provided on the second floor, over the reading rooms. The building will be entirely of wood, the exterior being shingled. The design is in the Gothic style of architecture.

THE ART OF WOOD TURNING.—XVI.

(second series.)

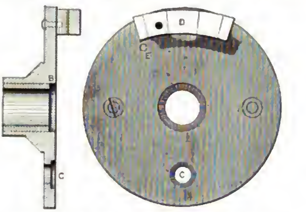
By Fred. T. Hodgson.

BESIDES the chucks and other devices and attachments, illustrated and explained in these papers, there are many others, among which may be mentioned the elliptical cutter, the epicycloidal cutter and Plant's geometric chuck. The ellipse cutter differs from the elliptical chuck in so much that the cutter possesses two motions, one on its own axis and another in an elliptical orbit, qualities that give it some advantages over the ordinary elliptical chuck. It may be applied to the ornamentation of cylindrical surfaces or to flat ones, or to disks attached to the face plate of the lathe, and in either case it may be employed for the formation of fine geometric designs and fine line tracery. This cutter has been treated by more than one author, but generally in a misty way, or in such a manner that the subject was left in a rather hazy state, until taken up by Mr. Evans in his "Ornamental Turning," to which I am largely indebted for the following description and illustration of the device. In the making of an ellipse cutter care is one of the chief factors required, as the fine capabilities of the machine are largely dependent on attention to details and excellence of workmanship. The name given to this machine may lead some to think that it is only capable of cutting figures of elliptical form, but of varying proportions. This, however, is not

be fitted to within about a full ⅛ of an inch of the terminal point; the metal plate then heated to cause expansion, when the bushing can be more easily driven home to its place, and when cold the contraction of the metal will render it perfectly tight. The next thing to do will be to bore out the hole perfectly true and smooth. The hollow to allow the oil to pass in is seen in Fig. 103, and is simply a small concave cut made with a rat tail file.

A very carefully made chuck is now required to accurately fit the steel bushing, and upon this the external of the metal plate are turned perfectly true to the bearing. It will be obvious that upon the truth of this fitting mainly depends the ultimate working of the whole instrument. The steel stem or sleeve is shown in Fig. 104. This has an enlarged collar at the front, A, the face of which forms a surface against which the face of the steel bushing bears, the front B being accurately fitted into the bushing and ground up together to run smoothly. Before turning and fitting the stem it must be bored throughout its entire length as shown, leaving the hole

Fig. 103.—Steel Bushing to go Inside of Face Plate.



Figs. 101 and 102.—Section and Elevation of Face Plate.

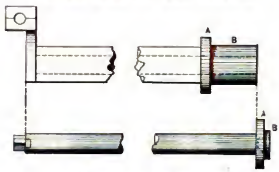


Fig. 104.—Sleeve with Flange and Support.
Fig. 105.—Stem or Mandrel.

The Art of Wood Turning.

the case, as the powers of the instrument are largely increased by the addition of two extra wheels of 24 and 28 teeth respectively, and here begins our introduction to looped figures. The instrument as now made, of the latest and most complete form, consists of two parts—namely, the means of producing the ellipse and that also of correcting the angular aberration arising from the alteration of the eccentricities, &c. The first part is composed of a gun metal plate, Fig. 102. This, it will be seen, has a projecting boss on the back, the dimensions being full size; further reference in this respect will not be necessary. The plate is first roughed out all over. It is most important to see that the casting is perfectly clear and free from flaws and blow holes, as it has to be drilled and worked all over its surface. The excellence of this plate assured, it must be carefully turned out at the center to the diameter shown, which is for the purpose of receiving a hardened steel bushing, which must be made to fit tight and which must be driven into its place firmly. The hole in the metal plate must be made to slightly taper, as also must the internal aperture of the bushing. The back face A, Fig. 103, should have a small semicircular groove made in it, as at A, for the greater convenience of lubricating the bearing. When in its place the face of the bushing should just project beyond that of the boss on the plate, and be quite flush at the front—that is, at the bottom of the recess B, Fig. 101, the bushing being now hardened and so left. It is not necessary to temper it; in fact, the harder it is without being tempered the better. It should

slightly taper, which can be effected by using a suitable tool specially made for the purpose. Through this sleeve passes the spindle, Fig. 105. This, it will be noticed, also has an extended flange at the front end, which is for the purpose of forming a face bearing for a wheel of 48 teeth, which has to be attached to it by a screw counter sunk into the face of the wheel. The opposite extremity of the spindle must pass through the sleeve to the extent of the thickness of the metal support, Figs. 106 and 107, and that of the worm wheel, indicated in the illustrations. The elevation, Fig. 107, must be so made that when the radius of the wheel is allowed for these there will be just room for the tangent screw to work and the top bearing to be fixed thereto. It will be seen that the projecting end of the spindle is tapped to receive a screw, while the worm wheel is made hexagon in the hole and the spindle fixed to fit it. This will require careful fitting, and, when completed, both the wheel and the spindle must be clearly marked, in order that the wheel may always be returned to the same place, and it must be turned thereon and the worm cut also to insure accuracy. This part may be completed so far while in hand. The wheel must have 150 teeth, and, in like manner to all such wheels, must be cut with a single tooth cutter and finished with a master tap suitable for the purpose. The upright projection or support must be drilled carefully through at the center of the diameter of the spindle when the screw is well down in the thread of the worm wheel, which must be done after the top bearing, Figs. 106 and 107, is in its place. The lower ends of the frame thus formed may be left square, as shown in Fig. 106, or countersunk to a cone, if the sleeve, Fig. 104, has been left long enough to center. The latter is, perhaps, more work, but it has the advantage of increased power of adjustment in case of wear, which is an important item. When this and the spindle are so far fitted, it will be seen that the bearings exist between the back face of the flange A of the spindle, Fig. 105 and that of the wheel against the face of the vertical projection, Figs. 106 and 107, and revolves between the support and the metal plate, Fig. 102, which it must do freely, but without the least undue shake or vibration. The 48 toothed wheel is fitted against the short projection B, Fig. 105, and must be provided with a steady join to assure its permanent position and its better security.

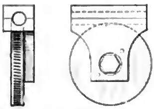
Having thus got the main plate, spindle and stem combined with the worm wheel and tangent screw to work, considerable progress has been made, and our attention must be given to the various parts which form the front of the instrument, and from which the required movement that produces the different figures is obtained. As it will be necessary to employ the plate in revolution during our progress, it will be better now to fit up the plate with a pulley, P, Fig. 119, which for lightness should be made of wood, and is attached to the plate by two steel screws countersunk into the front face of the plate, as shown in Fig. 102.

We pass on now to the metal flange, Fig. 108. This must be of gun metal, and considerable care must be given to the pattern. Having secured a good clean casting, a hole must be bored through the center of the boss, but of less dimensions than ultimately required, as the final turning out of the part must be done when it is mounted in its place and the zero on the gauge decided. A steel stud must now be fitted to the plate. This is fitted in a hole, as shown at C, Figs. 101 and 102, and held securely by a screw at the back, which is tapped into the stud. Diametrically opposite to the stud on the face plate a metal block, D, is securely attached by two screws at the back. When thus fixed the two curves of the block, concave and convex, shown also at C and D, Fig. 112, must be carefully turned from C, Fig. 101, as center, as it is upon the stud that the principal movement of the flange takes place when in use. The stud is shown in Fig. 110. The flange, Fig. 108, must now be bored at A to accurately fit the stud, Fig. 110, at B, and from this point as center the recess A, Fig. 109, must be turned. Now it is upon this block and the shoulder of the stud that the flange rests and works. The stud is made as shown at Fig. 110, A being the fitting upon which the change wheels revolve, B that which received the plain fitting of the flange, as previously referred to. When the flange is thus fitted, and likewise the screw which retains the same in the stud, a slot, B, described from the same center, must be got out. This is shown in Fig. 108, at C, and is for the purpose of allowing the flange to be set over from the center of face plate, for reasons that will be fully shown. And when so adjusted it is fixed by a milled head screw passing through the metal block at A, Fig. 112.

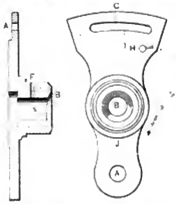
We have now the required movement, but for the greater accuracy of its adjustment a short main screw is fitted and passes under the top or wide end of the flange. The screw and bearing must be put together as shown in Fig. 111. The screw, although this is not absolutely necessary, should be made 10 threads to the inch, which will be the same as that in the eccentric cutter. The small bearing A is made of metal and fits against a shoulder of the screw. A small metal collar, B, is then fitted, and a pin placed across it to retain it in its place, so that the real bearing is between the two faces of the collar and the shoulder. It must now be got into its place, which is on the front plate, crossing beneath a flange, and to do this a hole, E, Fig. 102, is drilled in such a position as to receive the pin of the bearing, A, Fig. 111. A screw from the under side of the plate again holds this in its place; but, instead of being rigidly held, it has a slight movement created by the action of the main screw. In order that the flange for any of its required purposes may be set over from the center, the extreme end of the screw is provided with a square, F, in order that it may be adjusted with a key or wrench.

The next thing to do will be to provide the nut in which the screw is to operate. The whole of the front part, moving on a curve as it does, from the center of the stud in hole A, Fig. 108, it is preferable that the nut also be accommodated with the facility for a slight circular movement. It is made with a round pin, D, attached to it, as seen in Fig. 111, which passes up from the under side of the flange, Fig. 108, into the hole H, to which it must be very carefully fitted. The top edge of the flange is divided to an accurate scale from 0 to 40, and read from a zero line on the fixed block shown in Fig. 112.

The worm wheel at the rear, which has 150 teeth, is divided into 75 equal parts, and figured at every five—namely, 5, 10, 15, 20, and throughout its circumference, while the head of the main screw, B, Fig. 111, is divided into four equal parts. As we proceed we will explain the necessity for the aperture J, Fig. 108, which admits of the teeth of the two wheels when geared together being seen. Having these parts so far completed, the instrument must be very carefully put together, and from its own bearings the whole of the first part must be fitted up. To readily admit of this the stem must be placed in the slide rest and so arranged that the face of the instrument is toward the poppet head, and then with a keen boring tool the center aperture of the flange, Fig. 108, must be turned out, the revolution being obtained by a band from the overhead motion. Great care must be exercised during this operation, and it must be seen that the two zeros actually agree, for the reason that if the flange be moved by the screw to any degree of eccentricity, when returned to the original point, it must rotate with accurate precision concentrically, failing which no perfect work can be executed. When the hole is thus turned it is fitted with a steel bushing, having a cone turned into its front, B, Fig. 109. This must be hardened and driven in in the same way as the one in Fig. 102. Previous to hardening a small hole must be drilled through to agree with that marked F, Fig. 109, when it is finally borne to its position. The completed instrument, or at least the front portion of it, which consists of the eccentric cutter, is, in point of principle, a counterpart of the device usually employed for eccentric turning.



Figs. 106 and 107.—Section and Elevation of Metal Support and Worm Wheel.



Figs. 108 and 109.—Section and Elevation of Flange with Boss.

Fig. 110.—Metal Stud for Use in Connection with the Face Plate.

Fig. 111.—Adjusting Screw.

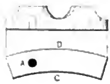


Fig. 112.—The Fixed Block.

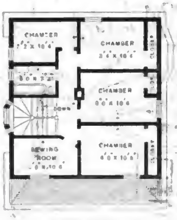
The Art of Wood Turning.

COMPETITION IN $2000 FRAME HOUSES.

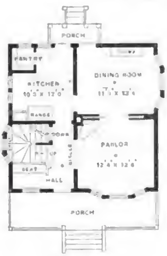
FIRST-PRIZE DESIGN.

THE committee having in charge the drawings submitted in the competition for $2000 frame houses, announced in our issue for December last, having completed its duties, we take this occasion to lay the main features of its report before our readers for their consideration. The invitation extended to our friends at the time named met with a most gratifying response from architects scattered over an area of the country bounded by Colorado on the west and the Gulf of Mexico on the south, thus clearly indicating the widespread interest which the competition developed. In fact, it may not be out of place to state that the character of the work submitted showed a marked improvement as compared with that of earlier contests, all of which goes to show the educational nature of the competitions which have been carried on under the auspices of *Carpentry and Building*. As might naturally be supposed in a matter of this kind the efforts submitted varied in a marked degree, running all the way from the extremely plain and unpretentious cottage to the more elaborate dwelling embodying individuality of design and architectural merit to an extent which would cause even a layman in building affairs to question the possibility of its being faithfully constructed at a cost within the limitations prescribed by the present contest.

In order to impartially discharge the duties imposed upon them the members of the committtee found by reference to the conditions published in the December issue that there were several items with each of which it was necessary the drawings should comply before they could properly be considered. These requirements included a front elevation, one side elevation, foundation or cellar plan, first and second floor plans, and a selection of details, including both exterior and interior finish. Another requirement was that each set of drawings should be accompanied by a brief specification outlining the construction of the building, with an indication of the materials to be employed. A call was also made for an estimate under the heads of "Excavation," "Mason Work," "Carpentry Work," "Plastering," "Painting," and "Tinners' Work," the latter to cover the plumbing, if any. This estimate was to show the cost in detail of each of these portions of the structure, as well as the aggregate cost. Each estimate was to be accompanied by a certificate fram some responsible builder to the effect that he would be willing to erect the house indicated by the drawings and specifications for the sum named in the estimate. Finally, it was required that each set of drawings should be submitted under a *nom de plume* or designation, which also should be placed upon a sealed envelope containing the real name and address of the author.



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot

Front Elevation.—Scale, ¼ Inch to the Foot.

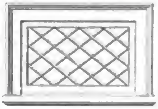
Competition in $2000 Frame Houses.—First Prize Design.—Charles W. Smith, Architect, Watervliet, N. Y.

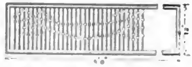
Notwithstanding the fact that these requirements were stated in the most explicit terms there were a number of sets of drawings which failed to meet the conditions, and the committee had no alternative but to consider them as at once out of the contest. In many instances the name and address of the author appeared on the drawings instead of in a sealed envelope, clearly indicating by whom they were prepared; in others the detailed estimate of cost was lacking, the figures for the different classes of work being given in a lump sum, instead of under the headings, as called for by the published conditions. This is greatly to be regretted, as the committee report that there were several designs fairly entitled to careful consideration, had it not been for the omission of the estimate of cost in detail. In one instance there were no exterior details, while those for the interior consisted solely of an elevation and section of the main stairs.

A point upon which the committee dwells at considerable length is the elaborate character of many of the designs, and the evident desire on the part of the authors to include pretty much everything one would expect to find in a residence fitted with all the latest improvements. This seems to be a rather natural fault of designers in house competitions, if fault it may be called, for the same tendency has been observed in practically every contest we have conducted, where the question of cost was a prime factor. It evidently grows out of the idea that irrespective of well defined limitations of cost, the design which embodies the greatest number of meritorious features architecturally considered will be the one securing the prize.

While in every instance estimates were acccompanied by builders' certificates, the committee were compelled to regard those given in connection with the more elaborate designs, and which obviously were excessive as to cost, as largely in the nature of a favor to the architect by the builder, who felt sure he would never be called upon to execute the work.

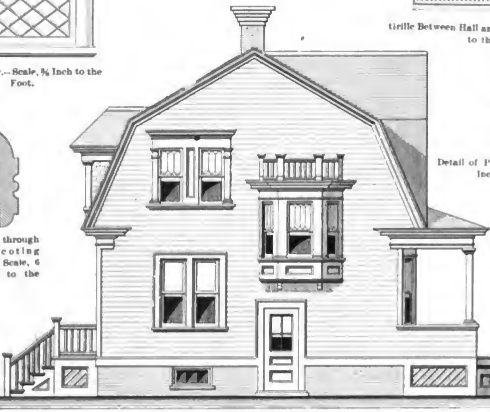
The report of the committee shows that under the


Hall Window.—Scale, ¾ Inch to the Foot.

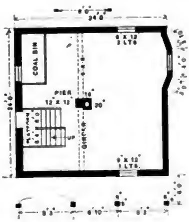

Grille Between Hall and Parlor.—Scale, ½ Inch to the Foot.


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

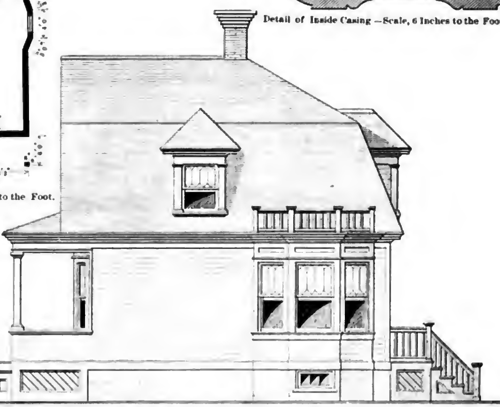

Section through Wainscoting Cap.—Scale, 6 Inches to the Foot.


Side (Left) Elevation.—Scale, ¼ Inch to the Foot.

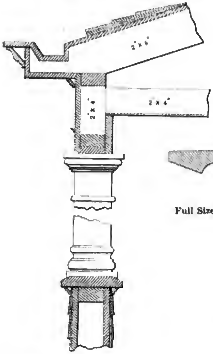

Detail of Inside Casing.—Scale, 6 Inches to the Foot.



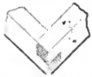
Foundation.—Scale, 1-16 Inch to the Foot.


Side (Right) Elevation.—Scale, ¼ Inch to the Foot.

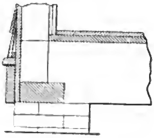
Competition in $2700 Frame Houses.—First-Prize Design.—Elevations and Details.



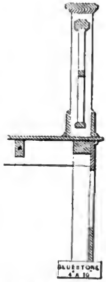
Details of Porch.—Scale, ¾ Inch to the Foot.



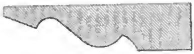
Detail, Showing Framing of Porch Sills



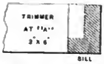
Detail of Water Table.—Scale, ¾ Inch to the Foot.



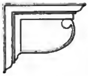
Detail of Rear Porch. Scale, ½ Inch to the Foot.



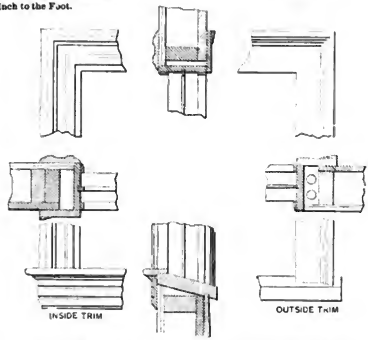
Full Size Detail of Molding for Outside Casing.



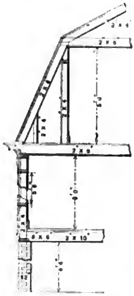
Detail of Framing at A of Rear Porch.—Scale, 1 Inch to the Foot.



Bracket Under Hall Bay.—Scale, 1 Inch to the Foot.



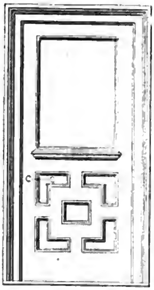
Window Details, Showing Outside and Inside Trim.—Scale 1 Inch to the Foot.



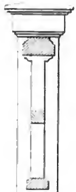
Section Showing Hights of Stories.—Scale, ½ Inch to the Foot.

Base.—Scale, 3 Inches to the Foot

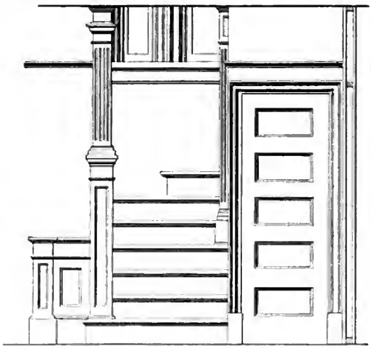
Section of Front Door on Line C C.—Scale, 3 Inches to the Foot.



Elevation of Front Door.—Scale, ¾ Inch to the Foot.



Detail of Balustrade on Bay Windows.—Scale, 1 Inch to the Foot.



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

Competition in $2000 Frame Houses.—First-Prize Design.—Miscellaneous Constructive Details.

terms of the contest the first prize, of $100, is awarded to the design submitted by Charles W. Smith of 1567 Second avenue, Watervliet, N. Y.; the second prize, of $60, to the design of John P. Kingston, 518 Main street, Worcester, Mass., and the third prize, of $40, to the design of Louis Falk of 2785 Third avenue, New York City.

Although not entitled to a prize, there were several designs which, in the estimation of the committee, are worthy of special mention, and may, in due course, be published in these columns. Concerning these the report says: "The design contributed under the *nom de plume* of 'Buzz' works up with beveled ceilings in front and rear rooms; the large hall is a very neat feature, and the elevation would work and paint up very prettily. The author, however, has made no provision for lighting either by gas piping or by wiring for electricity. His estimate of cost is also lacking in detail. The design of 'Battle' shows quite a broken up roof, which kind of work on a house adds considerably to the cost. The plan gives good rooms; the plumbing fixtures throughout are of the best, the piping being nickel plated brass; the sink is of slate, and there is a white porcelain lined bathtub. This extra fine plumbing is costly, however, and adds quickly to the cost of the building. The foundation is exceedingly heavy for a small house, being 24 inches at the bottom and built to taper to an 18-inch wall at the top, all of which contributes largely to the cost. 'Emanon' has a well planned house with combination front and rear stairs, a nice reception hall and vestibule entrance. All the bedrooms have straight ceilings and a good attic which could be finished out to make additional rooms. The cellar, being divided off by brick walls, is a good feature in several ways, chiefly because it prevents the settling of the building in the center, a very common occurrence in structures supported by piers, unless they are exceedingly heavy. The plan makes a very dressy house, having clean lines and details, and by the specifications, what little there is of them, we infer that the inside finish is in harmony with the exterior. The author has specified real bronze for the hardware trimmings, which add greatly to the appearance of the interior, as well as to the cost of the house. No furnace, gas or electric lighting are shown or mentioned, while from the plumbers' estimate, given in the prices accompanying the drawings, it is evident he has not intended to include heating, lighting or draining. The single flue would hardly seem sufficient for the entire house. A very complete design is that by 'Bob,' the house having a very good finish throughout. A novel feature is found in the construction at the line of the water table. The foundation does not extend up under the floor beams, as is generally the custom, but the sill is placed just above the grade line, with the outside studding resting directly on it, and just above a ribbon strip is cut in for the support of the first floor beams. This has evidently been done to reduce the expense of the mason work, which would run into more money than the extra carpentry work. His drawings show heating plans and diagram of gas piping for the house, all being in the most complete form. The design of 'Thunderhead' shows a plan exceedingly well arranged, with an exterior that will work up very well, but estimate is lacking in detail."

We present herewith the design awarded the first prize, giving in the same connection the specifications for material and labor. While the committee awarded it the first prize under the terms of the contest, they point out one or two changes in the plans which could advantageously be made. We quote from the report: "This design has a very pretty elevation all round, and an open stairway, which is well arranged and works up in excellent shape. One objection is having to pass into the front hall to go down cellar; but this could be easily overcome by placing the kitchen door leading to the hall a little forward, as well as the grille opening from the hall to parlor. The second story plan would, in our opinion, be improved if it were worked up into two bedrooms over the parlor and dining room, instead of three, which would be an easy alteration to make. The design, however, appears to have been well studied and one which can easily be built for the money."

In submitting his design the author says: "In looking over the results of previous competitions, I notice that there is a great difference in the price of labor and material in different localities, and naturally came to the conclusion that parties living in localities where labor and material are cheap have a decided advantage over other competitors not quite so fortunately situated, thus allowing them to put into a dwelling more room, comfort and beauty than could otherwise be possible. I see bricks laid for $6 that would cost here from $10 to $12; plastering at 16 cents a yard that would cost 25 to 30 cents here; lumber at $12.50 that costs $18 to $20 here; pine at $25 that would cost $40 to $45 here; labor at 25 cents an hour, while we pay here 30 and 35 cents for the same class of work. But, no doubt, the committee in making awards will take such matters into consideration. In regard to designs inclosed, would say that you will find the rooms compactly and conveniently arranged. The main features of the plan, apart from its attractive exterior, are the reception hall, with its main staircase and seat; the cozy parlor, with its cheerful open fire place, and the convenient way in which all the rooms can be reached directly from the hall. Another convenient feature is the outside entrance to cellar, and also the separate rear entrance to dining room and kitchen from back porch. The upper floor contains bedrooms of comfortable dimensions considering their number, and also a well equipped bathroom. In compliance with rules of competition, have inclosed a certificate from a local builder, but being one myself, would be glad to build in any part of the country a dwelling according to inclosed designs for sum specified."

SPECIFICATIONS.

Dimensions.—Building to be of dimensions shown on plans. Always take figures in preference to measurements.

Excavation.—Excavate for cellar, foundation, walls, chimney, piers, &c., to required depth and dimensions, and use earth to grade around house.

Brick Work.

The foundation walls, piers and chimney to have brick bases laid in cement mortar. The foundation walls to be 12 inches thick and to start from cellar bottom and to extend up under first floor joists. Chimney to start from cellar bottom and to extend up about 2 feet above roof at ridge and to be of size and design shown on plans. Chimney to have joints struck inside and to be put up plumb and true up to attic, and thence to rack over so as to come through center of roof, as shown. Cellar pier to be 12 x 12 inches, piazza piers to be 8 x 8 inches. Foundation walls above grade line and chimney above roof to be laid in red mortar. Foundation wall to be bonded at every ninth course. All other brick work to be laid in ordinary mortar.

Plastering.

All walls, partitions and ceiling of first and second stories to be lathed with spruce lath, and with joints properly broken, and same to be plastered two coats, last coat to be hard finish, and all angles to be run plumb and true, and all work to be flush with grounds.

Carpenter Work.

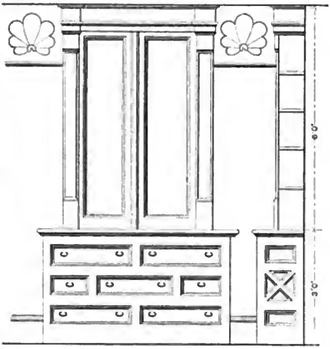
Framing.—Building to be 24 x 24 feet, balloon frame. Sills to be 2 x 8 inches. First floor joists to be 2 x 10 inches; second floor joists to be 2 x 8 inches; attic floor joists to be 2 x 6 inches, all set 16 inches from centers. Rafters to be 2 x 6 inches set 20 inches from center. Studding and partition joists to be 2 x 4 inches, set 16 inches from center, double at all openings and three in all angles, and to be well bridged with 1½ x 3 inch bridging. All partition, except line partition, to be set on the flat. Outside plates to be double, 2 x 4 inches, well spiked together and to studding. Partitions to have 2 x 4 inch plates top and bottom. Headers to be properly framed around all chimney and stair openings. First floor joists to be supported by 6 x 8 inch girder, same to rest on pier and in side wall. Frame work of dormers to be 2 x 4 inches. All timber to be good, sound hemlock, free from all defects.

Outside Finish.—Entire outside of frame, from cellar foundation to roof, to be covered with first quality hemlock shiplap sheathing. Same to be covered with one thickness best building paper properly lapped, and entire outside, except front gable, to be sided with first quality 6-inch clapboards, laid 4 inches to the weather and well nailed. Roof to be covered with 1 x 6 inch hemlock boards, laid 2 inches apart. Shingles to be 18 inches clear butts, laid 4½ inches to weather on upper part of roof and 5 inches on lower part; 1¼ x 4 inch corner boards to be placed at all angles. Water table to be 1¼ x 6 inches, with 1¼ x 2 inch cap, beveled. Casings to be 1¼ x 4 inches.

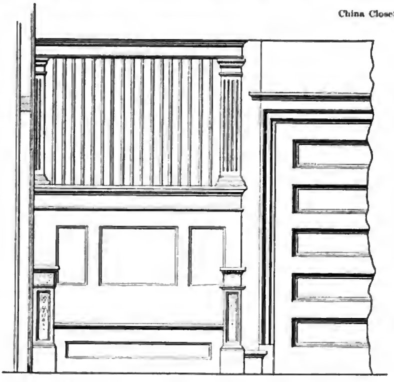
Cornices.—All eaves and gables to have molded cornices, and box gutters formed in eaves. To have crown mold, planer, frieze, bed molds, belts, &c., as shown.

Piazza to have 4 x 6 inch sills, same to rest on piers, as shown.

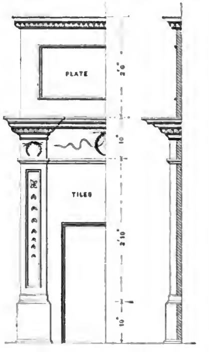
Floor Joists to be 2 x 6 inches, set 2 feet apart. Floor to be 1¼ x 4 inch matched clear spruce boards, blind nailed. Ceiling to be ⅝ x 2¼ inch matched and beaded North Carolina boards, blind nailed, with neat 2-inch bed mold run around same. To have molded cornices as shown. Columns to be 6 x 6 inches of design shown on detail. To be sided with clapboards 2 feet 4 inches high, as shown, and to have neat beveled cap. Rafters to be 2 x 6 inches, 20 inches from center, and to be covered with 1 x 6 inch roof boards, 2 inches apart, and to be shingled with 18 inches clear butts pine shingles laid 4½ inches to the weather. To have paneled lattice work, as of size shown. To have molded cornices, as shown, with balustrade of 5 x 5 inch square molded newels, 2 x 4 inch molded rail, and 1-inch square balusters, set 2 inches from center. Space between cornice and windows of dining room bay to have molded panels, as shown. Small bay in hall to be as shown and to have 12-inch flower



China Closet in Dining Room.—Scale, ⅜ Inch to the Foot.



Side View of Main Stairs.—Scale, ⅜ Inch to the Foot.



Half Elevation and Section of Parlor Mante —Scale, ⅜ Inch to the Foot.

Competition in $2000 Frame Houses.—First-Prize Design.—Miscellaneous Constructive Details.

shown. To have front stoop where shown, with 1¼-inch treads, ⅞-inch risers and 1½-inch strings, molded nosings and cove and molded and paneled sides.

Rear Porch.—Sills to be 4 x 6 inches and to rest on 4 x 6 inch posts. Posts to rest on stones. To have 2 x 6 inch trimmer through center. Floor to be 1¼ x 4 inch matched spruce boards, blind nailed. Space from floor to ground to have paneled lattice work, as shown. Stoop to have 1¼-inch tread, ⅞-inch recess, 1½-inch strings, with paneled lattice work in sides. To have square molded 5 x 5 inch newels where shown, with beveled 2 x 4 inch rail and 1½ x 1½ inch balusters, placed 4 inches from center.

Bays to be constructed in parlor and dining room shelf where indicated. To have molded panels below windows and brackets underneath, as per details. Balustrade to be same as dining room bay.

Dormers.—To be two dormers where shown, with molded casings, cornices, &c. Roof and sides to be shingled same as main roof.

Floors.—First story to be double floors. First floor to be of hemlock boards laid diagonally, and to be covered with one thickness deafening paper well lapped. Finished floor to be ⅞ x 2½ inch best comb grained Georgia pine flooring, blind nailed. Entire second story, except bathroom, to be floored with first quality 1 x 6 inch matched spruce boards, blind nailed. Floor of bathroom to be same as first story. Plane all joints and butts in

Georgia pine floor. Same to be laid only after plastering is dry and to be protected from all injury.

Doors.—Front door to be best quality cypress, 2 inches thick, 3 x 7 feet, with molded and raised panels, and to have double thick glass in upper part, as per detail. Rear doors of kitchen and dining room and outside door to cellar to be sash doors, 4 pounds and 1⅓ inches thick. All inside doors to be 5 panel ogee doors. Closet doors to be 1¼ inches thick, all other doors to be 1½ inches thick. Closet doors to be 2 feet 4 inches by 6 feet 6 inches; all other doors on second floor to be 2 feet 6 inches by 6 feet 6 inches. All inside doors on first floor to be 2 feet 6 inches by 6 feet 8 inches. All sash door to be 2 feet 8 inches by 6 feet 8 inches. To be sliding doors between parlor and dining room, with overhead guides, stops, &c., complete. Doors to be 2 feet 6 inches by 6 feet 8 inches. All doors to have 2-inch ogee stops.

Windows.—Cellar windows to have plank rebated frames, 1½-inch sash, and good butts and catches. All other windows to have box frames and 1½-inch sash, with 1½-inch weights, Silver Lake sash cord, pulleys, Ives' bronze sash lifts and locks. To have plain jambs and soffets, molded stools and aprons. Windows of parlor and dining hoom to have neat molded panel backs. Windows of kitchen, mullion on left side, and of dormers to have 1¼-inch outside blinds with rolling slats, and good butts and catches. Size of windows as follows: Center windows in two large bays to be 2 feet 10 inches by 5 feet 6 inches; side windows of same to be 2 feet by 5 feet 6 inches. Windows in hall bay to be 2 feet by 4 feet 10 inches in center and 1 foot x 4 feet 10 inches on sides. Kitchen mullion to be 2 feet by 5 feet 0 inches. Pantry and rear kitchen windows to be 2 feet by 5 feet 6 inches. Hall window to be 2 x 3 feet. Windows in front chambers on second floor to be 2 feet 10 inches by 4 feet 10 inches. Mullion in second story to be 2 feet by 4 feet 10 inches. Dormers to be 3 x 4 feet. All windows to have proper stops.

Picture Mold.—Neat picture mold 1½-inch wide to be run around all side walls of parlor, hall and dining room. No interior finish to be put on till plastering is dry.

Casing and Base.—All inside casings to be as per detail, to have 1¼ x 10 inch base blocks. Base to be as per detail and to be laid throughout. Base of first story to be 9 inches, base of second story to be 7 inches.

Wainscot.—Kitchen, 3 feet high with ⅝ x 2¼ inch matched and beaded cypress boards, blind nailed. Bathroom to be wainscoted 4 feet high with ⅝ x 2¼ inch matched and beaded cypress boards; all wainscot to have neat 2-inch cap and ¾-inch quarter round at bottom.

Grounds.—All necessary grounds to be put on for plastering and wainscot.

Cellar Stairs.—Build cellar stairs where shown. Strings to be 2 x 10 inch hemlock, steps to be 1½-inch, platform to be 1 x 6 inch spruce flooring, and to be 2 x 4 inch rails and posts. All to be of dressed spruce. Cellar entrance from hall to be ceiled on sides and under main stair with ⅝ x 3½ inch center beaded tongue and grooved North Carolina pine.

Grille.—To be grille in opening from hall to parlor as per detail.

Main Stair.—Main front stair to be constructed as per detail. To have 1⅛-inch treads, ⅞-inch risers and 1½-inch strings, molded nosings and core, 3 x 4 inch molded and turned rail, with 1-inch square balusters, and 6 x 6 inch newels. To have grille with fluted posts, cornice, and balusters, as shown, and seal with molded panels in front, back and sides.

Pantry and Closet.—Pantry to be fitted with 10-inch shelf, four rows high. All closets to have 2½-inch beaded clothes strips, with 12 hooks each. Side walls underneath front stair to have strip with hooks. Each closet to have 10-inch shelf over clothes strip.

Inside Trim.—Parlor, hall and main staircase to be best quality clear white pine. Remainder of finish throughout to be best quality cypress.

Lumber.—All timber to be best quality hemlock.

Electric Bell.—To be an electric bell hung in kitchen having encased and concealed wires leading from same to push (bronze) button located at front door, and having good battery and all required fixtures and put in good working order.

Painting.

Entire outside to be given two coats best Atlantic white lead. Shingles on roof and front to be given one Cabot's creosote shingle stain. Parlor, hall and main stair to be finished in white enamel, treads of stairs to be stained cherry, hand rail to be stained a rich mahogany color. Dining room, kitchen, bathroom and pantry to be given one good coat best liquid wood filler and two coats best North American varnish and left a perfectly smooth job at completion. Remainder of trim to receive two good coats best Atlantic white lead, or finished natural as above. Parlor and halls of first and second stories to be papered with wall paper of green shade, with 18-inch border. Dining room to be papered with wall paper of some shade of red, with 18-inch border. Paper for side walls and ceilings to cost no less than 15 cents per single roll, border to cost no less than 10 cents a yard. All other rooms to be given one coat of Muresco wall finish, or any other standard wall finish, in shades and tints to suit owner. Hard wood floors to be given one coat best liquid wood filler and two coats best North American varnish or any standard floor oil. Shellac all knots and putty all nail holes.

Plumbing.

Bathroom to be fitted with one roll rim, enameled iron bathtub, on painted iron legs, with nickel plated bath cocks for hot and cold water, nickel plated overflow strainer, and all necessary plugs, chains, &c., completed. Water closet to be siphon jet, furnished with finished double oak covers, copper lined oak cased tank and nickel plated brackets pulls and chain, all set ready for use. To be one pink Tennessee or Italian marble lavatory with nickel plated compression basin cocks, on nickel plated brackets, and straps straight back, all complete. Kitchen to have one 18 x 30 x 6 inch cast iron, white porcelain lined sink, on japanned iron brackets. Boiler to be 40-gallon galvanized iron, on iron standards, with ⅝-inch brass sediment cocks and couplings, complete.

Piping.—Connect with main in street and run a ¾-inch supply pipe under cellar bottom to a point under sink, and run two separate risers, one to each floor, with ⅝-inch branches to boiler, sink, bath and water closet, and ½-inch to lavatory. Hot water to be supplied through ⅝-inch branches to sink and bath, and 1½-inch to lavatory. All said supply pipe to be "A" lead. Sink and bath to have 1½-inch waste, lavatory to be 1¼-inch waste, all of "D" lead, with vented traps connected with soil pipe. All pipe exposed above floor line to be nickel plated, and all needed stop and waste cocks to be provided.

Iron Pipe.—To be a 4-inch cast iron pipe (soil) extending from cellar bottom to 2 feet above roof and to be well flashed at roof lines. Cellar bottom to connect with a 5-inch drain pipe to extend under rear cellar wall outside and connect with a 6-inch tile drain to run to and connect with sewer, and said 5-inch drain inside cellar wall to have 5-inch running trap with a 4-inch fresh air pipe of iron extending up and through wall above grade line and to 3 and 4 inch branches from said 5-inch drain, to connect with all roof leaders outside foundation wall. To be a 2-inch iron vent pipe with connection to all fixtures, and extending 2 feet above roof and well flashed at roof lines. All pipes to be well calked with lead and oakum in the joints, and held with iron hooks, and to have all needed bends and branches and good pitch and connections. All the above plumbing work to be made complete and first-class in every respect, and to conform with sanitary ordinances.

Tin Work.—All gutters, valleys, and roofs of bays to be tinned with "M. F." tin, well soldered and flashed. Properly flash around chimney and dormers. To have 3-inch galvanized iron conductors leading from gutters to cellar and connect with iron drain.

Gas.

Connect with main in street and run gas pipes of required size throughout building, with outlets for ceilings and sides, where marked thus * on plans. Parlor and dining room chandeliers to be three lights, with globes, complete. Hall chandelier to be one light, with fancy globe, &c., complete. Side jets to be swing brackets. All to be gilt finish and to be well tested at completion.

Hardware.

Front door to have large brass face mortise lock, with night works and ornamental oxidized bronze knobs and elongated escutcheon, complete; door to be hung on three loose pin bronzed butts. All other doors, except closet doors, to have brass face mortise locks, with steel keys; closet doors to have mortise latch. Sliding doors to have mortise bronze lock and flush pulls on sides and edges. All doors to be hung with two 3½ x 3½ inch loose pin butts each. Sliding doors to be hung with McCabe's patent steel top hangers. All doors to have white knobs, with rosette and escutcheon.

Mantel and Grate.

To be a mantel and grate where shown as per detail.

Sundries.

Kitchen and bathroom to have neat mantel shelf supported on two black japanned brackets each. Dining room to have neat molded mantel with frieze board and supported on neat wooden brackets.

Coal bin in cellar to be formed of rough hemlock boards. Box vent pipes in kitchen and bathroom, face to be put on with round headed screws.

ESTIMATE OF COST.

The detailed estimate of cost is as follows:

Excavation, 85 yards at 20 cents	$17.00
MASON WORK.	
Brick work, 15,300, at $10 per 1000 laid	$153.00
Five stone sills for cellar windows	5.00
Plastering, 556 yards, at 25 cents per yard, including lathing	139.00
9000 lath, at $3.25 per 1000	29.25
Total	$343.25
CARPENTER WORK.	
Framing lumber, 4170 square feet, at $18	$75.06
Georgia pine flooring, 570 square feet, at $35	19.95
Spruce flooring, 570 square feet, at $22.50	12.83
Shiplap sheathing, 1152 square feet	23.04
Beveled siding, 1080 square feet	32.40
Shingles, 14,000, at $3.50	49.00
Water table, 72 lineal feet	2.59
Pine for cornices, 456 square feet, at 4 cents	18.24
Crown mold, 3-inch, 220 feet, at 1½ cents	3.30
Bed mold, 2-inch, 256 feet, at 1 cent	2.56
110 square feet spruce for cellar stairs, at $22	2.42
Corner boards, 26 feet, at 4 cents	1.04
840 feet molded casing, at 3½ cents	29.40
Base, molded 9 inches, 64 feet, at 3½ cents	2.24
Base, molded 7 inches, 188 feet, at 3 cents	5.64
Wainscot, 186 feet	4.70
Wainscot cap, 50 feet, at 1 cent	.50
Quarter round, ⅝ inch, 60 feet, at ½ cent	.30
Eighteen windows	46.00
Front door	6.00
Doors (18)	40.00
Blinds	8.00
Porch columns (four)	8.00
Material for front stoop, complete	8.00
Two bay window balustrades, complete	5.00
Back porch complete, material only	8.42
Cellar frames and sash (four)	6.00
200 feet cove, at ½ cent	1.00
Pine for panels in bays, 30 feet, at 4 cents	1.20
Coal bin material	1.00
Shelving in pantry and closets, 32 feet	1.28
N. C. ceiling under stairs, 72 feet, at 2½ cents	1.80
Rough floor, 1 x 10 hemlock, 570 feet, at 2 cents	11.40
Apron and stools, 120 feet, at 4 cents	4.80
Clothes strip, 2½-inch, 15 feet, at 3 cents	.45
Roof boards, 1 x 6 inch hemlock, 1160 feet, at 2 cents	23.20
Rough boards for gutter lining, 220 feet, at 2 cents	4.40
Piazza floor, 1¼ x 4 inch, 180 square feet, at $24	4.32
Piazza ceiling, N. C., 150 feet, at 2½ cents	3.75
N. C. bed mold, 2-inch, 60 feet, at 1 cent	.60
Picture mold, 1½-inch, 67 feet, at 1 cent	.67
Mantel shelf in kitchen	1.00
Mantel shelf in dining room	2.00
Mantel and grate in parlor	25.00
Main staircase, complete	100.00
⅞-inch grounds, 500 feet, at 1 cent	5.00
1½-inch cap on front porch, 40 feet	1.60
Bridging, 1½ x 3 inches, at 2 cents (150 feet)	3.00
Hall window frame	3.00
Frame of mullion in second story	7.00
China closet, material only	15.00
Grille in parlor	6.00
Electric bell, complete	5.00
62 feet base block, 10 inch, at 3 cents	1.86
36 feet panel back, at 4 cents	1.44
Door frames and window frames	70.00
Total	$717.40
Carpenters' labor	$480.00
Plumbing, complete	170.00
Painting, complete	175.00
Hardware, complete	40.00
Tin work, complete	39.00
Gas fixtures, complete	12.00
Gas pipe laid, 80 feet, at 10 cents	8.00
Total cost	$1,984.65

LAW IN THE BUILDING TRADES.

WHEN ARCHITECT'S DECISION IS NOT FINAL AND CONCLUSIVE.

Where a building contract provided that in event of any doubt or question arising respecting the true meaning of the specification reference should be had to the architect, whose decision "being just and impartial," should be final and conclusive, in a suit by the contractor for extra work and material, it is error for the court to say that the architect's decision as to the value of such extra work and material was final and conclusive. Long *vs.* Pierce County (Wash.), 61 Pac. Rep., 142.

WHEN BUILDING IS BURNED.

Where one contracted to move a house and had partially performed his contract when the house burned, without his fault, he may recover for the work done.—Angus *vs.* Scully (Mass.), 57 N. E. Rep., 674.

QUALITY, NOT NAME, GOVERNS USE OF MATERIAL.

Where a building contract provided that all the walls of the building should be of Wilkeson stone, and the contractor claimed damages by reason of the fact that the architects had refused to allow him to procure stone from any quarry save a certain one, and it appeared that that quarry was the only one open at the time the contract was made, it was error for the court to say that the county—the building being a public one—had a right to restrict the contractor to procuring stone from the single quarry open at the time the contract was entered into, since he had a right to procure the stone from wherever a suitable quality was to be found.—Long *vs.* Pierce County (Wash.), 61 Pac. Rep., 143.

WHEN ARCHITECT IS ENTITLED TO PAY FOR SECOND PLANS.

One agreed in writing to make plans and specifications for a building and superintend the construction for a stipulated price. After accepting the plans and specifications made, the other abandoned the idea of erecting the building in accordance with the plans and specifications and ordered new plans for an entirely different structure, which were furnished. The court held that the accepted order for the second set of plans and specifications constituted a new contract, having no relation to the work done under the first, and was not governed by it, so as to be included within the price agreed on for the first plans.—Fitzgerald *vs.* Walsh (Wis.), 92 N. W. Rep., 717.

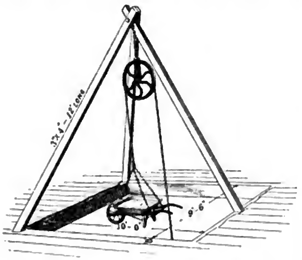
WHEN CONTRACTOR IS NOT LIABLE FOR POOR MATERIAL.

A building contract provided that the owner and his architect might reject materials not in accordance with specifications. The architect rejected certain flooring, and the contractor supplied new flooring, which the owner and architect approved. The court held that the contractor was not liable for the warping of such flooring, due to insufficient seasoning, occurring after the building had been approved and paid for, where the contractor had no knowledge of such defect, and the architect could easily have discovered it by the application of well known test.—Standard Stamping Company *vs.* Hemminghaus (Mo.), 57 S. W. Rep., 746.

CORRESPONDENCE.

Apparatus for Raising Masons' Materials.

From W. S., *Paterson, N. J.*—In reply to "M. T. O.," New Iberia, La., who asks in the February issue for the construction of an elevator for raising masons' materials, I send a rough sketch of a hoist that was used on a brick school building recently erected in this place. The mason hoisted all his bricks and mortar, using iron body wheelbarrows for his mortar and the regular wooden barrow for the bricks. The large pulley at the top was about 2 feet in diameter and the rope ran through a snatch block on the lower floor. At one end of the rope were three pieces of chain long enough so that the rings on two of them could be slid over the handles of the barrow, while the hook on the other would go on the wheel. The general arrangement is indicated in the accompanying drawing which shows the wheelbarrow just rising through the opening in the floor, the pulley wheel being large enough in diameter so as to cause the rope to escape the barrow while being drawn up. The frame of the hoist was made of three pieces each 3 x 4 inches in cross section and 12 feet in length, held together at the top as shown. The hook on the pulley hung from this bolt. As the barrow came up a man stood to receive it, taking hold of the wheel and pulling it in toward him at the same time blowing a whistle as a signal to the driver to slack off. The opening in the floor was left 9½ x 10 feet. We hoisted all our floor and roof timbers with this device when the mason was not using it. The building was about 75 x 80 feet in size and four stories high. The floor beams were 2 x 14 and 26 feet long. Each floor took about 250 beams. The rafters were 2 x 8 and some of them were 31 feet 9 inches long, and all went up this hoist with horse power. The device here shown is not exactly an elevator, but operates quicker than one, and I think may interest the correspondent asking the question.



Apparatus for Hoisting Masons' Materials.

Sweating Chimney Flues.

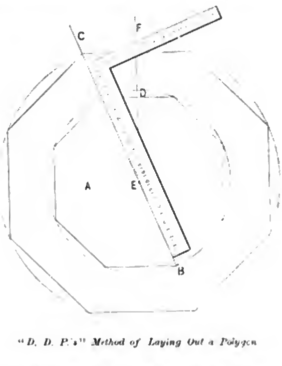
From H. T. F., *Toronto, Ont.*—In reply to "C. C. H.," Brookville, Pa., I may say I was in the same fix as he now seems to be in. My chimney was built from the ground up; the ground was damp and marshy and there was always water as high as the top of the footings of the foundation. Several attempts were made to prevent the walls of the chimney from sweating when a fire was burning, but all to no purpose. Finally the chimney was taken down, two courses of slate laid in cement, coated over with asphalt, was tried and the chimney rebuilt on this foundation, and from that day forward the sweating was no more. On another occasion I built a row of dwellings for workmen, and at each end of the row the chimneys had a tendency to sweat and dissolve the plaster. This continued for several years and was very annoying, as the plaster which was rendered on the brick work of the chimneys became disfigured and paper would not adhere to them, so the chimneys were taken down, slate and asphalt laid on the stone foundation as a damp course, the flues were lined with glazed tiles and the cure complete. The reason why the intermediate chimneys remained all right and gave no trouble, though built in the same manner as the two end ones, still remains a mystery. Hard wood was used as a fuel in all the cases I have mentioned and the two chimneys in the row that gave trouble were at the exposed ends of the buildings. These facts may have had something to do with the sweating of the two chimneys.

The Use of Tarred Paper.

From R. J. C., *Phillipsburg, N. J.*—In answer to the letter of "M. A. B.," in the February issue, inquiring about the use of tarred paper, I give the following bit of experience in reference to it which may throw some light on the subject: A few years since I used tarred felt under tin on a roof and for some reason the tin did not last as long as it should, rust commencing from the under side. This is attributed to the effect of the tarred paper. It is in many minds an open question as to whether painting tin roofs with tar does not destroy them. Some defend the use of tar, but I would as soon think of painting a tin roof with acid as with tar. With many tinners there is a well founded belief that tarred paper in contact with sheet iron, whether plain, galvanized or tinned, will in time have a destructive effect, and this is no doubt the reason why tarred felt is not used more frequently by tinners in protecting their work. The use of it by "M. A. B." for an outer covering, however, after the pipe has been protected, is not open to objection. In many instances, however, the water proof qualities of the tarred felt are not needed for building purposes, hence the use of other kinds of paper.

Laying Out a Polygon.

From D. D. P., *Carroll, Iowa.*—I have been much interested in the subject of polygons and inclose herewith my method of laying one out. The rule will apply to a polygon of any number of sides, the sides being of any length desired. Referring to the sketch which I inclose, lay out the polygon by striking a circle, as A, then with the dividers step off the circle into as many sides as it is desired the polygon should have, making these smaller than the original is to be. Now draw a line from B to C. Find the center of the side of the polygon to the right of



"D. D. P.'s" Method of Laying Out a Polygon.

the line B C, as at D. Draw a line from the center of the polygon at E through D to F. Now lay the blade of the square parallel with and touching the line B C with the tongue laying across the line E F. Move the square up or down the line B C as the case may be until half the length of the side of the polygon that you wish to lay out is shown on the tongue intersecting line E F, as at 6 inches. This is the radius point to be used in striking the circle to lay out the polygon.

Double Hung Windows in Frame Walls.

From A. O. C., *Lake Charles, La.*—In answer to "Hee H. See," Montreal, Canada, I would say that down here in Louisiana we make our frames for double hung windows just about as he says they do in Canada—that is, with the parting bead running clear around the window head and the sill and head jamb let into the pulley stiles. The pockets are generally put on the inside of the jamb, although once in a while we find them on the outside. I think they are less liable to leak when put inside, but if a weight should get loose it would be necessary to take off the stops in order to reach it, whereas, if the pocket is on the outside there is no necessity of disturbing the inside trim at all in order to gain access to the weight.

Design for Store Counter.

From H. K. R., *Larned, Kan.*—I inclose herewith two sketches of a counter in response to the inquiry of "J. G. B." of Southport, N. C. The counter can be made of any desired length and of any material, and in my opinion it would be suitable for any kind of a store. The shelving can be placed beneath the counter to suit the person for whom it is to be made. Fig. 1 shows a general elevation of the counter while Fig. 2 is an enlarged view of the corner showing detail of ornamentation. There is probably no part of the counter except the ornamentation shown on the frieze which could not be worked out by any good mechanic, and the ornament is in fact of small account, although it tends to somewhat relieve the monotony of the extended surface.

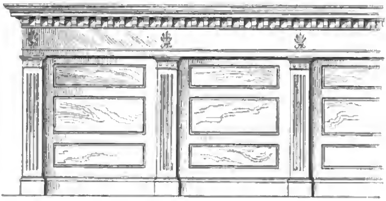


Fig. 1.—General Elevation of Counter.

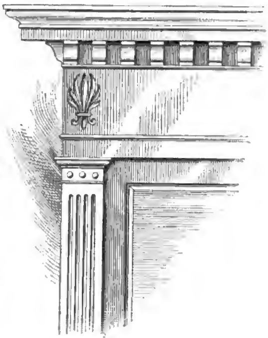


Fig. 2.—Enlarged View of Corner, Showing Detail of Ornamentation.

Design for Store Counter.—Submitted by "H. K. R.," Larned, Kan.

Short Method of Estimating Buildings.

From A. W. JOSLIN, *Roxbury, Mass.*—In answer to the inquiry of "A. M. K.," Elkhart, Ind., in the January number, I want to suggest a method of estimating which is comparatively short and accurate enough on which to make a bid if measurements are carefully made. I will begin by assuming that the subject in hand is a frame church, on a stone foundation, with a cellar under the whole area. Of course the dimensions are merely assumed and the prices are based on such work in the writer's vicinity. As far as practicable we will use a "square" (100 square feet) as the unit of measure. First find the area of the first floor, which, for example, we will say is 1850 square feet, or 18½ squares. Now we have got to excavate 18½ squares to a depth, say, of 5 feet. A little mental calculation would be about as follows: 100 square feet, or one square, 1 foot deep, is almost 4 cubic yards; 5 feet deep will be 20 cubic yards, and, at the rate of 30 cents per cubic yard, would be $6—the cost of excavating an area of one square to a depth of 5 feet—which multiplied by 18½ squares equals $111, or total cost of excavation.

Now for the stone work. Assuming that the wall is 26 inches wide at the bottom and 20 inches at the top, we have an average thickness of 23 inches, or nearly 2 feet, and to facilitate figuring we will call it 2 feet. Now measure the outline of the building, which we will call 182 feet. There is 5½ feet of stone work below grade and 2½ feet above, making a total of 8 feet, which multiplied by 182 equals 1456 square feet, which we will call 15 squares, allowing the slight gain here and on the average thickness of wall to make up for extra width of footings, pier, chimney and step foundations, &c. Now if the wall were 1 foot thick there would be practically 4 perches in a square, but in this case double that for a 2-foot wall, making 8 perches. Now, knowing the cost per perch, we can readily get the cost of a square and multiply by the whole number of squares, and thus find cost of the total stone work. Next consider the concrete. Take the area of the cellar, inside of walls, and having found the number of squares multiply by the cost per square, which will be from $4.50 to $5, according to quality and thickness. Now look back to the first floor area—18½ squares. Say the joists are 2 x 12 inches and placed 16 inches on centers. Now, if they were 1 x 24 inches and we were to lay them flat, each joist would lap over onto the next space 8 inches, or half the space. Thus you will readily see that the board measure of the floor joists is equal to the area plus half the area. Then for a square of floor we get 150 feet of frame, 100 feet of boards for under floor, or 250 feet in all, plus one-fifth for waste, making 300 feet, at 3 cents per foot in place, which equals $9. If the ceiling is plastered add 2 cents per foot for it, or $2. Then add, say, 8 cents per foot, or $8, for top floor and the paper under it, making a total of $19 as the cost of a square of floor complete. Now multiply by the 18½ squares and the result is the cost of the entire first floor.

In the same manner get the number of squares of walls, roofs, partitions, hung ceilings, &c., and carry out costs as above. This still leaves doors, windows, stairs, sundry inside finish, and such items as plumbing, painting, brick work, gas pipe, electric work, heating, &c. The doors and windows we can count and by a little figuring find the cost complete of one average door and one average window, including labor, finish, hardware, &c., then multiply by the whole number of each and thus dispose of these items. What other inside finish there is, such as base and molding, sheathing, panel work, balustrades, closets and so on, can be gotten at separately and added in. Then it will be possible to figure the other items mentioned or judge the cost very closely by drawing comparisons with like work in similar buildings you may have erected or had brought to your notice and of which you know the cost. In many cases most of these items would have been figured by the subcontractors doing those particular lines of work and then a definite figure could be obtained.

Assuming now that you have carried out these various totals, you have simply to add the column to find the total net cost, to which you can put for profit any per cent. you see fit. After two or three buildings have been figured in this way you will have the cost per square for all sorts of surfaces in your head and will not have to stop to figure it up as I have done above in order to make things plain. As one who makes a living by estimating for a general contractor all kinds of brick, stone and wood structures, I would not recommend figuring this way if you have the time to go more into detail. However, I frequently figure this way when pushed for time, especially certain classes of houses, factories and stables, but measurements must be taken reasonably accurate and care must be used to get in all such items as are not taken by the "square."

Amount of Mortar Required to Lay 1000 Bricks.

From D. C. C., *Jacksonville, Ill.*—Noticing at different times in the paper articles on the amount of mortar required to lay 1000 bricks. I concluded to calculate the amount for myself, and having done so send you the result of my calculation, hoping it may be of benefit to your readers.

Table Showing Amount of Mortar Required to Lay 1000 Bricks.

Size of brick.	Thickness of bed joint.	Thickness of cross joint.	Number cubic inches mortar in bed joints.	Number cubic inches mortar in cross joints and filing.	Number bricks to cubic yard.	Number bricks to cubic foot.	Total amount mortar, cubic yard.	Proportion mortar, cubic yard.	Amount in bushels to lay cubic yard bricks.	Amount in bushels to lay 1000 bricks.	Amount lime required to lay 1000 bricks.	Amount sand to lay 1000 bricks.	Amount cement to lay 1000 bricks, 1 to 3.	Amount sand to lay 1000 bricks, 1 to 3.
Inches.	Inch.	Inch.									Bushels.			
8¾ x 4 x 2¼	1/16	1/16	2,592	1,207	568.54	21 06 —	3.799	[illegible]	1.786	3 1	1	3.075	......	......
8¾ x 4 x 2¼	3/16	1/8	3,888	1.178 2 —	551.51 —	20.26 +	5,066.2	[illegible]	2.3652	4 28 +	1.30 —	4 142 +		......
8¾ x 4 x 2¼	1/4	1/4	4,860	2.257 58	524.57	19 47 —	7,117.58	[illegible]	3.3	6 25	2 2	6.211	2 3148	6.0541
8¾ x 4 x 2¼	3/8	1/4	6 804	2,152.5	500.16	18.32 +	8,736 5	[illegible]	4.165	8 32	2.684	8.1533	3.0815 —	8.105 —
8¾ x 4 x 2¼	1/2	1/4	9,072	2,030	471.7	17 44	1,110.2	[illegible]	5.1027	10.9	3.52 —	10.812	4,087 —	10.618 —
8¾ x 4 x 2¼	5/8	1/4	10,530	1.952.2	453.92	16.81	12,492.2	[illegible]	5.787	12.74	4.0197	12 361 —	4 719 —	12.41

I will say that out West here our bricks are larger than those given in table in the February number, and are 8¾ x 4 x 2¼ inches.

In my figures I have calculated for the brick to be entirely surrounded by mortar, but as brick are very seldom, if ever, entirely surrounded by mortar, unless in massive work, which is grouted, or is pushed or shoved joints, my calculations overrun; and I doubt if it will take more than two-thirds of the amount given in the table.

In face brick work the brick being buttered, not more than one-half of the brick has mortar on it on the bed side, and on the ends the cross, or head joint extends in not more than half way, so you can see the amount would only be about one-half that calculated; but as there is considerable waste, two-thirds will not be any too much. The same is true as regards the heavier joints. While the mortar of the heavier joints is spread on the wall, the mason by running his trowel through the center of the mortar forces it from the center to the edge, and when the brick is laid not more than one-half or two-thirds of the brick has mortar on it.

Relative Cost of Curb and Gable Roofs in Plank Frame Barns.

From C. K. S., *Wayland, Ia.*—In the issue of *Carpentry and Building* for January, 1898, on page 21, there are shown two forms of roofs by J. L. Shawver. I would like to know which he considers the cheaper form of construction. From the general appearance it seems to me the gambrel roof takes less material than the gable roof, but as to this I cannot say, hence my request for an expression of opinion from the author in question.

Answer.—The inquiry of our correspondent was submitted to Mr. Shawver of Bellefontaine, Ohio, who replies as follows: So far as the actual construction of the frame is concerned there is practically no difference in the cost of the curb and gable roof. The timbers required for the curb roof, however, are much longer than those in the gable roof and are somewhat difficult to secure, as well as more expensive to purchase. The roofing materials required for a curb roof will cost more than those for the gable roof, owing to the fact that there is more surface. For example, we will take a barn 40 x 60 feet with 20-foot posts, and a gable roof of one-third pitch and compare it with a 40 x 60 foot barn with 16-foot posts and curb roof of three-quarter and one-quarter pitch, which gives the same storage capacity. The first barn will require 480 square feet more siding than the latter, but the latter will require about 4000 more shingles. The excess in siding will cost, say, $8, while the excess in shingles in the other case will cost $16. The siding would never have to be replaced, while the shingles would, so for this reason a gable roof is preferred in most localities, with the exception of Michigan, Wisconsin and some parts of New York. It might be mentioned in this connection that we receive ten times as many orders for models, bills and specifications of gable roof barns than for curb roof barns, and we fully approve of the preference of the majority. The curb roof is fully as strong and as easily constructed as the gable roof, so we never try to influence a man one way or the other in his choice.

Laying Out Centers for Bake Oven.

From A. O. C., *Lake Charles, La.*—A few days ago I had to lay out and build the centering for a bake oven which was arched from three sides, necessitating the putting in of two hips. I could not lay them out, but I managed to do the work by obtaining two of the common centers and scribing the hips. This is not very mechanical, but it is sure. I can draft the shape on the floor or drawing board, but cannot transfer from the drawing to the board to be cut. The arch was 12 feet 7 inches span and 14 inches rise. Now I wish some brother would tell me how to lay out a hip for this work. I want a rule that will apply to any case.

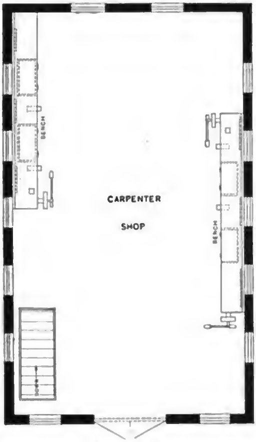
I would also like some brother to tell me how to strike an ellipse of any size without drafting when the major and minor axes are known.

Quantity of Tar for Gravel Roof.

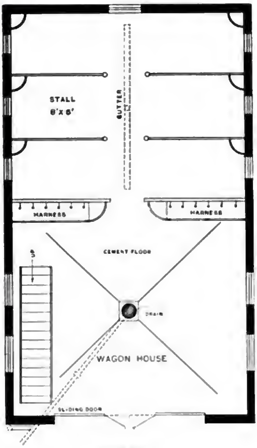
From W. P. C., *Wahpeton, N. Dak.*—Will some of the readers of *Carpentry and Building* who are experts in laying gravel roofs and have the figures at hand kindly inform me how much tar it takes per square (100 square feet) for a three-ply roof, so as to have a good coat of tar over the paper to hold the gravel? What is their experience with gravel roofs as compared with the old tin roofs?

Laying Clapboards.

From H. C., *Pike River, Conn.*—Will some of the readers of *Carpentry and Building* express their views on the subject of laying clapboards? In this part of the country some carpenters commence at the upper part of the house, whether it be a gable or a hip roof, and snap a chalk line for every course of clapboards; other car-



Second Floor.



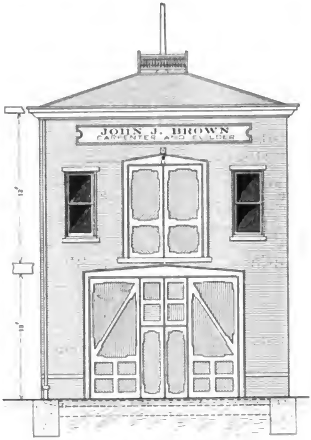
Main Floor.

Scale, ¼ Inch to the Foot.

penters first gauge the clapboards to the required weather and commence laying at the bottom. Now what I want to know is, which of the two is the proper way and which the more advantageous? Is it better to keep the short pieces which are cut off with a view to using them somewhere on the rear of the building, or in other places where they will not be much noticed, or is it better to use the short pieces as we go along ? I would like very much to see the subject thoroughly discussed in the columns of the paper.

Design of Stable and Carpenter Shop.

From T. F. BROWN, *architect, Germantown, Philadelphia, Pa.*—Thinking it may be of interest to some of the many readers of *Carpentry and Building*, I send blue prints showing elevation and plans of a two-story brick stable and carpenter shop, erected to meet the requirements of John J. Brown of this city. The drawings show so clearly the arrangements as to call for little comment. The first floor, it will be noticed, is used as the stable and wagon house, the latter occupying the front portion.



Front Elevation.—Scale, ¼ Inch to the Foot.

Design of Stable and Carpenter Shop.

There are six stalls with two harness closets conveniently located. The wagon house has a cement floor sloping to the center, where there is a drain. The upper floor, which is used as a carpenter shop, is well lighted and is fitted with benches on both sides of the room. The main doors of the first floor are combination hinge and sliding, the central ones being hinged, while the side portions slide, thus giving an opening very nearly the entire width of the building. The front doors on the second floor enable material to be unloaded from a wagon immediately below, and in the same way the finished stuff is carried out. Just over the doors on the second floor is a projecting timber with block for attaching tackle for raising and lowering heavy material. Another feature which will probably be noticed from an inspection of the front elevation is that the first-floor ceiling is 10 feet high and the second floor 12 feet.

What is a Right and Left Hand Door ?

From C. W. M., *Greenville, Iowa.*—I would like to ask through the Correspondence columns which way a door should swing to be called a right hand door—that is, in entering from the outside, the door being hung on the inside ? We often find locks that are not reversible, and when ordering we must necessarily know whether the lock is for a right or a left hand door.

Note.—This question is one which in years past was discussed at considerable length, the resultant opinion being that a door swinging to the right as one enters a house or room is a right hand door, and when swinging to the left a left hand door. There was a time, many years ago, when manufacturers marked their locks just the opposite to what we have described, and it is possible that in some parts of the country this practice may still prevail. We lay the question before our readers, however, and shall be glad to have them describe the custom which obtains in the locality where they reside.

Finding Down Bevels of Purlins on Hip Roofs.

From D. H. Meloy, *Waterbury, Conn.*—In the February number of *Carpentry and Building* three methods are given for fitting purlins in hip roofs. These methods

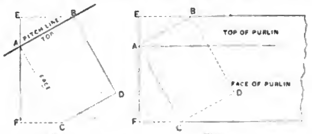


Fig. 1. Fig. 2.

Meloy's Method of Finding Down Bevels of Purlins on Hip Roofs.

may be correct and may be satisfactory to "Learner" and perhaps to other readers of the paper, but I venture to say that not one carpenter in a thousand will be able to comprehend the methods presented, or to lay out the work by them. I would like, therefore, to offer my method for doing such work, and which, by the way, is fully illustrated and explained in "Progressive Carpentry," and from which every kind of frame work can be fitted perfectly, whatever may be its form and position. Referring to the sketches, make a section of the purlin full size and the exact shape and position it is to be placed, as shown in Fig. 1. Draw a vertical line, E F, touching the corner of the top and face at A. Now square across the top of the face of the purlin, near the end; take the distance from E to B of Fig. 1 and set it off on the back corner on the top E B of Fig. 2. Mark A B in Fig. 2. Then take the distance F C of Fig 1 and set it off on the bottom corner of the face, Fig. 2, and mark A C. Cut to the marks A B and A C of Fig. 2. If it is desired to mark the other two sides of the purlin, use the same bevels—the face bevel for the back and the top bevel for the bottom, and cut by the dotted lines to D of Fig. 2.

Tool for Truing Grindstone.

From T. E. D., *Silver Run, Md.*—Answering the question of "A. I. F." of Provincetown, Mass., which appeared in the February issue, I would say that he can obtain what he needs from either William P. Walters' Sons, Philadelphia, Pa., or C. A. Strellinger & Co., Detroit, Mich. No doubt there are other dealers who handle tools of this kind, but the above occur to me at the moment. The tools range in price from $6 to $17, according to the length of the rolls. "A. I. F." will find them to give satisfaction, and after once being bolted to the frame of the stone are almost automatic in their action. In using this dresser as well as in hand dressing, which will be treated below, it is absolutely necessary that the shaft bearing be true and tight, otherwise the correspondent cannot expect good results, owing to the fact that the stone will have a tendency to lift and become gouged on its face. The writer has at different times dressed stones of varying grit with a cheaper form of dresser, my first attempt being with a worn out file, the end of a three cornered taper being used in the same manner as a chisel is applied to work in wood turning. Later I conceived the idea that a sharp cornered flint stone would be better, which was used with some success, as its cutting qualities were much better. In either case a firm rest is required for the cutter. Of course, it is understood that the method of hand dressing is not recommended as being better than the tool first noted, but rather to serve as a shift.

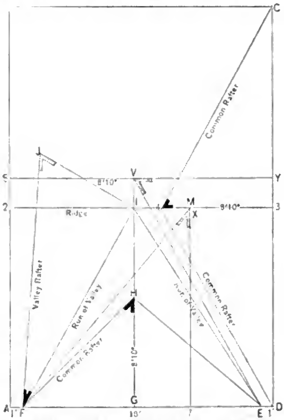
Thickness of Boarding for Gravel Roofs.

From J. D., *Taunton, Mass.*—What is the usual thickness of boarding to cover a roof where tar and gravel are to be used and the pitch is ½ inch to the foot ? Is it practical to put on 2-inch planking nailed to 2 x 8 rafters, or should it be thinner boarding and using two thicknesses, crossing joints one over the other ? The roof is 10 feet wide, 80 feet long and leans against a building. Should the planed side be outside, so that the roofers would have a smooth side to work on ? Any information on the subject will be greatly appreciated and may be of interest to others.

Answer.—The boards should be at least 1 inch thick, of well seasoned stuff, planed on one side and matched. They should be laid with the dressed side up. The subject of gravel roofing was discussed at some length in the volume of the paper for last year, articles of interest appearing in the issues for August, September and October.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From N. O. T., *Cuyahoga Falls, Ohio.*—If the editor will allow me a little space I will endeavor to help "Learner" out of his trouble. Let A B C D of the inclosed sketch represent the plates, with E and F the seats of the valleys. Let G H represent the rise of the small gable and 3-4 the rise of the large gable, which in this case is the same as the small one. The ridge lines are represented by G I and 2-3, while F I and E I represent the run of the valley rafters. Connect F H and H E, which will give the common rafters of the small gable. Set off the length of the common rafter from F to 7; square up to the ridge M and draw the line F M. A bevel set at M will give side bevel for the right hand side of the left valley.



Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

Now connect 4 C and 4 D for the lengths of the common rafters on the large gable. Set up the lengths of these rafters from D to Y and from A to S; connect Y and S; draw a line from E to V, and a bevel set at V will give the bevel for the left side of the valley. Cut the right valley with the bevels reversed. Square up from F I to J, the rise of the valley; connect J and F. A bevel set at J will give the plumb cut for the top of valley, while a bevel set at F will give the cut for the bottom of the valley. Bevels set at H and 4 give the plumb cuts for the top of the common rafters.

WHAT BUILDERS ARE DOING.

REPORTS at hand from various centers of the country indicate a most gratifying prospect for the coming season in the building line. Architects have a great deal of work on their boards, involving both large and small undertakings, with dwelling houses perhaps predominating. In some localities the outlook is reported as the brightest in years, and it is only here and there that business is expected to be rather quiet. Thus far there are few indications of labor disturbances, although on the first of April and May it is probable some demands will be made regarding rates of wages and hours of labor. In a general way, however, it may be stated without fear of contradiction that the building season of 1901 opens with prospects of greater activity than has been the case for a long time past.

Albany, N. Y.

The building situation in and about the city of Albany is such as to warrant the expectation of a gratifying volume of business during the spring and summer months. There is a great deal of contemplated work now on the boards of architects, this being largely in the nature of new construction. The county of Albany is about to award a $40,000 contract for the almshouse, and a house of detention will be erected, also an office building for the American Express Company, a new public school building and a public bath. Many private residences will be put up, and according to the present outlook many of them will be handsome architecturally and expensive in cost.

The Carpenter Contractors' Association held their annual meeting on February 6 in their quarters at 20 and 21 Drislane Building, choosing the following officials for the ensuing year: President, Richard Wickham; vice-president, Adolph Knuth; recording secretary, Edward A. Keeler; financial secretary, Henry Kroner, Jr., and treasurer, John J. Maas.

Anderson, Ind.

Something like 50 building contractors held a meeting recently at Alexandria and formed what is known as the Building Contractors' Association of Indiana, the aim being to unite the builders and establish local organizations all over the State. The headquarters of the State organization will be at Anderson. The following officers were elected: President, T. W. Hamilton, of Elwood; first vice-president, Phil Patton of Marion; second vice-president, Thomas H. Jones of Alexandria; secretary, M. D. Wright of Anderson; assistant secretary, D. Eshelman of Anderson; treasurer, Ed. M. Cramer of Muncie.

Charleston, S. C.

Advices under recent date are to the effect that the building outlook for the season now opening is very bright, more especially so on account of the South Carolina Interstate and West Indian Exposition, which is to be held in Charleston next December. Stimulus has also been given to building operations by reason of the anticipation of the establishment of a naval station here. The builders have agreed to an advance of 15 per cent. in carpenters' wages, to take effect after April 1, nine hours to constitute a day's work, this scale to hold good for one year.

At the annual election of the Contractors' and Builders' Association, held at their quarters in Hibernian Hall on Meeting street, the following officers were chosen for the ensuing year:

President,	Secretary,
Henry Oliver.	G. H. Dehrmann.
Vice-president,	Treasurer,
I. T. Snetson.	T. E. Hurst.

Arbitration Committee,

Henry Oliver, Robert McCarroll,
H. A. Cutteton.

Chicago, Ill.

The course of events since the settlement of the labor troubles in the city is bearing out the prediction that building operations are likely to be conducted upon an immense scale during the ensuing year. The permits which have been granted during the first two months reach a very respectable number in the aggregate, while the character of the buildings contemplated is suggestive of a large amount of investment capital. During February there were 247 permits issued for buildings estimated to cost $1,539,000, which is a gain of more than 200 per cent. compared with February of last year, when the figures were 108 permits for buildings costing $485,000.

At the annual meeting of the Builders' and Traders' Exchange, held at their quarters, Room 217, Chamber of Commerce, Chicago, the following officers were elected:

President,	Secretary,
A. E. Wells.	J. F. Daggett.
First vice-president,	Treasurer,
Jas. Sinclair.	E. T. Malone.
Second vice-president,	
John Dick.	

Directors (holding over),

Alex. Gordon,	J. H. Coffey,
S. M. Randolph,	Martin Delaney,

W. Irving Clark.

Directors (newly elected),

S. S. Kimbell,	T. F. O'Connell,
Jas. A. Hogan,	Wm. Gavin,

N. J. Bique.

Columbus, Ohio.

An enthusiastic meeting of the Builders' and Traders' Exchange was held in the early part of March for the purpose of considering a proposition looking to the formation of a State association of builders' exchanges. A letter from James Young, chairman of the special committee of the Cleveland Exchange, was read urging the formation of such a State association, in order to secure concerted action in legislation and in wage troubles. It was suggested that a member of the association be present in the capital city during sessions of the General Assembly, so as to keep track of bills touching the financial welfare of builders. The president of the Columbus Exchange was instructed to appoint a committee of three to confer with like committees from other cities. We understand that the State organization will include the cities of Columbus, Youngstown, Toledo and Cincinnati.

It was decided to hold the meeting of the exchange hereafter on the first Wednesday of each month instead of every two weeks as heretofore.

Fort Worth, Texas.

Growing out of the labor troubles in the early part of the year the principal contractors and builders organized the Fort Worth Builders' Club, selecting for the ensuing year the following officers: President, William Bryce; vice-president, John Bardon, and secretary and treasurer, John E. Homan. The object for which the club organized was primarily to oppose the unjust demands of labor unions, and, secondly, mutual protection and benefit, both of which up to the present time are said to have been successfully accomplished.

The trouble which ultimately led to the formation of the club started on the first of the year by the journeymen plumbers going out on strike, owing to the refusal of what was regarded by the master plumbers as unreasonable demands. The master plumbers at once put non-union men to work, but other trades refused to work on buildings with the non-union men. All work was rapidly being stopped when, at a meeting of the Builders' Club, held January 29, the following resolution was adopted:

"*Resolved*, That on and after this date no member of the Fort Worth Builders' Club shall employ any workman who is a member of the union affiliated with the Building Trades Council."

The following day there were very few union men at work on any building in the city, and after this condition had existed for nearly two weeks a communication from the unions was presented at a meeting of the club, asking for a committee of three to meet with a like committee from the unions. This joint committee was to select five reputable business men who should constitute a permanent Board of Arbitration, this board to arbitrate all present and future differences between employer and employed. This was agreed to, and the two committees met and selected a board to serve one year from May 31, 1901. A few days later the board met and heard each side of the controversy between the journeymen and the master plumbers, rendering a decision which may be summarized as follows: Wages were allowed at the rate of $4 per day, and other points of minor importance were settled principally in favor of the masters. The greatest point gained, however, was the decision that union men must work on any building, regardless of the fact whether other workmen on the same job be union or non-union men. We understand that the men of all the trades are back at work and any trouble that may arise in the future will be settled without the customary strike.

The Builders' Club meets the second Thursday in each month and although young, the members expect to make it one of the best of its kind in the country.

Honolulu, H. I.

Honolulu builders are now interested in the proposed new charter for the island city and in the building laws which will be embodied in it. On February 8 the Master Builders' Association held a meeting and after a protracted session framed a set of resolutions proposing a set of building laws which were later submitted to the conventions of the respective political parties. How the proposed laws will be received by the politicians is not yet known. There is an evident necessity that the building situation in Honolulu should be cleared in order that building may be encouraged. There is a deplorable lack of good residences in the city. It is stated that a four-room cottage without modern water and lighting fixtures and without any special social or other inducements as to surroundings, is rented for $30 per month. Many residences are, however, already planned or under way, especially on Beretania avenue and other recently improved streets.

Kansas City, Mo.

A. S. Rankin, secretary of the Master Builders' Exchange, reports that the feeling among the trade is most hopeful and the outlook is for a greater building business than ever before in the history of Kansas City. Architects are very busy, and some of the work in contemplation will run as high as $300,000 in cost. During the month of February permits were issued for over 190 buildings, estimated to cost $511,000, these figures comparing with 105 permits of buildings costing $131,000 for the same month a year ago.

The Master Builders' Exchange gave the fourteenth annual banquet at the Midland Hotel the latter part of February, the attendance being the largest in its history. The large dining-room was tastefully decorated and the appointments were ideal in all respects. Covers were laid for 150 guests. The menu cards were done in black and white, the drawing on the front cover representing the outline of an unfinished building with a derrick from which was suspended a large unhewn stone swinging into space. The toastmaster was J. T. Patterson, president of the exchange, and after the wants of the inner man had been supplied addresses were in order. The first speaker was Col. James G. Stowe, Consul-General to Cape Town. In the course of his remarks he described the buildings in South Africa as being mostly one story and the architectural features, from the American standpoint, decidedly crude. Following Colonel Stowe the toastmaster introduced Judge Robinson, who responded to the toast, "Organizations and their Legal Status," and who in concluding his speech prophesied the future greatness of the Kansas City organization of master builders. The final toast of the evening was "Plans and Specifications," and was responded to by Architect Frank M. Howe. By this time the evening was well spent and the guests departed feeling that the fourteenth annual banquet had been in all respects a decided success and one reflecting great credit upon the Committee of Arrangements.

Los Angeles, Cal.

Los Angeles builders state that not since 1889 has there been such an amount of solid heavy building on hand for that city as will be recorded this year. It is stated that since the first of the year some 5,000,000 or 6,000,000 brick have been contracted for. There is also a good demand for residences and architects have a great many plans on hand. Nevertheless the year has opened rather quietly and there is a probability that the promised activity will not come for a month or two yet. January and February of this year were, according to the building records, somewhat behind the same months of last year.

Lowell, Mass.

The feeling among architects and builders of Lowell regarding the outlook is most encouraging. There are promises of the best building season the city has enjoyed for eight years, the only cloud on the horizon being the activity and unreasonableness of the building trades unions. It is feared that their demands for increased pay and shorter hours will have the effect of deadening business, and it is to be regretted that the contractors are not altogether unanimous as to the proper attitude to be taken regarding the labor question. The opinion is expressed that nothing but an effective strike will awaken them from their apparent indifference to matters of great interest to themselves and owners. There are several large buildings in prospect, and the outlook is for the erection of many new dwellings.

A new building ordinance is in prospect embodying recommendations made by a special committee of the Builders' Exchange. At the moment, however, the matter seems to be held in abeyance, the principal opposition apparently coming from speculative builders and owners of cheap tenement property. It is hoped that those having the true interests of the city at heart will awaken to the necessity of such an important enactment.

The Builders' Exchange continues to hold its own as regards membership, but the limit has not by any means been reached, and there is a feeling that the exchange is not numerically as strong as it should be. Regret is expressed that the architects of the city are not more interested in the welfare of an institution which has for its principles the good of all concerned—owners, architects and builders.

Memphis, Tenn.

The building prospects are said to be the best ever known in the city of Memphis. Hundreds of residences are in process of erection or contemplated; a \$500,000 hotel and a \$333,000 mercantile building are under way, while other large and small buildings are in prospect.

At the annual election of the Builders' Exchange, held at their quarters in the Planters' Insurance Building, the following officers were chosen for the year 1901: President, F. B. Young; first vice-president, Charles Chamberlain; second vice-president, A. B. Bartholomew; treasurer, P. R. Friedel, and secretary, O. O. Howard.

Milwaukee, Wis.

Authentic advices under recent date are to the effect that the outlook in the building line in Milwaukee and vicinity has never been more encouraging than it is just at present. Quite a number of large jobs for the interior of the State, as well as outside, are ready for figures and practically every contractor is busy preparing for an unusually prosperous season. Among the improvements contemplated are a large number of factory buildings, flats, &c., and as soon as the weather permits active operations will be begun. Building material is steady, so far as price is concerned, and as there are no indications of labor troubles, a profitable season is expected.

The report of the building inspector's office for February shows that 57 permits were issued representing property valued at \$529,290. In the corresponding month of last year 43 permits were issued for buildings valued at \$177,125.

A number of local builders have recently joined hands and formed a Builders' Club, the organization having just been perfected. The officers elected at the last meeting were: President, Henry Ferge; first vice-president, M. L. Patek; second vice-president, George Schwarz; secretary, Peter L. Peterson, and treasurer, John Bonnet. The trustees are H. S. Pelton, Henry Herman, Louis Hoffman, Louis Griewisch, Frank Dengel and Nicholas Ehr. It is the intention of the club to secure suitable quarters and put the new home in order as speedily as possible. The organization is to be largely of a social nature and will be limited in membership to those interested in the building industry.

New Haven, Conn.

At the annual meeting of the Builders' Exchange of the city of New Haven, held at their quarters, 139 Orange street, the following officers were selected for the ensuing year:

President,
L. I. Thomas.
Vice-president,
Harry Baldwin.

Secretary,
George A. Sanford.
Treasurer,
J. Gibb Smith.

Directors,

James E. Todd,
George P. Merwin,
C. A. Mansfield,
W. A. T. Smith,
E. H. Sperry.

Aside from alterations and repairs and a few of the larger buildings for business or association purposes, with the better class of residences where the owners are to occupy them, the building business may be described as rather quiet. There is certainly no speculative building, and while architects are more or less engaged there is no prospect of anything like a boom. There are, however, quite a number of fine residences on the boards, some of which will soon be in the hands of the builders. Among the larger jobs now in the hands of the contractors may be mentioned the Y. M. C. A. Building, costing something over \$100,000; the bi-centennial building of the Yale Corporation, estimated to cost over \$1,000,000; the Fayerweather Dormitory, costing some \$75,000 or \$100,000; the Benton-Armstrong paper box factory on Orange street, the contract for which has just been awarded, and the building on Chapel street for the Ed. Malley Company.

New York City.

The number of transactions which are being reported in the real estate market, combined with the permits for new buildings issued by the Bureau of Buildings, indicate an active season in prospect. There is more or less work under way in the business sections of the city, but the suburbs are rapidly being built up to provide accommodations for the growing city. Some of the more prominent improvements contemplated include an 11-story brick and stone store and loft building to be erected on West Eighteenth street, from plans drawn by Robert Maynicke; an 11-story store and loft building having a façade of brick and limestone on Broadway between Spring and Prince streets, designed by architects De Lemos & Cordes, the estimated cost being placed at \$340,000; a 12-story brick and stone hotel, 86 x 89 feet, and estimated to cost \$550,000, to be erected on West Thirty-fifth street, from plans by Henry B. Milliken; a new theater, to be known as the Colonial, to be erected at Broadway and Forty-seventh Street, at a cost of a half million dollars; a 12-story apartment hotel at Madison avenue and Sixty-third street, to cost about \$600,000, and having over 200 rooms and 110 bathrooms, besides parlors, reading rooms, &c., the plans being prepared by Buchman & Fox; a 12-story brick and stone modern office building from plans by Clinton & Russell, to be put up at the corner of Wall and Water streets by the Tontine Company, and a 25-story building on the triangular plot of land at Broadway, Fifth avenue, Twenty-second and Twenty-third streets, which it is estimated will cost about \$1,800,000. From the peculiar shape of this plot of ground it is commonly referred to in real estate circles as the "flat-iron."

An important decision affecting the contractors of the city has recently been rendered by the Court of Appeals declaring the law prohibiting the use of stone from other States unconstitutional. The law was passed a few years ago at the instance of several labor organizations, and the penalty for violating it as it stood was the withholding of moneys due the contractors. The claims now held up in the city are said to amount to nearly \$200,000, but the decision of the Court of Appeals involves the payment of millions of dollars in the future.

At the twelfth annual meeting of the Building Trades Club, held at their quarters in the Townsend Building in February, the following ticket was elected: President, Frank M. Weeks; first vice-president, Warren A. Conover; second vice-president, Charles L. Eidlitz; secretary and treasurer, William K. Fertig.

Managers for Three Years.—George Moore Smith, Samuel I. Acken, Jr., Hugh Getty, George F. Baimer, Archibald J. Marton.

Manager for Two Years.—A. Dudley Bramhall.

William K. Fertig, the secretary and treasurer, presented his financial statement and report, showing the cash balance on hand January 1 and the membership at present to be 275, of whom 10 are non-resident and 5 associate members.

Philadelphia, Pa.

In our last issue we made mention of the annual meeting of the Master Builders' Exchange, giving among other things a list of the directors elected for various terms. Subsequently the directors organized by choosing William Conway, a prominent brick manufacturer, president of the exchange; W. S. S. Shields, J. Lindsay Little and Thomas F. Armstrong, vice-presidents; Charles H. Reeves, treasurer, and William Harkness, secretary. George Watson was made trustee.

Mr. Conway, the new president, has been a member of the exchange since it was organized, and succeeds John S. Stevens, recently resigned. Mr. Conway was a member of the Board of Directors, and for three successive terms was vice-president of the exchange.

Pittsburgh, Pa.

At the annual meeting of the Pittsburgh Builders' Exchange the following officers and Board of Directors were selected for the ensuing year:

President, W. B. Lupton.
First vice-president, J. J. Munn.
Second vice-president, Adam Wilson.
Secretary, John S. Elliot.
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Board of Directors:

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Adam Wilson,	A. A. Hersperger,	W. Green,
G. S. Fulmer,	A. Rasner,	H. R. Rose.
J. M. Jones,	J. P. Knox,	

The general feeling among members of the trade is that the coming spring and summer months will witness a great deal of activity and that the season will be one of the best for some years past. The building operations under way are now not confined to any particular locality or section of the city, but are pretty well divided. The construction now going on in the business portion of the city is of a very gratifying character. Permits for February were 189 in number as compared with 98 in February of last year.

One of the notable undertakings is covered by a contract for the erection of 100 brick and stone dwelling houses which has been awarded to F. C. Martsolf, a McKee's Rocks contractor. The dwellings will cost $2500 each and will be erected on the West Park plan of lots, near McKee's Rocks, by C. F. Baker of Canal Dover, Ohio. The aggregate cost of the contract is $250,000. The contractor will break ground at once and the buildings will be completed about July 15.

The ninth annual meeting of the Wholesale Lumber Dealers' Association, held in the city the first week in March, was well attended and a success in every way. Business matters were discussed, a banquet enjoyed and excursions made. The trustees who were elected organized by choosing the following officers: President, Robert C. Lippincott; first vice-president, Pendennis White; second vice-president, Charles H. Bund; treasurer, Frederick W. Cole; secretary, Eugenie F. Perry; general counsel, John J. McKelvey.

Providence, R. I.

The annual report of the inspector of buildings shows the extent of the operations in the city during the past year and also calls attention to some of the changes which have been made in construction. The number of permits issued was 1122, as compared with 1268 the year previous, and the amount expended considerably in excess of the outlay during the 12 months of 1899. Inspector Hopkins states in his report that the total results when compared with the year before are very gratifying and lead to the conclusion that the material and visible improvements to the city are in a healthy condition. For obvious reasons buildings erected on the principal streets in the city will hereafter be undoubtedly of a substantial character, and the report places emphasis on the fire proof construction. The prospects for the ensuing year are very encouraging for large additions to the city's growth and material prosperity.

Salt Lake City, Utah.

A few weeks ago the united building trades issued a circular to the architects and contractors of the city, with the object, it is stated, of shutting out non-union men from working on the projected buildings in the city. The new order of things was to go into effect on April 1, and any contractor or subcontractor employing non-union men would be called upon to pay a fine of $50, but no non-union men would be allowed to work on any buildings or works on which the said contractor was engaged.

The opinion among architects and contractors is that if the conditions of the circular are carried into effect it will prevent a great deal of building which otherwise would be executed. In some instances architects are advising their clients to hold off until matters are more settled, while others express the view that it will stop at least 50 per cent. of the building operations.

San Francisco, Cal.

The San Francisco building situation has been cleared somewhat by the settlement of the long drawn out millmen's strike, which has restricted building to a large extent during the last six months. On February 19 a board of arbitration submitted a compromise which was accepted by the men and most of the mill owners. This trouble was hardly settled, however, before another labor disagreement arose to hamper the building trades. This time it was the teamsters who struck. The brick yards and other material houses are now refusing to load non-union teams, and no one knows just how serious the matter may become. Only an average amount of building is under way, although the prospects for the city and the State at large are splendid. Residence building will undoubtedly be a feature of the spring, as dwelling houses are scarce and rents for this character of property are rising.

At a meeting held on February 1 the San Francisco Building Council elected the following officers: President, P. H. McCarthy; vice-president, E. J. Brandon; recording and corresponding secretary, O. A. Tveitmoe; financial secretary, H. Thieler; treasurer, John E. McDougald; sergeant-at-arms, H. J. Skeen; trustees, P. H. Farley, Walter Goff, V. J. Donovan, W. A. Cole and D. D. Brown.

Seattle, Wash.

Advices from Seattle under date of March 7 are that the city has just closed the greatest building month in its history. During February 425 building permits were issued in this city. This is nearly three times as many as were issued in February, 1900. The notable fact about this midwinter building activity is that by far the greater part of the new work is on residences, over 600 new dwellings having been begun since January 1. The great movement in the erection of wooden buildings has led to a scarcity of carpenters, and contractors are now paying $4 per day for expert workmen.

Spokane, Wash.

Notwithstanding the great amount of building done in Spokane, Wash., last year, there is reported to be a great lack of desirable buildings, both for residence and for business purposes. The lack of suitable residences has already led to considerable building this season. New residences are now going up in many quarters of the town. These range in general from $6000 to $1000 in cost, there being several now under way which will cost slightly below the former figure. The demand for good business locations is strong and is expected to result in some big modern buildings before long, although no new plans have been made public recently. The Spokane Association of Architects held its annual dinner on February 12.

St. Louis, Mo.

Building permits issued by Commissioner of Public Buildings Longfellow since January 1 show an increase over the first two months of 1900 of $1,025,391. Architects and contractors predicted at the close of the year that this year's building improvements would surpass all records for many years. The valuation of permits issued in February is $152,166 in excess of the same month of last year. The January increase in valuations is $873,225, making a total increase for the two months of $1,025,391, as stated.

Toledo, Ohio.

The Builders' Exchange held their annual meeting on the evening of Monday, March 4, nearly the entire membership being represented. More interest was manifested in the proceedings than in any election heretofore held by the exchange. Many matters of importance were considered. A motion prevailed that a committee be appointed to whom all important matters brought up were referred, with instructions to make and submit some new system to the exchange, in order to make it more successful in every way, the report to be ready for submission at the first meeting in April. An appropriation of $50 was voted for an entertainment and smoker to be given at the first meeting next month, this committee consisting of Henry Thorspeck, chairman, George O'Toole and G. Hofer.

The election resulted in the selection of the following officers and directors: President, J. L. Creswell; first vice-president, Henry Thorspeck; second vice-president, P. H. Degnan.

Directors.—A. R. Kuhlmann, John McCaffery, Charles A. Hartman, R. G. Bacon, W. J. Albrecht and Frank R. Stahl.

The secretary, assistant secretary and treasurer are to be elected at a later date.

Utica, N. Y.

The Builders' Association Exchange of Utica held their annual election in January and selected the following officials for the ensuing year: President, William Fisher; vice-president, George W. Shippy; secretary, Harry Lancaster, and treasurer, Joseph Wicks. The trustee for three years was Charles Y. Fuller.

While it is rather difficult to say to what extent building operations will be conducted the coming season in and about the city, most of the architects appear to be busy, and at the same time there is considerable repair and alteration work in progress.

Watertown, N. Y.

There is considerable new work in sight in and about the city, and architects are comparatively busy for this season of the year. The prospects are good for an active year.

At the annual meeting of the Builders' Exchange, held at their rooms in Burdick Block, the following officers were elected for the ensuing year: George F. Townsend, president; C. C. Burns, vice-president, and W. C. Easterly, secretary and treasurer.

Youngstown, Ohio.

At a meeting of the Builders' Exchange held early in March an agreement was reached with the bricklayers by which the latter will work nine hours a day for the coming summer, the workmen waiving their demand for an eight-hour day. It was also agreed that on Saturday the men would work eight hours and receive pay for that number of hours. A provision in reference to the stone masons' scale was inserted in the settlement made with the bricklayers, which is to the effect that if the stone masons get less than 40 cents per hour in Pittsburgh the Youngstown stonemasons are to receive that rate; while if the stone masons in Pittsburgh receive more than 40 cents per hour, the Youngstown men will receive the same amount.

It is now given out that many who intended to build and withheld their contracts until the eight-hour question was adjusted, will go ahead with the work of construction.

Notes.

Reports from Saginaw, Mich.; Troy, N. Y.; Columbia, Pa.; Canandaigua, N. Y.; Pottsville, Pa.; Newark, N. J.; Schenectady, N. Y., and other places indicate the outlook for an active season in the building line.

The full bench of the Supreme Court decided on March 13 that the Westminster Chambers, in Copley Square, Boston, Mass., must come down to 90 feet, the hight established by the Legislature for structures in that square. The building is said to be 6 feet in excess of the hight limit, and the owners are given until October 1 to comply with the law.

The Eastman Building for the Rochester Institute.

Some time ago we made brief mention in these columns of the fact that Mr. George Eastman had donated a sum of money for the erection of a new building for the Atheneum and Mechanics' Institute at Rochester, N. Y., with a view to providing additional facilities for instruction in various departments of industry. The corner stone of the new structure was laid on October 15 last, and the building will be formally opened with elaborate ceremonies extending from April 15 to 20 inclusive.

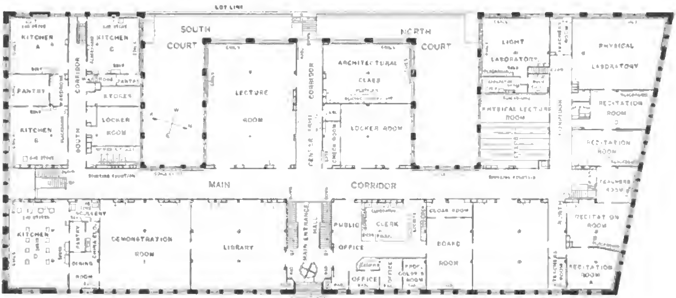
The new building is of red brick with stone trimmings and is two stories and basement in hight. The main frontage on Plymouth street is 286 feet, that on Spring street 132 feet, while on the canal side it is 134 feet. A general idea of the disposition of the rooms will be seen from an inspection of the first and second floor plans, which are presented herewith. It will be noted that the north wing is to be devoted entirely to the industrial and fine arts department, while the south wing is to be used for the department of domestic science.

The center wing, bounded by the alley and the north and south courts and divided by the center corridor, is 100 feet long. On the north side of the corridor is a room 29 x 42 feet, to be devoted to architectural drawing. There is also a locker room, 28 x 33½ feet, and the janitor's check room, which will face the corridor dividing the wing. On the other side of this corridor and occupying the south side of the center wing is a large lecture room, 42 x 57½ feet, with a seating capacity of 400.

On the second floor, which is similar in general outline to the first floor, are found the rooms for designing, free hand and mechanical drawing, modeling, painting, &c. In size the rooms for mechanical drawing measure 35 x 40½ feet, 29 x 40½ feet, and two of them 19½ x 36 feet. The painting room or art studio, occupying the northeast corner, and giving the best possible light for the purpose, is 25 x 40½ feet in size. The two rooms devoted to free hand drawing face the canal, one 33 x 34½ feet, the other 27½ x 34½ feet in size. The life class occupies a room at the west end of this wing, facing the alley, and also lighted by a skylight. The room is 24 x 28½ feet. The design room, 32 x 34½ feet, faces the alley and north court, and adjoining is the clay modeling room, 24½ x 32 feet, facing the north court. Off this room are wardrobes and toilet rooms.

The interior finish of the building is in white wood, the hall floors of the corridors and the court being of cement. The architects' plans were made from drawings by Professor E. C. Colby, principal of the fine arts department, who designed the arrangement of the entire building.

The new structure is separated by only a few feet from the old building, which will be used entirely for manual training in wood and iron, including joinery, wood turning, pattern making, forging, vise machines and lathe working. The two buildings are connected by a bridge at the second floor, as indicated on the plan shown in this connection.



Plan of Main Floor.

The Eastman Building for the Rochester Institute.

The New England Building at the Pan-American Exposition.

We understand that, instead of each State erecting a separate building at the Pan-American Exposition to be held at Buffalo this year, the commissioners of each of the New England States of the Exposition have agreed to recommend that one structure be erected for the group, each State bearing its proportion of the expense. It is stated that the estimated cost of the building is $18,000, and will be built of staff and painted to represent red brick with marble trimmings. The style of architecture will be old Colonial, so characteristic of the New England States. The entrance of the building, which has been designed by Josephine Wright Chapman of Boston, Mass., will be a large, square hall with a wide Colonial staircase. On the main floor will be the bureau of information, post office, coat rooms, lounging and waiting rooms, &c., while on the second floor will be six State rooms, arranged so that each room is practically on a corner, all rooms being of equal size and fitted with fire places. Careful study is to be given to the interior decoration of the building. The paint throughout will be of old ivory white, and the walls are to be hung with old time papers, the large hall to be covered with the landscape paper so popular a century ago.

Real antique furniture is to be used throughout the building, from the old clock on the stairs to antique mirrors over the fire places, and fine old rugs will cover the floors.

The entire building, as well as the covered piazzas which surround it, will be lighted by electricity.

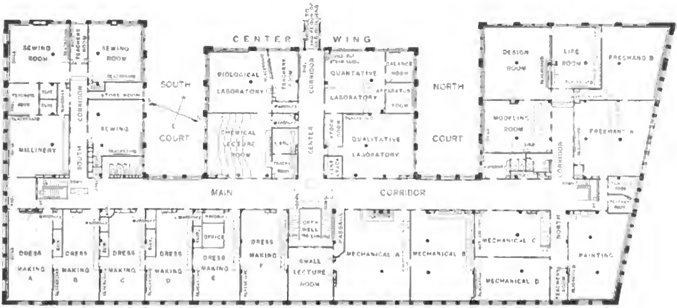
The most magnificent work of architecture is the Taj Mahal, in Agra, Hindustan. It is octagonal in form, of pure white marble, inlaid with every sort of precious stone. The work took 22,000 men 20 years to complete, and though there were numerous gifts and the labor was free, the cost was about $16,000,000.

School Heating Systems.

Evidently there is need for some better method of acquainting those who have charge of operating the heating systems in school buildings with the proper method of managing them. From various parts of the country reports come that school buildings had to be closed owing to the failure to secure a comfortable temperature in them. In many instances investigation finds the failure to be due to want of knowledge on the part of the janitor, or, in his absence, of the teachers in the school building of how to manipulate the different valves and dampers to secure an increase in the temperature in the building when the outside temperature falls. It will very readily be seen that to the uninitiated the low pressure steam system, hot water system, or even the later day furnace systems present complications which, if not thoroughly understood, make it impossible to operate them so as to warm a building comfortably. In many instances this forces the closing of the school. Sometimes it is found that those who have some idea of how to fire up burn the fire entirely out by opening the dampers and giving full draft, without taking up the labor of replenishing the fire with fuel, this menial task being left to the janitor.

Some leading contractors furnish explicit directions of such a nature that any intelligent person by carefully reading them can attend to such simple details as are needed to check the fire or increase it. This example is one worthy of being widely followed, particularly by those who install heating systems in school buildings. It may be safely assumed that a school building is never closed on account of low temperature as soon as it should be. Thus more or less risk to the health of all who occupy the building is incurred before the teacher adopts as a final measure the closing of the school, to escape exposure to a temperature that is too low for health. While it may be the duty of a school board to see that the janitor gives intelligent service, the fact that so many schools in widely separated sections are closed on account of inability to heat the buildings shows that something further is necessary than can be expected from the school board or the janitor.

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



Plan of Second Floor.

The Eastman Building for the Rochester Institute.

New Publications.

A Practical Treatise Upon Steam Heating. By Frederick Dye. Size, 5½ x 8¾ inches. 238 pages. Published by Spon & Chamberlain. Price, $4.

Readers of the English trade and technical journals have long been familiar with the name of Mr. Dye, the author of this book, who is a constant writer upon topics connected with domestic heating by steam and hot water. In view of the popularity of steam heating in the United States, the author's preface will be read with surprise, for in it he states that his reason for publishing this book was the fact that there was nothing available in England on the topic. He first compares the systems of steam and hot water heating and intimates that the former is only applicable to large buildings and for special purposes. His point of view is summed up in this sentence: "There is considerable certainty that steam will never be preferred to hot water for general heating work—in English residences, for instance—but for many purposes it excels hot water and every other means of affording warmth."

The practice of heating engineers in America and England differs so widely that it would be impossible to recommend this book as a guide to the novice in this country, nevertheless it can be studied to advantage by one who is already familiar with the business. Americans are not apt to go to England for suggestions, but it would argue too much self complacency to say that the works of English heating engineers cannot afford us any assistance. The general principles of heating, of course, are the same the world over, for the attraction of gravitation and the effect of heat upon water are universally the same, but when it comes down to the practical points there is a wide variation between the two countries. The cast iron heating boiler is practically unknown to the English heating trade, except so far as they have been educated to the use of American apparatus. Their elaborate wrought iron boilers are undoubtedly very efficient heaters, but they will hardly find favor either from the point of view of construction or of cost in America.

Another very important difference between the practice of the two countries is the degree of heat demanded by the public. In commenting upon an American heating job, Mr. Dye points out that it is usual in the Northern States and in Canada to allow for a 65 or 70 degree rise of temperature, the minimum outdoor temperature being assumed at zero. In England, on the other hand, the engineers, according to Mr. Dye, usually calculate on a 36-degree rise—that is, from 26 degrees F. to 62. It will be readily seen that such a great difference between the temperature demanded in the two countries will modify the size of boiler, amount of radiating surface and all that goes into the heating system.

The author begins with the general principles of steam heating, followed by a similar chapter on the distribution of heat. He then considers steam heat specifically and follows with a design of a low pressure gravity steam heating apparatus. Then come designs of apparatus which do not return the condensed water direct into the boiler. Chapter VI deals with the amount of radiating surface required, a table being presented based upon the cubic contents of apartments with modifications for variation in glass area, &c. The author next proceeds to describe the apparatus, one chapter being devoted to boilers, followed by one on radiators, valves, fittings, &c. Chapter IX deals with heating water by steam, the author beginning with the statement, "A hot water heating system can be heated by a steam heater in a much better manner than by a fire—that is, with less fluctuations of temperature and with less trouble and attention." Chapter X, which is very brief, gives some points on high pressure steam heating. Chapter XI gives sundry information and data relating to steam heating. Chapter XII deals with heating by steam, and the rest of the volume is given up to tables. The book is well printed, but the illustrations are little to boast of.

Heating Groups of Houses from a Central Plant.

One of the most important building schemes which has been undertaken in Chicago for some time past involves the erection in one of the city's many suburbs of 176 two-story brick flat buildings, some of which are to be so arranged that the ground floors may be used as stores. Work on 22 of these buildings is already under way and the rest will follow as soon as contracts can be let. The innovation will be in the heating of all these buildings, for which a steam plant 100 x 75 feet at West Lake street and Forty-ninth avenue will be provided. Boilers calculated to supply about 5000 feet of street mains will be installed at once and additions will be made as the demands may require. It is expected to have everything ready for use by the beginning of the renting season.

Specifications for the Painter.

A little work which will be found of special interest and value to architects, house painters and others engaged in the building trades, is an attractively printed and carefully arranged hand book issued under the above title by Harrison Brothers & Co., Incorporated, of Philadelphia, Penn. It presents in condensed form a great deal of information which is often desirable to have for ready reference, but which is seldom available when needed. Painters frequently complain of the inadequate manner in which the average painting specification is written, and when appealed to they are often unable to suggest a better form that will meet all the conditions of the case. In the preface to this little book it is asserted that within its covers will be found a method of specifying each different class of painting under its appropriate head, and in the briefest form. When different materials or methods may be used for the same class of work, the correct specification for each has been given, so that the architect or painter may use his own judgment in the selection of that best adapted to the special case in hand. Copious notes in small type have been introduced in explanation of the specifications, or to suggest amendments applicable to special conditions. In preparing the specification forms the compilers have sought the advice of a number of leading architects and painters to the end that the information presented may be thoroughly practical. Under the head of "Useful Notes" suggestions are given as to the time required in painting; when to prime a new building; the number of coats recommended for stables, barns, outbuildings, &c.; how to re-paint old surfaces, green or seasoned lumber, and how to produce tints of all kinds.

Organization of Brick Makers.

Articles of incorporation of the Association of Brick Manufacturers and Agents, with principal office in New York City, were filed with the Secretary of State at Albany on February 27, the object being to foster the brick trade, reform abuses and promote a more enlarged and friendly intercourse between the members.

The directors are William R. Hammond and Robert Main of New York City; John B. Rose, Homer Ramsdell and Fred. W. Bartlett of Newburgh; Everett Fowler, H. W. Wood and Lucien Washburn of Haverstraw; A. E. Albridge of Fishkill-on-Hudson; Charles A. Shultz and Albert Terry of Rondout; George W. Washburn of Saugerties and Jerome Walsh of Stockport.

A piece of rapid work was recently executed in Paterson, N. J., as the result of a wager, P. S. Van Kirk, a well-known carpenter and builder, constructing a carpenter shop, 50 x 80 feet in size and two stories in hight, in the space of four hours and a half. All of the material was first placed conveniently at hand, and at a given signal a force of 75 men commenced operations. The building was finished ready for occupancy in the time stated.

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WINTER HOME AT SOUTHERN PINES, N. C., OF E. M. FULTON OF NEW YORK CITY.

BARRETT & THOMSON, Architects

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
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MAY, 1901

Model Tenements as Profitable Investments.

One of the most interesting of the supplementary reports of the New York Tenement House Commission, recently presented to Governor Odell and the State Legislature, is one prepared by Dr. E. R. L. Gould of the City and Suburban Homes Company of New York on the "Financial Aspects of Recent Tenement House Operations." The report is a comprehensive statement of the financial results obtained from twenty-five typical modern tenements built in New York City during the past four years, and it shows, in the most convincing manner, that the model tenements erected by Dr. Gould's own company and other agencies for improved housing of the city's poor are profitable investment propositions, paying an average of between five and six per cent. profit on the capital invested, while providing housing at prevailing rentals. In ascertaining the percentage return to the owner upon his investment, Dr. Gould first of all deducts from the gross possible rental twelve and a half per cent. for vacancies and losses through nonpayment of rent, a proportion which his experience finds to be very liberal in the case of the improved modern tenements, where vacancies and defaults are comparatively rare. From the net rental he deducts thirty-seven and a half per cent. for repairs, taxes, water rates, insurance, wages of janitor, &c., and ten per cent. more to represent depreciation. The result shows that after these disbursements, the average return on the twenty-five typical tenements stands about seven and three one-hundredths per cent. The tenements selected are divided into five groups distributed throughout the upper and lower east and west sides of the city, inhabited by the poorer classes, the rentals imposed being no higher than those asked in the old crowded and unsanitary buildings of a similar nature located in the same districts. The deduction from the tabulated results is obvious, that there is no good economic excuse for the existence, much less for the further construction, of such dark, ill ventilated, overcrowded human beehives as form the large majority of the five thousand odd tenements that now exist in the borough of Manhattan.

Typical Modern Tenements.

Of the operations of the City and Suburban Homes Company of New York, with which he is himself actively connected, and which is the largest and most important of the agencies working for the amelioration of living conditions in the city, Dr. Gould says that their investments in model tenements to date amount to a little over $1,500,000, while plans are being matured to invest at least $1,000,000 more. In striking contrast to the unsanitary, overcrowded buildings which exist all over the city are the model structures put up by the company referred to. The unit for their buildings is a frontage of either fifty or one hundred feet. In the center of each unit of one hundred feet is a large sized court, ventilated at the bottom, thirty feet square, and between two one hundred foot units is a recessed court eighteen feet wide and about sixty-five feet in length. The apartments are nowhere more than two rooms deep, and are lighted and ventilated from two sides. There is not a single dark room, or even a dim room, in any of the buildings. Moreover, every apartment is a complete house in itself, separated from other apartments by deafened partitions, and containing a water closet for the exclusive use of the family, stationary washtubs and sink, hot water supplied from a central boiler system, clothes closets and dressers, mantels and the like. Gas ranges and steam heat are also supplied to every apartment, and there are shower baths on the ground floor and bathtubs in the basement, as well as laundries and steam drying rooms for the free use of the tenants. Dumb waiters are used to bring up articles from the cellar and to take down garbage. The buildings are fire proof, the staircases being built of noncombustible materials, and are surrounded by fire proof parapet walls. The rentals of these apartments per square foot of rental area—the only fair basis of comparison—are practically the same as those charged for much inferior accommodations in the same neighborhood.

Pittsburgh's Latest Office Buildings.

Some of the latest building improvements under way in Pittsburgh will afford the citizens a sight which they probably never before witnessed within the corporate limits of the city—the erection at the same time on opposite street corners of two skyscrapers, one being 15 stories and the other 18 stories in hight. The latter structure will be known as the Arrott Building, and will occupy a site fronting 73 feet on Wood street and 60 feet on Fourth avenue. There will be two stories below the street line, the same as in the Carnegie and Frick buildings, while the hight from the level of the street to the top of the cornice will be 240 feet. The material selected for the first three stories is pink granite, the remaining 15 stories being in alternate courses of buff brick and terra cotta. Every side of the exterior will be finished, thus leaving no blank walls to mar its appearance from any point of view. There will be on Wood street one large entrance, 18 feet wide and 32 feet high, which is intended to be a distinctive feature of the building. An arcade will run through the sixteenth and seventeenth stories and balconies will project from the eighteenth. This arcade will consist of marble pillars, with terra cotta pilasters, and will be ornamented with lions' heads. The top story will be in the frieze and entablature. The first floor will be occupied by two banking rooms, 28 x 56 feet in size and 32 feet high. Heavy paneled ceilings and large marble columns with ornamental caps will add to the interior decoration. Each floor above the first will contain ten offices, making 170 in all. The stairway will wind around the elevator shaft, in which will be located six high speed elevators, and will be of marble and bronze. The plans were drawn by Architect F. J. Osterling, who secured the commission for the new building in competition with several local firms, and on April 5 the contract for the erection of the building was awarded to Wm. Miller & Sons. The cost is estimated to exceed half a million dollars and will require more than 1200 tons of structural steel. Next to the Frick Building, this will be the tallest structure in the city.

People's Savings Bank Building.

The 15-story structure referred to will be an unusually handsome one and will be put up for the People's Savings Bank on the corner opposite to the Arrott Building. The first three stories of the exterior will be of red granite and the remaining stories of red brick and terra cotta, the roof being ornamented with a heavy cornice of terra cotta with bronze cresting. The architectural feature of the structure will be the two entrances to the banking room, one on Wood street and the other on Fourth avenue, these forming a corner entrance. This will be spanned by richly carved granite arches, while the doors will be of the revolving kind, made of bronze and glass set in marble cylinders. The main entrance to the building proper will be on Fourth avenue and will be finished in marble, and the stairway to the second floor will be of solid marble. This material will also be used in all the halls and corridors for wainscoting, as well as for the floors. The rooms will be finished in hard wood. The banking room will face on Fourth avenue and extend the length of the building, 70 feet. The room will be finished in marble and will have a delicately ornamented ceiling. On the side walls will be pilasters with richly molded capitals, and there will be free standing columns in the room, similarly ornamented and incased in marble. The screens on the banking counters will be of bronze in special design. The architects of the building are Alden & Harlow, and the contract for the construction has been awarded to the George A. Fuller Company, the cost being placed at about $500,000. The building is expected to be ready for occupancy by March 1, 1902, the old buildings on the site having just been razed and the ground cleared for the active work of construction.

A Novel Stable Building.

A movement is on foot in Boston looking to the erection of a co-operative stable, which will be something altogether novel in the line of building. The proposition as outlined is to erect a building having a frontage of 232 feet on Lansdowne street, with a depth of 98 feet and a hight of 91 feet. At the back of the stable there will be a 16-foot passage way, which will allow the bringing in of provender and the carting away of manure. It is proposed also to have seven floors, each floor to have six separate and distinct stables, making in all 42, and each to have accommodations for five horses, making 210 for the entire building.

It is proposed to enter at double doors at the center of the front and to have a runway to each story by which the horses can go up and down. There will be two elevators in the center, which will be run by the owners of the building, and which will take horses and carriages up and down. Every portion of the building will be fire proof. There will be no wood except the window sills and partitions of the stalls.

Each stable will have five stalls for horses and a separate room in which the provender will be kept; also a large carriage house, a living room for one or more men and a harness room. The sanitary arrangements will be in accordance with the very latest ideas of plumbing. There will be a balcony outside of each stable which will afford a fire escape from each.

Richard P. Hood, one of the architects, explains the plan as to sanitary conditions as follows:

"Each suite has a separate manure shute, at the bottom of which will be a wagon, which when filled will be carted away and another will take its place. There will be a ventilating duct for each suite, which will be steam heated and by which the air from the stables where the horses are kept will be constantly ventilated. Both of these ducts will be of fire proof material and the ventilators will run through the roof 3 feet into the air.

"The manure cartways are to be walled up entirely and ventilated by a shaft, which is reinforced by steam heating or radiation of some sort to secure circulation of air. There will be three windows in front of the stalls and a Dutch door at the side, and these will admit fresh air. The ventilating ducts will remove the vitiated air.

"Instead of having a separate stall pan for drainage each group of stalls will have one large pan, which will admit of perfect flushing. For each floor we have a common bathroom for the stablemen, closet, shower and bath. There will be rooms in which the people who occupy the building will live, and the entire building will be heated by steam.

"The building will be lighted by electricity, the dynamos being in the basement. The driveway will be under a glass covered *porte cochere*. The estimated cost of the building is in the vicinity of $250,000."

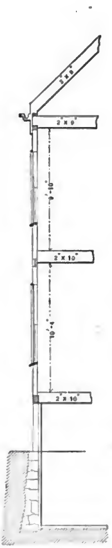
INTEREST in technical and trade education is rapidly spreading in the South, owing to the growth of industrial interests in that section and the increasing demand for properly trained artisans. Already several of the Southern States have technical schools, but their number should be materially increased to keep pace with the local demands for skilled workers in industrial lines, and a strong movement is on foot looking to the filling of this need. Georgia has a very complete State School of Technology at Atlanta. North Carolina has an Agricultural and Mechanical College at Raleigh, and the University of Tennessee at Knoxville maintains a technical department. Clemson College, at Clemson, Ala.; the Agricultural and Mechanical College, at Auburn, Ala., and a similarly named college in Mississippi are other institutions which furnish technical education of a more or less advanced type. Then the negro is furnished with trade and technical instruction at Booker T. Washington's Tuskegee Institute, at Tuskegee, Ala., and at the Hampton Institute, at Hampton, Va. All these schools are largely attended, the Georgia School of Technology enrolling this season 460 pupils, but they are unable to meet the pressing demand for trained and intelligent workmen for the new industrial establishments that are springing up all over the South.

IN pursuance of long considered plans for providing better housing for the poor, the London County Council has decided to invest $7,500,000 in the purchase of 225 acres of land, on which to build workmen's cottages. The houses will be erected in Tottenham, a northeastern suburb of London, where considerable building land is available. It is proposed to erect 5779 cottages, accommodating some 42,500 persons. The rents will range from $1.50 a week for a cottage of three rooms and a kitchen to $2.50 for one of five rooms and a kitchen. Workmen, by a special arrangement, can obtain railway tickets in this district at one-fourth of the regular fare. The enterprise, once started, will be self supporting, and is expected to pay a small dividend. While not directly involving a removal of the London slums, the scheme will have a beneficial influence upon the slum problem indirectly, as the denizens of the more overcrowded parts of the British metropolis are likely to remove into the tenements vacated by the working people who will occupy the new cottages. As an experiment in municipal landlordship the new departure to be made by the London County Council is of considerable importance.

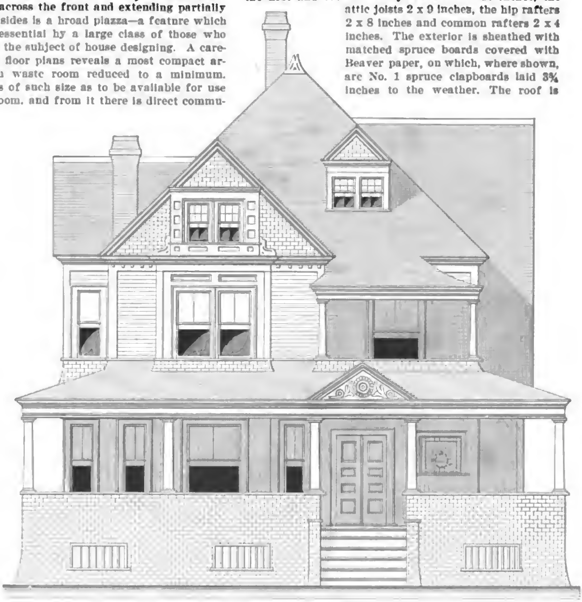
A PATENT has been taken out by a man in Chattanooga, Tenn., for a process to stain a log of wood all through, by subjecting the log to a strong hydraulic pressure that forces the staining material through the grain of the wood, which same pressure forces the sap out ahead of the stain. It is said that the inventor has, with a 200-pound pressure, successfully stained a 10-foot maple log by this process, giving it the appearance of mahogany.

A RESIDENCE IN A BOSTON SUBURB.

THE basis of our supplemental plate this month is a residence possessing many features of architectural interest, located at the corner of Carruth and Shenandoah streets, in the Ashmont district of the city of Boston. An examination of the half-tone engraving, which is a direct reproduction from a photograph of the finished house, shows an exterior well broken in its outlines, so as to fully relieve the monotony of any plain surfaces, while across the front and extending partially around the two sides is a broad piazza—a feature which is regarded as essential by a large class of those who are interested in the subject of house designing. A careful study of the floor plans reveals a most compact arrangement, with waste room reduced to a minimum. The main hall is of such size as to be available for use as a reception room, and from it there is direct communication with the principal rooms on that floor, this arrangement being especially convenient between the kitchen and front door. The stairs are of the combination type, a door separating from the main landing the short flight leading to it from the kitchen. The position of the cellar stairs is such as to be convenient to the kitchen, and yet at the same time so placed as to avoid being seen from the front of the house. Communication between the hall and the parlor and between the parlor and the dining room is by means of sliding doors, while access to the dining room from the kitchen is had through a well arranged china closet. The second floor is divided into a sitting room, three sleeping rooms and a bathroom, all of which are readily accessible from the main stairs, which land in practically the center of the house, so that there is no waste room. The continuation of the main flight leads to the attic, where there is space for one or more finished rooms, with plenty of storage capacity. In the basement is the laundry and a water closet.



Section.



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

A Residence in a Boston Suburb,—Arthur W. Joslin, Architect, Roxbury, Mass.

The foundation is of block granite, lined with brick, leaving an air space between. The timber used in the frame of the building is of spruce. The sills are 6 x 8 inches, the girder is of hard pine, 10 x 14 inches, the first and second floor joists are 2 x 10 inches, the attic joists 2 x 9 inches, the hip rafters 2 x 8 inches and common rafters 2 x 4 inches. The exterior is sheathed with matched spruce boards covered with Beaver paper, on which, where shown, are No. 1 spruce clapboards laid 3¾ inches to the weather. The roof is covered with cedar shingles. All flashings are of copper, as well as conductor pipes, gutter, cresting, &c. All outside finish is of pine.

The hall and dining room are finished in quartered oak, with oak floors. The parlor is finished in pine, painted, and has a spruce floor. The kitchen and bathroom have a 5-inch plain ash finish, with birch floors. The dining room has a brick fire place, with oak mantel, and the parlor a tile fire place, with pine mantel. There is a wood cornice in the parlor, hall and dining room. The second story sitting room is finished in white wood, stained in imitation of mahogany, and has a birch floor. The sleeping rooms are trimmed with white wood, natural finish, and have 5-inch corner blocks, the floors being of birch.

The plumbing is of the exposed type, and the bathroom is fitted with a siphon jet closet flushed by an air valve tank located in the attic and an iron enameled bathtub, all exposed piping being brass, nickel-plated. The sink, back and drip shelves are of soapstone and there are three soapstone trays in the laundry. The house is heated by a Thayer hot water heater made by Blake & Andros of Boston.

The residence here shown was erected for George F. Quinby in accordance with drawings prepared by Arthur W. Joslin of 21 Alpine street, Roxbury, Mass.

Painting Brick Work.

Just how much a good coat of paint adds to brick work does not appear to be fully realized by those owning brick structure, says a writer in an English paper. However, it is not difficult to distinguish between the painted and the unpainted brick work, and it is not hard to see the improvement which the paint makes upon the brick.

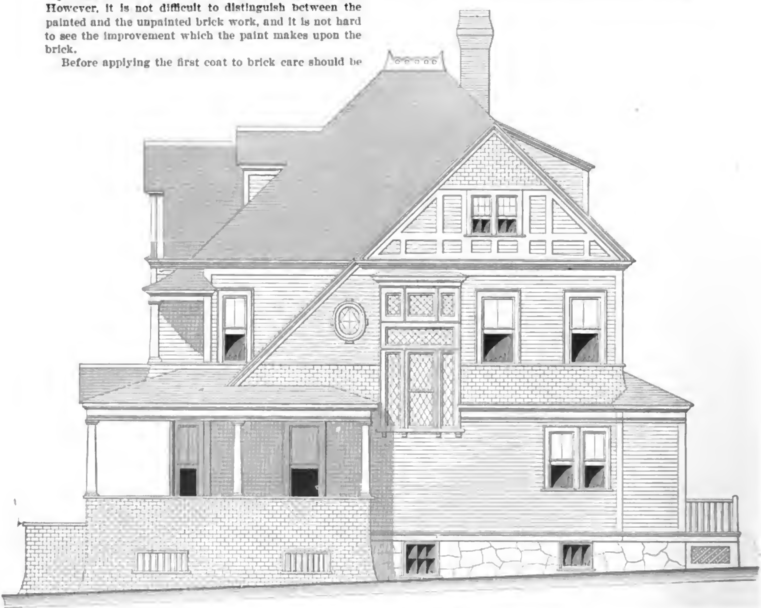
Before applying the first coat to brick care should be taken to clean the surface to be painted. The best priming coat for this work consists of glue size and Venetian red mixed in the proportions of ten to one. Oxide of iron paint mixed with boiled linseed oil also forms a good priming coat, and a little drier can also be added to this.

In applying the priming coat care should be taken that it be well brushed on. The paint should not be too thick when applied. As soon as the priming coat has thoroughly dried and all the joints and cracks have been puttied up, the second coat can be applied. For the coats after the priming coat Venetian red mixed with linseed oil and drier is used; considerable turpentine is also used, especially in the final coat.

The surface of painted brick work is perfectly flat, and to effect this but little oil must be used in the last coats. An excellent final coat for this work can be made by mixing brickdust with Venetian red and ocher, using varnish and turpentine. In this no oil is used. It is the brickdust that gives the surface a natural appearance.

After the wall has been painted attention must be given to the joints. These may be painted either in white or black. This is rather fine work. A straight edge and a seamer are used in this work. There are many things in painting the joints in brick work which require more than ordinary precaution. In this work the horizontal joints are usually painted first, and then the vertical ones are easily filled in. It is a mistake to attempt to paint these joints directly upon the mortar joints. If this is attempted the result will be far from satisfactory. By painting just a little beneath the mortar joints far better results will be obtained. By doing this it will be possible to get a uniformity in the work, and a satisfactory job will be the result. In some cases the joints are painted in oil colors, and a glossy finish is the result, but this is not so much to be desired, especially with a dull surface like brick work.

Oil must be used in the first coat of paint for brick work, for it is the oil which forms the material which binds the pigments together. Certainly brick work must be perfectly dry when the paint is applied, for otherwise it would soon scale off. If the proper precaution is observed in painting of this character there will be little cause for complaint, and the protection added to this kind of work by paint is almost as great as is the protection added to wood work.

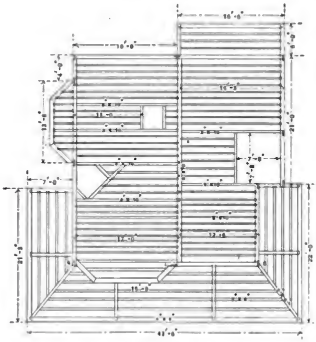


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot

A Residence in a Boston Suburb.

Novel Method of Preventing Foundations from Settling.

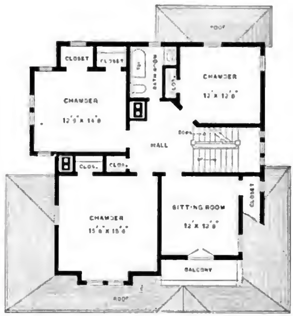
A rather novel plan of preserving a block of houses which had been condemned by the building inspectors on account of cracked walls caused by sinking foundations was recently adopted by a contractor near Boston. It appears that the houses had been built upon what was years ago a swamp with a stratum of quicksand below the boggy peat, so that the houses were in reality floating upon a very unstable foundation. In order to overcome the difficulty a broad trench 12 feet deep was dug outside the foundations of the entire block, and in this trench 7 or 8 inch holes were bored for the reception of pipes, which were then filled with concrete, making, in fact, a series of concrete piles. On top of these was placed 6 feet of concrete and this in turn was surmounted by several feet of solid masonry. The result of the operation was to place the entire block of houses in what might be termed a huge box, fully capable of withstanding any outward pressure and preventing any further settlement of the foundations of the buildings. We understand the work was done by Lawrence P. Soule & Sons of Cambridge, Mass.



First-Floor Framing Plan.

Roof Plan.

First Floor.



Second Floor

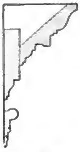
A Residence in a Boston Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Swelling and Shrinking of Wood.

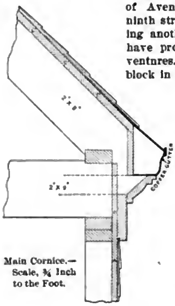
In discussing the matter of the shrinkage and swelling of wood an English writer says that as wood gives off the moisture it contains a proportionate shrinkage in its volume occurs. One of the objects of seasoning is to reduce the moisture to the proportional limit observed between the wood and the air by which it is surrounded; and, as stated, in reducing the moisture the reduction of volume is also achieved. Neither natural seasoning nor kiln drying at temperatures below 200 degrees F. will affect the capacity of wood for taking up additional moisture when there is an excess of humidity in the air; and whenever wood takes up moisture it increases in size. If a piece of wood is at any time charged with water to 50 per cent. of its weight, it will then be as large as it originally was in the green state. A piece of heart wood immersed in hot water will swell out to be larger even than its volume was in the living tree.

This faculty of resuming original size, of being larger and smaller according to atmospheric conditions, is one of the most difficult problems the wood worker has to deal with. To paint wood work or to varnish it makes little difference to these qualities, and in all places where wide areas of wood work are required the craftsman is obliged to adopt some method of nullifying the effect of, or of concealing altogether, the working of the

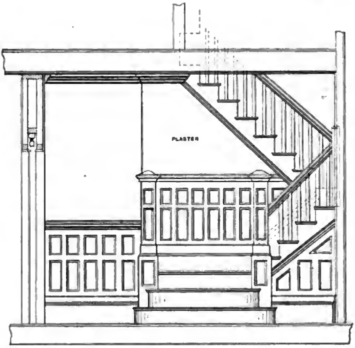
Base.—Scale, 3 Inches to the Foot.



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



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

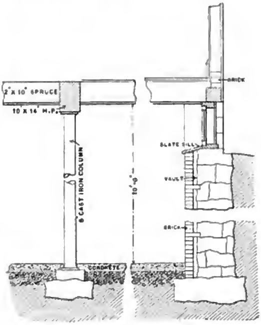


View in Hall Looking Toward the Main Stairs.—Scale, ¼ Inch to the Foot.

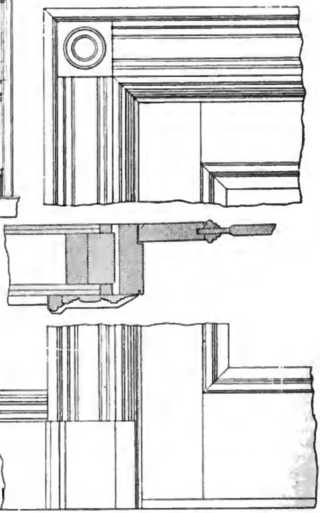
various pieces of wood after they are placed in position. Panels have to be left unsecured at the edges, ledge keys must be glued at one end only, weatherboarding nailed at one side, and so on, or else the various pieces of wood must be so framed that the greater or stable part of each dimension of the area consists of timber placed lengthwise. But the combined precautions of intelligent framing and the application of protective coats of paint fail to secure immunity from hygroscopic effects. Closely fitted windows and doors afford many forcible examples of this fact by jamming fast during the wet months of the year. While wood is sensitive to changes of temperature, it is doubly affected by the atmospheric moisture as well as low temperature of the winter months.

A handsome residence, stable, gardener's lodge and coachman's cottage are in process of erection for L. A. Watres of Scranton, Pa. The site of the buildings is just outside the city in the center of a large piece of property, and in carrying out the work the improvements will also include the laying out of the entire ground with the necessary driveways, walks, &c. The plans for the buildings were drawn by F. R. Comstock of 20 East Forty-second street, New York City.

The City & Suburban Homes Company, concerning which more or less has been said in these columns, have recently acquired a block fronting on the east side of Avenue A, between Seventy-eighth and Seventy-ninth streets, New York City, for the purpose of erecting another model tenement block on the lines which have proved so successful in their previous building ventures. At present the company have under way a block in Sixty-second street, near Eleventh avenue.



Section through Foundations.—Scale, ¼ Inch to the Foot.



Elevation and Section of Door and of Trim in Main Rooms on First Floor.—Scale, 1½ Inches to the Foot.

Miscellaneous Constructive Details of Residence in a Boston Suburb.

THE SCIENCE OF HANDRAILING.

By C. H. Fox.

IN Figs. 7-8 is shown the method by means of which the face mold and bevels may be projected in practice. The plan, Fig. 7, may be drawn in the manner explained above for the similar operation at Fig. 5. Then join A-C with the chord line A-K-C; this is the seat line, and if correct will be at right angles with the ordinate O-B of the plan. Now square with A-C draw C-F, equal in length with that of the rise of the rail, then joining F-A, the right inclination of the section plane may be obtained. Now produce the joint line O-C, and set off C-D equal with the half rise of the rail; then joining D-B, the inclination of the section plane over the tangents may be obtained. This done, divide the plan curves into any number of parts, and from each point produce lines, as H'-H-E,, A-P', N'-I-Q', &c., meeting the right inclination, as shown in the points H'-A-I', &c.

Now, in Fig. 8, set off H-A-I, &c., equal with H'-A-I'-J', &c., of Fig. 7; square over the ordinates of the section plane, as shown, and make them equal in length to that of the corresponding ordinates of the plan. Then, joining A-B, B-C, and the projection of the tangents of the face mold may be obtained; square with these draw arcs in V-V'; drawing E-V and D'-V' respectively through the intersection at V gives the projection of a level line lying on the surface of the joint. Then, drawing E'-U' and D-U respectively at each joint, square with D-V, &c., gives the projection of the "plumb line." In this simple manner we obtain in D'-E'-V' the angle of the bevel required.

Now to develop the joint section: In cutting a wreath piece comprised of wood there is really no necessity for constructing a developed section, as the right section of the straight rail is sufficiently correct for all practical purposes; but if the material made use of be stone or marble and the right section of the straight portion, say of a piece of coping, is a right lined rectangle 10 or 12 inches high and 16 or 20 inches wide, then a right lined figure will not be correct as a joint section, for the coping over the curve of the plan, for, as may be seen at the joint surfaces of the model, the right section as there developed, is one bounded by elliptic curves. By making use of the geometrical principles employed at the developments of the section of the model, a correct section may be projected which will stand perpendicular over its

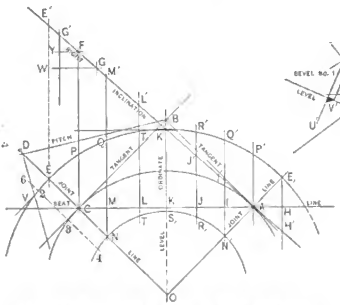


Fig. 7.—Quarter-Circle Plan of Coping, the Rise of Which May Be Equal Over the Plan Tangents.

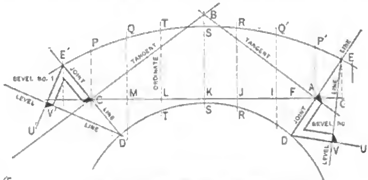


Fig. 8.—Obtaining the Face Mold and Joint Bevels.

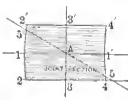


Fig. 9.—Showing Development of Joint Section.

The Science of Handrailing.

the joint lines D-E. Now trace first the convex curve, then set off A-D, C-D', equal respectively with A-E, and additional points may be obtained at the joint lines through which to trace the concave curve. Now to find the angle of the "plumb bevel." First, at the points given in E-D of the joint line, square with A-C, draw E-G, D-F. Now in Fig. 7 set off G'-G equal with G-F of Fig. 8; then square with C-F draw G-W. It may now be seen that the point D of the lower joint line is situated at a vertical hight equal with that of W-G' above the point E of the line. Also that the point E' of the upper joint line is situated at the equal vertical hight above that of the point D'. Notice this is only the "vertical hight," such as may be found at a vertical line, as that of G-D of the model of Fig. 4-5*a*. In order to find the correct angle of the bevel we have to find the length as obtains at the inclined surface of the joint, similar to that given in C'-J of our model. This may be found as follows: At Fig. 7, square with B-D draw D-V indefinitely. Then set off D-E equal with G'-W above. Then parallel with B-C draw E-V. Now in Fig. 8, when the points D-E' respectively of the lower and upper joint lines as the centers, and the length D-V, Fig. 7, as the radius, draw arcs in V-V'. Then with the opposite points of the joint lines as the centers, and the width as E,-N' of Fig. 7 of the rail as the radius,

curved plan, thus obviating all "rule of thumb" methods. In Fig. 7 set off D-6 equal to the half thickness of the rail or coping; then parallel with the joint line O-D draw 6-2-3-4. Now at Fig. 9 draw two lines, as 1-1' and 3-3', at right angles. Then, taking A as the center point of the joint section, set off A-1', and A-3, A-3', equal respectively with the half thickness and width of the rail; through the points given in 3-3' draw lines parallel with 1-1'; then set off 2'-3'-4', &c., equal with 2-3-4 of Fig. 7; through the points given in 2'-1-2 and 4'-1-4 trace curves, which will give the contour of the section. Now transfer the angle, as given in D'-E'-U' of Fig. 8, to the points as shown in 5-A-3, which will complete the drawing.

We have gone rather minutely into this problem, that of the model, for, containing as it does the whole of the geometrical principles upon which the "tangent system" of handrailing is founded, it is highly essential that the student should thoroughly understand the constructions and developments here explained, for upon this depends in a great measure his future progress. Having now the two models, the question may be answered as to which of the models—that first constructed to the method of other writers, or that just constructed to the method of the author—is the better one as a means of illustrating the several constructions in a practical manner and with the least effort and time.

COMPETITION IN $2000 FRAME HOUSES.

SECOND-PRIZE DESIGN.

ACCORDING to the announcement published in our last issue the second prize in the competition in $2000 frame houses was awarded to the drawings submitted by John P. Kingston of 518 Main street, Worcester, Mass., and we take pleasure in presenting them herewith. In forwarding the matter the author stated that the blue prints were exact duplicates of original drawings of a house at that time in course of erection, the specifications being slightly abbreviated as compared with the originals. In concluding he says: I have had this same house with a gambrel roof built complete in another city for the sum of $1872.

We give below the specifications and estimate of cost as furnished by the author:

Excavation.

Take off the surface soil and set aside in convenient place for finished grading. Excavate the cellar, making excavations large enough to properly construct the walls, making cellar 7 feet 6 inches in clear. Excavate for trenches, bed stones, piers and other places required by the drawings. Where no figures are given go by accurate measurements. The bottom of walls to be at least 4 feet below finished grade, 4 inches below cellar bottom and rest on good, hard bottom. The cellar bottom to be left clean, level and smooth.

The materials taken from cellar to be graded up around the building after walls are finished and when outside carpenter work is done, the loam, &c., is to be evenly spread over the whole, as directed.

Foundations.

To be built of good sound, flat field or junk ledge stone with footings well bedded 4 inches below the cellar bottom. To be laid up dry with inner face laid even and well bonded with through stone. Joints to be made as close as possible and well chinked up with small stone and all joints trowel pointed. The wall to be 24 inches thick at bottom and 18 inches at top. Chimney stone to be at least 6 inches thick and 8 inches larger all around than outside of brick work. Pier stone to be at least 5 inches thick and 20 inches across. The bottom of all stone work to be 4 feet below finished grade, 4 inches below cellar bottom

Cesspool.—To be a cesspool within 25 feet of house, to be 6 feet in diameter at bottom, 4 feet at top, inside measure. The bottom to be at least 8 feet below bottom of house cellar. The wall to be not less than 18 inches thick, laid dry, to within 2 feet 6 inches of top, which is to be laid in cement mortar. The top wall to be about 2 feet 6 inches below finished grade. Cover to be furnished by carpenter.

Sewer.—To be drain pipes from cellar to connect to cesspool in lot at front with good, true falling grade. All pipes to be best quality 6-inch cement or salt glazed vitrified drain pipe, joints to be made with cement.

Water Supply.—Lay from water main in street to cellar a service water pipe with stop and waste cock complete.

Mason Work.

Chimney and Underpinning.—Flues to be built, as shown. All joints to be well filled and to be smoothly plastered from bottom to top on outside and tile lining inside. Caps to be of artificial stone, flashing at junction of roof. Build in the thimbles as marked.

The underpinning wall to be 9 inches thick. All brick used to be good merchantable quality with those for outside of even color. All mortar to be good quality with proper proportions of best lime and clean, sharp sand. The exposed parts to be colored red. Fire place to have the facing and hearth. Build in all fixtures and do all necessary work in connection with and helping other workmen employed about the work.

Lathing and Plastering.

Lathing.—Lath all the parts with good spruce lath 1½ inches wide, and to be laid about ⅜ inch apart. All well nailed to each and every bearing. To be carried down to lining floors on outside walls.

Plastering.—The walls and ceilings of the entire building above basement to be plastered with a coat of best lime, sand and hair mortar. To be well worked into the lath and smoothed up in best manner. Fill plastering down to lining floors on outside walls and up to grounds and beads. All ceilings except closets to have a good coat of kalsomine wash. The work to be done true, even and straight, and all parts of building cleaned up at completion.

The exposed parts of brick and stone wall in cellar to have a coat of whitewash.

Carpenter Work.

The framing work to be done in usual manner for such a building. The timber to be spruce, free from all imperfections and of good merchantable quality. The sills to be 4 x 7, bedded in mortar, girders in cellar 8 x 8, first floor joist 2 x 8, second floor joist 2 x 7, third 2 x 6, exterior wall studs 2 x 4, with double plates, partition studs to be 2 x 4 and 2 x 3, all set not more than 16 inches on centers, hips and valleys 2 x 7, furring for ceiling ⅞ x 2½, put on 16 inches on centers. Rafters to be 2 x 5 and ceiling joist 1 x 7, 24 inches on centers.

Put beads on all corners and three-quarter grounds at all openings and bottom of all partitions to plaster against.

Inclosing Boards, &c.—The walls and gables to be covered with No. 2 planed ⅞ matched spruce or hemlock boards laid breaking joints. To be nailed with at least two nails to each bearing.

Boarding for Roof and Lining Floors.—The roofs and lining floors to be covered with ⅞ planed hemlock boards. Those for floors to be laid close together and well up to all openings and corners. Those for roofs to be laid not more than 3 inches apart. All to be well nailed to each bearing with at least two nails.

Clapboarding.—The side walls, except otherwise specified, to be covered with 6-inch spruce clapboards laid not more than 4½ inches to the weather.

Side Shingle.—The other parts of walls and gables to be shingled with clear butt 16-inch cedar shingles laid not more than 5 inches to the weather, well nailed with joints even on bottom.

Paper.—The sidewalls and lining floor to be covered with good quality of sheathing paper, well lapped before any finish, clapboards or side shingles are put on. Do all flashing necessary.

Roof Shingle.—The roof to be well shingled with X quality 16-inch sound cedar shingle, put on to show not more than 4¾ inches to the weather, with at least two nails to each shingle. Valleys to be laid open with 14-inch painted tin. Ridge to be covered with 6-inch pine saddle boards and a 2-inch ¾-round on top.

Iron Columns.—The girders in cellar supported on 6 x 6 chestnut posts and veranda to be supported on 2½-inch pipe with cap.

Bulkhead.—To be built where shown, with 3 x 8 spruce frame well secured in place, finished on top and sides. The side finish to extend down over stone work. To have double sheathing covers hung with three heavy hinges and proper fasteners. Steps and stringers to be of 2-inch and risers ⅞-inch spruce. To be a plank frame at bottom of steps with cleat doors hung and fastened in proper manner.

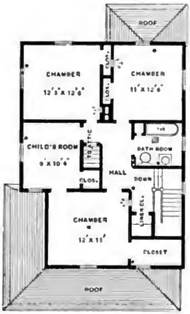
Coal Bins.—Build coal bins in cellar where shown of 2 x 4 studs, 36 inches on centers and matched spruce boards.

Exterior Finish.

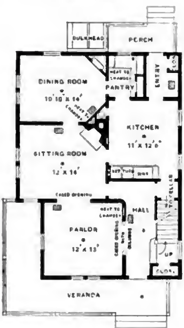
To be made from well seasoned No. 2 Western pine lumber. Veranda and porch floor to be 6 inches wide, well driven together and well nailed. Ceiling to be 4-inch cypress or N. C. pine sheathing, with 1½-inch molding in angle. The columns, brackets and balustrades as per detail. Steps to have ⅞-inch risers, 1½-inch treads and 2-inch stringers. Do all flashing about frames, finish, &c., to make job complete.

Frames and Sash.—The cellar windows to have 2-inch plank frames and 1¼ pine sash. Frames above cellar to have 2-inch stool, ⅞-inch jambs and casings, with ¾ x 1½ molding around outside of casings. To have pockets finished sash pulleys and grooved for 1⅜-inch sash.

Sash.—The above frames to be fitted with 1⅜-inch pine double sliding lip sash glazed with No. 1 glass well fastened and puttied in place and to be well fitted in



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

frames and hung and evenly balanced with weights and cord. Stationary sash shown to be glazed with cathedral glass.

Blinds.—All sliding windows above basement to be fitted with best quality 1¼-inch pine blinds hung in proper manner.

Exterior Doors and Frames.—Frames to be made of 1¾-inch pine with 2-inch hardwood thresholds, ⅞-inch casings and moldings like windows. Front door to be clear cypress 1¾ inch thick, flush molded, with No. 1 glass in top part. Rear door to be hung with three butts.

Interior Work and Finish.

All to be as shown by drawings or described in specifications to be worked out from good, clear, sound, kiln-dried stock, to be sandpapered and put in place in good workmanlike manner and put on after all plastering is done. Finish in the several parts are as follows:

The hall, parlor, sitting and dining rooms in whitewood to finish natural, and all the second floor in whitewood to paint.

The kitchen, pantry, entry and bathroom in N. C. pine, with all doors to match.

Door Jambs.—To be 1⅜-inch thick, double rebated, cased openings the same, all set plumb, level and true. Cased openings between hall and parlor to have turned columns.

Doors.—To be 1⅜-inch thick, five horizontal panels with ¼-round O. G. on edges for first floor and 1⅜-inch, four panel bevel edges for second floor.

Door and Window Finish.—The hall (both floors), parlor, sitting and dining rooms to have 4¾-inch archi-

Front Elevation.—Scale, ¼ Inch to the Foot.

Competition in $2000 Frame Houses.—Second-Prize Design.—John P. Kingston, Architect, Worcester, Mass.

traves and 1 x 5 header with crown molding. The remaining parts to have 4½-inch side architraves and 1-inch molded header. Stools to be ⅞ inch thick rebated to rest on outside stool with ⅞ x 3½ inch molded aprons. Window stops 5 inch thick with molded edge, sides put in with screws, top nailed in.

Base and Molding.—Each room not sheathed to have 8-inch bevel base. The parlor, sitting and dining rooms and hall to have 1½-inch molding on top of base.

Sheathing Wainscot.—The kitchen and rear entry to be wainscoted 3 feet 4 inches high, pantry 2 feet 8 inches high, bathroom 4 feet high with narrow beaded sheathing put on vertical.

Chair Rail.—The dining rooms to have a rail 3½ inches wide, about 3 feet 4 inches from floor to top.

Closets.—To have narrow 5-inch base and 3½-inch casings and two rows 2-inch beaded wardrobe strips with coat hooks and one shelf. Put wardrobe strips and hooks in rear entry with two shelves over refrigerator space.

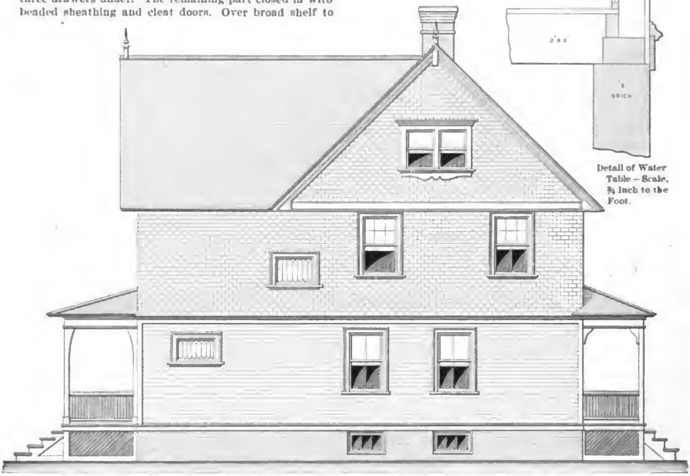
Floors.—The finished or top floors in front hall, dining room, kitchen, bathroom, rear entry and bathroom to be ⅞ smoothly worked matched birch or maple flooring not more than 2½ inches wide. Top floors in other parts to be square edge smoothly worked pine. All top floors to have paper under and put down between base.

Linen Closet.—To have three shelves at one end and wardrobe strips on wall space.

Sink.—To be fitted in kitchen sheathed up under with case of drawers and a small cleat door. Back to be 12 inches high with 6-inch shelf on top. To have drip shelves.

Set Tubs.—To be soapstone properly supported on wood frame sheathed around with cleat door. Back 12 inches high with wood shelf on top and base over. To have 1¼-inch covers.

Pantry.—To have broad counter shelf with case of three drawers under. The remaining part closed in with beaded sheathing and cleat doors. Over broad shelf to be four shelves 12 inches wide. The part shown to be closed in with sheathing and have two cleat doors.



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

Competition in $2000 Frame Houses—Second-Prize Design.

China Closet.—To have a case of four drawers under broad shelf and have three shelves over, as shown. To have two sash doors 1¼ x 1 foot 6 inches by 4 feet, glazed with No. 1 glass cut up as directed.

Shelves.—The sitting room to have a mantel to cost $15, fitted in place by contractor.

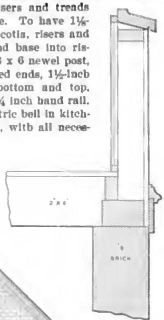
To be a clock shelf about 3 feet long, 6 inches wide on ornamental bronze brackets in kitchen where directed and one in bathroom 2 feet long.

Bathroom.—To be fitted up as shown for open work. The plumber to furnish seats, tank with back for closet and other fixtures and carpenter will fit all wood work in place.

Plumbing Strips, &c.—Put up all necessary strips, cleats, &c., to run and fasten pipes on in a neat and substantial manner. Pipes going through plastering to have a piece of wood fitted around or have a metal collar. All parts exposed to dampness to be fastened with brass screws.

Tank.—Build and fit in place a 30-gallon tank made in a substantial manner of 1½-inch pine plank. To be placed in attic high enough above floor to operate stop cock and supported in proper manner. To be lined by the plumber.

Stairs.—The several flights of stairs to be built as shown on 2 x 10 plank stringers, accurately cut to the required dimensions for risers and treads and firmly secured in place. To have 1⅛-inch treads, ⅞ risers and scotia, risers and treads grooved together and base into risers. Front stairs to have 6 x 6 newel post, 4 x 4 angle post with turned ends, 1½-inch turned balusters, square bottom and top, two to a tread, and 2½ x 3¾ inch hand rail.



Detail of Water Table – Scale, ¾ Inch to the Foot.

Bell.—To be a small electric bell in kitchen to ring from front door, with all necessary buttons, wires and batteries, &c., to operate in best manner.

Hardware.—The contractor will figure in $35 for purchasing the hardware for door and window trimmings, small hinges and catches, wardrobe hooks and brackets and screws for same, window stops and barrel swings, but does not include weights, cords, pulleys, nails, brads or screws for other purposes.

Wall Papering.—The contractor will figure in $35 for purchasing wall paper, moldings and all labor in connection with putting in place.

The walls of bathroom, kitchen, pantry and entry are to be painted and come under painter's contract.

Heating.—The contractor will figure in $100 for heating apparatus.

Painting.

Outside Work.—All the exterior work and except otherwise specified to be painted with two coats of lead and pure linseed oil and turpentine, all colors to please owner.

Side Staining.—The shingles on side walls, gables, &c., to have one coat of pure linseed oil stain and one coat of pure linseed oil, as directed.

Inside Work.—All interior work must be well cleaned before any finish is put on. All nail holes and other imperfections well puttied, matching wood as near as possible.

Floors.—The hardwood floors in front hall and dining room to have a coat of equal parts raw linseed oil and turpentine and a coat of floor finishing wax. The floors in bathroom, pantry, kitchen and entry to have a coat of the oil and turpentine. The closet floors to have one good coat of paint.

Finish.—The hall, parlor, sitting and dining rooms to have one coat of liquid filler and two coats of varnish, the last coat to be rubbed a little with pumice stone and oil. If owner wishes any of the above rooms may have a coat of stain of color selected in place of the filler.

The hard pine work to have a coat of shellac and one coat of the preservative. The work in second story to be painted two coats of pure lead and oil paint colors, as directed.

Walls.—The wall of bathroom, kitchen, pantry, entry and china closet to have a coat of oil size and two coats of paint.

All work to be done so as not to hinder or interfere with other workmen in any particular. All finished floors must be protected with paper at all times. No interior work to be done except in best weather, and all the work must be delivered to owner complete in every particular.

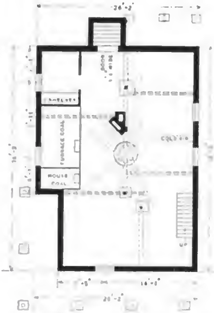
Gas Piping.

Provide and fit in place in best manner according to schedule of gas light company all gas pipes necessary to light the several parts of the building.

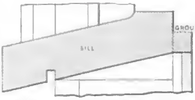
Plumbing.

To be a 4-inch cast iron soil pipe with a running trap inside of wall with fresh air inlet and hand hole. To be continued along to and under fixtures up through at least 2 feet and flashed tight at roof with 3 pounds sheet lead. To have all necessary Y branches, bends, offsets, &c., to connect the several fixtures to. All joints to be made and calked with oakum and molten lead well driven in and properly calked.

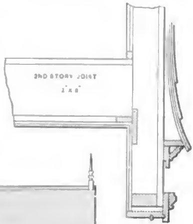
Water Closet.—To be all earthenware with copper lined, beaded finished tank with back properly supported. To have hardwood seat and back. Supply from tank to be 1¼ and to tank ⅝ brass pipe and fittings with vent pipes, chain and pull. To have good valve, ball cock and float complete. To be properly trapped and have necessary vents. All exposed parts nickel plated.



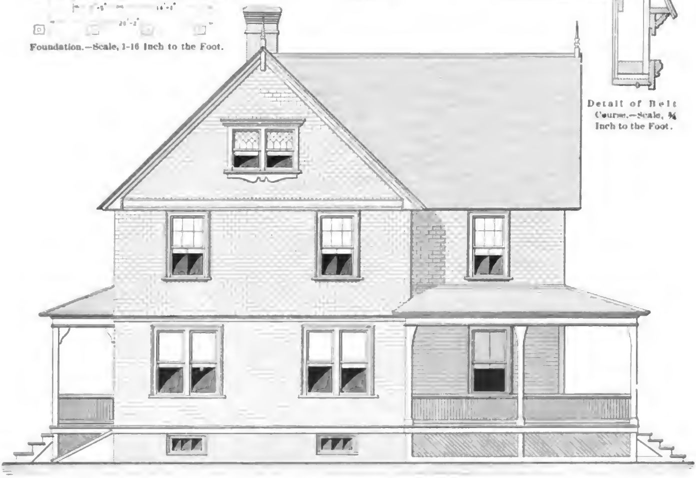
Foundation.—Scale, 1-16 Inch to the Foot.



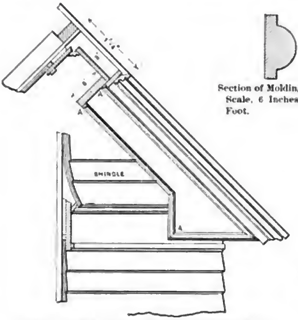
Section through Window Sill.—Scale, 3 Inches to the Foot.



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

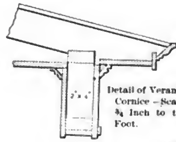

Left Side Elevation.—Scale, ¼ Inch to the Foot.

Competition in $2000 Frame Houses.—Second-Prize Design.—Elevation, Plan and Details.



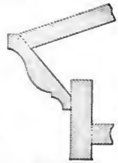
Elevation of Main Cornice.—Scale, ¼ inch to the Foot.

Section of Molding at A.—Scale, 6 Inches to the Foot.

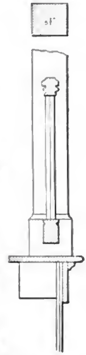


Detail of Veranda Cornice.—Scale, ¾ Inch to the Foot.

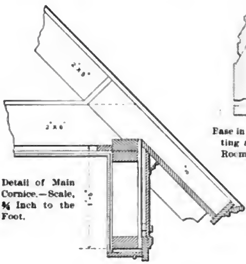
Horizontal Section through Door Frame.—Scale, 1 Inch to the Foot.



Crown Mold and Fascia of Veranda Cornice.—Scale, 3 inches to the Foot.

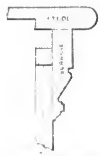


Detail of Veranda Column and Rail.—Scale, ¾ Inch to the Foot

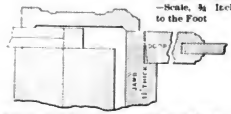


Detail of Main Cornice.—Scale, ¾ Inch to the Foot.

Base in Parlor, Sitting and Dining Rooms.

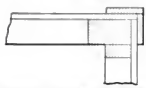


Detail of Window Stool.

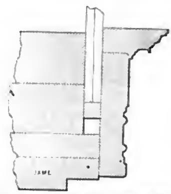


Side Finish in Parlor, Dining and Sitting Rooms.

Scale, 3 Inches to the Foot.



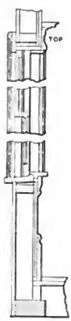
Detail of Corner Boards.—Scale, ¾ Inch to the Foot.



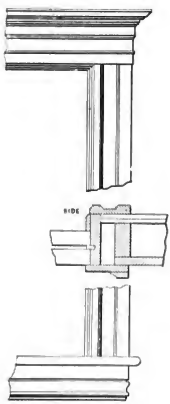
Detail of Top Finish in Parlor, Sitting and Dining Rooms.—Scale, 3 Inches to the Foot.

Side Finish in All Parts of the House Except Parlor, Sitting and Dining Rooms.—Scale, 3 Inches to the Foot.

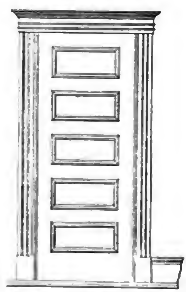
Section through Main Wall, Showing Hights of Stories.—Scale, ⅛ Inch to the Foot.



Vertical Section through Window and Floor.—Scale, ¼ Inch to the Foot.



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



Elevation of Doors in Dining and Sitting Rooms.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Second-Prize Design in Competition in $2000 Frame Houses.

Wash Bowl.—To be a marble slab resting on brackets with a 14-inch white earthenware bowl properly clamped to same. Backs to be 8 inches high, ⅞ inch thick of marble, fastened to sheathing with round head screws. To have two arm brass basin cocks, chain, stay and plug complete, all nickel plated.

Bathtub.—To be a steel clad copper lined bathtub 5 feet long (of regular pattern) with hardwood rim. To have two arm brass bath cocks, chain, stay and plug complete, all nickel plated.

Sink.—To be a 20 x 36 x 5 inch beaded iron sink with cesspool outlet. To have two arm brass compression bibb cocks. Cold water to be hose bibb.

Set Tubs.—To be a set of two part soapstone wash trays of regular size with soap dishes. To have two arm nickel plated flange, nut and couplings, compression bibb cocks, brass strainer outlets, plugs, chains and stays complete.

Supplies.—The above fixtures to be supplied with cold water where not exposed through ½-inch galvanized iron water pipe and hot water through ½-inch brass tubing pipe branches.

Wastes.—The above fixtures except water closet to waste through 1¼-inch lead branches and 4-inch round trap with trap screws connecting to iron soil pipe.

Hot Water Boiler.—Fit up in closet near chimney a 30-gallon copper hot water boiler to rest on iron stand. To have all necessary couplings, sediment cock, stop cock complete. To be supplied with water through ½-inch galvanized water pipe.

Tank.—Fit up in place in attic and line with 20-ounce copper the 30-gallon tank made by carpenter. To be supplied with water through ¾-inch galvanized iron water pipe, good ball cock and float complete with shut off in cellar, to overflow into nearest practicable place with ¾-inch lead pipe.

Branch Supplies.—To be branches from cellar, one for bathroom and sink and tubs and one for tank, of best ½-inch galvanized iron water pipe with stop and waste for each in cellar.

Main Supply.—The main supply from street to be ¾-inch galvanized water pipe continued along through cellar to the several branches with stop and waste under floor in cellar for each riser.

The pipes to be fastened with brass clips and screws. All fittings, pipes and other apparatus must be cleaned off and free from stains or blemishes. Cocks, valves and other fixtures shall be washed and freed from sediment and regulated and arranged with special care so as to be easily accessible for repairs and to avoid danger from freezing. To be a lead drip pan with 1-inch lead pipe dripping outside for refrigerator waste.

Estimate

The detailed estimate of cost is as below:

CELLAR WORK.		
Excavation	$30.00	
Foundation	78.27	
		108.27
MASON WORK.		
Brick work	$53.00	
Lathing and plastering	114.00	
		167.00
CARPENTER WORK.		
Framing and partition lumber	$135.00	
Matched siding boards	46.80	
Hemlock roof and lining floor boards	68.60	
Roof shingle	53.75	
Side shingle	30.00	
Clapboards	28.00	
Cornice belt, water table, &c.	64.00	
Piazza finish	42.00	
Cellar windows	5.00	
Windows, sash, blinds and finish	163.20	
Outside doors, frames and finish	15.00	
Hardwood top flooring	27.00	
Pine top flooring	26.00	
Sheathing for wainscoting	18.00	
Pantry and china closet	15.00	
Clothes closets	8.00	
Inside doors and finish	70.38	
Base and moldings	22.00	
Stairs	40.00	
Mantel and shelves	17.00	
Nails, paper and flashing	18.00	
Hardware allowance	35.00	
Carpenter labor	340.00	
		$1,289.73
Plumbing and gas		195.00
Painting		105.00
Inside wall papering		35.00
Heating furnace		100.00
Total		$2,000.00

The builder's certificate was signed by W. E. Towne of Webster, Mass.

LAW IN THE BUILDING TRADES.

WHEN OWNER REFUSES TO PAY FOR EXTRAS

A declaration by the owner to a contractor that he would not pay more than a specified sum for extra work excuses the latter from a strict compliance with an agreement to refer to the architects a disagreement as to the value of his services.—Munk *vs.* Kanzler (Ind.), 58 N. E. Rep., 543.

OWNER LIABLE FOR DELAY OF SUPERINTENDING ARCHITECT.

If the architect employed by the owner to superintend the erection of a building, who is to direct the work, and is by the contract made the arbitrator as to its proper performance, delays the contractor unreasonably in his work for the benefit of the owner or other contractors, and by allowing other contractors to obstruct the work renders it necessary for the contractor to do it in an unusual manner, which adds largely to its cost, the owner is liable to the contractor for the loss resulting.—Del Genovese *vs.* Third Ave. R. Co. (N. Y.), 57 N. E. Rep., 1108.

LIABILITY FOR DAMAGES WHEN BUILDING IS NOT READY FOR CONTRACTOR.

Where a party agreed to plaster a building within four weeks from the time of receiving written notice that the building was ready for plastering, a complaint which alleged that on notice that the building was ready the complainant incurred a large expense in transporting a number of men to begin the work, when the building was in fact not ready, stated facts sufficient to constitute a cause of action for breach of contract.—Brown *vs.* Langner (Ind.), 57 N. E. Rep., 743.

OWNER LIABLE FOR DAMAGES OF DELAY AFTER PAYMENT OF CONTRACT PRICE.

Where a contractor has sustained damages by delay in the prosecution of his work by the owner, his receipt of the stipulated contract price for the performance of his contract is not a waiver of his right to proceed against the owner for the damages sustained by the violation of the agreement.—Weeks *vs.* Rector, &c., 67 N. Y. Supp. Rep., 670.

BLUE PRINTS ARE PLANS.

Blue prints furnished by an architect, instead of the original drawings prepared by him, are "plans" within the meaning of the contract requiring him to furnish the plans of a building and entitle him to compensation for same.—School Dist. *vs.* Fiske (Neb.), 84 N. W. Rep., 401.

"FIRE PLACE" INCLUDED IN BRICK WORK.

Parties agreed to complete the brick work as prescribed in plans and specifications for a house. The specifications contained eight paragraphs in reference to the brick work. The first two related to the chimneys, and the third began with the words "Fire place," in large letters, followed by six paragraphs. The first specified that a red brick fire place should be built in accordance with plan 12 of a certain manufacturer's fire place, and the remaining paragraphs referred to the manner in which the brick work should be done. The court held that, under the specifications and agreement, the building of the fire place was included in the brick work as a matter of law.—Daly *vs.* Kingston (Mass.), 58 N. E. Rep., 1019.

PREVENTING DAMPNESS IN BUILDINGS.

IT is a fact universally recognized that a dry building is much more durable and healthful as a habitation than one which is damp, and one of the annoying problems which the builder is frequently called upon to handle is how best to keep the dampness from the walls and interior of a dwelling. There are various ways of accomplishing this, dependent, of course, upon the circumstances of the case, but the principles are simple and such as to be of ready application. It may, therefore, be interesting to American readers to present brief reference to some of the methods discussed by F. A. D. Jackson in a London paper representing, as they presumably do, good English practice.

Before enumerating the various methods that may be employed to prevent dampness penetrating into the interior of a building, I should like just to put before my readers' notice the various sources from which it springs, and which may be classified as follows: 1. The ground on which the building is erected; 2, the exterior walls and roofs which are exposed to the weather; 3, defective construction or leakages.

The Site.

If the site on which the building is to be erected be a damp one great care must be exercised in thoroughly draining it in such a way as the particular case may require, and this precaution will often save a very large future expenditure. Having, therefore, assured yourself that you have made your site as dry as possible and provided such permanent pipe tracks that will carry away all superfluous water that falls on to it, building operations may be commenced with safety.

Bricks and stone, of which the foundations and walls of a building are generally composed, are more or less porous, and however well the site may be drained, it is impossible to extract from the soil all the moisture. The open pores of the bricks or stone quickly take in this moisture until they are filled, and by capillary attraction it rises in the walls of the building. This action takes place in all walls that are in contact with the ground, and I will now lay before my reader some of the precautions and constructions necessary to counteract this evil.

A bed of concrete is placed in a large number of buildings immediately under the footings to obtain a stronger and more solid foundation for the superstructure, but all concrete is not impervious to moisture, and to make it so that the damp will not penetrate the brickwork a layer of damp-proof material, the different kinds of which I shall describe hereafter, and known when placed in a horizontal plane as a horizontal damp course, must be placed on the bed of concrete. This becomes very expensive, but the cost may be reduced in several ways. First, Seddon recommends that a bed of good concrete should be substituted for the ordinary brick footings, thereby obtaining a more even and solid foundation. Now concrete is cheaper per cubic yard than common brickwork, so that foundations composed of concrete would for the same quantity be cheaper than brick footings. Fig. 1, which explains itself, is a very good and inexpensive means of preventing damp rising in walls. In case brick footings were used instead of concrete the damp course would be put on the top of same.

Rooms Below Grade.

Now, if there be any rooms below ground floor used either for living purposes or for keeping food, &c., the surface of wall above footings and below ground level, which, being in contact with the ground, will take in moisture and carry it to the interior, and thereby render such places dangerous to health. Among others, the following constructions are employed to avoid this: 1. By putting an air drain around the exterior walls. This consists of a wall of sufficient stability to retain the weight of earth behind it, being built parallel to exterior walls and having a space of 9 inches or 12 inches between them. This air space must be properly ventilated and drained, the latter arrangement being executed as shown in Fig. 2, which consists of forming a channel in the concrete footing and facing it with cement mortar. At convenient intervals small gulleys are inserted and connected to drains, thus carrying away all water. This air space is covered at the ground level by a flag cover with weathered top, as shown in Fig. 3, and the two sides in contact with brickwork of main wall are covered with damp-proof material. Sometimes it is spanned by an arch, and in such cases the extrados is often covered with damp-proof material.

2. By putting a cavity, as shown in Fig. 4, in the external wall, that is, by building the external wall in two parts with a small space from 2 inches to 4½ inches wide between them. These parts are bonded together by means of cast or wrought iron tie irons, the irons formed in such a manner that water passing along them will drop off about the center into the cavity, or by means of purpose-made bricks, all of which kinds of ties will be hereinafter referred to. The cavity should be continued at least a course below damp course level, so that accumulation of moisture will not get at interior half of wall.

3. By rendering the exterior face in contact with ground with a natural asphalt, cement or pitch and tar.

Before concluding my remarks with reference to walls below ground level, I should suggest that the foundations would be improved by laying ordinary field tiles around them and about 2 feet 6 inches from same, with outlets to drains, thus taking away any accumulation of water.

Walls Above Grade.

External walls above surface of ground are always exposed to the rain, snow, frost and wind. Materials in their construction which are at all porous are saturated by the rain, which invariably carries with it any deleterious substances the atmosphere contains into the interior, and according to the chemical composition of such materials so will be the result, that is, chemical combination will take place, and decay set in. Furthermore, if such materials contain an over percentage of water and the frost is severe, such water will become frozen, consequently expanding, and the same will break and split. A gentle breeze will tend to dry out the moisture from walls, whereas a strong wind carrying with it particles of sand, &c., beats on the surface of the walls and wears it away. Again, exterior walls which are shaded from the rays of the sun will be found to decay sooner than the others, owing to the dampness constantly existing. From the foregoing remarks it will readily be understood that districts with a heavy rainfall or particularly damp will require extra precaution to prevent dampness acting on the walls of building. In case the walls are composed of stone, care must be exercised in choosing one that will be most effectual in resisting these enemies to its durability. If the walls be of brick for the outside, they should absorb as little moisture as possible, certainly not more than one-seventh their own weight. To prevent any damp which must get on the exterior surface from penetrating to the interior the principal method adopted is that of building the wall in two parts, separated by a cavity 2 inches to 4½ inches wide and bonded as before mentioned. Such walls are known as hollow or cavity walls.

Door and window openings have to be made in the majority of external walls, and it is at these points the construction of cavity walling is defective. Look, for example, at a vertical section through a door frame head in an ordinary cavity wall, as shown in Fig. 5. Here we see the head of the door frame becomes the bottom of the cavity, and therefore catches all moisture. This not only affects the door frame head, but is carried by capillary attraction to the interior portion of the wall. Hence the object for which the cavity was made is defeated.

In order to prevent this a piece of sheet lead 3 inches wider than the cavity is built into the exterior portion of wall to a depth of 2 inches, then projecting into the cavity and turned up, as shown in Fig. 5, to form a gutter, a clear ¼ inch being left between the lead and the inside portion. This is carried across the opening, a distance of 4½ inches beyond each side of lintel, and turned down so that any water in this gutter falls into the cavity to the bottom of the wall.

When building hollow walls great care must be taken to prevent any mortar falling down the cavity, for should it drop on one of the bonding ties or bricks it will harden and act as a mediator to carry water from the outer portion to the inner portion. This may be avoided by using strong laths, which are laid across from the lower layer of ties and which catch any moisture or other substance dropping down the cavity during the building, and when the level for the next layer of ties is reached, usually every fourth or fifth course in brick walls, these laths are lifted up by cords attached to both ends, cleaned, laid across the next layer of ties, and the operation is repeated until completion.

Some authorities say that the air in the cavity should have no connection with the external air, and as such would keep the interior rooms warmer, air being a nonconductor of heat. This, however, in my opinion is impracticable, as it would entail endless difficulties; for example, how are we to obtain air currents near joist ends to prevent dry rot? And such currents being obtained from the external air, we should have connections at floor levels between external and internal portions of the wall at the distances which the joists are apart, and complicated and expensive constructions would ensue. The construction I always adopt is as follows: At the bottom of cavity, if the same be above the surface of the ground, I place 9 x 3 inch ventilating bricks about 3 yards apart, also at the top of the cavity, consequently a current is formed. This current, although it may cool the inside portion of wall, which, by the way, will not be to any perceptible extent, dries out the moisture in the cavity, and keeps the whole of the wall at practically the same temperature, and, furthermore, admits of ventilating the joist ends without any further construction.

Sometimes, where stone sills are used and the stone is porous, the sill carries water to the inside and gives it to the interior half, and, as I have known in houses that have only been built a few months, and during which time have been well rained on, the portion of plaster between windowboard and skirting under the window has been thoroughly saturated. This may be avoided by using a piece of sheet lead equal in width to the thickness of inside part of wall, plus the width of cavity, plus 1½ inches, which must be placed under sill on inside half, and the part in the cavity formed into a small gutter, as shown in Fig. 6. The ends of this must taper down to allow the water to pass away. Another way is to put a damp course on the inner portion underneath the sill and work a throat on the sill, as shown in Fig. 7.

(To be continued.)

Fig. 1.—A Simple Method of Keeping Dampness from Rising in Walls.

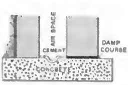


Fig. 2.—Drain for Air Space.

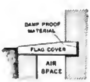


Fig. 3.—Cover for Air Space.

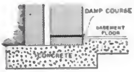


Fig. 4.—External Wall Built in Two Parts.

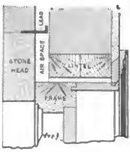


Fig. 5.—Vertical Section through Head of Door Frame in Ordinary Cavity Wall.

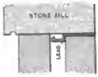


Fig. 6.—Lead Gutter in Air Space.

Fig. 7.—"Throat" Worked on Sill.

Preventing Dampness in Buildings.

English Workmen in the Building Trades.

It is a well-known fact that in many parts of the country building interests have in the past greatly suffered through unwise demands made by the labor unions, and subsequently abandoned by them, but it would seem that the injury was small in comparison to that which some of the trade unions appear to be inflicting upon the building industry in England. In a recent issue of the *Nineteenth Century* there is an article by an English architect, in which he traces the threatened commercial decline of England to the harmful domination of the labor unions. While these organizations are steadily forcing up wages, it is pointed out that they are at the same time cutting down the actual working hours until these are now said to average little more than four hours of honest work each day.

Union men in the building trades in England are expected to work 50 hours a week in summer and 47 in winter, thus making an average of about eight hours a day. But when they are paid at noon on Saturday many of them are not seen again on the building until the following Tuesday, by which time they have spent all their wages. Their absence throws the contractor into serious trouble, but he cannot put new men in their places. This is only one of many ways in which the unions are said to delay the work and make it expensive.

The men go to work at 6.30 on a summer morning. The first thing they do is to look around to see if there be any non-union man on the job, and, if so, to demand his dismissal on pain of a general strike. At 8 o'clock they take half an hour for breakfast. At 10.30 beer is served, for which they pay, but not for the time spent in getting and drinking it. At noon they have an hour for dinner, and at 3 o'clock beer is again served, which sustains them until they quit work at 5. But the most serious curtailment of working time comes in the shape of arbitrary rules for limiting the amount and kind of work a man is allowed to do. While a bricklayer could easily lay 1200 bricks a day in some kinds of work, the union rules forbid him to lay more than 500. This seems like an excessively small day's work. Bricklayers have also made up their minds recently that roof tiling work belongs to them, so they go out on strike unless the skilled tilers be dismissed and the work be given to themselves. These are but examples of the general state of labor matters in England. The *Nineteenth Century* writer says the unions are organized with a paramount view to promoting idleness among the members.

One result is that the workmen's houses now cost much more than they did 15 years ago. Bids on a rod of brick work are now $40, where they were then $20. Thus the laborer must pay a higher rent, while he is at the same time undermining the industries on which he depends for a livelihood. The British unions appear to be preparing the way for an industrial collapse in their country. The question at stake is the same as that which was recently fought out in Chicago—whether or not a man shall do an honest day's work for a full day's pay. In England the question has been answered in the negative by the unions, but it is the wrong answer.

CORRESPONDENCE.

Strength of Timber Truss for Shingle Roof.

From G. B. K., *Dundee, Mich.*—Inclosed find drawing of a truss, Fig. 1, in which I should like to have Mr. Kidder point out the weak spots. It is intended for a timber truss, the trusses to be placed 12 feet apart and to be made of four pieces of 2 x 8 spiked and bolted together. The roof is to be shingled; the ceiling is to be plastered, and the wall to be 12 inches, with pilasters opposite the trusses.

Answer.—The sketch of our correspondent was submitted to F. E. Kidder, who furnishes the following comments: The truss shown is too weak all round for a spacing of 12 feet. If the trusses were spaced 6 feet

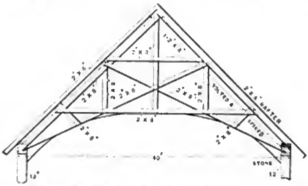


Fig. 1.—General Elevation of Truss as Submitted by "G. B. K."

apart the construction shown would be about right if well bolted at the joints, and the bottom joints were reinforced in some way. For a distance of 12 feet, center to center, of trusses, the construction shown in Fig. 2 is the lightest the writer would dare to use. With this type of truss it is generally necessary to make the wooden members larger than the stresses would require, in order to obtain the necessary strength in the joints.

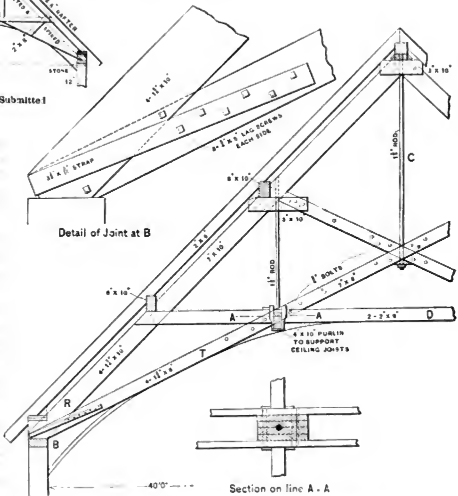


Fig. 2.—Method of Construction Recommended by Mr. Kidder.

Strength of Timber Truss for Shingle Roof.

Allowing 40 pounds per square foot of roof surface for the weight of truss, roof, wind and snow, with 14 pounds per square foot for the weight of the ceiling, the stress in the bottom of rafter R will be 37,700 pounds; in the tie T 29,700 pounds, and in the center tie C 20,360 pounds. To make a joint at B which will be safe for 29,700 pounds is an impossibility, using merely bolts and spikes. The writer has found that a strap and lag screws make the best connection for this joint when the stress exceeds 10,000 pounds. Such a joint requires that the rafter and tie be of the same thickness. It would also be very difficult, if not impossible, to secure a plank tie in the center so as to resist a strain of 20,360 pounds, and it is much better and not much more expensive to use a rod. The 2 x 8 planks D should be spiked and bolted to each side of the truss after the center rod has been tightened.

The best method of supporting the ceiling is by means of purlins hung between the trusses as shown, the ceiling joists being placed parallel with the tie beams of the truss and curved pieces nailed to the side of the joists to form the curved portion of the ceiling. Buttresses of ample size should be built against the wall, depending upon its hight.

The Pitch of Roofs.

From F. W. M., *Medina, N. Y.*—As there has been some old time discussion in *Carpentry and Building* of late as to what constitutes one-fourth, one-third and one-half pitch of roof, I think for the good of the young chips it would be well to republish, if it can be done, the articles on roof framing by D. H. Meloy, which appeared in this paper from November, 1890 to March, 1891. They are the best on the subject of which I have knowledge, being simple and accurate. I was taught when young that one-fourth pitch was 6 and 12 on the square, and that is the carpenter's standard for nearly all work because 6 is one-fourth of 24, the length of the blade, and 12 is the standard of or unit of measure. For one-third pitch use 8 and 12, because 8 is a third of the blade, and so on. Whether this is correct or not, I cannot say, but I do know that it always worked. For instance, for a building 24 feet wide, one-half pitch of the rafter would be 12 times the length of 6 and 12 on the square, and then the cuts always fitted. Even if not theoretically correct, it is practically so, and that is what the carpenter of to-day wants.

Note.—With regard to the articles on roof framing by Mr. Meloy, we would state that after appearing in *Carpentry and Building*, they were compiled in book form and now constitute a portion of the little work known as "Progressive Carpentry," copies of which can be had through our Book Department at $1 each, postage paid.

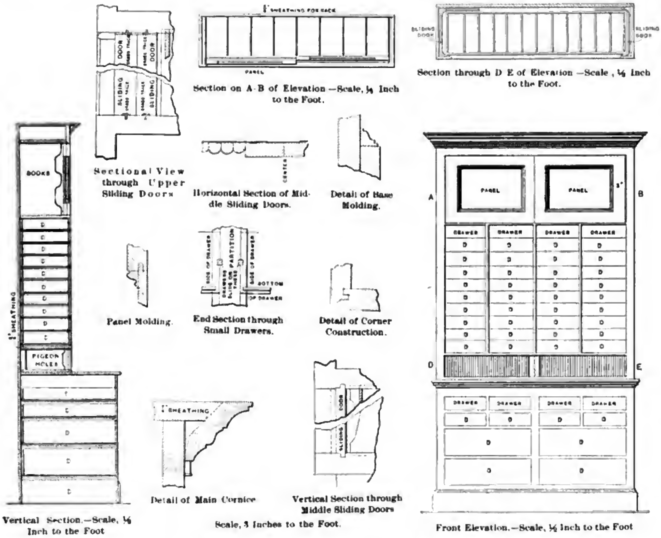
Constructing a Pentagon Upon a Given Side.

From O. L. W., *Dallas, Texas.*—In several of the recent numbers of *Carpentry and Building* there have been presented different methods of constructing a pentagon upon a given side, and as each correspondent claimed all previous methods to be wrong, I was left with the suspicion in my mind that somebody was wrong. I therefore compared the several methods with "Robinson's Geometry" and will give the result as I see it. I find

Mr. Yalden's method, as given in the January issue, to be fully demonstrated in the geometry, and therefore believe it to be correct. He is also correct in stating the error in "F. L. T.'s" method. In reference to the method of Mr. Meloy in the February number, I find a pentagon to have five equal sides forming five equal obtuse angles of 108 degrees each, instead of 72 degrees. However, he may have reference to the external angle formed by a side and an adjacent side produced. This angle is 72 degrees, and I find that its co-tangent is 0.32492. This would make a little more than 3¾ inches and 12 inches on the square, instead of 3½ and 12, as he says.

Design for a Cabinet.

From George P. Connor, *Roxbury, Mass.*—I have been a regular reader of your excellent paper for some time and take the liberty of inclosing blue prints of a cabinet which may be of interest. The cabinet was designed especially for Police Station No. 13 in Boston, the upper part being used for record books, the drawers for manifold and warrant blanks, while the middle portion is for envelopes and small stationery. The front and sides of the cabinet are of quartered oak, the back of North Carolina pine sheathing and the inside of white wood. The hardware consists of a bronze card plate and pull for all drawers, with knobs for the middle sliding doors. There are recessed pulls for the upper sliding doors. The drawings so clearly show the general arrangement and construction that extended description would seem to be unnecessary. The cabinet was recently built and put in place by Calvin Lamont of this place.



Section on A-B of Elevation.—Scale, ¼ Inch to the Foot.

Section through D E of Elevation.—Scale, ¼ Inch to the Foot.

Sectional View through Upper Sliding Doors

Horizontal Section of Middle Sliding Doors.

Detail of Base Molding.

Panel Molding.

End Section through Small Drawers.

Detail of Corner Construction.

Detail of Main Cornice

Vertical Section through Middle Sliding Doors

Vertical Section.—Scale, ¼ Inch to the Foot

Scale, 3 Inches to the Foot.

Front Elevation.—Scale, ¼ Inch to the Foot

Design for a Cabinet.—Contributed by G. P. Connor, Architect

Rule for Chamfering.

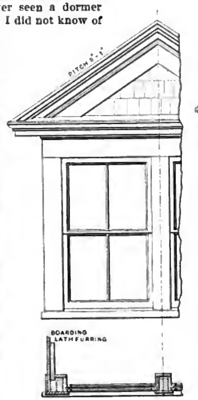
From O. L. W., *Dallas, Texas.*—Some months ago a correspondent in the Northwest asked for a rule for cutting chamfers, and as I have as yet seen no reply published, I beg to offer a few suggestions which may be of interest. I would say, however, that in this section of the country the trade in general follows no rule for chamfers, but rather it seems the practice, so far as possible, to avoid a rule. What little work of this character we have is usually done in the planing mills. If I have ever employed anything that could be termed a rule for laying out chamfers, it has been to commence the chamfer a distance from the end or angle of the timber, equal to a fractional part of the face, say one-half or one-quarter, and on long pieces leave a square. I generally employ a stop chamfer on heavy timbers and a round, such as the mills make, on small work, taking care to avoid making them too deep.

From J. M. S., *Appleton, Wis.*—As I understand it, the depth or breadth of a chamfered edge is entirely a matter of taste. Of course it should never be so deep as to impair the strength of the timber, while on the other hand, it should be prominent enough to be clearly seen from any point where the timber so treated is conspicuous. This is especially the case with girders and floor beams, which, being above the eye, require a somewhat heavier chamfer than posts and railings, which are lower down and more closely observed.

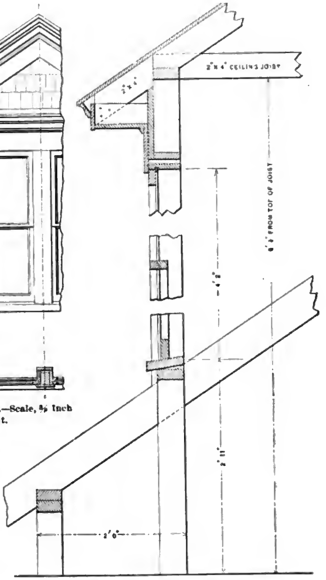
From G. A., *Osceola, Ark.*—With regard to a method of chamfering, I would say I have found that a safe rule is to allow 1-12 inch for every inch of face diameter of stick or stile up to 3 inches; from 3 inches to 6 inches allow ⅛ inch, and from 6 inches to 12 inches allow 2-12 inch per inch diameter. This rule for diameters between the sizes given is somewhat elastic. For example: A 5-inch stick would look better treated as a 6-inch stick than as a 3-inch, and the same would govern for odd sizes. Now for the application of the rule. Gauge out from the corner, both ways, 3-12 for 3 inches, 6-8 for 6 inches, and so on, working to the gauge lines. Another way is to set the chamfer plane to correspond to the face of the chamfer required; 6-8 will show 1 inch on 6 inches.

Construction of Dormer Window.

From W. C., *Ware, Mass.*—Some months ago a correspondent in Michigan asked through the columns of the paper how to construct a dormer window so as to obtain a fair width of casing inside without having the outside casing out of proportion. At the time this inquiry appeared I was getting out a set of plans for a building with just such a dormer window apparently as the correspondent wanted, but I deferred sending the details of it for publication because I had never seen a dormer with a fair width of casing inside, and I did not know of any one around here who had. Now the building is completed, however, the contractor states that the window is all right, so I inclose a blue print showing a few details which may be of interest to the readers, although somewhat late perhaps for the corespondent making the inquiry. One of the drawings represents a half elevation and plan of the dormer, while the other is a vertical section showing the hight of the window from the top of the attic floor joist, and the hight of the ceiling between the joist, which is the same as under the main roof. The underside of the ceiling joist of the dormer window is on a line with the underside of the front plate, the latter being continued on the same level around the dormer window. No studding are used on the sides or plank of the dormer window to which to nail the boarding, the latter being nailed simply to the main rafter trimmer and to the side plate of the dormer. An examination of the plan will show the boarding at the sides with no studding and the lath furring, the lath and plaster being applied in the usual manner. The stippled portion represents the lath and plaster. In covering the sides it is preferable to use matched boards. The detail of the cornice is carried around the three sides of each dormer, but the 2 x 4 rafter and roof board shown in the detail should have been represented dotted, as in reality there is no rafter pitching toward the front of the dormer, it being simply put there to show the projection of the cornice.



Half Plan and Elevation.—Scale, ¼ Inch to the Foot.



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

Construction of Dormer Window.

Creosote in Chimneys.

From S. H. C., *Claremont, N. H.*—I would like to ask through the Correspondence columns concerning a chimney that seems to be thoroughly saturated and dripping with what is commonly known as creosote, this running down inside the house and above the roof. The chimney is about 38 feet high, single brick, with a flue 8 x 12 inches running its entire length. The chimney stands plumb except for a slant of about 4 inches in 8 feet in the attic. The flue is known to be free from obstruction, as with a hand mirror one can see its entire length from cleanout at the bottom. The brick are hard burned and laid in gray lime mortar. There is only one stove used to any extent, and that is the kitchen range. The fuel is hard wood. The house is new, having been completed only about five months. I shall be glad to have practical readers give the cause of the trouble and the remedy.

Note.—The sweating of chimneys is a quite common trouble and the cause and remedy have at intervals been discussed in these columns. The trouble is doubtless caused by the aqueous vapors resulting from the use of hard wood as fuel becoming cooled before they escape from the chimney. It is well known that wood contains a large amount of hydrogen in some form, usually in combination with carbon. When the hydrocarbon is burned in the air the results are water from the combustion of the hydrogen and carbonic acid from the burning of the carbon. When the smoke is cooled a little the water usually makes its appearance in the form of steam or vapor, this turning into water after a little further cooling. When wood is slowly heated acetic or pyroligneous acid, tar, &c., in addition to the water are given off, the whole forming the black, disagreeable liquid usually called creosote. When a brisk fire is maintained in a stove or furnace where wood is used as a fuel all the steam, tarry matter, &c., usually pass off into the air before they have time to cool and run down the flue of a chimney or pipe. If, however, the flue is very long the smoke is liable to become cooled on its way out and the trouble begins. This often takes place when the fire is first lighted, but usually lasts only during the time required to heat the pipe or flue.

When the dripping occurs after the fire has been well started a scheme which sometimes tends to alleviate the difficulty is to place a little register in the stove pipe near its entrance to the chimney flue and open it whenever the drafts of the stove are closed. This tends to create a free circulation of air in the flue, and as a result the gases are carried out before they have time to condense. The dripping which results when a new fire is kindled is a rather serious matter and the remedy is difficult to find. Our correspondent does not give much information that might be desirable in forming a proper conception of the relative position of the stove with regard to the chimney flue, and it is possible that there is a long stretch of stove pipe between the range and the point where it connects with the chimney, so that the vapors are condensed early in their passage to the outer air. Sometimes beneficial results have been obtained by extending several sections of stove pipe up into the chimney flue and thus warming it to such a hight that the vapors will freely escape without condensation. Still another suggestion would be to contract the chimney top somewhat, causing the products of combustion to assume a sort of spiral column in the center of the flue. Local conditions, however, have such a bearing upon the solution of a problem of this kind that it is difficult to say just what would apply, as very often apparently similar cases fail to yield to similar treatment. We lay the communication of our correspondent before the readers of the paper, and shall be glad to have them discuss it in the light of their experience.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From L. G. K., *Kansas City, Mo.*—Replying to the request of "Learner," of Paterson, N. J., I would say that the following method for side bevels is perhaps the simplest and best discovered. Being absolutely correct for any angle or pitch it can be applied in a general way and really requires but one additional line to be drawn on an ordinary plan which shows the length and seat of the rafter to be beveled. It is similar in effect to that of "O. L. W." of Dallas, Texas, which appeared in the paper for March, 1898. The method has been known for a long time and has been employed by the writer for nearly 20 years. Referring to Fig. 1 of the diagrams, let the lines E A and A C represent the outer edge of the plates, with D d the line of the ridge against which the valley rafter is to fit. Let A D represent the seat of the valley rafter.

In order to find the side bevel of the valley rafter to fit the ridge proceed as follows: From A on the line D A square down to the line of the ridge as at *d*, drawing the line A *d;* produce A D indefinitely, making A B' equal to A B, the length of the valley rafter. Draw B' *d*, and a bevel set at B' along A B' and B' *d* will give the angle of the bevel across the square edge of the valley rafter to fit against the ridge. Use the same bevel across the under edge of the valley rafter to fit against the edge of the plate A C, as A C is parallel to the ridge D *d*.

Now in order to use the steel square place it on the back of the piece with the figures representing its length, as A B, on the blade and A *d* on the tongue and mark along the tongue, as shown in Fig. 2. The side bevel of any hip, valley or jack rafter or brace having square edges may be readily found by this method. It also applies where the plan of the sides form any angle, acute, right or obtuse, and when the seat or plan of rafter or brace forms any angle with the sides or plates.

Figs. 3, 4 and 5 are designed to illustrate this system as applied to getting the side bevels across the square edge of rafters and braces. Referring now to Fig. 3, let the lines E A, A A' and A' C represent the outer edge of plates of one end of a building out of square, D D' being the line of the ridge and A D, D A' the seat of the hips. The first step in obtaining the side bevel of the hips is to produce the line of the ridge indefinitely, as D *d*.

To find the side bevel of the hip on the long corner proceed as follows: From A on the line D A square down to the line of ridge produced as to *d*, drawing the line A *d*. Take the distance A B on the blade and A *d* on the tongue and use the line of blade as in Fig. 2. For the side bevel on the short corner use A' B'' and A' *d* in the same manner as A B and A *d* were used for the long corner. As a general thing square over from the line of run of rafter to be beveled to the line of ridge produced; thus with the line E C representing the line of ridge or face of piece, square up to that line produced.

It may be remarked in this connection that the sides or face of the ridge piece should be vertical, hence level across the edges. The sides of the rafters should also be vertical, then a line squared across the back would be level. When placed in similar positions the side bevel is found the same, let the piece to be fitted be a rafter or a brace, and the piece against which it is to fit be the ridge or plate of a roof or the side of a post. In order to make this clear draw the plan, as shown in Fig. 3. Take a piece of plank, say 3 or 4 inches thick, and cut to the shape shown by the triangle A D *d;* then saw through it from the upper edge, as B, to the bottom edge along A *d*. Place the section on the plan drawn. The upper surface may be termed a section of a roof cut through along the ridge line D *d*, and placing the square with the blade along A B it is evident the tongue will coincide with A *d*, as shown in Fig. 4. In Fig. 5 is

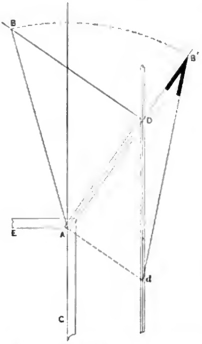


Fig. 1.—Finding Side Bevel of Valley Rafter to Fit Against Ridge.

Fig. 2.—Method of Using the Steel Square.

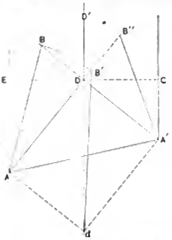


Fig. 3.—Method of Obtaining Bevels of Hips.

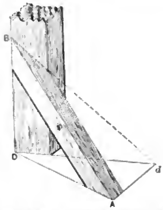


Fig. 5.—Showing Same Method Applied to a Brace Fitting Against a Post.

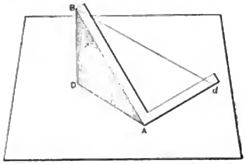


Fig. 4.—Showing Application of Method by Means of Section of Plank and the Steel Square.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

illustrated the same method, but applied to a brace fitting against the side of a post. It is so clearly indicated that no special explanation would seem to be required for "Learner" or any one else, if he is determined to master the correct principles of laying out timber with the square.

A Handy Shingling Gauge.

From O. W., *Birtle, Manitoba.*—Thinking the matter may be of interest to readers of *Carpentry and Building,* I inclose rough sketches of a shingling gauge of my own design, which I have used for 16 years. By means of it I have laid and nailed 25,000 shingles in five days, carrying them up a 20-foot ladder and doing all the work myself. If I had not the use of the gauge to hold the straight edge I am sure I could not have put on nearly as many shingles. The way to make the gauge is to take three pieces of 1 x 2 or 3 inch strips about 5 feet long, and tack the three pieces together so as to hold them firm while laying out the width it is desired to expose the shingles to the weather. If 5 inches, then mark across one side and on the edge of the strip every 5 inches, drawing a line down each side of the strip ⅝ inch, and then cutting out this piece with an ordinary drawing knife. An idea of what I mean is indicated in Fig. 1 of the sketches. I sometimes drive into each piece two shingle nails, in order to keep them from splitting off. This is shown in Fig. 2, which represents a side view of one of the gauges in position on a roof, with three courses of shingles completed and the fourth course under way. An examination of the sketch will show that the butts of the fourth course rest against the straight edge. Fig. 3 is a plan view of a section of a roof with three of the gauges in position, as they appear when looking down upon them. The shaded portion represents the straight edge with the fourth course of shingles partially laid. It will be seen that the hooks H H H on the upper end of the gauge are intended to be driven into the sheathing, in order to hold them securely in position. For a 20-foot roof two gauges will answer the purpose. It is not necessary to nail the straight edge, as the gauges will hold it properly in place. After the shingles are nailed in each course the straight edge is moved up another notch in the gauge and another course of shingles laid, and this operation repeated until the shingling is finished.

Fig. 1.—Side View of Piece, Showing How Gauge is Made.

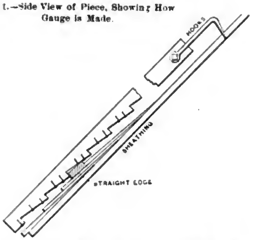


Fig. 2.—Side View of Gauge, with Straight Edge in Place.

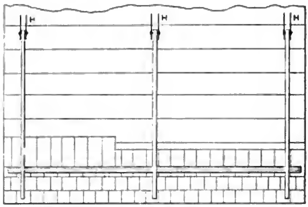


Fig. 3.—Plan of Portion of Roof, Showing Three Gauges Holding Straight Edge in Position, with Course of Shingles Partially Completed.

A Handy Shingling Gauge.

Apparatus for Raising Masons' Materials.

From W. S., *Paterson, N. J.*—The April issue of the paper has just been received (March 22), and I desire to say that it is very gratifying to be able to get my copy early instead of in the middle of the month of the date it bears, as was formerly the case. With regard to my sketch showing the apparatus for hoisting masons' materials, published in the April issue, I would say that the pulley at the top was a wooden one having a cover over half of it so that the rope would not slip off the pulley. I would also state that the pulley was suspended at the top by means of a large hook instead of a chain.

Laying Clapboards.

From R. W. D., *Moline, Ill.*—In the April number of the paper "H. C." of Pike River, Conn., asks for advice regarding the laying of clapboards, and in the hope that I may be able to aid him or some other chips who may be willing to adopt new methods, I venture to offer a few suggestions. The method we use here in the West is very different from those of which "H. C." speaks. We simply lay off our casings with the dividers into spaces as nearly equal to 4½ inches as possible and mark the points on the casings, beginning at the frieze. We very seldom carry exactly the same spacing from top to bottom, as it is generally true that spacing that fits a jamb will not fit any other division of the whole side. We always begin a window casing by making the first board flush with the underside of the sill, and space so that the board over the top is not cut down. Between windows of different stories, windows and water table and upper windows and frieze, we divide into equal spaces as on the windows themselves When everything in the hight of the building has been spaced we mark the divisions on a pole, the top of which is held against the frieze, and we use this pole in making all other casings on the building.

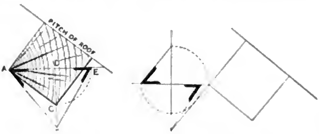
Instead of striking a chalk line between these points we fit in the boards and straighten them with the eye. As we always set the frames in the same story at exactly the same level a single pole will do duty on an entire building. A short frame, or some other such thing, may at first puzzle one unused to this method, but the principles ought to be sufficiently clear for any carpenter to follow. If we are to judge from "H. C.'s" method of scribing the boards, he is used to running up a side regardless of such things as window sills and heads.

As to beginning at the top or bottom, I believe it is better to commence at the bottom, for then we are working over the boards instead of constantly pushing a lower board under the next one above. It is usual here to begin at the highest scaffold and work to the top; then remove the highest scaffold and begin at that next below, working up to the clapboards that we first put on, and so continue to the bottom.

I find that there are enough short spaces on an ordinary frame house to use up the greater part of the short pieces, if the pieces are judiciously employed. If there are not enough short spaces we work in the pieces as we go, thus avoiding a great mass of spliced pieces in any one part of the building. A collection of short spliced pieces is always much more noticeable than a few short pieces spliced in among long ones. I would say that the method of spacing, above described, applies only to that part of the building below the side frieze. The gables are gauged to the required weather, except where a frame prevents, in which case they are spaced to fit the frame as on the side.

Finding Bevels and Cuts for Purlins, Roof Boards, Fascias, &c.

From C. B. H., *Warren, Pa.*—Thinking that the matter may be of assistance to many in the building business, I inclose herewith sketches showing my methods of obtaining the bevels, cuts, &c., for some of the problems in



Figs. 1 and 2 Accompanying Letter of "C. B. H."

Finding Bevels and Cuts for Purlins, Roof Boards, Fascias, &c.

hip roof construction. Referring to Fig. 1, draw the horizontal line A E, as shown, and at any point on the line A C draw the perpendicular line B D. Take the distance A C and mark the point B measured from D. Connect B-A, and with D-C as radius strike the arc E-C. Connect B-E. The bevel at E is applied on inside and outside face, while the bevel at A is applied on the top along the line of the rafter. The same results are given by Mr. Monckton in Fig. 2 by another method. These are the two easiest ways, as well as the plainest, for obtaining correct cuts for purlins, roofing boards, planceers, fascias, &c., that I have ever used or seen. These methods are applicable to planceers only when inclined to the pitch of the roof and with rafters cut square with the pitch of the roof. If desired I will give a short, quick plan for laying out a side casement for stair rails.

Note.—We shall be glad to have our correspondent furnish the article in question, as the matter will doubtless interest many of our readers.

Plate Glass in Making Blue Prints.

From "YOUNG CHIP," *Coalville, Utah.*—I would like to ask if French plate glass is good to use in making blue prints? Is it as good or better than double strength common glass for this purpose? Can French plate glass be cut with an ordinary diamond?

Note.—Plate glass is generally regarded as somewhat better for use in the blue print frame than common glass, more especially if the frame is a large one. The plate glass is not so apt to spring and it presses the paper more firmly, thus tending to make a better print. Of course, if the frame is a comparatively small one, common glass will serve the purpose.

The successful cutting of French plate glass with an ordinary diamond will depend somewhat upon the thickness of the glass. We present these inquiries to our readers, and shall be glad to have them express their views on the subject.

Designs Wanted for Self Supporting Roof.

From J. L. B., *Denver, Ind.*—Will some of my brother carpenters or some of the architectural friends of our good paper furnish the editor with a few new designs of a self supporting roof? We will assume the size of the building to be 40 x 80 feet, with two cellar rooms 20 x 80 feet, two rooms on the first floor 20 x 80 feet, and the second floor, 40 x 80 feet, to be occupied as a lodge hall with level ceiling. I would also like a design for an oval ceiling. Any of the readers who will give this request attention will be serving an interested reader and at the same time may be helping many others.

Cut Nails vs. Wire Nails for Shingles.

From A. T. B., *Elyria, Ohio.*—In regard to the nail question, I would say that I prefer the old iron cut nail for shingles, owing to the fact that both wire and cut steel will rust off.

Calculation of Slate Roofing.

From A. A. B., *Clinton, Mass.*—In some early issue of the paper will you please give the formula for finding the number of roofing slates in a square with 2, 2½ and 3 inch lap?

Answer.—In calculating the number of slates to a square deduct the lap from the length of the slate, divide the remainder by two and multiply the result by the width of the slate. This will give the square contents, in inches, of each slate exposed on the roof. Then divide the 14,400 inches contained in a square by the product. This will give the number of slates to the square. As an example of this method, take a slate 20 x 10 inches, with a 3-inch lap, and work it out as follows:

$$20 - 3 = 17$$
$$17 \div 2 = 8.5$$
$$8.5 \times 10 = 85$$
$$14400 \div 85 = 169.41+$$

This gives 170 slates with 3-inch lap, each square, in 20 x 10 inch sized slates. The same formula holds good for all sizes of roofing slates and for 2 and 2½ inch laps.

Constructing Round Silos.

From L. & F., *West Auburn, Pa.*—Replying to the inquiry of "C.," Colchester, Conn., covering round silos, we beg to say that we are making a specialty of silos and use 2 x 6 material matched and beveled, finishing to the shape and size indicated in Fig. 1 of the sketches. We have used ⅝ round iron for the hoops, and for a silo 16 feet in diameter and 30 feet high 11 hoops, spaced first 2 feet, then three 2½ feet, then four 3 feet, and two 4 feet, this giving ten spaces and 11 hoops. We consider the best roof is of boards and battens. Take the circumference in feet and half as many 12-inch boards of the length required to give sufficient pitch, sawed diagonally from end to end, as indicated in Fig. 2. Place the points at the apex and cover the joints with 3-inch bats, as indicated in Fig. 3. This, well painted, makes a cheap and serviceable roof. It can be used with or without a plate, but if a plate is employed make it of 6-inch boards 3 feet long and rounded on one edge, as shown in Fig. 4. To do the work strike a circle on a barn floor, or other convenient place, having the half or quarter sections to-

Fig. 1.—Shape of Material.

Fig. 3.—Shape of Batten to Cover Joints.

Fig. 4.—Shape of Plate.

Fig. 2.—Showing Way to Saw the Boards.

Constructing Round Silos.

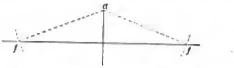
gether, according to the size of the silo. It is necessary to have a circle about 2 feet in diameter to which to nail the upper ends of the boards.

Mortar for Tuck Pointing.

From T. H. F., *Montreal.*—Replying to "J. O. L.," in February issue, I would say an excellent mortar for tuck pointing can be made from pure fat lime. A small quantity of water is added to the freshly burned lime, which then slakes, giving off steam and increasing in bulk. When the slaking is completed more water is added, until the mixture is of the consistency of thick cream, and it is then passed through a hair sieve to remove all hard lumps. The lime is now left to settle for some weeks and the water allowed to evaporate until the lime putty becomes thick enough to use. Sometimes, in order to insure perfect slaking, the mixture will require to be kept one or two months. If not perfectly slaked the putty will in course of time fall out of the joints. This method of making "tuck pointing mortar" was practised by the old builders in Holland and in England, and work executed with it is still to be seen, and is as good as when done 200 years ago. There are buildings in the New England States, and a few in New York and neighborhood, that were tuck pointed before the Revolution with material prepared in this way, that are still looking quite good. All coloring matter injures the mortar more or less, but, when necessary, the coloring materials must be minerals of some sort, oxide of iron being the best, which will give the mortar any shade of red desired.

Striking an Ellipse Without Drafting When Major and Minor Axes Are Known.

From Seyor, *Portsmouth, Va.*—In the April issue of the paper "A. O. C." of Lake Charles, La., asks how to strike an ellipse of any size without drafting when the

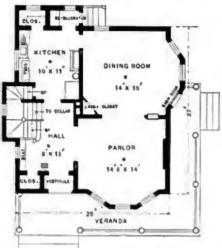


Striking an Ellipse Without Drafting When Major and Minor Axes Are Known.

major and minor axes are known. In reply, I would state that a simple method is as follows: Lay off the axes at right angles to each other, and with the semi-major axis as a radius and the extremity of the minor axis *a* as a center, find the two foci *f f*. Stick pins, or drive nails, at *a*, *f* and *f*, and tie a string snugly around these nails. The string should be as unstretchable as can be obtained. Remove the pin at *a* and place a pencil or scratch inside the loop and carry it around, keeping the string at an even tension. The pencil will describe the ellipse whose major and minor axes are used. This is a simple method, much easier done than described.

Elevations Wanted for Floor Plans.

From J. W. H., *Lynbrook, N. Y.*—I send herewith blue print showing first and second floor plans of a cottage to be erected in this place on a plot 100 x 100 feet in size. I would like very much to have some of the architectural friends of the paper furnish for publication, elevations suitable to these plans, and at the same time give an idea of what it would cost to build the house in accordance therewith.



First Floor

Second Floor.

Scale, 1-16 Inch to the Foot.

Elevations Wanted for Floor Plans.

Proportion of Portland Cement to Sand in Building Bridge Abutments.

From H. T. F., *Toronto, Ont.*—Replying to "F. R." on the above subject, I may say that authorities differ somewhat; not so much on the proportions as on the question of "best proportions for least cost." The following proportions for cement mixture, which are taken from an eminent German authority, are said to be the formulas followed by many engineers who have charge of large public works:

1. Cement......1	Sand......5	Lime paste (putty)...... ½
2. Cement......1	Sand..6 to 7	Lime paste (putty).....1
3. Cement......1	Sand......8	Lime paste (putty)......1½
4. Cement......1	Sand.....10	Lime paste (putty)......2

The above proportions are to be taken by measure. Hydraulic lime may be used in place of ordinary slaked lime in making the paste or "putty." The cement lime mortar must be prepared by first making a dry mixture of the required materials. Milk of lime is then made with the necessary quantity of lime paste and water, and this milk of lime thoroughly mixed and worked in with the mixture of cement and sand. The first proportion is intended for fine, strong work, and joints in the stone work may be made very thin. The lime paste or "putty" makes the mortar work freely under the trowel, which would not be the case if the proportions of one cement and five of sand were alone used, and the paste does not weaken the mortar. The other proportions are given for coarser work according to their order. The last, No. 4, answers very well for strong coarse brick work, in almost any situation. The sand must be clean in every case, and would be improved if of different degrees of coarseness.

Comments on Hand Railing.

From J. A., *Oakland, Md.*—I am glad to see that the subject of hand railing has again been opened in *Carpentry and Building*, although continued rails and winding stairs are almost out of style, while angle newel stairs are at present the fashion. Mr. Fox has presented in the January and February numbers a comprehensive outline of the science of hand railing, in itself nothing new, as the same principles are taught in a practical manner in "Monckton's National Stair Builder," and in others that have been published as long as 30 years ago. I think that we owe much to the teachers of hand railing who have unselfishly shared their knowledge with their fellow men. Among these are Riddell, Monckton, Gould, Cowper, Girard, Nicholson and others. Much information on the subject of hand railing has also been gathered from the pages of *Carpentry and Building*. To my notion, a well arranged continued staircase is to be preferred to one which is full of small newels. In this place there was but one continued rail stairs put up last summer. It would afford me much pleasure to hear from readers in different parts of the country in regard to the different styles of stairs which are common in their sections.

WHAT BUILDERS ARE DOING.

THE building statistics for March of the present year make a better showing in Atlanta, Ga., than for any similar period in a number of years. According to Building Inspector Frank Pittman, 214 permits were recorded during March, representing an estimated expenditure of $161,569. This is said to be the best showing for March since 1897, when the Tower was built at a cost of $175,000, and the 62 permits issued that month ran the total up to $238,160. Last year there were two months, May and August, which were record breakers, owing to the number of large contracts awarded. The figures for the first three months of this year show 180 permits issued in January, 167 in February and 214 in March, these comparing with 135 permits in January, 142 in February and 173 permits in March of last year.

Baltimore, Md.

The Board of Directors of the Builders' Exchange of Baltimore City have indorsed the recommendations of Building Inspector Preston, looking to the improvement of some of the public school buildings and annexes in the overcrowded districts, and have addressed a letter upon this subject to the Mayor and City Council. It is understood that his Honor the Mayor strongly advocates the improvements.

Among the local contracts recently awarded to members of the exchange are the Fifth Regiment Armory, to cost $242,200, E. M. Noel being the contractor; a $25,000 residence for Dr. M. H. Carter, the contractor being Israel Griffiths, and the Suburban Club Building, to cost $35,000, Henry Smith & Sons contractors. This concern also has the contract for the new building of the Merchants' Warehouse Company. Plans are being prepared for the Calvert Bank by Architect J. Evans Sperry, and for the Catonsville Bank by Architects Baldwin & Pennington.

Boston, Mass.

At the annual meeting of the Master Builders' Association of the city of Boston the following officials were selected for 1901:

President, Lyman D. Willcutt.
Vice-president, William N. Young.
Secretary and Treasurer, William H. Sayward.

Trustees for three years are Frank L. Whitcomb and Arthur C. Whitney. The other trustees making a full board consist of Walter S. Gerry, Orlando W. Norcross, Lewis F. Perry and William J. Sullivan. The terms of the last four expire, two each in 1901 and 1902, they having been chosen for three years at previous elections.

The association has recently issued its "Year Book" for 1901, consisting of a neatly printed publication of 20 pages and containing valuable information relative to the organization. Among other things it gives a preamble to the by-laws, makes mention of architects' privileges, refers to the Uniform Contract, and presents a list of officers and committees for 1901. There is also given an alphabetical list of members of the association corrected up to January 1 of the present year, and in connection with each name mention is made of the line of business in which the member is engaged. Another list is arranged by trades, and in a way to be of special value.

Buffalo, N. Y.

A valued correspondent, writing under date of April 15 regarding the conditions existing in the building trades, says: "While the Pan-American Exposition has done considerable for Buffalo in the line of advertising, and while most of our business men will reap a considerable benefit from the 20,000,000 to 30,000,000 of people who will visit the exposition the coming summer, yet it has raised havoc in the building lines. The demand for workmen of all classes has been so great that the unions have taken every opportunity to make most unreasonable requests from the master builders. Plasterers, who a few months ago were getting $2 to $3 per day, are now getting $6 per day. The carpenters are receiving 35 cents an hour on Pan-American work and 30 cents on outside. Plumbers have demanded an advance of about 10 per cent and painters have made a like demand. The mill hands and wood workers have demanded an increase of 10 per cent. of salary and reduction of one hour per working day. Because of the refusal of the mill owners to grant the demands of the wood workers a strike was ordered some ten days ago, and no compromise as yet has been reached.

"Several of the carpenter contractors who had work at the Pan-American, owing to the fact that the outside carpenters were called out on sympathetic strike, have been forced to give in to the demand of the union, but the end is not yet, as the majority of the mill owners remain firm in their stand that they will not grant the demands of the men. The masons were out on strike for about a week, demanding an advance of 4 cents per hour. Their demand was refused. Practically all of them have returned to work at the old scale. Bricklayers demanded an advance of 5 cents per hour, to take effect May 1. They have been offered 2½ cents, and I rather believe they will accept the compromise. All in all, labor conditions in Buffalo are decidedly unsettled, as is shown by the above. Demands of the labor orders have been very unreasonable, and no doubt they will find in the future that unreasonableness does not pay, as they have forfeited considerable demand to public interest and sympathy because of the position they have taken during the past few months."

Chicago, Ill.

The figures showing the number of permits for building operations in the city during March are a striking commentary on the changed conditions in the labor market as compared with a year ago. During the month named there were permits issued for 591 new buildings, having a frontage of 15,307 feet, and involving an estimated expenditure of $2,410,280, these figures comparing with 167 permits for buildings, having a frontage of 3738 feet, and estimated to cost $269,400, for the month of March last year. This increased activity is largely due to the great number of flats and residences in progress rather than to the execution of single contracts involving any considerable amount. Taking the figures for the first three months of the present year and comparing them with the corresponding period for 1900, the contrast is most striking. Carrying the comparison still further and covering a period of five years, it is shown that the number of permits issued in the first three months of 1901 was exceeded only once, and that in 1897; the frontage in but one year, 1898, and the estimated cost in only one year, 1897, and then by a very small margin.

There is a great deal of building in progress in the suburbs of Chicago, especially in Evanston, where the outlook is more encouraging than it has been for a number of years past. In the three months of the present year permits for improvements costing over $161,000 have been issued, the greater portion of the work being in the nature of residences, flats, &c. Among the more important improvements may be noted the academy of the Sisters of Visitation costing $200,000, a dormitory for the young women of Northwestern University to cost $30,000 and the Cable Memorial Building of the Evanston Hospital to cost $25,000. Real estate and renting agents speak of an unprecedented demand for high class apartments, but thus far little attempt seems to have been made to meet the demand. The Yarvan Company, who heat many houses in the central portion of Evanston, are preparing to extend their hot water pipes in the eastern portion of the city and erect a new plant to heat the buildings in the Second and Fifth wards.

The Chicago Architectural Club held the opening reception of the fourteenth annual Exhibition of Works of Architecture and Allied Trades on Thursday evening, March 28, in the galleries of the Art Institute.

Detroit, Mich.

It is stated that the carpenters have accepted the offer of their employers of 25 cents an hour as a minimum rate of wages, eight hours to constitute a day's work. A short time ago the men struck for an increase in wages, but as soon as the employers voted to pay 25 cents per hour to the least skilled in the trade the offer was accepted. All the building trades in Detroit are now on an eight-hour basis, and the opinion seems to prevail among the carpenters generally that it will be a permanent arrangement.

The Architectural Club has recently instituted a class in structural steel, meetings being held in the club rooms every Wednesday evening. The class is conducted by B. H. Jessen, draftsman with the American Car & Foundry Company. The club is also giving a series of lectures on alternate Monday evenings, the topics including "Theatre Construction," "Designing" and "Furniture and Interior Decoration," "Designing and Constructing Large Factory Stacks," "Pompeiian Pottery" and "Rendering."

Erie, Pa.

At a meeting of a number of members of the building trades, held a short time ago, the Erie Builders' Exchange was successfully organized, with Ed. Carroll, president, and A. W. Tuttle, secretary. A Board of Directors consisting of 15 members was also chosen, divided among the different trades. The directors were instructed to transact such business as may come before the exchange until the charter, for which application has been made, is granted, when permanent officers will be elected. It is the intention to fit up handsome and convenient offices, centrally located and adapted in every way to meet the requirements of such an organization. When the exchange was formed those interested had the assistance of three members of the Cleveland Builders' Exchange—namely, President Wm. H. Hunt, Secretary Edward A. Roberts and ex-President Chas. W. McCormick.

Janesville, Wis.

At a recent meeting of the builders and contractors of the city an organization was effected, to be known as the Builders' and Traders' Association of Janesville. By-laws and regulations were formulated and adopted, and a committee appointed to secure and fit up rooms for the use of the association. The officers chosen are president, George K. Colling; vice-president, James Shearer; secretary, J. W. Peters, and treasurer, S. Hutchinson, Jr.

Los Angeles, Cal.

The wet winter and excellent agricultural prospects of Southern California are already beginning to bear fruit. The building trades have felt the impulse for several weeks past. In almost every part of the city unusual business activity is to be noticed, and in the building line this runs more to residences than to business buildings. The center of the new residence movement just now is Adams, Jefferson and Washington streets. The new residences are, as a rule, of the more modest sort. Carpenters' wages have been raised to $3 per day, and in the future the men will work only eight hours a day.

Lowell, Mass.

Earlier in the year architects and builders were looking forward to a good season's business, although there were no indications of what might be termed a "boom." The prospects, however, have been dimmed somewhat for the present by the attitude of the labor unions. Every branch of labor, with the exception of the plumbers, who are under agreement with the masters until May 1, is in more or less of a turmoil, and matters have been made much worse by the fact that the master painters conceded what every union has been demanding—eight hours with more pay than the men had been receiving for nine hours' work. One master plasterer has granted the demands of his union, and the others have formed an association, and, as our correspondent puts it, have not "been looking for work." The bricklayers and journeymen carpenters have made certain demands, although the former have not ventured anything very insistent as yet. The general opinion seems to be that the condition of business in the city in no way warrants any of these demands.

The annual meeting and banquet of the Builders' Exchange will be held on April 17, and promises to be of much interest this year, as labor agitations have proven beyond doubt the high value of proper organization among contractors in the shape of a Builders' Exchange. We hope in our next issue to be able to give a full account of the affair.

Milwaukee, Wis.

The favorable weather has rendered building operations in and around Milwaukee quite active, and a number of large jobs are under way. Some of these are two churches, a large forge works, a factory for the A. J. Lindemann & Hoverson Company, a new malt house, a tool factory for Kearney & Trecker, while the partial removal of the extensive plant of E. P. Allis to North Greenfield, one of the suburbs of the city, will represent an enormous increase in the building list.

Nearly all members of the exchange have work on hand, and are pushing ahead, but at the same time they do not forget the Builders' Club. A very desirable piece of property has been secured on Broadway between Mason and Ouida streets, and as soon as the owner is able to vacate the old building will be removed and a new one, estimated to cost about $10,000, will be erected to meet the requirements of the club, as well as of the Builders and Traders' Exchange. Bowling alleys, billiard and pool tables and a buffet will add to the attractions of the place, and as the management is in very good hands all doubt of success is removed.

At a recent meeting of the Architectural Club the bill now pending before the Legislature to license architects was discussed. Every one seems to be in favor of its passage, and feels it will be more satisfactory to owner as well as contractor to have dealings with men thoroughly competent to handle the subject before them. The members of the exchange seem equally to favor the bill, and as no serious objection has developed up to date, there are strong hopes that the bill will pass.

New Bedford, Mass.

The building outlook in and about the city is much more promising than it has been for the past three years. There are many dwelling houses either in process of construction or contemplated, together with several city buildings and cotton mills.

At the annual meeting of the New Bedford Builders' Exchange the following officers were elected for 1901: Samuel C. Hunt, president; Edward F. Penney, secretary, and Benjamin C. Tripp, treasurer.

New York City.

The prospects of the new Tenement House Commission bill becoming a law, and which, in fact, received the signature of Governor Odell on April 12, caused a rush to file plans for flats and tenement houses at the Department of Buildings to such an extent that for the 24 hours ending at noon April 11 the plans filed involved an estimated outlay of nearly $20,000,000. The record for the week ending April 11 shows that plans were filed in the boroughs of Manhattan and the Bronx for 573 new buildings, estimated to cost $21,378,550, as compared with 69 buildings, estimated to cost $1,581,750, for the same week last year. The rush was probably due to the opinion held by many of the builders in the city that they could not erect tenement and flat houses under the new law as profitable commercially as they could under the old law. There is a great deal of building in prospect, not only in the business sections of the city, but especially in the outlying districts, where the season promises to be an active one. The real estate deals which are under way show the tendency of capital, and many important improvements in the way of new and costly buildings are contemplated. Some idea of the outlook may be gathered from the statement that the plans filed for new buildings in the boroughs of Manhattan and Bronx from January 1 up to April 11 numbered 1534, involving an estimated outlay of $61,012,150, as against 430 buildings, estimated to cost $14,812,385, for the corresponding period of last year.

There have been a few minor labor troubles during the past month, but no serious developments are anticipated.

The first annual meeting of the Association of Dealers in Masons' Building Materials was held in March and followed by a banquet at Delmonico's, which we understand is to be an annual function. At the business meeting some changes were made in the by-laws intended to permit the admission to membership of other manufacturers of building materials of every kind. The officers elected for the ensuing year were president, Wright D. Goss; vice-president, Charles E. Murtagh, and treasurer, John J. Bell.

Thomas J. Brady, for several years Commissioner of Buildings for the boroughs of Manhattan and the Bronx, resigned the last of March and was succeeded by James G. Wallace, a well-known contractor in the building business for the past 20 years.

The Building Materials Exchange held their twentieth regular annual election of officers and trustees on the evening of April 8, resulting in the following selection: De Witt C. Overbaugh, president; George A. Molitor, vice-president; Benjamin Cochran, treasurer; trustees, De Witt C. Overbaugh, George A. Molitor, Benjamin Cochran, Walter C. Shultz, Frank E. Wise, William H. Meserole, James E. Cloniu, William F. Fisher, Arthur C. Wood, Uriah F. Washburn, Hammond Talbot, John F. Knowles and Frank L. Holmes; inspectors of election: Foster F. Comstock, William F. Dalton and John B. Cook.

At a recent meeting of the general Society of Mechanics and Tradesmen recognition was made of the long and faithful services of Stephen M. Wright by publicly presenting to him, elegantly engraved and framed, a preamble and resolution congratulating him upon the close of his brilliant administration of the affairs of the society, and acknowledging their obligation to him for much of the prosperity which marked the year just brought to a close. The presentation speech was made by President Frank E. Conover, to which Mr. Wright made a most fitting response. After the presentation a collation was served and the remainder of the evening was spent in social intercourse.

Ogden, Utah.

F. C. Woods & Co. of Ogden have now on hand plans for $70,000 worth of new residences and business buildings for that city. These plans, it is said, will be put into working order in a few weeks. The tendency of building operations in Ogden this spring seems to be toward tenement and apartment houses. Some of the real estate men and capitalists of Ogden have taken up the matter of apartment houses and will build several as a speculation.

Omaha, Neb.

At the annual meeting of the Builders and Traders' Exchange of Omaha the following officers for the year 1901 were elected: President, J. F. Smith; vice-president, J. I. Watt; secretary and treasurer, E. G. Hampton. Directors: John Rowe, A. J. Vierling, W. C. Bullard, R. L. Carter, J. M. Dow and J. H. Harte.

The building outlook is regarded as very encouraging, and as the season opens operations are being pushed forward as rapidly as possible.

Philadelphia, Pa

In and about the city there is a considerable amount of work in the aggregate in progress and in prospect, so that the outlook for the building season is quite promising. Architects generally are busy, and there are a number of building operations under way which will call for the investment of a large amount of capital. Bids have recently been invited by architects Hale & Ballinger for the erection of the new Kynett Memorial Methodist Episcopal Church to be erected on Seventeenth street, the structure to measure 250 x 125 feet, and to be of the English Gothic style of architecture. It will be built of granite with Indiana limestone trimmings. Another improvement under way is the new Merchants' Warehouse, to cost about $400,000, the contract for which has been secured by the George A. Fuller Construction Company. An operation involving the erection of 12 handsome houses is about to be commenced in Glenside, the architect being H. L. A. Jeckel. The houses will measure about 32 x 50 feet each, and will be three stories high, some of the designs involving the use of stone, others of brick and stone, and still others of brick alone. Another interesting building operation under way is in the Twenty-third Ward, where H. R. Warren is putting up 14 two-story brick houses, each covering a plot 14 x 43½ feet. It is understood that Mr. Warren will erect 26 more in the same neighborhood early in the summer. Frank K. Stahl will begin work at once on 24 two-story houses and a two-story store and dwelling at Musgrave street and Pleasant avenue. The houses will measure 15 x 40 feet each. In the Twenty-fourth Ward F. A. Poth is putting up 12 four-story houses 24 x 61 feet each on Parkside avenue and 12 three-story houses 18 x 68 feet each on Forty-second street, the estimated cost of the improvements being placed at $144,000. In the Thirty-fourth Ward Alexander Cowan will erect 27 two-story houses each 15 x 37 feet and one two-story store and dwelling 17 x 37 feet, the entire operation estimated to cost a little over $45,000. At Oak Lane ten three-story stone houses are about being erected by E. S. Radley, in accordance with plans drawn by Stearns & Castor, who are also the architects for houses to be built in Wilmington, N. C.

The fourteenth anniversary of the Lumbermen's Exchange was celebrated at the Bourse on the evening of April 11 by a "Night in the Woods." After the election of officers for the ensuing year had taken place a light lunch was served, followed by a lengthy vaudeville performance. The officers elected were: Franklin Smedley, president; Edward F. Henson, vice-president; Harry C. Humphreys, treasurer, and A. J. Cadwalader, Charles C. Coolbaugh and Horace J. Hazard, directors. The report of the treasurer and secretary showed the exchange to be in good financial condition, and that there had been a very considerable gain in membership.

Pittsburgh, Pa.

There is a great deal of activity in the building line in and about the city, and the prospects are such as to warrant the belief in a season's business which will be a record breaker. The report issued by Superintendent J. A. A. Brown of the Bureau of Building Inspection shows that permits were issued during the month of March for 282 new structures, estimated to cost $826,960. There were also permits issued for 65 additions, to cost $226,075, and 72 alterations, to cost $29,103, making a total for the month of 419 operations, involving an expenditure of over $1,000,000. A classification of the permits shows 54 were for brick structures, 191 for frame, 21 for brick veneer, four for iron clad, one for steel and nine for frame and veneer. The statistics show, as compared with March, 1900, an increase of 54 in the number of buildings, and $211,869 in the estimated cost. Superintendent Brown expresses the opinion that the record this year will probably double that of any previous year in the history of the city. There are a number of important buildings under way in the down town section, which will add very largely to the year's record. Among these are the Frick Building, costing $2,000,000; the People's Savings Bank, which will be 15 stories high, involving an estimated outlay of $600,000; the Arrott Block, costing a similar amount; the Keystone Bank Building, costing $500,000, and the new Exposition Building, estimated to cost $275,000. The architects for the latter building are D. H. Burnham & Co. of Chicago, and it is expected to have it completed within the record breaking period of 20 weeks, and in order to accomplish this the work will be carried forward night and day, so as to have the building ready for the season which opens on October 4. Architects Alden & Harlow have recently awarded to A. & S. Wilson the contract for the new residence of A. R. Peacock on North Highland avenue, the estimated cost being placed at $140,000. It will be a fire proof structure, three stories high, the principal materials used being steel, terra cotta, brick, stone and marble. It will be colonial in its style of architecture, and will contain 36 rooms.

The building permits issued in Allegheny during the month of March were 81 in number, and the estimated cost of the improvements $134,150. This record is almost double that for the same month last year.

Portland, Oregon.

Portland building operations are opening up on a large scale this spring, the demand being chiefly for dwellings that will rent for from $10 to $20 per month. Several elegant homes are also to be built in the East Side and Nob Hill section of the city. Real estate dealers report many inquiries for residence sites in the new additions and other outlying districts. The labor situation is considered propitious; also the material situation in general, though there is said to be something of a scarcity in some of the finer grades of finished lumber.

Racine, Wis.

At a recent meeting of the Builders and Traders' Exchange, held at their quarters in the Young Men's Christian Association Building, the following officers were elected for the ensuing year:

President,
George W. Horlick.
First Vice-President,
H. R. Edwards.
Second Vice-President,
E. A. Cornwall.
Treasurer,
O. C. Davis.
Secretary,
John M. Driver.

Directors for Three Years.—Frederick Nelson and John M. Evans.

Directors for Two Years.—Simon Starke and Jacob Mahr.

Directors for One Year.—John M. Roberts and Thomas M. Gleason.

The regular meetings of the exchange are held on the second Monday of each month.

According to Secretary Driver, business in the building line is active, and there is a considerable amount of work in view, not only in Racine, but throughout that district. The work involves both public and private buildings, including many dwellings adapted to meet the requirements of those in moderate circumstances. Altogether the prospects are such that the year 1901 promises to eclipse any previous year in the building line, not even excepting prosperous 1892.

St. Louis, Mo.

Advices from St. Louis under date of April 12 are to the effect that the building situation is not, broadly considered, of the most encouraging nature. It is true that many plans are being considered, but the owners are dilatory in proceeding with the work, and in a number of cases the plans have been shelved for future action. The work that is now under way is being done at an extremely low figure, which would naturally be interpreted as indicative of unhealthy conditions as applied to building operations. The anticipated increase in the building business in vew of the World's Fair has not yet materialized, although the volume of building, more particularly that of commercial and office structures, exceeds up to the date of advices that of last year. The general feeling among the contractors and builders is that their business will not experience any decided activity for at least six months.

At the annual meeting of the Building Contractors' Association of St. Louis, held at their quarters in the Turner Building, 304 North Eighth street, the following officers were chosen for 1901: James Kearney, president; John B. Hughes, first vice-president; Patrick Rowan, second vice-president; John J. Collins, secretary; John M. Powers, treasurer, and Joseph H. Furber, assistant secretary.

The St. Louis Architectural Club met Wednesday evening, April 3, in its rooms at 916 Locust street, and elected officers as follows: President, G. M. A. Brueggeman; first vice-president, J. P. Jamieson; second vice-president, Charles O. Pfeil; secretary, Ernest Helfensteller, Jr.; treasurer, Charles H. Dietering. Those on the Advisory Board are Edward G. Garden and F. A. P. Buford.

Salt Lake City, Utah.

For some time past the building contractors of the city have been endeavoring to perfect an organization to enable them to meet the demands made upon them by organized labor. A number of informal meetings were held to determine what might be done in this direction, and finally it was decided to form for mutual benefit the Association of Contractors, with the following officers: President, H. J. Hayward of the Salt Lake Building & Mfg. Company; vice-president, C. J. Brain; secretary, Asper Noall, and treasurer, Frank Atkinson.

San Francisco, Cal.

Building in San Francisco seems to be tending toward large fire proof structures this season, says our regular correspondent under date of April 6. The building of smaller structures and moderate cost residences is not entirely neglected, but there is no unusual activity in those lines. Projects for large fire proof office, factory and apartment buildings are, however, very numerous. The proposed new structures of this sort range from 2 to 11 stories in hight, and are located in all parts of the city.

In the region lying south of the city, in San Mateo County, building is very active. The extending of the electric car lines in that direction has led to a great deal of building, all of which is in the nature of high-class dwelling houses. In the Alameda County suburbs, building is perhaps not quite so active as a year ago, but the situation is nevertheless very good.

Spokane, Wash.

There is an active demand for houses at fair rental in the city, the result of which is seen in the large number of dwellings and apartment houses now in course of erection. It is stated that the number in progress is in excess of that of last year, notwithstanding a vast amount of new work was executed at that time. Two new warehouses are contemplated in the heart of the city, and in addition the Great Northern Railroad is about putting up a new passenger depot upon its property near the river bank. Scores of small cottages are under way in the suburbs, and work upon a number of improvements will be commenced as soon as the weather permits. An interesting feature in connection with the buildings erected in Spokane is their freedom from fire, the department claiming that during the month of February not one dollar's worth of property was lost through conflagration.

Springfield, Mass.

While comparatively few large buildings are under way or in contemplation, there is more or less building of dwelling houses scattered over the city and suburbs. The building outlook is not of the most encouraging nature, yet architects and builders appear to be hopeful of a fair season's work.

At the annual election of the Springfield Builders' Exchange the following officers for the year 1901 were chosen: President, E. T. Davis; first vice-president, C. P. Chase; second vice-president, E. W. Shattuck; secretary, William J. Hyland, and treasurer, S. H. Howland.

The first annual banquet of the Springfield Builders' Exchange was held in Cooley's Hotel on the evening of Wednesday, April 10, a large representation being present. The company assembled at 8.30 and while the banquet was in progress the Philharmonic Orchestra furnished music. President E. T. Davis acted as toastmaster, and at his right and left were Mayor Hayes and Wm. H. Sayward, the latter being secretary of the Master Builders' Association of Boston. Speeches were made by J. G. Smith of New Haven, who gave a short history of the exchange in that city; James A. Fogarty, also of New Haven, and L. O. Eaton and C. P. Chase of Springfield. These were followed by Mr. Sayward, who spoke at considerable length and touched upon many points of value to those interested in the Builders' Exchange movement. He described the formation of the Boston association, telling of the organized work that had been done before it was brought to its present fine condition, and offered suggestions looking to the improvement of the local exchange. The remarks were well received and the occasion as a whole was one which will be long remembered by those present.

Tacoma, Wash.

The fine weather of the early part of March set the builders of Tacoma at work, and a great many new buildings are now under way. In the residence district, extending from the race track to Whitworth College, over 40 new houses are being built. Among the new buildings are two modern eight-room cottages in Colonial style, for Mrs. B. Bartlett, a similar building for Mrs. E. Kachlein, two houses for Conrad Dahl and one for Mrs. E. Frank.

Toledo, Ohio.

In our last issue we made reference to the annual meeting of the Builders' Exchange and to the selection of a Board of Directors for the new year. Since that issue went to press the directors have selected the following officers in addition to those previously named: Secretary, Albert Neukom; treasurer, John W. Lee; assistant secretary, P. J. Kranz. At this meeting President Creswell appointed committees for the ensuing year, including those on membership, rooms, finance and arbitration.

Notes.

A movement is on foot in Clinton, Mass., to establish a Master Builders' Association, which will include among its membership members of the hardware and allied trades.

It is stated that 50 new residences will be put up in Winchester, Ind., during the present season, in addition to several business blocks. A new hall, three stories in hight, will be erected by the Red Men.

THE ART OF WOOD TURNING—XVII.

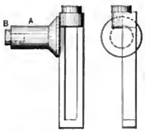
(SECOND SERIES.)

BY FRED. T. HODGSON.

THE tool slide, or, as before styled, the eccentric cutter, must now be dealt with. It must be made from a forging represented by Figs. 113 and 114. In the first place, it must be carefully centered and the short pin A turned to accurately fit the bearing in the flange. Before this operation is commenced the forging must be shortened as nearly as possible to the ultimate length required. The tail end of the pin is then drilled and tapped to receive a screw. The extreme end is reduced in diameter as at B, to fit the recess in the wheel of 36 teeth, which has to be fixed to it, and as the space in which this has to work is limited the head of the screw is countersunk into the lower face of the wheel. If the operation of fitting the stem has been so executed that when in its place the front center is absolutely true, all is well. If not, the center must be accurately found and defined, as it is from this that the top surface of the slide has to be fitted when proceeding to fit up the slide. It will be seen that the extremity of the pin nearest the slide is turned to a cone, which must, of course, precisely correspond with that in the bearing B, Fig. 109. This affords a ready means of taking up any slight wear that may occur. The wheel when thus fixed is immediately above the 48 wheel, which is fixed to the main spindle, and in consequence of the small space that intervenes both must necessarily be very close together, but at the same time perfectly free from contact one with the other.

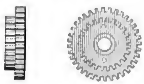
While the front part of the slide is in progress of finishing it is advisable to place a piece of tube over the pin or stem A to prevent damage to the fitting, if from any cause a slip of the file should occur. Fig. 115 shows some of the minor parts of this portion of the eccentric cutter and will aid in a thorough understanding of the instrument in detail. Figs. 116 and 117 illustrate the pair of extra wheels necessary to the production of four looped figures. These, however, are made in precisely the same way as the 36 and 24 toothed wheels are made, but their numbers are instead 24 and 48. These are provided with a steel collar and are fixed together by the two small steel pins, as shown.

These illustrations and descriptions are expected to be ample and sufficient to enable any intelligent machinist to contruct the instrument, but to make the matter more clear various illustrations of the *ensemble* are exhibited in Figs. 118, 119 and 120, in which the various parts previously described may be readily recognized. The whole of the working parts are shown as clearly as possible, and being partly in section, the definition is distinct and easy to grasp. The complete instrument, put together and ready for work, is shown in perspective in Fig. 120. We are now ready to put the instrument to use, but, before doing so, it may be well to point out that the division of the flange D, also the adjusting screw F, are of the same relative value as those on the micrometer of the screw of the eccentric cutter K, which in its turn agrees with all screws of a similar description for like purposes. This will be recognized, thus: One turn moving the tool to a radius of 1-10 inch, while a corresponding movement of the screw F results in the same amount of eccentricity to the flange D, and in this way the two movements are obtained and adjusted in the proportions required for ellipses of various differences between their two axes. It must be remembered that the eccentric cutter K has fixed to its termination a wheel of 36 teeth, and that the two wheels of 24 and 36 respectively are attached and revolve on the stud, and by these the 48 wheel is fixed to the spindle and the 38 on the cutter K are connected. And it will be seen that upon rotating the pulley and flange D one complete turn or circle the eccentric cutter K revolves twice in the opposite direction, which causes the tool to trace or cut an ellipse, the various degrees of difference in the form being decided, as before stated, by the adjustment of the two points D and K, the longer or transverse axis being always twice the amount, while the short diameter or conjugate axis equals twice the difference. Therefore any variation may be obtained by the setting of these eccentricities to produce an elongated ellipse, or the same may be reduced to a circle if desired.

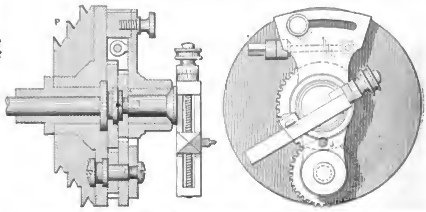


Figs 113 and 114.—Face and Side Views of Eccentric Cutter.

Fig. 115.—One of the parts of the Cutter.



Figs. 116 and 117 –Side and Face Views of Pair of Extra Wheels.



Figs. 118 and 119 —Sectional and Face Views of Instrument, Showing Parts Assembled.

The Art of Wood Turning.

As we are already aware that the worm wheel is provided with 150 teeth, and is divided into 75 equal parts on the chamfered edge, and the micrometer of the screw being set in four equal parts, and figured 0, 1, 2, 3. We are also equally aware by this that one turn of the screw will move the wheel through the space of one tooth, by which movement the 48 wheel attached to the main spindle is rotated to the extent of the movement given to the wheels. One-quarter of the turn, or, in other words, one division of the micrometer, precisely compensates the angularity occasioned by the flange D being moved one division. If the flange is increased, the worm wheel must be correspondingly moved in the same equal proportion; while, if the ellipses are cut with the eccentricity of the flange reduced, the worm wheel must be moved proportionately, only in a contrary direction. In most instances the worm wheel attachment is employed to compensate every individual movement of the flange; but it is also of considerable service for placing the various patterns in different positions on the work, and it is at times used entirely for this purpose, the work being held stationary by the index in the dial plate.

When about to start a pattern in the lathe the best way is to commence with the instrument set for the center—that is, the worm wheel, flange D, and eccentric cutter K, all carefully adjusted to their respective zeros or starting points, and when thus set, if the instrument is accurately made, the tool will cut a minute point only. The hight of center must also be closely studied and the tool adjusted accurately to it by the diverting ring of the slide rest, which, of course, carries the whole instrument. It must also be set to the same point laterally. Now, by these adjustments being correctly carried out, the pattern produced will be the center of the object to be decorated.

As a primary example of simple pattern adjustments we will take a series of ellipses of equal proportions, or, in other words, concentric. The first thing will be to pay great attention to the setting of the tool exactly in the center in both directions. The eccentric cutter may now be moved, say, eight divisions of its micrometer, and the flange moved four divisions of its scale, and to place the individual or separate cuts in equal proportion the movement of each must coincide. The number of separate ellipses is divided by the movement of the dial or index plate, and any other position is determined by the lateral movement of the slide rest. To produce a pattern in which a series of ellipses are all required to be in one parallel line the eccentricity of the flange must remain unmoved, while that of the eccentric cutter is reduced in equal ratio for each consecutive cut. A third and very effective result is attained by first cutting a straight line and afterward reducing the proportions until a

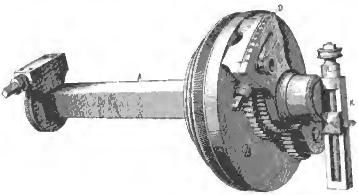


Fig. 130.—Perspective View of Instrument Ready for Work.

The Art of Wood Turning.

circle is the result of the terminal cut. For instance, the eccentric cutter K and flange D are both equally extended, as to eccentricity, to cut the straight line. The cutter K then remains unaltered while the flange D is reduced for each cut until the zero coincides again with the reading line, when a circle equal to its eccentricity will be produced. By the foregoing examples a clear idea is obtained of the way the instrument is to be employed for simple ellipses, the extent of variation being practically without end.

As the more complex patterns are approached it will be found necessary to employ the worm wheel and tangent screw at the back, to adjust the different cuts to the required positions. The worm wheel having 150 teeth, the micrometer on the screw being divided into four, and one turning moving the wheel through the space of one tooth, it will be seen that it will necessitate 37½ turns to place two ellipses at right angles one to the other; but it must be remembered that the number of turns must be calculated from the division at which the wheel stands when it has been moved to compensate for any extension of the flange D for the first cut. To place the ellipses equidistantly it will, therefore, require 25 turns of the tangent screw for each, and by calculation any number of ellipses may be then placed within a given space on the work.

We have now regarded the manipulation of the instrument as far as its power of cutting ellipses of any proportion between the straight line and the circle is concerned. Its capabilities, however, are largely extended by the introduction of extra wheels of 24 and 48 teeth. The two wheels replace the 24 and 36 on the stud, while that on the stem of the eccentric cutter has substituted for it one of 24, in the place of that having 36 teeth. To make this alteration the screw is removed from the stud and the milled head screw taken out, the flanges then withdrawn from the face, the 24 wheel fixed in the eccentric cutter, the 24 and 48 to revolve on the stud and the flange replaced. The 48 wheel attached to the main spindle running through the stem is never changed. When withdrawing and replacing the flange, the two screws being removed, it can be easily accomplished. As the nut through which the main screw works is provided with a circular pin, it only remains to see that this fitting and that of the stud coincide with the corresponding holes in the flange and replace the screw.

New Publications.

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This directory, which has been published annually since 1891, contains over 350,000 names, addresses and business classifications, with full lists of manufacturers of every kind of material, apparatus and machine used in the building trades. It is probably the most complete work of its kind ever brought out, and will be found of great value to the buyer or seller, the architect, the engineer, the contractor, the purchasing agent, the manufacturer, and many others. It includes all professions and trades interested directly or indirectly in the industries indicated by the title and gives many valuable mailing lists of the entire country. Some idea of the scope of the work may be gathered from the statement that the names are classified alphabetically by trades and professions under more than 5000 headings, requiring an index of contents of 44½ pages, giving more than 200 classifications on each index page and covering every city, town and hamlet of the country. The list of architects requires 24 pages of the volume, the brick manufacturers 30 pages, carpenters, contractors and builders 153 pages, masons and builders and their materials 56 pages, sash, door and blind manufacturers 21 pages, roofers and roofing materials 45 pages, architectural and interior wood work 10 pages, and so on through the list of the building and allied industries. The work has been most carefully compiled by men who have familiarized themselves with the industries represented, and the publishers point out that it is a directory into which every firm name, address and business classification is inserted, regardless of patronage.

THE WINSLOW TABLES. By Benjamin E. Winslow. Size 12 x 9½ inches, 53 pages, including 19 full-page plates, bound in board covers. Published by the Engineering News Publishing Company. Price $2.00, postpaid.

The object of this work is to furnish to architects, engineers and others interested in construction, a rapid and easy means of computing sizes of beams and columns by the use of graphical tables. No attempt has been made to deal with complicated engineering problems or with such as are of infrequent occurrence; neither has the author thought it avisable to recommend the safe working stresses to be used in any special case. For the purpose of increasing their accuracy, all the diagrams have been reproduced from large drawings and the positions of all the lines have been verified with the greatest care. The author states that he has used the tables daily for several years with a great saving of time and labor in making calculations of strength for the public school buildings of Chicago and for other important structures. The diagrams are intended for calculating the strength of wood, steel and cast iron beams and columns.

Commencement Exercises of the New York Trade School.

The twentieth annual commencement of the New York Trade School, First avenue and Sixty-seventh street, New York City, was held on the evening of Wednesday, April 10, in the presence of a large and enthusiastic audience which filled the auditorium to overflowing. Upon the platform were a number of the trustees, as well as several representatives of the various trade associations. The exercises opened with a short address by President R. Fulton Cutting, who called the attention of the young men to the fact that there were two great things to which they should apply themselves in life. One of these was to acquire a thorough knowledge of their chosen trade and the other was to apply the knowledge they had attained. The speaker also emphasized the importance of honesty and industry as essentials to success and pointed out that the young man who makes a reputation for honesty possesses a capital that is worth everything in life, and is something that he cannot lose.

At the conclusion of Mr. Cutting's remarks graduating certificates were distributed to the pupils by F. Augustus Schermerhorn and Thomas J. Tuomey. After this ceremony William E. Dodge, one of the trustees, presented the "honor rolls" to those entitled to them, and as the parchments were distributed he shook each recipient heartily by the hand and congratulated him upon his success. It may be interesting in this connection to state that the honor men were those obtaining 95 per cent. or over out of a possible 100 per cent. in their examinations and during their season's work. In the class in carpentry there were three receiving this standing, being David W. Van Nostrand of College Point, L. I., William A. Cornell of Pleasantville, N. Y., and Frank Lier, Jr., of New York City. The honor man in the bricklaying class was George L. Werle of Warren, Pa.

William H. Oliver, representing the Master Painters' and Decorators' Association, presented the *Painters' Magazine* medal to J. E. Helderman of Great Neck, L. I.

The medals given by the Master Steam and Hot Water Fitters' Association were presented by John J. Smith, who represented the committee having the matter in charge. Two medals were awarded, one going to the scholar in the day class who showed the greatest proficiency, and the other to the pupil in the evening class who stood the highest. There were five pupils whose work was of such a high order that in the estimation of the committee they were entitled to honorable mention, and these young men were called to the platform. In the course of Mr. Smith's remarks he stated that the examination was very exacting and a very high standard was required. One scholar graduated at a standing of 90 per cent. and another had 98 per cent. Pupils receiving the medals were Elwood Noyes of Amesbury, Mass., and Charles Schweiker of Brooklyn, N. Y.

President Cutting then introduced Prof. Nicholas Murray Butler of Columbia University, who made the address of the evening. The dominant feature of his remarks was the importance of brains and skill in the pursuits of life, pointing out that in this country at least there is no place for drones. Everybody is supposed to be trained to a life of work of some sort, and that everywhere the genuine American citizen is to be found at work. There is no occupation of man in which brains may not be used and in which skill may not be developed. The speaker also laid stress upon the fact that in order to succeed in life it is necessary to thoroughly learn the technique of a calling down to its very limits, and at the same time to make ourselves as broad, as generous and as interested as possible in other things in order that we may have a full, rich life. If a man knows absolutely nothing but his trade or calling he cannot compete for a moment with the man who knows many other things, is well read, has studied, has thought and has more character, therefore more personality to put into the work which he does. The question of skill is not of the hand alone, not of being able to mold, to move and create the finished product from the crude materials, but to do that with personality, to do it with character and with interest. Everything that goes to make up a broad, widely informed nature will largely come from the study of the reasons for things, what are called the theoretical reasons which give rise to practical rules that concern us in life.

The address of Professor Butler was followed with close attention, and at the conclusion the speaker was loudly applauded. The testimonials of merit were then distributed by James Curran and George A. Suter, after which the exercises were completed by a few remarks by President Cutting.

There were 12 graduates in the day class in carpentry and ten in the evening class, eight in the day class in bricklaying and eight in the evening class, 38 in the painting class, five in the class in plastering, 163 in the plumbing classes, 17 in the class in steam fitting and 26 in the cornice class.

Houses for Canary Islands.

Builders may be interested in knowing that Consul Berliner of Teneriffe, Canary Islands, under date of March 6, 1901, reports that he has a request for plans for frame or wooden houses, ready to be put up without delay. The person making the inquiry is anxious to have circulars or any matter appertaining to this subject, as he is contemplating the building of this class of structures. If the necessary information is sent to the United States Consulate at Teneriffe, it will, in the opinion of Consul Berliner, lead to business.

THE Armour Institute of Chicago, which owes its existence to the late Philip D. Armour, has received an addition of $1,000,000 to its endowment, a gift from Mrs. P. D. Armour and J. Ogden Armour, the widow and son of the founder.

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RESIDENCE OF MR. GEORGE F. QUINBY, CORNER OF CARRUTH AND SHENANDOAH STREETS, ASHMONT, BOSTON, MASS.

ARTHUR W. JOSLIN, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MAY 1901

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JUNE, 1901

Three Months' Building Operations.

A visit just at this season to the upper portions of New York City, more particularly the west side and above the Harlem River, cannot fail to impress the most casual observer with the fact that there is a vast amount of building in progress both in the way of private dwellings and of apartment houses, many of which, being in excess of five stories in hight, are therefore equipped with passenger elevator service. Perhaps one reason for the unusual activity during the past month is the exemption given to builders from the strict terms of the new building law, provided foundations to buildings are actually commenced prior to June 1. Another may possibly be found in the progress of the work on the "Subway," which, when completed, will greatly reduce the time between the City Hall and the section known as Washington Heights, and beyond, where real estate is changing hands at a rapid rate, and preparations are making for increased building operations. In this connection it is interesting to note the figures of the report of the Department of Buildings issued early in May for the quarter ending March 31 of the present year. For the five boroughs constituting Greater New York applications were filed for new buildings and alterations involving an estimated outlay of $38,083,722, as compared with $18,377,689 for the corresponding quarter of last year. By far the largest proportionate increase is found in the figures for the boroughs of Manhattan and the Bronx, due perhaps in some measure to the expectation finally realized that the laws governing tenement house construction would be changed. For these boroughs the estimated cost of new buildings and alterations for the first quarter is placed at $31,714,290, as against $14,006,011 for the corresponding quarter of 1900, while for Brooklyn the figures are, $5,263,215 and $3,360,670 respectively. In the boroughs of Manhattan and the Bronx plans were filed for 700 flat and apartment houses estimated to cost $18,800,000, as against 184 buildings of the same general class, estimated to cost $7,791,200, for the first three months of last year. In the five boroughs there were projected during the first quarter of this year dwelling houses, not including those of wood, involving an estimated outlay of $2,924,430; while of frame dwellings there were 518, for which plans were filed costing $1,808,318. Of public municipal buildings there were 16 for which permits were issued, having an estimated cost of $2,433,000; while of hotels and boarding houses the report shows plans to have been filed for 15, to cost $3,771,650, and of manufactories and work shops 57, to cost $2,729,850, all of which, labor troubles aside, indicates much that is encouraging for the building season of the present year.

The New Tenement House Law.

The law which has recently been enacted by the New York State Legislature governing the erection and supervision of tenement houses in New York City defines a "tenement" as any building wherein three or more families reside. This includes all kinds of apartment houses, as well as tenement buildings. In addition to providing for more air, light, comfort, better sanitation and greater safety to tenement dwellers in New York City, the new law creates a department in the city government to be called the Tenement House Department, to which is intrusted the enforcement of the law. Enactments were carefully drawn, and it is confidently expected by the members of the Tenement House Commission and others interested in the better housing of the poor that the accommodations available to many thousands of New Yorkers who are obliged to live in tenements will be vastly improved in the future. One of the features of the new law is that the limit for the hight of a tenement house is the width of the street and one-third more. Thus, upon a street 60 feet wide a tenement 80 feet high may be built. It is further provided that every tenement 60 feet in hight must be provided with a yard 12 feet deep in the rear, with an additional foot for every additional 12 feet of hight. Special attention has also been paid to the securing of fire protection to tenements. Every tenement over five stories high is obliged to be fire proof under the new regulation.

Municipal Ownership of Tenements.

It is said that Glasgow, Scotland, is one of the best managed cities in the world, and it offers, perhaps, the most prominent example of the policy of municipal ownership of public facilities extant. Everything which touches the public interests, as distinguished from private business, is municipalized, and the experiment, so far, has worked passing well. Perhaps the shrewd, calculating Scotch characteristic of its inhabitants has something to do with the success of the plan. The gas and water works, sewerage, electric lighting and street railways of the city are all owned and operated by the municipality, and are managed so satisfactorily as to yield a handsome revenue, while the cost of these facilities to the public has been materially reduced. So successful has been the management of the street railways, for example, that rates have been fixed at 1¼ cents a mile, which is considerably below the rate in most of our large cities. The latest, and perhaps the most interesting development in this line that has lately taken place in Glasgow is the municipal ownership of tenements, an innovation that is probably peculiar to the city on the Clyde. A few years ago the city obtained permission from the British Parliament to condemn certain tenement houses as unsanitary. These buildings, which were of ancient date and located in the most crowded district of the city, were demolished and the owners refused to rebuild. The municipality then bought the ground at a valuation fixed by arbitrators, and erected 1375 model tenements, housing over 6000 persons. The power to condemn buildings as unsanitary is still vested in the city authorities, who propose to undertake further work on the same lines as the need occurs. The experiment, which has not yet been long enough in operation to determine results, will be worth watching; but, however successful it may prove in Scotland, it is doubtful if any such socialistic measure would be acceptable to the people of America, who have a strong aversion to paternalism, whether municipal, State, or Federal.

A Chicago Feat in Rapid Building.

A remarkably rapid piece of construction work has been accomplished in the erection of the new mercantile building and warehouse for Sears, Roebuck & Co., at the corner of Fulton and Jefferson streets, Chicago, after plans made by Architects Nimmons & Fellows, 204 Dearborn street, Chicago. The permit was issued on February 20, and the building of ten stories, including double basement, is practically completed, and was occupied the first week in May. The building covers a ground space of 150 x 170 feet. It cost $350,000. The structure has many points of unusual interest. It consists of the highest type of mill construction, and has features about it which make it far more fire proof than the ordinary building of this character, for the reason that the timber usually employed in floor joists, laid on top of girders, is utilized in adopting the same quantity of lumber thus employed in increasing the thickness of the floor boards. The floors are, therefore, 6 inches of solid wood, and span the entire distance from one girder to the other without any intermediate joists and without employing any more lumber than is necessary to construct the ordinary mill constructed floor of 3-inch plank flooring. This floor gives the twofold advantages of being much neater and more attractive in appearance and also being more fire proof. The spikes used in the flooring were 10 inches in length, and were made to order.

Other advantages are the increased available head room, which may be used in each story; the simplifying of the automatic sprinkler system, the deadening of sound and the absolute water proofing of each floor at every story, so that in case of fire, or in case of the discharge of the sprinkler system, the stock of merchandise underneath the point of discharge of water may be entirely saved by the water proof process adopted in the flooring. The top story, which is to be used for clerical work, will be occupied by about 2000 clerks, and has been constructed with a saw tooth skylight roof, so that perfect north light is secured for the entire floor. This enables the utilizing of every square foot of the floor without the use of any artificial light until the sun goes down, as the floor will be practically as well lighted as if there were no roof on it at all.

Practical Value of Designs in Carpentry and Building.

It is interesting as showing the wide circulation and importance of *Carpentry and Building*, as well as the care with which the designs presented within its covers are studied by intending builders, to mention that the house forming the basis of the supplemental plate accompanying our issue for October of last year, and designed by John P. Kingston of Worcester, Mass., is being duplicated in Havana, Cuba, for Charles R. Todd, a merchant of that place. The construction of the house is along lines calculated to specially meet the requirements of the climate of Cuba, and in the execution of the work brick is being largely employed. In the arrangement of the house there are four large rooms on the first floor, with a broad hall in the center, and on the second floor are five rooms and bath.

While possibly this may not have been the very first house designed by an American for erection on the island it is certainly among the first, and is a distinction for the architect, as well as a compliment to American architecture. Mr. Kingston advises us that the house which we illustrated in the issue for May, 1900, being that of Edward Moulton, impressed a resident of Clearfield, Pa., so favorably that he secured a set of drawings from which to build one like it. These are not exceptional instances of the kind, but simply emphasize in a marked degree the practical value of the designs which appear in the columns of *Carpentry and Building*.

A NEW nine-story building is to be erected by the Colonial Trust Company of Reading, Pa., in accordance with plans prepared by Architects Seymour Davis and Paul A. Davis, third, of Philadelphia, who secured the commission in competition with eight other architects. The structure will cover an area of 60 x 120 feet and will cost about $130,000.

New Chamber of Commerce Building.

For some time past a movement has been on foot by the New York Chamber of Commerce looking to the provision of new quarters in the shape of a building of their own. Plans have just been completed for the erection on the site of the old Real Estate Exchange, at Liberty street and Liberty Place, of a structure of white Vermont marble, with a white granite base, the design being classical and monumental in character. According to the drawings of Architect James B. Baker, the building will be four stories in hight, the first floor being some five steps above the street and intended to be used as a banking room, handsomely finished, with mahogany fittings and marble mosaic floor. The main entrance to the building will be on the Broadway side, opening into a large vestibule, which in turn admits one past the elevators into a monumental hall and stairway 20 feet wide and 80 feet long, extending through two stories. It will be built of Caen stone and marble and will have an overlooking gallery at one end. Opening directly off this gallery and also from the platform at the head of the stairway will be the main room or "Chamber of Commerce," which will occupy the second floor, the room being 90 feet long, 60 feet broad and 30 feet high. The room will be wainscoted, with fixed seats, while the floor will be white marble. Light will be admitted through windows some 20 feet above the floor and also through an immense skylight in the ceiling which opens into a court of equal dimensions extending through to the roof. The third story of the building will be occupied by the executive and committee rooms of the Chamber, while the fourth story will be occupied as reading room, club room and commercial library, together with a small kitchen and serving room.

A Seven-Story Building Successfully Raised.

An interesting piece of work, which has recently been successfully executed, was the raising of the seven-story Cambridge Hotel building at Thirty-ninth street and Ellis avenue, Chicago, and this without so much as cracking the plaster of a wall. The building, constructed in 1892, had originally only a 5-foot basement, which was not sufficient to allow the boilers in the steam heating and electric lighting plants to come up to the grade level necessary under city ordinances. The building had to be raised 3 feet. This has been done by using over 1500 jack screws, combined with a steel substructure. The work was completed in 21 days instead of 30, the limit placed in the contract. The contractors were the L. P. Friestedt Company, 145 La Salle street, Chicago.

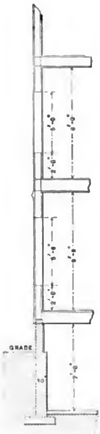
The Cambridge Hotel building contains 450 rooms, is seven stories in hight and is built of brick on a steel frame work. It covers a ground space of 50 x 138 feet, is 150 feet high, and weighs 15,000 tons. This is claimed to be the highest building ever raised, except a church whose steeple was 145 feet high. The company were under a $75,000 bond not to injure the building, and the work was accomplished according to specifications and in nine days less time than the limit allowed. The company had 80 men on the building, with four foremen and one superintendent, and the work went on without a hitch.

New Stock Exchange Building.

The new building which will be erected on the site of the New York Stock Exchange will be 10 stories in hight and will have a frontage of about 138 feet on Broad street, 153 feet on New Street, and 15 feet on Wall street. The *façades* will be of marble and the estimated cost of the structure is placed at $1,000,000. The plans were drawn by Architect George B. Post, and the contract for the work has been awarded to Charles T. Wills. The caissons for the new structure will be sunk by John F. O'Rourke, all of New York City.

A ROW OF HOUSES IN EAST ORANGE, N. J.

IT was not so very many years ago that it was common practice to so design a row of houses as to make each individual structure severely like its neighbor, giving them a general effect which in these progressive times would be regarded as extremely monotonous. This practice, we are pleased to state, has given way to a more attractive style of architecture, in which variety of effect is the object sought, and now in the suburban districts as well as in the smaller cities and towns, one may find rows of dwellings where each building has an external treatment differing from that of the one adjoining, and thereby increasing not only the attractiveness of the street upon which the houses are located, but adding to the beauty of the buildings themselves. A good illustration of this tendency may be found in the picture which forms the basis of our half-tone supplement plate this month. Here is represented a row of cottages in which the treatment of the exterior is varied in a marked degree; the one in the immediate foreground being in its general aspects strikingly different from the one at the extreme left, which partakes of the early English in its architectural design.



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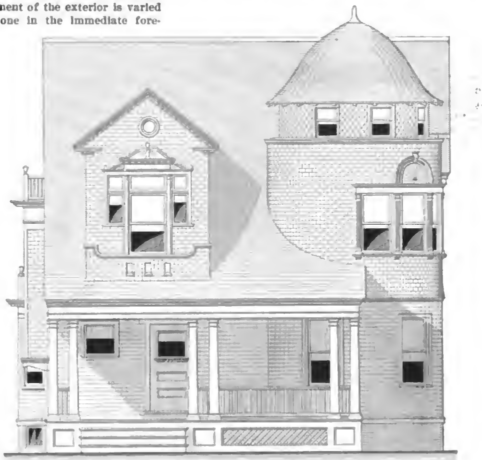


Front Elevation.—Scale, ⅛ Inch to the Foot.

A Row of Houses in East Orange, N. J.—F. R. Comstock, Architect, New York City.

The house which we illustrate upon this and the following pages is the one shown at the right in the picture. Prominent among its external features may be mentioned the tower at the corner, with its triple window, the bays at the sides, the broad window which lights the landing of the main stairs, the overhanging gable and the dormer window shown in the front elevation. The treatment of the exterior involves a liberal use of shingles above the belt course of the first story, the general effect being hightened by contrast with the pure white trimmings.

An inspection of the plans shows upon the first floor a library, dining room, reception room and kitchen, together with a commodious staircase hall, kitchen pantry, closets, butler's pantry and a rear hall. On the second floor there are four sleeping rooms, a den in the front of the house looking out upon a little balcony, a bathroom and closets for each sleeping room. From the den access to the balcony is obtained through a swinging panel back window. There are also main and rear stars, so that the servants are not compelled to enter the front portion of the house in order to reach the upper floors. In the attic is a sleeping room and ample space for storage purposes.

The construction of the frame is of spruce, the bearing beams being 8 x 10 inches, the sills 4 x 6 inches, the first and second floor timbers 2 x 10 inches, the attic floor timbers 2 x 8 inches placed 16 inches on centers, the main rafters 2 x 8 inches, and the valleys, hips and ridges 2 x 10 inches. The exterior wall studs are 2 x 5 inches and the partition studs 2 x 4 inches. The outside casings on attic, second story and dormer windows are 2½ x 1¼ inches, all molded casings excepted. The corner boards are 4 x 1¼ inches.

The interior finish of the principal rooms on the main floor is in oak, while the second floor is treated in cypress. As showing the attention which the architect has given to some of the little things, it may be mentioned that the specifications state that the side gas fixtures in the second story rooms are placed 6 feet from the floor, the exception being the light in the den, which is 6½ feet from the floor. That portion of the second story hall at the entrance to the bathroom is lighted by means of a window 4 x 2½ feet in size, placed in the partition 6 feet above the floor. An inspection of the floor plan will show its exact location. The kitchen and bathroom are wainscoted 4 feet high, and just over the drain board of the sink is a window 2 feet high, which is made to slide up into the head jamb. This is a convenient feature, as after the dishes are washed they may be passed through the window to the counter in the butler's pantry, thus effecting a saving of many steps.

The row of houses here illustrated was erected on

Eighteenth street, East Orange, N. J., for Leon Morgan, in accordance with drawings prepared by Architect F. R. Comstock of 20 East Forty-second street, New York City, the builder being Joseph Davis of East Orange, N. J.

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

Base.—Scale, 3 Inches to the Foot.

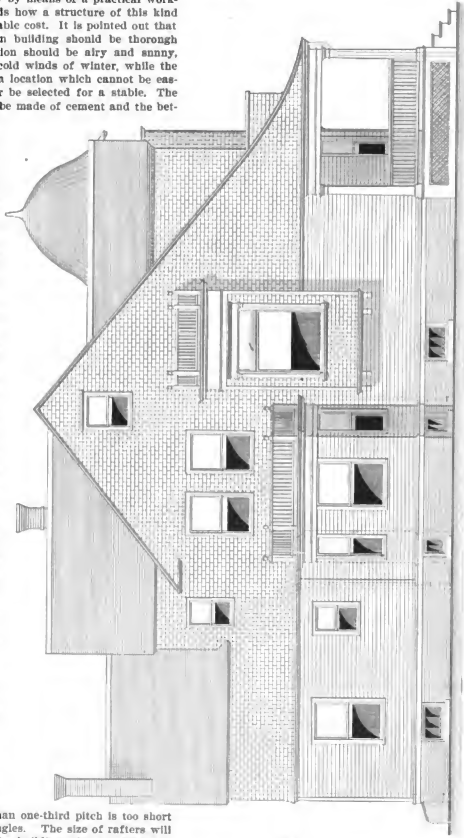
A Model Stable at the Pan-American Exposition.

One of the many features which will interest builders who may visit the Pan-American Exposition just opened at Buffalo, N. Y., will be the demonstrations by F. A. Converse, who will show by means of a practical working stable on the grounds how a structure of this kind can be built at a reasonable cost. It is pointed out that the first consideration in building should be thorough drainage, that the location should be airy and sunny, but not exposed to the cold winds of winter, while the fact is emphasized that a location which cannot be easily drained should never be selected for a stable. The floor should in all cases be made of cement and the better and more thorough the foundation is constructed the cheaper it will be in the end. Under no consideration can a stable be built properly with storage room overhead. It may be connected with the barn and silo at one end, but to be right it is important that the construction be entirely separate.

The foundation wall should not extend above the floor. From the floor level, the stable walls should be built with a dead air space, as this is the most satisfactory nonconductor of heat and cold. Starting from the top of the foundation wall, a sill is imbedded in fresh cement mortar. This should be 6 inches square, halved and pinned at the corners in the usual manner. Studding 2 x 6 inches by 8 feet, 3 feet apart, are toe-nailed into the sill, upon the upper ends of which is spiked a 2 x 6 inch plate.

Building paper should be used both inside and outside of the studding, thus making a 6-inch dead air space. This paper may be protected with cheap or expensive boarding at the option of the builder. If the paper is carefully put on, it will provide the necessary air space without respect to the quality of lumber used. The roof should be steep, as anything less than one-third pitch is too short lived if covered with shingles. The size of rafters will depend on the size of the building, though, generally speaking, 2 x 4 inches, placed 2 feet apart, for a rafter up to 12 feet in length, is strong enough for one-third pitch or steeper.

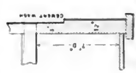
Make ample provision for large windows, especially in the south side. Admit sunshine, if possible, into every corner of the stable. To secure proper warmth



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

A Row of Houses in East Orange, N. J.—Elevation and Miscellaneous Details.

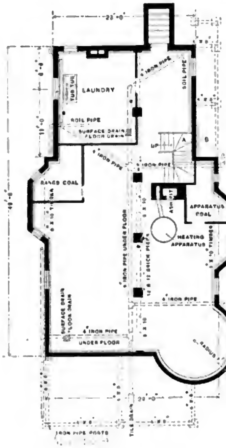
Detail of Water Table.—Scale, ¾ Inch to the Foot.



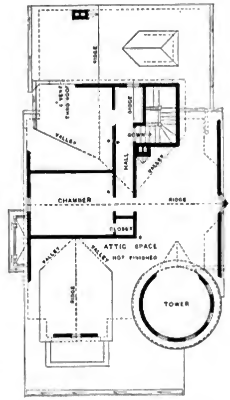
Section of Foundation on Line A B.—Scale, ½ Inch to the Foot.

and ventilation, a ceiling must be provided 8½ feet above the floor. As a stable should in no case provide for storage overhead, this ceiling may also be very light. Two by 6 inch joists will be heavy enough for almost any stable, no matter what the size may be, because it can be supported from the stall and manger partitions at different places.

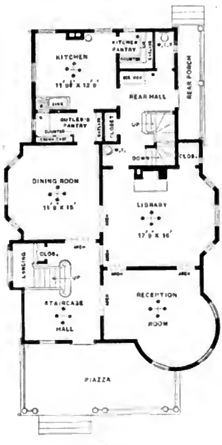
It should be remembered that dust is one of our worst enemies, as when moistened with the breath of animals it constitutes an ideal breeding element for microbes. For this reason, all walls, partitions, manger and stall rails should be smooth. Leave no ledges and have no beading on the lumber used for ceiling or otherwise about the stable. The ceiling should be covered with paper on top, as the boarding will prevent the paper from sagging between the joists. Care must be taken to make good joints where the ceiling paper joins the wall paper.



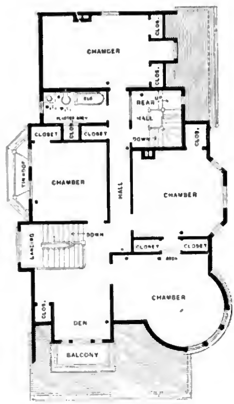
Foundation.



Attic with Roof Lines.



First Floor.



Second Floor.

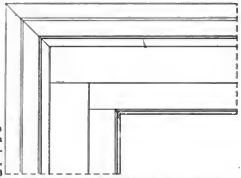
A Row of Houses in East Orange, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.

The loft should be provided with opposite openings for ventilation and a trap door that is well fitted. This is for the purpose of rendering the stable cool in summer and warm in winter. With fly screens, dark blinds and double doors and windows properly fitted we now have a room which may be shut up practically air tight, and would be a very unhealthy place for animals unless provided with a good system of ventilation.

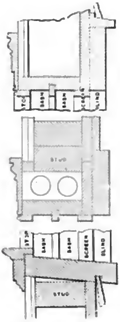
The King system is advocated by Mr. Converse, and will be illustrated by him at the exposition with a thorough, full sized working model in operation, assisted by drawings and explanations carefully given to all interested visitors. This system works on scientific principles that are well known, almost automatic in practice, and when rightly proportioned to the size of the stable gives good satisfaction..

The value of fresh air has never been brought forcefully to the attention of small dairymen because the ordinary, loose jointed farm building admits plenty of it. In building warmer stables an attempt was made to furnish sufficient air by allowing a liberal amount of cubic feet per head of stock. Ideas were so liberal in this respect that many stables were built so large and with such high ceilings that in practice they were found to be cold, damp and unhealthy. Warmer buildings have shut out fresh air and opened the way to disease. As the most expensive animals were naturally housed in expensive stables, the impression got abroad that thoroughbred stock contracted disease more readily than common hardy scrubs. An intelligent, systematic effort is now being made to demonstrate the reason why it is not only possible but profitable to construct a comparatively cheap stable that is warm in winter, cool in summer and sanitary at all seasons.

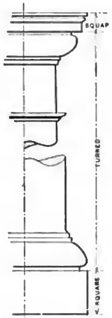
Section through Corner Block in Kitchen, Bathroom, Pantry, &c.—Scale, 3 Inches to the Foot.



Detail of Inside Trim at Corners.—Scale, 3 Inches to the Foot.

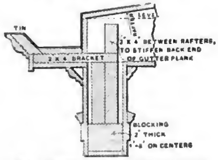


Details of Window Frame.—Scale, 1½ Inches to the Foot.

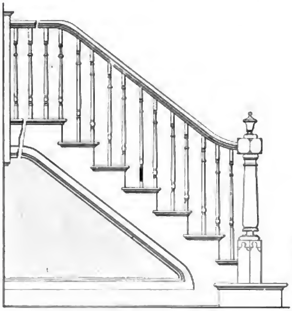


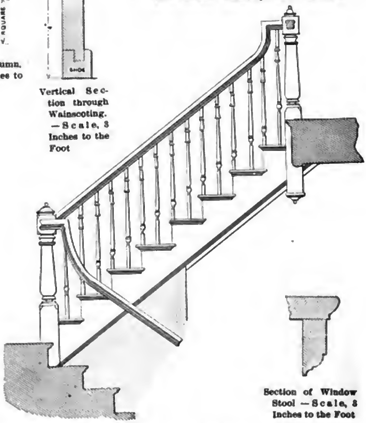
Detail of Piazza Column.—Scale, 1½ Inches to the Foot.

Vertical Section through Wainscoting.—Scale, 3 Inches to the Foot



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





Section of Window Stool —Scale, 3 Inches to the Foot

Elevations of Stairs from Floor to First Landing and from Landing to Second Floor.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of a Row of Houses in East Orange, N. J.

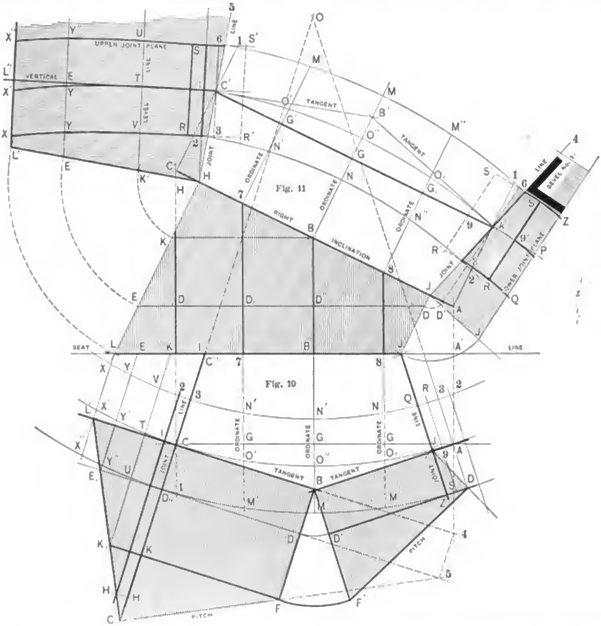
ESTIMATES have been received for the First Church of Christ, Scientist, Grand Forks, N. D., a building 45 x 74, and to be erected of stone and pressed brick. F. R. Comstock of New York City is the architect.

THE SCIENCE OF HANDRAILING.

By C. H. Fox.

THE next point which we shall consider is the explanation of the construction of a cardboard representation of a solid showing the actual inclination and position, together with the development of the sections, which belong to the face and joint surfaces of a rail, the plan of which is less than a quarter circle, the rise of the section plane of the face mold being taken equal over the plan tangents.

In Fig. 10 is shown the plan, with the tangents A-B-C forming an obtuse angle. In the plan of Fig. 5 they ferent method. We have already explained, in order to show the surfaces of the lower joint, that it is necessary to raise the ground plane above that of the seat line forming the base of the model. Assuming C-D, of Fig. 10 as equal to the hight desired, draw D_2-D″-5 parallel with the plan tangent C-B produced. Now set off D_2-C′ equal to the vertical rise of the rail, and divide it in K into two equal hights. Then draw through K the line K,-K-F parallel with C-B, which gives in D″-F the vertical rise of the rail over each tangent. Parallel



Figs. 10 and 11.—Construction of Cardboard Representation of a Solid, Showing the Actual Inclination and Position, together with the Development of the Sections which Belong to the Face and Joint Surfaces in a Rail, the Plan of which is less than a Quarter Circle, the Rise of the Section Plane being taken equal over the Plan Tangents.

The Science of Handrailing.

formed a right angle, but in this plan, owing to radius A-O being of greater length than that in the plan before mentioned, and the center curve less than a quadrant, the tangents are obtuse. Having drawn the plan curves and the tangents A-B-C to the points A-C of the center curve, at which joints are desired, we will explain the manner of ascertaining the position of the "directing plan ordinate."

In practice the center O may perhaps be at too great a distance from the curves of the plan to be advantageously employed for this purpose, as was the case in the last construction. We will, therefore, employ a dif-

with C-C′, draw B-F, then join C′-F and produce it to meet D_2-5, as shown in 5; then parallel with B-F draw 5-4. Join 4 with A and produce it, and the position of the "level directing ordinate" may be obtained.

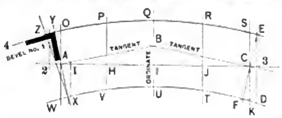
As before explained, draw the plan ordinates parallel with this. Now at any convenient point, as B′, draw L-B′-A′ the seat line, square with the ordinate. Set off K-C and A′-A of Fig. 11 equal respectively with C-C′ and C-D_2 of Fig. 10; then, joining C-A, the right inclination of the section plane may be projected. In the manner explained for the similar operations in Fig. 6, square over the ordinates of the section plane, find the points through which to trace the curves, draw the tangents, and square with them the joint lines, as H-5 of the upper and J-4 of the lower joint surfaces. Then in Fig. 10, with B as center rotate D‴-F into D′-F′, and join F′-D. Square with F′-D draw D-J, which completes the representation of the tangent plane over the lower tangent A-B of the plan. Then square with F-C′ draw C′-L′, and the representation of the tangent plane over the tangent B-C, may be completed. Then parallel with the joint line O-C, draw K, K, E, E, and X‴-L′-X′-L.

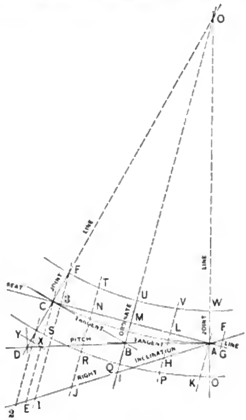
Now in Fig. 11 draw H-L′ and J-J′ square with the right inclination; then parallel with the tangents A′-B′, B′-C′, draw J-J″ and H-L′. Now with H and J respectively as centers, rotate K-E-L of the upper and D-J′ of the lower joint plane into like points, as shown at the diagram. At the lower joint surface, with J″ as center, and J-J′ of the plan as radius, draw an arc in P; then with D-J of the plan as the radius, and A′ of Fig. 11 as the center, cut the arc in P; joining J″ with the intersection at P gives the line in which the joint surface meets the plane of the base of the model. Square with J″-P draw P-A′, which gives the line in which the tangent plane over the lower tangent meets the surface of the joint. The angle of the plumb bevel is given in 4-A′-P. Now in the manner fully explained for like operation in Figs. 5 and 6, find the points Q-P-Z, R-S, &c., and through them trace the curves of right section of the joint surface. At the upper joint surface, with L′ as center and L′-L of the plan as the radius, draw an arc in L″; then with C′ as center and C′-L′ of Fig. 10 as radius, cut the arc in L″. Joining C′ with the intersection at L″ gives the position of the line in which the tangent plane intercepts the surface of the joint. The angle of the plumb bevel is given in H-C′-L″. Now square with C′-L″ draw K′-U, E′-Y″, &c., and in the manner already explained find the points and trace the curves of the right section which belongs to the joint surface.

We may remark the curves of the right section are exactly alike at each joint surface—that is, the section which belongs to the lower is an exact representation of that which belongs to the upper joint surface. The same remark applies equally to any example at which the rise of the section plane may be equal over the tangents of the plan. At all other examples the sections will be different ones at each joint surface. This is a very important point for those who may be interested in stone work of this nature to notice; for, say at a piece of coping having an unequal rise over the plan tangents, the section of one joint surface may be almost a right lined one, but at the other joint the section will be curved in a manner very noticeable.

Now take a sharp knife and cut clear through the board at the outline of the drawing, following the direction as given by the curve of the section which belongs to the face mold. Then cut about half through the board at the lines 5-H, H-J, J-4 and the seat J′-L of Fig. 11, and at the lines J-B and B-L′ of Fig. 10. Then with the lines on the exterior fold the three sides of the model into their vertical position over the plan, then fold over the section planes into the inclined positions and the model may be completed. As in the case of the last model, cut full size joint sections and a duplicate face mold. The means of employing these with advantage have been fully explained, therefore a repetition is unnecessary.

In Figs. 12-13 is shown the method which may in practice be employed for the purpose of developing the face mold and joint bevels. In Fig. 13, O shows the plan center, A-C the center curve, and A-B-C the plan tangents. The chord line A-M-C joining A-C is taken as the seat line, and all plan ordinates are drawn at right angles with it. Understanding this, at the joint line O-C produced, set off C-D equal to the rise of the section plane over the tangent B-C; then, joining B-D, the inclination of the section plane over the tangents may be projected. Now square with A-C draw C-E equal to the total vertical rise of the wreath piece; joining E-A, the right inclination of the section plane may be projected. Produce the plan ordinates, as shown in A-K, V-H-P, &c., and in Fig. 12 set off 2-A-H, &c., equal with 2-A-H-I, &c., of Fig. 13. Square with A-C draw the ordinates of the face mold equal in length to that of the corresponding plan ordinates and trace the curves; then draw the tangents A-B-C and square them with the joint lines X-A-Y and F-C-E of the face mold.





Figs 12 and 13.—Diagrams Showing Practical Method by Means of which the Face Mold, and Plumb Bevel may be Constructed for a Rail, Plan, &c., of which is Similar to that given in Fig. 10.

The Science of Handrailing.

Now to find the bevel proceed as follows: In Fig. 12 draw E-D square with A-C; then parallel with A-C draw F-D. Now in Fig. 13 draw A-F equal with F-D of Fig. 12, and parallel with the ordinates draw F-G; now at the joint line O-D set off D-X equal with F-G; then square with B-D draw D-Y. Then parallel with B-C draw X-Y. In Fig. 12, with Y as center and D-Y of Fig. 13 as radius, draw an arc in Z; then, with point X as center and the width, as O-W, of Fig. 13 of the rail as radius, cut the arc in Z. Drawing X-Z gives the position of a level line lying at the surface of the joint, and 4-Y drawn square with X-Y gives in X-Y-4 the angle of the plumb bevel required in order to obtain the proper direction at which to "square the wreath."

A joint section may now be developed in the manner explained for the similar operation in the diagrams of Figs. 7, 8 and 9.

(To be continued.)

AN African mahogany log, 12 feet long and 39 inches the deepest way after being squared, was recently sold at Liverpool, England, for what is equivalent in United States money to $2600.

HOUSE RAISING AND MOVING.

By Charles W. Smith.

HOUSE RAISING and moving is a work which builders, especially those in the West and Southwest, are often called upon to perform, sometimes as an operation by itself, but more often perhaps in connection with their regular line of building. It may seem a simple matter, but in reality it is a line of business which requires on the part of the contractor much sound judgment, an ever watchful eye, and no little degree of engineering skill, as the method of procedure is largely the result of circumstances; at least this is the case as regards the preliminary work; a great deal depending on the kind of structure to be raised or moved, the condition and construction of its under frame work, &c., all of which must, of course, be taken into consideration.

The lumber most generally used for timbers is Georgia pine or spruce. The timbers are of all sizes from 10 x 14 inches and 12 x 12 inches to 2 x 4 inches, with inch boards, while shingles are almost indispensable, taking the place of wedges and saving much time. The jack screws are also of all sizes and lifting capacity, but those most generally used in ordinary cases are the 12-inch and 14-inch, with a lifting capacity of 12 tons each, and the 16-inch and 18-inch, with a lifting capacity of 16 tons each.

In showing the different methods employed we will take for example a two-family house, 22 x 40 feet in plan. The first thing to be done is to place 10 x 12 inch timbers underneath, from side to side, across the width of the house. These should be placed about every 8 feet or so, according to the weight of the building. Under these are then placed two other timbers at right angles to those above, and just inside the foundation walls. Under these last timbers are placed the jack screws, about 8 feet apart, and between the latter are put the cross blocking, as shown in Figs. 1, 2 and 3. For each cross blocking place two 8 x 10 inch, flat or wide side on the ground, and as nearly level as possible, the length and space apart depending on the hight to which the building is to be raised. For a hight of about 3 feet the timbers should be 6 or 8 feet long and about 4 feet apart, and over these at right angles place two 6 x 8 inch and across these 4 x 6 inch and so on up to the timbers. The blocking may be made up of timbers all of one size, or they may be diminished in size as they near the sill, as may be deemed most expedient. An idea of this may be gained from Fig. 4.

When all the above have been attended to and the jacks are in position, we are ready to raise. Where the builder is sufficiently equipped, it is, of course, safer, quicker and more desirable to raise both sides at once, but should it happen, as it sometimes does with builders who do not make this line a business, that they are short handed or handicapped by a lack of jacks, they may raise only one side at a time to a hight of about 4 inches and after blocking up well, remove the jacks and bring around to the opposite side, when the operation is repeated.

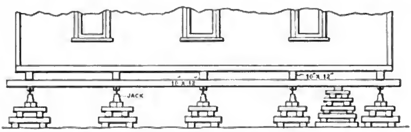


Fig. 1.—Side View Showing Blocking and Jack Screws.

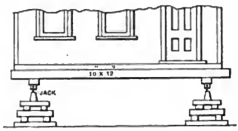


Fig. 2.—Front View.

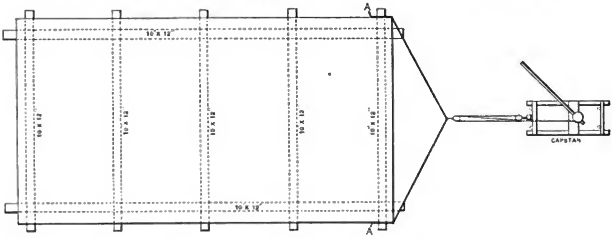


Fig. 3.—Plan of Timbers, Showing Capstan and Connections in Position.

House Raising and Moving.

After raising has begun great care should be exercised in keeping the building always well blocked up, even while the jacks are being worked—that is, not wait till the threads in the jacks have been let out to the limit before blocking up, as is sometimes done, as the buckling of a jack might in that case result in a serious loss.

When the house has been raised to the desired hight and it is intended to be moved, the following preparations are made: On each side of the timbers which are now resting on the jacks, place a 6 x 8 inch timber to serve as a run, and block them up to within the width of the rollers from sill or timber, then place the rollers on same and wedge up tight, as in Figs. 5 and 6. But before putting on the rollers a 2 x 6 inch about 8 feet long, as shown in Fig. 7, should be spiked under the timbers which rest on rollers, the front having a long bevel to catch the rollers as they are placed in front of the building and allow them to drop out at the rear. One of these is placed at the four corners and three rollers put under each, as shown at A A in Fig. 5. A fourth roller is always kept ready to be caught by the jumper as soon as the rear one drops out, which last one is again brought to the front. This operation requires the services of one man while the building is in motion. Rollers are of all sizes, from 6 to 3 inches, those made from yellow birch being the best. In front of the building another set of runs is placed and blocked up on a level with the first. Runs should always be kept as nearly level as practicable.

We are now ready for the actual moving. Unless it is found more desirable to fasten the rope directly to the front of the building, holes should be bored in the side sills, and iron bars driven in, to which is fastened the rope or chain, and brought around to the front so as to form a sort of sling, to which is made fast the rope from the capstan, all as shown at A A in Fig. 3. Twelve-inch tackle blocks of one and two sheaves, and 1¼-inch rope will do in any ordinary case. The frame of capstan is about 8 feet long, 4 feet wide and 3 feet high.

The capstan itself is held in place by an iron band fastened to frame work, as shown in Figs. 8 and 9. The capstan is set directly in front of the building, and as far from it as the length of rope or tackle block will permit. It is held firm in position by iron spikes driven into the ground in front and rear, and a large stone or weight laid across the rear end to prevent it from tipping up. One end of the rope is then made fast to the building and the other end is passed a few times around the bottom of the capstan, and the end held by a man who takes in all the slack while the capstan is being turned. If tackle blocks are employed instead of a single rope the two-sheave block is made fast to building, and the one-sheave block fastened to front of capstan, if the latter will hold it; if not, to a post or iron bar driven down in front of it, while the end of the rope which passes through the last sheave of the block at the building is passed around the bottom of capstan and held as shown in Fig. 3. The block containing the greatest number of sheaves is always the one to be fastened to the building. When no capstan is used blocks of two and three or three and four sheaves are used instead of those mentioned above.

It sometimes happens that there is no room in front of building for the above methods. It must then be pushed from the rear with jack screws. This is done by digging a small hole in the ground in which is placed a short, heavy block, against which rests the bottom of the jack, while the top pushes against the sill. The jacks are inclined about 45 degrees, but the more nearly horizontal they can be placed and still hold their footing the better.

The theories and principles advanced herein are mostly intended for frame dwellings and buildings, still the same principles and methods might be successfully employed in ordinary brick buildings, the only difference being that the timbers are placed nearer together, no more than 2 or 3 feet apart, and instead of being rolled the building is made to slide on timbers lubricated with soft soap. To accomplish this, two large timbers are placed in front and rear, where the rollers would set, and made to slide on a large timber which takes the place of the two used for runs in frame buildings. But it is seldom that a builder is called upon to move brick buildings, this class of work being generally done by experts who make a specialty of this kind of work.

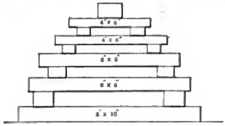


Fig. 4.—Cross Blocking.

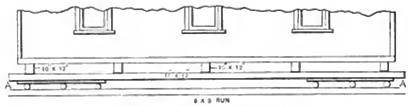


Fig. 5.—Side View of House on Rollers.

Fig. 7.—Side View of 2 x 8 Jumper at A of Fig. 5.

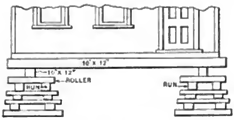
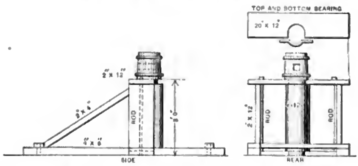


Fig. 6.—Front View of House on Rollers.



Figs. 8 and 9.—Side and Rear Views of Capstan.

House Raising and Moving

Electric Bells in Dwellings.

Some rather interesting suggestions regarding the installation of electric bells in an ordinary dwelling are found in a late issue of the Canadian *Architect and Builder* and we present the following for the benefit of readers on this side of the line:

Nearly every house of any pretention is supplied with electric bells and annunciator in the kitchen, and perhaps other electrical appliances in various parts of the building. Where the carpenter does this work, he should make it a rule to have all wires running from the various bells to batteries concealed either behind the lath and plaster or along the line of some wood work where they will not be noticed. All wires used for this purpose must, of course, be of copper and insulated—that is, covered with some non-conducting material. In choosing bells, it should be seen that no two bells have a like tone, or confusion will surely take place in answering them.

There will be no trouble in procuring bells with different tones. Ordinarily five bells will be sufficient, and they may be arranged as follows: One from front door to kitchen; one from outside to inside of kitchen; a foot bell from dining rooom to kitchen; one from parlor to kitchen; one from second story hall to kitchen. Of course there may be a greater or lesser number, according to the size and character of the building. There is no trouble in placing and putting in working order these bells, and any country carpenter with any brains at all may, with half an hour's study, be able to install a set of bells such as is here described. All the material can be purchased from any dealer in electrical supplies, and books of instruction may be had for the asking when supplies are purchased. Electric bells are great conveniences and should be more used in country residences than they are, and it is thought they would be if the country contractor was only able to put them in buildings cheaply and efficiently.

THE ART OF WOOD TURNING—XVIII.

(second series.)

By Fred. T. Hodgson.

THUS arranged, the train of wheels 48-24, which causes the eccentric cutter to revolve four times to one revolution of the pulley, creates a figure of four loops. The various ratios between the two points—that is, the flange and cutter—with regard to these eccentricities, of course, alter the character of the figure to a large or small extent, according to the movement of either or both.

As an example of the difference to be obtained, we will again set the instrument to the center as at first, and if from this point the flange and eccentric cutter are extended a like distance the loops will touch at the center, and the result will be that they will all resemble an egg in shape, the curves decreasing in width toward the center.

If the eccentricity of the flange alone be increased, it will be seen at once that the figure is entirely different, resulting, as it does, in an open cusped figure, with looped extremities, the amount of such space in each loop depending upon the eccentricity given to the flange, which, as a matter of fact, may be made eventually to terminate in a square; also the radius of the tool varies the figure in accordance with its movement.

So far, then, we have explained the result of extended eccentricity to the flange only. To effect another variation, if the movement of the tool as to eccentricity be increased beyond that of the flange, the course of the loops will be round the center, leaving an ornamental space at that part, the amount of curve left in the center of the different figures resulting from the ratios of the two settings. When executing the work above described it will be necessary to resort to the worm wheel and tangent screw at the back, for the purpose of correcting the angularity of the designs so cut—that is, where each successive cut requires an increase of eccentricity to the flange; and supposing that a series of loops is to be placed on the work, eccentric to the axis, the instrument receives lateral adjustment by means of the main screw of the slide rest, and by this the loops may be placed any distance from the centers.

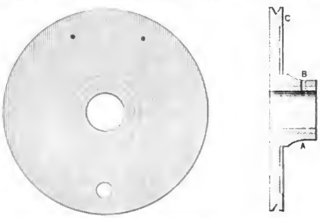
When the instrument is about to be adjusted for use the eccentric cutter K should stand across the face at a right angle, and to facilitate this adjustment a hole is made through the front of the flange at H—shown as J in the previous details—and this must be exactly over the teeth of the wheels when in gear, a tooth being marked by a small dot, so that it can be seen through this hole. By this means it will be rendered an easy matter to readjust the whole of the wheels, when the parts for numerous reasons may have been removed.

When the flange D and cutter K are both set to their respective zeros the revolution of the instrument cuts a minute dot only; and this is an evidence of the accuracy of the workmanship displayed in the instrument, and without it standing this test it will not satisfactorily perform the work it is intended to execute.

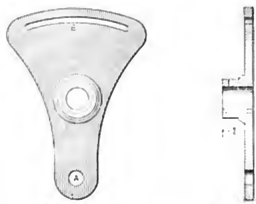
To proceed, if eccentricity be given to either the flange D or cutter K, the tool will describe a circle equal to the same eccentricity; while, if the eccentric cutter K be set to a corresponding eccentricity to the flange the tool will trace a straight line twice the length of the combined eccentricities, and if the eccentricity of either be increased the tool will cut an ellipse.

This being understood, we now come to a very important section of the instrument, and that is the worm wheel and tangent screw, which is fitted to the rear end of the stem. This is required for the purposes of compensation, for each successive row or series of cuts, failing the employment of this addition, they will not stand vertically, or coincide in any way.

The necessity for this compensation arises from the fact that the course of the tool traversed by the revolution of the eccentric cutter K with each separate movement of the flange D will cause each series of cuts to be more or less at an angle, their direction being to the left if the eccentricity is decreased and to the right when the same is extended.



Figs. 121 and 122.—Front and Sectional Views of Face Plate.



Figs. 123 and 124.—Front and Sectional Views of Flange.

The Art of Wood Turning.

The figure itself may be multiplied again by varying the position of the tool by the movement of the worm wheel. For instance, if it is desired to have two four-looped figures so placed as to represent eight loops equidistantly apart, then the first cut having been made the worm wheel must be moved through the space erected by 18½ turns of the tangent screw, and the same proportionate movement of the screw will be necessary for increased numbers, this adjustment being always calculated from the point at which the wheel stands after the figure has been set to the vertical position.

A still further increase of the powers of the ellipse cutter may be effected by the introduction of a second radial arm, which fits over the circular bars of the flange, and has a curved slot by which it is fixed to the flange. This arm carries two wheels revolving on pivots, so that either or both may be employed to produce figures in either direction—that is, inward or outward. To engage with this a small wheel of 18 teeth is placed on the termination of the eccentric cutter. The 48-wheel, as before stated—that on the main spindle—always remaining constant, the changes being made always with the intermediate wheels.

Having fairly described the ellipse cutter in a manner which we trust will be understood by the readers of this journal, we will now venture to describe another adjunct to the lathe of which perhaps many readers would like to know. This is the epicycloidal cutter, a tool capable of forming an endless variety of figures.

As in the description and illustrations given of the ellipse cutter, we have borrowed freely from Evans' "Ornamental Turning" and other authors who have written on the "lathe and its capabilities," we trust we have put the matter in such a shape that it will be acceptable to the readers of *Carpentry and Building*.

"If the actions of two circular movements are so combined that the velocities and eccentricities have a united effect the course traversed by the tool or cutter will give a single example of the numerous geometric or epicycloidal figures, which may be continued to infinity."

As in other geometric chucks, the point of the tool may remain a fixture in the epicycloidal chuck, and the work to be ornamented revolve, or the cutter may revolve under precisely similar conditions or principle, while the work to be operated upon is held stationary by the index in the dial plate of lathe pulley.

In describing the ellipse cutter we partly covered the ground required for a description of the epicycloidal cutter, which it somewhat resembles, but the latter has largely increased facilities and advantages over the former, which may be summed up as follows: The various patterns to be effected are not only numerically increased, but the dimensions of the same are considerably enlarged; the capacity of the whole arrangement is so increased in all ways that it is not only in the extension of the dimensions that we benefit, but the work is executed with greater facility, and in proof of this it may be said that it is not only in the increased size of the various loops and patterns which may be extended that give the advantages claimed, but what may be considered more important is the fact that when it is required to change a train of wheels the alteration is made without the necessity for removing the flange or front of the instrument, which, it will be remembered, is the case with the ellipse cutter.

It will be seen that the end of the radial arm, having its aperture made throughout the end of the arbor which carries the wheels, is easily removed from the same, the wheels changed to those required and returned with equal ease to gear with those that remain permanent. This is obviously a very great saving of time and trouble.

The ability to introduce a far greater number of wheels and consequent variations in ratios gives a considerably increased range of loops, both consecutive and circulating, the former ranging from 2 to 6—that is, 2, 3, 4, 5 and 6 emanating from the number of revolutions of the eccentric cutter in proportion to the rotation of the pulley, while the latter are obtained from 5 to 70, caused by delaying the revolution of the eccentric cutter, and introducing a train wheel of fractional value.

The various figures may have their loops turned inward or outward from the center; but each will require compensation, and this, as with the ellipse cutter, is effected by the worm wheel at the back of the instrument, the only difference in this particular being in the wheel, which has 96 teeth, as against 150 in the instrument previously detailed.

The necessary amount of compensation will entirely depend upon the relative movements of the eccentric cutter and flange as to their respective zeros. With these few preliminaries, we will at once proceed to give the details connected with the construction of the instrument.

Many of the observations following will be similar to those made in connection with the construction of the ellipse cutter, but, although the instruments are in many respects alike, it is thought best that each instrument should be dealt with as though the other had no existence, for there are some very important differences, which, explained as the machine is being made, will more readily be understood than if they were taken up alone or in connection with the making of the ellipse cutter.

The actual fitting up of the square stem, main spindle and front plate may be regarded as the same as for the ellipse cutter, differing as they do only in their respective dimensions, as far as the plate and worm wheel are concerned; the stem, of course, is identical, and must fit the tool box of the slide rest in exactly the same way as all instruments of a kindred nature. This being the case, it is quite unnecessary to illustrate this particular part, as it has already been illustrated and described; the same may also be said of the spindle which passes through the same.

Commencing, we have first the front circular plate, Figs. 121 and 122. This must be 5¾ inches in diameter. It does not matter much if it slightly exceeds this. It will be better, however, to keep as nearly as possible to the dimensions herewith. The plate, as will be seen, is provided with a boss or projection at the center, extending from the back, A, Fig. 122. A good pattern is, of course, the first item to consider, and from it, having obtained a clean, sound casting, it must be carefully turned all over in the lathe to prove its soundness. It will be noticed that it is recessed at the back, leaving practically a rim where it is turned to a V-groove, by which it is driven from the overhead motion. The object of the recess is for the purpose of relieving the weight as much as possible, for the reason that, when completed in all its parts, it is desirable that the weight should be as much reduced as possible.

In distinction to the instrument previously described it will be seen that the driving pulley is in this case turned on the edge of the plate, dispensing with the additions of the wood pulley. The extreme thickness of the plate at B, Fig. 122, is about 5-16 inch, but there is nothing to fix this thickness; it is, however, sufficient. The rim at C is ⅝ inch; so that when the recess is turned the body of the plate will be about 5-16 inch. So far, then, we have the proportionate dimensions of what may be termed "the base of operations."

When this part has been roughly turned all over a hardened steel collar, about ¾ inch in diameter, must be tightly and carefully driven in at the center, after which it must be ground out true and smooth. This makes the bushing which works on the spindle of the lathe. Before hardening this collar or sleeve be careful not to forget to drill a small hole through for the purpose of lubricating. This should be drilled in the collar, as shown at B in the figure; and the hole in the collar should exactly coincide with the corresponding hole in the bars, as shown at A, Fig. 122.

Assuming that the directions for the stem, spindle and worm wheel have been carried out in accordance with instructions previously given, not forgetting that the latter must have 96 teeth in place of the 150, we may turn our attention to the front flange and its accompanying parts and details.

Figs. 123 and 124 illustrate the form of the flange, for which, in the first place, a good pattern must be made, and the dimensions given will be what are most suitable. The plate ¼ inch thick when finished and ¾ inches deep from back to front of bars. The casting must in this, as in all other cases, be turned all over in the lathe. It will be readily seen that the flange in the present instance is of considerably increased dimensions, shown in Figs. 123 and 124, to that I have already dealt with. The necessary operations, however, required in its manufacture are very similar. There are at the same time certain deviations. References to Fig. 124 will point out that the back face is perfectly flat, and that the recess at the upper part is not turned in it, as in the flange of the ellipse cutter; the whole in the present case resting on the one plane, and working from the center joined at A, Fig. 123, and held in the numerous positions required by a milled head screw passing through the curved slot B, which is obtained from this same center.

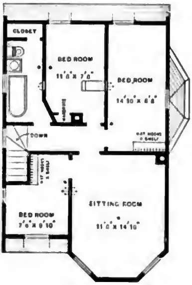
Let us endeavor to show as clearly as possible the easiest and best way to cut out this slot to insure perfect accuracy, having the main surface to work from—viz., that of the back of the flange. Lay off the center and bore the hole A. A chuck with a true surface sufficiently large in diameter should be used to allow of a center pin being fitted to receive the hole A, and the plate of flange to be flat upon it. When thus placed two small steel clamps are used to fix it to the face of the chuck securely. A cast iron surface chuck is preferable, but a good well seasoned chuck will answer the purpose, if an iron one should not be obtainable. Having thus chucked the plate a drill spindle is employed to cut out the slot.

The character of the drill has much to do with this class of work, and we strongly recommend for this purpose a rose drill; at the same time, however, a drill having four cutting edges will do the work, and allow for more clearance. Such a drill, too, is easily made. When ready lay off the precise length of the slot required on each side of the center. At each of these points pass the drill right through the plate and set the segment stops to the exact position for each. After this it simply remains to cut the remaining portion by a series of cuts of suitable depth, moving the plate through the required distance by hand. The two thoroughfare holes allow the drill to pass out at each end, and so cut a perfectly clean and smooth aperture.

COMPETITION IN $2000 FRAME HOUSES.

THIRD-PRIZE DESIGN.

According to the decision of the committee having charge of the competition in $2000 frame houses, the third prize, as announced in our April issue, was awarded the design submitted under the *nom de plume* of "Goethe," the author being Louis Falk of 2785 Third avenue, in the Borough of Bronx, New York. In presenting the design herewith, we give the specifications of the author in full, together with his detailed estimate of cost, both of which, it will be observed, indicate a clear appreciation of the letter and spirit of the conditions of the contest.



Second Floor.

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

He states in the preface to his specification that the outside dimensions of the house are 20 feet over all at front and rear, with a depth of 30 feet and an average hight above grade of 24 feet. The design is to be executed outside the fire limits, and comply with the building laws established in Greater New York.

Mason Work and Materials.

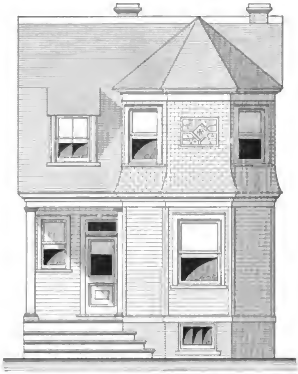
Foundations.—To be of sound native building stone laid in good sharp sand and cement mortar, the bottom stone to be lawful size; all the brick work in foundation to be laid in cement mortar. Build the brick piers for piazza as shown. All the window openings are to be faced with brick.

Build the chimneys, as shown on plan, with common hard brick; all flues to be lined according to law. Top out about 4 feet above the roof with sound hard selected brick laid in cement mortar. Each chimney to have a blue stone quarry cut chimney cap with flue hole cut in same for each flue. All windows in cellar to have blue stone quarry cut sills.

Plastering.—All walls and ceilings of the first and second story to be lathed and plastered three coats of King's Winsor dry mortar, to be applied according to the directions of the manufacturer.

Concreting.—The cellar is to be concreted in the usual manner.

Miscellaneous Mason Work.—The mason is to do all the patching and pointing up of the wall where required. The kitchen hearth is to be made of Portland



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

Competition in $2000 Frame Houses.—Third-Prize Design.—Louis Falk, Architect, New York City.

cement about 2 inches thick on deafening prepared by carpenter. The mason is to brick up the partition back of the range 4 feet wide and 3 feet high, the studding being taken out by the carpenter for that purpose.

Carpenter Work.

All framing timbers to be sound spruce, but all studding for walls and partitions may be of hemlock.

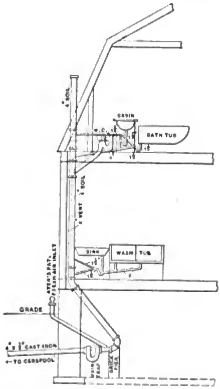
The framing is to be of balloon type, spiked and braced together in a workmanlike manner.

Sills are to be 4 x 6 inches; the posts, 4 x 4 inches; the plates, 4 x 4 inches; first and second tier of beams, 3 x 8 inches; 16 inches on centers. Trimmers and headers, 4 inches thick, and rafters, 3 x 6 inches, placed 24 inches on centers.

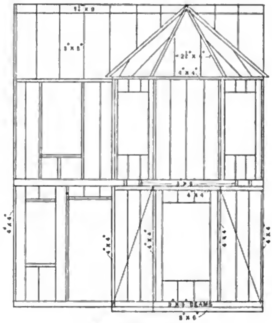
Sheathing.—The outside, including the roof, to be covered with sound North Carolina pine tongued and grooved sheating put on horizontally and well nailed to each stud.

The entire surface is to be covered with good rosin sized building paper, lapped 2 inches around doors and windows. The first story is to be clapboarded between the sill and cornice with 6-inch clear pine or cypress clapboards.

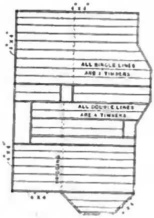
The walls and roof above cornice are to have cypress shingles, and if they are 18 inches long they are to be



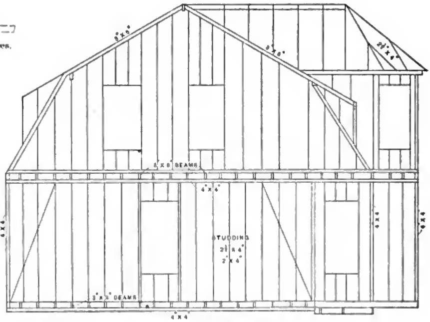
Vertical Section Showing Plumbing Fixtures.



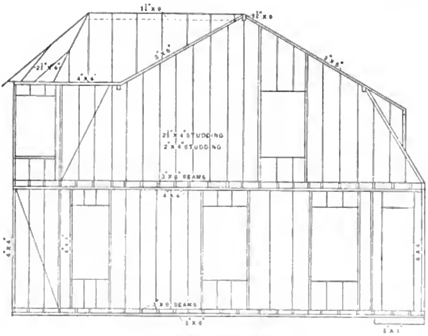
Framing of Front.



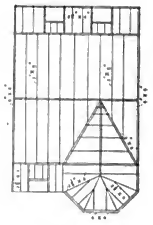
Framing Plan, Showing Second Tier of Beams.



Framing of Left or West Side.



Framing of East or Right Side.



Roof Tier of Beams.

Competition in $2000 Frame Houses.—Third-Prize Design.—Framing Plans and Elevations.

laid 5½ inches to the weather on the sides and 5 inches to the weather on the roof.

Mill Work and Materials.

All the outside wood work not otherwise called for is to be of cypress. Corner boards and water table are to be 1⅛ inches thick and cornice and molding ⅞ inch thick.

Doors and Window Frames.—Are to be made in the usual manner, with pulley and pocket; the outside casing being 1⅛ inches; sill, 1⅛ inches, and subsill, 2 inches.

Sash.—All sash are to be made and glazed as per elevation with front, with two lights to the window, glazed with double thick, first quality American glass; the sides and rear to have four lights to the window glazed with second quality, single thick, American glass.

Cellar Sash.—Are to be hung on top and fastened with knob and batten at the bottom.

Blinds.—All windows above the cellar are to have outside rolling slat blinds in two folds, hung and fastened complete. Blinds to be painted two good coats of paint before they are hung to the house.

Doors.—All outside doors are to be 2 inches thick, and made as per elevation.

Flooring.—All the first and second floor is to be laid with tongued and grooved North Carolina pine, ⅞ x 4 inches, clear flooring, blind nailed.

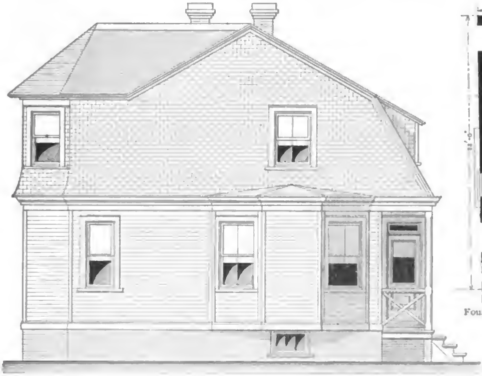
Inside Trim.—Is to be of clear cypress, as per detail showing the base, casing, jambs, &c.

Inside Doors.—All inside doors are to be 1½-inch thick regular mill made doors, with flush molding. All doors to be hung on loose pin butts, and fastened with mortise locks and provided with wood knobs.

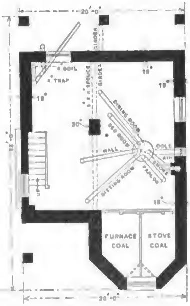
Stair Work.—Build the stairs as shown on plans. The main flight will be a box stairs; string pieces and steps to be 1¼ inches thick, riser ⅞ inch, the steps and risers to be housed into the string pieces and glued and wedged; also a hard wood handrail fastened to the wall with iron brackets.

Cellar Stairs.—To be made of rough spruce, 1¼-inch plan, with open risers; 1¼-inch string pieces, with newel and slat handrail.

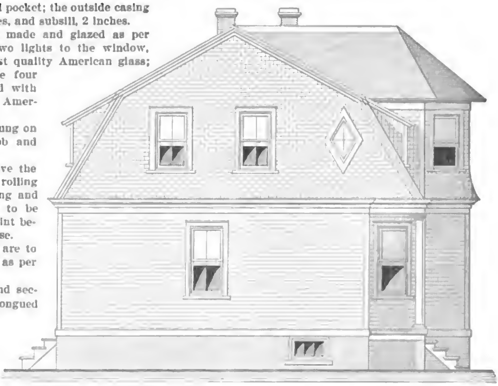
Dressers.—Kitchen and dining room dressers to be made in the usual manner, with sash doors above counter shelf and drawers and doors below, as per detail.



Side (Right) Elevation.



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



Side (Left) Elevation.

Competition in $2000 Frame Houses.—Third-Prize Design.—Elevations.—Scale, ⅛ Inch to the Foot.

Front and Rear Stoops.—To be built as per plan, the flooring to be 1⅛ x 4 inch clear pine, the columns, posts and rail all as shown, and steps 1¼ inch, riser ⅞ inch, spring piece 1¼ inch.

Mantel.—For parlor may be selected by the owner, put up complete, not to exceed $20.

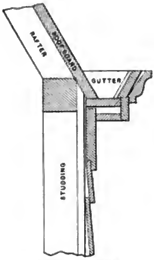
Wainscoting.—The kitchen and bathroom to be wainscoted 4 feet high with ½ x 2 inch clear cypress ceiling and finished with a neat cap molding. The dining room and hall to have chair rail to match the trim.

Miscellaneous Work.—Put up hat strips with hooks and shelf in each bedroom closet where required. Put door stops and door saddles to all doors.

Build the woodhouses in cellar, as shown, with hemlock boards.

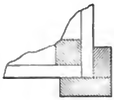
Plumbing Work and Materials.

The approved permit from the Department of Buildings is to be considered a part of this contract. The plumber is to do all his own excavating for sewer and Croton water pipe. The plumber is to tap and pay for tapping the main water pipe in street; connect at this point and lay a ¾-inch galvanized iron pipe to the inside of stone wall. Place a stop cock and waste faucet so as to shut off the water at this point; continue with a ⅝-



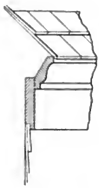
Detail of Main Cornice.—Scale, 1 Inch to the Foot.

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

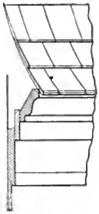


Corner Boards.—Scale, 1½ Inches to the Foot.

Base.—Scale, 3 Inches to the Foot.

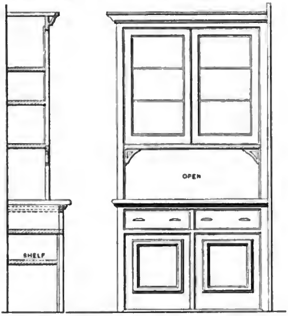


Tower Cornice.

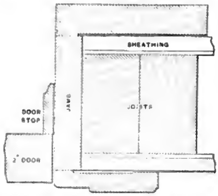


Belt Course.

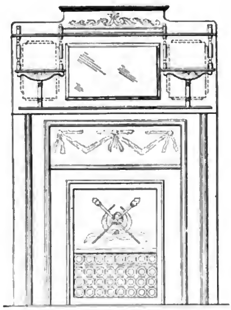
Scale, 1 Inch to the Foot.



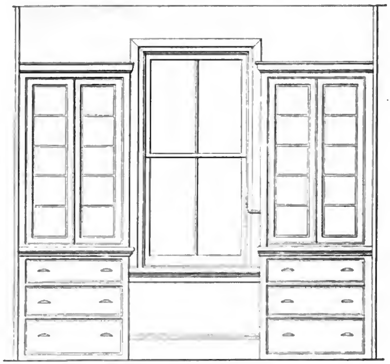
Section and Elevation of Kitchen Dresser.—Scale, ⅝ Inch to the Foot.



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



Elevation of Parlor Mantel.—Scale, 1 Inch to the Foot.



Elevation of Dining Room Dressers.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Third-Prize Design in Competition for $2500 Frame Houses.

inch lead pipe to all fixtures with ½-inch outlets. Faucets to all fixtures to be compression. All cast iron to be extra heavy cast iron, as required by law, to connect to sewer in street or cesspool in yard.

Water Closet.—To be earthen ware porcelain front wash out closet, with hard wood seat and cover complete, with slate safes under same, and flushed by 10 x 10 x 18 inch copper lined tank.

Ranges.—To be Graff & Co.'s "Hero," or as may be selected by the owner, with warming shelf, water back and gas attachment complete.

Boiler.—To be 30-gallon galvanized iron, to rest on galvanized iron stand; connected to range with brass couplings, with blow off attachment connected to the waste pipe. All put up in good, workmanlike manner.

Wash Basin.—Marble slab and back, earthen ware bowl, 12 inches in diameter, supplied with hot and cold water.

Bathtub.—To be steel clad bathtub; hardwood rim; hot and cold water supplied through combination faucets. All faucets to be nickel plated, and all exposed pipe to be silverized in bathrooms.

Washtubs.—To be Empire slate or soapstone; two compartments; set on galvanized iron legs, with hardwood covers and hot and cold water supplied.

Sinks.—Sinks to be roll rim, galvanized, with back and legs; hot and cold water supplied.

Gas Piping.—Pipe the building with outlets as shown on plans—also range. The rising lines to be ⅝-inch, branches ½-inch, drop lights ½-inch, side lights ⅜-inch, all tested in presence of owner or his representative. Arrange for meters.

Painting.

All the exterior wood work, including the leader, porch floors, ceilings of porches, cornices of wood, molding around windows, to have two good coats of white lead and linseed oil paint. The shingles on sides and roofs to have one good coat of colored stain in such color as may be directed by owner.

The interior wood work is to be filled with wood filler and finished with one coat of varnish. All the hard wood is to have one good coat of linseed oil and turpentine mixed, and finished with a good coat of varnish.

Heating.

Furnish and put up a furnace in the cellar, with all the necessary pipes, registers, linings and cold air box, with all necessary fittings to comfortably heat the house.

Tinner Work and Materials.

All gutters, valleys and projections to be lined with painted tin. Put up the 3-inch leaders with elbows to lead the water to the ground.

Pressed metal work to be put on front tower as shown.

Detailed Estimate.

The detailed estimate of cost of the various parts of the work is as follows:

MASON WORK.

75 square yards excavating, at 30 cents	$22.50
1000 feet stone work, at 12 cents	120.00
141 feet bottom stone, at 25 cents	35.25
2 chimneys, 16 x 16 inches, lined, with cap	45.00
4 flat stone sills for cellar windows, at $1	4.00
4 brick piers to piazzas, at $2.50	10.00
380 feet concreting cellar, at 10 cents	38.00
400 yards plastering, at 35 cents	140.00
Concrete of hearth	3.00
Whitewashing cellar walls and ceiling	2.50
Plastering cellar ceiling on plaster boards	11.40
Total	$431.65

CARPENTER WORK AND MATERIALS.

3500 feet of lumber, at $20	$70.00
1800 square feet of sheathing, at $16	28.80
Joist, 2½ x 4 inches, 50-10, 25-12, 40-10; 1200 feet at 1¼ cents	15.00
Wall strips, 2 x 4, 50-10, 25-12, 40-10; 1200 feet at 1 cent	12.00
1800 square feet of paper, at ¼ cent	4.50
1260 feet clapboard, No. 1, at $25	31.50
1100 square feet roof shingles, cypress, at 5 cents	55.00
1100 feet furring for same	10.00
1000 square feet shingles to sides, at 5 cents	50.00
Flooring, 1500 square feet (1200 net), at $2.50	37.50
Flooring piazza, 150 square feet, at 4 cents	6.00
Ceiling piazza, 150 square feet, at 3 cents	4.50
Bridging and hanging ceiling stuff	10.00
Woodhouses in cellar, 6 x 17 feet	5.00
Total rough lumber	$339.80

CELLAR.

One cold air window frame and slides	$2.00
4 cellar frames and sashes, at $2	8.00

FIRST STORY.

106 running feet 1¼ x 6 inch water table, at 4 cents	4.24
110 running feet double corner board, 1¼ x 7 inch, at 4½ cents	4.95
126 running feet of belt cornice, 20-inch, at 10 cents	12.60
35 running feet of tower cornice, 12-inch, at 6 cents	2.10
138 running feet of gable cornice, 12-inch, at 6 cents	8.28
50 running feet of ridge capping, at 6 cents	3.00
9 windows; frames, sashes and blinds; at $8	72.00
3 piazza columns, at $2.50	7.50
1 piazza newel, at $2	2.00
5 string pieces, at 30 cents	1.50
3 steps, 1¼ x 12 inches, 10 feet, at $1.20	3.60
3 steps, 1¼ x 12 inch, 4 feet	1.50
8 running feet of rail stuff	2.00
2 door frames, front and rear, complete	25.00
3 inside door frames, complete, at $6	18.00
1 porto opening, at $3	3.00
2 dining room dressers, at $8.50	17.00
1 kitchen dresser, complete, at $9	9.00
1 mantel, complete, grate and mirror	25.00
150 running feet of base and mold, at 6 cents	9.00
Stairs, complete	40.00

SECOND STORY.

190 running feet base and mold, at 6 cents	11.40
7 door jambs and casing, complete, at $6	42.00
5 windows; frame, sash and blind; at $8	40.00
3 dormer windows; sash and blinds; at $10	30.00
24 running feet shelving and hat strips, at 10 cents	2.40
1 diamond window, complete	6.00
Pipe casing	3.00
280 square feet wainscoting and cap	8.40
Total mill work	$424.47

Tinner work	$25.00
Hardware and nails, &c	40.00
Furnace, complete	110.00
Painting, two-coat work, and staining	75.00
Plumbers' work, complete, including cesspool (or sewer) connection	275.00
Carpenter labor not included above	275.00
Total subcontract	$800.00

RECAPITULATION.

Mason work	$431.65
Total rough lumber	339.80
Mill work	424.47
Subcontract	800.00
Total cost	$1,995.92

The drawings were accompanied by three builders' certificates, these being signed respectively by Treadwell Ketcham of 449 Willis avenue, New York City; Henry Jaeger of 2151 Mapes avenue, Borough of Bronx, New York, and T. J. Cunningham of 454 East 150th street, New York City.

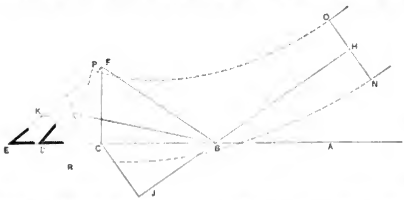
The New Connellsville Library.

It is said that the new Public Library, which is to be erected in Connellsville, Pa., as the gift of Mr. Carnegie, will be something quite out of the ordinary as regards its style of architecture. The plans for the building have been drawn by Architect J. M. McCollum of Pittsburgh, and call for a structure 89 feet long, 72 feet wide and two stories in hight. The location of the site is such that the building will face four streets and will have three entrances, all in keeping with the old Italian school of architecture. On the four sides of the building along the second story will be a balcony with free standing columns, each 20 inches in diameter and 18 feet high, with Italian capitals. Back of the columns against the wall will be pilasters of the same kind and similarly ornamented. The building material will be stone with terra cotta trimmings, and the roof will be of tile. The floors will be of tile and the wainscoting of marble. On the second floor will be an auditorium seating 400 people, and in the basement provision has been made for a swimming pool, gymnasium and a billiard room. The light for the building is to be furnished by a local electric light company, and the heating will be by steam. It is expected to have the new building ready for occupancy by November 1.

CORRESPONDENCE.

Method of Obtaining the Lines for Wreath Pieces in Flight of Stairs the Plan of Which is Less than a Quarter Circle.

From C. B. H., *Warren, Pa.*—I have read *Carpentry and Building* for quite a number of years, and finding in its pages many articles and illustrations of great value to me as a builder, contributed by those whose only object seemed to be to assist others in mastering the various and many times perplexing problems met with in the several departments of the building business, I have conceived the notion that an illustration of a stair problem might not be without interest to some who are using a much more complicated system. I inclose diagram illustrating a simple and easy method of obtaining the tangents, bevels, &c., of side easements or wreath pieces going around less than a quarter circle and coming to a level, together with the face molds for the same. The least possible number of lines employed to properly lay out a piece of work is always desirable, as the liability of mistakes is thereby lessened. Referring to the sketch, draw A B C D E as the line of the front string. Next draw H B, the pitch of the stairs, from the string, and continue H B to J indefinitely. From F, the center of the side of the newel, draw F B—a level tangent. Make B A the same length as B F, then A is the spring line. Draw F C at right angles to the string and at right angles to B J draw J C G indefinitely. Take the length of the lower taugent from B, where it touches J C G, and draw G B; then G B H is the tangent line for the face mold. At right angles to the string draw A H.



Method of Obtaining the Lines for Wreath Pieces in a Flight of Stairs the Plan of which is Less than a Quarter Circle.

To find the required bevels make C D and C E the same as A H and C J respectively. Connect E and D with F. The bevel at E applies to the joint G, while the one at D is applied at H. Draw K L half the width of the rail from the string line. Take the distance K E and from G mark R and P, the width of the face mold on the butt joint. Now make H O and H N equal to D L, the width of the face mold at the upper joint H, and ease the angle between P O and between R N. Add straight wood to N H O, as desired, and the face mold is complete. These lines will be found correct no matter what the pitch of the stairs or curve out may be, provided the curve is less than a quarter circle.

Design Wanted for Summer House.

From D. B., *Hastings, Ont.*—I have been watching *Carpentry and Building* for some time for designs suitable for summer houses, but as yet have seen none published. Will some of the correspondents of the paper furnish the editor with a few designs for vine clad or any other style of summer house, say about 6 x 8 feet or 8 x 10 feet in size ?

Shingling Hips.

From G. H., *Baltimore, Md.*—I would like to ask the readers how they shingle hips with the extra course coving the hip all the way up?

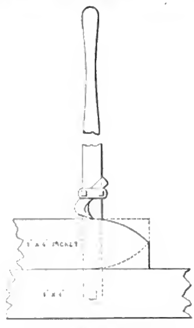
Note.—We would state for the information of this correspondent that the subject of shingling hips was very fully discussed in the volume of *Carpentry and Building* for 1892, several methods being found in the issue for August of that year. It is possible that our correspondent may not have access to a file of the paper for that year, and we shall therefore be glad to have our practical friends describe their present methods of doing work of this kind.

The India Oil Stone.

From M. H. K., *Texarkana, Ark.*—In the issue of *Carpentry and Building* for January of last year I promised to give the readers my experience, as well as that of the several carpenters of which my crew consists, in using the India oil stone manufactured by the Norton Emery Wheel Company, and sold by the Pike Mfg. Company of Pike Station, N. H. We have used the different grades of this stone from fine to coarse for 18 months, during which time our grindstone has not been employed for sharpening any tools, except such as axe or adze. Our work consists generally of building depots, water tanks and such other work as comes to the bridge and building department of a railroad company. We have to use about all the carpenters' tools that go to make up a wood worker's kit, as well as some other mechanics' tools, and out of some 50 oil stones of various kinds and qualities none has been found to suit my men so well as the India stone. At their request I recently ordered and received one No. 0 coarse Indian oil stone for each of my best and most progressive workmen. To carpenters who already have an ordinary oil stone for fine work I would advise purchasing a No. 0 coarse India, otherwise get a medium coarse for general work. It must be remembered that fast cutting stones cannot put on razor edges, but one good enough for ordinary work. I will conclude by saying that no intelligent carpenter will regret the money invested in an India oil stone of the above manufacture. I do not know anything about the corundum stone or stones of that name.

A Handy Picket Pointer.

From F. J. G., *Fort D. A. Russell, Wyoming.*—I send inclosed a sketch of a picket pointer which may meet



A Handy Picket Pointer

the wishes of "S. F. H.," whose inquiry appeared in a recent issue. It will suggest to him the idea, and he can exercise his own ingenuity for holding the picket from slipping, as he may find it necessary to make two or three cuts to form a single side. The handle is 2½ feet in length, measuring from the point where it is bolted to the 4 x 4 piece. The device is simple and effective, and makes all pickets alike.

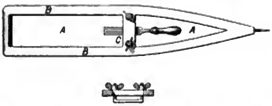
Gravel and Galvanized Iron Roofs.

From G. M. B., *Arcadia, Ind.*—Will some reader of *Carpentry and Building* who has had actual time experience with gravel and galvanized iron roofs tell me which is the better as regards durability—that is, what is the life of a No. 1 gravel roof properly constructed, and what is the life of a galvanized roof made of the best galvanized iron with a slope of 1¼ inches to the foot?

Note.—Without any desire to anticipate the comments which we hope our practical readers will present for publication, we would remark that in a general way the life of a roof depends very much upon local conditions, the quality of materials employed and the manner in which the work is done. A gravel roof properly made should last an indefinite period, while the life of a galvanized iron roof will depend very much upon the frequency with which it is painted, and the absence of salt and sulphur in the atmosphere. There is much to be said on the subject of roofs of the kind named, and we trust our readers will express themselves freely.

Device for Grinding Tools.

From H. K. R., *Larned, Kan.*—I inclose herewith rough sketches of a grinding device or clamp which I have been using for some time, and a brief description of which may be of interest to the readers of the paper. I build my grindstone frame just high enough so I can turn the stone without stooping. Referring to the sketches, B B of Fig. 1 represent a piece of hardwood board 1 inch thick cut out at A A. At C is shown thumb screws on top of the clamp for holding chisels and plane irons. In Fig. 2 is represented a cross section of



Figs 1 and 2.—Plan View of Grinding Device, with Cross Section of Clamp at the Point C.

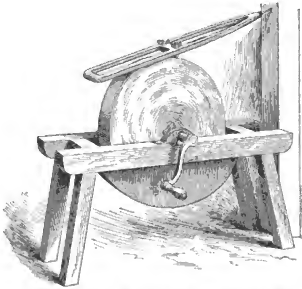


Fig. 3.—General View of Stone and Grinding Device in Use

Device for Grinding Tools.

the clamp at C of Fig. 1, while in Fig. 3 is presented a general view of the clamp in use in connection with a grindstone. The clamp is of such a character that it can be made by any carpenter at very small expense, and the device is a very handy one for use, especially if there is no boy to turn the stone. The bit can be held at any angle with one hand, while the stone is turned with the other. The general view shows the point of the clamp stuck into a post at the end of the grindstone for the purpose of holding it in place.

Use of a Gin in Barn Raising.

From C. A., *West Union, Iowa.*—In the issue of the paper for September, 1897, page 211, there is an article entitled "Barn Framing in Western Pennsylvania," in connection with which appear illustrations of a gin for raising barns. I would like to know if the cast iron tripod fastener at the top can be obtained in any market, and also if the gin is to be set for every bent that is raised, or is it placed out on the end of the barn? I would also like to know if the top pulley plate is on a swivel?

Answer.—We submitted the inquiries of our correspondent to the author of the article in question, who furnishes the following reply: Concerning the cast iron tripod fastener or table shown in Fig. 39 of the issue of the paper mentioned by the correspondent, would say that the casting that was used in the construction of this gin was made at Porter's foundry and machine shop at Clayville (Lindsay Post Office), near Punxsutawney, Pa. That was about 18 years ago, and it is doubtful whether the patterns may still be there, as I think the place has been burned out once or twice in the interval. If the correspondent is building a gin after this plan, I suggest that he make a pattern after the measurements given in Fig. 39, making the "draw" or taper inside to suit the top of the tripod. I would also remark that our experience with the machine described was that it would have been better to have had the legs a foot or two longer, so that it would stand say 20 or 21 feet clear under the "mast head" when rigged.

With regard to the second question as to the gin being set for every bent that is raised, or whether it sets out on the end of the barn, I am not quite celar as to his meaning. The last sentence of the article above referred to, which appears on page 212, may serve in part for an answer: "The lightness of the gin made it possible for three or four men to move it at will to any part of the building." Our method, except for the purlins, was to set up the posts, one at a time (using the gin, if there was not help enough to do this by hand), fill in and then put the cap timbers in place with the gin. This we found could be done as quickly and with less danger than by raising in bents. Of course this necessitated moving the gin for each post, or to the center for each long timber or piece of timber. In the case of the purlin, if it had leaning or short posts, it was all put together and the gin placed in the center, being well guyed and ballasted, and the bent raised in place.

The question, "Is the top pulley plate on a swivel?" I think is answered mainly by the second paragraph on page 212, as above, beginning "Other machines of my knowledge," &c.; the last sentence in particular, which reads, "With the metal table with the round pin and a corresponding hole in the mast head, a timber might be reversed if need be, &c." In Fig. 40, showing the details of the mast head, which the correspondent refers to as the "top pulley plate," it will be noticed that there is a 2-inch hole through at 10 inches from the three front pulleys and 40 inches from the tail pulley or fall. In rigging up the gin the mast head was placed on the cast iron table with the 2-inch pin, Fig. 39, through this hole. This permitted of a swinging motion or reversing, if necessary. The casting was solid.

I notice one thing was omitted in the description as it originally appeared in the columns of the paper. In Fig. 41 in the base of the gin is shown an eye bolt. In this a single block was hooked, through which the fall or loose end of the rope was threaded when a team was used, or the lift very heavy.

Geometry and Handrailing.

From CHARLES H. FOX.—Under the heading, "Some Comments on Handrailing," in the March issue of the paper I notice what "Red Oak" has to say respecting the manner of presenting the subject I am treating. While there is a great deal of truth in what the correspondent says, yet I know from practical observation that the majority of men are too impatient to study geometry. They wish to obtain practical results in as short a time as possible. They do not care to study the projection of points, lines, planes or solids; instead, they want something to look at, something they can see and not conceive—that is, in having a representation of a solid before them they do not have to conceive in their mind's eye the positions, intersections, &c., of the several points and planes (as it were in space) of which the solid may be comprised. Having been taught the construction of the solid, or rather, of the representation of the solid, they will, if so minded, retrace their steps and study geometry.

Position and Paneling of Newel Posts.

From W. H. M., *Woodlawn, Ala.*—I am a reader of *Carpentry and Building*, and come to the Correspondence columns for a little information respecting the subject of stair building. I inclose sketches of four different styles of stairs, and would be glad to have some of the experts inform me as to the position of the several newels, their length and the paneling of them. I want to ascertain if the space between the newel and the nearest baluster should be the same as between the different balusters, estimating both with two and then with three balusters to the tread. Any information on this subject submitted through the columns by some good authors on stair building will be greatly appreciated.

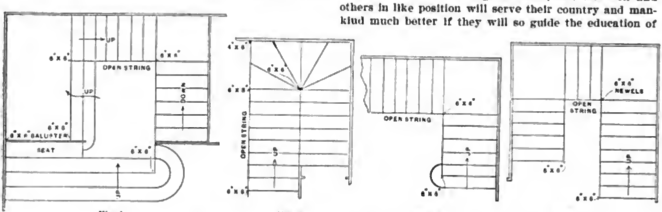


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Position and Paneling of Newel Posts.—Diagrams of Four Styles of Stairs Submitted by "W. H. M." of Woodlawn, Ala.

Finding Pitch of Roof From a Circle.

From M., Denver, Col.—I intended to answer the letter of "E. L. M." of Greenville, Ia., relating to finding the pitch of a roof from a circle, some months ago, but I have been too busy to give it attention. The way I was taught was to consider the rise in proportion to the width of the building. In his table, "E. L. M." gives 5 feet rise to 12 feet run for one-quarter pitch; 7 and 12 for one-third pitch; 12 and 12 for one-half pitch; 21 and 12 for two-third pitch, and 30 and 12 for three-quarter pitch. Where would he go to get a whole pitch?

I send a table showing my understanding of the pitch question for a building 24 feet wide, which will divide up to the best advantage in a question of this kind.

Rise.	Run in feet.	[illegible]	Degrees.	Minutes.
4 feet.	12	1/6	18	26
6 feet.	12	1/4	26	33
8 feet.	12	1/3	33	42
12 feet.	12	1/2	45	0
16 feet.	12	2/3	53	7
18 feet.	12	3/4	56	20
24 feet.	12	1	63	27

In all my experience I have never had occasion to use anything of the kind except in connection with ore mills. We hear it quite frequently, when talking about bins, setting screens, &c., but never on an ordinary building, as the square is much better. If mechanics only understood the steel square a little better it would be largely to their advantage, and I am surprised to find the number of so-called carpenters who do not know the rules of the square. If more carpenters would study the tool, they would find it time well spent. I have found many who do not know how to use the board rule or brace rule, and as for the octagon or 100 scale, they know still less about it, and still they have the nerve to call themselves mechanics. It takes all kinds of people to make a world and we have all kinds in it. We all can learn a vast amount and then know but little.

Protest Against Public Trade Schools.

From G. L. McM., *Tacoma, Wash.*—In the March issue of the paper, on the editorial page, is an extract from the report of Wm. H. Maxwell, Superinte dent of Schools of New York City, in which he favors the introduction of trade schools after the sixth grade is reached. I beg leave to enter a protest against the idea. Boys at 12 years of age are too young to commence learning a trade at the present day. That might do were they still required to serve a seven years' apprenticeship, some part of each year of which they spend in school; but boys in the sixth grade have not yet acquired sufficient education to lead us to hope they could become even ordinary skilled mechanics, let alone masters of their trade, to say nothing of the lack of physical ability to perform the ordinary work of the trade. No boy should begin specializing in his education before he leaves the High School at least, and if conditions compel boys to leave school at 14 years in order to go to work, Mr. Maxwell and others in like position will serve their country and mankind much better if they will so guide the education of each youth that the conditions which are responsible for such a state of things may cease to exist, than by advising such changes in our school sytem as will turn loose a supply of half taught mechanics who have hardly sufficient education to intelligently use the language of their country and not enough to even begin to understand the first principles of their trade. Our country can produce enough to supply the needs of all without requiring boys of 12 to commence learning trades in order that they may leave school and become wage earners at 14 years of age.

Design Wanted for Grand Stand.

From L. W. R., *Central Islip, L. I.*—Will some reader furnish for publication a plan for a grand stand about 40 feet long and 18 or 20 wide? I want something that is not too elaborate and yet not what would be called cheap. I am a young chip and have never been around where I could see any fairly good ones, and will therefore be thankful for any designs which the practical readers may see fit to furnish for publication.

Comments on First-Prize Design in $2000 House Competition.

From Rural Scratch Awl, *Smith Center, Kan.*—I am always interested in plans giving details of work, material and cost, such as the prize design in the April issue of the paper. It seems to me, though, according to Mr. Kidder's rules, given in *Carpentry and Building*, there is a weak spot—namely, the girder to support the floors and partitions, especially when it is considered that hemlock is the kind of lumber to be used, and that the first-floor joist may be spliced on this girder. This design comes to us from an architect who is also a builder, and it is not the intention of the writer to criticise his work further than to call attention to a fault, if I am correct, that ought not to have been overlooked by the committee and sent out to be copied by those of us looking for practical help.

Note.—We are always glad to have our readers criticise designs which appear in the columns of the paper, as it shows they are sufficiently interested to carefully study them in all their details and ascertain their weak points, if there be any. In this case, however, we fear our correspondent's position is not a strong one. In the first place it will be noted that the spans are less than 12 feet; that the line partition is bridged, which practically makes it a truss, thereby relieving the girder of considerable weight, and that the house itself is not a large one. In order, however, to ascertain what the author, Charles W. Smith of Watervliet, N. Y., had to say upon the particular point raised by the correspondent above, we laid the matter before him, and have the following in reply:

"With regard to the criticism made by the correspondent concerning the girder in the first-prize design, I would say with all due respect for both himself and Mr. Kidder, that I consider the girder in question to be as strong under the circumstances as any that could be used. In the first place both spans are less than 12 feet between bearings, and in the next place I had intended that the timber of both floors should be the full length, which renders the floors to a certain degree self supporting. Again, the bridging of all partitions, especially the line partition, forms a truss which is no mean factor in relieving the girder of some of the weight. Finally, in this instance the girder has no very great weight to support, as the house is not large and the whole frame work, partitions, floors, &c., are as light as possible.

"Now as regards the strength of girders, I am convinced, from practical experience and observation, that a sound 6 x 8 inch hemlock girder will answer the purpose just as well as a larger one for all ordinary buildings where the span between bearings is not over 12 feet, and this when the floor timbers are in two lengths. Our own residence, for instance, is a large house, 27 x 48 feet, two full stories and a finished attic in hight; the partitions of which support 22-foot rafters, and the girder is only 6 x 8 inches, with floor timbers in two lengths. In short, if the correspondent will look over a few numbers of *Carpentry and Building* he will find designs of large houses by prominent architects where the girders are only 6 x 8 inches; but as the girder is one of the vital parts of a building's construction, it would no doubt prove interesting, as well as instructive, if some of the readers would give their opinion on the subject."

Cheap Process for Preserving Shingles.

From J. B. W., *Boone Grove, Ind.*—I would like to ask through the columns of the paper what is the best and cheapest process to preserve shingles. Should they be treated before or after laying, or both, in order to render them most durable. I am very much interested in the Correspondence Department, and gain from it many valuable points.

Note.—Without any desire to anticipate the comments of our readers on this subject, we would suggest that our correspondent will obtain very satisfactory results by dipping his shingles in creosote before laying them. By reference to our advertising columns he will find concerns who make a specialty of creosote stains, which, it is claimed, not only add to the durability of the shingles, but also give attractive coloring effects.

Durability of Wire Nails.

From M. C. G., *Sheriden, Wyo.*—I have heard a great deal said about wire nails rusting out when driven in cedar shingles, but I cannot say that I have been fully convinced, for last week I took off part of a roof that had been on a building nine years, wire nails being used to hold the shingles. I inclose herewith a couple of the nails which I took out, and I should say that they were good for 20 years more.

Note.—The nails inclosed by our correspondent measure $1\frac{1}{4}$ inches in length, and for a distance of $\frac{3}{4}$ inch from the point are apparently as bright as the day they were driven. The remaining portion of the nails are slightly discolored, but in no place is there any indication of scaling; in fact, their condition is what might be termed as remarkable under the circumstances, for we confess to having seen wire nails with their heads completely rusted off, and this after having been in use only a comparatively short time.

Tool for Truing Grindstone.

From J. A. R., *Spokane, Wash.*—In answer to "A. J. F." of Provincetown, Mass., who asked in the February number for a tool for truing a grindstone, I would suggest that a piece of common gas pipe of small size, say $\frac{1}{2}$-inch or thereabouts, will take a cut that will slip a belt very often, and is used in some machine shops for doing the work. Fasten a solid wooden rest close to the face of the stone, apply the end of the pipe, and as the cutting point is worn away roll the pipe on the rest, thus bringing a new cutting edge to the work. A solid piece of metal becomes rounded on the end and so ceases to cut, but the pipe being hollow keeps an edge much better. The stone should remain dry while truing it up, as water hinders the work. The rest must be straight and true with the face of the stone. The pipe would slip on a metal rest much worse than on a wooden one, hence the suggestion that the latter kind be used. There will be much dust created by the operation of truing the stone, so the windows and doors should be left open. On a power stone care must be taken not to let the pipe crush the hand against the stone when taking a heavy cut.

Design for a Prayer Desk.

From OLD HICKORY, *Michigan.*—Will some of the readers furnish a design of a "Prie Dieu" or prayer desk? A friend wishes one made from timber grown on my property, and as I am under many obligations to her I would like to gratify her wish if I could get a simple and proper design for use in a dwelling.

Laying Clapboards.

From W. S., *Paterson, N. J.*—In answer to "H. C.," Pike River, Conn., I would say that in this section we usually gauge the clapboards to a width, working so as to have the courses show as near alike as possible from the water table to the bottom of the window sills and from the sills to the top of the window heads or belt courses, as the case may be. When the building is sheathed we put 5 or 6 inches of clapboards on a pair of horses, and after gauging them we cut both ends square for a long stretch, and the short ends we use between the windows wherever they will cut to advantage. The quickest way to put on clapboards, or siding, as we call it here, where the spaces are less than the whole length of boards—that is to say, 4, 6 or 8 feet—is to cut them half an inch longer than the space. When, on the other hand, the short pieces can be handled to better advantage than the long ones, we cut enough pieces square on one end to fill the panel, then mark and cut them off as we go along. Sometimes we start at the bottom of the gable and side it and finish the cornice and roof; then start from water table and carry up until the gable is reached, shoving the last board under those already on the building. I have been in places where they used a wide miter box or a jack in which to cut the siding, but of all the slow methods that was the slowest. Here we use a small try square and cut the boards slightly bevel so they will fit tight on the face.

Designs for Counters, Mantels, &c.

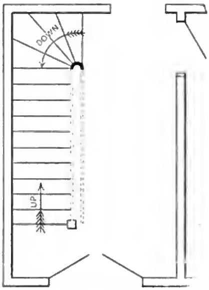
From R. I. W., *Toronto, Canada.*—I have been a reader of *Carpentry and Building* for a great many years and I find it getting better and better with every number. I would like to ask some of the practical readers to send for publication drawings of counters in hard and soft wood finish, and also of first-class mantels. I am sure that a good many others like myself would be benefited by their publication and at the same time it would open up a channel for discussion on the subject.

Comments on Second-Prize Design.

From C. W. S., *Watervliet, N. Y.*—I have carefully examined the second-prize design in the $2000 house competition, published in the May number of the paper, and as far as I can see, the committee have made a good selection. My personal impression is, however, that the author's estimate is somewhat low, although it may perhaps be possible to execute the design in his neighborhood for the sum specified.

Laying Out a Stair Rail Around a 6-Inch Cylinder Containing Winders.

From S. W., *Paterson, N. J.*—I would like to have some of the practical stair builders among the readers of the paper tell me how to get out the twist part of a stair rail where it goes around a 6-inch cylinder containing winders. I want a simple method which will not require a knowledge of geometry, as all the systems I have



Laying out a Stair Rail Around a 6-Inch Cylinder Containing Winders.

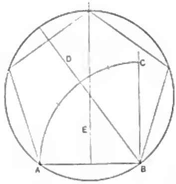
seen are so full of lines that an ordinary carpenter cannot understand them. I inclose sketch of the stairs, and would say that there are a good many of this kind put up in this section. The ceiling is 10 feet 6 inches in the clear.

Construction of a Dry Kiln.

From S. D. H., *Dana, Ill.*—I am an interested reader of *Carpentry and Building* and would like to ask some of my brother carpenters how to construct a dry kiln for drying green lumber. How long does it take on the average to make a drying?

Constructing a Pentagon Upon a Given Side.

From H. W. E., *Olean, N. Y.*—Having read with much interest the discussion begun by "F. L. T." in the December issue of *Carpentry and Building* regarding the construction of a pentagon upon a given side, and continued in subsequent numbers by such well-known professional men as D. H. Meloy and others, I take the liberty of offering a method which I consider will be of more value to members of the trade generally, as it covers the subject of polygons of any number of sides. Referring to the diagram which I inclose, let A B represent the given side of the polygon; erect the perpendicular C at right angles with A B, and with A B as radius describe the quadrant A C. Divide this quadrant into as many parts as there are sides in the polygon. Now through the second division from C draw the diagonal B D and bisect A B and erect the perpendicular E. The point of intersection with the diagonal will be the center from which to describe a circle intersecting the vertices of the polygon. Then with A B as the given length step off with the dividers the remaining sides of the polygon. This method is the same in all regular polygons, and is



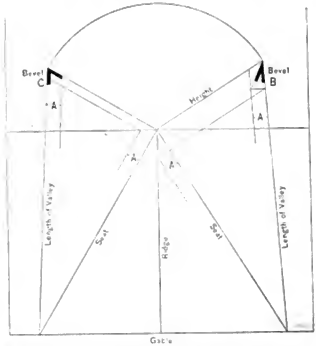
Constructing a Pentagon Upon a Given Side.

taken from W. D. Baker's "Contractor, Craftsman and Apprentice."

I am also interested in the tool chest controversy, and up to this writing think the Grandpa tool chest still holds its own for the general carpenter outside of shop work.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From F. S. W., *Crawfordsville, Ind.*—In reply to "Learner" of Paterson, N. J., in the March number of the paper relative to cuts for valley rafters, I inclose sketch showing the manner in which I get out of the difficulty he names. All the explanation that would seem to me to be required is in connection with the points marked A, representing the thickness of the valley rafters, let it be what it will. The bevel B will cut the rafter to fit the ridge running to the front gable, while the bevel C cuts the rafter to fit the ridge running at right angles. In this particular case the bevel C is almost the same as the plumb cut. If any of the brethren should be short of time and knowledge a very simple way to obtain any of these cuts is to make a block of the same pitch as the valley and set the base



Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

on the seat of the hip or valley, squaring up on both sides at the line of the ridge board, joining the two points on top across the pitch. Let the block be as thick as the rafter and square on bottom or base. This will work on an octagon roof as well.

WHAT BUILDERS ARE DOING.

PROBABLY there never was a time in the history of the country when building operations were being pushed to the extent that is now prevailing in all parts of the United States. Notwithstanding sporadic strikes and labor disputes, which are causing interruption to building work in several quarters, and some delays through inability to secure materials, structural operations are being vigorously prosecuted, and those who make or sell building supplies of any kind are simply swamped with orders. The call for structural steel, lumber, brick, builders' hardware, plumbing and heating goods and kindred supplies is enormous, and the outlook points to the largest business in these lines ever done in any former season.

Atlantic City, N. J.

Since our last issue went to press the labor situation in Atlantic City has developed considerable friction, more especially in the building trades, growing out of the demand for an eight-hour day. As the situation now stands the builders claim they are completing their contracts by working all the men they have overtime, while, on the other hand, the strikers claim they have kept the builders from obtaining help from out of town. There are something like 400 cottages under course of construction, besides 10 or 15 large apartment houses and six or seven brick stores. A noticeable fact in connection with the building operations now under way is that most of the large hotels are of the fire proof order. One of the largest improvements contemplated is the new office building to be erected at the corner of Central and Tennessee avenues, and to be known as the Blackstone, owing no doubt to the fact that it will probably be the future home of a majority of the lawyers of the city. It will be a ten-story affair, constructed of granite and brick, and will cover an area of 98 x 41 feet in size. The contractors are Stiles & McClay.

The Builders' Exchange is in a flourishing condition and at their annual banquet elected officers for the ensuing year as follows: President, Frank A. Souder; vice-president, James Tilton; treasurer, John Turners, and secretary, Joseph Conover, whose residence is at the corner of New Jersey and Arctic avenues.

Boston, Mass.

The method of settling differences existing between employers and employed pursued by the Mason Builders' Association and the bricklayers unions of Boston might with advantage be adopted in other parts of the country. There was a disagreement regarding the basis of wages for the year's work, the men demanding an increase of 5 cents per hour, while the employers contended that business conditions would not warrant them in paying more than the scale then ruling, which was 45 cents. This disagreement led to the proposition of appointing a judge to settle the matter, and Charles Francis Adams, who has large interests in real estate and building enterprises and is therefore well qualified to consider the matter, was selected. His decision was that the bricklayers should have an advance in wages of 2 cents per hour—that is, from 45 cents to 47 cents, beginning May 15.

Chicago, Ill.

The greatest boom in building since the days of the World's Fair is reported by the building department of the city of Chicago, with indications that the high water mark then set will be exceeded in the coming months. In April 659 building permits were issued, covering a frontage of 18,611 feet, the buildings to cost $2,992,640. Last year in the same period the cost of buildings, for which permits were then issued, was $600,000. May 1 of this year passed off without any labor troubles, being the first experience of the kind in many years. Since the great building trade strike of last year was settled Chicago has developed an increasing demand for skilled labor. The greatest activity is on the North Side, where a large number of fine apartment houses are being erected in Buena Park and other desirable suburbs. The plans of most of the buildings in course of erection call for modern improvements from basement to attic, and the amount of money owners are putting into them is somewhat larger than usual. In fact, it is stated that the general run of the buildings going up is far superior to those of any former year in the last decade. The result of this activity has been to render the demand for brick very strong, and in some instances an insufficiency in the supply has caused some men to be temporarily out of work. Contractors are of the opinion that several hundred millions of brick will be used in the city before the season is ended.

Columbus, Ohio.

It is to be regretted that the feeling of unrest and discontent in the building trades has spread to such an extent as to reach nearly all sections of the country. It is to be hoped, however, that where differences exist they will be speedily adjusted, so as not to interfere with building operations at a season when the outlook is so promising for a greater volume of business than has been the case for many years past. According to our latest advices from Columbus it is expected that the wage dispute will be settled in a few days. It is stated that a number of the contractors have expressed a willingness to concede the demands of the men, while on their part the men express a willingness to be graded according to their capacity for work, but claim the minimum price of 40 cents an hour for an eight-hour day. They also concede to the contractors the right to discharge a man for incapacity.

In this connection it is interesting to note the scale of wages in the various branches of the trade, as given in one of the local papers. The bricklayers get 50 cents an hour for eight hours; the stonemasons 40 cents and work eight hours; the plasterers 40 cents, work eight hours; the tinners receive 30 cents, work nine hours; the hod carriers get a little over 28⅛ cents and work eight hours; the painter works nine hours at 30 cents an hour, while the carpenter gets 30 cents an hour for eight hours.

Los Angeles, Cal.

During the last two weeks, says our correspondent under date of May 6, Southern California has been treated to several showers of rain, and while this section of the country will not be blessed with very large crops, the situation is nevertheless so much better than it has been for several years that builders expect to do and are doing more than for a long time past. During the last few weeks the building permits for new buildings have averaged over $100,000 a month. A summary of the building permits granted during the month of April shows three factories, one four-story lodging house, five two-story brick residences, eight stores, 13 two-story flats, 57 two-story residences, 82 one-story residences, and 23 other buildings.

Lowell, Mass.

In accordance with the programme announced in our last issue, the annual banquet of the Builders' Exchange was held at the American House on the evening of April 17. The occasion was a notable event in the history of the exchange, there being a full turn out of the members, while a very large number of others engaged in the building trades of the city who properly should belong to an exchange of this kind availed themselves of the Banquet Committee's invitation to participate in the annual festival. When the feast had been served President W. H. Fuller called the members to order and introduced as toastmaster of the evening Col. Royal S. Ripley.

The first toast of the evening was "The City of Lowell," responded to by his Honor, Mayor Dimon, who received quite an ovation. The speech of the evening, however, was made by Vice-President Patrick Conlon, who responded to the toast, "The Builders' Association." He briefly outlined the history of the Builders' Exchange from the time of its organization in April, 1888, and traced its growth from that time up to the present. He pointed out the fact that the architects are coming to regard membership in the exchange more and more as a standard of merit and trustworthiness, and briefly reviewed the advantages and privileges resulting to membership in an exchange of this kind. In conclusion he stated that the time was past when the Builders' Exchange of Lowell could be regarded as an experiment. Other speakers were Major Chas. S. Proctor of the Governor's staff; E. F. Foster, principal of the Manual Training School; Fred. H. Stickney, representing the architects; Col. James Bennett, Frank L. Weaver, Amasa Pratt and Edgar M. Hill.

The annual meeting of the Builders' Exchange was held April 17 and was largely attended. The annual reports of the different officers and committees were well received and the exchange was shown to be financially and numerically in even better condition than a year ago. The exchange affairs have been judiciously and successfully administered and during the month of April some new members were added. The annual election resulted, with two exceptions, in a continuance in office of the old board, the new members being Norman Whitelaw and Capt. O. M. Pratt.

With regard to the building situation in the city it may be stated that on May 15 the plasterers were still out, no settlement having been reached, and as a result of the refusal of their demands for an eight-hour day and a minimum wage of $2.25 the union carpenters went out on May 1. As a result of the labor situation the prospects for a very good season's business have been somewhat blighted. It may be stated, however, that there is considerable work under way, the largest improvement being that of the Textile School building, which will be of buff brick and will approximate in cost $200,000. The bids for this work closed on May 6.

Minneapolis, Minn.

The following is the outline of the agreement adopted by the Master Builders' Association and representatives of the Carpenters' Union, the rules and regulations to hold good until April 1, 1902:

Eight hours shall constitute a day.

Thirty-two and one-half cents per hour shall be the minimum wages of journeymen carpenters.

Time and one-half shall be paid for all overtime.

Double time shall be paid for Sunday work.

Contractors shall decide when overtime is necessary.

All members working for *bona fide* contractors must be paid in full at least every two weeks.

A non-union superintendent may be employed by the contractor, but there must be a union foreman between him and the carpenters.

No representative of the Carpenters' Union shall be allowed to visit men on jobs during working hours unless called to the works to settle differences between men employed and the contractor, and then the business agents shall not call the men off before the contractor or his authorized agent has been notified, and the two parties shall meet and settle the differences unless the contractor is out of the city, in which case 24 hours shall be given before the men are called off.

Union carpenters will put up material regardless of factory or shop manufacturing same, after May 1, 1901.

All contractors or builders employing union carpenters within the jurisdiction of Carpenters' Union No. 7 shall be allowed one apprentice to each shop, and all contractors and builders employing on an average of 20 carpenters during the year shall be entitled to one additional apprentice to every 20 carpenters and joiners so employed.

On the first Tuesday of November each year a joint committee of five members from the Master Builders' Association and five members of the Carpenters' Union No. 7 shall meet for the purpose of drawing up and agreeing on wages and working rules for the following year, which shall take effect April 1 following.

New York City.

As we go to press with this issue it looks very much as if building operations in the city might be seriously interrupted unless an agreement is reached in the next few days by the Mason Builders' Association and the bricklayers. The trouble grows out of the action of the contractor of a large apartment hotel on upper Broadway, formerly the Boulevard, in whose contract was a clause forbidding him to use non-union labor to lay fire proofing material in the hotel. This clause, it is stated, was disobeyed, and the material was being laid by men employed by the company making the material. As a result a strike followed, the bricklayers demanding the discharge of the non-union men and the right to lay the fire proofing. The dispute was submitted to a board of arbitrators made up of members of the Mason Builders' Association and of members of the unions. It was decided that the contractor should not have violated his contract, but he consenting to have the rest of the work on the building done by union labor, the matter was considered closed. The members of the union, however, refused to abide by the decision of the board, as it was bound to do under a written agreement, because the board had not awarded them wages which they claimed they had lost during the strike. The board found that the men had lost no time of consequence, and that the contractor should not be called upon to pay their claim. In addition to this trouble the wage agreement under which the men have been working for several years and which was renewed yearly on May 1, had not up to the time of going to press been signed, although some of the employers were said to be willing to sign it. The bricklayers intimate that those who do not sign last year's contract will this year have to pay 60 cents an hour, while those who sign the contract will be asked to pay 55 cents an hour.

The Mason Builders' Association have issued a notice reviewing the facts of the strike and pointing out that the acquiescence in the demand on the part of the men for pay for the time they were on strike and while their grievance was being adjusted by the arbitration board, would be placing a premium on strikes and establishing a dangerous precedent. They therefore, at a meeting held on Saturday, May 11, passed a resolution that "all work of journeymen bricklayers on the building operations of the members of the Mason Builders' Association be suspended on Thursday, May 16, unless in the meantime the members of the bricklayers' unions live up to the annual agreement existing between the association and the unions and abide by the decision of the joint arbitration board in the case cited above. Subsequently, at a meeting of the Mason Builders' Association, it was decided to extend the time until noon of Friday, May 17, this action, it was explained, being taken in order to give the bricklayers no excuse for claiming that they did not receive fair notice. The announcement issued by the association also states that "for 16 years no rupture has occurred between the two organizations, and an annual agreement has been signed; that the Mason Builders' Association has and always will stand first and last for arbitration and an amicable adjustment of differences, but the unusual and most arbitrary stand taken in this issue compelled the above action."

The Marble Cutters', Carvers' and Polishers' unions of New York City entered into an agreement with their employers which began May 1 and will last two years. The cutters will receive $4.50 and the carvers $5 a day. All three unions are to have an eight-hour working day and a Saturday half holiday. If on May 1, 1903, no action has been taken on either side regarding a new agreement, this agreement is to continue until either side notifies the other that it wants a change.

In Yonkers the strike which existed for a few days resulted in a compromise on the question of wages. Previous to May 1 the bricklayers, plasterers and masons were receiving 50 cents an hour, and they decided to make a demand for a half holiday on Saturday and for an increase of 5 cents an hour in wages. This the employers refused to grant and the men went out on strike. After a number of conferences the men agreed to accept an advance of 2½ cents an hour.

Philadelphia, Pa.

A vast amount of building is in progress in the outlying districts of the city, principally in the way of dwellings, although in the city proper there is more or less being done in the way of business structures. Among some of the large building operations at present under way is that of Contractor Harry Brockelhurst, who is putting up 157 two-story houses in the Thirty-third Ward, in accordance with plans drawn by Hales & Ballinger. Work has also been commenced in Germantown upon the first installment of a building operation involving 234 houses, which will necessitate the expenditure of nearly three-quarters of a million dollars. B. S. Sterling has finished the plans for 51 houses which will be erected in the Twenty-third Ward. Plans are also under way for the erection of 70 two-story, eight-room houses on a tract of land at Seventeenth and Bristol streets; permits have been issued for 38 two-story houses and six two-story stores and dwellings to be built in the Thirty-fourth Ward by Alexander Wilson, and work has recently been commenced by Isaac Dunne on an operation including 98 two-story houses in the Twenty-fifth Ward. There is also an operation under way by Wm. H. Bahn covering 22 houses in the Twenty-fourth Ward, while minor operations bring the aggregate up to a large total.

An interesting fact which may be mentioned in this connection is that Architect Chas. E. Oelschlager has recently finished and forwarded plans to Ponce, Porto Rico, for a new Methodist Episcopal church to be erected in that city. The building will be of steel frame construction, with tile roof, and will be in the Spanish style of architecture. It will cost about $10,000, and will cover an area of 40 x 75 feet.

One of the contemplated improvements in the city of Philadelphia is an 11-story apartment house to be known as the Northumberland, covering a plot 50 x 42 feet. The structure will be of the steel frame type and have ornamental fronts of brick laid in Flemish bond and trimmed with gray terra cotta.

Peoria, Ill.

There is nothing new in the building situation in the city, the differences between the carpenters and the Master Carpenters' Association remaining practically unchanged. The men have been out since April 8, and up to the time of going to press there seemed to be no immediate likelihood of a settlement. There is not a great amount of work in sight just at present, but the feeling among builders and contractors is that there will be increased activity just as soon as the labor troubles are settled.

At the annual election of the Master Carpenters' Association, held at their quarters in the Woolner Building, the following officers were chosen for the ensuing year: George J. Rotban, president; J. S. Johnson, vice-president; C. J. Sutter, secretary, and Joseph Miller, treasurer.

The Board of Directors selected consisted of J. M. Hartwig, M. F. Langton, George Todhunter, Henry Wiechmann, Sr., Harry Bates and W. F. Benson.

Pittsburgh, Pa.

The report issued by Superintendent Brown of the Pittsburgh Bureau of Building Inspection shows that during the month of April permits for 325 new buildings were issued, estimated to cost $1,682,937, which with additions, alterations and repairs bring the total for the month up to $1,781,-598. This record is said to be without precedent in the history of the city. A number of large buildings in the business portion of the city are swelling the totals, but there is also a proportionate increase in activity throughout other sections. The apartment house movement is growing very rapidly, and some new buildings of this character are under way. In the Morningside district a building operation involving the erection of more than 50 brick dwellings is under way, and in the Thirty-fourth Ward 25 two-story houses and nine two-story stores and dwellings are being erected by Wm. A. Patterson. An operation including 28 two-story houses in the Thirty-ninth Ward has been commenced by George W. Young, and the Park Land Company have recently awarded the contract for the erection of 30 houses in Belmar Place, Twenty-first Ward.

It is estimated that fully 300 houses are under way at Glassport, and it is expected that a great deal of building will be commenced at Blair Station in a short time. A contract has been recently awarded for the erection of 50 houses at Swissvale to cost about $2000 each. Several real estate concerns are putting up rows of five and six room houses in McKeesport, and it is estimated that fully $1,000,000 will be spent in that vicinity for the erection of houses costing on average about $2000 each. The Knoxville Land Improvement Company will build 100 houses in Knoxville Borough, representing an investment of something over $400,000. The dwellings will be erected on 25-foot lots, each house costing from $4000 to $4500, and will be built in accordance with plans prepared by Architect Ludwig Dick. A five-story mercantile and apartment block, to cost about $150,000, will be erected in Oakland, the building covering a site of 220 x 80 feet. There will be ten stores on the first floor, and the upper stories will contain 40 apartments.

May 1 saw several changes in the labor situation. The basis on which all the scales are constructed is the official agreement of the Master Builders' Association, which is to the effect that on and after May 1 eight hours shall be considered a day's work for journeymen carpenters. The tinners and cornice workers recently ratified the wage agreement which calls for 33⅓ cents per hour for an eight-hour day. It is said that the trades now working under an advanced wage scale include the marble cutters and setters, tile layers and helpers, bricklayers, hod carriers, lathers, painters, decorators and paper hangers, tinners and cornice workers, structural steel and iron workers, masons and stone cutters, carpenters, joiners and stair builders, elevator builders, plumbers and gas fitters. The pattern makers have a special scale.

Quincy, Mass.

The Master Builders' and Traders' Association of Quincy, Mass., recently perfected their organization by electing Wm. A. Bradford president, John W. Pratt vice-president, and Henry L. Kincaide clerk and treasurer. The directors elected were Benjamin Johnson, Jr., George H. Field, Henry I. Kincaide, Frank S. Patch, Edward J. Sandberg, Julius Johnson and William A. Bradford.

Rochester, N. Y.

Early in May the building contractors of the city held a meeting to take action upon the demands made by the union carpenters for an increase of wages from $2.40 to $2.50 per day. After discussing the matter it was decided by the contractors to grant the demands, and they in turn asked that the union carpenters refrain from sympathetic strikes and to refer all difficulties between employer and employed, first to the joint executive committee of contractors and carpenters, and in the event of their decision being unsatisfactory to a single arbiter, whose decision should be final. This demand, it is stated, has been conceded by the carpenters. One of the prominent contractors in the city states that if this agreement can be maintained for a number of years it will be a decided benefit all around. The feeling is that a great point has been gained, for matters in dispute can now be speedily settled instead of dragging along for weeks and seriously hindering building operations.

Rochester, Pa

Several meetings have lately been held by the master builders of Beaver County with a view to perfecting an organization by which mutual interests would be protected. At a meeting held in Rochester the latter part of April an organization was perfected, known as the Beaver County Builders' Exchange and incorporated under the laws of the State of Pennsylvania. The object of the new organization is "the promotion of social enjoyment and friendly interchange of views and sentiments, with cultivation of agreeable business relations between those who may become members; the advancement of all legitimate interests of the building trades of Beaver County, and to establish and maintain a central office headquarters where members may meet and transact business." At this meeting 19 firms were represented, and the deliberations were presided over by W. Dolby, while the position of secretary was filled by F. McDanel. At the close of the meeting a collation was served, the menu cards being printed in blue, while the names of the dishes were couched in builders' terms, making it both unique and interesting to the fraternity.

Salem, Ore.

Advices under date of May 6 are to the effect that a great deal of building is now going on at Salem, the capital of the State of Oregon. This movement is chiefly in the line of dwellings and business blocks of moderate dimensions suitable to a town of the size of Salem, but there are also a number of high-class buildings. The most notable now in course of construction is the Federal Building on Willsons avenue, which is to cost $100,000. Among the less pretentious buildings may be mentioned that of Dr. F. E. Slater by Contractor Homer Truex, as well as those of Dudley Henry, Jacob Amsler, D. S. Bentley and Breyman Bros.

San Antonio, Texas.

At a recent informal meeting of the Builders' Exchange, held at their headquarters on East Commerce street, the labor situation was considered and a committee on publication was appointed. It was also voted to issue a list of membership of the exchange, which shows Henry Pauly to be president, Earnest Steves first vice-president, James Brocks second vice-president, W. Fenstermaker third vice-president, Chas. Baumberger fourth vice-president, O. A. Balcom secretary, and Jacob Wagner treasurer.

The trustees include N. M. Carney, Otto Kroeger, Fred Hummert, John Umscheid and James Wilson.

It is stated that as the result of the differences between contractors and carpenters comparatively little work is being done in the city, thus leaving a large number of buildings incompleted. As we go to press it is reported that all contracts for buildings soon to be commenced have been canceled or extended.

San Francisco, Cal.

Our correspondent, writing under date of May 6, states that the building situation is now in first-class shape. The labor troubles of a few months ago seem to have smoothed themselves out, and there is a general tendency to settle down to a healthy, busy season. Owing to the lowering of the rate of interest at the savings banks here, there is a general movement among people of moderate capital to invest in homes. Architects are busy on numerous plans for work of this sort.

The big buildings so long contemplated have actually reached the starting point. On April 22 three important building permits were issued, one to Charles E. Green and H. T. Scott to construct a 12-story fire proof hotel building 137.6 feet on Powell street by 165 feet on Geary street; one to James L. Flood to erect on the big Baldwin block at Powell and Market streets a fire proof building 250 feet in hight, and one to the Mutual Savings Bank to erect a ten-story fire proof building 147.6 feet high on Market street.

The Board of Supervisors has, after a long struggle, passed a bill imposing fees for granting building permits. It has also passed an ordinance removing all restrictions on the hight to which fire proof buildings may be erected. An ordinance has been proposed limiting hospital buildings to four stories in hight.

The Builders' Exchange of this city on March 18 elected its Board of Directors. The latter met on April 15 and elected the following officers:

President, S. H. Kent; vice-president, Thomas Elam; recording secretary, James A. Wilson; treasurer, J. J. North; financial secretary, John A. Dunker; doorkeeper, Julius A. Krauss.

Membership Committee: Thomas Elam, Charles A. Ingerson, James Fennel.

Rooms Committee: Charles A. Day, Tim Sullivan, R. Herring.

Finance Committee: E. L. Snell, Thomas Butcher, R. Herring.

Arbitration Committee: James A. Wilson, Thomas Elam, Thomas Butcher, R. Herring and C. A. Ingerson.

St. Louis, Mo.

Advices under date May 10 are to the effect that building operations in the city during the past 30 days have received a decided impetus and the outlook is very encouraging. Ground is changing hands and architects are busy drawing plans. Quite a number of buildings are under way, and in some cases tenants are waiting for the completion of the structures. The amount of building will necessarily be increased as soon as the World's Fair site is chosen, which will be within a short time. Public enterprise seems to have found its legitimate sequence in the activity of private capital. This our correspondent believes is but the beginning. Improvement of streets, parks and public buildings and a new city administration will follow, and will tend largely to inspire confidence in men of wealth whose civic pride has been wounded by past actions of former city officials. It is their desire to improve the city and make it thoroughly presentable before 1903. This, it is thought, will insure better buildings and more of them, while at the same time it will be an inducement to others who might otherwise look for investments elsewhere. Strangers are rapidly invading the city, and it is reasonable to suppose that from now on St. Louis will witness a revival of building second to none in the country.

The erection of wholesale houses on Washington avenue will aggregate more than $1,250,000, while those on Olive street will run in excess of $1,000,000. Aside from this there are under way in different parts of the city business structures, churches, residences and apartment houses (the term flat becoming obsolete in St. Louis) amounting to more than $1,000,000.

The labor situation in the city is anything but satisfactory and probably can best be described as chaotic. All agreements heretofore existing between masters and their men are said to have been abrogated by the B. T. C., and at present there is no telling what the near future will develop.

Seattle, Wash.

The records of the City Clerk's office show a remarkable amount of building construction for the month of April, the figures being more than double those of the corresponding period of last year. Work, however, is much delayed on account of the shortage of lumber and general building material. The figures indicate that permits were issued during April for 550 buildings, costing $590,000, as compared with 205 permits for structures involving an outlay of $255,500 in the same month of last year. Our correspondent advises us that there is a good opening for an up to date sash and door factory, but that labor is in plentiful supply at present.

Spokane, Wash.

During the first four months of the present year the amount of new building undertaken was greater than that of any other similar period in the history of the city, excepting that immediately succeeding the great fire in 1889. The total for the four months foots up to almost half a million, and nearly all of this represents buildings ranging in cost from $600 to $5000. Permits have been issued for only a few large buildings. Among these are the Great Northern freight depot, to cost $20,000, and the Thomas Hogan Building, to cost $12,000.

Notes.

There is much activity in the way of building operations in St. Joseph, Mo., accompanied by a scarcity of skilled labor.

A great deal of work is in progress at Bangor, Pa., and it is stated that 100 buildings will be put up through the coming summer.

It is said that building operations at Niagara Falls, N. Y., will exceed this season any previous period in the history of the city.

The opinion prevails in Biddeford, Maine, that there will soon be under way a building boom the like of which has never been equaled in that section.

Several hundred new dwellings of moderate size are under way in Camden, N. J., and the outlook is said to be favorable for a continuous demand for dwellings of this character.

The carpenters of Poughkeepsie, N. Y., will hereafter work eight hours a day and the painters will receive an increase of 25 cents a day for their work, making their wages $2.50 instead of $2.25 per day.

A large amount of new building has been started in the suburbs of Syracuse, N. Y., and it is stated that the number of dwellings to be erected in that part of the city during the next six months will be greater than during any corresponding period.

Reports at hand indicate a considerable amount of building this season in Ithaca, N. Y., where on the campus a new medical college and a large annex to Sibley College are to be erected. There will also be built a new Presbyterian church, a salt plant and the Alhambra Building.

It is stated that at a meeting early in May the members of the Master Carpenters' Association of Newark, N. J., signed an agreement to pay carpenters $3 a day for eight hours' work, but the journeymen are not to work for any one who is not a member of the Master Carpenters' Association.

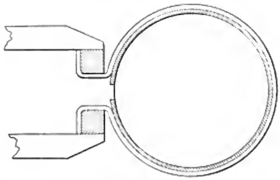
The demands of the carpenters in Saginaw, Mich., for an eight-hour day and a wage scale of 30 cents an hour have been granted, as the result of a joint meeting of committees from the Builders' Exchange and the Carpenters' Union. The trouble of the striking plumbers has also been amicably adjusted and they are to receive $2.50 for an eight-hour day.

The strike which was in progress for some time in Indianapolis, Ind., resulted after several meetings of the contractors' and carpenters' committees in an agreement which was to continue in force one year from April 16. The basis of the settlement is a wage scale of 32½ cents an hour; time and one-half for all overtime and double time for holidays. The union men are not to work for contractors who do not comply with the agreement.

Veneering Large Round Columns.

The subject of veneering is always of interest to carpenters, cabinet makers and other workers in wood, so that a brief account of the method by which large round columns are successfully treated by a contributor to the *Woodworker* may not be without suggestion to some of the readers of this journal. We quote as follows:

I have used the following method for veneering round columns and other convex surfaces for a number of



Veneering Large Round Columns.

years, with good results, in places where there have been only a few to veneer and the work in a hurry:

The veneer should be made damp on the outside, to make it strong and pliable. After the veneer has been carefully bent around to the glued surface, use a damp canvas or sail cloth, with a strong cleat nailed securely on each edge, as shown in the sketch.

Rub the canvas perfectly smooth with the hands, to remove all wrinkles and to get out the glue. For full round columns the veneer should be cut ¼ inch shorter than the circumference of the column—shorter if conditions will admit. This will give a chance for the glue to get out. It will readily be seen that as the damp cloth begins to dry contraction takes place; this, of course, has a tendency to draw the veneer closer to the glued surface, thereby making a perfect contact.

I might add here for the benefit of those who have never used the cloth that I get the best results by cutting the cloth from the end of the roll; if my column is longer than I can get cloth wide, I use two pieces side by side. I find the contraction is more uniform this way, owing to the grain or weave in the cloth. If there are large numbers of columns to be veneered, then there are other and more economical ways of doing this.

Foundations for a Tall Office Building.

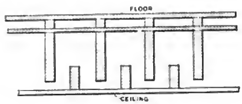
An interesting fact in connection with the new building of the Mutual Life Insurance Company, in process of erection on Cedar and Liberty streets, New York City, is that the cellar floor is about 55 feet below the level of the sidewalk and 35 feet below the line of standing water. In sinking the foundations the problem was somewhat complicated by the fact that the adjoining building was an 18-story structure, and the ground floor was filled with the safes and vaults of a safe deposit company, so that a settlement of the foundation as much as 1-16th inch would have interfered with the working of the time locks and prevented the doors of the vaults from being opened. In order to sustain the wall caissons formed of steel tubes 3 feet in diameter were sunk and a substantial underpinning provided, after which the construction of the foundations for the new building was commenced.

It was necessary to sink the main caissons through loose sand and crumbling rock in some places 32 feet in depth, so that bed rock was not reached until the caissons were down very nearly 100 feet below the street level. The site of the new building was practically inclosed by sinking steel caissons each 8 feet in width and from 15½ to 22 feet in length. When these were down to bed rock, a water tight inclosure was made by ramming the space between them full of red clay. This was accomplished by sinking a 3-inch pipe between the caissons by means of a water jet, and dropping cores of clay into the pipe and then forcing this out by dropping a heavy steel bar upon it; the pipe meantime being drawn up foot by foot until the whole of each space was filled. Some idea of the extent of the work involved in connection with this part of the structure may be gathered from the statement that in the permanent foundations there are 2000 tons of steel, 20,000 barrels of cement, 10,000 cubic yards of stone and 5000 cubic yards of sand. Above the sidewalk the new building will be eight stories in hight in Cedar street, in order to correspond with the old structure, while in Liberty street it will be 16 stories above the sidewalk and will cost, when completed, in the neighborhood of $2,500,000.

Method of Deadening Floors.

A novel scheme of construction having for its object the deadening of floors in apartment houses is being carried into effect by an architect in Chicago. One of the very annoying features of the modern flat or apartment house is the distinctness with which sounds are communicated from one floor to another, and in some houses it is not infrequently the case that tenants on one floor are unable to long occupy their apartments, owing to the continual noises overhead; every sound of walking or moving about being communicated through the floor and walls as if the latter were made up of "sounding boards."

From an inspection of the sketch it will be seen that instead of using one joist on which the floor will rest and to which the ceiling will be attached, the architect has two, one for the floor and one for the ceiling. The floor joist will be 2 x 12 inches and the ceiling joist 2 x 6 inches, placed as shown in the illustration. There



Method of Deadening Floors.

is a space of 1½ inches between the bottom of the floor joist and the ceiling, and the open space cuts off all communication between the floors. The cost of the building will be materially increased, but as it is being erected for investment and not for speculation, the owner believes that the advantages of an attractive structure such as it is proposed to construct, will appeal to tenants, and that they will appreciate it.

ALL who have visited the Pan-American Exposition in Buffalo unite in declaring that nothing hitherto produced in the way of electrical illumination can compare with the display made at the Pan-American, with the aid of the electricity generated at Niagara Falls. The electrical tower itself is described as something absolutely unique, resembling a great pillar of flame from the ground to the golden figure which surmounts it. Every building of the exposition glistens at night with thousands of incandescent lamps, imparting a fairylike, and at the same time magnificent, aspect to the whole surroundings. Electricity is probably the strongest point about the present show, although it is said to be remarkably strong in every department.

FROM the top of the 360-foot level of the Electric Tower of the Pan-American Exposition there will be operated a searchlight, the beam from which, it is expected, will be visible 50 or more miles distant. This searchlight will be a 30-inch projector and one of the most wonderful of the kind ever made. While the searchlight which commanded so much attention at the World's Columbian Exposition was known as a 36-inch projector, this 30-inch projector of the Pan-American Exposition will be far more surpassing light.

PREVENTING DAMPNESS IN BUILDINGS.

ALL hollow walls should be provided with a damp course—that is, a course or layer of some material impervious to damp, at least 3 inches above bottom of cavity—and this damp course should always be immediately below underside of ground floor joists and where possible above ground level.

Fig. 8 shows an arrangement which may be used in many residences where the level of ground floor is above ground surface and where there are no cellars. If thought advisable the damp course may be put on outside half as well as inside half, and at the same level.

Fig. 9 shows an arrangement which may be used when ground floor level is only just above surface level, and when basements are provided the thicker portion of wall on the outside below such surface, in order to be more capable of sustaining earth. A damp course may be provided for outside half immediately above the surface level. If the thin portion of wall ran down to the footings there would be no bend in the cavity, as shown in Fig. 9.

Fig. 10 shows an arrangement for a building with a parapet wall and gutter behind. In case of snow or heavy rains the parapet wall would get wet, as also in the case of overflows or leakages, and to prevent this wet getting to the interior portion below a damp course is inserted at some convenient point below level of gutter, as shown.

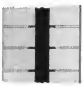


Fig. 11.—Cavity in Wall Filled with Damp Proof Material.

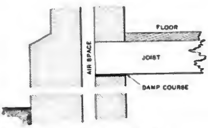


Fig. 8.—Damp Course where Level of Ground Floor is above Grade Line and there is no Cellar.

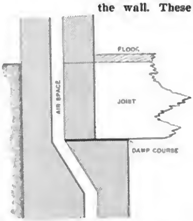


Fig. 9.—Arrangement of Damp Course when Ground Floor Level is only slightly above Grade Line.

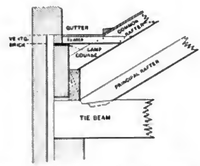


Fig. 10.—Management of Damp Course for Building with Parapet Wall and Gutter Behind.

Preventing Dampness in Buildings.

In all cases where hollow walls are used the cavity may be made 1 to 2 inches wide, and the joints near the cavity left clear of all mortar, as shown. The cavity is then filled in with damp proof material in a fluid state, which fills up the cavity and remainder of the joints, sets hard, and the result is one solid wall, perfectly impervious to damp, as shown in Fig. 11.

Slates, overlapping vertically, placed between external and internal parts, and ties which are bent up and hooked, secured ultimately to slates and walls, answer the same purpose. These are sometimes called vertical damp courses.

Where hollow walls are used of an even number of half bricks in thickness, exclusive of cavity, there are arguments for and against the use of the thicker portion outside and for its use inside, which may be briefly summed up as follows:

Thicker portion outside: This is often the case with walls having a stone face, and it allows of deep reveals to openings, if such be required, without additional construction. It, however, admits of holding a much larger percentage of water, which causes a greater bulk to be nearer the inside wall. Timbers, &c., if they are to be carried by the stronger portion, will have to be lengthened, and consequently connections are made between the two portions, which will act as transmitters of the damp from outside to inside.

Placing the thicker portion inside gives the best support for roofs, floors, &c., without having to lengthen the members, and all connection with outside is avoided, but there is much difficulty in forming deep reveals without the danger of forming a connection between the two parts so that damp may be transmitted from one to the other. However, I may say that the thicker portion inside is better and more economical.

In regard to the materials necessary I would say that tie irons are made of cast or wrought iron, the latter of which I prefer, being lighter and more capable of resisting tension. They are made of different patterns, but are generally twisted at the middle, or sunk, to allow the water to drop off and not pass along them toward interior portion. They are better forked at the ends, giving them a better hold. They are also made of wire, in the shape of the figure eight on its back, and are twisted at the middle and have a small drop to lead the water away. In all cases they should be either dipped when hot in tar, enameled, or galvanized.

Damp courses are formed: 1. Of vitrified pottery slabs, pierced with perforations of different patterns. They are usually about 9 inches long by 1½ to 3 inches thick, their width varying according to the thickness of the wall. These slabs have a tongued and grooved meeting joint, and the surfaces are ribbed at right angles to the face.

2. Of different kinds of natural and artificial asphalts, which should, in all cases, be impervious to damp.

3. Sheet lead laid along walls, from 1½ to 5 pounds per superficial foot in weight—the joints should be lapped.

4. Slates laid in cement mortar in double courses, heading joints, broken.

5. A mixture of boiling pitch and tar run on hot to a thickness of ⅜ inch and sprinkled with sand.

6. One or more courses of Staffordshire blue bricks laid in cement mortar.

7. Callender's pure bitumen damp proof course is an excellent material and most convenient to use. This material is made up in various widths to suit all thicknesses of walls and in different lengths, from 24 feet, upward. The meeting joints are made by lapping the material 1½ inches, heating with a hot iron and pressing.

In addition to the natural forms in which dampness attacks buildings the latter often suffer through gutters, rain water pipes and waste pipes leaking, gulleys placed against building overflowing, footways insufficiently drained, drain pipe joints leaking, &c.

The sooner defects of this nature are remedied the better, for it is a very forcible case of "a stitch in time saves nine."

Those who have old buildings, the walls of which are damp through prevailing rains, if such wall or walls

Continued from page 127, May issue

were rendered with cement, covered with slates or good tiles lapped and secured to battens, or other walls built around the damp ones, leaving a cavity between them and tying them together as hereinbefore described, and ventilating such cavity, would in most cases remedy the trouble. If the dampness arises from the foundations, the first thing to do is to effectually drain them and then below the floor level and above the ground level insert a damp course. I have had a case in which the floors were taken up and the site was covered with 6 inches of concrete.

But circumstances alter cases, and what applies to one may not to another, and so it is with curing dampness in old buildings. I should strongly advise those in their possession to consult some person who has had experience in such cases before inadvertently spending their money, and those who are about to build take advantage of other people's experiences. Make your buildings damp proof and they will be more durable, more healthy, less expensive to maintain and will in the end be by far the cheaper. Be wise in time, therefore, and remember dampness means destruction to the building and death to those who inhabit it.

New Publications.

BRICK LAYING. By Owen B. Maginnis. Size 6 x 9 inches. 86 pages. Illustrated by over 200 engravings. Bound in board covers with gilt side title. Published by the Author. Price $2, postpaid.

This little work has been prepared to meet a well defined demand for a treatise on the most approved American methods of bricklaying, the data having been obtained directly from practical work during process of construction. The matter is comprised in several chapters covering bricklayers' tools and their application; laying out the work; mixing concretes and mortars; bonding; building brick angles, corners and intersecting walls; brick arches, lintels, and piers; chimney flues and chimney breasts; anchoring, bracing and furring brick walls, together with general and miscellaneous details of brick work. The volume is divided into two parts, the second of which relates to shoring and needling, as originally published in *Carpentry and Building*, together with a chapter on underpinning and sheet piling. The author states that the contents of the work is made up of serial and individual articles written for various trade journals and which have been revised and supplemented by other valuable information gathered by him in his own daily observation and experience in building construction during the past 20 years.

SAW FILING AND THE MANAGEMENT OF SAWS. By Robert Grimshaw. Size, 4 x 6½ inches. 94 pages. Illustrated by 81 diagrams and engravings. Bound in board covers. Published by Norman W. Henley & Co. Price $1, post paid.

This is a revised and enlarged edition of a work by a well-known author, whose aim has been to make the little book to serve as a practical aid to those who use saws for any purpose. As its title implies, it treats principally of saw filing, but at the same time attention is given to the questions of gumming, spring setting, swaging and hammering, as well as to the brazing of band saws. There are also extensive comments upon the speed, work and power to run circular saws, &c. In the revision of the work the effort has been to bring it up to current practice, and to render it of special interest and value to the practical mechanic.

Proposed Technical School in Pittsburgh.

Preliminary plans for a group of buildings for the proposed Carnegie Technical School, at Pittsburgh, Pa., to cost $1,000,000 or more, have been prepared by Emil Swensson, formerly chief engineer and manager of the Keystone Bridge Works, of the Carnegie Steel Company, but now the property of the American Bridge Company. These plans are now in the hands of the Committee on Plan and Scope, at Pittsburgh. The plans provide for six large buildings of brick, two and three stories high. The idea is to have them grouped about a central court yard or hollow square, in the center of which will be a well kept lawn. One large building will face the street at the edge of a lawn artistically cut up with driveways, flower beds and fountains. Behind this building across the central court is another of equal size, and inclosing the central square on either side are two pairs of smaller structures, to be used for various purposes.

New Building for the Department of Agriculture

The appointing of a board, consisting of Secretary of Agriculture Wilson, Supervising Architect of the Treasury Knox, Cass Gilbert of New York, J. H. Rankin of Philadelphia, and Rush Marshall of Washington, to superintend the preparation of plans for a new building for the Department of Agriculture has recently been approved by Secretary Gage. This board is to select ten architects, who are to be invited to submit plans by October next, when the board will decide which plan shall be adopted and presented to Congress for approval.

The new building, which is expected to cost about $2,000,000, will have a frontage of 400 feet for the main section, and the wings will be 200 feet deep. It will be of white marble and four stories high.

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A ROW OF FRAME COTTAGES ERECTED FOR MR. LEON MORGAN, ON EIGHTEENTH STREET, EAST ORANGE, N. J.

F. R. COMSTOCK, Architect.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
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JULY, 1901

Public Support of Trade Schools.

An interesting departure has recently been made by the public school authorities of Springfield, Mass., in the starting of trade classes in connection with the public school system of the city, the expense being borne by the public funds and the classes superintended by the City Superintendent of Schools. This is probably the first instance in which a definite trade education has been provided in connection with the public school system of any city in the United States, and the venture will be watched with considerable interest by those interested in the industrial training of American boys. Should the Springfield experiment prove successful there is every reason to expect that the example will be followed in other cities. The labor unions may perhaps array themselves against this practice, and it is quite possible that their influence may be sufficient to prevent its wide adoption. Nevertheless the principle is a good one. It has been tried and found satisfactory in European countries, and, when properly understood, is likely to commend itself to the public at large, or at least to that section of it which is more particularly interested in the industrial development of this country. Reports from Germany clearly demonstrate that the industrial excellence attained of late years by the workmen of that country is due almost entirely to the facilities given to the youth of the Fatherland to obtain a trade training at the public expense.

Lack of Public Financial Support.

Hitherto the trade school movement in this country has been hampered by the lack of public financial support. Such schools as are now in existence have been started either by associations of employers in the building trades or by private munificence. No public support, has to any very material extent been provided for any of these institutions. It is this that has prevented the spread of the trade school movement in the United States. In view of the rapidly expanding foreign trade of this country and the growing demand for skilled labor of all kinds, it would seem that a larger public support of institutions whose object is the training of American boys as skilled artisans is one of the greater needs of the present day. At the present time, and for some time past, there has been a complaint from many parts of the country of a scarcity of skilled workmen, especially in the building and allied trades, and it is an obvious fact that the supply of such labor is not equal to the demand. One reason for this state of affairs is that the policy of the trades unions has been, and still is, to keep down to the narrowest possible limits the number of apprentices in the different building trades. The only way by which an American boy can be provided with a clear field for making a livelihood along industrial lines is by giving him every facility for equipping himself with the best theoretical and practical knowledge of a trade; and this can best be provided through the medium of the trade school.

Paying Model Tenements.

Further substantial support of the claim that the erection of model tenements can be made a paying investment was offered a few weeks since in the annual report presented to the stockholders of the City and Suburban Homes Company of New York. The report in question shows that the company have now upward of $2,000,000 invested, chiefly in model tenements in the Borough of Manhattan. The earnings on this investment during the past year have been satisfactory, and dividends of 4 per cent. have been paid after all current expenses were met. Last year the dividend rate was 3½ per cent., and in the previous year, the first in which the company operated, a 3 per cent. dividend was earned. The increase in the rate of dividends has been effected without impairing the surplus which existed a year ago. The experience of the company during their three years' existence demonstrates, the report says, that it is possible for model tenement houses to be made to earn 5 per cent. net, with a liberal allowance for depreciation. The company at present are operating two model tenement properties, one on the east and one on the west side of the city, from which the total rent collections last year were $26,000, the losses from bad debts being only $48, and the loss from vacancies during the year only 3.44 per cent. The vital statistics of the company's tenements, too, are strikingly favorable, showing a remarkably low death rate as compared with the figures of the entire city. So successful have the company been with their existing investments that they have determined, during the coming year, to put a further sum of $1,250,000 into model tenements for colored people on the west side of New York, to contain about 290 apartments, chiefly of two or three rooms each. A very important result of the company's operations is noted by President E. R. L. Gould, in the fact that by establishing a higher standard of housing accommodations on a basis of successful financial returns, other owners of tenement property in the vicinity of the company's estates have been compelled to improve and manage their property with more regard to the health and social welfare of their tenants. This is rightly regarded as one of the most encouraging results of the efforts of the company, and it is not too much to expect that the important experiment which Dr. Gould and his associates have undertaken will, in connection with the new tenement house law, work a revolution in the matter of housing the poorer wage earning classes of the city of New York, provided always that the tenement house law is strictly and honestly enforced.

The Tendency Toward Fire Proof Dwellings.

Those who closely observe the tendency of the times cannot have failed to notice after a stroll through some of the residential sections of New York City the extent to which old fashioned dwellings with brown stone fronts and high stoops are being torn down to make room for modern homes, largely fire proof in their construction, and arranged in accordance with the latest architectural devices for comfort, convenience and luxury. In commenting upon the change which is taking place it may be pointed out that the average brown stone house put together 30, 40 or 50 years ago was designed with too much disregard of the possibilities of ruin from fire and that not a few of them were anything but attractive to the eye. The architects of to-day have made striking advances over the pattern of the old style brown stone house, and certain residential quarters of the city are rapidly taking on new aspects, the change being most striking both in outward appearance and in the interior arrangement of the homes of those who are in more than comfortable circumstances. The somber monotony of the antiquated rows of exactly similar "brown stone fronts" with high stoops is giving way to transformations which make many blocks far more attractive than before and are fully in harmony with the spirit of modern improvement and progress. The excessive use of brown stone by builders has been supplanted by a welcome diversity of building materials and in the fronts and the si lines of costly houses. The deadly dullness of the c olate tint is becoming less prevalent. Many different kinds of stone and of brick are now used freely in the rebuilding of houses, and it is gratifying to note that the new homes in a great number of instances are more nearly fire proof.

Association of Builders' Exchanges.

The Ohio State Association of Builders' Exchanges was organized at a meeting held in the rooms of the Cleveland Builders' Exchange, in the Chamber of Commerce Building, May 15, this being the second organization of its kind in the United States. The new association is intended to bring into closer affiliation building contractors and dealers in building materials of the State for the purpose of influencing legislation at Columbus, procuring greater uniformity in methods of practice, providing a means of intelligent consideration and action in wage matters, cultivating acquaintanceship and maintaining headquarters where information of mutual interest may be collected and disseminated.

There were present at this meeting representatives from all the exchanges in the State except Cincinnati, but a letter was received from the latter city pledging co-operation in the movement. The delegates in attendance were J. L. Creswell, president, and Albert Neukom, secretary of the Toledo Builders' Exchange; President Miley, Louis Heller and H. P. Heedy of the Youngstown Builders' Exchange; R. J. Gardiner, secretary of the Columbus Builders' and Traders' Exchange, and a committee of five, representing the Cleveland Builders' Exchange.

The officers for the ensuing year elected were: President, James Young, a prominent general contractor of Cleveland; first vice-president, J. L. Creswell of Toledo; second vice-president, H. P. Heedy of Youngstown; third vice-president, R. J. Gardiner of Columbus; secretary and treasurer, Edward A. Roberts of Cleveland.

The visitors were entertained at a social and business luncheon at the Hollenden Hotel at noon, upward of 75 being present, when enthusiastic speeches in favor of the proposed organization were made. It was decided to include in the representation individual contractors and builders in cities and towns where no association exists, and to have an Executive Committee, consisting of one member from each city and town, to conduct the affairs of the State association in the interim between annual meetings. Features of the association are to be standing committees on legislation and arbitration.

It was decided to arrange for the first general meeting at the Hotel Victory, Put-in-Bay, early in the summer.

THE competition among the 13 prominent architects of the country for plans for the Public Building at Cleveland, Ohio, has been settled by the unanimous agreement of the Board of Award, which has selected the plans submitted by Arnold W. Brunner of New York City. The Board of Award consisted of the following architects: C. A. Coolidge of Chicago, T. C. Young of St. Louis, J. M. Carroll of New York, S. S. Peabody of Boston. James Knox Taylor, Supervising Architect of the Treasury, *ex-officio*. The report of the board was approved by Secretary Gage and Assistant Secretary Taylor. The building, it is said, will be one of the finest in the United States.

Girls Learning Carpentry.

Female students of the State Normal School who participate in the sloyd class at the school completely disprove the old saying that "a woman cannot drive a nail straight," says the Baltimore *American*. The young women of the class not only drive nails, but handle saws, planes and other carpenter tools with a dexterity that would shame the awkwardness of many men. The whole system of education by sloyd teaching means to combine intellect with the handtraining, and educators the world over are interested in it.

The sloyd room in the basement of the Normal School is really a well equipped carpenter shop. It contains about a dozen sloyd or carpenter benches and a complete equipment of all varieties of carpenter tools. Before taking up this part of the work the pupils are instructed to mold certain objects, and do work in paper folding. This elementary part of the work is really very complicated. Working plans are made of all the work. Then comes cardboard work, forming figures out of pieces of cardboard, representing geometrical solids. After this preliminary work the pupils are introduced to the carpenter shop. They display some little awkwardness at first, but soon become skillful in handling the tools, and become intensely interested in the work.

Only one girl has injured herself thus far, and that happened because of a shaving alighting on her nose. She was so interested in her work that she thoughtlessly brushed at it with her knife and cut her nose. The first tool handled is a sloyd knife, with an ordinary blade about 3 inches long. The first article made is a glove mender, requiring 22 steps in the making. The next article is a seed stick, introducing the use of the plane and requiring eight different steps. Thus different articles are made, each introducing her tools, until the use of all the tools is acquired. The pupils work in both hard and soft woods. All work is shellacked by the students, who, also, do all gluing and use sandpaper sparingly.

The tools used include different sizes and varieties of chisels, saws, planes, hammers, mallets, gouges and squares. The middle and senior classes participate in the work. Prof. W. C. A. Hammel is the instructor. He has studied sloyd training under Swedish teachers, and planned the system at the State Normal School.

Convention of Architects.

The next annual convention, which will be the thirty-fifth of the American Institute of Architects, will be held in Buffalo, N. Y., October 3, 4 and 5 of the current year. President Peabody has appointed as a committee of arrangements Glenn Brown of Washington, Walter Cook of New York and E. B. Green of Buffalo.

We understand it is the intention of the committee to secure several papers showing the results produced on Government architecture by the Tarsney act, together with several papers on the Exposition.

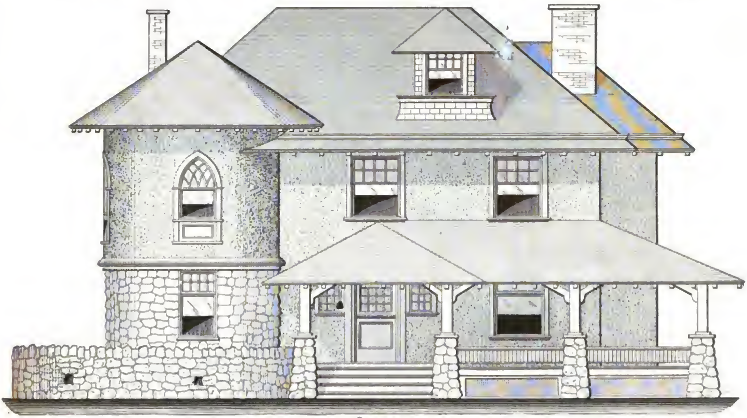
THE first stone of Cologne Cathedral was laid on August 15, 1248, and the body of the edifice was not opened until August 15, 1848, 600 years later to the very day. It was not, however, until August 15, 1880, that the splendid structure was finally completed, having thus occupied in building the "record" time of exactly 634 years.

A PRESS DISPATCH from Menominee, Mich., reports the sale of a quantity of shingles which will rank among notable transactions of its kind. It states that the Edward Hines Lumber Company of Chicago have purchased of Northwestern concerns 100,000,000 shingles of the 1901 season's cut and involving $200,000.

HOUSE IN A NEW YORK SUBURB.

THE residence which forms the basis of the illustrations presented upon this and the pages which follow, embodies in its design much that is of suggestive interest and value. The architectural treatment of the exterior is such as to attract more than passing attention, the noticeable features being the plaster stucco work, which covers the outside of the house except the tower, where the first story wall is constructed of field stone laid in cement mortar, the piers supporting the veranda columns, the low wall partially encircling the tower and forming an uncovered porch at that end of the building, the heavy overshot cornice and the leaning toward the Spanish in the style of architecture. A general view of the finished structure, as well as parts of the interior, are given on our half-tone plates, which are made from photographs taken for the purpose.

A careful study of the floor plans shows a rather open arrangement of the first floor, the disposition being such as to make the parlor, library and reception hall practically one room. The dining room is at the right of the reception hall as one enters the house, while the kitchen is directly in the rear, communication between it and the dining room being established through the butler's pantry. The main stairs land nearly in the center of the house, giving easy access to the principal sleeping rooms on the second floor.



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

House in a New York Suburb.—A. F. Leicht, Architect, 24 State Street, New York City.

The walls below grade, as well as arches and topping out of chimneys, are laid in cement mortar, composed of one part Brooklyn Bridge cement and three parts sand. All walls above grade are laid up in 1½ parts Rockland lime to three of sand, with the face of the wall laid in cement mortar as above.

According to the architect's specifications, the timber used in the frame of the building is white pine or spruce of the following sizes, and as approved by the Yonkers Building Department. Girders 6 x 8 inches, sills and posts 4 x 6 inches, plates composed of two 2 x 4 spiked together, window and door studs 2 x 4 inches, hip and valley rafters 2 x 10 inches, and common rafters 2 x 6 inches, placed 16 inches on centers. The first and second floor beams are 2 x 10 inches, the third floor beams 2 x 8 inches, all placed 16 inches on centers; the ridges are 1 x 10 inches, and the ribbon pieces 1 x 5 inches. The frame work of the building is covered with hemlock sheathing boards, put on horizontally, then lathed and covered with Portland cement mixed with King's Windsor cement, in the proportion of about two of the latter to one of the former and one of sand. The cement was floated to an even surface and finished with cement dash work, all as shown by the elevations and half-tone plate. The roofs are covered with 18-inch red cedar shingles laid 5½ inches to the weather, all corners being woven in and hips and ridges combed with Boston hip.

The floors of the first and second story are double, the rough or lower one, being composed of ⅞ x 8 inch boards laid diagonally and well nailed to the beams. The top or finishing floors are composed of strips of ⅞ x 3½ inch tongued and grooved Georgia pine, while the third floor is of strips of ⅞ x 4 inch North Carolina pine. The heads and jambs of the interior door openings, as well as the trim and base, are of chestnut. All windows on the first floor have panel backs and all others have molded stools. The kitchen, bathroom and butler's pantry are wainscoted. The stairs from the first to the second floors are of chestnut, with threads and risers housed into the wall strings.

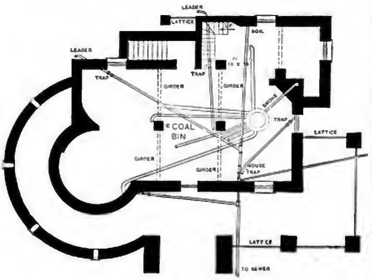
The wood work of the first and second floors is finished natural, and has one coat of Wheeler's best filler stained in colors and well rubbed in, after which it is treated to two coats of Charles H. Gillespie & Sons' Monarch wood finish. All exterior wood work has two coats of white lead and linseed oil.

The bathroom is equipped with a Standard iron enameled bathtub with combination faucet, a Kenny deep seal siphon hopper and trap combined closet and a 14 x 17 inch oval Standard iron enamel wash bowl, with nickel plated fixtures.

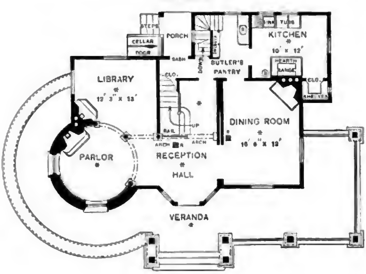
The kitchen is fitted with a No. 80 portable Thatcher range, a 35-gallon galvanized iron boiler and a two-part

Alberene stone laundry tub, all plumbing being done under the rules of the Board of Health of Yonkers. The house is wired for electric lighting and is heated by steam and hot air.

The residence here shown is that of Mrs. R. F. Eastman, and is beautifully situated in Lowerre, Yonkers, one of the many attractive suburbs of which the city of New York can boast. The house was erected in accordance with drawings prepared by architect A. F. Leicht of 21 to 24 State street, New York City.



Foundation.



First Floor.

Second Floor

House in a New York Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Advantages of Membership in a Builders' Exchange.

At the annual banquet of the Builders' Exchange of Lowell, Mass., the principal address of the evening was made by Vice-President Conlon, who after reviewing the history of the organization since its inception in April, 1888, referred as follows to the advantages and benefits resulting from membership in such a body:

In looking around this banquet table to-night, I see some of the members present who, in my opinion, deserve the thanks and congratulations of the members at large for their untiring work and zeal in carrying out the business and the object for which the exchange was organized in a faithful, conscientious and unselfish manner. "'Tis a pity we have not more of the same kind."

Gentlemen, some say that they are not likely to receive or need help from any body of men. A sufficient reply to this deceptive and contracted view is the assertion that no man, I care not how advantageously he may deem himself situated, is or can be independent of his fellows; nay, more, show me a man holding and acting upon these views, and I will show you one that the world will be no better for his having lived. The belief, I care not by whom entertained, that he is or can be independent of his fellows, is a fallacy of monumental proportion. The man who by good fortune has attained what may seem to him to be a position of independence and therefore thinks he has no interest in common with his fellow men, has lived to little purpose, and it goes without saying that such a one may safely be put upon the list of those who never will be missed.

Gentlemen, the question is apt to arise in the minds of the members of the Builders' Exchange, What benefit do we receive from this organization? and I have heard it expressed very, very often by some of the members present to-night. In this connection I am impelled to say that the benefits to be derived from an association such as the exchange are in almost direct proportion to the use that is made of the advantages and privileges it affords, for many new members, I fear, have the idea that by joining the exchange they will be the recipient of gifts without further attention or even attendance. When they do call at the exchange they are disappointed because they do not find dollars on the floor or suspended from the ceiling, waiting to be taken, or, in other words, they expect to find some person waiting to take them out and show them some job whereby they can make enough profit to pay their year's dues.

Another complaint we hear is that such or such a man never asks me for a bid. In reply to that I want to say if any member of this exchange does not see fit to want my bid, that, gentlemen, is his right and privilege. We do not know why he does not ask us for our bid, but he does not. We should not try to force ourselves on any one. Again, we hear members say that this or that man has not used us right. To that I will say, kick, gentlemen, kick. Tell him so, go to that man, ask for an explanation, meet him face to face, man to man, and I venture to say that in nine cases out of ten you will find that the gentleman had no intention of using you wrongfully and the motive will be explained to your entire satisfaction. If not, you know what to do, never give him a bid again. Any man may be taken in once, but it is a fool that can be played for a sucker a second time, and in my homely way I would say, "Watch him, but don't go out on the street corners telling everybody about it. Your time will come; just watch him."

But, gentlemen, it is worthy of notice that the most faithful members and the oldest members of the exchange are the best satisfied and most contented with their membership. Many opportunities are offered through the organization to broaden and extend one's business.

In conclusion, gentlemen, I want to remind you that our business hour at the exchange is from 11 o'clock to 12 o'clock daily, and to impress upon your minds the necessity and advantages of attendance, if it is only for five minutes each day; call at the exchange. You who have two or more members in the firm certainly have time to call daily some time between 11 o'clock and 12 o'clock. The time is past when the Builders' Exchange of this city can be called an experiment. It is a fixed fact and only needs that we be true and loyal to our undertakings to realize all our reasonable expectations.

Wood Working Tools in the Philippine Islands.

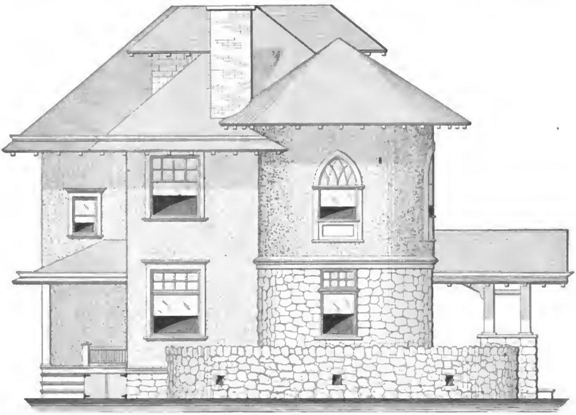
In the wood working line the manufacture of boxes and cases in the islands has opened a new demand for appropriate tools and equipments, says a correspondent in discussing the needs of the islanders regarding articles of hardware. The great forests of the country are about to be included in the available products of the islands, and the hum of the saw may already be heard in the woods. Mahogany, rosewood, pine and kindred other species are being cut in large quantities, sawed into building and box making materials; all this is calling for more wood working tools than the stores of the country have thus far been able to furnish. Buzz saws of a portable character are much wanted, so that wood cutters may move from point to point with the sawing outfits. I know of several parties here possessing circular sawing outfits who are earning money by going from place to place cutting lumber for others. Values of sawed lumber are high and profits are large.

Carpenters' tools are being ordered to a larger extent than ever before. Native made planes are odd devices and seldom satisfactory in their work. Chisels are inferior, and the same is true of the whole list of tools. The boring tools are particularly defective and holes are drilled only with considerable exertion and trouble. The resulting bore is always imperfect. Bits and bit stocks sell with ease. Gimlets, all kinds of cutting tools and hammers are selling very freely.

The Exhibit of Hygiene and Sanitation at the Pan-American Exposition.

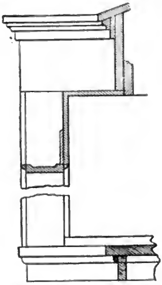
The exhibit in the interests of sanitation at the Pan-American Exposition will be under the direction of Dr. Selim H. Peabody, superintendent of the department of Liberal Arts, and in the special charge of Dr. Jacob S. Otto, assistant superintendent. The exhibit, it is said, will be a representative one, though not of great extent, owing to the small space available. The exhibit in public hygiene, made by the United States Commission at the Paris Exposition and collected by Dr. Samuel W. Abbott, secretary of the Massachusetts Board of Health, will form the basis of the exhibit at the Pan-American Exposition. The general powers and duties of cities and municipal boards of health and the results attained in various departments connected with them will be presented in the form of reports, charts and models. A complete quarantine system will also be on exhibition. In addition to maps illustrating the progress of the introduction of large water supplies in cities and towns, there will be photographs and plans to show the various schemes for supplying water to large communities and the relation of the mortality rate in certain localities to measures undertaken for the purification of the water supply.

Owing to the close relation of the subject of water supply to sewage and sewage disposal, a map will be exhibited showing the percentage of population by States and Territories living in sewered towns in 1897. Various methods of sewage disposal will be illustrated by exhibits made by cities and municipalities where such methods are in operation. The exhibit of the city of Worcester, Mass., will illustrate the chemical precipitation methods. There will also be a model of the great drainage canal at Chicago. The American Sewage Disposal Company will erect a plant to illustrate the biological system of sewage disposal and water purification, which will demonstrate the action of bacteria on sewage in process of purification, and photographs, charts and statistics will be used to show the equipment and results obtained by the Lawrence Equipment Station in Massachusetts under the control of the State Board of Health.



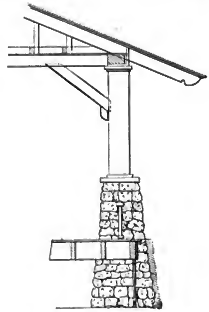
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

House in a New York Suburb.

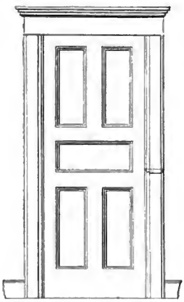


Detail of Exterior Trim for Windows.—Scale, ½ Inch to the Foot.

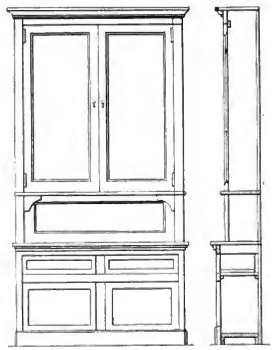
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



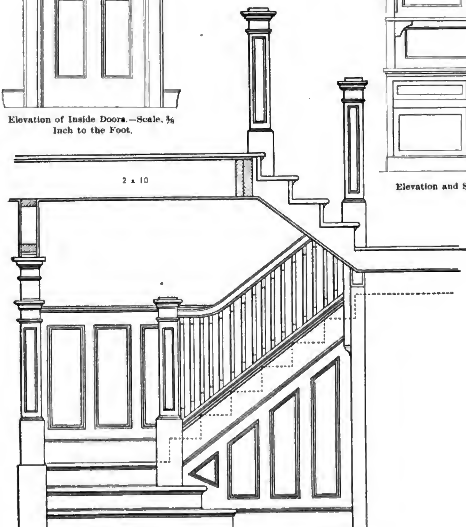
Detail of Porch Construction.—Scale, ¼ Inch to the Foot.



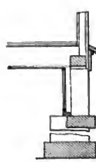
Elevation of Inside Doors.—Scale, ⅜ Inch to the Foot.



Elevation and Section of Dressers.—Scale, ⅜ Inch to the Foot.



Details of Main Staircase.—Scale, ⅜ Inch to the Foot.



Detail of Water Table and Foundation.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of a House in a New York Suburb.

THE ART OF VENEERING.

AN article on the subject of veneering, which appeared in a late issue of one of the London building papers, contains so many interesting suggestions that we present it herewith: A wood suitable for veneering requires to be thoroughly well seasoned, free from knots and shakes, and should not contain turps. The best of woods for the purpose are mahogany and American walnut, although good pine answers well for ordinary purposes. The surfece, if flat, is carefully planed with the trying plane. It is then well toothed over with the toothing plane—first the lengthways of the wood and afterward the crossways—care being taken to tooth the work thoroughly. If you are working pine, use a coarse toothing iron; if mahogany or other hard wood, a finer iron is requisite. If the wood presents a hollow or rounded surface, it is shaped with suitable planes, rasps and files, and finally well prepared crossways with coarse glass paper such as strong No. 2 or No. 2½.

The next preparation is sizing. To make the size, take one part of good Scotch glue and boil it well with 50 parts of water; then brush over the ground work while hot; allow to dry, and if there should be any defects in the ground work fill in with stopping. Make your stopping by mixing some finely ground plaster of paris with hot glue and water, enough to form a moderately stiff paste. Then lay in where necessary with a chisel, taking care to allow for shrinkage; let it dry, then level off with a rasp.

Preparation of the Veneer.

Having sized the ground work over next proceed to the preparation of the veneer while it is drying. Look carefully to the wood before cutting it, and see that it is done in such a manner as to get the grain of it to the best advantage. Cut it rather larger than the surface it is intended to veneer, to allow for leveling at the ends and sides. Most veneers, such as mahogany, oak, chestnut, maple, sycamore, birch, satinwood and various other woods, are ready for cutting as received from the merchant; but some, like burr walnut, brown oak, Amboyna, &c., present an uneven surface, called "backly." When this is the case, damp one side with clear water, lay it down with its dry side upward, and put the wet side of the next veneer upon it, repeating the operation till all are done. Take particular care to keep each veneer, if there are more than three or four, in its proper order as you damp and turn over, and do not on any account get them mixed. Let the wood stand about four or five hours, then lay them out to allow to nearly dry and they will be ready for cutting out.

The next process is flatting. Get two pieces of wood (dry straight pine will answer), rather longer than the veneer and heat them on a stove or before a bright fire; then place the veneer together between the hand screw, and allow it to remain for about half an hour; repeat this operation until the veneer is perfectly dry and thoroughly flat.

Filling In.

Our wood is now ready for filling in. If it is perfectly sound this operation is, of course, unnecessary; but it frequently happens, especially with burr walnut, that it contains holes that require filling. To do this take a piece of the veneer (off the edges of that already cut out), and flat it precisely as the other. Select the part of it which matches best with the grain of the wood around the hole to be filled in. Place this underneath the hole. If you have a stamp rather larger than the hole, you may now cut it square or circular and the piece for filling it at the same time. If not, take an ordinary pocket knife having a sharp point and cut your hole and veneer the required shape. When you have filled in the wood lay it on a flat board, then press the piece in with a hammer. If they are rather large use one or two finely pointed tacks to keep them in position. Now cover all the pieces with strips of paper, selecting a strong paper such as copy book or note paper for the purpose—one that is not too thick—and glue it on one side. Take care to use glue just thick enough to hold the wood in position. Pay particular attention to this or it will cause a good deal of trouble. You will find it best to cut the paper in strips about 1¼ to 1½ inches wide. Lay it on a board to glue and smooth it over your veneer with a damp rag.

Jointing.

We now proceed to jointing. Place the veneer in the position it will appear when laid. Observe that it matches. If you are to have one joint with two veneers or two joints with four veneers see that the grain of the wood forms a figure having both sides alike. If the veneers have been kept in their right or following order this will not be difficult. If you are working a thick veneer (saw cut), make the joints with an iron plane or ordinary trying plane on the shooting board; if using thin veneer (knife cut)), make them with a chisel and straight edge. Take particular care to have the bevel edge of the chisel against the straight edge when cutting or it will run, and you may come off with an ugly cut. Now put the jointed edges together on a deal board, and tack one edge down; put the tacks about ¾ inch from the jointed edges and about 2½ inches apart. Having tacked one piece down put the other up to it and tack it in the same manner. Now cover all the joints with paper, glue together in the same manner as previously mentioned in the filling in; smooth it well down with a damp rag and allow to dry. If the weather is hot it is best to cover your joints to prevent them drying too quickly. A good and simple method is to lay your board with the veneer downward on the floor. Let the joints dry, then take out the tacks and knock the head holes in with a hammer from the underneath side. Put the veneer aside until you are ready for laying it. It is best to cover it up and keep the air from it by placing it under a board or wrapper.

There are two ways of laying veneer—by means of a caul or a veneering hammer. I shall describe both methods, although the first is of greater importance, and should, whenever practicable, be adopted, but in certain cases which I shall mention the second is extremely useful.

Veneering by Caul.

In the first place to make a caul take a piece of well seasoned cedar or pine, rather larger than the surface intended to cover (about 1 inch to 1½ inches each way), and plane it up true on both sides, if the work is flat. If otherwise, make it to the requisite shape to fit the work, hollow, round, or whatever it may be. If it is necessary to shape the caul use thicker stuff, and it is advisable to screw on two or three battens on the back. When making shaped cauls it is best at the same time to get out the pieces of wood necessary to form a flat surface when the wood is put in the caul. Thus, suppose we wanted to veneer a door having a rounded surface on one side and a hollow one on the other. We have made a hollow caul to correspond with the rounded surface having its under side flat. Now put the rounded side of the door in the caul and shape your piece of wood, rounding it to fit the hollow side. They should be 2 inches wide—the same width or a little larger than the caul, and 5 inches or 6 inches apart. If one side only of the wood is shaped these woods are unnecessary. If the wood is not wide enough make a good joint, dowel it together, and take it to pieces for heating. The caul, if likely to be much in use, should be covered with zinc. Cut the metal out large enough to cover the face of it, with sufficient to turn over the edges and ends, and fasten it on with flat headed zinc or copper nails.

Glue.

Numerous failures in unaccustomed hands may be ascribed to bad glue. Nothing but the very best glue should be used for veneering. Get the best Scotch glue you can, break it up and boil thoroughly. It differs so much in strength that the proportion of water cannot be given, but after breaking up in pieces just cover with water and allow it to soak; then boil off with frequent stirring. It will, if good, now require about half as much water as previously added to bring it to the right consistence for veneering. It should be spread evenly with the brush and be free from lumps. Having made the caul and prepared the glue, get the hand screws and cramps to commence laying. Heat the caul on a stove or before a bright fire. If it is to be doweled together, and if it is more convenient, take it to pieces, taking care to mark your joints first. If you intend laying two similar pieces of veneer on flat surfaces heat both sides of it and do both pieces together. If not, get one side of it well heated, as hot as you can without letting it burn. While it is heating set the hand screws and cramps open as near the distance as you will require them, and place handy for the work. Now glue the ground work well, and if the veneer shows any signs of being backly glue it slightly on the underneath side, as this will help to soften it. Having finished gluing, put the veneer on the work and smooth it over gently with the hand. Then see that the caul is hot enough, and that its surface is free from any small cinders or dirt. Now rub it over with a greasy rag, and lay it gently on your veneer. Draw the work and caul a little over the edge of the bench, just enough to get the hand screw on; put it on very gently, then tighten as much as possible. You can then stand it upon the floor, and if you have nobody to hold it for you rest the hand screw against the bench while you put on the remainder. They should be placed about 6 inches apart, and mind that they bite fairly. Do not get any screw tighter than the other or you will only get the pressure at the outside and inside of the chaps. If you have a piece of work so wide that the screws will not reach the center from either side or the ends, get two pieces of wood 2 inches or 2½ inches thick and about the same thickness, plane them up, slightly rounding on one side, put their rounding sides facing each other on the work, and hand screw them at each end; they will then tighten in the middle and give sufficient pressure. Let the caul remain on for nearly an hour (in very hot weather longer will not hurt), then undo the hand screws, and if the caul sticks insert the edge of a thin metal square, the back of a hand saw, or anything of a similar nature, between it and the veneer, and work it carefully about until you get them apart. If the glue has been used thick enough and the caul well greased there will not be very much trouble, and they will often come apart themselves, or by giving the end of the caul a tap with the hammer, or on the end of the bench. See that the veneer is down. Feel it all over with the hand. If it is up you will be able to tell by the hollow sound on tapping it with the tip of your finger as well as by the raised appearance called blisters it will present when held to the light. If you heat your caul sufficiently, use the glue thick enough, and put the hand screws on properly, you will not be troubled with blisters. Should, however, there be any, let the work stand for one or two hours, and then put a smaller hot caul on when required until well down all over.

To level the veneer, first lay it (veneer downward) on a board and scrape off with a chisel as much of the glue that has come over the edges as you can. Now put it on the bench screw and level toward you with the paring chisel if thin veneers; if thick, use a smoothing plane. Put it aside to dry. If you have two pieces of the same size put them with their veneer sides together; if only one, place it so that the air does not get to the veneer; allow to stand for two or three days, then scrape off the paper for filling in pieces and jointing with a chisel, having previously damped it with hot water. The work is now ready for sizing. This operation may be dispensed with, but it is decidedly advantageous, especially if working wood which has an open grain. The size, which should be about the same strength as that used for the ground work, is brushed or rubbed over the veneer with the hand, then wiped off as dry as possible with a cloth.

Veneering by Hammer.

As I have already mentioned, this method is useful in certain cases. We sometimes want to veneer an edge, to put a narrow slip of veneer on some small surface where it would be very inconvenient to caul it down. If we are working a wood of a glossy or greasy description, like satinwood or rosewood, its nature will not admit of sufficient pressure by this process, nor should it ever be adopted for work where water will act injuriously. I believe the prevailing opinion is that veneer requires a good deal of water to make it lie. In the first process, you will remember that it is laid quite dry. In the second process water is used, and if we consider that a damp surface tends to cause the wood to cast as it dries, we can readily understand where it should be used.

Artificial Stone.

In a recent report to the State Department Consul-General John L. Bittinger of Montreal refers to an artificial stone made from lime and sand and known as "Owen stone," from the name of the manufacturer. In its preparation quartzose sand is first dried by being heated, after which it is thoroughly mixed with hydraulic lime in the proportion of about 12 per cent. of the latter to 88 per cent. of the former. This mixture, still in a dry condition, is packed into very strong molds of any desired shape, the filled molds being subsequently built up in a steel frame or box. The latter is conveyed by tramway to an immense steel cylinder, inside of which it is placed, the cylinder now being closed and the door strongly bolted. Water near the boiling point is then admitted until the cylinder is full, and an indicated pressure of from 60 to 70 pounds maintained. The water is kept in a highly heated condition by steam coils running along the length of the cylinder inside.

On the admission of the boiling water the hydraulic lime in the molds commences to slake, and the pressure maintained assists in forcing the water into the sand and lime mixture so as to bring about complete slaking throughout the mass. The mixture being confined in strong molds, it follows that the expansion of the material consequent on slaking is not allowed free play, so that immense pressure is set up within the material itself, which tends to render it much more compact than might otherwise be the case.

It is important that as little air as possible should be admitted into the cylinder during the slaking; this is why the water is admitted at boiling point and the temperature kept up by steam coils instead of live steam being injected direct into the water.

When the lime is thoroughly slaked, the pressure and temperature are gradually lessened and the material is allowed to cool slowly. When the cylinder is opened, the mixture is found to be converted into solid stone. The latter is in a wet condition and becomes harder in the course of 24 hours. The whole operation, from the packing of the cylinder to the withdrawal of the molds, occupies about 50 hours. The manufactured stone and bricks may be molded into any form and are of a handsome gray color.

Mr. Owen is authority for the statement that it can be manufactured much more cheaply than natural stone can be furnished from the quarry.

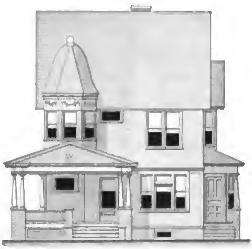
The idea of having a roof garden in connection with a building is not confined exclusively to theaters and apartment hotels, but is now and then to be found as a feature of a church edifice. There was recently dedicated in Parkersburg, W. Va., a kite-shaped church building with a roof garden consisting of an upper story with 22 windows. These are so arranged that when opened the sides of the structure practically disappear, leaving only the supports of the roof. The pastor of the church planned the building.

The quarterly *Bulletin* of the American Institute of Architects, compiled and edited by Glenn Brown, the secretary, contains much that is interesting to the architectural profession. There are comments upon the future grouping of Government buildings in the city of Washington, together with notes concerning various chapters of the institute; also an index of literature from the publications of architectural societies and the periodicals on architecture and allied subjects, from January 1 up to April 1 of the present year.

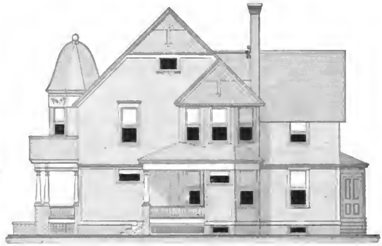
SOME DESIGNS FROM THE $2000 HOUSE COMPETITION.

THE recent publication of the designs awarded prizes in the competition for $2000 frame houses has attracted no little attention on the part of our readers and has brought requests that a selection consisting of some of the other efforts submitted in the contest be laid before them for consideration. It will be remembered that in their report the committee referred to the fact that in several instances the authors failed to comply in all respects with the conditions of the contest, and that they had therefore no alternative but to throw out all drawings included in this category. This was greatly to be regretted as there were many designs which from an architectural standpoint contained much that was of suggestive interest and value.

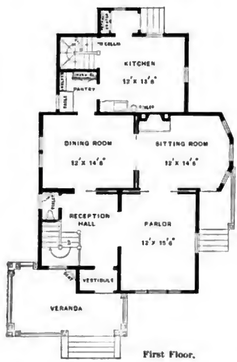
We have, however, selected from some of these five sets of floor plans and elevations and present them herewith. The design submitted by "Maple City" shows on the first floor a reception hall, parlor, sitting room, dining room and kitchen, with front and rear stairs, while on the second floor are five sleeping rooms and a bathroom. It will also be noticed that under the main stairs on the first floor is a toilet room. The study contributed by "Buzz" presents an exterior in which the first story is covered with siding, while the second with the gables is shingled. The first floor has a parlor, dining room and kitchen, a well equipped pantry, and provision is made for a china closet in case one should be required in the future. On the second floor at the front is a large bedroom, opening out of which is a dressing room, while at the rear of the house are two sleeping rooms and a bathroom. The next design is that of C, the exterior of which shows a chimney exposed its entire length, while at the left corner of the house is a tower extending through two stories. The first floor has a commodious reception hall, parlor, dining room and kitchen with combination stairs. The second floor provides for a sewing room, three sleeping rooms and a bathroom. The fourth study which we present is that submitted by "Ideal" and shows a rather attractive exterior with its shingled gables, leaded glass and eyebrow windows, &c. The main stairs rise from a reception hall out of which opens parlor, sitting room and dining room, while at the rear is the kitchen. The latter may be reached from the dining room through the pantry and from the sitting room through a short passage from which rise the rear stairs. Access to the cellar is gained by a flight of stairs leading directly from the kitchen and also through a door from the outside which opens upon a broad landing. The second floor has three sleeping rooms, a sewing room, bathroom and ample closet room. The last design which we show is that of 160 D. P. S. the house being more nearly square in its outlines, and involving in its external treat-



Front Elevation.

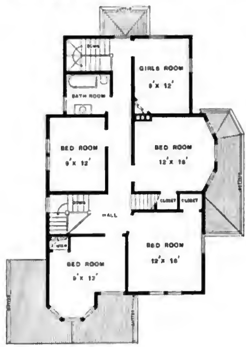


Side (Right) Elevation.



First Floor.

Submitted by "Maple City."

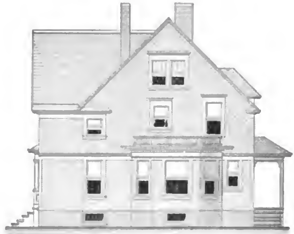


Second Floor.

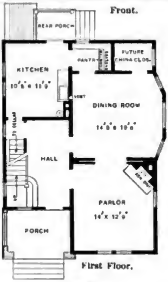
Some Designs From the $2000 House Competition—Scale, 1-16 Inch to the Foot.

Elevations and Plans Submitted by "Buzz."

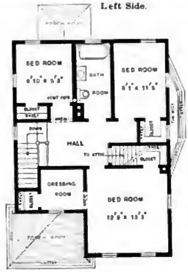
Front.



Left Side.

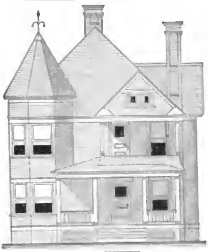


First Floor.

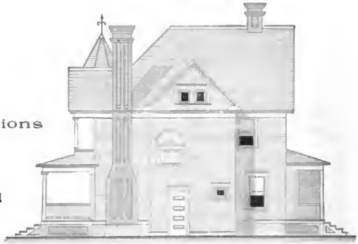


Second Floor.

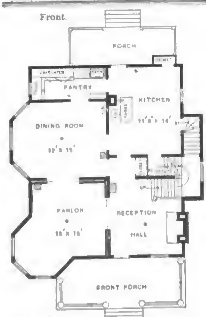
Elevations and Plans Submitted by "C."



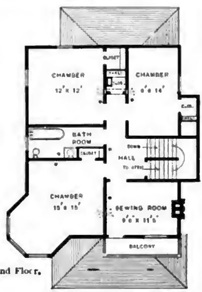
Front.



Right Side.



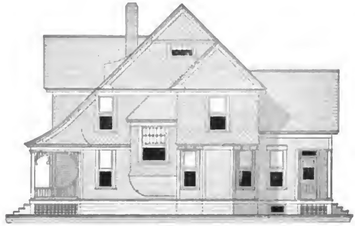
First Floor.



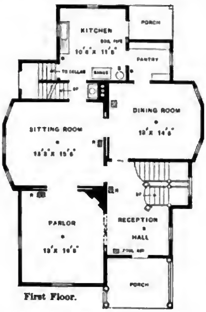
Second Floor.

Some Designs From the $2000 House Competition.—Scale, 1-16 Inch to the Foot.

Front.

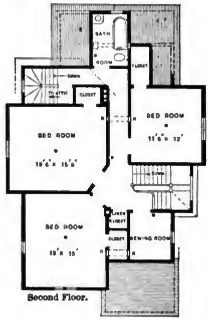


Right Side



First Floor.

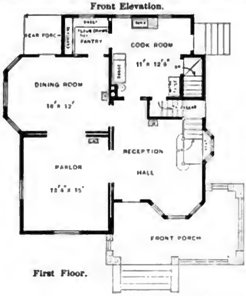
Elevations and Plans Submitted by "Ideal."



Second Floor.

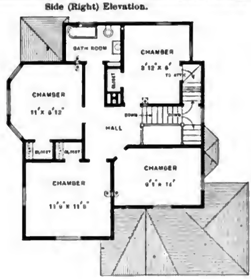
Front Elevation.

Side (Right) Elevation.



First Floor.

Elevations and Plans by "D P. S."



Second Floor.

Some Designs From the $2000 House Competition.—Scale, 1-16 Inch to the Foot.

ment considerable shingle work. The first floor shows a large reception hall, parlor, dining room and "cook room," as the kitchen is designated, with main and rear flights of stairs as well as those leading to the cellar. The second floor is divided into four sleeping rooms and bathroom. A study of this plan will show that the stairs are of the combination order, the main flight landing in nearly the center of the house.

We have made the elevations to the same scale as that of the floor plans—namely, 1-16 inch to the foot, which we feel sure will facilitate comparison and study. We shall be glad to have our readers comment upon these designs freely, expressing their views regarding treatment of exterior, arrangement of rooms, and any other features which may attract their interest and attention.

Free Baths in Public Schools.

"Hot and cold shower baths, at any time, for all pupils who want to keep clean."

This is the sign, says the New York *Mail and Express*, that in a few days will be conspicuously displayed in the class rooms and the halls of Public School No. 1, at the corner of Oliver and Henry streets. Further, the notice will mean everything that the words indicate. Any child in the school can have a bath for the mere asking. Later on the children will be compelled to take it whether they want to or not.

This idea of shower baths for the children marks a new departure in the public school system. So far as known, it is the only school in the State that is supplied with such a plant. It is an experiment upon which thought has been expended, and, if successful, it will be extended to every school in Greater New York, at least.

Its success or failure is being watched with the keenest interest, not only by all of the School Commissioners and those in any manner connected with the public schools, but by the health officials as well. It is also being watched by health and police officials all over this and other States. The idea of supplying the schools with baths is an old one, but it never took tangible shape until something over a year ago. At first the intention was to supply the schools particularly in tenement districts, where baths are few, with a regular plunge bath. Such a scheme was to have been put in operation in Public School No. 1, but after an exhaustive discussion it was abandoned. The conclusion reached was that the plunge bath would be unhealthy, for the reason that so many children would necessarily be compelled to bathe in the same water.

The shower bath, it was pointed out, would in any event prove more beneficial. If in general use in the schools a marked improvement in the health statistics might be looked for. So the plunge for No. 1 was abandoned, and the basement floor, on the Oliver street side of the building, which had been lowered, was raised to meet the new conditions. There are 16 shower baths there now, all of them practically ready for use. The only thing necessary is to fix up a couple of "waiting rooms" in the basement, as the plans provide for. They will be undertaken at once. As soon as the 16 are in working order, the work of building 50 additional baths will begin, and before the summer is over they, too, will be ready. The baths are 7 feet in length, open at the top, between which and the ceiling is a distance of 4 feet. The sides of the baths are all of thick smoked glass, which was specially made for the purpose. Through this glass is a network of wire, the wire itself being covered with asbestos. This is for the reason that the wire being subject to contraction or expansion from the heat or the cold would break the glass. The asbestos covering will prevent this.

Each bath is something over 6 feet in length and 3 feet wide, and a heavy curtain acts as a door. The arrangements are such that a child four years old can manipulate them, and it will be impossible for children to scald themselves.

While pure water, fresh from the hydrant, can be turned on at will, it is made impossible for the hot water to be turned on to a greater temperature than 78 degrees. When that temperature is reached a valve closes automatically, and the water, while in use, is kept at that temperature. The floor of the baths is of cement, and by means of a graded channel all waters are carried off.

Preparation for Resisting Damp Walls.

Many articles have been tried to prevent the damp from striking through the walls, but all are more or less of no practical value to the painter, says a writer in an English exchange. One of the many objections to them is the exorbitant prices charged by the dealers, while at the same time the material from which they are produced perishes after a few months' exposure to the weather, which generally results in the damp resister and overcoats falling off in large masses.

An effective preparation may be prepared as follows: Procure 14 pounds common rosin and melt over a fire, or by means of a hot water bath. After it has completely melted, stir in 2 parts each boiled linseed oil and hard oak varnish, and then allow it to cool down somewhat and take well away from the fire and add slowly ¾ gallon coal tar naphtha, constantly stirring until all the ingredients are thoroughly mixed.

This preparation should be kept in air tight vessels, otherwise the naphtha, being volatile, passes off, leaving a thick, unworkable mass.

The above preparation is transparent, but may be prepared in any shade or color by adding any good bodied pigment, thinned down with naphtha and thoroughly mixed into the preparation.

The best method of applying the preparation is to rub the first coat well into the work by means of a heavy varnish brush. This should be allowed to thoroughly dry, which usually takes about three hours, it may then be given another coat, which dries hard with an excellent gloss. The work may then be proceeded with in the usual way. This recipe produces about 2½ gallons, and will cover about 120 square yards, one coat.

THE SCIENCE OF HANDRAILING.

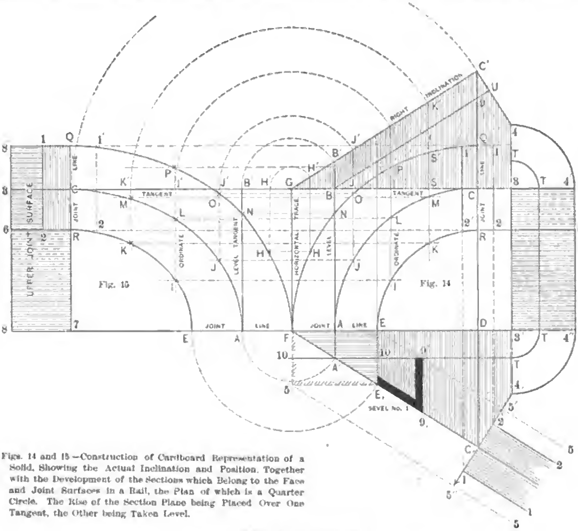
BY C. H. FOX.

WE will now explain the construction of a cardboard representation of a solid, showing the actual inclination and position, together with the development of the sections of the face mold and joint surfaces, in a rail the plan of which is a quarter circle, the rise of the section plane being placed over one tangent, while the other is "level." The problem presented in the diagrams of Figs. 14 and 15 is very different to that explained in the preceding constructions. There the rise has been taken equal over each plan tangent, while here it is placed altogether over one, the other being termed "the level tangent." It may be noted in the models already constructed, that the joint surfaces are inclined to the plane of the base of the model. Here we may find that only the upper one of the joint surfaces is inclined. The lower one, although at right angles with the section plane, will also be at right angles with the plane of the base of the model. For this reason it is generally termed "a plumb surface." The problem is that generally employed to cover a quarter turn at a landing to either "start from" or to "meet" a level rail.

In order to construct a representation of the solid proceed as follows: In Fig. 14 is shown the plan, D being the center. Draw the convex F-O-Q, the center A-L-C, and the concave E-K-R curves, as shown. The points A and C of the center curve are the representations of the points at which joints are desired. The center quadrant A-C is again inclosed within the square A-B-C-D, two sides of which, A-B and B-C, represent the tangents; the opposite sides, A-D, D-C, represent the joint lines of the plan. This understood, produce the sides of the square indefinitely in either direction. Now, assuming C-9 as equal to the vertical rise of the rail, draw B-9; then parallel with A-B draw F-G, the horizontal trace. This is the line in which the oblique section plane of the face mold meets the plane of the base. Now parallel with B-9 draw G-C', which gives the right inclination of the section plane of the face mold. Now square with G-C' draw C'-4 of any length. Through 4 draw 4-4, parallel with C'-D, which gives in C-G-C'-4-3 the representation of the plane tangent with C, which forms one side of the model. Now upon the joint line D-F construct a similar figure, this giving another side

lel with Q-7 draw 1-2. Then in Fig. 14 set off E-10-E, equal to the hight of the rail, and complete the section of the rail as shown in the diagram, which will complete the model.

Now take a sharp knife and cut clear through the board at the outline of the drawing, following the curve line Q-P-J' of the face mold. Then at the lines G-F, F-3', 3'-3 and 3-G of Fig. 14, and at Q-7 of Fig. 15, cut about half through the board; touch the edges with liquid glue and bring them together with the lines at the exterior, then fold over the section plane into its proper position, and it may then be seen that only the upper joint surface is inclined to the plane of the base of the model. The lower joint surface will, if the drawing has been projected correctly, be in a vertical position in its relation to the plane of the base. Now, cutting as before directed the two joint sections and placing them



Figs. 14 and 15.—Construction of Cardboard Representation of a Solid, Showing the Actual Inclination and Position, Together with the Development of the Sections which Belong to the Face and Joint Surfaces in a Rail, the Plan of which is a Quarter Circle. The Rise of the Section Plane being Placed Over One Tangent, the Other being Taken Level.

The Science of Handrailing.

of the model. The other side may be constructed by making 3-4' equal to 3-4 of the tangent plane. Then parallel with C'-D through 4' draw 4'-4", which completes the sides of the model.

To construct the representation of the section plane and develop the curves of the face mold proceed in the following manner: First, through any points, as I-J-H, &c., of the plan curves, parallel with the tangent A-B draw H-H', J-J', I-I', &c., meeting the right inclination, as shown in H'-J'-I', &c. Now, with G as center, rotate each point into the tangent C-B, produced as shown in H'-B'-J', &c., of Fig. 15. Now parallel with G-F draw H'-H, B'-A, &c. Then parallel with C-G from each point of the plan produce lines, as shown; these intercept the ordinates of the section plane in the points H-J-I, &c., giving the points through which to trace the elliptical curves of the face mold. Now having drawn the curves and produced the joint line Q-7 of the upper joint surface, set off Q-8' equal with C'-4 of the inclined line of Fig. 14. Through 8' draw 8'-8; then set off Q-1 equal with the half thickness of the rail, and through 1 paral-

in their proper positions at the model, it may be seen that the plan of the plumb joint is simply the line E-F, but that, owing to the inclination of the joint surface over C, the plan of the joint section occupies a space as shown comprised within the lines 1'-2'-2-1 of Fig. 14. The patterns will also show to the student the manner in which the top and under surfaces "twist" in covering the curve of the plan. If at the side of the model over the joint line F-3', lines as E-5' and 5-5", are drawn through the points E-5 of the joint section, parallel with F-C, the thickness required of the wreath piece may be obtained, as shown in 5"-5', and, as may again be noted, the wreath piece is in a manner intersected with the central plane F-C, and it is upon the representation of this plane that the face mold has been developed.

It may be of interest to those readers who are engaged in the laying out of these problems and the material made use of is other than wood, say stone or marble, to state that the section planes of the face model as projected by the tangent system method are not the most favorable ones as regards the quantity of material required out of which to form the finished stones. Owing to the conditions required in this system "that the joint surfaces be square with the working surface of the solid," a quantity of stone must of necessity be wasted.

In the cutting of stone a different method has to be adopted than that which obtains when the rail may be comprised of wood, for the simple reason that the stone cutter is not able to fasten the face mold to the working surface of the solid in the manner the wood worker does; the lines must be marked directly upon the working surfaces of the rough stone. This is not required with wood, as other methods may be employed to give the proper direction at which to form the cylindrical sides of the wreath piece. Letting like conditions obtain—that is, projecting the patterns so that they may be employed in the manner the stone cutter generally make use of them, the molds to be applied and the contour marked at either surface of the stone, there are many problems connected with handrailing, in which, by selecting and making use of a more favorable section plane upon which to develop the face mold, nearly one-half of the material may be saved over that required if the tangent system of projecting the molds be employed.

In Fig. 16 is shown the method by which the face mold and bevels may be developed in practice. O represents the center with which the plan curves may be drawn, A-A'-B the tangents, and O-A, O-B the joint

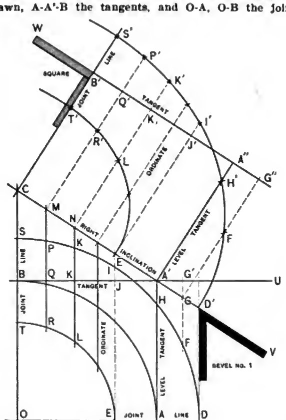


Fig. 16.—Shows Practical Method by means of which Face Mold and Bevels may be Constructed for a Rail, Plan, &c., of which is Similar to that given in Fig. 14.

nary square," is shown at the upper joint surface; its application may be clearly seen on an inspection of the upper joint surface of the model. In Fig. 17 is shown an oblique projection of the model, and in Fig. 18 a geometrical elevation of the solid of the rail with the bevels shown applied to the surfaces of the joints.

(To be continued.)

In connection with the new 20-story Frick Building now in process of erection in Pittsburgh, Pa., there will

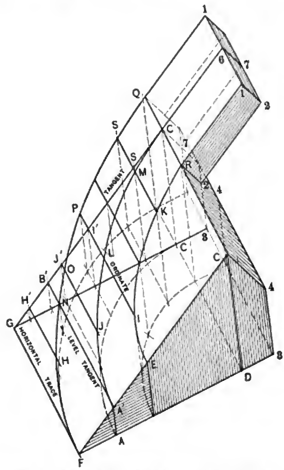


Fig. 17.—Pictorial Representation of Cardboard Model of Figs. 14 and 15.

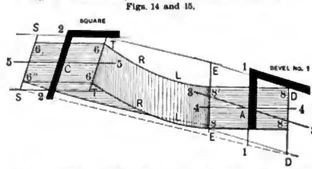


Fig. 18.—Geometrical Elevation of Rail after being "Squared Up;" Bevels are shown Applied to Joint Surfaces in the Manner Observed in Practice.

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lines. Assuming B-C as equal with the vertical rise of the rail, by joining C-A' and producing it, we may obtain the right inclination of the section plane of the face mold. This understood, parallel with A'-A draw the plan ordinates to meet the right inclination, as shown in the points D'-G-A'-E', &c.; then square over the ordinates of the section plane, and set off the length of these equal with that of the corresponding ordinates of the plan, and the points may be obtained through which to trace the elliptical curves of the face mold. The joint lines of the mold are already given in A'-C and C-B' produced. The bevel No. 1 of the lower joint surface is shown in D-D'-V, the construction of which will be apparent from the drawing. The other bevel, "an ordi-

be a considerable amount of solid bronze and ornamental iron work which will be used with artistic effect. There will be solid bronze staircases, rails, newels, elevator inclosures, bank railings, window frames and the like for the lower floor, while on the upper floors there will be ornamental iron radiator casings, staircases and elevator inclosures. There will also be railings of bronze around the building, all of which, inside and outside of the building, will be of the most ornate character. The contract for this work has been awarded to the Winslow Bros. Company, of 396 Carroll avenue, Chicago, Ill., who are also to furnish all the ornamental iron work for a $400,000 office and hotel building which is being erected at Honolulu, Hawaiian Islands.

CORRESPONDENCE.

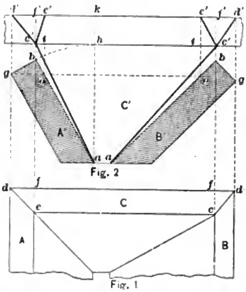
Method of Obtaining Hopper Bevels.

From A. ROBERTS, *Lincoln, Neb.*—The following method of obtaining the bevels for hoppers is the most simple and easily applied of any with which the writer is acquainted. It has the great advantage, with scarcely a variation, of being employed for obtaining the bevels for any kind or shape of hopper; so that the mechanic has only one method to learn or remember, and that, by the way, the easiest one.

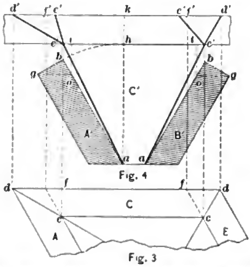
Referring to the diagrams, Figs. 1 and 2 represent portions of a rectangular hopper, one side of which, B B', is set at a different pitch from the others, while Figs. 3 and 4 represent parts of a hopper, one corner of which is the same as that of a triangular hopper and the other that of a hexagonal one. The several figures are lettered alike, so that one description with little variation applies to all. The plan views show portions of the sides A and B and the end C, the bevels for which are to be obtained.

First erect a perpendicular at *a* and set off *a h* equal to the width of the board, or *a b*. Draw a line through *h* parallel with the base, which gives the upper edge of the side C C' as it would appear if set plumb, instead of flaring. We know, however, that the length of this top edge must be the same as that from *c* to *c* on the plan; hence by erecting at either end a perpendicular from *c*, or directly from *b* on the elevation, we obtain the point *c'*; then *a c'* is the side bevel required.

Now to obtain the bevels across the edge of the board lay off the thickness of the stuff from *h* to *k* and draw through *k* a line parallel to *c' c'*, which gives a representation of the edge of the board revolved into the plane of projection. For a miter cut we know that the outer edge of this board must be the same as it appears on the edge of the plan, hence if we erect a perpendicular from *d* we know that *d'* is one point, and *c' d'* is the bevel required. If we wish, however, to make a butt joint instead of a miter, we erect a perpendicular from *f* to *f'*, which latter would be a point in the butt joint if the edge of the board were level; but the outer edge is lower than the inner, coming only to the mark *o* level with the corner *g*; hence it must be shortened by a distance equal to that from *b* to the line *o i* or *c' i*. Hence if we set off that distance back from *f'* we obtain the point *e'* and *c' e'* is the bevel for a butt joint. As will be seen from the figures, these rules will work as well for a triangular or hexagonal hopper as for a rectangular one, and they will answer quite as well for any other form.



Figs. 1 and 2.—Portions of a Rectangular Hopper, One Side of Which is Set at a Different Pitch from the Others.



Figs. 3 and 4.—Portions of a Hopper, One Corner of Which is the Same as That of a Triangular and the Other That of a Hexagonal Hopper.

Method of Obtaining Hopper Bevels.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From G. L. S., *Temple, Ind.*—I have been reading the various replies to "Learner's" request relative to beveling a valley rafter in a roof of two different pitches, and have found each of them, up to and including the May number of the paper, inaccurate. I have waited in the hope that some other chip would challenge the accuracy of these replies, but as no one seems to say anything I certainly think it would be a great mistake to let the answer go out to the young fraternity without some correction. Thousands of young mechanics as well as "Learner" are interested in this problem, as it is one of the most important in roof framing. There are other features which should be brought out in this same problem, such, for instance, as the intersection of the cornices on roofs of this character, also the difference in length of studding under the two roofs. To be sure, much of this is the architect's duty, but, strange as it may seem, not one architect or carpenter in 50 seems to understand anything about it and always neglects it, so the work falls on the carpenter in the end.

Carpentry and Building is doing a great work, and where an error gets into its columns it is important that it should be corrected. If no one else points out these errors, and it is desired that I should do so, I will willingly take time and demonstrate the whole problem, including cornice, studding and all, in an article for some future number of the paper.

Note.—We shall be very glad to have our correspondent put his demonstration on paper, with a view to adding to what has developed into an interesting discussion of an important phase of framing.

Designs for Small Houses.

From C. H. N., *Wheatland, Wyo.*—I would like to see published more designs for small houses, say four, five and six rooms, costing from $500 to $1500. What I especially have in mind are houses which are built by people of moderate means, as those are the kind the carpenters of country and small towns are principally called upon to construct. I think such designs will be of more benefit to the members of the trade than the costly houses where the plans are furnished by architects.

Note.—We are always glad to have letters from our practical readers expressing their views regarding the conduct of the paper, and intimating the particular things in which they are most interested. Our aim is to present such a variety of designs as to meet all requirements, and while we have in the past given considerable attention to low cost houses, especially in the volume for 1899, we will bear the wishes of our correspondent in mind and endeavor to give additional designs along the lines indicated.

Laying Gravel Roofs.

From J. S. L.--Will some one please inform me how to put a gravel roof on a building that at the present time has a tin roof, without removing the latter? The size of the roof is 48 x 60 feet, and the pitch is 2 feet. Would this be practicable?

Answer.—So far as the pitch is concerned, that would be sufficient to carry off the water. While it would be better to lay the gravel roof direct on the sheathing, we see no reason why the gravel roof could not be laid direct over the tin roof, providing, however, that the roof is made perfectly level by pounding or nailing the buckles down well and assuming that a cap flashing is already in the wall. Lay the gravel roof as follows, but do not have any walking thereon after the roof is completed. When the roof has been made smooth coat the surface with a layer of hot roofing pitch, 3-16 inch thick. On this put five layers of best roofing felt, weighing not less than 15 pounds per 100 square feet single thickness, with the several layers each cemented together with hot roofing pitch for one-half the width of each sheet, using about 8 gallons per 100 square feet for the sticking. Then put on flashings around all the walls and openings, turning same up against the wall underneath the cap flashing and out on the felting 4 inches. Nail the flashings down upon the felting about 3 inches apart; then put on two layers more of felting over base flashings, cemented to the five layers of felting with hot roofing pitch. Then finish the roof by putting on a heavy coating of hot roofing pitch and about 6 pounds per square foot of dry beach gravel that will pass over ¼-inch screen and through a ⅝-inch screen and avoid walking over same constantly.

Shingling Hips.

From R. W. D., *Moline, Ill.*—In the last issue of the paper "S. H." of Baltimore asks how we shingle hips. In this section of the country I would state that there are used a number of methods, although I have found only two which would stand the test of time. One way, and I think it is the best, is to let the shingles break where they will on the hip and cover the joint with a galvanized hip roll or hip shingle, such as that for example, illustrated in a recent issue of the paper, and made, I believe, by the Willis Mfg. Company of Galesburg. Another good way, and neater in appearance than the above, is to make the corresponding courses of shingles intersect the hip at the same point, and cover each of the joints on the hip with a tin shingle about 4 inches wide and long enough to reach well up under the course next above. The corners of the tin should be clipped off to fit the course over which it is nailed.

Condensation in Chimney.

From G. J. N., *Meaford, Ont.*—Will some of the readers please tell us what will cure a chimney of sweating? The chimney runs up through a one and one-half story cottage. It is used in connection with a hot air furnace, and an 8-inch pipe leads from the furnace up 14 feet and then runs over 4 feet to the chimney. The chimney is 10 x 14 inches in size, and it sweats so freely that the condensation runs down through the bottom of the chimney. The pipe does not sweat, the trouble appearing all in the chimney, yet the furnace is not interfered with from lack of draft.

Note.—Evidently the chimney is not of sufficient hight to have any considerable natural draft, and owing to its size at the point where the smoke pipe enters it is not heated sufficiently for the draft to carry off the products of combustion before condensation takes place. Where the smoke from an 8-inch pipe having an area of 50 square inches enters a 10 x 14 inch flue, which has an area almost three times as great, it is natural for the contact of the smoke with the cooler walls of the chimney to cause the condensation noted. Having stated the cause, the remedy can best be applied by our correspondent, who is on the spot and is the best judge of what is needed. It is quite possible that if a smoke pipe was run up inside of the chimney from the present point of connection to the top the trouble from condensation would be avoided.

Laying Out Wreath Pieces for Stair Rail Around a Cylinder Containing Winders.

From C. B. H., *Warren, Pa.*—In reply to the query propounded by "S. W." of Paterson, N. J., regarding a

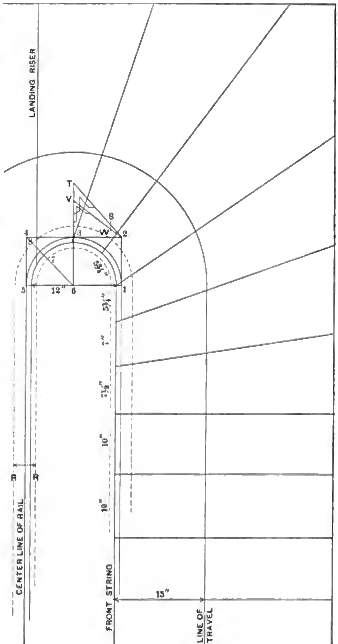


Fig. 1.—Partial Plan of Stairs.

Laying Out Wreath Pieces for Stair Rail Around a Cylinder Containing Winders.

plain illustration of the principles employed to lay out the wreath pieces for a stair rail around a 6-inch cylinder containing winders, I submit a plan of stairs in which the same rules are applied to make a much easier and better flight of stairs, as well as a better appearing rail. In developing this problem I use more lines than the practical stair builder requires, but only what seem necessary to make the principle plain to the inexperienced workman. Right here let me say that stair lines cannot be comprehended at a glance. Close and careful study, as well as practice, are required in order to fully understand them.

The plan of stairs is given in Fig. 1, which shows a 12-inch cylinder. I wish the readers to notice the line of travel 15 inches from the line of the front string. On this line it will be observed the treads are of equal width from start to finish, but as we approach the cylinder they are reduced at the front string and widened at the wall string, all as indicated on the plan. The tangents to the center line of the rail are shown at 1, 2, 3, 4 and 5. These lines are level tangents. Now as the rail is rising from 1 to 4 in passing around the cylinder, these three tangents are much longer.

The length and pitch are shown by 2 T of Fig. 1, but how are we to find the length and pitch as there given? We must obtain the stretch out of our circular rail and the exact hight of the rail at the finish, as well as above its lower or starting point at the cylinder line, where joined to the front string. We set up, therefore, an elevation of a few treads and risers of the stairs below

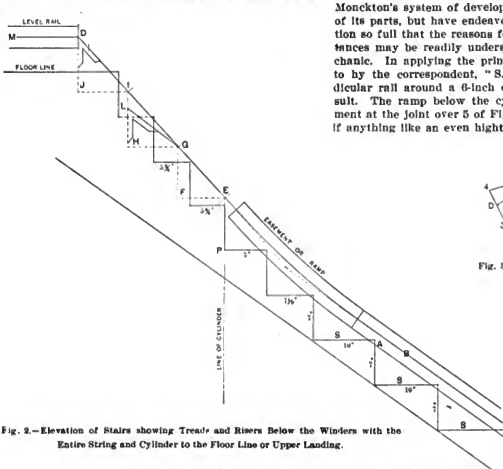


Fig. 2.—Elevation of Stairs showing Treads and Risers Below the Winders with the Entire String and Cylinder to the Floor Line or Upper Landing.

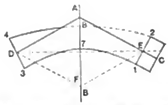


Fig. 3.—Method of Laying Out Face Mold for Lower Wreath.

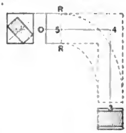


Fig. 4.—Showing Application of Bevels to Upper Wreath.

Laying Out Wreath Pieces for Stair Rail Around a Cylinder Containing Winders.

the winders and all of the string and cylinder to the floor line or upper landing, as shown in Fig. 2, making the width of treads the same as shown on the front string in Fig. 1. Taking now the distance from 1 to 2 of Fig. 1, which is the length of the level tangents, we space off from the cylinder line P E of Fig. 2 the distances F, H and J, as shown by the dotted lines. At D J, a distance of half a riser above the floor, draw a level line representing the bottom of the level rail. Draw the line D M, representing the center of the rail. Now D becomes a fixed point and cannot be moved. Through the top of the treads at the center of the short baluster, or 1 inch from the face of the risers on the regular treads, draw the bottom line of straight rail; also draw the center and top lines of the straight rail. Next draw the line from D to E and extend it 3 inches at any hight desired. This line from D to E gives us the pitch and full length of the three tangents as used in laying out the face molds or rail. Two of them are used or embraced in the lower wreath, and one, a level tangent, as from 3 to 5 of Fig. 1, in the upper wreath piece. Now by drawing the level or horizontal lines E F, G H and I J of Fig. 2 from the point where the perpendicular lines touch the raking tangent line, we divide the same directly over 2 and 3 of Fig. 1. Therefore from E to G, G to I, and I to D are the length and pitch of each of the three tangents when in position over 1, 2, 3 and 4 of Fig. 1.

In Fig. 3 we show the manner of laying out the face mold for the lower wreath piece, which is done by drawing the line A B as shown, making F, 7, 8, A, equal to 6, 7, 8, 4, of Fig. 1. Make A E, A D, F E and F D each equal to E G of Fig. 2 or 2 T of Fig. 1. From E and D set off half the width of the rail as found on the line 2 V at W of Fig. 1, and through the points 1, 7, 3, and 4, 8, 2, bend a flexible strip and mark the lines of the face mold.

The bevels for squaring this wreath piece at both ends are found at L of Fig. 2 or at V of Fig. 1. The bevel at D, Fig. 2, or at T of Fig. 1, is applied to the upper end of the upper wreath piece, as shown in Fig. 4. Detailed explanations for making this face mold are perhaps not necessary at this time, as it explains itself.

Readers will observe that I have used James H. Monckton's system of developing this problem in many of its parts, but have endeavored to make the explanation so full that the reasons for using the lines and distances may be readily understood by the ordinary mechanic. In applying the principle to the plan referred to by the correspondent, "S. W.," an almost perpendicular rail around a 6-inch cylinder would be the result. The ramp below the cylinder line and the easement at the joint over 5 of Fig. 1 would be very abrupt if anything like an even hight was maintained over the cylinder, as is always a desirable feature in rails of this kind. I will not here enter into a treatise on the application and use of face molds and bevels, as the same may not be expected or required by the correspondent making the inquiry.

Size of Crown Mold for Gutter.

From J. C. S., *British Columbia.*—Will some of the readers tell me through the correspondence department what size of crown mold to order for a 6-inch gutter, as I find a 6-inch crown mold will not miter. I notice on some buildings in this part of the world that the gutter is returned and the crown mold run down into it. Is this a good way ?

Cost of Cornices.

From O. T. B., *Massachusetts.*—From time to time we have received valuable information through the columns of the paper, and I believe you can help a country mechanic a great deal by showing the cost of different styles of metal cornices, using a certain base price on copper and galvanized iron. I would like also to know how to figure the cost of skylights and various metal work done in a cornice shop. At the present time, on account of the low price of cornice brakes, nearly all tin shops have a brake of some kind, and many days' work can be had in making skylights in country towns where wood is now used, if tinners could take hold of that line of work.

In talking with owners of shops we find that the lack of ability to give builders an idea of the cost, rather than the lack of ability to make cornices, is the reason why they do not do that class of work.

Answer.—It is impossible to give the cost of any given style of cornice work per running foot without first taking off the quantities from the drawings, as the styles of cornces vary. One of the first steps necessary in obtaining the amount of material in any cornice, after receiving the plan, no matter what scale it is drawn to, is to take the dividers and obtain the stretchout of the material required, by stepping up the section of the cornice and placing all divisions on a straight line, after which obtain the correct length or girth by using the scale rule of the proper scale. Assuming that the girth is 4 feet, multiply this by the length of the cornice, which will give the number of square feet, and assuming that No. 26 galvanized iron is to be used, which weighs 14½ ounces to a square foot, multiply the number of square feet by 14½ and divide the product by 16, which will give the number of pounds required. To this must be added the cost of the pressed zinc work, if any, which can be obtained from the various catalogues on work of this kind, and the cost of cutting, forming and setting the work together in and out of the shop, to which the entire profits must be added. In arriving at a close bid on labor experience is the best teacher.

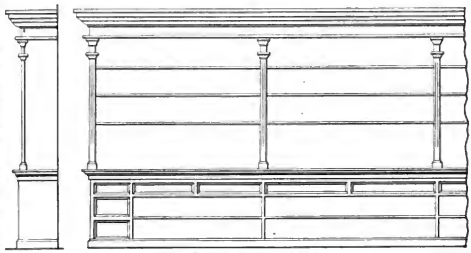
In skylight work the rate of prices can easily be given, as there is no change in the construction or shape as in cornice work. There is not much metal used in skylight construction, and for that reason it is desirable to know the price of glass per square foot as may be called for in the specification. Flat skylights using ¼-inch ribbed glass are worth from 35 to 45 cents per square foot in New York, while hipped skylights can be made, using ¼-inch thick glass, for 50 to 60 cents per square foot. If, however, the glass is ⅜ inch or ½ inch, or sometimes wire glass, the amount over the price of ¼-inch glass should be added to the above prices. We would suggest that our correspondent make three or four flat and hipped skylights, and note carefully the labor on same and material. These lights can always be used, and he will have something to guide him. The same applies to cornice work. Make a cornice about 3 feet high and 20 feet long, and note carefully the time and labor expended on each piece, which will give an insight into work of this kind. It requires experience to estimate from a set of plans, and this can only be obtained in one way.

Method of Deadening Floors.

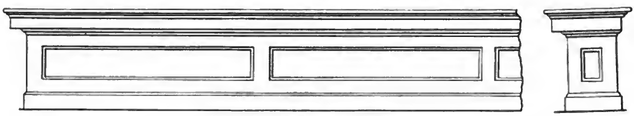
From J. M. FLANNERY, *Syracuse, N. Y.*—In the June number of *Carpentry and Building*, page 166, is published a sketch showing a method of deadening floors being carried into effect by a Chicago architect and referred to as a novel scheme. I wish to say that the method is not new at this time. I have used the same scheme for the past ten years and find it gives very satisfactory results, the cost not exceeding that of any other deadening which will give like results. By omitting the double floor and the furring strips between the cost is less than any form of deadening that can be put in, while the results are far ahead of any of the familiar practices in use.

Design for Store Counter and Shelving.

From W. A. E., *East Waterford, Maine.*—In the February issue of the paper "J. G. B." of Southport, N. C., asked for designs of a store counter, and in reply I will try and help him by sending the sketches inclosed. These represent the front and end elevations of a counter, and also sections of shelving intended to stand just in the rear of the counter. Our friend may use whatever he likes for moldings around the top and bottom. He can also arrange the shelves and drawers to accommodate the kind of goods which it is intended to keep on them



End and Front Elevations of Shelving.



Front and End Elevations of Counter.

Designs for Store Counter and Shelving.—Contributed by "W. A. E.," East Waterford, Maine.

Design for a Wooden House on Wheels.

From ONWARD, *Bombay, India.*—Will some of the many readers of the paper kindly send for publication plans of a one-story wooden house of Swiss style of architecture, the cost to be about $300? I desire something light, cool and portable, running on wheels, with an open stairway. The plan of the wheel gear is especially requested.

Note.—If any of our readers can furnish designs of the character indicated by the correspondent in India we shall be glad to have them sent forward for publication.

Durability of Wire Nails.

From C. H. N., *Wheatland, Wyo.*—I am much interested in the correspondence of brother chips and obtain many valuable hints therefrom. I will say in support of "M. C. G.," whose letter appeared on page 161 of the June issue, that any one acquainted with the climatic conditions of this section will not be surprised at the preservation of wire shingle nails in roofs. We have only a few showers spring and fall, the wind soon dries the roof, the air is pure and dry, and the lumber (we use Oregon white pine and fir) is rich in oils.

THE ART OF WOOD TURNING—XIX.

(SECOND SERIES.)

BY FRED. T. HODGSON.

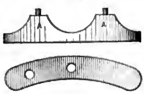
SO far, then, we may consider the flange in a state ready for getting it attached to its place, prior to which the block shown at Figs. 125 and 126, which supports one end, and the stud, Fig. 127, to effect a like purpose for the opposite extremity, must be made. The latter is fixed to the main plate by being carefully fitted to a hole bored in the correct position and held thereto by a screw from the back. The position required will be that which when the flange stands in the vertical position the center bars will run as nearly true as it is possible to get it: and here, again, a hint as to the best means to secure this may not be out of place. I may say, that, first of all, a piece of box or other equally hardwood should be securely fastened in the center hole of the main plate, which must be turned off perfectly true to fit the so far temporary or rough hole through the center of the bars or flange; then place the latter onto the plate, and with this guidance we get the position in which to fix the stud; mark from the hole in the flange with a fine pointed scriber or circle, and in the center of this drill the hole the correct size.

By the foregoing method we also obtain the proper position in which to fix the block, Figs. 125 and 126. This is, in the first place, made to the shape and curve, as seen in Fig. 125, which is obtained by the circle or curve being struck from corresponding centers. It is then fixed securely to the main plate by two screws from the back. The hight of the stud between A and B, Fig. 127, must correctly correspond with the depth of the block at A, Fig. 126. Any error in this respect will cause the flange to lie the reverse of parallel with the plate, which will create very considerable difficulties if not discovered in time to make any correction required in this respect. When the block, Fig. 125, is in its place to satisfaction it is a safe plan to insure its return positively to the same position by drilling two small holes about 1-16 inch in diameter, and fit to each a steel steadying pin. These are shown at A, A, Fig. 126. These are driven tightly into the block and must fit accurately into the plate. They prevent any alteration in its original position and are important.

With the flange thus attached to the plate it is almost needless to say they revolve together. We are ready now to prepare the hole in the center of the bars for the reception of the hardened steel collar till it is necessarily fitted.

As before explained, there are two ways of doing this; and perhaps, considering the weight we have to deal with, we may as well utilize both. First, then, a steel chuck with an accurately turned pin to fit the steel collar in the main plate, and from this, when so fitted, the hole in the front of the flange may be turned out to receive the steel collar in which ultimately the stem of the eccentric cutter is to revolve.

While the above precautions may secure accuracy, it is almost impossible to obtain and maintain accuracy without the greatest care in construction, and it will be well to feel doubly sure by exhausting every effort to make the instrument perfect. Therefore, I would advise that the best means of obtaining it in this case is to place the instrument together as now finished very carefully, and then either mount it on a block of wood in the lathe or place it in a slide rest, and from its revolutions from the overhead motion while thus arranged take a very fine cut through the hole. This is a positive method of insuring perfect accuracy, so far as human efforts can go. Before turning out the hole as above take particular care to see that the face of the block is quite free from any foreign matter, and the milled head screw, Fig. 128, is then securely fastened down in its place. It is, with all fixed at center, in this way that we have the perfect concentricity of the instrument assured, and before any attempt is made to release any individual part the zero line, as shown at Fig. 129, must be distinctly but finely marked across both flange and block, and thus when any movement of the former is desired it can be returned to the zero with precision.



Figs 125 and 126.—Top and Face of Bearing Block.

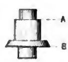


Fig. 127.—View of Stud.

Fig. 128.—Milled Screw.

Fig. 129.—View of Zero Block.

The Art of Wood Turning

Church Built of Chicago's Old Post Office.

The recent dedication in Milwaukee, Wis., of St. Josephat's Church recalls the interesting fact that this unique piece of architecture was largely constructed of materials taken from the old post office in Chicago. The story in connection with the building is that the pastor of the church while riding through Chicago in a street car overheard two passengers discussing the sale of the old post office to the Chicago House Wrecking Company. He inspected the building and was told by E. Brielmaier, an architect, that the material could be used and it was therefore purchased. He also secured the pillars from the La Salle street side of the Chicago City Hall and they are now supporting the Corinthian entrance of the church. The work of Mr. Brielmaier in arranging the building is a rather unique architectural feat. When the 500 carloads of material from the Chicago post office were unloaded it was scattered over a number of vacant lots near the site of the church. Then he personally inspected and measured every stone, figured where it belonged and what he could do with it in the way of erecting the new building. The stones were all shapes and sizes, some carved, some plain, but all designed for a commercial building. The architect, however, sorted and marked every stone, and each sets in its place in the present structure as though specially cut for the purpose.

The church building is 250 feet high and 240 feet in circumference, its massive exterior being covered by the old copper roof of the post office. The church itself is built in the form of a cross and is 212 feet long by 128 feet in its extreme width. No particular style of architecture was followed in its construction, but it appears to blend the Grecian, the Roman, the Byzantine, and the Renaissance, together with some of the modern utilitarian ideas seen in the construction of a business block. The entrance follows a Greek design, the front is flanked by two towers of Oriental pattern, while the dome is decidedly Roman. The church has a seating capacity of 2400 and standing room for 1600 more. The interior is finished in pure white.

MODELS of Iroquois houses of 300 years ago form a notable feature of the exhibit in the balcony of the Ethnology Building of the Pan-American Exposition at Buffalo, N. Y. The models, like the houses, are covered with bark. They include the "long house" with its three openings in the roof for the escape of smoke, a squaw dwelling house, a round dwelling house, a temporary camp, a stockade and a "house of the dead."

WHAT BUILDERS ARE DOING.

ON the evening of Tuesday, June 4, the Builders' Exchange of Baltimore city held their thirteenth annual meeting and election of officers and directors at the exchange rooms, corner of Charles and Lexington streets. The business meeting was preceded by a luncheon, after which the regular ticket was elected, as follows:

President, John H. Short.	Third Vice-President, E. M. Noel.
First Vice-President, Joseph H. Hellen.	Secretary, John M. Hering.
Second Vice-President, John J. Kelly.	Treasurer, B. F. Bennett.

Directors:

H. L. Black,	Israel Griffith,
C. W. Coggins,	Louis F. Young,
Jno. T. Buckley,	Wm. Garthe,
J. D. Cashner,	Theo. F. Krug,
F. H. Davidson,	H. H. Duker,
Albert Weber,	J. Fred'k Brumshagen.

The new president went to Baltimore from St. Mary's County, Md., when 13 years of age, and for the past 41 years has been engaged in the mill business. For several years he has been a member of the Board of Directors of the exchange and last year served as first vice-president. In assuming his office Mr. Short, in well chosen words, acknowledged the honor conferred, and clearly revealed the sincerity of his purpose in accepting the responsible position of president, urging the importance of hearty co-operation by his associates, in order that the success of his administration might be assured.

Benjamin F. Bennett, the treasurer, entered upon his thirteenth year in office, having had charge of the financial affairs of the exchange ever since it was organized. John M. Hering, the genial and popular secretary, was re-elected to the office, he having previously been chosen to fill the unexpired term of Mr. Miller, whose death occurred shortly before the annual meeting last year. Mr. Hering has introduced a number of new features, all of which have proved of great benefit to the members, and his unanimous election at the meeting on June 4 is a striking illustration of the esteem in which he is held by the members.

The report of the retiring president, Jefferson J. Walsh, showed the exchange to be in good condition, attention being called to a number of points of special interest. Reference was made to the appointment of A. H. Clarke as librarian, his interest in the exchange, and especially in the matter of the technical library, being generally recognized. The report also stated that upon the bulletin boards of the exchange have been published 114 projected improvements and 128 general contracts in operation. The portion of these which fell to the general contractors of the exchange was valued approximately at $2,550,000, and the popularity of the sub-contractors and the dealers in supplies among outside contractors was referred to as being "pleasing beyond measure." Several new members were added to the exchange during the year, and the retiring president expressed gratification that, although the exchange had not a large membership, yet no department of house construction need suffer from the want of an "exchange" man to master it.

In conclusion Mr. Walsh said: "I would not have you practice any false economy, for a judicious expenditure of available means in improving the facilities of the exchange is sure to prove a paying investment. To this end, therefore, I would urge the prompt paying of the yearly dues, which would leave the secretary unhampered and with much more time at his disposal for serving the members in ways more profitable and genial than would otherwise be the case. I would once more impress upon you the fact that builders' exchanges have passed the experimental stage, and the rapidity with which they are springing up in some 50 or 60 cities of the United States shows that everywhere craftsmen and dealers realize the importance of getting together to simplify methods, to expedite business and to establish a prestige founded upon skill and honor. Advertise your exchange on your business cards, on letterheads and billheads, and in your newspapers, but, better than this, let every job you do be a good one, a sample job, and let it be known that an exchange man did it. Let every piece of material furnished ge as good as or better than is specified, that it may be known that the *honor* of an exchange member is his only standard.

Chicago, Ill.

Building operations in the city of Chicago continue upon a most gratifying scale, and the figures which are available for the month of May show that with but one exception the estimated cost of the projected buildings is the largest in its history. This exception was May, 1892, prior to the World's Fair, when permits were issued for 1300 buildings, estimated to cost $5,372,200. In May of the present year permits were issued for 719 building improvements, aggregating a frontage of 19,947 feet and estimated to cost $4,835,000. This is an increase over the same month of last year of 424 buildings and $3,712,500 in cost.

There is a considerable amount of work in progress in the way of high class residences, some of which will aggregate $100,000 in cost. Among the office buildings prominence may be given to the new structure which will be put up by the National Life Insurance Company on La Salle street, estimated to cost $1,250,000. The plans were drawn by Jenney & Mundie, and the contract has been awarded to the George A. Fuller Company. The building will be 13 stories in hight and will have a frontage of 88 feet, with a depth of 210 feet. It will be of skeleton frame construction, with exterior of granite and terra cotta, while the interior will be elaborately finished in white marble mosaic and mahogany.

Cincinnati, Ohio.

More or less building is in progress in and about the city, although the aggregate is not particularly striking. There have been a number of minor labor disturbances, but they have not been thus far sufficient to seriously interfere with active building operations.

At the annual election of the Builders and Traders' Exchange, with headquarters in the Grand Opera House Building, corner Vine and Longworth streets, the following officials were selected for the ensuing year: President, Frank Hoke; vice-president, B. H. Busse; secretary, George H. Heitbrink, and treasurer, William J. Tanner. These, with J. M. Blair, S. L. Snodgrass and Ross Hamilton, constitute the Board of Directors

Cleveland, Ohio.

The month of May will be remarkable, in the sense at least that the estimated cost of building operations for that time in many sections of the country was in excess of that for any previous corresponding period. In Cleveland the percentage of increase was very marked, the number of permits for new buildings issued in May of the present year being 432, estimated to cost $1,236,900, as against 272 permits, involving an estimated expenditure of $377,085, in May, 1900. The difference is not quite so great for the first five months of the year, although the gain, particularly in the estimated cost of the improvements, has been most striking, the figures being $3,028,033 for 1901, as compared with $1,147,568 in 1900.

The work of getting in shape the new Ohio State Association of Builders' Exchanges is making rapid progress, and already the Cleveland Exchange, as well as those of some of the other cities, have ratified the action of the joint committee. We understand that plans are now being considered for an outing of all the exchanges at Put-in-Bay, and it is thought that this will be one of the most enjoyable affairs in which the builders of Ohio have participated. It is estimated that the members of the Cleveland Exchange will go in a body, making this their annual outing for the summer.

The Builders' Exchange is prospering, and according to a recent report of the Board of Directors, the membership is now the largest in its history, and, with one exception, of that of any in the country. The finances are also in excellent shape and there is a reserve fund of several thousand dollars. The exchange is well organized and the various committees are doing effective work. The exchange now has a baseball team, which engages in active practice whenever possible, and we understand that it is getting in shape for its first game, to occur on Saturday, June 15.

The Cleveland Architectural Club will hold its annual exhibition in the auditorium of the Cleveland Chamber of Commerce during the week beginning June 17. At the meeting of the club to be held on Thursday, June 13, the annual election of officers will occur, and at the same time will be received the annual reports of the various officers and committees.

Dayton, Ohio.

The city has been having a rather varied experience in regard to labor matters, and the building trades have not escaped the general infection. On May 1 the plasterers in the city went out on strike, and on May 8 the carpenters and wood working machine men declared what they term a "detial strike," and put it into operation next day by calling out the men of a member of the Carpenter Contractors' Association. In support of this member the rest of the carpenter contractors of the city, which include four planing mills, suspended operations on May 11. The situation is now said to be clearing, and many of the men have pulled away from the union and returned to work as nonunion men. We are advised that there are now working about 65 per cent. of the entire force in the city. The manufacturers are standing firm against unjust demands, and it is hoped that soon matters will be progressing smoothly.

Something of a departure in the way of organizations in the city is what is known as the Builders' Council. The carpenter contractors, stone contractors, brick contractors, and, in fact, all of the master mechanics in the various building branches, are organized into separate associations, each of which selects three delegates and sends them to the general council, forming what is known as the Builders' Council. The secretary of this, as well as of the Carpenter Contractors' Association, is S. S. King.

We understand that efforts are being made in the city to organize a builders' exchange along the same general lines as those at present in existence in the leading cities of the country.

Easton, Pa.

The builders of Easton, Pa., have recently organized the Mason Builders' Association, with a membership of 40, and a movement is now on foot looking to the formation of a builders' exchange. The officers of the new association are Frank McPherson, president; Daniel Hunt, vice-president; E. W. Gilmer, treasurer, and Thomas J. Heller of 207 South Sixth street, secretary.

Lowell, Mass.

The labor situation in the city is practically the same as last month, no advances having been made on either side, although journeymen carpenters have in some cases returned to work for their former employers. There is in the aggregate considerable work being done, among the contracts just awarded being that to P. O. Hern for the Textile School, to cost $120,864; to W. H. Wiggin for the Pickering Mfg. Company's Building, and to C. F. & J. B. Varnum for the Primitive Methodist Episcopal Church. Nearly all the subcontracts were awarded to members of the Builders' Exchange.

The annual "outing" of the Builders' Exchange will be held June 25 at Bass Point, Nahant. The committee in charge is composed of Messrs. Fuller, Conlon, Carroll, Weaver and Whittel. At a meeting held June 5, C. E. Howe & Co., lumber dealers, were admitted to membership.

New York City.

There is little in the local building situation to call for comment, as operations are being conducted along the same general lines as heretofore. The season is in full swing, and in the aggregate there is a large amount of work being done. An idea of the outlook may be gathered from the fact that up to June 14 there were 1169 permits issued for new buildings in the Borough of Manhattan, estimated to cost $72,241,960, and in the Borough of Bronx 648 permits had been taken out for buildings, estimated to cost $6,273,330. These figures are exclusive of alterations and repairs, which for the two boroughs for the period stated aggregated an estimated cost of $4,146,097.

The principal event in the building situation has been the practical settlement of the bricklayers' trouble referred to last month. A meeting was held on May 27 by the joint Board of Arbitration of the Mason Builders' Association and the Bricklayers' Unions, when an understanding was reached and the men returned to work pending a final adjustment of the trouble. The agreement was as follows: "In consideration of the bricklayers at once fully manning all the works of the members of the Mason Builders' Association, including the Stokes Building at Seventy-third street and Broadway, and submitting all questions in dispute to a joint Board of Arbitration, an umpire to be appointed if necessary whose decision shall be final and binding, the Mason Builders' Association agree that the wages of the bricklayers for the year ending May 1, 1902, shall be at the rate of 60 cents per hour, beginning June 28, 1901." Subsequently the arbitrators of both parties selected an umpire whose decision will be final in the settlement of the trouble. The umpire selected was R. W. De Forest, who at one time was president of the Tenement House Association, and is now president of the Charity Organization Society, as well as a lawyer of repute.

The seventh annual meeting of the Builders' League was held on the evening of June 6 at their headquarters, 74 West 126th street. The election of officers for the ensuing year resulted in the following choice: President, John B. Leo; first vice-president, Jackson Lawson; second vice-president, J. A. Rossman; secretary, J. S. Sayward, and treasurer, L. E. Landon. With the exception of Mr. Sayward all the officers were re-elected.

Oakland, Cal.

There is a very marked activity in building operations in Oakland at the present time and some large contracts are being made for private residences. Though the market price for building materials is about as high now as it ever has been, building operations do not seem to be materially decreased in consequence. Among the more important contracts let during recent weeks are the residence of Francis Cutting, on Durant street, to cost $20,000; the Josiah Stanford Building, to cost over $10,000, and six new flats for Mrs. Sarah E. Kesmer, on Telegraph avenue, to cost $18,000.

Omaha, Neb.

The outlook for building operations in and about the city is regarded as much more promising than for some time past. A large number of buildings are in process of construction, and we are informed that it is a fact that dwellings running from $20 to $30 a month cannot be had in sufficient number to meet the demand. Several large buildings are also in contemplation.

The building contractors of the city have recently organized a builders' club, to be composed exclusively of contractors who are engaged in the construction of buildings. The club was organized with a membership of 40, embracing the various lines of contractors and with the following officers for the year 1901:

President, Fred. H. Hoye.	Treasurer, J. E. Merriam.
Vice-President, Chas. W. Partridge.	Secretary, W. S. Wedge.

Directors:

J. J. Hanighen,	R. B. Anderson,
J. H. Jones,	A. A. Newman,
B. Kunkel,	Herman Gnrske.

The object of the organization is to bring together into closer relations those engaged in the building trades of the city as contractors. The associations represented in the club are plumbing contractors, carpenters, plasterers, sheet metal workers, painters, electrical workers, gravel and slate roofers, and contractors for brick work. At the meetings of the club, which will be held on the second and fourth Saturdays of each month, matters relating to the trades will be discussed and steps taken to improve the condition of the contractors. Should any labor troubles arise with any branch of the club the matter will be referred to the Arbitration Committee and the club will act as a unit on its decision. In this respect, we understand, the club will be similar to the Building Trades Council of the labor union. The Arbitration Committee and the Board of Directors are composed of a number from each branch of the trades represented in the club. Each branch of the club has one night set apart for its separate organization meeting, when matters pertaining to its individual affairs can be discussed.

Philadelphia, Pa.

Some of the building operations which are under way in the outskirts of the city indicate that building mechanics are likely to have plenty of work throughout the entire season. Many of the improvements contemplate the erection of more than 100 houses each, and in some instances the total runs considerably above the 200 mark. In the Thirty-fourth Ward Joseph E. Clark has commenced an operation which includes 222 houses, estimated to cost $748,000. All the houses will be two stories high and will be of Pompeian brick, with stone trimmings, and finished in hard wood. Many of them will be built in pairs in the neighborhood of Fifty-second and Brown streets. In the same ward an operation, including 107 three-story houses, is about to be commenced by Robert A. Pitts, architect and builder. They will be located on Sixty-second street and will cost about $400,000. The houses will be of fancy brick, finished in hard wood. E. L. Seeds has commenced work on 47 three-story and 21 two-story houses in the same ward, while in the Thirty-third Warde 260 two-story houses will be erected in accordance with plans drawn by H. D. Hale and H. G. Morse, Jr., the approximate cost of the improvement being $365,000. In the Thirty-ninth Ward T. F. Gallagher is putting up 21 two-story houses, and in the Fortieth Ward William Ball is about erecting 29 two-story brick dwellings, with corner stores, at a cost of $110,000. On Waterloo and Howard streets, beginning at Westmoreland, 56 two-story dwelling will be constructed by James W. Orr, at an estimated cost of $94,000. Architect A. E. Yarnell is preparing plans for nine three-story combination cottages to be built in Ogontz by William T. B. Roberts.

At the quarterly meeting of the Master Builders' Exchange, held on May 28, considerable attention was given to the consideration of a bill at that time before the subcommittee of the Council's Committee on Police and Prisons, of which William Harkness, secretary of the exchange, is chairman. The bill limits builders to the street space in front of the operation, instead of 80 feet additional, as is now the rule. The point was made that if the bill should become a law it would increase the cost of building, and, after several members had ventilated their views on the subject, it was referred to a committee of five, with authority to act in conjunction with the Legislative Committee. It was also agreed to leave it to the managers of the Pan-American Exposition at Buffalo to name a day in the week of September 9 or 14 to be known as Architects' and Builders' Day.

The Supervising Architect of the Treasury Department has invited estimates from the members of the Master Builders' Exchange for the erection of the new post office building in Hot Springs, Ark.

The third annual convention of the Architectural League of America was held at the Art Club on May 23, 24 and 25, and was a very successful affair. Papers were read, visits were made, receptions attended and Joseph C. Llewellyn of the Chicago Architectural Club elected president.

Pittsburgh, Pa.

The estimated cost of the building improvements in Pittsburgh during the month of May reached a total which was nearly five times greater than that of the same month last year, and was in excess of that of any one month since the Building Bureau was established. There is a vast amount of construction in progress in the way of dwellings in the city and suburbs, many being of an expensive character. According to Superintendent J. A. A. Brown of the Bureau of Building Inspection the number of permits issued for new buildings in May was 405, involving an estimated expenditure of $4,133,325, as against 207 building operations, estimated to cost $788,310, in May of last year. Taking into consideration the additions to new buildings and the alterations and repairs, the total is 605 permits for May of the present year, involving an estimated outlay of $4,498,308, as compared with a total of 383 permits, estimated to cost $872,445, for the corresponding month in 1900.

Among the improvements mention may be made of an 18-story office building, estimated to cost about $650,000, which will be commenced next year and erected in accordance with plans drawn by Architects Craig, Hodgens & Burns; a fine apartment house in Allegheny, to cost about $350,000, from plans by the same architects; the new 15-story building for the Keystone Bank, to cost more than $500,000, and a nine-story buff brick apartment house, to cost about $200,000, from plans by J. P. Bailey.

At McKee's Rocks the contract has been awarded for the erection of 20 houses, costing from $1800 to $2500 each. Twenty-five brick dwellings are under way in Belmar place, East End, for George H. Shickler, the cost approximating $75,000, in addition to which he is putting up 51 other houses in Belmar place, 13 in the Baum Grove district, 25 at Swissvale and 25 at McKee's Rocks. Most of them are dwellings which are intended to sell for $2500 to $5500 each, except those in Baum Grove, which are high class. Pyle & Riffle are about erecting a block of 18 brick dwellings of nine rooms each on Hermitage street, each house to have a frontage of 25 feet, and the total cost approximating $60,000. At Hazelwood 30 brick houses are about being erected, to cost about $3000 each, and there is considerable talk about a building improvement in Friendship Park, involving the erection of 80 houses, that will cost about $700,000. A. L. Schultz, general manager of the American Bridge Company's plants in the Pittsburgh district, is about erecting a handsome residence on North Highland avenue, the exterior to be of pressed brick, with stone trimmings, and costing over $20,000. The plans have been drawn by C. M. Bartberger. It is given on the authority of a prominent local dealer in builders' supplies that over $2,000,000 will be spent this summer in house building in towns adjacent to Pittsburgh.

The building report of Allegheny City for May, which was recently made public, was one of the best for that period ever issued by the Building Bureau. There were 91 permits for building improvements, estimated to cost $202,975.

Salt Lake City, Utah.

Architects are kept busy on previously made contracts, as well as on a large quantity of new small work. The building of dwellings to meet the unusual demand is going on at a rapid rate. A notable feature is that all the houses, no matter how small, are fitted up with the modern conveniences. Furnishers of building material are strengthening their forces and working their plants to the utmost in order to supply the demand for construction material.

Considerable trouble has been experienced by contractors with their workmen. Trouble has been threatened ever since the first of the year, and has broken out occasionally in a small way. On May 16 a portion of the men in the employ of the Salt Lake Building & Mfg. Company struck because the firm furnishing the stone work of the building were employing nonunion men. The strike, however, lasted only one day.

San Francisco, Cal.

San Francisco building continues steady, consisting chiefly of flats and other dwellings of comparatively small cost. None of the contracts for the Flood Building, the Union Square Hotel or the cold storage structure have yet been let. The record for the last week of May shows only 18 building contracts recorded, calling for the expenditure of $81,180. This, however, does not include a considerable amount of work which is being done by contractors who are also owners of the property.

In face of the present outlook for unsatisfied labor, prospective builders have in many cases ordered their architects to pigeonhole their orders. This has occurred in spite of the fact that the Building Trades Council has distinctively and repeatedly refused to make common cause with the labor unions now on a strike. It is also probable that the increased cost of building materials and labor has discouraged people with small capital and prevented them from building at present.

A substitute for a bill fixing the hight limit of buildings in the city has been passed to print. The limits are fixed at from 145 to 110 feet, according to the width of the street.

Seattle, Wash.

While the number of new buildings for which permits were taken out during May does not exceed, either in point of value or totals, that of April, it still shows a considerable increase in both respects over the month of May, 1900. The number of permits taken out was more than double those for May of last year, while the aggregate value shows a gratifying increase. There is a great deal of building going on in the south end of the city, along the line of the Seattle & Tacoma Electric Railway.

The demand for new residences seems to have fallen off considerably during the last few weeks, due probably to the immense number of buildings of this sort which have been recently put up. The demand for storeroom buildings in such locations as the business section of Second avenue is apparently as strong as ever. A number of new buildings of the larger sort are now in process of erection, among which may be mentioned the Philadelphia Block, at the corner of First avenue and Seneca street, to cost $55,000; the Bead Building, at the corner of First avenue and Spring street, to cost $70,000; the Pike Street Block, at the corner of First avenue and Pike street, and the new Curtis Building, on Second avenue, which will cost approximately $50,000.

Worcester, Mass.

A fair amount of building is in progress in and about the city, but there is nothing of sufficient importance to warrant special comment. There have been some differences between the master carpenters and the union with regard to rates of labor, wages, rights of delegates, apprentices, &c., and at a meeting of the master carpenters held in May it was voted, in view of the fact that every craft in the city was working eight hours, that it seemed advisable to adopt an eight-hour day. On June 1 they notified the men in their employ of this decision, leaving the matter of wages to each master carpenter to adjust individually. We are advised that there has been no strike except in a few individual cases, with no serious interruption to work.

The report of Superintendent C. H. Peck shows that during the month of May 60 permits for new buildings were issued, involving an estimated expenditure of $188,760. Of these 15 of the buildings were one-family residences, 7 were intended for two families and 18 for three families. There were also issued 34 permits for additions and alterations, to cost about $13,000.

The Builders' Exchange is in a prosperous condition, and Secretary H. W. Sweetser advises us that new members are being added each month. It is probable that the exchange will keep "open house" July 4 for members and guests.

Notes.

It is said that more building permits were taken out in Camden, N. J., during the month of May than for any similar period in the history of the city.

Among the building improvements in Washington, D. C., is one involving the erection of 268 three-story houses in accordance with plans drawn by Thomas Bennett of Philadelphia, Pa. The houses, which will cost in the neighborhood of $1,000,000, will be built in pairs on lots 50 and 25 feet front, with an average depth of 150 feet.

At the annual meeting of the Building Supply Dealers' Protective Association of Camden, N. J., held a short time ago, the following officers were chosen for the ensuing year: W. C. Reeves, president; W. J. Cooper, vice-president; Major Goodman, secretary, and Isaiah Hatch, treasurer. The Executive Committee consists of James Dougherty, W. Coles, Silas W. Volk and A. K. Bennett.

The Building Bureau of Birmingham, Ala., issued 81 permits during the month of May, calling for building improvements estimated to cost $132,362. Four were for buildings costing $10,000 and above, four for buildings costing $5000 and under $10,000, while 19 of the permits were for buildings costing $1000 and under $5000. Contractors are very busy and mechanics are said to have all the work they can do.

From present indications Allentown, Pa., is likely to experience a season of building activity which will surpass anything in its history. Contractors, builders, planing mill operators, lime dealers and sand and stone people are unusually busy for this season, while the permits already issued for buildings indicate widespread activity. Since the first of the year permits have been granted for 210 buildings, including houses, factories, stables, &c.

The building outlook in Windber, Pa., is for the erection of a large number of houses this year. The Berwind-White Company have recently awarded the contract to the W. T. Geddes Lumber Company for the construction of 100 new houses, these to be erected at the various mines of the company and in the town. A portion of the Statler farm has been purchased by John W. Carroll, who, it is understood, will erect a number of houses on the property.

Contractors in Canton, Ohio, report that they have an unusual amount of work in sight, and there seems to be no question that in spite of the high prices of all kinds of materials there will be a most gratifying degree of activity in the building lines through the spring and summer months. This activity has also stimulated the sale of vacant lots, the prices of which have advanced, and it is also thought that the demand for houses will tend to increase rents as well.

The differences existing between the members of the Carpenters' Union and the Contracting Carpenters' Association of Rock Island, Ill., were recently adjusted and work was resumed all along the line. The scale as agreed upon fixes the minimum wage for carpenters' work at 28½ cents an hour, which the contractors have been willing to pay, while the carpenters concede the right of the contractors to hire such men as they can obtain at wages to be agreed upon when the union is unable to meet the demands of the contractors.

LAW IN THE BUILDING TRADES.

"SUFFICIENT NOTICE IN WRITING" FOR LIEN.

A letter from material men to the owner, requesting him, when making payment to contractor, to see that a check for a specified amount is made payable to them on account of materials delivered, as their account largely exceeds such amount, and they will be obliged to register a lien if payment is not made, is a sufficient notice in writing of their lien.—Craig *vs.* Cromwell, 32 Ont., 27.

NO LIEN FOR WORK AFTER ACCEPTANCE BY THE OWNER.

Where one who contracted to erect a building did so in substantial compliance with the terms of his contract, turned it over to the owner, received full payment for his services, and was discharged by the latter, the relation of owner and contractor between the two was at an end, whether the building in all respects conformed to the plans and specifications agreed on or not, and the contractor, by afterward ordering and using brick to make the chimneys the hight required by the plans, could not make the property subject to a mechanic's lien for such brick.—87, Ill. App. Ct. Rep., 64.

AGREEMENT OF PARTIES TO COMPLETE A BUILDING NOT A PARTNERSHIP.

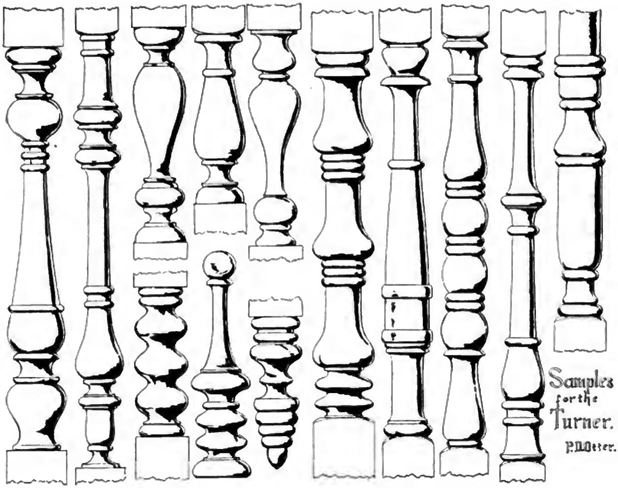
Where those having a contract to construct a building, not being able to complete the same for want of funds, contracted with certain creditors that certain persons should take charge of the work, provide the necessary labor and material and complete the building, pro rata advances to be made by the creditors, such agreement did not create a partnership.—Fewell *vs.* American Surety Co., 28 So., 766.

RIGHT OF CONTRACTOR WHEN CERTIFICATE IS UNJUSTLY REFUSED.

Though a building contract provides that all payments "shall be made on written certificate of the architect to the effect that such payments have become due," an unjust refusal of the architect to give the certificate does not defeat the contractor's right to payment.—McConologue *vs.* Larkins, 66 N. Y. S., 188.

Examples of Work for the Wood Turner.

In connection with the series of articles on wood turning now running through the columns of the paper it may not be without interest to present as supplementary thereto a few examples of wood turning gathered from various sources. It is quite true that there are many designs of this general character to be found in the catalogues of manufacturers and in the mass of circular literature which is distributed broadcast over the country, but it is not always in just the right shape to be of most value to the turner. Experience and observation have shown that comparatively few avail themselves of the vast amount of suggestive illustrations which are thus presented to the trade, as it has been found that the attention of those who should be most interested requires to be especially directed to the matter, while at the same time it must be carefully arranged and under specific headings. In this shape it is calculated to serve a most useful purpose. The sources from which material of this kind may be gathered are almost legion, but we present herewith a few examples which have been arranged from early American and English work by Paul D. Otter, and which is of a character to give inspiration to the enterprising turner in adapting them for posts, balusters and for general purposes.



Some Samples of Work for the Wood Turner.—Contributed by Paul D. Otter.

Tests of Yellow Pine and Washington Fir.

In order to determine the relative merits of Washington fir and yellow pine, there was recently made at the Puget Sound Naval Station a series of very interesting tests. Samples of fir were submitted from various parts of the State, the samples being in the form of pieces of fir 3 feet in length and 4 inches square. The samples of yellow pine were similar in size, but were specially selected, being taken from the long leaf yellow pine, grown in Texas. The transverse tests to ascertain the breaking strain of the wood were made in a machine so constructed as to record every 10 pounds of pressure brought to bear upon the specimen. On the under side at either end of the stick or piece of wood to be tested, was fastened a small steel plate, while in the center of the reverse side was placed a similar piece of steel. Each stick was then supported upon uprights at each end, the steel plates resting upon the supports. The weight was brought to bear upon the plate in the center and the pressure recorded.

In the first test the stick of fir withstood a breaking strain of 9060 pounds; the yellow pine broke at 10,060 pounds pressure. In the second test the fir broke at 8310 pounds and the pine at the same pressure. In the third and last test the native wood succumbed at 9040 pounds and the pine at 7640.

In the tensile tests each stick was placed in a lathe and the center turned down to a spindle only 1 inch in diameter. At each end was left a large knob to furnish a grip for the clutch. In the first test the fir yielded to a pulling strain of 19,200 pounds; in the second, to a strain of 18,200 pounds, and in the last test to a strain of 17,000 pounds. In each instance the specimen did not break, but the fiber was pulled out, leaving a hole at either end of the stick of the same size as the spindle. The best sample of the yellow pine submitted was only able to withstand a strain of 11,000 pounds.

Officers Hardwood Association

At the fourth annual meeting of the National Hardwood Association, held in Chicago May 23 and 24, officers for the ensuing year were elected as follows: President, F. H. Smith; first vice-president, W. H. Russe; second vice-president, William H. White; third vice-president, Max Sondheimer; secretary, A. R. Vinnedge, and treasurer, George E. O'Hara.

A SCHOOL OF TECHNOLOGY is to be added to the other departments of the Northwestern University, Evanston, Ill. The school will comprise courses in electrical and mechanical engineering.

New Publication.

BAMBOO WORK. By Paul N. Hasluck. Size 4½ x 7 inches. 160 pages. Illustrated by means of 177 engravings. Bound in board covers with side title. Published by Cassell & Co., Ltd. Price, 40 cents, postpaid.

This little work, by a well-known author, treats of a subject which is of interest not alone to furniture and cabinet makers, but also to the ingenious and skillful carpenter, who very often desires to make in his leisure hours convenient articles for the home. The variety of articles which may be made from bamboo is almost without limit, and the author of the book in review tells how the work is accomplished, while at the same time sufficient details are illustrated to make everything clear and readily understood. The matter is comprised in 11 chapters, the first of which deals wholly with the source and uses of bamboo, followed by suggestions as to the method of working it. The following chapters deal with various articles of furniture and household equipment, such as tables, chairs, seats, hall racks and stands, music racks, cabinets and cases, window blinds and miscellaneous articles.

St. George's Evening Trade School.

Superintendent Arthur A. Hamerschlag of the St. George's Evening Trade School, connected with St. George's Episcopal Church, New York City, advises us that the school has just concluded a very prosperous season in its new building at 505 East Sixteenth street. The total enrollment of boys in the past season was 302, of whom 50 were instructed in the plumbing classes, in charge of William J. Tucker. On May 1, 2 and 3 an exhibition of the work of the pupils during the past season was made in the school building, and on Wednesday, May 8, the commencement exercises were held in St. George's Memorial Building, at which President Charles M. Schwab of the United States Steel Corporation delivered an address to the graduates. Twenty medals and prizes were awarded. The course of instruction in the school covers three years. Classes are carried on in carpentry, plumbing, painting, mechanical drawing, free hand drawing, wood burning and decorating and manual training.

Licensing Architects in California.

The question of licensing architects is gradually receiving more and more attention by the legislative bodies of the country, and one of the latest States to pass a law in regard to this matter is California. Provision is made for the appointment of a State board of architecture, five of the members of the board being residents of the northern district of California and five of the southern district. The members of the board are to serve without compensation from the State, the expenses being paid out of the fees collected from applicants for certificates. The board for the northern district is to meet in San Francisco and that in the southern district in Los Angeles, to examine architects for certificates. Any person shall be entitled to an examination as to his ability to practice architecture upon the payment of a fee of $15.

A Heavy Concrete Floor.

The use of concrete in floor construction in heavy fire proof structures is very common at the present day, but the heaviest concrete floor construction in this country is said to be that of the Gottfried Brewing Company's stable building, in Chicago, where the average dimensions of the arches are 10 x 14 feet and 3 feet thick at the beam. In order to bring the weight of the arch upon the beams before the cement had fully set, in this instance a system of suspended centering was designed and patented, which has come into extensive use since, owing to its great convenience. Iron hangers acting on the principle of ice tongs, one end provided with jaws to clutch the lower flange of the beam, and the other end of each piece bent into a step to carry a joist, are set at proper intervals on the beam; the joists are set in position, carrying the sections of centering, which are thus forced up tightly against the bottom flanges of the beams from which they are hung, and as the concrete is rammed into place the weight is brought upon the beams. The centers are easily struck by disengaging the hangers, and the apparatus is exceedingly convenient for use.

WHAT will probably be one of the largest buildings of its kind in this country at least is the structure now in course of erection at Schenectady, N. Y., to be used as the offices of the General Electric Company. It will be over 200 feet in length, more than 100 feet wide and five stories in hight, and will be equipped with every modern appliance in regard to heating, lighting, ventilation and sanitation. The cost of the structure will be in the neighborhood of $250,000, and will have 100,000 square feet of floor space.

THE work is now in progress of razing the buildings at the corner of Broadway and Maiden lane, New York City, where an 18-story office building will be erected in accordance with plans drawn by Clinton & Russell. The plot has a frontage of 76.7 feet on Broadway and 88.1 feet on Maiden lane. The building is estimated to cost in the neighborhood of $900,000, will be erected by the Fuller Construction Company and is expected to be ready for occupancy in April, 1902. As showing the demand for office space it may be interesting to remark that tenants for a portion of the building have already been secured.

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THE DINING ROOM.

VIEW IN RECEPTION HALL, LOOKING TOWARD THE PARLOR.

RESIDENCE OF MRS. R. F. EASTMAN, AT LOWERRE, YONKERS, N. Y.

A. F. LEICHT, ARCHITECT.

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SUPPLEMENT CARPENTRY AND BUILDING JULY 1901

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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AUGUST, 1901

Tenement House Improvement in New York.

The new tenement house law, which went into operation in New York City on Monday, July 1, contains a number of provisions which are calculated to secure material benefits for those who dwell in the crowded districts of the city. It is stated that there are no less than 82,000 tenements in New York which come under the terms of the new law, some of the provisions of which are likely to cause irritation to owners of old tenement house property. For example, a clause provides that each room in old tenement houses must have a window opening to the outer air, or a window opening into an outside room. This will compel owners to put windows into the walls of rooms which are arranged with one front and one back outside window and two dark rooms between. There are over six thousand such tenements in the city. Another most salutary provision of the law is one requiring owners to supply plenty of water at all hours of the day or night on each floor, and also to supply receptacles for garbage and refuse. The sanitary value of these provisions, if they are strictly carried out, will be particularly recognized in such torrid weather as that which oppressed the city early in July. Enforcement of the regulations affecting new buildings has already been undertaken by the city Building Department, and the Health Department is responsible for seeing that the rules affecting old buildings are enforced until January 1, 1902, when the new city Tenement House Department of the municipal government created by the charter revision law will come into existence. It is the opinion among those best qualified to know that hundreds of the old houses now used as tenements will have to be abandoned if the new law is strictly enforced. The wiping out of such rookeries as cannot exist under the new law will be a satisfaction to all who have the well being of the city at heart. The owners, who are drawing a substantial revenue from them in their present unsanitary condition, are about the only persons who will regret their disappearance.

Good Counsel on Strikes.

President Samuel Gompers of the American Federation of Labor has issued a circular to all of the affiliated labor unions which contains some very sensible advice against hasty action in declaring strikes. This proceeding, Mr. Gompers says, was rendered necessary by the action of a number of unions entering into strikes too hastily, which strikes have proved very costly and at the best only partially successful. The circular says in part:

> No strike shall be ordered until every effort has been made by a committee to settle the differences with the employer.
>
> A strike should be inaugurated only as a last resort.
>
> A conciliatory policy is more advantageous than contest. Arbitration should be offered before a strike has begun. It is easier to adjust a difference before a strike than after.
>
> Whenever the question of strike is to be voted upon a secret ballot should be had and each member required to write his own ballot.
>
> When the union enters into an agreement with an employer its terms should be faithfully kept, regardless of temptations to break it.

This is sane and wholesome advice and timely withal. If the principles set forth by the president of the American Federation of Labor were generally adopted and honestly acted upon by all the labor organizations of the country, the strike as a weapon of offense would rarely be resorted to, and much unnecessary loss and suffering would be avoided. The strike should be used, as Mr. Gompers says, only as a last resort after all efforts in the line of conciliation and arbitration have been exhausted. Unfortunately it has been inaugurated too often in the past on the first impulse. It is a gratifying thing, however, to find one of the most prominent and influential labor leaders of the country coming out squarely in favor of justice and common-sensible action in a matter so vital to the industrial welfare of the United States. If employers and employed would at all times act on the principles laid down in his circular, instead of acting as if their interests were fundamentally antagonistic, how much trouble would be obviated and how smoothly the wheels of industry would run.

Pittsburgh's Modern Apartment House.

Among the many building improvements which are in progress or in contemplation in and about Pittsburgh a notable example is the six-story apartment house in Oakland, having a frontage of 220 feet and a depth of 80 feet. It will be constructed in accordance with plans prepared by Architect F. J. Osterling, and will, we understand, contain features never before introduced in apartment houses in Pittsburgh. The entire structure will be of steel, stone, brick and terra cotta, the floors of concrete, and the partitions of hollow tile. The first story will be of cut Cleveland sandstone, with molded and ornamental cornices and arched and pilastered entrances. The superstructure will be of ornamental gray colored terra cotta and buff brick. All the windows will be of plate glass and each room will be lighted from the outside. The rooms on the first floor will be finished in mahogany and those above in birch and oak. The main stairways will be of marble and iron and will surround two large passenger elevators and a freight elevator. Water will be supplied from artesian wells, from which it will be pumped to a reservoir on the roof. The building will be heated by steam from a central plant; there will be telephone service for each apartment, the light will be by electricity, and in the basement will be a well equipped steam laundry for the use of the tenants. The building will also be equipped with a refrigerating plant and the structure will in all respects be an up to date affair. The estimated cost is $350,000, and the contractors are Kerr & Fox, who expect to have the building ready for occupancy late in the spring of next year.

Six Months' Fire Loss.

The record of fire losses for the month of June, as compiled by the New York *Journal of Commerce*, shows a gratifying decline from the remarkably heavy losses recorded for the first five months of this year and for the whole of the year 1900. The loss for June amounted to $9,599,000, as compared with $22,380,000 in the preceding month, and $21,281,000 in June, 1900. The aggregate of fire losses for the first half of 1901 is given as $88,935,000, as against $103,299,000 during the same period of 1900. The June fire loss of last year was swollen by the great Hoboken disaster, but even taking that into consideration, the very marked decline shown last month indicates a welcome change from the expensive experiences which the fire insurance companies have had for almost two years past. Yet it appears to be a larger sum than should be wasted in one month, when we consider the improved fire fighting facilities possessed by our cities and towns, and the fact that legislation aimed at the prevention of fire has been so widely adopted. Taking the city of New York as an example, the losses by fire in the boroughs of Manhattan and the Bronx alone amounted last year to $7,500,000, and during the past three years to $17,835,000, as compared with $10,197,000 during the preceding three years. This big increase has naturally given the underwriters much concern, and they have been making an investigation of the causes. The result of the investigation is a severe arraignment of the city Building and Fire Departments, which are held to be responsible for the non-enforcement of the laws intended to protect buildings against fire.

Board of Directors of Architectural League.

At the annual meeting of the Architectural League of America, held in Philadelphia in May, a president was selected for the ensuing year, the choice of the remaining members of the Executive Board devolving upon the Executive Committee of that club of which he is a member. An announcement has recently been made through J. H. Phillips, of the Chicago Architectural Club, that the Executive Board has been filled by the reappointment of the members who served last year, and is constituted as follows:

President, Joseph C. Llewellyn of Chicago; vice-president, Richard E. Schmidt of 172 Washington street, Chicago; corresponding secretary, Emil Lorch, Art Institute, Chicago; recording secretary, Hugh M. G. Garden of 172 Washington street, Chicago, and treasurer, August C. Wilmanns, Journal Building, Chicago.

The Executive Board also includes Professor Newton A. Wells of Urbana, Ill., and Robert C. Spencer, Jr., of 1107 Steinway Hall, Chicago.

Builders' Association in Austria.

According to advices received from Consul Hughes of Coburg, the master builders of Austria have determined to petition the Government to allow the establishment of a national master builders' chamber (to a certain extent after the pattern of the chambers of commerce). The objects are to unite the master builders of the Empire; to guard their interests legislatively and otherwise; to give information to the Government as to building, labor, &c., and to see that the building regulations are observed. The Government, it is reported, will do everything in its power to promote the undertaking.

Builders' Day at Pan-American Exposition.

President John S. Stevens of the National Association of Builders has received notice that September 11 has been chosen as Architects' and Builders' Day at the Pan-American Exposition, Buffalo, N. Y.

Early Use of a Building Balance.

An interesting explanation has recently been given of the methods used by the architects and builders of the early cathedrals to determine the equilibrium of the arches and supporting columns. The various problems connected with their construction were solved by a graphic method, which involved the use of the "Bauwage," or building balance. This consisted of a flexible cord in the form of an inverted arch, passing over pulleys at either end, the cord being drawn into an equilibrium polygon by weights suspended at various points along the cord, each proportionate in position and amount to those which the arch would be required to carry at its various points. By means of weights connected with the cords passing over the pulleys at each end the system was supported and the horizontal force also measured. From the curve thus obtained the various elements could be readily calculated and a reliable method of construction devised. The system was employed by the so called master builders, who were included in a guild that extended over Europe during the Middle Ages. Through this guild the traditions and higher knowledge of the building art were confined to a few masters in each country, and there is every indication that they were endowed with more than mere artistic feeling and intuition in carrying out their constructions. The graphic method described was used before 1585, but previous to that time it is hardly thought to have carried with it any special knowledge of the laws of statics.

Characteristics of Ornament.

Egyptian ornament is thoughtful and always allegorical. There are serpents' heads, winged globes and palm leaves. Straight lines predominate, and the curves are slight and pyramidical. The Assyrian is still quainter, simpler and more primitive. It is full of diamonds, circles and pilasters, cross bars, crescents and cables. The Greek revels in noble sweeping curves and in fretted foliage, highly conventionalized. The Oriental types in their art lost their symbolic character and became enriched and idealized by fancy; harmony and a sweet grace are in every line. The Etruscan is rude and Asiatic, with Greek luxuriance. It has leaves and frets and circles. The Roman is strong and vigorous, leafy, luxurious and voluptuous. The Byzantine is barbarian, rich, knotted, linked and studded like embroidery. It is vigorous but conventional, sometimes grotesque and humorous, always varied, but full of strange harmonious confusion. The Moorish is the poetry of geometry and the mathematics of color, varied and changeful as nature. The Gothic is nature subdued and limited by rules and space. The Renaissance is poetical and extravagant, florid and bombastic, yet decorative and adaptive. The Cinque Cento is jewelers' work, costly, minute and fanciful. The Indian is varied—strange in its blendings and studied intermixtures, tropical and bold in color, arranged by the instinct of men of a hot climate; but the Persian is the most graceful and poetical of all Oriental work; gorgeous and yet delicate in color, it is full of the broadest effects of contrasting hues, and wreathed and blossomed with threads of flowers, bright as those of a missal. In the harmonies of dyes there are invention and imagination; in the lines lie the secrets of new flowers and a whole Paradise of beauties, both of form and color. It may be almost deemed the climax of one order of ornament, the Mixed, which, though more pure in creation than the Gothic, is less natural and less national.

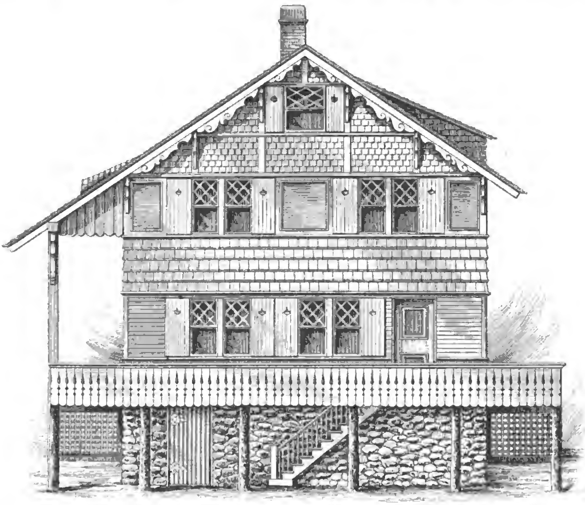
A new hotel is about to be erected in this city which is estimated to cost in the neighborhood of $500,000. The site selected is on Fifty-fourth street, just east of Broadway, and the plans have been drawn by S. B. Ogden & Co. The building will cover an area 75 x 92½ feet, will be 11 stories in hight and will have a front of brick, granite and Indiana limestone.

Many novel methods of moving buildings have been adopted in various parts of the country in order to meet local conditions and circumstances, but among the most curious ways of doing work of this kind is that of utilizing barges or flatboats to float buildings across stretches of water. One case of this kind occurred not long ago in Pittsburgh, and a later one is that at San Francisco, where a man, having constructed a small hotel, desired to move it to a lot which he had secured at Benicia. The house was first moved to the wharf and when the tide was right was pulled onto a barge by means of a horse windlass, after which the barge was towed to Benicia by a river steamer.

DESIGN FOR A SWISS COTTAGE.

A PLEASING variation in the series of designs which constitute a valuable feature of our columns is the cottage illustrated upon this and the pages which follow. It is intended for execution on high sloping ground, a very striking effect being produced by setting the house well toward the rear of the lot and using the long sweep in front for a well kept lawn, relieved with beautiful flower beds and walks of graceful curve. In referring to the design the author points out that while the front entrance as planned does not at first sight appear particularly inviting, yet it should be treated seriously, and may be guarded from the inquisitive eye as well as from the intrusion of each passing stranger; for, as he puts it, "things half seen appeal most strongly to our taste and tempt us most with interest and appreciation." The square outline of the building affords opportunity for economical construction and the treatment of the exterior has been such as would seem appropriate to the site for which it is intended. A noticeable feature of the exterior is the sliding shutters and the subdivisions of the glass, the latter not only emphasizing the character but aiding in the ornamental proportions of the windows.

According to the specifications of the architect, H. E. Barclay of 9 Newcomb street, Quincy, Mass., the foundation walls below grade and where not exposed to view are of granite, while the exposed walls are faced with round selected field stone, the latter being fitted together according to their size, and without spalls. The back and sides are split with a hammer where necessary to give a bond, and are laid in black cement mortar, backed up with split face rubble bonded to the facing with lime mortar. All the timber used is spruce, the first-floor joist being 2 x 9 inches; second floor, 2 x 8 inches, and the third floor, 2 x 6 inches. The floor timbers are double under all partitions running the same way and are set 4 inches apart. The sills are 6 x 6 inches, the outside wall studs 2 x 4 inches, and minor partitions 2 x 3 inches, all placed 16 inches on centers. The first, second and third story floors, as well as the exterior covering of the frame, are of hemlock boards, while the roof has ⅞ x 6 inch surfaced spruce boards. Over the sheathing boards is a layer of heavy building paper well lapped, this in turn being covered with spruce clapboards laid not more than 4 inches to the weather. The roof, as well as the walls and gables where shown, are covered with cedar shingles laid 5 inches to the weather. The upper floors are of matched rift hard pine, thoroughly kiln dried, and not more than 4 inches wide.



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

Design for a Swiss Cottage.—H. E. Barclay, Architect, Quincy, Mass

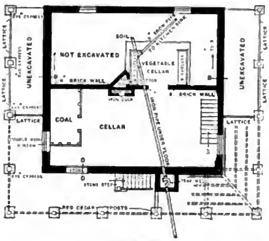
The piazza floors are of heart rift hard pine strips ⅞ x 4 inches and laid with 3-16 inch open joints, double nailed to every bearing. The outside steps are framed on spruce carriages bearing on stone foundations. The window frames are of cypress with pulley stiles and parting beads of Georgia pine, while the sash are of white pine 1½ inches thick, double hung with No. 7 Silver Lake sash cord and cast iron weights.

All outside finish is of cypress, with Beaver brand building paper under all window and door casings. The eaves and gables are finished with rafter ends dressed as shown in the details. There is a ⅞ x 8 inch molded frieze against the wall and a ⅞-inch board cut between the rafters and gained ¼ inch into them, being driven down against the frieze to make a tight joint. The edges of the eaves and up gables are finished with ⅞ x 2 inch molding.

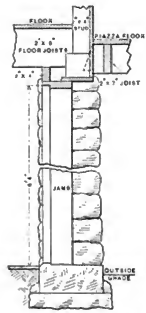
All the outside wood work is to have two coats of lead and oil paint, while the wall shingles are to have one coat of Cabot's creosote shingle stain. The interior is to be finished in the natural wood or stained, as the owner may desire, and to have one coat of wood filler and two coats of Crocker's No. 1 preservative.

All inside finish is of cypress except 'the kitchen, which is of North Carolina pine. The base of all the rooms and halls is ⅞ x 7 inch with 1½-inch base mold, except the kitchen, where the base is nailed to the studding and the sheathing fitted to it. A china closet is built into the dining room and has four shelves inclosed with 1⅛-inch sash doors divided into lights, as shown.

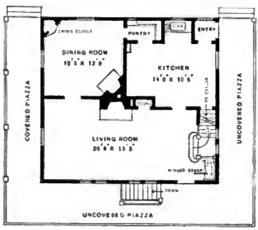
The front stairs are framed on plank stringers, three to each flight, finished with cypress risers, skirts, posts and balusters, with birch hand rail and oak treads, open strings and molded nosing returned at the ends. The bathroom is finished with 7-inch base and molding outside of wainscoting and finished with rail ⅞ x 3½ inches. A feature of the bathroom directly over the wash basin is a medicine chest or closet provided with two shelves and having a 1-inch panel door, glazed with French plate glass mirror. The bathroom is fitted with siphon closet and 5-foot roll rim porcelain enamel bathtub with compression double cock and waste; Italian marble slab and wash basin, with bracket, all exposed fixtures being nickel plated.



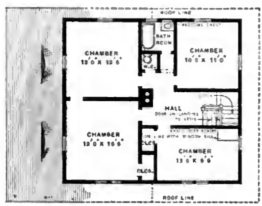
Foundation.



Section through Front Wall on Line D D of the Foundation.—Scale, ⅛ Inch to the Foot.



Main Floor.



Second Floor.

Design for a Swiss Cottage.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Making Glue Size.

A writer in one of the furniture papers offers the following directions for making a good glue size: Put about 4 ounces of best white glue into a tin vessel and just cover with cold water; let this soak until so soft that you can press your finger through it or for between two and three hours; then place the vessel into hot water and leave until the glue is perfectly dissolved. After that is accomplished put your thumb and first finger into the warm glue and pour in warm water slowly, stirring with your hand until you can feel one finger resist another. This is an indication that the glue is of the right consistency. When the fingers are first put in it will be impossible to feel them through the glue. This shows that it is too strong and needs the water as directed.

Workingmen's Homes at Cold Spring.

At the recent meeting of the Get Together Club in New York J. M. Cornell of J. B. & J. M. Cornell made the following address which we reprint from *Social Service*, the journal of the society:

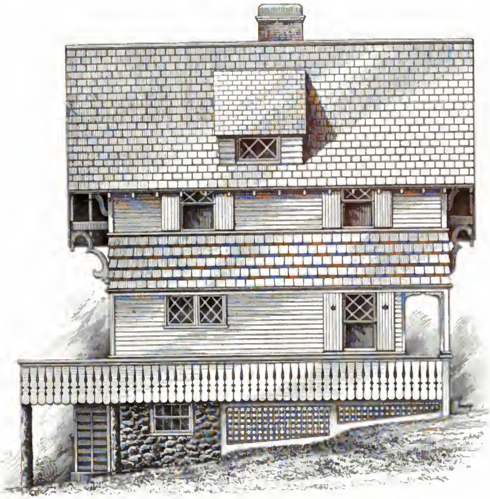
The science of making lives of employees comfortable without incurrng the sense of obligation is a difficult one and worthy of much study. All idea of inspiring gratitude on the part of employees must be dispensed with, for gratitude is the result of a sense of obligation. If the employer is entitled to any reward for his efforts in this direction he must take it in the knowledge that he has been of some use to his fellow men.

About four years ago we commenced to move our works to Cold Spring from New York, having secured the Old West Point Foundry property. One of the reasons for making this change was the desire to get our employees into a place where we could carry into effect the plans we have had for some years for adding to their comfort. Our first move was to offer to sell and deliver coal and flour at wholesale cost, being careful to have it known that they were under no obligations to purchase from us; no store orders have ever been known in our establishment. This has resulted in a large saving to the men.

Having a number of skilled men who were not ready to move their families from the city, we secured a large dwelling on one of the best streets near the village and near the works, naming it "The Iron Inn." This was furnished comfortably and put under the care of my secretary, with instructions to have a good table and a plentiful one. These men were housed there, and they came to the city Saturday afternoon, returning Monday morning. I frequently spend a night or take a meal at the "Inn" for my own convenience and to see that the table is good. They certainly seem to be very happy. In summer the piazzas and windows are entirely inclosed with wire screens. A number of our men have moved to Cold Spring with their families, and as every house in the place was soon filled it became necessary to build some cottages.

These houses I carefully planned and believe them to be very comfortable. Care was taken to have them painted differently in cheerful colors. Each house has a cellar with a cement floor and an up to date furnace, stationary slate washtubs and white enameled bathtub and basins in bathrooms; a good range and boiler in kitchen; parlor, dining room and kitchen on first floor and four bedrooms and bathroom on second floor, with a well ventilated attic—keeping the house cool in summer. Especial attention was given to the number of windows of generous size and covering the entire house, under the shingles and clapboards, with double hair felt paper, making these houses warm in winter and cool in summer. A privet hedge in front and the flower gardens we propose having will make the little houses very attractive. These houses rent for $12 per month, which gives about 10 per cent. on the investment, 5 per cent. being in cash and 5 per cent. in the pleasure we have when we look at them. It is our intention to build some cottages which can be rented for less, also laborers' cottages, with bathrooms, which can be rented for, say, $6 per month. I am now struggling with this problem.

I regret to say that this is all we have been able to do as yet. We have purchased property for a large club house—it is to have a reading room, billiard room, bowling alleys, bathrooms and gymnasium, the latter to be used as a hall when required for meetings.



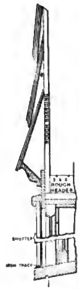
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Design for a Swiss Cottage.

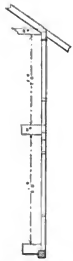
Organizing a Builders' Exchange.

The degree of activity in the building trades which has prevailed during the past six months has greatly stimulated interest in the builders' exchange movement, if one may judge from the number of these organizations which are springing up all over the country. In places where there are no exchanges, however, and where it is desired to organize them for mutual benefit, local contractors and builders will find much that is suggestive in the following extracts from an article which appeared in a recent issue of the *Architects' and Builders' Journal:* Let it be understood, first, before starting such an organization, that it must not be a social club, but strictly a business organization. A Builders' Exchange is, or should be, a rendezvous; a common place of meeting for those engaged in the various branches of building, whose trades have to be prosecuted in conjunction with each other; also for those whose lines of business make it desirable for them to frequently see the contractors in various trades for the purpose of selling material.

It should be impressed very strongly on the minds of those who in the future contemplate organizing a builders' exchange that prompt attendance at 'change hours means time and money to the builder. On the floor of the exchange, at the recognized 'change hour, the builders may be reasonably sure on any business day of finding those men whose work must be on the same lines with theirs, and whom they in consequence need to see to talk up some detail, or whose experience they wish to consult as to the feasibility of certain work or whose estimates they want for immediate use. The common meeting place then once established as a daily habit be-

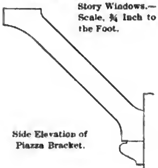


Belt Course Over First-Story Windows.—Scale, ¾ Inch to the Foot.

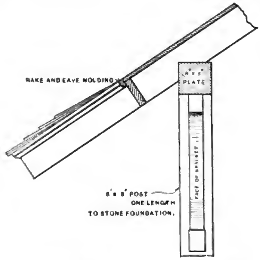


Section.—Scale, ½ Inch to the Foot.

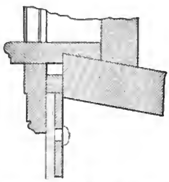
Belt Course Above Second-Story Windows.—Scale, ¾ Inch to the Foot.



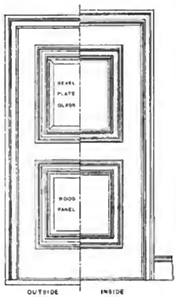
Side Elevation of Piazza Bracket.



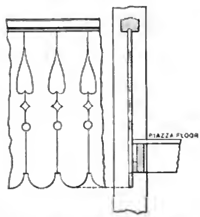
Details of Piazza Cornice and Bracket.—Scale, ½ Inch to the Foot.



Detail of Window Stool and Apron.—Scale, 3 Inches to the Foot.

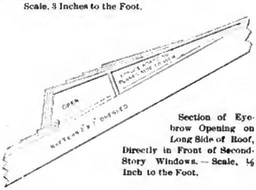


Elevations of Front Door, Showing Outside and Inside Finish.—Scale, ¾ Inch to the Foot.

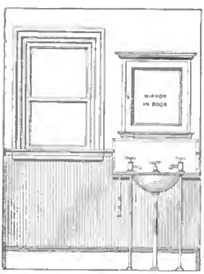


Details of Piazza Balustrade and Column.—Scale, ½ Inch to the Foot.

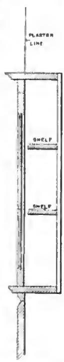
Cross Section of Wainscoting in Bathroom.—Scale, 3 Inches to the Foot.



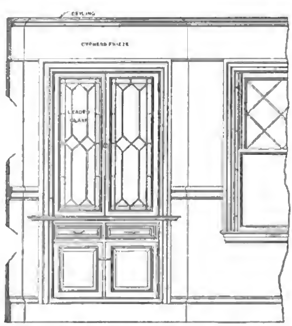
Section of Eyebrow Opening on Long Side of Roof, Directly in Front of Second-Story Windows.—Scale, ½ Inch to the Foot.



Elevation of One Side in Bathroom.—Scale, ¾ Inch to the Foot.



Section through Medicine Chest Directly Over Wash Bowl in Bathroom.—Scale, 1 Inch to the Foot.



Elevation of China Closet in Dining Room, Showing Style of Finish.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of Design for a Swiss Cottage.

comes as indispensable as any other of the many conveniences which aid the transaction of business and assist in the many movements of life.

The question may be asked: Cannot I get along without it? Yes; one can get along without it, and can get along, too, without many of the helps which experience has raised for the advantages of the world. Most any one can get along without using steam transportation, which now whisks him from the Atlantic to the Pacific at 50 miles per hour. He may, if he chooses, get along by using the old fashioned stage coach, but we think his journey would be rather a long and lonesome one, and his feelings rather mortifying on arrival to find that, though he had got there all the same, his competitors had been and gone.

To those who can get along without these things which a builders' exchange affords, we would say, "Get in line; do not use the old stage coach; go by rail, as your competitors do; get there as soon as they. Do not rely so much on the mails; use the telephone and telegraph when necessary, and you will find with the aid of this machinery and your builders' exchange your business will increase, it will keep you in touch with those you should see and want to see each day to make your business a success. A builders' exchange is a place where a builder can come during 'change hours, if only for a few minutes, and will find a bulletin board which keeps him posted on all that is going on in the building world in his city and nearby towns; he will also find a first-class library filled with the best references on anything he may want to know; he will also find a complete file of all the trades' journals and different sets of plans on the tables.

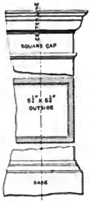
To those who would organize a builders' exchange it would be perhaps well to understand that the mere establishment of such an organization will not give those who seek the protection and welfare of the fraternity any new power over those who do not, so long as the weak and the unreliable, the bad and the indifferent, are taken into the organization on the same footing as the good and honorable. Such an indiscriminate organization is incapable of sound management, for it utterly destroys any distinctions between those who are honorable in their methods and skillful in their work and those who are not. An exchange that does not offer some inducements to the best men of a given city to become identified with its interests cannot hope for success, and it is self evident that the best men will find no inducement to membership in an exchange which includes among its members the worst as well as the best. An exchange to offer such inducements as will draw to it the fidelity of the men whose standing and influence are sufficient to give it dignity must so discriminate in the selection of its members that membership shall be something to be desired, otherwise it becomes a thing of no value, so commonplace and insignificant that no man with any regard for his reputation would desire it.

An exchange in its management or administration should be liberal and progressive. In and about the rooms which are to be the business center for so many people during so many hours in the course of a year the comfort of those who are to occupy them should be a constant consideration. Appointments that should comprehend all the improvements of the day should be freely placed at the service of members.

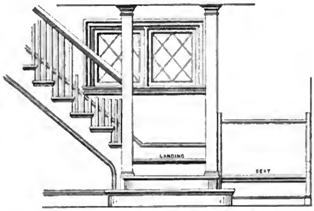
A good location should be obtained and care taken to make the place attractive and refreshing to all who enter the doors. Writing tables supplied with stationery and writing materials are of course indispensable and should be kept in the freshest condition for use by constant daily service, and the telephone service should be of the best.

A builders' exchange should be a place for daily meetings of persons whose associations as contractors, manufacturers or material men connect them with the industry of building, in order to facilitate business intercourse between such persons, to promote mechanical interests, to inculcate just and equitable principles of trade, to acquire, preserve and disseminate valuable business information, to adjust differences and settle disputes, if any, between members, and generally to promote the interests of building.

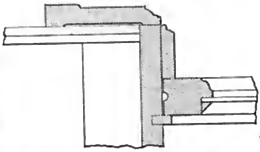
Dado in Kitchen.—Scale, ¼ Inch to the Foot.



Detail of Stair Post.—Scale, ¾ Inch to the Foot.



Elevation of Main Stairs and Seat.—Scale, ¼ Inch to the Foot.



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

Vertical Cross Section through Seat. — Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Design for a Swiss Cottage.

Quantity of Brick that Can be Laid in a Day.

In an article on the subject of estimating, which appeared not long since in one of the English architectural papers, it is stated that in foundations and walls where the joints are left rough a bricklayer supplied with materials by his helper can lay 1500 bricks per day of ten hours, as owing to the mass of the work he can pack them in with both hands. In boundary and other walls, where both faces have to be worked fair, not more than 1000 bricks, and if they are carefully jointed and faced with picked bricks of uniform color, not more than 500 per day can be laid, and then only in straight walls without many openings. A builder engaged in large operations is said to estimate that a bricklayer can lay 500 inside and 300 facing bricks per day, which would be an average of 400 bricks for the entire wall.

We shall be glad to have our readers express their views as to the amount of similar work which the average bricklayer can do in their section of the country.

SOME COMMENTS ON PHILIPPINE ARCHITECTURE.

IN commenting upon the architecture of the Philippine Islands and the prospects of its style changing, a correspondent of one of the daily papers, writing from Manila, says:

The present method of building houses, while well suited to the climate in many respects, leaves much to be desired. There are two important things that the architect must obviate as much as possible, the effects of earthquakes and heat. Out of deference to the former there are almost no houses in Manila that are more than two stories high. The churches, though they cannot be reckoned in stories, are very large, and most of them have huge vaulted roofs. It is well known that the cathedral suffered severely from an earthquake not long ago, and that a large building in its vicinity was completely shattered. The churches are built as massively as mediæval castles, the walls being in some cases from 4 to 5 feet thick. This is all of solid masonry—cement and stones. There once stood on the Calle Palacio a large church which has been completely destroyed by an earthquake. It was built in 1700, and the ruins, which are still standing, would indicate that the style of architecture differed from the other huge churches with which Manila is filled, and which have withstood earthquake after earthquake for 200 or 300 years. The greatest curiosity in church buildings in Manila is that of San Sebastian, in Santa Cruz. It was literally "made in Germany" and brought to this country in pieces of galvanized iron. Such is the firmness with which these are bolted together, and the careful relation which each bears to the other, that it is considered strong enough to withstand a very heavy shock. It is claimed that the building could not be broken apart, but could be only swayed or bent—or tipped over altogether. The very massive form of architecture in which most of the churches are built, and which seems to have survived the shocks well, is being abandoned for that of the new buildings which are going up.

Houses Antique and Gloomy.

The most common sort of house of the present day is the two-story wooden one; that is, in speaking of houses of the better class. These are all built in one general way, the architecture being decidedly Spanish. The largest ones are entered by a driveway which runs underneath the house into a courtyard in which are the stables. In some cases the stables are on the first floor of the house. Except when a house is built in the bungalow style, with only one story, the family live, eat and sleep on the second floor, and there is rarely so much as a loft above it. In the old days the red tiles of Spain were used in all cases for the roof. For some time these have been entirely abandoned for the new houses, and are only to be found on the old ones. The reason of this is easily understood; during the shock of an earthquake the earthen tiles flew about in such a manner as to endanger the lives of those with whom they came in contact. There was also this danger during a typhoon, when the tiles were blown off instead of being shaken. They have been replaced by large sheets of galvanized iron, which are bolted down, overlapping each other. This sort of roof, however, is not without its menace to life as well as the tiles. One of the greatest precautions against earthquakes in the building of a house is to have the upright beams, or pillars, of one solid piece. This is not difficult in a land as rich in magnificent hard woods and trees of enormous size as the Philippines. In the new portion of the Jesuit college in the Walled City this has been done. The advantage is that while the shock sways the building it cannot break it.

Escape from the Heat.

In meeting the question of heat, the houses are built, most of them, so that they can be entirely thrown open or entirely closed up. It is not uncommon late in the afternoon, when the breeze begins to come in from the sea, for a house to be so opened that any one passing in the street can see the entire interior of each room, just as we see a house at home when one of its walls is pulled down. This cannot be done when a house is built with the "corridor," which runs along the second story outside of each room, and overhangs the sidewalk below, like a balcony. The rooms open upon this with folding doors, and sometimes the doors are the only means of admitting the light and air to the interior; more often there are apertures in the wall besides. The "corridor" has moving casements above and below, and these may be pushed back at will. The upper casements are composed of green wooden blinds and "conch" windows, which have countless small panes of cut shell instead of glass. When closed these are found to be translucent and admit a dim light, which is much less trying than that which would come through glass windows. In fact, when glass is used—and that is very seldom, on account of the earthquakes—there are always inside shutters provided as well. Since the "corridor" has been so largely adopted by architects, they must consider that its advantages in the way of coolness are very great. When the sun is likely to beat down upon a house all day, it probably serves to keep much of the heat out; at the same time it often makes the interior stiflingly hot and close at night. I am inclined to think that this style will be abandoned by the American builders, for there will be houses built here soon by our enterprising countrymen.

All buildings in Manila have hard wood floors, that being the very cheapest variety which can be put in. They differ only as to the grade of the wood, the care with which it is made and the width of the boards. In this particular we could not possibly do better. They are the most healthy and cool for the climate, and easily cared for.

In the toilet arrangements we shall make great improvements, and there is need for such, for Manila plumbing is of a most primitive character. The harvest to be reaped by the plumber who sets up in business out here should throw his past records into the shade. In only a few houses, and those the more recently built ones, are the baths what they should be in this climate, but there are a few which are so delightful as to leave us in wonder why they are not all as adequate. Some are so arranged that you can literally swim in them. Still, there is a very good opening for our plumber, with his porcelain tub. The hot bath is a feature almost unknown. Of course, none of the houses have boilers, and consequently no hot water faucets. Hot water could be brought in pails and dumped into the tub, but in all the Manila traditions and customs which I have come across I never hear of this being done. The people share the same fate as their clothes and their dishes, they are always washed in cold water.

New Medical Laboratories of the University of Pennsylvania.

The University of Pensylvania are about erecting a new laboratory of medicine, which, it is expected, will be the most extensive and complete ever constructed in this country or Europe. The medical school of the University of Pennsylvania is the oldest in this country, and they intend to expend more than $500,000 in the erection of the new laboratory. The latter will have a frontage of 340 feet and a depth of nearly 200 feet, the front facing north, thus securing a maximum amount of the best light for laboratory purposes. The building will be quadrangular in shape and two stories in hight, with an unusually high basement. In addition to the numerous laboratories, research rooms, &c., there will be four lecture rooms in the building, each capable of seating 185 students. At the rear of the building will be two more large lecture rooms, each seating 400 students. The most modern apparatus will be employed in lighting, heating and ventilating the building. The new laboratory building is only one of a group of buildings for the teaching of medical science contemplated by the trustees of the university. The architectural construction of the entire group will correspond with that of the dormitories of the university, the same architects having been engaged to design the new medical laboratories.

THE SCIENCE OF HANDRAILING.

By C. H. Fox.

WE now come to the explanation of the construction of a cardboard representation of a solid, showing the actual inclination and position, together with the developments of the sections of the face mold and joint surfaces of a rail, the plan of which is less than a quarter circle. The full inclination of the section plane of the face mold is placed over the upper tangent, the lower one being termed "level." This problem is very similar to that illustrated by means of the diagrams in Figs. 14 to 18. Here, as in that problem, the rail starts from the level. The plan is given in Fig. 19, at which A,-B-C represents the tangents to the points A,-C of the center curve, at which joints are desired. This understood, we proceed as follows: With any convenient radius draw the plan and divide the curves into any number of points, and from these parallel with the tangent A,-B produce the plan ordinates. Then at the ordinate C,-C set off C,-C', equal to the assumed vertical rise of the rail, and through C' draw A,-C'-M. This is the right inclination of the section plane of the face mold. Now parallel with A,-M draw T-K. Notice here the joint line T-K becomes the seat line, and the surface represented in T-K-K, of this model answers a double purpose; firstly, that of representing the vertical joint surface over A, and secondly, that of containing in T-K the right inclination of the section plane of the face mold.

To develop the elliptical curves of the face mold, proceed as follows: Square with T-K draw E-S, A,-B, &c., the ordinates of the section plane, equal respectively with the corresponding ordinates of the plan. Then, connecting A-B, B-C', gives the projection of the tangents of the face mold. Square with these draw the joint lines U-Y' of the upper joint surface, and trace the curves in the manner before directed for the similar operation at the preceding diagrams.

Now to draw the representation of the tangent planes, which form two sides of the model, proceed as follows: In Fig. 19 square with the plan tangents A-B and B-C, draw B-F and B-F", making them equal to A,-A of Fig. 20; then draw E-F and F-I parallel with the tangents. This done, set off I-G equal to C,-C', which gives the vertical rise of the rail. Join F"-G, which gives the inclination of the section plane over the tangent. Then square with F"-G draw G-W, and the representation of the planes which form the two sides of the model may be obtained. Now to obtain the representation of the inclined surface of the upper joint and develop the right section, we have to first find the vertical line in which the tangent plane over the upper tangent intercepts the surface. This may be found as follows: In Fig. 19 parallel with the joint line H-J through W draw V-W-U, then parallel with the ordinates draw T-U. Now in Fig. 20 parallel with the ordinates draw T-U, equal with T-U of the plan; then, with U as center and U-W of Fig. 19 as the radius, draw an arc in W. Then, with C' as the center and G-W of Fig. 19 as the radius, draw an arc in W; drawing U-V through the intersection at W will give the position of the line in which the upper joint plane meets the plane of the base of the model, and W-C' drawn square with U-W gives the position of the vertical line in which the surface is intercepted with the tangent plane. This line, if the drawing is correct, will pass through the points C'-W, already projected.

This is, perhaps, the best method for the student to employ at the model, but the following one may be employed in practice for the purpose of ascertaining the position of the vertical line required. In Fig. 20 draw Y'-Y parallel with the ordinates; then square with the seat line draw Y-M, and parallel with it draw C-M. Now in Fig. 19 set off G-J equal with Y-M of Fig. 20, and parallel with B-C draw J-Z. Now in Fig. 20, with Y' as the center and G-Z of Fig. 19 as the radius, draw an arc in H"; then with C' as the center and the half width, as T-A,, of the rail of Fig. 19 as the radius, cut the arc in H"; now through H", drawing C'-H", the position of a level line lying on the surface of the joint may be projected, and H"-Y' at right angles with this will give in C'-Y'-H" the angle of the plumb bevel, required at the surface in order to "square the wreath." On trial these lines may be found parallel with the lines given respectively in U-W and C'-W first drawn. Now to project the right section we may assume G-Z of Fig. 19 as equal to the half thickness of the rail, and through Z draw Z-Y parallel with the joint line. Then in Fig. 20 set off Z'-D'-Y" equal to that given in Z-D-Y of Fig. 19, and through the points trace the curves, which will give the contour of the section desired.

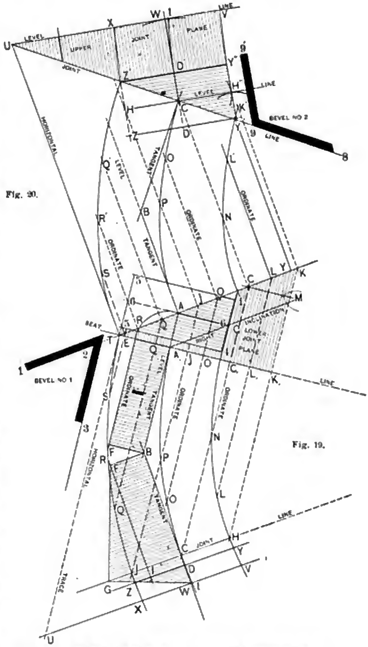


Fig. 20.

Fig. 19.

Figs. 19 and 20.—Construction of Cardboard Representation of a Solid, Showing the Actual Inclination and Position, together with the Development of the Sections which Belong to the Face and Joint Surfaces of a Rail, the Plan of which is Less than a Quarter Circle, the Full Inclination of the Section Plane of the Face Mold being placed over the Upper Tangent, the Lower one being Termed "Level."

The Science of Handrailing.

Take a sharp knife and cut through the board at the outline of the drawing of Fig. 20; then at the plan cut through the board at the outline A,-E, E-F, F"-G and G-W. Then at the lines U-Y' and T-K of Fig. 20, and at T-K,, A,-B and B-C of Fig. 19, cut about half through the board; now turn up the sides of the model into their perpendicular position. Then fold over the section planes into their inclined positions, at which they may be secured in any manner which suggests itself to the student. Then in the manner directed in connection with the models previously constructed cut the full size sections, and secure them at their proper position. The manner in which the top and under twisted surfaces of the rail may be formed will be seen. Fasten the duplicate face mold into its position parallel with the top surface of the model, having the tangents of the mold perpendicular over those of the section plane. The observations made in the diagrams of Figs. 14-18, referring to the projection

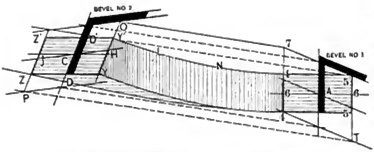


Fig. 21—Geometrical Elevation of the Solid of the Rail Shown in Figs. 19 and 20.

The Science of Handrailing.

of the mold over the arris of the upper joint surface, &c., may be noted.

In Fig. 21 is shown a geometrical elevation of the rail with the bevels applied to the working surface of the wreath piece. Bevel No. 1, the construction of which will be apparent from the drawing, is shown applied to the lower joint surface, and bevel No. 2 to the upper surface.

Constructing a Chimney of Concrete.

At the present day concrete is being so extensively used for nearly all varieties of buildings that brief reference to a chimney which has recently been constructed of this material at Elizabethport, N. J., for the Singer Mfg. Company, and which, we understand, is the second of its kind in the country, may not be wholly without interest. The chimney is 125 feet high and has a 9-foot flue. In the execution of the work what is known as "wet" concrete was used, the mixture being composed of 1 part American Portland cement, 3 parts sand and 5 parts broken Hudson River limestone.

The chimney is of the Ransome cold twisted iron construction, the twisted iron bars being imbedded in the foundation and radiating from the center. In this work twisted rectangular bars were used, as the spiral ribs formed upon the iron tend to make a continuous lock between the bars and the concrete. After the foundation had become thoroughly set a mold 12 feet in hight was put in place and filled with concrete, through which iron bars were distributed. The concrete was then thoroughly tamped and allowed to set. After this was accomplished the mold was raised 5 feet and then again filled with concrete and iron rings. Perpendicular iron ribs were also placed through the chimney and these were joined at every filling, thus making a series of continuous bars from the base to the top of the chimney. After the concrete had set the mold was again raised 5 feet and the operation repeated until the entire work was finished.

WE have received from Glenn Brown, secretary of the American Institute of Architects, a copy of the proceedings of the thirty-fourth annual convention of that body, held in the Arlington Hotel of Washington, D. C., on December 12 to 15, inclusive, of last year. The matter is issued in the same general style as that which has characterized the proceedings of other conventions, and constitutes a volume of 186 pages. A great deal of interesting matter is presented, and in addition to the regular proceedings are to be found lists of officers, Executive Committee and members of the institute.

Splitting in "Deals."

As a general observation it may be stated that woods do not alter in any material degree in respect to length. They, however, contract in width, warp, twist, and when fitted in panels in loose grooves they shrink away from the edge which is most slightly held, but when held by nails or other attachments which do not allow them the power of contraction they will split with extraordinary force. It is said by some authors that the softest woods split most in width, but it is very difficult to get definite information on this subject, says a writer in an English journal. In woods that have been partially dried this defect is lessened where they are defended with paint or varnish, but the defects do not then cease, and with dry woods every time a new surface is exposed to the air, even should the work have been made for many years, these perplexing alterations will, in a degree, commence even independently of the changes of the atmosphere, the fluctuation of which the woods are at all times freely disposed to obey. The atmosphere has an effect on most woods, and some deals, particularly the stringy deals, are very liable to be affected by the moisture of the atmosphere, and never lose the property—however long they have been seasoned—of expanding or contracting with every change of atmosphere.

When a lot of green wood is exposed to a dry atmosphere the outer fibers contract both at the sides and ends, whereas those within are in a measure shielded from its immediate effects and retain nearly their original dimensions. Those deals cut near the center of the trees are very liable to split, yet they are not so bad as those cut near the outside. All deals are slightly split up at the ends, and in 12-foot deals one can scarcely calculate upon more than 11 feet 8 inches in length, for they will split up at each end. Splitting is an important thing to be considered in all woods which are cut down into boards, although small splits are not of so much importance in beams and sticks of timber, yet when cut down into thin boards, perhaps ½ inch thick, splits and other defects would be total destruction. Sap should be carefully excluded in all deals. We often meet with deals which are very good at one end and defective at the other.

The French are not so particular about sap as the English. If the deal has the required quality of good wood on one side they do not care much about the other. Their deals are not so good as ours in that respect. Their common calculation in regard to sap is that in a plank 12 inches wide there shall be 9 inches free from sap on both sides. The deals cut next to the sap are the best between the center and the sap. The center deals are clearer of sap than the outside deals. White deals are similar to yellow, except that the sap in white deals is not discernible from the heart. In yellow deals the sap or albumen of the tree ought to show itself only at the edge of that part of the deal which was furthest from the center of the tree. After the sapwood had been removed from the edges of the board (or after the edges have been what is technically termed shot without removing the sap) they are called "listed" boards. When the sides are planed they are described as "wrought." Deals are apt to rend from unequal or too rapid drying, which produces certain fissures or cracks called "shakes," and deals thus affected are termed "shaky." Outside deals are very subject to shakes. A knot is frequently very injurious to deals. The bark of a tree sometimes adheres to knots, which, consequently, have a black ring round them. When the deals come to be cut into boards a knot of this kind is apt to fall out. "Cast" or "warped" is an effect produced upon pieces of timber by heat, moisture, or otherwise, the fibers becoming bent or twisted from their original direction. To prevent warping as much as possible they are listed.

Another point is the action of mortar on deals. Very often it will be found that where surrounded by some kinds of mortar the deals will have simply rotted away. This is due to the action of the earthy particles in the mortar, for earth has the property of rotting pine or deal to a very marked degree.

A ROW OF HOUSES IN SCRANTON, PA.

(WITH SUPPLEMENTAL PLATE.)

THE half-tone supplemental plate which accompanies this issue of the paper represents a row of seven modern dwellings located on Green Ridge street, corner of Penn avenue, in the city of Scranton, Pa., which were erected for Dr. F. F. Arndt of that place. The house of which we show the front elevation and floor plans is the one in the foreground at the corner of the street. The picture is a good illustration of the manner in which a row of houses can be rendered attractive by varying the architectural treatment of the exterior, while conforming largely to the same floor plan.

In the corner house the frame is of white hemlock, the first and second tier joist being 2 x 10 inches, the third tier and the ceiling joist 2 x 8 inches, all spaced 16 inches from centers; the rafters, 2 x 6 inches, spaced 20 inches from centers; the collar beams for main roof, 2 x 6 inches, also spaced 20 inches from centers; the sills, 4 x 6 inches, halved and pinned at the angles; the girders in the cellar, 6 x 8 inches, and the posts in the cellar, 6 x 6 inches, with flagstone base, 4 x 18 x 18 inches. The joist are doubled and spiked together under all cross partitions and for headers and trimmers. The studs are 2 x 4 inches, placed 16 inches from centers, and are doubled and spiked together for all angles and for all window and door openings. All openings 4 feet or over in width are substantially trussed in the most approved manner. The partitions dividing the houses one from another are made of two rows of studs set staggering, with a thickness of felt placed between, as indicated in the detail to be found on the following page. The frame of the house is covered with hemlock sheathing boards laid diagonally, which are in turn covered with one thickness of two-ply building paper with joints well lapped. The first story of the house is of brick veneer laid in red mortar, the brick facing being anchored to the sheathing by wire spikes. The stone water table, sills and lintels are of Nicholson bluestone, rock faced. The second story is covered with white pine bevel siding, while the roofs are covered with white cedar shingles 18 inches long, laid 5 inches to the weather, the shingles throughout being dipped in Cabot's creosote stains. All flat roofs and balcony floors have four thicknesses or layers of the Acme brand of roof felt, the first course next to the eaves being of five thicknesses or layers of Acme felt.

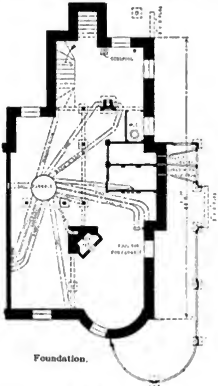
In this connection it may not be without interest to describe how the work was done. Each successive layer was lapped at least two-thirds of its width over the preceding layer, and the felt firmly secured with cleats nailed on in the manner customary in the best composition roofing. The surface underneath the outer layer of the first course and underneath each succeeding layer, as far back as the edge of the next lap, was thoroughly mopped with a thin coat of the Diamond brand of roofing cement, equal to not less than 10 gallons to 100 square feet, including what was used between the layers of felt. The latter was then covered with a coating of slag, granulated and bolted for the purpose; no slag being used larger than that which would pass through a ⅝-inch mesh and none smaller than that which would be caught by a ¼-inch mesh.

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

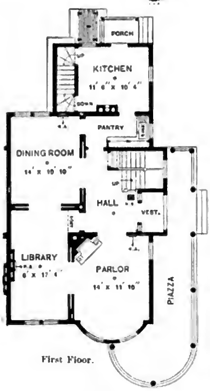
A Row of Houses in Scranton, Pa.—Edward H. Davis, Architect.

The bottom of the entire cellar and step areas are covered with 4 inches of concrete, composed of 1 part F. O. Naughton's Bridge brand Rosendale cement, 2 parts screened sand and 3 parts broken stone sufficiently small to pass through a 2-inch ring. The concrete is topped with ¾ inch of Portland cement.

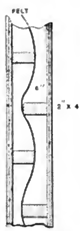
All exterior trim, such as doors, window casings, corner casing, ridge boards, water table, cornice, moldings, &c., are of white pine. The sills of the front porch are 4 x 6 inches, and the columns are 8 x 8 inches poplar. The porch is floored with white pine laid at right angles to the building and painted two coats of oil and lead.



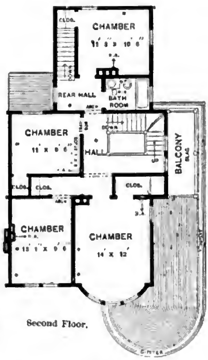
Foundation.



First Floor.



Horizontal Section through Partition between Dwellings, Showing Method of Deadening—Scale, ¾ Inch to the Foot.



Second Floor.

A Row of Houses in Scranton, Pa.—Floor Plans—Scale, 1-16 Inch to the Foot

The porch is ceiled with ⅝-inch No. 1 tongued and grooved North Carolina pine.

The floors of the house are of North Carolina pine, tongued and grooved and blind nailed. The vestibule, first story and bathroom have oak floors. The kitchen is wainscoted 3 feet high with ⅝-inch North Carolina ceiling, having a 2½-inch face, while the bathroom is wainscoted 4 feet high in the same manner.

The finish of the halls and stairways, dining room, bathroom and pantry is North Carolina pine, the finish of the balance of the house being white pine for painting. The main stairs are of North Carolina pine.

The side walls and ceilings of the first, second and third stories of the house are plastered two coats, the first coat being composed of "F" Paragon with fiber, while the second coat throughout was composed of best finishing lime and fine white sand.

All exterior wood work is painted two coats, and all tin work two coats of Prince's metallic paint. The hall, dining room, kitchen, pantry and bathroom have one coat of McCloskey's Royal filler and two coats of Architectural Coach, made by the Chicago Varnish Company, while the balance of the first, second and third stories are painted two coats of oil and lead. The oak floors have the grain well filled with best filler and one coat of Supremis floor finish smoothly flowed on.

The houses here shown were erected in accordance with plans drawn by Architect Edward H. Davis, Commonwealth Building, Scranton, Pa.

Public Support of Trade Schools.

Commenting on the editorial on "Public Support of Trade Schools," printed in our issue for July of this year, Thomas M. Balliet, City Superintendent of Schools of Springfield, Mass., remarks as follows in connection with the trade classes that have been started in that city under the public school system:

"I hope the little beginning that we have made may lead other cities to do the same thing on a larger scale. I am glad to say that the labor unions have placed no obstacle in our way. On the contrary, the plumbers' union has passed a resolution that they will take as helpers only such young men as take a course at our trade school. I believe that the labor unions will indorse the school. I know, at least, nothing to the contrary. My sympathies with the cause of labor are so strong that I should be sorry if trade schools should prove prejudicial to its interests. I do not believe they will, however, and I think that the labor unions will come to see the matter in this light. It is not possible for any trade school to make a full fledged journeyman. Every graduate of the trade school should serve a short apprenticeship in a shop. So long as this point is insisted upon the trades unions can control the labor market, and need have no reason to feel afraid of trade schools. I believe that this is the way out of that possible difficulty."

Mr. Balliet is recognized as one of the leading educational workers of the country, and his opinions, fortified as they are by careful study of the trade schools in Europe, will carry weight with others who are studying this phase of the educational problem.

CORRESPONDENCE.

Making a Cellar Water Tight.

From F. R., *Coalville, Utah.*—I have a cellar which is 6 feet deep with an 18-inch stone wall all around. During the summer months water rises 12 to 14 inches, and I desire to learn what I can do to keep the water out and make a good clean cellar. The ground in which the cellar is built is mostly gravel, especially the bottom. If any of the readers of the paper can assist me in this matter they will greatly oblige one who has only the best wishes for the success of the paper.

Elevations for "J. W. H.'s" Floor Plans.

From E. F. T., *Salem, Mass.*—I send herewith blue print showing what I think will make suitable elevations for the plans of "J. W. H.," Lynbrook, N. Y., published in the May issue. I would say by way of explanation that the roof is square pitch. The windows are 22-inch finish in first and second stories, which, I think, will bring them about right. The windows in front bay are 13½ x 30 inches; the dormer windows are 24 x 24 inch glass, the twin windows on the first flight of stairs are 24 x 36 inches, and the twin windows on the second flight of stairs are 24 x 24 inches. The top lights of the second-story windows are 15 x 26 inches and the bottom light is 30 x 26 inches. The kitchen window, it will be observed, is scaled rather large on account of the sink.

Front Elevation. Side (Left) Elevation.

Scale, 1-16 Inch to the Foot.

Elevations for "J. W. H.'s" Floor Plans.

Glue Size and Shellac for Finish.

From E. H. C., *Lahrina, Maui, Hawaiian Islands.*—I would like to ask through the columns of your valuable paper how a "glue size" is prepared and applied to nice finish work; also how shellac is thinned, evenly applied and smoothed up? I wish to get a very hard finish for desk tops, suitable for writing upon, and desire to learn which is the best method.

How can varnish be applied so it will give an even, smooth appearance? I am not a painter, but am away out here in mid-Pacific, where painters are not to be had; so if some one will kindly give me the desired information I will promise not to use it where it will hurt a legitimate tradesman.

Comments on First-Prize Design in $2000 House Competition.

From D. J. McL., *Sandon, B. C.*—Referring to the criticism of "Rural Scratch Awl" in the June number on the 6 x 8 inch girder in the prize design, which appeared in the April issue of the paper, I would say that his point is well taken. It appears unnecessary to go into figures to show that the load contributed by 2 x 10 inch joists on 16-inch centers to a 6 x 8 inch girder of nearly equal span would be too much for it. Their section modulus is respectively 33 1-3 and 64 inches—two joists being stronger than the girder. To say the least, it is a very inconsistent use of material.

The assumption by the architect in his reply to the correspondent that the joists being in full lengths would relieve the beam to a certain extent, is entirely wrong. If the beam was placed in the center and on a level with the end supports it would carry ten-sixteenths of the load on the floors, three-sixteenths going to each of the end supports, assuming the load to be uniformly distributed—see table on page 141 of "Modern Framed Structures." The beam would be relieved by making the joist noncontinuous.

A Roofing Problem.

From J. & C., *Troy, Ala.*—We have a roofing problem which we wish to solve, and come to the Correspondence department for assistance. The architects through this section, in specifying the method of putting on flat veranda and deck roofs, where 20 x 28 tin is used, require that it shall be put on flat, lock seamed and soldered on both sides and the same nailed to the sheathing. The question is, can any of the readers tell us how it can be done in a skillful and workmanlike manner? We think we are practical roofers, but this gets ahead of us.

Note.—In some sections of the country, instead of flat seam roofing being put on a sheet at a time, the tin is prepared in rolls. Usually it is soldered on but one side, although it is often painted on the under side. In applying the tin to the roof, a ½-inch edge is turned up along one side of the strip and turned down on the other. The strip is then fastened by nails being driven close in under the edge which is turned, and the closer the nails are placed together the more easily and strongly the seam can be soldered. Tinned nails should be used for this purpose. It may be that the architects desire to have the tin put up in rolls for this class of work, and have the seams soldered on both top and bottom sides.

Method of Deadening Floors.

From Samuel Cabot, *Boston, Mass.*—Referring to the article on page 166 of the June number, headed "Method of Deadening Floors," it may be interesting to you to note that the Steinway Building in Chicago was entirely constructed upon this deafening-by-disconnection plan. After it was built it was necessary to go over the entire building with a special deafener because it was found that the scheme was a failure. In deafening, a great deal depends upon the construction of the building, of course, but no special construction for framing buildings has ever yet been devised that will give a sound proof result, except occasionally with the aid of special deafeners.

Laying Out a Stair Rail Around a 6-Inch Cylinder Containing Five Winders.

From MORRIS WILLIAMS, *Scranton, Pa.*—I tender the accompanying diagrams and explanation in answer to the request of "S. W.," Paterson, N. J., which appeared in the June issue. Fig. 1 illustrates the plan, elevation and inclination of tangents over the cylinder. On one tangent the hight of five risers is marked, as shown at *y, a, b, c, d,* and *e*. This will fix the hight of the floor line above the springing of the cylinder. The landing rail is shown at 7 above the floor line, the distance *e*-7. By continuing the landing rail from 7 to 6 the point 6 becomes a fixed one from which the inclined tangents over the cylinder are to start downward to meet the rail over the bottom flight, as shown from 6 to 1. At 1 is shown an easement in the bottom rail to conform with the inclination of the tangents. The joint at 1 is made square to the tangents, not to the bottom rail.

In this manner the inclination of the four tangents

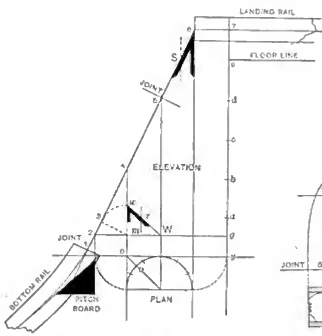


Fig. 1.—Diagram Showing Plan, Elevation and Inclination of Tangents over the Cylinder.

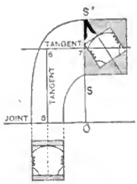


Fig 3.—Face Mold for Upper Wreath.

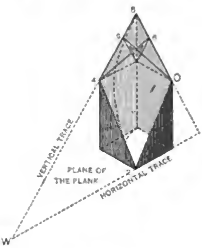


Fig. 4.—Perspective View.

Laying Out a Stair Rail Around a 6-Inch Cylinder Containing Five Winders

of the two wreaths has been found, the upper wreath having one tangent, 7-6, level, and the other, 6-5, inclined. The two tangents of the lower wreath are equally inclined, as shown at 5-4 and 4-2.

The center joint is shown at 5 made square to the line of tangents. The bevel for the upper wreath is shown at S-6, and the bevel for the lower wreath is shown at *w-x*. This last bevel is to be applied to both ends of the wreath, while the other is to be applied at the end 7 of the upper wreath.

To draw the face mold for the lower wreath, mark on the line A B of Fig. 2 the distances 5, 4, 3, 2, 1, taken from the tangent in Fig. 1. Draw 3-6 perpendicular to A-B, and from 4 with the distance 4-2 cut the line 3-6 in the point *c;* then draw a line from 4 through *c*, extending it indefinitely. We have thus found the tangents of the face mold 5-4 and 4-*c*, also the angle *c*-4-5 between the tangents. One end of the face mold will be made square to the tangent 5-4 and the other end to the tangent 4-*c*. Draw the dotted line *c*-O parallel with 4-5 and the dotted line O-5 parallel with 4-*c*. Connect the points 4 and O. Mark the distance 4-*w* equal to *o-o* of the plan, Fig. 1. On *w* mark the width of the straight rail, and on each side of both 5 and *c* mark the distance *w-x*, taken from the bevel in Fig. 1. Connect all the points thus found with a flexible piece of wood and the face mold is complete. The bevels are shown at both ends applied square to the tangents, and a square section of the rail is shown, indicating how by means of the bevels the wreath is twisted.

In Fig. 3 is shown the face mold for the upper wreath, while Figs. 4 and 5 represent perspective views of the whole construction, which, I think, will adequately explain every line shown in Figs. 1, 2 and 3.

Construction of Dry Kiln.

From D. K., *Indianapolis, Ind.*—In regard to the question of the correspondent "S. D. H.," which appeared in the June issue, I would suggest that the proper thing for him to do under the circumstances is to consult some dry kiln manufacturer and let him put up a kiln under a guarantee to satisfactorily dry the green lumber. There

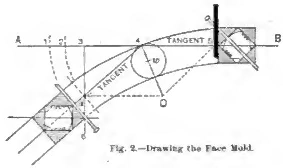


Fig. 2.—Drawing the Face Mold.

are many concerns in the country making a specialty of this line of business, and they can probably do the work for him very much cheaper and more satisfactorily than he can construct a kiln himself.

A Question in Pumping.

From J. H. C., *Connecticut.*—A farm water service has two discharges; the one at the barn, being a few feet the lower, furnishes water when open. On account of low water in the spring none can now be drawn at the house unless that discharge be lowered, which is not convenient. Formerly a tight barrel, except an air inlet pipe, was sunk in the ground at the house low enough to have a fall from the spring at all times, and water was pumped readily from the barrel. Whenever the spring filled up sufficiently water would run from the pump spout, as no shut off was provided below the pump to stop it. Then the pump and barrel were removed and the water came by gravitation as high as desired. Now the spring is low and the question which the above preamble leads to is, will a pump draw water to a house if attached direct to the service pipe without having a barrel reservoir as formerly, and if not why not? It is not feasible to raise the pump above the maximum water in the spring or have the spouts discharge below its minimum. Under these circumstances what action would be advisable? The spring is about 6 or 8 rods from the house.

Answer.—The conditions of your water supply may be so arranged as to equalize the flow of water at house and barn: 1. By a new and separate pipe line from the spring to the house, a few rods only, which will give a constant and reliable flow of water at either place. 2. If it is not desirable to lay an extra pipe or to enlarge the present line from the spring to the house a house flow may be obtained direct from the pipe by partially closing the outlet at the barn, allowing only enough water to flow for actual use. This arrangement will lessen the friction in the pipe between the spring and house and raise the flowing head. 3. A direct connection of the pump with the water pipe will allow of a good house service, only that the pump will operate in a somewhat jerky manner, because it has to pull its water through the long pipe at each

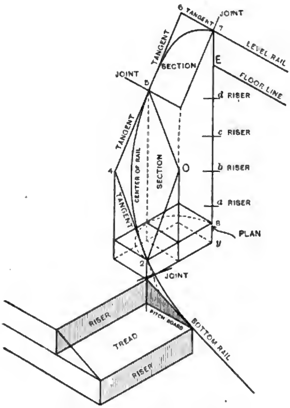


Fig. 5.—View Showing Entire Construction

Laying Out a Stair Rail Around a 6 Inch Cylinder Containing Five Winders.

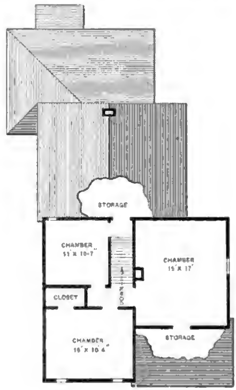
stroke. An air chamber of 3 or 4 gallons capacity connected to the water pipe as low as possible and near the pump will equalize the pump action and give a satisfactory service. In order to prevent a constant flow when the spring is high a faucet should be placed at the pump discharge and a double acting pump used. If a pitcher pump is in use the faucet should be placed in the suction pipe.

Plans for Farm House.

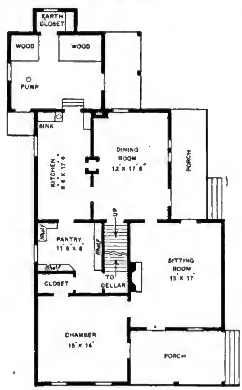
From TUEBOR, *Mich.*—I send herewith plans which may answer very nicely for a farm house, and could be built, in this section at least, for something like $1200. The main part of the house has 16-foot posts and is of one-third pitch; the sitting room and porch, 13-foot posts and also one-third pitch, while the dining room and kitchen should have 9-foot posts and be of one-quarter pitch. This may interest " D. L. P." of River, Ind., and " H. W. L." of Climbing Hill, Iowa, whose inquiries appeared on page 68 of the March issue.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From W. B. J., *Charlotte, N. Y.*—I have taken your valuable paper for several years and am much interested in the way the several correspondents are handling the subject of bevels of hip and valley rafters in a roof having two pitches. In each and every one of the explanations given the writer assumes that the ridges



Second Floor.



Main Floor.

Plans for Farm House Submitted by " Tuebor."—Scale, 1-16 Inch to the Foot.

intersect. Now let us suppose they do not come level. I have just framed a roof where this was the case and had no small difficulty in locating the true seat of my valley. One roof had a rise of 13 feet in 14 feet run, while the other had a rise of 15 feet in 12 feet run, for the common rafter. In framing a valley rafter for a roof of this kind it is necessary to carry one valley to the higher ridge for support, then cut the opposite valley against the one already mentioned. In getting the side bevel of the hip or valley rafter where it intersects with the ridge, one has only to make the draft for said rafter and take the run on one side of the square and the length on the other and mark on the length side, the result being the bevel. The trouble in my case, however, is to know where to seat my rafter, so as to get my draft. I shall be pleased to hear from any and all on this subject, as I know from experience it is the hardest in roof framing.

From J. F. W., *Danville, Pa.*—I notice in a late issue of the paper an inquiry from "Learner," Paterson, N. J., who wants to know how to get the lengths and bevels of valleys, hips and jacks of a roof having two pitches; also the various answers thereto. As being of interest in this connection I send a sketch showing my method of doing the work. The house is 40 feet long and 30 feet deep, the letters B B representing the center lines of the structure. The pitches and run of the main rafters are represented by C C C C, while D D represent the rise or pitch of the valley or hip rafters. Take the length of the rafter C and lay it on the center line B

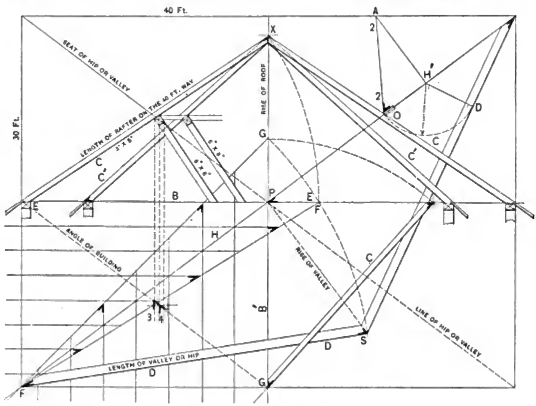


Diagram Submitted by "J. F. W.," Showing His Method of Doing the Work.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

from E to E; then draw a line to the corners, as F to F, and space off the jacks on the long side, as shown. Take the length of the rafter C' and lay it on the line B' from G to G, drawing a line from G to F, as shown, which represents the run of the valley rafter, the line H being its seat. Space off the jacks from F to G, which will give the lengths of jacks on the short side. Square up the rise of the valley or hip from P to S and draw the line S D F, which will give the length of the hip or valley. A bevel set at P will give the side cut. In order to obtain the backing of the hip rafter, square from the hip D to the line H', as shown in the upper right hand portion of the diagram, and take that distance as a radius; then square to A and draw 2-2. A bevel at 2 will give the backing. At 3 is the bevel for the cut across the edge or top of purlin bents, while a bevel set at 4 will give the down side or cut. The top bevel for the valley or hip is shown at S, while at X is the plumb cut for the rafters on the 30 or 40 foot sides.

From G. L. S., *Temple, Ind.*—In looking over some of the recent issues of the paper containing articles relative to beveling a valley rafter to fit between two roofs or gables of different pitches, I note slight errors in each. I have therefore decided to submit a solution entirely different to either of those presented. We will suppose the inclosed sketch to represent the building in question, A B indicating the valley rafter. First extend the line F B C to a point directly plumb with D, thus making

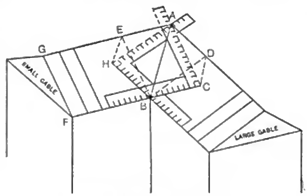


Diagram Submitted by "G. L. S."

F B C equal G E A. This makes the line B C the run of the common rafters in the large gable and is equal to the ridge line E A. Connect C and A, and the line thus made becomes parallel and equal to the common rafter B E. Now the corner A C B has by this construction become a square corner and the square applied as shown at A C B demonstrates that if the run of the rafter B C be taken on one side of the square and the length of the rafter A C be taken on the other, marking by A C will give the required bevel to fit against the ridge A D.

We have already shown that B C is equal to E A and that A C is equal to B E; therefore, to find the bevel against the ridge A D, take the length of the common rafter and the ridge in the opposite gable and mark by the rafter, or

B A D = A E × B E; cut by B E.

Also B A E = A D × B D; cut by B D.

It will thus be seen that this bevel in either roof is cut by figures taken from the opposite roof, and in this respect the error in the demonstration in the April issue will be found

WHAT BUILDERS ARE DOING.

THE building situation in the city of Baltimore is comparatively quiet just at the present time, although there are under way a number of building improvements which involve a considerable amount of capital in the aggregate. Of the contracts awarded probably the one of most interest was that of the Maryland State Building at Annapolis, reference to which has already been made in these columns. Some of the recently awarded contracts include the Maryland Hotel and Sanitarium, near Ellicott City, for which H. D. Rollman of Baltimore has the contract; the Catonsville National Bank Building, to cost $13,000, for which Baldwin & Pennington are the architects; a $15,000 residence for L. A. Dieter, for which Edward Brady & Son, members of the Builders' Exchange, are contractors; a $40,000 residence for Gen. A. E. Booth, to be erected in accordance with plans drawn by J. E. Sperry of Baltimore; a $10,000 residence for William Blackford, for which D. H. Thomas, Jr., is architect, and a $6000 addition to the residence of R. D. Hopkins, the contract for which has been awarded to Israel Griffith, also a member of the exchange. We understand it is the purpose of the Bank of Commerce to erect a bank building to cost about $75,000, and of the Citizens' National Bank to make extensive additions and alterations in accordance with plans by J. E. Sperry.

Chicago, Ill.

The activity in building continues on a most gratifying scale, and all indications point to a volume of business which will far exceed that of any recent year. The figures for June show that permits were issued for 627 building improvements, having a frontage of 18,670 feet and estimated to cost $4,090,950, which compare with 335 permits for buildings, having a frontage of 7570 feet and involving an estimated outlay of $1,111,900, for the corresponding month of last year. In recent years the only time that the money value of the building improvements exceeded last month's record was in June, 1895, and the impression seems to prevail that the present activity will continue for some time to come. During the six months ending June 30 permits were taken out for the construction of 3145 building improvements, covering a frontage of 88,223 feet, estimated to cost $17,779,965, these figures forming a most striking contrast when compared with those of the corresponding period of 1900, when permits were issued for 1274 buildings, having a frontage of 33,898 feet and estimated to cost $4,536,540. These small totals were, of course, due to the prolonged strike in the city, which brought nearly all building operations to a standstill. To what extent operations were suspended may be gathered from the figures for the first half of 1899, when permits were taken out for 2118 buildings, estimated to cost $11,865,260.

Columbus, Ohio.

An important meeting of the Builders' Exchange was held on the evening of July 3, when it was decided to make the Columbus Exchange a part of the Ohio State Association of Builders' Exchanges, thus practically completing the State organization. The action of the local exchange also secures for it a membership in the Executive Board, and John Drayer was appointed to the office. The principal address of the evening was made by Joseph Young of the Cleveland Builders' Exchange, temporary president of the State Association, who explained the objects and benefits of the state organization. Addresses were also made by William Watson and August Blesch, both members of the local exchange, who spoke in favor of the association.

As intimated in our July number, the first convention will be held at Put-in-Bay, July 30 and 31, when a permanent organization will be effected and the officers will be elected. This convention will be largely in the nature of an "outing," and the delegates from Columbus will go up to the lake in special cars. A committee of three, consisting of William Watson, F. E. Reeves and John Drayer, was appointed to arrange for the comfort of the local members at the convention.

Erie, Pa.

The record of the Building Inspector shows 150 permits to have been issued thus far for new buildings, which is only 18 less than were issued during the entire year of 1900. During the month of April 95 permits were issued for old and new work, 98 during the month of May and 74 during the month of June, while up to July 12 23 permits had been taken out for the month, mostly for new work. Among the more important contracts may be mentioned the Presbyterian Church, to cost $25,000, Constable Bros. Company contractors, and the St. Andrew's Church, to cost $21,875, Kirstner Bros. contractors. The buildings for the Erie Electric Motor Company for the new summer resort called "Waldameer" are rapidly being completed by Contractor A. H. Schoper. This resort is pleasantly located about 4 miles west of the city, with water surroundings which made it an ideal spot for bathing. The grounds have been laid out by Superintendent Wilbur of the Electric Motor Company and the architectural work is that of Architect Joseph Front.

The Erie Builders' Exchange is in a flourishing condition and includes in its membership the leading members of the building trades.

Hartford, Conn.

The building trades in Hartford, after an unprecedented spring rush, have settled down to normal conditions, and it is the opinion of the Building Inspector that the issue of weekly permits for new work from now on will be on an average scale only. Yet there is much work in hand to be finished, and the trades will be kept busy throughout the summer and fall. The permits issued by Inspector Budde thus far the present year show a most gratifying increase, as compared with the same time last year, this being particularly noticeable up to May 1, since which time, however, there has been a slight shading in the number issued.

Hazleton, Pa.

The outlook for the season's building business is not altogether encouraging, owing to the differences existing between the carpenters and contractors. A strike has been in progress since the latter part of May and from recent advices a settlement seems to be a long way off.

At the annual meeting of the Hazleton Builders' Exchange the following officers were chosen: President, P. F. Boyle; vice-president, Charles Knelly; treasurer, Justus Schaub, and secretary, Oliver Leibensberger. The Board of Directors consists of Benjamin Rausch, Samuel Frederick and Fred. May.

Louisville, Ky.

The carpenters' strike, which will go on record as one of the longest ever known in the city of Louisville, was brought to an end after our last issue went to press, concessions being made on both sides. The trouble began on May 2 by reason of the refusal of the Builders' Exchange to recognize the demands of the Carpenters' Union for a nine-hour day and a minimum wage of $2.50 per day. The recognition of the union card was also demanded. After being out six weeks, during which time a number of conferences were held, and after a sympathetic movement was begun more than once among the plasterers, tinners and plumbers, an agreement was reached, as follows:

"That for a consideration of the District Council agreeing to withdraw from the Building Trades Council the Builders' Exchange agrees to pay members of the Carpenters' Union who are mechanics at the rate of $2.50 per day of nine hours' work.

"That the Builders' Exchange have the right to employ whom they please, but that the union has the right to use all honest endeavors to induce the nonunion men to become members of said union without any interference on the part of the employers.

"Shopmen, when employed exclusively as such, are not bound by the above agreement.

"Members of the union are not barred from working with shopmen, but not exceeding the length of time of one week.

"It is also mutually agreed that the relationship and conditions existing between the employers and the carpenters shall be in the same status as before May 1."

Many jobs on which work had been practically suspended will be pushed to completion as rapidly as possible, and it is expected everything will run smoothly for a long time to come. It is said that the permanent Arbitration Committee will be composed of Gustav Lortz, A. N. Struck and John Keller, representing the Builders' Exchange, and I. F. Jones, R. L. Glasgow and Thomas Reagan of the carpenters' unions.

The Building Contractors' Association was incorporated June 25, its object being to foster friendly relations between its members and those not in the membership. The incorporators were Jacob Stengel, Fred. C. Krebs, J. B. Ohligschlager, John Hoertz and Charles Hamsbey.

Los Angeles, Cal.

For the half year ending June 30 the new buildings undertaken in Los Angeles were estimated to cost $1,672,953. This total represents a gain over the same period in 1900 of $622,654, and a gain over the same period of 1899 of $553,566. No part of the city seems to have been exempt from the building activity, most of which was in the nature of new residences.

Private advices received in the city are to the effect that owing to strikes and threatened strikes in the logging camps of the north there is likely to be an advance of all kinds of lumber of from $2.50 to $3 per 1000, and it is understood that contractors are taking this probable advance into consideration. Among the new business buildings now being put up in Los Angeles are the Angelus Hotel, at the corner of Fourth and Springs streets, costing $250,000; the Conservative Life Insurance Building, at the corner of Third and Hill streets, costing $175,000; the addition to the Broadway department store, the City of London Building and the Todd Ford Building.

Montreal, Can.

The building record of Montreal, Canada, for 1900, just prepared by Building Inspector Chausse, shows that the amount of building done was $3,084,403, as against $2,370,080 for the year preceding. It is further explained that a large proportion of the buildings were tenements, showing an increased demand for houses.

Oakland, Cal.

Our correspondent, writing under date of July 6, says that Oakland and other suburban cities are enjoying such a building activity that the scarcity of mechanics is becoming a serious matter. The supply of skilled carpenters is entirely exhausted and advertisements for more help are frequently noted. The demand for suburban residences costing from $3000 to $10,000 is fast filling up what was formerly open territory lying between Oakland and Berkeley. In the latter place especially the dry season is being taken advantage of by property owners for the erection of new buildings, and it is estimated that more than 200 dwellings are now in course of construction in that town. In Alameda the situation is somewhat similar, though not to so great an extent. The supply of business houses and office buildings is apparently ample, as no new structures of this character are now under way.

Ogden, Utah.

Many business blocks are now in course of construction, many of them being pushed rapidly to completion in order that the contractors may begin work on other structures which they desire to have under cover before winter weather sets in. Among the big buildings now under way are the Healy Hotel, on lower Twenty-fifth street; the Rogers Block, on the same street, which is now almost completed, and the Patterson Block, on Washington avenue. Residence building is also actively under way in nearly all parts of the city. There is, however, no marked scarcity of labor, although some lines of building material are anything but plentiful.

Omaha, Neb.

The outlook for the erection of a large number of dwellings and buildings adapted to business purposes is regarded as particularly bright just at present. The greatest need of Omaha is said to be for dwellings which will rent for $20 to $30 a month, the demand being far in excess of the supply. The figures for the month of June show improvements to have been projected estimated to cost $212,485, as compared with $30,084 in June last year. For the first six months of 1901 the figures show a considerable increase over the corresponding period of last year, the gain being more than 50 per cent. Thus far the most important building enterprises have been the erection of the Bennett Building, 176 x 132 feet in size, and the Omaha High School, costing $150,000. Several school buildings have been put up, ranging in cost from $8000 to $18,000; several residences, ranging in cost from $20,000 to $25,000, and brick flats from $14,000 to $30,000.

Secretary W. S. Wedge, writing with regard to the Omaha Builders' Club, states that at the end of the first quarter of its existence it is in a most flourishing condition, with 60 members on its roster and a number of additional applications in sight. The members are working energetically to make the club a success, and it now looks as if they would succeed beyond expectation.

One of the many things they are trying to accomplish is to have all bids opened in public. This has always been a knotty problem to solve, and one which has given all exchanges a lot of trouble. There would seem to be no good reason why a bidder who had spent a number of hours working hard over a set of plans should not have the satisfaction of knowing how the bids of his competitor stood, but it seems impossible to get the average architect to look at it that way. As Mr. Wedge says, "They fail to give you any satisfaction, simply telling you that you were not in it, and even after a contract has been awarded you get little or no satisfaction.

"The United States Government and State architects have all bids opened in public, and why cannot our architects do the same? They have power to reject any or all bids if they so desire. The opening of bids in public would do away with all excuses of nonsuccessful bidders and talk about crooked work or a large sized 'nigger in the woodpile' when Mr. Smith or Mr. Jones fails to get a contract. We have some architects who very readily open their bids in public, also some who give a list of bids and figures as soon as the contract is awarded, but they are comparatively few. The writer must confess that he has tried to accomplish this for a number of years and has failed to do very much good along this line so far."

Philadelphia, Pa.

The monthly statement of the Building Inspection Bureau shows that during June 814 permits were issued, covering 1199 operations, estimated to cost $2,301,860. This was a decrease as compared with the month of May of 108 permits and $1,575,965 in the estimated cost. The figures for June last year show 763 permits to have been issued, covering 1151 operations, estimated to cost $2,448,875. The operations covered by the permits issued in June of this year included 3 school houses, 10 manufactories, 9 workshops, 5 warehouses, 3 municipal buildings, 20 stables and carriage houses, 368 two-story dwellings, 78 three-story dwellings, 2 apartment houses and 287 miscellaneous jobs.

The records of the Building Bureau show that only once has the total value of building for the first six months of the current year been exceeded, the exception being the first half of 1897. The figures from January to June of the present year show 4323 permits to have been issued, covering 6836 operations, the estimated cost of which is placed at $15,099,840. These figures compare with 3987 permits, covering 5485 operations, estimated to cost $11,447,815, in the first half of last year, while for the first six months of 1897, which constitute the exception noted above, 4138 permits were issued, covering 7907 operations, estimated to cost $15,777,020.

Pittsburgh, Pa.

The building operations in the city continue on a large scale, and the amount of work under way makes a most gratifying showing when compared with the same period of last year. During the month of June, 1900, permits were issued for 193 buildings, estimated to cost $944,115, which figures were increased to 355 buildings, estimated to cost $2,310,971, for June of the present year. Taking figures in the report of Superintendent J. A. A. Brown of the Bureau of Building Inspection, it is found that for the first half of the year permits were taken out for 1794 buildings, estimated to cost $10,369,344, as against 1031 buildings, involving an estimated expenditure of $4,004,769, for the first six months of 1900. January, May and June were the months this year which showed a heavy increase as compared with the corresponding months of a year ago.

Portland, Oregon.

Property owners in Portland seem to have decided that there is a lack of flats in the city, as more are now being put up or are in contemplation than ever before. During a recent week work on half a dozen or more costly residences has been commenced. The most important movement in larger buildings is the extension of the Y. M. C. A. Building, on Fourth and Yamhill streets, the estimated cost of the extension being $25,000.

San Francisco, Cal.

Some of the architects report that the labor troubles have caused a certain number of their clients to postpone building, but the record of contracts shows that construction is still unusually active, especially in small lines. The weekly records of building contracts during the past month have averaged from 25 to 30 in number, and in the neighborhood of $150,000 in value. Dwelling houses are still in such strong demand that it is hard to find habitable dwellings for rent either in San Francisco or in the suburbs. During the fiscal year just closed the Building Department issued 1200 permits for new buildings and improvements. A local lumber paper states that never before has San Francisco and its vicinity witnessed so much building with wood as the principal structural material. Receipts of redwood and pine have not kept pace with the demand.

The State Board of Architecture met for the first time in the city on June 21, when the following officers were elected: President, Octavius Morgan; vice-president, Seth Babson; secretary and treasurer, Merritt J. Reid; assistant secretary and treasurer, Fred. L. Roehreig. The board will meet as a whole once a year. In the interim it will be divided into two sections, one for the northern and one for the southern district of the State. The board is now engaged in formulating regulations for the examination of persons applying for certificates as architects.

Seattle, Wash.

The value of building permits taken out in Seattle during June was $312,217, which shows a very satisfactory increase over the month of June, 1900. During the latter period the permits amounted to $221,568, showing a gain of nearly 50 per cent. This is considered especially good, as during the month just closed only one permit was taken out for a large building, the others being chiefly homes built by the owners. The prospect is that during the month of July a similar record will be maintained.

St. Louis, Mo.

According to advices received from our special correspondent under date of July 10, the building business since the selection of the World's Fair site has received an impetus that is astonishing. Plans and specifications in the hands of architects are increasing daily, and members of the Building Contractors' Association have been requested to bid on work the past two months to an extent in excess of that of the past two years. Prices remain normal, although material has in some cases slightly advanced. Labor in most all branches is in demand, more particularly, perhaps, bricklayers at 55 cents and carpenters at 45 cents.

The permits issued for building improvements during the month of June were estimated to cost $1,342,104, as against $296,910 for the same month last year. The figures for the first half of 1901, just issued by Commissioner C. F. Longfellow, show the cost of the building improvements to have aggregated a total of $6,259,825, as compared with $2,669,156 for the first half of last year.

The Contractors' and Manufacturers' Protective League has been organized, having for its object the doing away with sympathetic strikes in the city. There has been more or less friction between the contractors and the Building Trades Council of the city, and the feeling has been growing that the time has arrived to take some action to prevent strikes, especially during the World's Fair period and subsequently. We are advised that the methods adopted to accomplish such a result resemble those of Chicago, but it is expected that the struggle will not be so long drawn out, owing to better organization. The league embraces in its membership the Master Builders' Association, iron and lumber interests, a majority of the building materials men, and the Master Bricklayers and Stone Masons. It is probable that the Building Contractors' Association will also become a member. The league is composed of men of determination, said to be thoroughly in sympathy with unionism, but bitterly opposed to the methods practiced by the Building Trades Council and its business agents in St. Louis during the past two years.

Waltham, Mass.

After holding several preliminary meetings the contracting carpenters convened at Waltham on June 14 and organized the Master Builders' Association of Waltham, Newton, Watertown, Weston and vicinity. They adopted articles of agreement intended for mutual benefit in a business way, and a board of officers was elected, as follows: President, R. E. Glancy of Waltham; vice-president, H. V. Ross of Newton; secretary and treasurer, Herbert M. Gragg of 67 Lawrence street, Waltham, Mass.

The Executive Committee consists of the above named officers and A. B. Murdough of Watertown and C. H. Ireland of Newton.

Owing to the controversy regarding the number of hours of labor to constitute a day's work, and having many large contracts at the present time, it was voted to adopt the eight-hour day, to commence January 1, 1902. As many of the jobs under way in the suburban districts are being executed on a nine-hour day, the members of the association feel that in stating a distinct time so near at hand for the universal adoption of the eight-hour day in their district they are granting all that the men can reasonably expect and all that public opinion will warrant.

THE ART OF WOOD TURNING—XIX.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THE next move will be to get the eccentric cutter fitted up. This should be made from a steel piping similar to that used in the instrument previously described, and should be made on the same lines as those mentioned. It may be remarked, however, that there is a slight difference with regard to the vertical projection which carries the tangent screws and frame at the back. In the following it will be seen how this differs from the ellipse cutter in one or two trifling particulars. The illustration, Fig. 130, shows the complete instrument with all its details. On examination of the illustration it will be seen that the frame in which the tangent screw rotates is held to the upright by two screws countersunk into the top, and then two screws, F F, with spherical heads are employed to more accurately adjust the working of the screw when in place.

The micrometer head of the tangent screw is in this case divided into 50 equal parts, having been turned to a rather acute chamfer, as illustrated; the scale of divisions is then figured at every 10, thus 10, 20, 30, 40, &c., having at the same time a small dot over every intermediate fifth line. By this means the wheel and its movements may be subdivided into any number that with the wheel having 64 teeth that is fixed to the spindle, passing through the center of the square stem. This, being correctly set out, will cause the second wheel on the arbor to assume its correct position with regard to the 40 wheel that is attached to the end of the stem of the eccentric cutter.

When setting out the above distances considerable care and attention must be given to it. Observation will show that the space into which all wheels, &c., have to be fitted is limited—that is, between the face of the main plate and the under face of the flange. The arbor being made of steel and well fitted, need not be hardened. This arbor, it will be seen, does not require a nut in order to keep the wheels in their places, for these are held by the flange which fits over the end of the stud; therefore the fitting is between the collar of the arbor which bears against the base of the stud and the underside of the flange, the feather or key on the arbor rectifying the movement of the wheels in connection with it.

With regard to the collar in which the stem of the eccentric cutter is fitted, the conditions are different, for, because of its being the principal fitting, and on which the accuracy of the working of the instrument

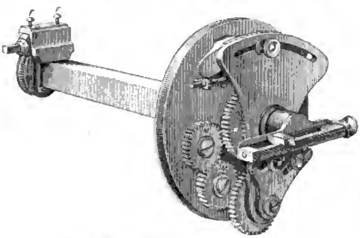


Fig. 130.—Front View of Epicycloidal Cutter.

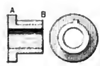


Fig. 131. Views of Loose Arbor.

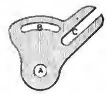


Fig. 132.—Radial Arm.

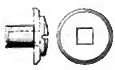
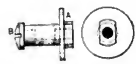


Fig. 133.—Steel Washer.



Figs. 134 and 135.—Views of Flat Filed Arbor.

The Art of Wood Turning

may be required. Reverting for a moment to the main spindle, which passes through the stem, the face of the stem forms the front bearing to retain the main plate in its place. On the front end of this is fitted a wheel having 64 teeth. This is shown in the illustration at the letter C, and is sufficiently distinct to need no further comment.

Returning to the eccentric cutter, having fitted this to the steel collar, the projecting end has fitted to it a wheel having 40 teeth. This wheel is, when once finished, a fixture, and unlike that similarly fitted in the ellipse cutter, is never required to be moved, the changes in the train of wheels emanating, as they do, from a different source.

Before referring further to this, it will be well to study the revolving arbor which is fitted to the stud, upon which the flange turns and upon which the change wheels are placed. A reference to Fig. 131 will show the manner in which this is made, and, for preference, cast steel should be employed for the purpose. After it has been accurately fitted to its place—that is, to the stud upon which it revolves—it must be again fitted to a perfectly true arbor, and the outside turned to fit the aperture in the wheels with equal precision. This done, a narrow key should be fitted and fixed throughout the length A B, and this in turn must fit the keyway that is cut in the wheels, for the purpose of preventing any movement of the same when arranged for use.

It will be seen that the base of this arbor is provided with a projecting collar, and this must be turned to such a thickness that the wheel, which is then fixed, will line depends, it should in all cases be hardened to prevent wear.

As thus fitted we have in this arbor one wheel of 32 teeth working in the same plane as the 64 on the main spindle, with a second wheel of 60 teeth in a corresponding plane with the wheel of the 40 teeth attached to the extremity of the eccentric cutter. Thus arranged it is of course evident they revolve simultaneously.

So far then, it will be seen that we have four wheels fitted to their respective positions; but it will be equally clear that at present we have no means of connecting them in any way, and as the instrument now stands the three existing movements work independently of each other.

It is in order now to provide the necessary means of communication, which consists of a radial arm, in which a second adjustable arbor is fitted. This is for the purpose of accommodating the various changes in the different trains of wheels employed. First, then, we will take the radial arm. This is made from a piece of cast steel forged or cut to the shape shown in Fig. 134. It must be carefully faced on both sides, and about 3-32 inch thick. The center hole A upon which it moves is carefully fitted to the stud, which projects above the face of the flange and terminates in a square above the radial arm. To the square is fitted a steel washer, Fig. 135, with a corresponding hole. It is then retained in its place by the screw, as shown, which must fit well into the stud. This arm is made to partially rotate, in order to meet the requirements of the various changes of wheels. A segmental slot is cut, as shown at B, and this must be made from the center A, as it turns upon that fitting and is fixed in the desired position by a screw with a square head and washer that well covers the slot; in fact the larger this is the more tightly it will clamp the arm to the flange.

We have so far the motions obtained from the arm, that will admit of adjustment to the wheels in one way. The next thing to do is to cut out a radial slot, as seen at C, Fig. 134, in the projecting arm. Into this is fitted the removable arbor, which slides throughout its length and receives the different wheels as required.

The construction of this arbor will require careful consideration, especially with regard to the necessary lengths. The first part will be the short spindle, Fig. 133. This is made from a piece of round cast steel about ¾ inch in diameter turned down at A to, say, ⅝ inch, and then filed flat on each side, as shown in Fig. 136, to fit well in the radial opening. The length of this fitting must be just under the thickness of the arm, in order that the screw which clamps it may take immediate effect upon being screwed up. It is always advisable to have a thin loose washer under such screw heads: it greatly assists in its clamping power. By this arrange-

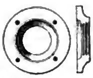


Fig. 136.—Milled Headed Nut.

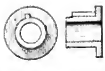


Fig. 137.—Steel Socket.

Fig. 140.—Removable Arbor.

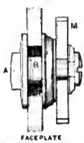


Fig. 139.—Arbor and Stud.

Fig. 138.—Pin Wrench.

The Art of Wood Turning.

ment it will be seen that the spindle can be fixed in any position within the length of the open slot.

Our next move will be to fit to the projecting end another steel socket to revolve thereon. This is shown in Fig. 137, and is made to fit accurately between the face of the collar in Fig. 133 and the screw head B in the same illustration. Now we are here again somewhat limited; hence the necessity for the spindle on which the socket rotates being small; as the screw head must not exceed in diameter the bottom of the thread upon which the milled head nut, Fig. 132, screws. The latter is required to retain the wheels on the socket, which is also provided with a feather to fit the keyway in the wheels. The thread of the socket and nut must be a very fine one on account of the limited space that can be spared for the purpose.

In Fig. 140 the removable arbor is shown complete in itself with back and front screws. Of course the precise lengths, widths, &c., will largely depend upon the thickness of the wheels, depth of bed and other conditions, but the general outline may be taken as correct. It may be mentioned that the best material of which to make the wheels will be the kind used by clock makers, only, perhaps, a little harder. It should be about 5-32 inch thick, so that it will finish to the required thickness and size. There should be 12 change wheels—*i. e.*, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 in duplicate, and 60 teeth, respectively, and these will enable the number of loops already described to be obtained.

Upon putting the instrument together, when so far completed, we shall find that by interposing the arbor we have just considered the upper wheel of the two placed upon it will gear with the 40 wheel on the eccentric cutter, while the lower one performs the same office with the 60 wheel, which is the top one on the socket, that revolves on the stud. With the instrument thus geared it will be seen that we have formed a connection between all the parts, and provided two wheels of equal numbers are employed in the unity the value of the train remains the same and will produce a figure of three loops caused by the eccentric revolving three times as compared with one complete revolution of the main plate of the instrument. And the various wheels employed on the removable arbor for the different trains multiply or divide the initial value of the permanent train, which is 64-60.

To change the train of the 32-40 wheels on the arbor is a simple matter. First relieve the screw H and withdraw it from the radial arm; then loosen the milled head nut J and remove the wheels, replacing them by those required in exchange, and fixing securely with a pin wrench, Fig. 138. This done, the arbor is returned to the radial slot; release the screw which binds the arm to the flange, readjusting all the wheels to gear freely, as nearly without shake or backlash as possible, and refix all clamping screws. Having effected all these movements we see that they consist of the lateral adjustment of the arbor in the radial slot, combined with the semi-rotation of the arm on the flange.

The foregoing being thoroughly understood we may proceed to the two carrier wheels marked M M in Fig. 130; which are for the purpose of reversing the direction of the different looped figures produced. To effect this result it is necessary to connect the 32 wheel at the lower extremity of the arbor that revolves on the stud with the 64 wheel attached to the main spindle passing through the square stem. This is accomplished by two carrier wheels. These are made as shown in Fig. 139. It will be seen by reference to the illustration that a short steel stud passes through the face plate, and is clamped tightly to the same by the screw A at the back. On the opposite extremity a similar but shorter projection exists, to which is fitted a wheel. The hole in the plate through which the plain part B, Fig. 139, passes is much increased in size. In order that either or both wheels may be released from gear, a washer should be placed under the head of the screw, and this must be of sufficient size in diameter to cover the aperture in the plate.

The main object of these two carrier wheels is, as already stated, to change the direction of the pattern. For example, if both are employed at the same time it will be seen that we have an equal number of axes at work, which causes the loops of the figure to turn inward; whereas, if only one is geared, the result is the loops turn in the reverse direction, or outward. It is perhaps needless to remark that these wheels do not in any way alter the value of the train of other wheels employed, but simply supply the means of largely increasing the number of alterations in the unlimited quantity of figures to be obtained.

Reference to Fig. 130 will discover the fact that the frame screw and vertical projection are different from those illustrated in connection with the ellipse cutter. These are matters of detail, depending upon the diameter of wheel and number of teeth in the same.

Tests of Fire Proof Stairs.

Consul-General Gueuther of Frankfort reports that on March 4 official tests of so called fire proof stairs for apartment houses were made at the yards of one of the fire department stations in Frankfort, where intense fires had been started for the purpose. The stairs covered with plastering showed the longest resistance and could still be used after being subjected to the fire for 25 minutes. Of stairs coated with fire proof paints no tangible results could be stated, as the stairs experimented with were of great variety as to material and strength; but they were still serviceable after five or ten minutes under fire. Of the wooden stairs without fire proof paints, those of oak withstood the fire the longest.

WATER SERVICE IN A SUBURBAN RESIDENCE.

THE plumbing of a suburban dwelling, no less than that of a city residence, pertaining as it does to a phase of the building business which is of paramount importance in every well equipped habitation of the present day, is a matter of general interest to a large class among the readers of this journal. It may not, therefore, be out of place to here give the account of an interesting job of plumbing in a suburban residence contributed by a correspondent of *The Metal Worker* to a recent issue of that publication.

All the material used was such as is obtainable at any stock house, and all the pipe in the job, except the soil pipe, vent pipes and a few odd waste connections, is galvanized iron pipe. The kitchen of the house, where the portion of the work described is placed, is of the long, narrow type, and the piping is arranged, as far as possible, so that each fixture has separate supplies. Though a trifle more expensive, this is an excellent feature for work in a suburban house, where the possibility supply. To avoid a failure and make proper circulation certain at all times, regardless of the trap in the hot water service pipe made by dropping from the boiler to the floor and running across under it to the sink where it rises, the hot service pipe was continued to the attic and a return was made from there, an air pipe being taken from the highest point, to prevent its becoming air bound. The air pipe was carried over to a point over the sink and left open so that all of the hot lines will drain when the supply cocks are shut off. On account of the supplies being carried down from the boiler and up behind the sink, stop cocks are placed where they will drain without giving special attention to the waste water, which will discharge into the sinks. This arrangement also enables the stop cocks to be placed where they can be readily reached from the first floor. Pipe 6 is the cold water supply to the bathroom fixtures, and the supply to the water closet tank is taken from the pipe 9, where it passes under the closet room floor, a cock being

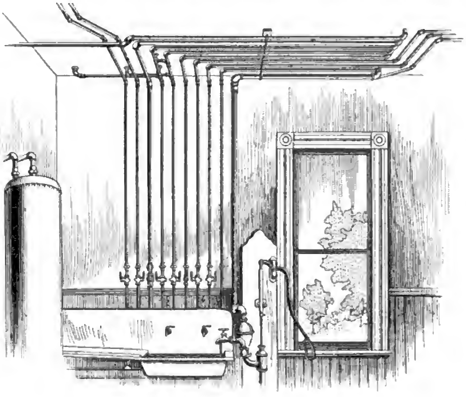


Fig. 1.—View of Piping on Wall and Ceiling.

Water Service in a Suburban Residence

of the pipes freezing is somewhat greater than in the more closely built sections of a city. If anything gets out of order, so as to require the services of a plumber, it is a simple matter to shut off the supplies to such a fixture while the repairs are being made in order to prevent damage, leaving all the other fixtures still available for use.

A view of the piping from the top of the kitchen sink to the ceiling is presented in Fig. 1, while Fig. 2 shows the pipe connections under the sink. In order that the purpose of the different pipes shown in Fig. 2 may be understood, they are numbered, and in the description these numbers are used. Pipe 1 carries the water from the house force pump to the tank, and is arranged so as to discharge over the top of the tank. The tell tale pipe, 2, runs from the tank and discharges over the sink at the bottom, so that the person using the pump can tell as soon as water flows from it that the tank is full to the point of overflowing. The discharge nozzle of this tell tale pipe may be seen on the splice back of the sink just behind the pump faucet. The cold water supply to the china closet and butler's pantry sinks is 3. No. 4 is the hot water supply to the same fixtures. Pipe 5 is the return circulating pipe from the bathroom hot water placed just above the closet room floor. Pipe 7 is the hot water supply to the bathroom fixtures. The main cold air supply from the tank is pipe 8, which has a cock over the sink, and is also provided with a valve at the tank. Pipe 9 supplies cold water to the laundry and the hall lavatory, as well as the water closet supply, as already mentioned. Pipe 10 supplies hot water to the laundry and the hall lavatory.

All of the service pipes, both hot and cold, above the first floor are continued up to and turned over the tank. This allows the air to enter the pipes when the stop cocks on them are turned off. The line of pipe on the ceiling in the foreground, in Fig. 1, is a full sized continuation of the boiler hot water service pipe, which is carried up to the tank with an open end which turns over the tank. This is to afford a relief for vapor and steam. The pipe which supplies the fixtures turns down behind the boiler and runs over to the sink, where it rises for the purposes mentioned. On account of the trap it would not serve well as a relief under any conditions, and again the hot water supply might be shut off when the relief was needed most. There is neither trap nor cock on this line. It is always open as a safeguard against hammering and accidents due to expansion, regardless of what may happen to other parts of the piping system. The tank being in the attic directly over the kitchen, the pipes pass up through the kitchen and on the partition separating the bathroom from the bedroom. Over the pipes boards are arranged and secured with screws so that access to the pipes can be readily had in case of necessity. The kitchen sink faucets have air chambers and stop cocks on the branches. The traps in the various supplies have bleeders with stop cocks, as shown under the sink. The hot and cold pipes are put up in pairs, with the hot pipes always on the left hand side. Whereever the pipes run horizontally the hot pipe is always the upper one. Oak is the material of which all the cappings, splash boards and drain boards are made, and they stand out from the wall so that air can circulate freely behind them and a brush can be passed up and down the space to clean it out. The lines from the bottom of the tank stand filled with water at all times, unless drained by the faucet shown connected to the air chamber. The nozzle of this faucet is over the sink. There is a check valve in the air chamber where it bolts

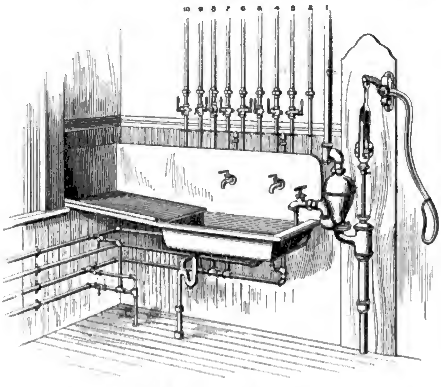


Fig. 2—View of Piping Below Sink

Water Service in a Suburban Residence.

to the cylinder opening. There are pet cocks tapped in under the check valve, and also one under the bottom valve of the cylinder.

The line of pipe at the extreme right on the ceiling, in Fig. 1, is an extra line to the cellar which the owner intends to use for connecting a hydraulic ram later on, and the tee on the pump pipe is designed to receive the supply from the ram direct. In connecting the water back with the boiler, to further facilitate rapid circulation, a brass nipple was screwed into the end of the tee in such a way as to allow a freer passage of water through the nipple than through the branch. The nipple of the tee was connected with the return circulating pipe and the branch to the bottom of the boiler, and the other end connected with the lower opening in the water back. The tank valve is somewhat novel, not being a regular system valve, but is a standing bath waste connection lengthened out so as to bring the overflow holes above the water line. The waste end coupling collar is connected to the bottom of the tank with a wipe joint, and the water overflowing from the tank enters the side opening of the waste just as the waste from a bathtub would. This plan allows air to enter and empty the pipes. A valve is naturally placed where it can be easily reached, or may be operated with a chain if desired. The practical plumber will note several little interesting features in this work. It is of interest to know that the job has been in use for two years, giving excellent satisfaction.

The Carnegie Technical School.

The Advisory Committee appointed by the Board of Trustees of the Carnegie Institute of Pittsburgh to investigate and prepare a plan for the proposed School of Technology to be presented to the city of Pittsburgh by Andrew Carnegie, have handed in a report which advocates the establishment of three grades of schools. The first will be the Carnegie Technical College, which will provide a technical education to high school graduates, teaching engineering in all its branches. The second, to be called the Carnegie Technical High School, will be for the benefit of graduates of the grammar schools, and will provide, in addition to the regular high school studies, instruction in blast furnace and foundry practice, brass founding, pattern making, metal working, stationary, locomotive and marine engine and boiler management, gas manufacture, electricity and other departments, more particularly adapted to the needs of the Pittsburgh district. The third school will be the Carnegie Artisan Day and Evening Classes. These classes are intended for the benefit of those who are unable to take advantage of the more complete courses in the technical school.

Proposed Hotel for Women.

The plans have recently been filed with the Building Department for the proposed hotel for women, which will occupy a plat 75 x 197½ feet on East Twenty-ninth street, just off Fifth avenue, New York City. It will be of fire proof construction throughout, 12 stories in hight, and will have a *façade* of brick, Indiana limestone and terra cotta. The cost is estimated at $350,000, and the building will be erected in accordance with plans drawn by Architect Robert W. Gibson.

THERE is a woman carpenter in the city, says a recent issue of the Davenport, Ia., *Times*, and yesterday she was found on the roof of a house engaged in shingling. She did the job neatly and well.

Some English Forms of Cornice Construction.

It is interesting at times to compare methods of construction which prevail in one locality with those which obtain in another considerably remote, as it often affords suggestions or hints of value to the practical mechanic. It is well known that many phases of building construction as practiced abroad differ radically from American methods, and it is with a view to gratifying the curiosity rather than affording practical suggestions that we present herewith illustrations of two forms of cornice construction, as recommended by a correspondent in an English trade journal. An examination of the illustrations will show some of the parts designated by names which differ with the practice of this country, but the meaning of which is readily apparent.

Test of Steel Flooring.

A most interesting test of the endurance of fire proof flooring to be used in their new warehouse has recently been made by the Boston & Albany Railroad Company. A large oven was built to test the steel and concrete flooring, which is 9½ inches thick and has a weight of 100 pounds to the square foot. The flooring in area is about the same as that in a good sized room in a dwelling house. Upon it workmen built what seemed to be a solid mass of bricks, carrying these up in a square column the same size as the flooring beneath them. In all fully 50,000 bricks were required for the test, which is that of 1200 pounds to the square foot. The bricks were piled high, without the use of mortar, until enough had been used to secure the required test of strength of 1200 pounds to the square foot. By building the bricks in piers they were prevented from arching. The weight of bricks reached 1000 pounds to the square foot, but the steel floor stood the test with the deflection of only ¼ inch.

No mortar was used because, when the extreme test of weight had been reached, the bricks could as readily be taken down as put up, leaving standing the mass of brick to the hight of only 4 feet. This had been calculated to mean 400 pounds to the square foot, which is the "working load," as it is called, that the Boston & Albany Railroad will require for their purposes in their warehouse. In the big vault oven beneath the floor was built a fire of oak and birch heavy timber. With this a temperature of 2000 degrees was sought, to be kept at that figure from two to three hours. Following this about 48 hours were allowed for the oven and flooring to become cold, and then the bricks were piled up again just as they were before the test, to get a proper knowledge of the endurance of the steel flooring and the weight it would hold after it had been through the firing process.

The State Department has received from Commercial Agent Johnson of Stanbridge a report on the discovery of a wood preservative, in which he says that "the sap is removed from timber and at the same time it is impregnated with chemicals to render the wood either fire proof or impervious to attacks of insects or to decay in salt or other waters. If necessary the impregnating plant can be used at the felling ground. The cost of impregnating is about 2 cents per cubic foot and the cost of the plant about $1000."

A Water Proof Wash for Brick Work.

Damp walls are a source of almost endless worry and expense, and the troubled householder often longs for a cheap and simple cure. In many cases the damp arises in the wall from the wet ground, and in other cases it comes from defective gutters and flashing. Water proof washes are useless in cases like these, says a London journal, but when the damp is caused by rain beating against the surface of the wall and percolating thence to the interior of the building, a water proof wash may be of service.

Two solutions are required, the first consisting of castile soap and water in the proportion of ¾ pound of soap to 1 gallon of water, and the second of alum and water, in the proportion of 2 ounces of alum to a gallon of water. The wall must be perfectly clean and dry before the solutions are applied, artificial heat being resorted to if necessary, and the temperature of the air should be above 50 degrees. F. Wash No. 1 (the soap wash) should be applied boiling hot, and carefully laid on with a flat brush in such a manner as to avoid making a froth on the surface of the wall. After this has been allowed to dry and harden for 24 hours, wash No. 2 must be applied in a similar manner, but its temperature need not exceed 60 degrees or 70 degrees. This also must stand for 24 hours, and then a second coat of wash No. 1 must be applied, to be followed, after another interval of 24 hours, by a second application of wash No. 2. As a rule two coats of each will be sufficient, but in exceptional cases three or even four coats of the two washes must be applied.

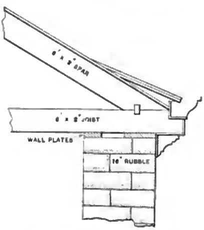


Fig. 1.—Cornice for Low Pitch Roof.

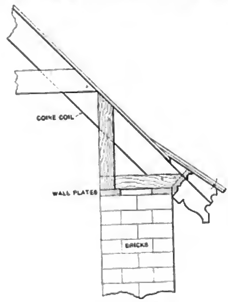


Fig. 2.—Cornice for Steep Roof.

Some English Forms of Cornice Construction.

Cost of Excavating Cellars.

In estimating the cost of a building, about the first thing we are confronted with is the digging or excavating the cellar and trenching for foundation walls. This work is generally estimated by the cubic yard, and the contents in cubic yards may easily be obtained by the following method: First obtain the number of square feet on the surface and divide by nine, which will give the number of square yards on the surface, then multiply by one-third of the feet in depth. The result will be the number of cubic yards. Thus, to find the number of cubic yards in a cellar 18 x 30 feet and 7 feet deep, there are 540 square feet on the surface, which, divided by nine, gives 60 square yards. Multiplied by two and one-third, which is one-third of 7 feet, we have 140 cubic yards. The cost of excavating varies with locality, quality of materials to be removed, distance of hauling and in other particulars, but the usual cost where all things are favorable may be put down at from 20 to 30 cents per cubic yard, including hauling. To excavate clay costs more than to excavate sand or loamy soil, gravel still more and shale and rock very much more. Limestone rock, if blasting is necessary, may cost from $2.25 to $3.25 per cubic yard, according to conditions, says *Stone*. Hard conglomerate may cost from 40 to 70 cents per cubic yard, and often more when it is naturally cemented together.

The Workingmen's College, Melbourne, Australia.

We are in receipt of the fourteenth annual prospectus of the Workingmen's College of Melbourne, Australia, for the year 1901, a substantial illustrated publication of 120 pages, giving detailed information regarding the wide field of educational work covered by that excellent technical institution. The college and its work in the line of technical and trade instruction have been referred to in these columns at various times in the past few years. It is sufficient to say of the present prospectus that it shows the institution to be keeping well in line with modern progress in the extent and variety of the subjects included in its curriculum, as well as in its equipment for providing its pupils with the best technical education available. In the nine departments of the college instruction is given by a large staff of professors and instructors in engineering, mathematics, mining and metallurgy, architecture, art and applied art, music, commercial subjects, agriculture, and household economy. A large trade school, giving instruction in carpentry and joinery, plumbing and gas fitting, turning and fitting, blacksmithing, metal foundry, carriage building and printing by means of day and night classes, is an important feature of the institution. The curriculum in this department contemplates a three years' course, each year representing a different grade of instruction, from elementary exercises up to the finished problems in each trade. More than 200 pupils were enrolled in the various departments of the college during the past year.

New Publications.

How to Become a Good Mechanic. By John Phin. 68 pages. Bound in paper covers. Published by the Industrial Publication Company. Price, 25 cents, post paid.

This is the second edition of a work which was brought out very nearly 20 years ago in response to numerous inquiries relating to the subject matter of which it treats. The matter has been rewritten and the work enlarged so as to bring it up to date and make it more than ever practically useful. The book is intended as a guide to self taught men, telling what to study, how to begin, what difficulties will be met with and the manner in which they may be overcome. It is, in fact, a description of how to carry on such a course of self instruction as will enable the young mechanic to rise from the bench to something higher.

Practical Draftsmen's Work. Edited by Paul N. Hasluck. Size, 5 x 7½ inches. 160 pages. 226 illustrations. Bound in board covers. Published by Cassell & Co., Limited. $1, post paid.

This little work, as the title indicates, is intended for the special use of the draftsman, and the matter has been put in convenient shape for every day use. It consists substantially of a number of series of illustrated articles by Prof. Henry Adams which originally appeared in two English publications edited by Mr. Hasluck. The matter is comprised in ten chapters, the first of which deals with drawing boards, paper and mounting. The next chapter considers drawing instruments, after which instructions are given in drawing straight lines, circular lines and elliptical curves. The subject of projection is considered in a chapter by itself, following which are extended comments on the back lining of drawings, coloring drawings, drawing to scale and preparing maps, and, finally, a discussion of the subject of making a drawing. In this chapter the author describes the various steps from the beginning of the drawing until the work is completed. A comprehensive index alphabetically arranged is a valuable feature of the closing pages.

In the construction of the new buildings now approaching completion at the Brooklyn Navy Yard glass has been employed to a greater extent than usual. The side walls have a brick base with glazing above, and put on in bevels or sections which are capable of being swung out to provide ventilation. The side walls of the clearstory are of corrugated iron with glazing above. The bulk of area of the shed roofs is skylight, and wide skylights are also placed in the clearstory roof.

The library which will be erected in Phœnixville, Pa., as the gift of Andrew Carnegie will be a structure one story and basement in hight and will cover an area 64 x 72 feet. It will be built of Avondale limestone and have a slate roof. The basement will contain a public document room and receiving rooms, while the main floor will be devoted to a board room, library, reading room and lavatory. The interior finish will be in quartered oak. The lighting will be by electricity and the heating by steam. The plans were prepared by Architects Savery & Sheetz of Philadelphia, who secured the commission in competition with several others.

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ROW OF HOUSES ERECTED FOR DR. F. F. ARNDT, GREEN RIDGE STREET AND PENN AVE., SCRANTON, PA.

EDWARD H. DAVIS, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, AUGUST, 1901

(FOR ELEVATION AND FLOOR PLANS SEE PAGES 203-204.)

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

SEPTEMBER, 1901

Dwelling Houses of Glass.

No little attention is being given in the trade press to the ideas advanced by a French glass expert, Jules Henrivaux by name, who puts forth the theory that the next age is likely to be distinguished as an age of glass. He maintains that this material will be largely used in the future for building construction, as, in his opinion, it is the best substance known for almost any kind of structural purpose, but more particularly for dwelling houses. The claims of this glass enthusiast appear to be founded upon the inexhaustible supply of the materials from which glass is made, from its adaptability to all shapes and forms, its durability and its cleanliness. Practically every part of a dwelling, according to M. Henrivaux, can be constructed of this material. It can be molded into cornices, slates, bricks, wall decorations, panels, and, in fact, about everything that enters into the construction of a building. The foundations and walls can be constructed of a variety of glass recently invented called "stone glass," which is said to have already withstood the severest tests. When crushed it is said to give a resistance three times as great as granite, and when subjected to heat and cold it is found to be less sensitive than steel. It is claimed to resist a shock, such as a hammer blow, to a degree 22 times as severe as that which would fracture marble, while the test of tension has practically no effect on it whatever. The walls of such a house, as described by M. Henrivaux in the London *Daily Express*, would be built of glass, held together by angle iron, so as to permit of a hollow space through which pipes could pass (the pipes themselves being of glass) conveying hot air, hot and cold water, gas, electric wires, drain pipes, and everything needed for the health and comfort of the inhabitants. Stairs, balustrades, ceilings, wall decorations, floors, mantels and fire places all could be constructed of glass. Moreover, even the household furniture and utensils could be made of vitrified material. Such a house would be absolutely clean and practically indestructible. The whole of the surface could be washed from top to bottom without any humidity being left, and dust would find no resting place upon the polished surfaces.

Cost of Glass Houses.

As to the question of cost, this advocate of glass claims that such a house would be fully as cheap or cheaper than a house constructed of the building material at present in general use. Glass can be made out of anything amenable to the influence of fire. The stone glass referred to is manufactured almost entirely from what has hitherto been regarded as waste substances, such as the slag from blast furnaces and mines. To avoid the monotony which one would naturally associate with such a house as that described, M. Henrivaux claims that the glass can be shaped, colored and decorated to an extent of which no other material is capable, thus providing all the variety desired. How far such a building would make a comfortable dwelling place is a matter of doubt. One great advantage, however, possessed by a glass house filled with glass furniture would be its practical immunity from fire. It may just be possible that M. Henrivaux has hit upon a solution of the problem of the absolutely fire proof house.

New York's Latest Model Tenement.

At the time of their completion we referred in these columns to the several model tenements erected in the city to provide accommodations for the deserving poor, but it is probable that none of them will compare in magnitude and appointment with the building of this character for which plans were filed a week or two since, this being practically the first under the new tenement house law. The building will have a frontage on Avenue A extending the entire block from Seventy-eighth to Seventy-ninth streets, will be six stories in hight and will contain 186 separate apartments of three and four rooms each. The *façade* will be of golden buff colored bricks, with Indiana limestone and terra cotta trimmings. The entrances will be of polished colored granite, the vestibules will be wainscoted with marble, and the floors of the entrance and staircase halls of colored inlaid tiles. The roof will be of plastic slate, and the fire walls will be carried above it so that it can readily be transformed into a roof garden or playground for the children should this be found desirable. There will be eight staircases, inclosed in heavy brick walls, with absolutely fire proof floors, stairs, doors and windows. The first floor will contain nine stores, 16 apartments and a number of shower and tub baths for the use of tenants, while each of the upper floors will be divided into 34 apartments. The aim of the architects, Harde & Short, who spent several years in the study of the economic planning and construction of improved model tenements, is to make each apartment in itself a complete home, with plenty of light, air and ventilation. Each will be supplied with a gas range for cooking, hot water from the basement, steam heating, dust shoot leading to the cellar, where there will be a special furnace for consuming the sweepings, refrigerator space in each private hall, letter box, speaking tubes and electric vestibule door openers. There will also be dumb waiters, and a complete laundry and steam clothes drying apparatus in the basement. A feature that would doubtless be highly appreciated by tenants of some of the higher class flat houses of the city will be sound proof floors and partitions which will separate each apartment from its neighbor. The entire structure has been so planned that there will be no interior vent shafts of any kind, but the rooms will have from one to three windows opening directly on the street, yard or large open courts. When the building is completed it is the intention of the owners, the City and Suburban Homes Company, to commence work on a second section in the rear, fully as large as the one now under way and separated from it by a 20-foot roadway. When these improvements are fully carried out accommodations will be afforded for a greater number of people than are to be found in many of the smaller towns and villages of the country.

Modernizing an Old Office Building.

A piece of work of special interest to architects and builders, more especially those located in the city, is found in connection with the alterations which are being made to the Morse Building, a brick and stone structure situated at the corner of Nassau and Beekman streets, New York City. At the time of its completion, in the year 1879, some features of its ornamental brick and structural work were illustrated in these columns, as our older readers will doubtless remember. The property recently changed hands, and the new owner decided to add six stories to the building, placing them on top of the old walls, which are of a most substantial character. In doing the work a story and a half was taken from the top of the building and a continuous line of large steel girders was strung on all exterior walls, while steel supports were placed on the center walls. Upon these steel girders is now being erected the skeleton frame for the additional stories, thus combining in a single building the old and modern styles of construction. White brick will be used for the outside walls of the new portion and the red brick of the old structure will be covered with artificial stone. For the purpose of raising materials a huge derrick was placed on what was originally the eighth floor, while over the sidewalk for the protection of pedestrians heavy scaffolding was erected, this also supporting the hoisting engine.

Convention of Ohio Builders' Exchanges.

The first annual convention of the Ohio State Association of Builders' Exchanges was held at Hotel Victoria, Put-in-Bay, on July 30 and 31, in accordance with the plans announced in a previous issue. There was a large representation of the exchanges present and the affair was most enjoyable in every way. A very fine address was made by President James Young and Secretary E. A. Roberts presented his report. A constitution was adopted and some interesting discussion developed regarding the question of what should be recognized as a builders' exchange. It was finally voted that any regular organization of builders, comprising not less than ten members, should be eligible to join the State association. It was also decided that each exchange should have five votes in the deliberations of the convention, and that an Arbitration Committee was unnecessary.

Among the papers presented was one by J. C. Romeis of Toledo entitled "Practical Use and Development of the State Association;" another, by Secretary R. J. Gardiner of the Columbus Exchange, on "Business Ethics Among Builders," the author's remarks being based upon experiences of his exchange; one by H. P. Heedy of Youngstown, on the relation of Ohio exchanges to each other, and still another by C. W. McCormick of Cleveland relating to the question of "Needed Legislation for the Building Interests of the State."

The election of officers resulted in the choice of James Young of Cleveland for president, J. L. Creswell of Toledo for first vice-president, H. P. Heedy of Youngstown for second vice-president, F. J. Reeves of Columbus for third vice-president and Edward A. Roberts of Cleveland for secretary and treasurer.

Athletic games were included in the programme for the day, and a feature which served as the basis of a souvenir of the occasion was a large group photograph with the Great Western Band in the foreground.

The C. M. Schwab Industrial School.

The new industrial school which is to be erected at Homestead, Pa., as the gift of C. M. Schwab, will be of brick, stone and steel with floors of concrete and will cost in the neighborhood of $50,000. According to the plans, which have been drawn by Architect F. J. Osterling of Pittsburgh, the building will have a frontage of 63 feet on Ninth avenue, extending back a distance of 98 feet. In the basement will be a boiler room, engine room, foundry, &c.; on the first floor the office, laboratory, machine shop, stock room and blacksmith shop; on the second floor rooms for drafting, turning, wood working, supplies, &c., while on the third floor are the drawing and sawing rooms, kitchen and dining rooms, matron's room and supply room.

"Builders' Day" at the Pan-American Exposition.

The following circular relative to "Builders' Day," September 11, at the Pan-American Exposition, has been issued from the office of William H. Sayward, secretary of the National Association of Builders:

The National Association of Builders has arranged with the management of the Pan-American Exposition to have a special day set apart as "Builders' Day," as above stated, with the idea that it would be a means of bringing together at the Buffalo Exposition builders from all parts of the country, who would naturally have a special interest in the buildings, as well as the exposition itself, and who would also find much of pleasure and information through assembling in fraternal fashion.

The National Association does not propose to hold any convention meetings, but advantage will be taken of this gathering to have one social affair, possibly a banquet, to which all builders present on the day indicated will be welcomed. Each one participating in this social affair will be expected to "pay his own way."

TRANSPORTATION.

No attempt will be made to secure reduced rates of transportation especially for this occasion, as reduced rates may be negotiated for from almost every section of the country upon fully as favorable terms as could be arranged under any special plan. Associations and individuals are therefore recommended to make their own rates with their own local transportation companies or agencies.

HEADQUARTERS.

Unless otherwise ordered, headquarters will be at the Builders' Association Exchange Building, corner Court and Pearl streets, Buffalo, where all further information can be obtained.

This circular is sent to all associations of builders throughout the country, with urgent invitation from the National Association of Builders and the Pan-American management to attend the exposition on "Builders' Day." It is hoped that a large number of builders will accept the invitation.

JOHN S. STEVENS,
President of National Association of Builders.
WM. H. SAYWARD, Secretary.

In this connection it is interesting to note that the Master Builders' Association of Boston have planned an "Outing," having for its main objective point the Buffalo Exposition, with the special feature of attending "Builders' Day." A large delegation will leave Boston on Monday afternoon, September 9, reaching Niagara Falls the following morning. An opportunity will be afforded for viewing the Falls, and then the journey will be continued to the exposition grounds. On Wednesday, September 11, the visitors will attend the ceremonies incident to "Builders' Day," and Thursday, September 12, will be divided between the Exposition and Niagara Falls. On Friday the delegation will return to Boston, stopping en route at Springfield.

The headquarters of the party will be at the International Hotel for the entire period, this location having been selected on account of its convenience of access to trains running at frequent intervals between Niagara Falls and the main entrance to the exposition grounds.

Lumber Consumption.

At the eleventh semiannual meeting of the Southern Lumber Manufacturers' Association, held in St. Louis, July 16 and 17, Secretary George K. Smith of that city presented some figures showing the comparative amount of lumber shipped from the following States in the last two years:

States.	1900. Shipments.	1901. Shipments.
Missouri	50,378,072	81,030,148
Arkansas	196,646,733	241,587,705
Texas	180,150,771	268,865,300
Louisiana	130,054,100	180,049,579
Mississippi	110,852,608	104,751,998
Alabama	75,815,152	69,589,979
Georgia	11,822,615	28,441,944
Totals	755,720,051	974,316,653

The consumption of lumber has correspondingly increased in building, as the permits in the territory embraced by the association show a gain of 37 per cent. for the month of June. The secretary declares that building in St. Louis has had a phenomenal increase, due to the World's Fair activity.

THE commission of architects for the St. Louis Exposition is composed of D. H. Burnham of Chicago, Walker & Kimball of Boston and Omaha, Carrère & Hastings of New York, Van Brunt & Howe of Kansas City, Cass Gilbert of New York, and Isaac S. Taylor, T. C. Link, Eames & Young, Barnett, Haynes & Barnett and Widdemann, Walsh & Boisselier, all of St. Louis. The general scheme of planning for the grounds and buildings will follow the design prepared by Walker & Kimball.

A MODERN COTTAGE AT ELIZABETH, N. J.

WE take for the subject of our supplemental plate this month a cottage which is in every way up to the times, and which affords in its design and arrangement many points of interest to prospective builders. The exterior is broken up in such a way as to relieve the monotony of plain surfaces, the noticeable features being the projecting bay at the landing of the main stairs, the broad veranda extending across the front and around a portion of one side, the bay window of the dining room, the dormers at the front and sides, and the effects produced by covering the entire exterior with dark green shingles, relieved by white trim.

The building is of balloon frame, all timber being hemlock, with sills 4 x 6 inches laid in mortar flat side down; girders 6 x 8 inches; first-floor joist 2 x 10 inches; second-floor joist 2 x 8 inches; third-floor joist and ceiling beams 2 x 6 inches, and outside wall joist 2 x 4 inches, placed 16 inches on centers; posts at the corners 4 x 6 inches; ribbon strips of hard pine, 1 x 6 inches; common rafters 2 x 6 inches, placed 20 inches on centers; valley rafters 2 x 8 inches; ceiling joist 2 x 4 inches, and partition studs 2 x 3 inches and 2 x 4 inches, also placed 16 inches on centers. The foundation walls from bottom to the top are covered on the outside with a coat of Portland cement and sand, and the entire cellar bottom is covered with 3 inches of cinders and cement, with a top finish of ½ inch of cement and sand, floated to a smooth surface. The outside walls of the building are covered with 1 x 10 inch tongued and grooved hemlock boards, placed horizontally, over which is a good quality of building paper. The dormer and main roofs are covered with 18-inch red cedar shingles, laid 5½ inches to the weather, and resting on 1 x 2 inch hemlock lath, while the outside of the house is covered with white cedar shingles. The floor of the veranda is ⅞ x 3½ inch white pine boards driven up in white lead, and the ceiling is finished with ½-inch beaded strips. The first-story floor is double, the lower one being composed of 1 x 10 inch hemlock boards, on which is laid ½ x 2½ inch North Carolina comb grained pine flooring. The second and third floors are of ⅞ x 3½ inch North Carolina pine, tongued and grooved, laid in courses and blind nailed to each beam.

The inside finish is of cypress. The casing is ⅞ x 4½ inch molded trim and the base is ⅞ x 6 inches, with a 1½-inch face mold on top, the same being mitered and run up the side of the casing to form a wall molding. This butts against the head casing, which projects 1½ inches beyond the side casing. The head and side casings have a ½-inch strip screwed to each and glued to keep them from shrinking apart. This results in an economical trim, while at the same time it presents a most attractive appearance when in place and properly finished.

Section.

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

A Modern Cottage at Elizabeth, N. J.—J. A. Oakley & Son, Architects

The bathroom is equipped with open plumbing and nickel plated fixtures. The bathtub is a 5-foot porcelain lined, made by the Standard Mfg. Company of Pittsburgh; the closet is a No. 2 porcelain washout, with copper lined oak cabinet tank. There is also a 22 x 30 inch marble countersunk slab, with a marbelized basin and 10-inch marble back and sides. In the kitchen is a 35-gallon boiler and a Richardson & Boynton portable range. The house is wired for electricity and piped for gas. It is heated by a No. 123 Richardson & Boynton furnace.

The cottage here shown is pleasantly located on Westfield avenue, Elizabeth, and was erected for Charles W. Oakley, in accordance with plans drawn by J. A. Oakley & Son, Elizabeth, N. J. The contractor for the carpenter work was M. Burns and of the mason work Alexander Kerr, both of the place named.

What is said to be the first apartment hotel in Kansas City, Mo., is about being erected on Broadway at a cost estimated to approximate $100,000. It will cover a plot 67 x 107 feet and will contain 42 apartments, with baths. It will be seven stories in hight, not including roof garden and basement. The first two stories will be of Carthage stone and white terra cotta, the next four will be of buff brick, while the seventh story and the entrance will be of white enamel brick. The roof garden, covering the entire top of the building, will be trellised over with beams supported by Doric columns. The building will be steam heated, each apartment will be fitted with the latest improvements, including refrigeration, telephone service, gas range, hot and cold water supply, &c.

Durability of Cut and Wire Nails.

In the past issues of the paper there has been more or less discussion as to the relative merits of cut and wire nails, more particularly perhaps in connection with roofs. Some rather interesting comments by a correspondent are to be found in a recent issue of the Mississippi Valley *Lumberman* regarding this question, and from it we quote as follows: While I have been in this place I have had good opportunity to note the lasting qualities of what has now become the old fashioned cut nail. A good many roofs of the old houses are giving out and being reshingled. Standing recently near a house that was being covered, I took up some of the old shingles and examined them and found that where the shingle was sound about the nail hole the nail itself was almost as good as ever, and it struck me then that the life of a cut nail and a white pine shingle was pretty nearly of the same duration. Where the shingle was decayed the nail also was rusted out, and so I concluded that where both the wood and iron were kept dry they were practically indestructible.

When the now common steel wire nail first came out it was generally conceded that they were a great improvement on the old cut nail, and there is no question that they are for general purposes in construction. Their toughness and breaking strain are so much greater than the old kind that the question of their strength and utility admits of no argument, but, as is the case with a good many things, there are some uses for which they are decidedly inferior to the cut nail, and these are where there exists a state of dampness. Common experience and observation go to show that the steel nail is susceptible of being oxidized much quicker than the cut nail. Go over one of your old sidewalks in the town where it has been put down with steel nails and you will find almost invariably that the nail has given out sooner than the wood. This is the cause of so many loose boards in the sidewalk.

It is for this reason that whenever you see a railroad company putting down a new platform at one of their stations you may notice that they use the cut nail instead of the steel article. You may also notice that the spike which is used to fasten the rail down to the tie is practically the same as it always has been and of the same material. If the steel kind were more serviceable you may be sure they would be used for that purpose, as railroad men are given to determining pretty closely what is the most durable in such matters.

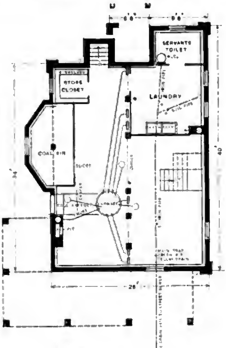
Fastening shingles to the roof with wire nails has come to be pretty generally known among observant builders as defective to the making of a good serviceable roof. They have learned this through experience, although it must be said that the great majority of them still keep on using them, and will continue so to do until the public generally becomes advised against them for that purpose. The principal reason for this is no doubt because of their being easier to drive than the old cut nail. Anybody, even a woman, can start and drive a wire nail, but everybody doesn't know how to do the same with a cut nail, because if you do not start the latter just right you will split the wood if you are driving it near the end of the piece. This will be news to some of you youngsters who have come up since the wire

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

A Modern Cottage at Elizabeth, N. J.

nail was first introduced. You ask your father if you've a mind to and he will tell you the same thing.

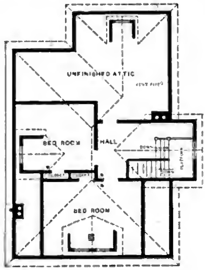
Two years ago I reshingled my own house and profiting by what I had seen of the wire nail for that purpose, I had my carpenter use the cut nail. He "kicked" about it, but, as I was paying him by the day, it made no difference to him. He contended, like a good many others, that it was not the fault of the nail that it rusted out so



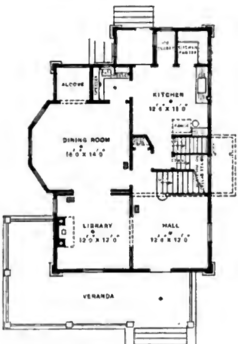
Foundation.

seen where wire nails have rusted through in white pine siding. This goes to prove that it is not acid that rusts them.

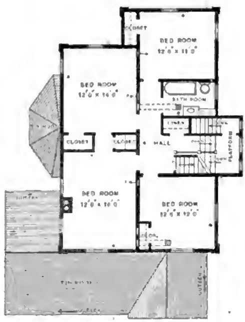
Within the past year or two there has been manufactured a new kind of wire nail which I think will before long come into general use to nail on shingles. It is the galvanized wire nail and has the sharp point and flat head of the common nail that is now used. Their cost is about the same, and may be had at any hardware store in the larger towns. They will keep them in the smaller places also if the carpenters manifest a disposition to ask for them. If the dealers don't care to keep the two stocks of shingle nails, the *Lumberman* could probably prove more effective in getting them into general use by



Attic with Outline of Roof Plan.



First Floor.



Second Floor.

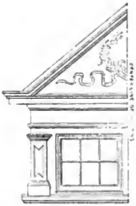
A Modern Cottage at Elizabeth, N. J.—Floor Plans – Scale, 1-16 Inch to the Foot.

quickly, but that the red cedar shingle was the cause. I am aware of the fact that from this idea has arisen a prejudice against this kind of shingles, it being claimed that there is some kind of an acid in the wood that has close affinity for metal and eats it away. Now, without beind rude to any one who holds such an opinion, I will say that I don't believe there is a grain of truth in such an assertion.

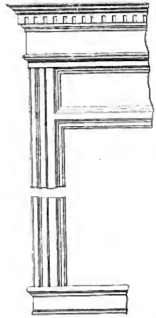
I have in my possession some wire nails that were used in putting on white pine siding. They had become so badly rusted that the heads had fallen off, compelling the owner of the building to have the siding entirely renailed. This is not the only instance of the kind I have

getting a few kegs and keeping them for sale. It won't take much arguing to induce some one who is building a house to buy the better article when there is no difference in the price.

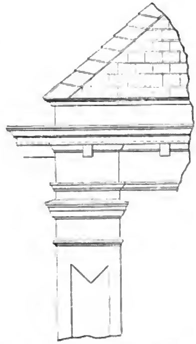
A GOOD way to avoid cold in a lower floor if the joists rest on a stone foundation is to "brick fill" between the joists to a level with the floors, making the brick "filling" not less than 4 inches thick. The bricks should be laid in good mortar, well "flushed" up to the joists and made level with the top of the timbers. In stone or brick buildings "brick filling" is generally done on the lower floor, but often in the upper stories where the walls are



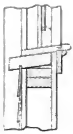
Elevation of Front Dormer Window —Scale, ¼ Inch to the Foot.



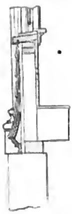
Detail of Inside Trim on First Floor.—Scale, ¾ Inch to the Foot.



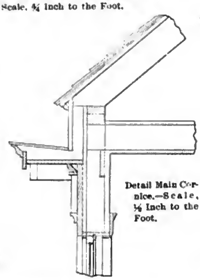
Elevation Main Cornice and Corner Pilaster.—Scale, ¾ Inch to the Foot.



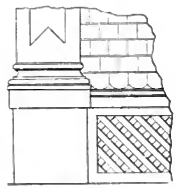
Section through Window Sill.—Scale, ¾ Inch to the Foot.



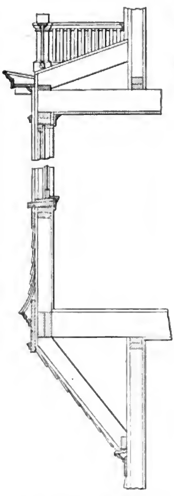
Detail of Water Table — Scale, ¾ Inch to the Foot.



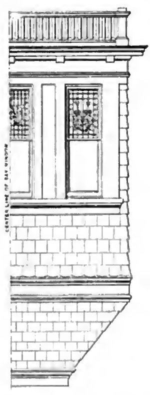
Detail Main Cornice.—Scale, ¾ Inch to the Foot.



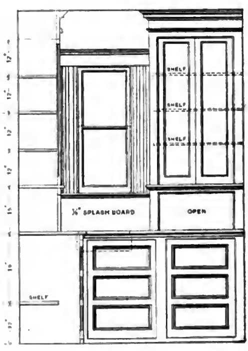
Elevation of Water Table.-Scale, ¾ Inch to the Foot.



Vertical Section through Window at Stair Landing.—Scale, ¾ Inch to the Foot.



Elevation of Window at Stair Landing.—Scale, ¼ Inch to the Foot.



Detail of Dresser in Butler's Pantry.—Scale, ¾ Inch to the Foot

Miscellaneous Constructive Details of a Modern Cottage at Elizabeth, N. J.

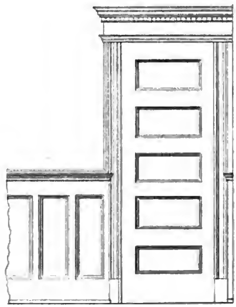
left thinner by the set backs the joists rest on the steps formed by the set back, in many cases nothing being done to the wall between the joists, while the ceiling and floors are finished with nothing to prevent the cold penetrating through the thin walls to the spaces between the lath and the floor. Sometimes a careful workman will see that the brick walls between the joists are rendered with a heavy coat of mortar, which is very good in its way, and would be better if the furring ran down to the edge or step and the space was lathed and plastered; but this is perhaps objectionable because of its forming places where mice or other vermin would find resting places. The better way is to brick fill, leaving a hollow space between the wall and the filling on the room side. If the projection of brick work receiving the joists is not more than 4 inches the brick filling may overhang the walls an inch or so on the inside, so as to give a 1 inch hollow space between the wall and the filling.

Chimney and Fire Place Construction.

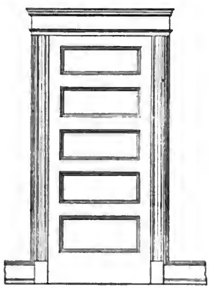
A subject which is always of interest to architects and builders, as well as house owners, is that indicated by the above title. A great deal has been said with regard to the construction of chimneys and fire places, but the subject seems to be by no means exhausted. In a recent issue of the *American Architect and Building News* the matter is discussed by W. W. Jackson, who, in part, says:

It is usual to think that a chimney has in itself ability to create a draft, but this is not true. Force is always needed. Usually it is heat; in some cases a fan or other machine gives the motion, or external air movements induce the currents. The chimney is merely a tube—the place in which the results of the energy are manifested, and without some external power there can be no draft.

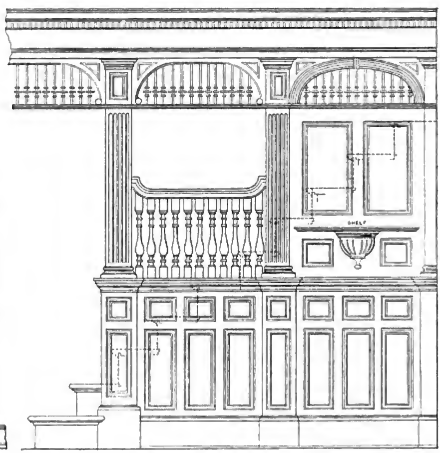
When there is a current up or down an unused flue, it will be found that the air of the house is warmer or cooler than that outdoors, or the sun's rays may be warming the chimney especially.



Detail of Panel Work in Dining Room and Trim for First Story except the Kitchen.—Scale, ⅜ Inch to the Foot.



Detail of Second Story and Kitchen Trim.—Scale, ⅜ Inch to the Foot.



Elevation of Main Staircase, Showing Paneling and Grille Work.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of a Modern Cottage at Elizabeth, N. J.

The amount of current in the flue depends on the difference of density between the air within the flue and that outdoors. Just as the balance falls when one side is heavier than the other, so the lighter column of air rises from the pressure of denser and colder air. It is pushed up by the heavier volume.

The architect's work is to make easy the operation of the currents. There must be a convenient entrance for the rarefied air from the fire place to the flue, and this throat, as it is called, would best slope at an angle of 45 degrees.

The flue must be built in proportion to the size of the fire place, and must have as much volume as possible in proportion to its wall area.

The surface of the wall exerts an enormous amount of resistance, and especially when there are turns, bends or changes in size. Flue linings are desirable, not alone for their protection against fire, but because of their smooth surface and their uniform size. In fact, a rough brick flue 8 x 8 inches when lined becomes 6 x 6 inches, and although the cross section is not much more than half, the draft is almost equally as good.

A small, smooth flue is better than a flue that is larger, but irregular. In cutting a channel for water in new irrigation plants, the water course is left rough from economic motives. As the demand for an additional supply is realized, the rough rock work is filled in and a more rapid flow results. Air and smoke are similarly affected.

When flue linings are not used, see that the inner walls of the flue are smooth. Cut off the corners when corbeling or turns are necessary.

The shape of the flue must be such as to give a large area, with little friction. Thus a circular flue is better than a square one, and a square better than an oblong rectangle. A triangle is bad, for, with but half the area of a square, it has 85 per cent. of the wall surface. And, too, the corner spaces soon fill with soot, so as to reduce the original area rapidly. The flues of old-fashioned city houses, wide and shallow, are especially bad. Thus, 4 x 16 inches is no larger than 8 x 8 inches, yet it has 25 per cent. more wall surface, and 50 per cent. more exposure to the outside cold.

It is always best to have the chimneys in interior walls, as then more heat is radiated to rooms adjoining the flues and less is taken from the smoke. With an outside exposure, the cooling of the smoke seriously reduces the draft of the flue.

With an interior flue, of course, the more exposed the brick work the more heat will be received in the house from the chimney, which is not a good feature for a kitchen flue in summer.

The size of the flue in cross section should be one-twelfth, or possibly as small as one-fifteenth, the area of the fire place opening. Soft coal requires a proportion of one to ten.

Do not alter the size of the flue, unless it be to increase the area near the upper part, and have no cap or stone over the top.

The chimney must be as high as the highest point of the house, and if there are any high objects near, there will still be trouble when winds are blowing across the chimney toward those objects. In mountainous sections a fire place will inevitably smoke in certain winds, though, of course, an increase in the hight of the chimney will help.

Except that they increase the hight of the opening, chimney tops or cowls do little good. It is not so much the direction of the wind that is disastrous to the draft, but an increase in density of the atmosphere at the place of obstruction. This heavy atmosphere, seeking an outlet to relieve the pressure, goes down the flue and causes a "downward draft."

There is one other feature required for the free burning of a grate fire, and that is a source of air to supply or replace the draft. It is evident that the air passing up the chimney must be replaced. One cannot suck air out of a bottle. If the furnace is running it supplies a volume of air and materially helps the draft.

In the usual case, the air comes through cracks around doors and windows, and if there be no cracks the draft is checked. The well built house is more apt to have smoky fire places than the cheap contract house. To supply the draft, either use some of the grates that are constructed on this principle, or yourself arrange a similar system.

Here, too, the wind has an effect on the fire. The side of the house on which the wind blows is under more than normal pressure, and there is a natural exit up the flues of the rooms on the side. On the other hand, the lee side is subject to suction, and the fire places here have this to overcome, or smoke pulls down the flue and into the room.

MAKING CEMENT WALKS.

THOSE of our readers who have occasion to make cement walks will doubtless be interested in the extracts from a little pamphlet, entitled "How to Use Portland Cement," issued by the Buckeye Portland Cement Company, which we present herewith:

Excavate below grade line to the depth of 12 inches. It is useless to make the excavation deeper than the outlet. The object of the gravel or cinder filling is to make a dry, porous foundation for the cement slab. If excavation is made below the outlet it will hold water. Abundant outlet for the water at the lowest point of the filling is necessary. Frequently the gutter is the only outlet; if so, the excavation should not extend below the level of the gutter. Sandy soils, or those porous at all times, need not be excavated. Stake strips, 2 x 4 inches, solidly on the outside, to keep the walk straight, being careful that the level and fall are right. Fill excavation within 4 or 5 inches of the top of strips with coarse gravel, stone or cinders, after which tamp and wet well. Then fill the level tops of strips with concrete made of gravel or broken stone 4 parts; clean, coarse sand, 2 parts, and Portland cement, 1 part, thoroughly mixed, dry and wet, and ram until the water comes to the surface. Blocks of from 20 to 30 square feet must be separated by tarred paper or cut effectually. If the concrete is 5 inches thick at the center, the blocks can contain 30 to 40 square feet, and if 6 inches thick at the center, they may contain 60 to 70 square feet. It is better to make all blocks 3, 4 or 5 feet square. Avoid long blocks. Avoid broken joints. Re-level the strips which have become displaced. Notch each end of a straight edge 1 inch, and strike off the top of the concrete so as to leave 1 inch space below the level of the top of the strips for the top cement coat. Fill that inch before the concrete has set, if possible, with stiff mortar made of cement and clean, coarse sand, equal parts; first mixing thoroughly, dry and wet. Level it with the straight edge from the top of the strips.

After laying awhile, float, and then trowel to a surface. Avoid dusting the surface if possible. Avoid troweling too long or air cracks will result. Never use pure cement for dusting, but equal parts of fine sand and cement mixed. Bevel the four sides of each block. Be careful not to break the edges in removing the strips. Keep the surface free from dirt and dirty water, that the color may be clear and uniform. Wet the walk thoroughly three times a day for ten days, not allowing anything on it during that time. Protect the surface against the hot rays of the sun and against currents of air if possible. For this purpose, canvas, boards, and corrugated sheet iron are used. Such 4-inch walks will require 7 or 8 pounds of cement to the square foot.

The following table gives the amount of surface covered by a barrel of Portland cement of 400 pounds when mixed with varying qualities of sand:

One barrel of sand:
- 67 square feet, 1 inch thick.
- 90 square feet, ¾ inch thick.
- 134 square feet, ½ inch thick.

Two barrels of sand:
- 104 square feet, 1 inch thick.
- 139 square feet, ¾ inch thick.
- 208 square feet, ½ inch thick.

Three barrels of sand:
- 140 square feet, 1 inch thick.
- 187 square feet, ¾ inch thick.
- 280 square feet, ½ inch thick.

For a good brick and stone mortar use:
- Portland cement............1 part.
- Clean, coarse sand.........6 parts.
- Lime putty.................1 part.

For inside walks, 2 parts of sand to 1 part of cement will do for the topping. For walks on business streets mix ½ to 1 pound of lamp black with each barrel of cement.

Prussian blue will make a bright blue, and Caput Mortuum will make a bright red stone, but is expensive. Venetian red is cheaper, but not so good.

In ordinary cement walks 1 cubic yard of concrete makes 100 square feet of 3¼-inch grout, made 1 of cement to 7 of gravel.

One hundred square feet of top, 1 cement to 2 of sand, ¾ inch, takes 271 pounds of cement.

Enough sand for the top coat can be sifted from most gravel with advantage to the gravel for grout or concrete.

DETERMINING STRESSES IN ROOF TRUSSES.—I.

By F. E. KIDDER, Consulting Architect.

THE various steps to be pursued in designing a roof truss, and by this we mean proportioning the parts and joints to the stresses that will be produced when the truss receives its greatest load, may be described as follows:

1. Laying out the roof and trusses on plan and section.

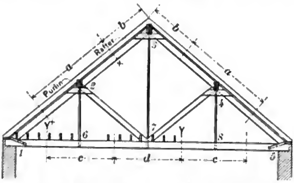


Fig. 1.—Simple Truss Supporting Roof and Ceiling.

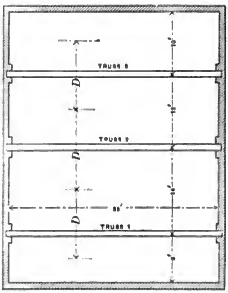


Fig. 2.—Plan of Walls and Trusses.

roof and ceiling surfaces for which the truss shall be computed. To do this one must know the construction of the roof, the kind of roofing material that will be used, the possible snow load, and the character of the ceiling, if any.

The weight of the roof will generally be made up of the following items:

Allowance for weight of truss itself.
Weight per square foot of purlins.
Weight per square foot of rafters.
Weight per square foot of sheathing.
Weight per square foot of roof covering.
Allowance per square foot for snow and wind.

For making up these weights the following data will be found of great assistance:

*Table I.—Approximate Weight Per Square Foot of Roof Surface of Wooden Trusses.**

(Prepared by the writer.)

Span. Feet.	½ pitch. Pounds.	1-3 pitch. Pounds.	¼ pitch. Pounds.	Flat. Pounds.
Up to 36	3	3½	3¾	4
36 to 50	3¼	3¾	4	4½
50 to 60	3½	4	4½	4¾
60 to 70	3¾	4½	4¾	5¼
70 to 80	4¼	5	5½	6
80 to 90	5	6	6½	7
90 to 100	5¾	6¾	7	8
100 to 110	6½	7½	8	9
110 to 120	7	8½	9	10

*For scissors trusses increase one-third.

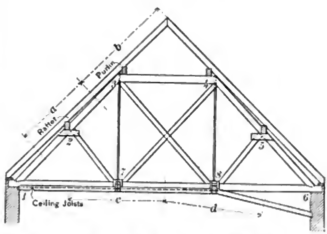


Fig. 3.—Truss Where the Loads Rest on Purlins Hung from the Tie Beam.

Determining Stresses in Roof Trusses

2. Computing the greatest possible loading of the truss, and its disposition.

3. Determining the resulting stress in each member of the truss.

4. Computing the size of the truss members and detailing the joints.

The first step presumes sufficient knowledge on the part of the designer to decide on the kind of truss it is best to use, its shape and hight, and the distance apart the trusses shall be spaced. These points will be determined largely by the width of the building, the inclination of the roof, and the shape of the ceiling below.

Before any computations are made a section should be drawn, showing the walls or supports, the roof and ceiling, and the approximate design of the truss. The spacing of the trusses should be determined at the same time. This drawing will enable the designer to get the necessary measurements for computing the loads at the different joints of the truss.

In drawing the truss the sizes of the pieces must be assumed, or guessed at, and after the stresses are determined they can be accurately computed, and the drawing revised.

Determining Roof Loads.

After making the section and truss drawing, the next step will be to decide upon the loads per square foot of

Table II.—Weight of Rafters Per Square Foot of Roof Surface.

Size of Rafters. Inches.	Spruce, hemlock, white pine. Spacing in inches, c. to c. 16 Pounds.	20 Pounds.	24 Pounds.	Hard pine. Spacing in inches, c. to c. 16 Pounds.	20 Pounds.	24 Pounds.
2 x 4	1½	1 1-5	1	2	1 3-5	1 1-3
2 x 6	2¼	1 4-5	1½	3	2 2-5	2
2 x 7	2 5-8	2 1-10	1¾	3½	2 4-5	2 1-3
2 x 8	3	2 2-5	2	4	3 1-5	2 2-3
2 x 10	3¾	3	2½	5	4	3 1-3

Wooden purlins will weigh about 2 pounds per square foot of roof surface, when the distance between trusses is from 12 to 16 feet.

Sheathing 1 inch thick will weigh about 3 pounds per square foot for the soft woods and 4 pounds for the hard woods and pitch pine.

Approximate Weight Per Square Foot of Roof Surface for Roofing Materials.

Shingles, common, 2½ pounds; extra thick or long, 3 pounds.
Slates, average, 6½ pounds; thick, 9 pounds.
Plain tiles or clay shingles, 11 to 14 pounds.
Improved flat tiles, 6½ to 7 pounds.
Ludowici tile, 8 pounds.
Spanish tiles (clay), old style, two parts, 19 pounds; new style, one part, 8 pounds.
For tiles laid in mortar, add 10 pounds per square foot.
Tin roofing, sheets or shingles, including one thickness of felt, 1 pound.
Copper roofing, sheets, 1½ pounds; tiles, 1¾ pounds.
Corrugated iron, No. 26, 1 pound; No. 24, 1 1-5 pounds; No. 22, 1½ pounds.

Standing seam steel roofing, 1 pound.
Five-ply felt and gravel roof, 6 pounds.
Four-ply felt and gravel roof, 5½ pounds.
Ready roofing, in rolls, 0.6 to 1 pound.

Allowance for Snow.

In making an allowance for snow, one's judgment must be exercised to a considerable degree, as the maximum snow fall varies widely in different localities, and the amount of snow that may lodge upon a roof will depend in a great measure upon the inclination of the roof and its exposure to the wind, also somewhat upon the roof covering and whether or not snow guards are used.

The weight of dry, freshly fallen snow is commonly given at 8 pounds per cubic foot, while saturated snow or snow mixed with hail or sleet may weigh as much as 32 pounds per cubic foot. Dry snow may attain a depth of 3 feet and possibly more in some localities, but snow weighing as much as 32 pounds per cubic foot will hardly ever be found more than 16 inches in depth, even on a flat roof.

As the maximum snow and wind cannot well be exerted on a roof both at the same time, because the wind would blow the snow off, a single allowance may be made for both kinds of loads when computing the stresses for the ordinary types of wooden trusses.

Allowance for Wind and Snow Combined.

In the opinion of the writer the following allowances for both wind and snow may safely be used for ordinary conditions and without requiring an undue amount of material.*

For Northern States, 30 pounds per square foot of roof surface for roofs of "one-fourth pitch" and 20 to 30 pounds for roofs of less pitch.

For Maryland, Missouri, Texas and States further South, 30 pounds per square foot of roof surface for one-fourth pitch and over, and 5 pounds for less pitch.

Ceilings.

For computing the weight of ceilings, the weight of the joists may be taken from Table II, or computed on the basis of 3 pounds per foot board measure for soft woods and 4 pounds for hard woods.

For lath and plaster allow 10 pounds per square foot. For ¾-inch ceiling 2½ pounds, and for metal ceilings with furring 1½ to 2 pounds.

The writer also usually adds from 3 to 5 pounds per square foot for occasional loads on the ceiling, such as persons walking or climbing over it.

Computing the Truss or Joint Loads.

After the loads per square foot are determined upon, the loads coming on the joints of the truss should be computed.

Calculations for the stresses in a truss are always based on the assumption that the loads are transferred to the joints, and that the various pieces are hinged at the joints, as on a pin. When purlins are used to support the rafters they should always bear on the truss as near the joints as practicable.

The method of computing the joint, or panel, loads, as they are often called, may be best illustrated by an example. For this purpose we will use Fig. 1, which shows a simple truss supporting roof and ceiling, and Fig. 2, which represents a plan of the walls and trusses. In this case the rafters are supported by purlins, which come at the joints, while the ceiling beams rest directly on the tie beam of the truss.

Now if we let D represent the distance in feet from the center of the space on the left to the center of the space on the right of any particular truss, then the load at joint 2 for that truss will be $a \times D \times$ weight per square foot of roof, and at joint 3, $2b \times D \times$ weight per square foot of roof.

The load at joint 6 or 8 will be $c \times D \times$ weight of ceiling per square foot, and at joint 7, $d \times D \times$ weight per square foot.

The points x x and y y, in Fig. 1, which fix the length of a and c, should be located at the center between the bearings and tie beam respectively. Thus the first x is half way between the wall plate and the first purlin, and the second x is half way between the purlins. The first y is half way between the wall and the rod at 6, and the second y half way between the rods at 6 and 7.

Example I.

To work out the example in figures, we will assume that Fig. 1 is a drawing of Truss 2 of Fig. 2; then D will equal 13. By measurement we find that a equals 11 feet 3 inches, b equals 6 feet 2 inches, c equals 8 feet 3 inches, and d equals 8 feet 6 inches.

The span of the truss is 33 feet, and rafters have a rise of 10 inches in 12. The roof is to be of slate on ⅞-inch sheathing; rafters and ceiling joists 2 x 8 inches, pine or spruce, 16 inches on centers.

The weight per square foot of roof will therefore be:

	Pounds per square foot.
For slate	6½
For sheathing	3
For rafters	3
For purlins	2
For truss	3¼
For wind and snow	30
Total	47¾

The weight per square foot of ceiling will be:

	Pounds per square foot.
2 x 8 joist	3
Lath and plaster	10
Add	5
Total	18

The load at joint 2 will = 11¼ × 13 × 47¾ = 6,983 pounds.
Load at joint 3 = 12 1-3 × 13 × 47¾ = 7,657 pounds.
Load at joint 6 = 8¼ × 13 × 18 = 1,930 pounds.
Load at joint 7 = 8½ × 13 × 18 = 1,989 pounds.

The loads at 6, 7 and 8 will be the same, whether the ceiling joists rest on the tie beam, as in Fig. 1, or on purlins hung from the tie beam, as in Fig 3; but it will make a difference in the required dimensions of the tie beam, as will be explained later.

When the roof is quite steep it is sometimes desirable to support the roof, as in Fig. 3, without a purlin under the ridge. In this case the load at joint 3 will equal $b \times D \times$ weight per square foot. As a rule, it is better construction to have a purlin at the top.

When the roof truss supports hips or valleys the roof area supported at the joints will vary somewhat, and must be computed from the framing plan of the roof.

*To be theoretically correct, the stresses due to wind pressure should be determined separately from those due to the vertical loads, but as the method above explained will give stresses sufficiently large to insure safety for the ordinary types of wooden trusses, without any appreciable waste of material, and as the more correct method is intricate and laborious, this method of treating wind pressure is generally pursued for ordinary types of trusses. For trusses with curved chords, or a very steep inclination, the more exact method should be followed.

Making Paste Wood Fillers.

Paste fillers for hard woods are made from any of the following materials, or a combination of these, says a writer in the *Painters' Magazine:* Silex or silica, terra alba, whiting, china clay, starch, rye flour, and sometimes barytes. Silex or terra alba will, on drying, give the least discoloration to the wood. The pigment should be of impalpable fineness and intimately mixed to a stiff paste with one-third each of pale linseed oil, pale gold size japan and turpentine. This paste may be either run through a mill or be given a very thorough mixing, and to test it for quality it should be thinned with turpentine to the consistency of a varnish, applied with a varnish brush to open grained good, preferably oak, allowed to set for about 20 to 30 minutes, and the surplus filler removed by wiping across the grain in the usual manner. After 24 to 36 hours, the surface should be lightly sandpapered and a good, flowing coat of rubbing varnish applied, which when fairly well set should not show any pitting or pin holes. Should it pit, however, or show pin holes or needle points, the filler is defective in binding properties and the portion of japan should be increased with a corresponding decrease in the proportion of turpenine. The linseed oil and the gold size japan must be of good body, and if corn starch or rye flour is used in connection with silex or silica, the proportions should be about one of the former to five of the latter by weight.

PLANING MILL AND SASH FACTORY.

AT the time of our competition in small wood working shops the prize designs attracted so much attention that some of them were republished by the *Woodworker* for the benefit of a large class among it readers. As a result a correspondent of that journal took the opportunity to contribute to it an article descriptive of a combination planing mill and sash factory, the idea being to show the arrangement of machinery which in his opinion would prove the most satisfactory for an establishment of that kind. What he has to say is of manifest interest to many of our readers, and we take this occasion to present the matter herewith.

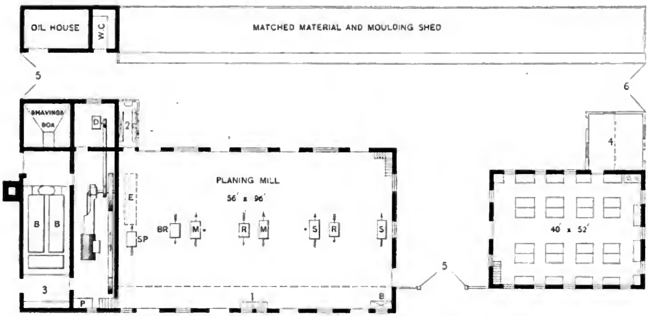
In the April and May issues of the *Woodworker* there appeared articles and drawings describing and illustrating plans of small wood working establishments, which were awarded first and second prizes in competition by the publishers of that well-known and popular journal, *Carpentry and Building*. These plans were very neatly gotten up, and the descriptions were so simply, plainly and interestingly put before the reader that a prospective builder, no matter of how limited experience, if wishing to make practical use of them, would have little difficulty in following them and carrying his work of erection to a successful issue.

It is my intention in this article to plan and describe a combination city planing mill and sash and door factory, doing general custom work in exterior and interior building and office finish. In doing this my hope and desire is that I may be able to make myself and my drawings as neat and complete and as easy to follow as the fortunate prize winners made themselves and their drawings in the articles referred to.

The site of the present plant is supposed to be in a city, and is, as it should be, with due regard to taxation, situated very convenient to the business portion of it. It has, moreover, the additional advantage of being bordered on three sides by streets, that in front being one of the principal thoroughfares of the city, while to the rear is the usual and very necessary water supply in the way of a navigable river. Thus it will be seen access to the mill is very easy by any of the several gates opening from the several bounding streets.

Having arrived at the plant, we enter the premises from the front street through the principal gateway, which on the accompanying ground plan is marked 5. To our left hand, upon entering this gateway, rises the substantial looking two-storied red brick factory, from the inside of which proceeds the hum of busy machines hard pushed to their work. Into the inspection of this we will enter later. In the meantime we will enter the door of the building to our right, which is also of red brick, substantially constructed and two-storied.

We find this to be, as expected, a stock warehouse, the lower flat of which is utilized exclusively for the storage of stock sash and doors, which, except in the slack season of the year, when other work is scarce in the mill, are imported from some large outside plant doing work in this line exclusively. The arrangements for the storing of stock here are very neat and complete. In the series of racks and divisions around the walls between the windows and in the center of the floor, as shown on plan, the stock is arranged, with lettered signs above each compartment stating plainly what style and size of sash or door is therein stored. It will be seen by the arrangement of the racks on the floor and the windows in the building that here, unlike the common run of storehouses, there is ample light thrown into every part of the building, so that a customer may see at once without carting the article out into the light of day what he is being shown and whether or not there are blemishes in the stock.



MAIN FLOOR, where "1" Represents Water Tap and Basins; "2," Filing Room; "3," Engineer's Vise Room; "4," Checker's Office; "5, 6," Gates; "D," the Dynamo; "B, B," the Boilers; "E," the Elevator; "SP," Surface Planer; "BR," Band Resaw; "M," Matchers; "R," Rip Saws, and "S," Stickers.

Planing Mill and Sash Factory.

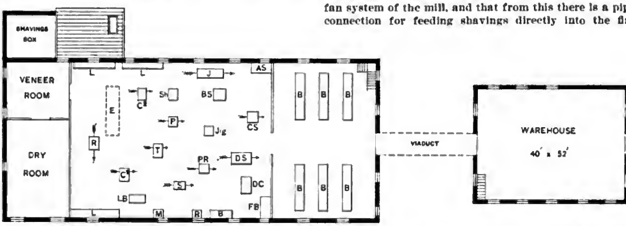
There are persons who would, no doubt, upon looking at this arrangement of racks, conclude that there was a great amount of floor space wasted, but a trial would soon convince them that it is really wonderful what an amount of stock can be stored in this way. I have seen from five to six carloads of sashes and doors piled away in a warehouse of this size under this arrangement, and even then one could almost make himself believe there was room for another, so uncrowded in appearance was the room. There is nothing like system.

The second flat of this building, which we reach by a stairway built at the mill end of it, is used to store the finished product of the upstairs department of the mill. This product, which consists of odd sizes and styles of sashes and doors, trimmings, such as newel and veranda posts, balusters and spindles, &c., brackets, and all kinds of house and office finish, is deposited here prior to shipment, on factory trucks, which reach the storehouse from the factory by way of a viaduct connecting the two buildings, as shown by the dotted lines on the plan of the second floor. In times when there is a rush of work on, extra work benches, if those in the factory are found insufficient, can be arranged here by crowding the finished product down to the shipping end, but preferably by keeping the floor clear by prompt deliveries.

Having fully inspected this very convenient warehouse in connection with the plant, we now make our way across the viaduct into the upstairs or sash and door department of the mill. We do not wait here, however, reserving this flat for later inspection. We turn to the right upon entering the door, and, crossing over to the corner, where is a stairway, proceed down into the planing mill department. Here in systematic arrangement we find eight large, heavy framed, modern looking machines, consisting of a pair of four-sided stickers or molders, two self fed rip saws, two powerful lightning matchers, a band saw, and, finally, a fine, businesslike double surfacer.

The arrangement of these machines upon the floor, together with the arrangement of the eight large sliding doors at the front and rear of the building, is such that wagons or trucks loaded with stock, which, by the way, is brought from the extensive yard on the opposite side of the front street, to be matched, dressed, resawn, ripped or molded, as the case might be, can be hauled right into the mill and unloaded, or left there to be unloaded as fed through the machines, and then the unloaded wagons or trucks passing on can now pick up the the feed end of the surfacer. Down here with the engineer we find things bright and shining and in perfect order. We are shown into the engineer's work room, indicated by the figure 3 on plan, and then into the dynamo room, where we examine the machine which grinds out lightning for the electrical lighting of the plant when working nights or in the short afternoons of the winter months. We are told that the twin boilers in the boiler room, which is separated from the engine room by a solid brick wall, are each of 75 horse-power, while the engine at high pressure will develop quite 100 horsepower, which is more than sufficient for all requirements likely to be put upon it. "But," as the engineer said, "the boss, unlike a great many other bosses I have known, believes in having lots of power behind his machines, and I am right in with him there, for it is always very discouraging to the engineer, not to mention expensive to the owners, when a plant is lacking in this essential."

The shavings box in connection with the boiler room is in size 15 x 15 feet, 30 feet high, and is of ample proportions for the storage of a large quantity of shavings against times when the supply from the mill is not sufficient to keep steam up to the proper pressure. It will be noted on the end elevation plan given that the usual dust separator or cyclone is installed in connection with the fan system of the mill, and that from this there is a pipe connection for feeding shavings directly into the fire



SECOND FLOOR, where "B, B" Represent Benches; "LB," Layout Bench; "FB," Filing Bench; "R," Rip Saw; "C, C," Cut off Saws; "E," Elevator; "L," Lathes; "Sh," Shaper; "P," Pony Planer; "T," Tenoner; "S," Sticker; "M," Mortiser; "J" Jointer; "R," Relisher; "BS," Band Saw; "PR," Panel Raiser; "DS," Drum Sander; "DC," Door Clamp; "AS," Arm Sander, and "CS," Combination Saw.

Planing Mill and Sash Factory.

finished material, pass through the rear door and on up town to make the delivery.

It will be noted, as designated on the plan by the arrows, that all the machines on this flat except the two rips and the resaw feed from front to back of the mill. The reason these three machines feed in the opposite direction to the matchers and surfacer will be readily understood by old planer men, but to those who are not familiar with the run of things in a planing mill it might be explained that the backward direction of the feed of these machines is for the purpose, in the case of rip saws, of dropping the ripped material as it comes from the saws handy to the front, or feed end, of the matchers and stickers, so that the work of returning the material to the front of these machines, if fed in the other direction, is saved. In the case of the resaw the reason of the reversal is that when the material is surfaced to be resawn after the surfacing, when passed through this machine it is right there for repassing through the resaw, or *vice versa*, if the resawing is done first, to be followed by the dressing.

At the rear of the surfacer, and outside of the main building, where good light is obtainable, is built, as indicated by the figure 2, the filing and grinding room. We all know how essential good light is to good work in this room, and here we have this essential light in abundance, given by two side windows and an end window, supplied with blinds, while in the roof is a hinged skylight for ventilating purposes as well as lighting.

From the planer department we now go down into the power rooms by way of the stair in the corner at boxes under the boilers. This is as it should be in all plants that make pretense of being up to date.

From the boiler room we retrace our steps, and upon the invitation of our engineer friend, who seems very proud of his charge, which includes all under the planing mill floor, we enter a doorway under the stair down which we came a short time age, and here, in the basement under the mill, is the main line of shafting with a multiplicity of wood split pulleys (which, by the way, are coming into very general use) on line shafting, of various diameters and widths of face. The position of this line of shafting is indicated by the long dotted line on the first-floor plan, and the only noticeable feature about its adjuncts out of the ordinary is the extraordinary length of the belt connections with the countershaft pulleys of the machines on the floor above, there being quite 16 feet between the centers of the shaftings. This necessitated, according to the diameter of the pulleys, belts from 45 to 50 feet long, which, by mill men familiar with the peculiarities of belting, boxings and loose pulleys, will be recognized as a great advantage.

And now again we emerge from the basement, and bidding our friend, the engineer, good-day, we make our way upstairs. Perceiving, as we reach the planer floor, that the power elevator, marked E on plan, from the sash and door department above is on the way down, we halt to observe its workings and its purpose. Immediately it comes to a rest upon the planing mill floor the surfacer operator throws over his belt to start his machine, and then proceeds to feed into it some 1½-inch material from a truck just brought in from the yard.

As this material passes through the machine the tail man stacks it upon the elevator, which is not a difficult operation, as it almost drops here of its own accord, and when in a few minutes the material is all dressed, having obtained leave, we position ourselves on top of the load and are elevated with it to the floor above.

We are now in the sash and door department of the plant. Introducing ourselves to the foreman of this department, and telling him the object of our visit, he at once places himself at our command. "Yes," he says, in response to a remark, "we have a very neat plant here all through, and I think my own department and its machinery about as well arranged and kept as any of them. We have very little lost motion, so to speak, in getting out our work. You see, now, for instance, this load of 1½ inches clear upon which you were elevated. Well, it is for an order of 50 odd sized stock pattern doors received this morning from a contractor down town. To machine these doors we proceed as follows: First you will notice that this material is brought from the surfacer below and placed, by the elevator, just where it is wanted for the self feed rip saw without handling. We now rip it to the proper widths—that is, 4¾ inches for stiles, mullions and top rails, 8 inches for lock rails and 10 inches for bottom rails. Without loss of time, or much wear of shoe leather, it is laid handy to the cut off operator by the tail man of the rip saw. Having been cut to the proper lengths, the material for rails and mullions is placed handy to the tenoner, and that for the stiles is taken to the layout bench, thence to the mortiser, all, you see, by a steady forward movement, which is continued through the sticker and relisher to the put together bench, and then on again over the clamp to the large three-drum sander, which finishes the operation and leaves the door ready to take into store, or be delivered to the customer.

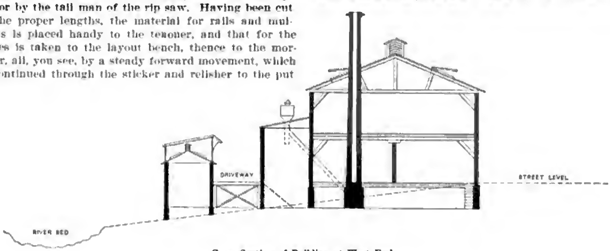
"And now," continued the good natured foreman, "supposing the next load up the elevator is stock for a batch of window or door frames. This material on its way forward will in no way interfere with the set of machines on door or sash work, for, being already run through one of the stickers below, both jambs and sills are ready for the cut off operation, which this time is done on the cut off saw here close to the elevator (marked C²). From here it is forwarded on trucks to the combination saw for dadoing, and then to the drum sander, or, if this machine is busy, to the arm sander on the other side. The frames are now ready to be shipped if ordered knock down, or if they are put together, to be taken to the bench room."

"Everything seems to have a continuous forward movement from start to finish by your system?" was ventured.

"Yes," acquiesced the foreman, "every conceivable job, almost, and you will easily see the advantage in that."

We are now shown the veneer and dry rooms, which are complete in every detail, and then back through the shop to the bench room, which will need no fuller explanation than is given by the accompanying plan. From here we continue our way down stairs, and then out through one of the rear doors of the planer department, to find facing us across the 32 feet of planked driveway a fine, capacious molding shed running almost the full length of the property. This shed is in depth 18 feet by about 12 feet high from the driveway floor. The length is in the neighborhood of 180 feet, and it is capable of holding a great variety of moldings and also a considerable stock of ceiling, flooring, siding and other ornamental material used in building operations.

Away down to our left at the end of this well built shed we notice a solid chunk of a brick building with a metal roof. We are of an inquisitive turn of mind and the appearance of this building arouses our curiosity, for from where we stand we can see no sign of a window except the skylight in the roof of iron. We also notice of the two doors in it one is of iron and the other of wood. Closer inspection tells us that the iron door, the one nearest the gateway, gives entrance to the fire proof oil house, while the wooden door gives entrance to what is a very necessary adjunct to all plants in operation, and that is the department which, when denoted by the combination of the letters "W" and "C," is sufficient wherever English is "spoke" without further explanation.



Cross Section of Building at West End.

Planing Mill and Sash Factory.

Warm Weather Houses.

The heat of the present summer ought to have some effect upon the construction of homes with reference to warm weather, says a recent issue of the Kansas City *Star*. In every large city, and even in the country, for that matter, all houses of considerable size should have some special provision for excessive heat as well as for extreme cold. The roof garden idea is capable of wide application. It may be utilized in an elaborate way in connection with fine homes, or it may be employed in a limited but saving extent in building smaller houses. For the past two weeks those who have had large verandas or flat roofs, especially such as could be resorted to as improvised sleeping quarters, have enjoyed an inestimable advantage over those who have been forced to occupy close rooms, shut off from the breezes that alone have made life tolerable. The time will come when there will be a general revolution in house construction with reference to hot seasons, particularly in the warmer climates.

Somers Clarke, the architect in charge of St. Paul's Cathedral, London, in a letter to the *Times*, says: "The immense weight resting upon the eight piers upholding the dome has caused the foundation under the dome to settle more than elsewhere. The settlement thus caused has broken the eight arches and the windows of the clerestory over them in the nave of the choir and the north and south transepts, where they abut on the dome piers, in the same way. The very great weight of the western towers has caused them to sink, and in sinking they have cracked the west front vertically through the great door, the window above and the vaulted ceiling of the portico. They have also cracked the wall of the chapel to the east." Mr. Clarke says that the two underground railways and the large sewers have affected the foundations.

BUSINESS ETHICS AMONG BUILDERS.

AT the first annual convention of the Ohio State Association of Builders' Exchanges, held at Put-in-Bay the last two days of July, one of the papers presented was that of R. J. Gardiner, secretary of the Columbus Builders' Exchange, and entitled "Business Ethics Among Builders." In it the author tells how the builders do business in the city of Columbus, and in a way to interest architects and builders all over the country. We therefore present the paper herewith:

It is very gratifying to state that perfect harmony exists between the Builders' Exchange and the architects. The latter very kindly furnish the exchange with a duplicate set of plans of nearly all the work that is prepared by them. The exchange has provided a room which they called the "figuring or plan room," which is 13 x 28 and entirely inadequate to accommodate the great number of plans that are placed there for the convenience of the members. Very little figuring is done outside of the exchange rooms by Columbus contractors, except it be on private work, or, as we term it, "invited competition."

On August 31, 1898, the following resolution was unanimously adopted and has been continuously in operation:

Be it Resolved, That on and after the passage of this resolution the members of this exchange shall place all bids with the secretary of the exchange at least one-half hour before the time set for letting, and the secretary shall take all bids to the architects, and if not then and there opened in the presence of the secretary he shall return all bids to the exchange, and be kept there until they shall decide to open them in his presence. Any member violating this rule will be subject to expulsion.

Resolved, further, That a copy of these resolutions be sent to all architects and members of the exchange.

Bids on all jobs are tabulated on blanks especially provided for that purpose and posted in the plan room immediately upon the opening of the same, this system doing away with the long delays the contractors were formerly obliged to undergo, after depositing their bids with the owner or at the architect's office, often hearing nothing at all from them.

I desire to state in justice to the architects that no insinuations are cast upon them whatever when I say that very often the bids are never heard from. This is no fault of the architects, as very often their clients have a preference as to whom the work shall be let, and they are obliged to submit to the wishes of the owner.

If the rule is objected to the job is then looked upon with suspicion. When bids are asked for in open competition and a contractor devotes his time and brains to such work, why is he not entitled to inspect the bids after they have been opened? After this rule was adopted we received letters from several of the architects expressing themselves as being perfectly satisfied with it; others who did not take kindly to it at first have since expressed themselves as being perfectly satisfied after giving it a trial, and in some instances it has proven beneficial to them upon their own acknowledgment. This rule does not apply to public work, as the law provides that bids on all work of that character be opened in public.

The different branches of the builders are organized within themselves in the Builders' Exchange, having their own officers and meeting regularly in the exchange rooms, the exchange being considered the mother of them all.

This is done in order to handle strikes and labor troubles, and proved highly successful during the recent carpenters' strike, and were it not for the limited time I should like very much to go into detail upon this subject. The union made a demand of 40 cents an hour on May 1, which was an advance of 80 cents a day, or 33 1-3 per cent. This demand, however, was met with a flat refusal by the contractors on account of the scarcity of 40-cent carpenters in Columbus. The contractors succeeded in disorganizing the two unions, rescinding the last year's agreement, which was a minimum of 30 cents an hour, and compelling every carpenter who returned to work (and they all returned) to apply for their positions the same as new men. The contractor to-day pays just what he thinks the man is worth. The success of the master carpenters in this strike is based upon two things: 1. Perfect organization, for without that the strike would undoubtedly have been lost. 2. Splendid "business ethics of the builders." Combine the two and you have what is required to successfully handle labor propositions.

I am now going to read you a resolution that borders on a subject with which all contractors are familiar. I don't know in what way you have endeavored to correct this evil, if at all, but after bids have been received on a job and tabulated you very often see a bid exceptionally low. You readily understand the work cannot be done for the price, but if the contractor has a rating at all the job is immediately offered him. He, of course, will look up the other bids to see just where the next lowest bidder stands, and then he says he made a mistake; he left out this and he left out that, and will then give the architect a new bid that comes within a few dollars of the next lowest bidder. We found it was being continually practiced, and those exceptionally low bids were intentional, which led to the adoption of the following resolution:

Be it Resolved, That on and after the passage of this resolution no member of the Builders' Exchange be permitted to raise or lower his bid on any job, when in competition with any member of the Builders' Exchange, after the time limit. But if an error is discovered by said bidder after the bids are opened, and he refuses to proceed with the work at his figure, he shall withdraw his bid and have nothing further to do with the job, either through the architect or owner, but shall have the right to correct any mistakes, providing it is done before the time set for letting. Any violation of this resolution shall be punishable by a fine of not more than —— and not less than ——. Said member shall stand suspended until said fine is paid, but if not paid within 30 days he shall be expelled from the exchange.

Resolved, further, That a copy of these resolutions be sent to all architects and members of this exchange.

All penalties are fixed by the Board of Directors.

It has been the custom of some contractors, doubtless on account of their incompetency, to have the lumber and mill men take off the lumber bills and mill work from architects' plans, and in making up their total bids these items were put in at actual cost, thus preventing a progressive contractor from making any money on this part of the business. This question came up for discussion before the Builders' Exchange, which brought out this argument: To be a general contractor one should be able to figure all branches of the building business, especially that pertaining to carpentry; should he be unable to perform this branch of the business he should not "pose" as a contractor.

A committee was appointed to wait upon the lumber and mill men, giving the views of the exchange upon this subject, which led to the lumber and mill men presenting a set of resolutions which were accepted by the exchange after every lumber and mill man in the city had signed it.

The substance of the resolutions is that the lumber and mill men decline to figure from plans in architects' offices, Builders' Exchange or for contractors or owners until after the jobs are let. This, of course, was intended to force the contractors to figure their own work, and after they receive the contract then the lumber and mill men could enter into competition.

The code of practice for sub-estimating recommended by the fifth convention of the National Association of Builders, which reads, "When architects or owners solicit estimates both in the aggregate and detail, members of this exchange should only submit estimates in detail," has been adopted by the Columbus Builders' Exchange, and should be practiced by every exchange.

In the summer of 1899 the exchange felt that they had occasion to draw this clause a little closer, and adopted this resolution:

Resolved, That hereafter when bids are asked for in the aggregate and detail, the exchange will bid only in detail, and if the architect or owner will receive bids in the aggregate (at the same time he receives bids in detail) the bids from the exchange will not be submitted.

I am extremely happy to say that every resolution and other business methods advocated by the Columbus Exchange has proven highly successful; they have made no mistakes and the building business under the reign of the Builders' Exchange has been highly elevated in the city of Columbus.

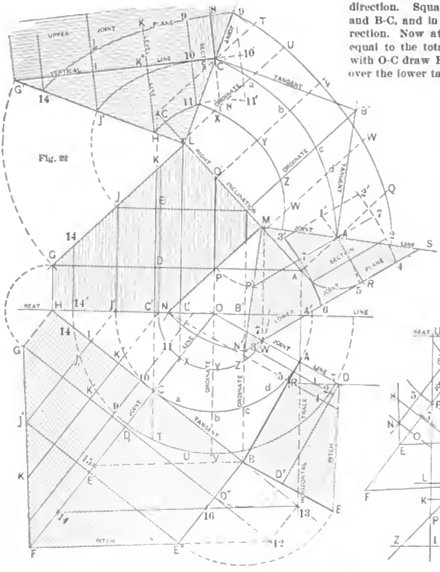
THE SCIENCE OF HANDRAILING.

By C. H. Fox.

THE next phase of the subject deals with the construction of a cardboard representation of a solid, showing the inclination and position, together with the developments of the sections of the face and joint surfaces of a rail, the plan of which is greater than a quarter circle. In this connection the inclination of the section square base, within which the center curve has, in connection with similar plans, been inclosed, we have in the present case a figure of somewhat different shape as regards the base. In order to construct the plan and find the direction of the directing plan ordinate, we draw the center curve A-C greater than a quadrant, then draw the joint lines O-C and O-A and produce them in either direction. Square with these draw the tangents A-B and B-C, and in like manner produce them in either direction. Now at the joint line through C set off C-14, equal to the total vertical rise of the rail, and parallel with O-C draw B-16, equal to the vertical rise of the rail over the lower tangent A-B.

In these drawings the hight may, of course, be assumed at pleasure, but we have in the diagram in question placed the greater rise over the upper tangent. This condition will in the diagrams which follow be reversed—that is, the greater rise will be placed over the lower tangent. In practice these hights may be obtained in the development of the tangents, or of the center falling line.

Now draw 14-16 and extend it to meet the tangent C-B, produced as shown in the point 13. Join 13 with



Figs 22 and 23.—Show Construction of a Cardboard Representation of a Solid Showing the actual Inclination and Position, together with the Developments of the Sections which belong to the Face and Joint Surfaces of a Rail, the Plan of which is greater than a Quarter Circle. The rise of the Section Plane of the Face Mold is taken unequally over the Plan Tangents.

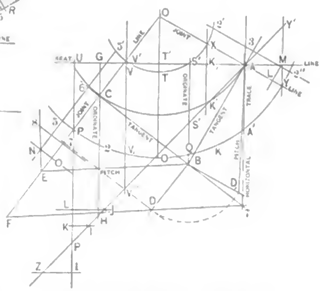


Fig 24.—Practical Method of Developing Face and Joint Molds.

The Science of Handrailing.

plane of the face mold is taken unequally over the tangents of the plan.

The problem to be explained in Figs. 22 to 27, inclusive, is considered by many handrailing experts to be the most difficult of any of those met with in this branch of stair building. However, the geometrical principles as applied to the developments of the face and joint sections of the models already constructed are those applicable to similar constructions in these diagrams, and if the student has mastered the application of the principles in question, as shown in connection with the preceding articles, he will have little difficulty in obtaining the required representation of this rather intricate problem in handrailing.

We show in Fig. 23 the plan, where A-C is the representation of the center curve and is here taken as greater than a quarter circle. It may be noted that, unlike the

A, and the position of the directing ordinate of the plan may be obtained. Parallel with this produce the ordinates of the plan.

To construct the representations of the tangent planes forming two sides of the model, we assume A-D as the hight required to raise the ground plane above that of the base of the model, in order to obtain the representation of the lower joint surface. Parallel with A-B draw D-D', then parallel with the joint line draw B-E, and with B as the center rotate D' into D'', and set off D''-E', D'-E, each equal with B-16, the rise of the rail over the lower tangent. Join E-D, and draw D-R square with E-D, and the representation of the tangent plane over the lower tangent may be projected. Now parallel with 13-14 draw E'-F; square with this draw F-G. Then parallel with the tangent draw D''-G and E'-J'. Then parallel with the joint line O-C draw G-H through G; this completes the construction of the representation of the tangent plane over the upper tangent. In Fig. 22 set off A'-A and C'-C respectively equal with A-D and C-F of Fig. 23; joining A-C gives the right inclination of the section plane of the face mold. Square over the ordinates of the section plane; make the length of these equal to that of the corresponding plan ordinates, and through the points obtained trace the elliptical curves of the face mold, and project the tangents. Square with them draw the joint lines L-9' of the upper and M-S of the lower surfaces. This done, square with A-C draw L-G and M-N; then parallel with the tangents draw L-G' and M-N'. Next with M as center rotate P-N into P'-N' at the representation of the joint surface. Join P" with A' and the projection of a level line lying upon the surface of the joint may be obtained. Now square with P'-A' draw A'-R, and the angle of the plumb bevel required at the lower joint surface is given in S-A'-R.

In the manner fully explained for like operations in the preceding constructions find the points through which to trace the right section which belongs to the surface and project the line N'-S. Now in the upper joint surface first set off H-G of the auxiliary vertical plane over the seat line, equal with H-G of Fig. 23. With L as center rotate the points K-J-G into the like points in the representation of the joint surface. Then with C' as center, and F-G of Fig. 23 as the radius, cut L-G' in G'; joining C'-G' gives the line in which the joint surface is intercepted with that of the tangent plane over the upper tangent. The angle of the plumb bevel required in this surface is given in L-C'-G'. Now find the points and through them trace the elliptical curves of the right section of the joint surface, which will complete the model.

Take a sharp knife and cut through the board at the outline of the drawing; then at the lines 9'-L, L-M, M-S and N-H of Fig. 22, and in the lines R-B, B-H of Fig. 23, cut about half through the board, then fold the three sides of the model into their proper vertical position, and fold over the inclined section planes of the face and joint surfaces. It may be found on trial that the vertical lines and the sections of the planes will fall perpendicular over the corresponding projections of the plan, which proves in a practical manner the accuracy of the constructions. Now cut the full size joint sections and the duplicate face mold. It may be noted in placing the face mold into its required parallel position over the section plane forming the top surface of the model the point 2' of the lower joint section is further removed from the section plane than is that of the point 11' of the upper joint section.

In Figs. 24 to 27 is shown the method which may be adopted in practice for the developing of the face and joint molds. In Fig. 24, O shows the center with which the plan curves may be drawn. A-B-C represents the tangents to the points A-C of the center curve at which joints are desired. These are, of course, drawn square with the joint lines O-A, O-C. Understanding this, produce O-C, and set off C-F equal to the total rise of the rail. Then parallel with O-C draw B-D, equal with the rise of the rail over the lower tangent. Draw F-D produced to meet C-B produced in 7, then join 7 with A, and the position of the directing ordinate of the plan may be obtained. Square with this draw the seat line through A, then through C square with the seat line draw G-H, equal to the total vertical rise of the rail; join H-A, and the right inclination of the section plane may be obtained. Now produce the plan ordinates as shown in Y-Y', A-A', X-K', &c.; then in Fig. 25 set off Y-A-K,, &c., equal with the lengths given in Y'-A-K', &c., of the right inclination of Fig. 24. Square over the ordinates of the section plane, equal to the length of the corresponding ordinates of the plan, and through the points obtained trace the curves. Project the tangents and square with them draw the joint lines, in the manner fully explained for similar constructions in preceding diagrams.

Now to project the plumb bevels, and develop the joint sections, proceed as follows: In Fig. 25 square with A-H draw 1-1', and W-3 of the upper and X-Z of the lower joint lines. Now in Fig. 24 set off P-J equal with 3-1', then square with C-H draw J-L. Then set off E-7 equal with P-L and parallel with B-C draw 7-8. Then square with B-E draw E-8. Now in Fig. 25, with I as center and E-8 of Fig. 24 as radius, draw an arc in N; then with W as center and the width of the rail as radius cut the arc in N; join W-N, and the projection of a level line at the surface of the joint may be obtained. Draw I-N square with W-N, and the angle of the bevel required is given in W-I-N; then set off E-N of Fig. 24 equal with the half thickness of the rail, draw N-5-6-5' parallel with O-C, and the direction may be obtained, as required in 5,-6-5 of Fig. 26, at which to project the right section of the joint surface. Now in Fig. 24 set off P-Z equal with A-Z of Fig. 25; square with C-H draw Z-1; then at the joint line O-A set off A-L equal with P-1; then, having drawn A-M square with D,-A (B-D,, of course, equals B-D, and D,-A is the pitch over the lower tangent), parallel with B-A draw L-M. Then in Fig. 25, with X as the center and A-M of Fig. 24 as the radius, draw an arc in M.

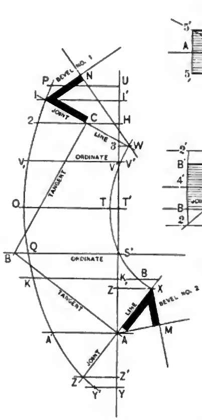


Fig. 25.—Projecting the Plumb Bevels.

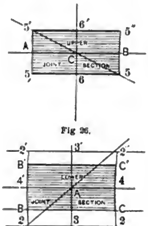


Fig 26.

Fig 27.

Figs. 26 and 27.—Developing the Joint Sections.

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Then, with A as the center and the half width, as A-X, of the plan of the rail as the radius, cut the arc in M; this gives in X-A-M the angle of the bevel required at the lower joint surface.

In Fig. 27, A-3' has been made equal with A-M of Fig. 24, at which figure 2-2' is drawn through M parallel with the joint line; the direction is thus given in 2'-3'-2" of the points required in Fig. 27 through which to trace the right section of the joint surface. Then, setting off B-4, 4-B, each equal to the half thickness of the rail, the section may be completed. Then in the manner previously explained transfer the bevel to the sections, as shown in 2-A-2" of Fig. 27 and 5-C-5' of Fig. 26.

(To be continued.)

The new college hall, which is to be erected by the trustees of Columbia University, will occupy a site on the campus at the corner of Broadway and 116th street, New York City. The structure will be 205 feet in length, 55 feet in width and four stories in hight, the architecture being of the same general style as that of Havemeyer and Schermerhorn halls. The cost of the building will be in the neighborhood of $400,000, and provision will be made for 19 lecture rooms and 50 studies, besides the offices of the dean.

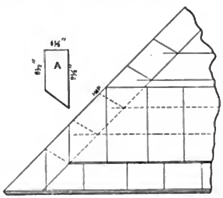
CORRESPONDENCE.

Design Wanted for Yacht Club House.

From CONSTANT READER, *Philadelphia, Pa.*—Will some of the architectural friends of the paper kindly send for publication the drawings of a boat house about 16 x 24 feet, two stories high, and suitable to the needs of a yacht club?

Shingling Hips.

From F. A. K., *Alba, Pa.*—In shingling hips I would say I have a very satisfactory method which cannot be without interest to the correspondent making the inquiry in a recent issue. In covering a roof I first lay the two bottom courses, and then draw a line parallel with the hip 4 inches, for example, from the center of the hip. The butts of the shingles are to be brought just to the points where the two lines come together on the roof. Then when the roof has been run up, shingle the hip, making the bottoms of the shingles cross the



Shingling Hips. Fig. 1.—Elevation of Roof, Showing Three Courses of Shingles Laid.

hip, so as to strike the lines on the other angle of the hip square. The shape of shingle is indicated at A of Fig. 1, where is represented an elevation of a portion of a hip roof, while Fig. 2 is a true face showing the shingling lines. The shingles should be of good material and something that will not split. After one side has been laid, take a chisel and flatten the edge of the shingle, so that the one above will fit over it, making a nice job. In this way all nails are covered.

Does the Barn Roof Sweat?

From C. R., *Fillmore, N. Y.*—I had occasion last fall to roof a barn 40 feet long, having about one-third pitch. I used galvanized V crimped iron, and instead of lap-

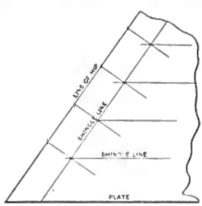
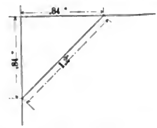


Fig. 2.—True Face of Roof, Showing Shingling Lines

ping, I locked the sheets together and pounded the seams down. Now the roof seems to leak in several places, more especially about two-thirds of the way down the roof. I have been there and used red roof cement on the seams, but the roof still leaks. Could some of your readers who have had experience with iron roofs of this sort suggest a cause for the leak? Can it be possible that the roof sweats?

Rule for Chamfering.

From TUEBOR.—In the April issue are some comments relative to chamfering, and as being of possible interest



Rule for Chamfering.—Fig 1.—Showing Marking on Each Edge of Piece.

in this connection I submit a rule furnished by an old Pennsylvania carpenter: "Take one-sixth the face of the piece for the width of the chamfer." For example, a piazza post is required to be chamfered, the clear hight between the bottom of the frieze and the floor being 8 feet; required the width of the piece and the face of the chamfer: $8' = 96''$ $(96'' \div 12) \times \frac{45.}{50}$ or $0.9 = 8'' \times 0.9 = 7.2''$. $7.2'' \div 6 = 1.2''$, the face of the chamfer. $1.2'' \times \sin 45° = 1.2 \times 0.70711 = 0.848532$, or 0.84 +, to mark on each side from edge of piece, as shown in Fig. 1. This allowance may seem large, as shown on the section, Fig. 2, but when the post or column is viewed from an angle of 45 degrees the chamfer is none too wide. Of course there are exceptions to any rule that may be given. The section of the column indicated represents that of a post for a veranda, the hight in the clear between bottom of frieze and floor being 8 feet, or 96 inches, and the width

Fig. 2.—Partial Section of Post.

of the post 7.2 inches, the width being determined by D. F. Allwood's "Rules for Proportion."

Water Closet Construction.

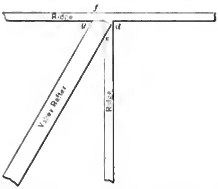
From W. S., *Blue Island, Ill.*—Please explain the difference between the siphon jet closet and the siphon washdown closet.

Answer.—A siphon jet closet is one in which the discharge from the closet bowl into the waste pipe is partially induced by means of a portion of the flushed water entering the discharge passage of the closet at the bottom of the water seal and being directed toward the waste pipe. The object is to induce an overflow into the weir formed by the shape of the outlet in the closet, which makes a practically right angled turn before it reaches the soil pipe connection. The weir retards the flow of the water slightly, so as to fill the full bore of the pipe and prevent air rushing up. The result is a downward movement of water in the stack, having exactly the same effect as that produced in the long leg of the siphon. This enables the atmospheric pressure to exert its force on the surface of the water in the closet bowl, and the contents of the closet are discharged.

In the washdown siphon closet there is no right angled turn acting as a weir to secure the siphonic action. Some washdown closets, however, are induced to discharge by means of a jet. The washdown siphon is really the best form of a hopper and trap combined closely connected. In operation the overflow is sufficiently quick and in large enough volume to set up a siphonic action and exhaust the contents of the bowl.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

From M. T., *Washington, D. C.*—I send the following method in answer to "Learner" of Paterson, N. J., who inquired in the March number how to obtain the bevels



Finding Bevels of Valley Rafters in a Roof Having Two Pitches. —Fig. 1.—Plan of Ridges Where They Intersect.

of valley rafters in a roof of two pitches. I would say first draw a full sized plan or top view of the ridges and valley rafter where they intersect each other, as indicated in Fig. 1. Next lay off the down bevel on the rafter and square across the top, as shown at *a b c* of Fig. 2; take the distance *d e* of Fig. 1 and lay it off square with the down bevel, as shown at *d e* of Fig. 2; then a line drawn from *e* to the point where the center line of the rafter crosses the line *b c* will give the side bevel. For the bevel on the other side take the distance *f g* of Fig. 1 and proceed as before. By this means a bevel can be found for hip, valley, cripple or jack rafters, either straight or curved, in roofs of any pitch, being careful always to lay off the distance *d e* square with the down bevel and not parallel with the edge of the rafter.

From W. S.—The August number of *Carpentry and Building* is at hand, and I see another good answer to my stair rail question. I also observe a very good system of framing a roof, by "J. F. W." of Danville, Pa., whose plan is, I think, a very convenient one, except where he tells how to cut the bevel of the valley to fit against the ridge marked P. The line shown is only the seat of the valley, and when we add the rise of the roof to it the bevel is changed and it is made longer. If he had carried the valley its full length from the lower

Fig. 2.—Obtaining the Bevels

corner to the point where it would strike the ridge, then a bevel in the angle would be the true bevel, as indicated by the dotted lines in the sketch, Fig. 3, inclosed.

Making a Cellar Water Tight.

From L. T. M., *Pottsville, Pa.*—For the information of "F. R.," Coalville, Utah, who asks about a water tight cellar, I would say that I have just completed a dwelling house and had to contend with a wet cellar. Water stood in the cellar and the mud and slush were several inches deep and would not drain off. I finally concluded to cement the cellar bottom and I filled in on top of the mud about 6 inches of concrete, composed of cinders and 2 inches of cement, with a top coat of the best cement. At first water came through the cement, but this ceased when the cement hardened, which took about a week. This composition made the best water tight floor I ever saw. There is not a bit of water to be seen and the cement is much harder than if the cellar had been dry.

From O. A. S., *Elgin, Ill.*—Regarding the inquiry in the August issue of "F. R.," Coalville, Utah, as to the way to make a cellar water tight, I would suggest that the cellar bottom be leveled up with sand and a layer of cement about 2 inches thick laid on, running it well up against the walls. After the cement is dry coat the floor and the walls on the inside with hot asphalt, after which pave with brick dipped in asphalt, covering with another coat. I would then suggest that the outside of the walls be coated with 1 inch of cement, running it down below the cellar floor level and covering this after it is dry with a coat of hot asphalt. I believe that if these instructions are faithfully followed a water proof cellar will result. The plan may prove somewhat expensive, but my opinion is that the job ought to be done well if at all.

Making Half-Tone Engravings.

From S. C., *Texas.*—Will you tell me through the columns of the paper how cuts suitable for relief printing are made from photographs, such, for example, as the half-tones which form the supplement each month? I am sure your answer will be very interesting to a great many of the readers and will be highly appreciated.

Answer.—There are many processes by which engravings or printing plates can be made from the photograph

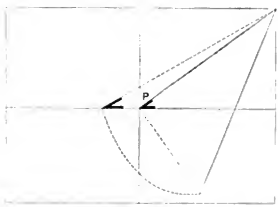


Fig. 3.—Diagram Accompanying Letter of "W S"

as a base. In some cases the photograph is given to a draftsman, sometimes called a pen artist, who makes a line drawing with a pen and a special black ink upon smooth cardboard, reproducing the shades and tones of the original, which drawing is placed in the hands of the photo-engraver, from which a plate is made by photo-mechanical process. The class of pictures known as "half-tone" engravings are made by the photo-mechanical process direct from a photograph without the employment of artistic work in any form.

In the case of the plate which is made from the "line" drawing previously referred to, the drawing is placed in front of the camera and a negative made therefrom in the usual way, with the exception that great density is required. A plate of zinc which has been previously polished to the highest degree is coated with a sensitized solution, of which the principal ingredients are albumen, gelatine and bichromate of ammonia. The coating of the plate must, of course, be conducted in a dark room, where it is kept until thoroughly dried, after which it is placed underneath the negative previously made and placed in the sunlight, or, in the absence of sunlight, close to a powerful electric light, for the purpose of printing the image contained in the negative upon the zinc plate. The action of the light in this printing process is such as to render insoluble those portions of the coated surface which have been acted upon by the light coming through the transparent parts of the negative.

Consequently, when the negative has been removed and the zinc plate placed in the tray of water, those portions upon the plate representing the lines of the original picture will remain upon the plate, while the other portions which have been covered by the dense parts of the negative will immediately dissolve in the water, thereby leaving a picture, or an impression, of the original drawing upon the zinc plate, which after being heated becomes much darker and more plainly visible. After the washing operation has been completed the zinc plate is placed in the etching bath, which consists of a dilute solution of certain acids, when the etching proper begins, the acid eating away those portions of the zinc which are unprotected by the lines of the film, while those portions which have been protected of course remain in relief and furnish the means for producing the impression when the plate is finally put in the printing press. To obtain sufficient depth to the space between the lines to insure good printing qualities, it is sometimes necessary to repeat the etching operation two or three times. After each "bite," as it is called, it is necessary to protect the sides of the lines to prevent the acid from eating under or undermining them. This is accomplished by means of a finely powdered gum dusted on in a peculiar manner, after which the plate is heated to make the gum stick to the sides of the lines.

In making the half-tone engraving the active agent in producing the effect is a glass screen, upon which fine opaque lines have been ruled or engraved very closely at right angles to each other. The effect produced by these lines in the plate can be seen by inspecting any half-tone engraving with the assistance of a magnifying glass. It will be seen by such an inspection that in the light portions of the picture the "tint" consists of a series of very small dots arranged in regular lines or squares. In those portions of the picture where the "tint" is darker the dots will be larger and will appear nearly square, forming a sort of checker board pattern. In the still darker portions of the picture the enlargement of the dots causes them to close completely at the corners, leaving some white dots upon a darker background, which white dots become smaller as we approach the darkest portions in the picture. The negative for the half-tone engraving is made in the same manner as for the "line" drawing above described, with the exception that the glass screen is placed in the camera a slight distance in front of the sensitive plate during the time the exposure is being made. The success of the work depends largely upon regulating the distance between the glass screen and the sensitive plate, which varies under different circumstances from 1/8 to 3/8 inch. The effect of this screen upon the negative is to transform the "tints" of the photograph into the large, medium and small dots seen in the engraving, according as the portions of the photograph are dark, medium or light. This negative, having been completed and sufficiently intensified in the usual manner, is used in subsequently printing upon the metal in the manner above described in connection with the "line" negative.

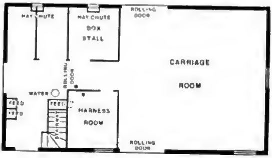
Copper is used in preference to zinc for half-tone work. The treatment of the two metals is similar, but different in detail, different acids being employed, and certain modifications in the sensitizing solution are also made.

Does the Barn Harmonize with the House?

From RURAL SCRATCH AWL, *Smith Center, Kan.*—I am sending under separate cover "snap shots" of a house and barn located in this place. The house was remodeled from plans furnished by the architect and I was then asked to construct a barn from the floor plan, to harmonize with the house. The first photograph shows the house and barn together, while the second picture represents a nearer view of the barn. The plan gives a general idea of the interior arrangement of the main floor. I desire to know what changes, in the opinion of others, would be an improvement. The cupola is supposed to be finished with a metal horse. The roof is half pitch, while that of the cupola is 15 inches to the foot.

Showing Relative Position of House and Barn.

General View of Barn.



Floor Plan

Does the Barn Harmonize with the House?

Troubled by Wall Sweating.

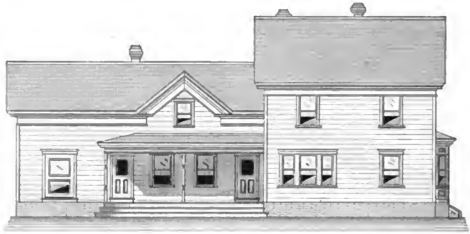
From B. W., *Innerkip, Ont.*—I have a customer who has a rough cast hollow wall house. It is finished with lath and plaster on the inside and has the same finish on the outside. The walls sweat so much in the winter time that the bed clothes become wet and water can be scooped up on the floor. The house is of frame construction and is girt half way up the side of the building. The front is one and a half story, while the kitchen is but one story in hight. There is just as much trouble in the kitchen as in the front room from the sweating The walls are hollow from top to bottom. On one side there is a row of five maple trees 20 feet from the house. On the other side there is a driveway between the house and another row of five trees from 35 to 40 feet from the house. Can it be that the trees cause the trouble? I should be glad to have any assistance possible toward remedying it.

Note.—The sweating is probably due to the fact that the walls, being cooler than the atmosphere of the room, cause the moisture contained in the air to condense. Where moisture is precipitated in such quantity as that mentioned there is obviously an excessive amount of it in the air. In the winter season the walls naturally are cooler than in the summer, which would induce a quicker condensation. Inasmuch as the doors and windows are closed in the winter season, the amount of moisture in the air can be controlled by the occupants of the building. If a tea kettle is kept on the cooking stove and the stove is used for boiling and preparing food or for any domestic work of that nature, considerable steam will be made, which will be taken up by the air in the room and deposited wherever the air comes in contact with a cool surface. We shall be glad to hear from our readers on this matter, as it is possible some of them have experienced the same trouble as that mentioned.

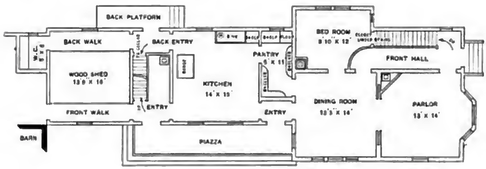
Designs for Farm Houses.

From W. A. E., *East Waterford, Maine.*—Having seen the inquiries of some of the readers of the paper for plans

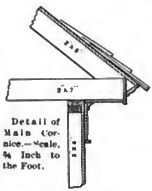
Front or East Elevation.



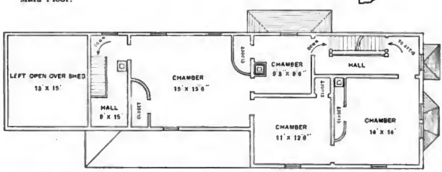
Side (Left) Elevation.



Main Floor.



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



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

Designs for Farm Houses.—Contributed by "W. A. E.," East Waterford, Maine.

of buildings suitable for farm and country homes, I take pleasure in inclosing floor plans and elevations of a house and "L" which may help out some of those who are looking for such designs. I have drawn the plans to have a southern and eastern frontage with the barn facing the east. An examination of the first-floor plan will show the line of the barn sills and that a one-roofed shed may be extended beyond the woodshed and joined to the wall of the barn as far as desired in order to enlarge the woodshed and other outbuildings, &c.

The small chamber or bedroom on the first floor of the main house may be used as a bathroom if desired, although the chamber in the "L" is large enough for division into a bathroom and bedroom or into two small bedrooms, according to circumstances. A casual study of the elevations shows that the roofs are all plain, as they are more durable and suitable for such buildings. I think the drawings show so clearly what is intended as to require no further description for any good carpenter to understand them.

Construction of Coved Ceiling.

From G. A. N., *Owatonna, Minn.*—Will some one please tell me how to accurately obtain a hip circle—that is, where a quarter circle is used in a brick building next to the ceiling and the wall. I am anxious to find out how to draw the circle on the bracket which goes in the corner.

Note.—This is a question which affords an opportunity for some of our practical readers to show their methods of doing the work, and we trust all will feel free to write us, accompanying their letters by such sketches as may be necessary.

Cleaning Skylight Glass.

From SKYLIGHT.—Some time ago a correspondent wanted to know how to clean skylight glass, but so many things occur to occupy my time that weeks often pass before I find opportunity to offer suggestions which I think may possibly prove of value. I would ask if the dust referred to as being ground into the glass might not be stains from iron rust or zinc corrosion from the galvanized sheet iron frame, which I assume forms the skylight. I think that if the correspondent making the inquiry will wash his windows with a solution composed of a handful of oxalic acid in a pail of water he will find that the dirt will disappear. Another method is to cover the glass with sand that has been brushed off of foundry castings and wet to a stiff mud with a weak solution of sulphuric acid and water. The acid will cut the stain if allowed to lie for a few minutes before it is washed off with clean water. A slight scouring may be necessary, then a thorough washing. An important part of the work is to polish the glass with a soft woolen rag so that the dirt will not readily adhere again. A little ammonia in the water that is used for the washing may prove of advantage.

WHAT BUILDERS ARE DOING.

THE figures covering building improvements in Chicago during the month of July do not make quite as favorable a showing as those for June, although when compared with July of last year the gain is very marked. The bulk of the building operations in July of the present year is made up of flats and one, two and three story houses, the flats predominating. During the month permits were taken out for 547 buildings having an aggregate frontage of 15,308 feet and estimated to cost $3,165,390, these figures comparing with 346 permits for buildings having a frontage of 9807 feet and estimated to cost $2,108,800 in July of last year.

The notice from the National Association of Builders that September 11 has been selected as Architects and Builders' Day at the Buffalo Exposition was considered by the Board of Directors of the Builders and Traders' Exchange on August 3. It was ordered that the notice be posted in the exchange rooms with the request that the members contemplating attending the exposition choose that day and that they record their names with the secretary of the exchange to the end that concerted action may be had for them to go as a body representative of the exchange.

Cincinnati, Ohio.

The year thus far has been characterized by an increased activity in the building line, each month showing a healthy increase over the amount of improvements last year. Most of the architects in the city have new work under preparation, and the present indications are that Cincinnati will have one of the most prosperous years in the building line which it has experienced for a decade.

Charles A. Tooker, Inspector of Buildings, reports that for July there were 318 permits issued for building improvements, estimated to cost $287,375, as against 326 permits for buildings estimated to cost $226,336 for July of last year.

Cleveland, Ohio.

The regular quarterly meeting of the Builders' Exchange was held on Monday evening, August 5, when it was decided that the exchange could not attend the Pan-American Exposition on Architects and Builders' Day, owing to the fact that the date has unfortunately been chosen during the week of the G. A. R. National Encampment in Cleveland; otherwise a large delegation would undoubtedly have gone to Buffalo.

The management of the exchange cordially invites all members of the building fraternity throughout the United States to make the spacious rooms of the exchange on the third floor of the Chamber of Commerce Building fronting on the Public Square their headquarters while in Cleveland attending the G. A. R. Encampment. We are advised by the secretary, E. A. Roberts, that the exchange will be glad if intending visitors will have their mail addressed in care of the exchange and make the exchange their rendezvous from day to day. A committee of 15 members of the Builders' Exchange will be detailed to assist visiting Grand Army builders to have a good time.

At the quarterly meeting referred to, the exchange took important action in indorsing the efforts of the Ohio State Board of Commerce to secure the passage by the next Legislature of three sweeping and far reaching measures. Other important matters were also discussed and a nominating committee was named to select candidates for the directorship of the exchange, consisting of Henry Watterson, W. H. Dettleback and W. H. Waterbury. The candidates selected by the committee will be voted upon at the annual meeting in November. C. W. McCormack was chosen as the Cleveland representative upon the Executive Committee of the State organization.

The report of Treasurer Palmer was one of the most encouraging in the history of the exchange, the statement showing over $6000 in cash assets to be available. Following the business session the members enjoyed their annual watermelon feast.

Detroit, Mich.

The building situation in the city has shown, up to the present time, a great improvement over last year, with indications pointing to still greater activity in the future. The report issued by C. W. Brand, permit clerk, for July shows 200 permits to have been issued for buildings, estimated to cost $377,800, as compared with 192 for buildings estimated to cost $318,300 in July of last year.

The members of the Builders and Traders' Exchange have not yet formulated any definite plans looking to their visiting in a body the Pan-American Exposition on Architects and Builders' Day, which occurs on September 11. It is probable, however, that the local organization will be represented on that occasion.

Fresno, Cal.

The contest between the Carpenters' and Bricklayers' unions and fourteen of the principal contractors of Fresno has been demoralizing building there. The dispute is over hours of work and recognition of the Federated Trades Council. The contractors met early in July and resolved to hold out to the bitter end. Practically all building operations have ceased. The Trades Council has declared a boycott on certain firms and contractors.

Honolulu, H. I.

Building is very active in Honolulu, and a small sized "boom" is now in progress. Architects have been pushed in the work of preparation of plans and specifications and have paved the way for an immense amount of building which will continue for several months. Along the main thoroughfares, such as Fort, King, Alakea and Hotel streets, together with numbers of residence streets, new buildings of the modern type and copied after the California style are in course of construction. In many instances the new dwellings do not seem well adapted to the needs of a tropical climate, which Honolulu possesses, and there is a cry among newcomers for houses better adapted to the climate. A box-like house constructed on the California plan does not meet the requirements of life in these islands, the low, rambling cottage, punctured by many windows, being probably a nearer approach to an abode of comfort that could be built here, but with the influx of Americans architecture has taken on an American style.

Lowell, Mass.

The annual "outing" of the Builders' Exchange, held at Bass Point, Nahant, was a most enjoyable affair. There was a large gathering of members and their guests, the latter including many gentlemen identified with the city's building interests.

As a result of a conference held in July at the Builders' Exchange between the Master Plasterers' Association and the Plasterers' Union, the journeymen plasterers returned to work at the former hours and wages, thus ending a 14 weeks' struggle. While the friction between employers and employed tended to curtail what promised in the spring to be a large business, the indications now are for an active fall.

It is a noticeable fact that the architects are looking upon the membership of the exchange as a whole with more appreciation. The requirements of admission to the exchange are such that no reliable firm should keep out on the plea of "It is of no benefit to me," as its usefulness has been clearly demonstrated during the past few months. Another fact which redounds to the credit of some of the general contractors of the exchange is a tendency to give the subcontracts to members and thus encourage the standing of the exchange and keep alive an organization that has for its prime object the protection of the interests of all concerned. Work placed in the hands of reliable and responsible firms can but prove the cheapest in the end, if not always on first cost, as represented by the bids for contracts. This fact is too often lost sight of by architects and owners, for good work is worth its price.

Our correspondent expresses the wish that some power could be used to instill the above idea into the minds of owners, who seem to regard cheapness as the only consideration in building construction. In the city the banks are becoming cautious in the matter of loans on buildings erected on the speculative or cheap contractor methods. Experience has been indeed a dear teacher in the past few years, and the local tendency is now toward better construction.

The Board of Directors of the exchange have just issued a circular letter to the membership, reviewing exchange matters, dealing with the strikes which have prevailed and proposing methods which are expected to still further redound to the credit of the organization in the future. With regard to Architects and Builders' Day at the Pan-American Exposition, there is every reason to believe that the exchange will be represented, although at the time of going to press no action had been taken as to attending in a body.

Philadelphia, Pa.

The amount of building in progress in and about the city continues to show a large volume in the aggregate, the development of suburban property being especially noticeable. The report of the Bureau of Building Inspection for the month of July shows 799 permits to have been issued, covering 1202 operations, involving an estimated expenditure of $2,811,320, which record, with the exception of that for July, 1896, when 615 permits were issued covering 1267 operations, costing $3,041,565, eclipses that of any corresponding July in the history of the bureau. It is stated that more than one-third of the work in progress lies within the boundaries of the Eighth and Thirty-third wards, the large figures in which are due in a measure to the theatre for B. F. Keith, now under way on Chestnut street, the numerous dwelling operations in the suburbs, and the erection of several factories.

One of the operations in the Thirty-third Ward includes 45 houses for H. H. Downsbrough, to cost about $110,000, while another, in the same ward, covers 81 two-story houses and three two-story stores and dwellings for John Loughran, estimated to cost nearly $220,000. In the Thirty-fourth ward William A. Patterson is erecting 44 two-story houses, while George W. Haney is erecting 30 two-story houses on Priscilla street. One of the more important operations in the Twenty-fifth ward includes 17 two-story houses, which are being put up for E. R. Galloway.

If present plans are carried out, about 150 members of the Master Builders' Exchange and their friends will leave the city September 9 for a visit to the Pan-American Exposition. They expect to spend Tuesday, September 10, at Niagara Falls, and visit the exposition on Architects and Builders' Day, which is September 11. They will also devote Thursday, September 12, to the exposition, and will leave for home that night, reaching Philadelphia September 13.

Pittsburgh, Pa.

The building activity which prevails in and about the city shows no signs of diminution, although contractors rather looked for a little easing up during July and August. It is probably safe to say that the amount of work for the year, if the present rate of activity continues, will be far in excess of any corresponding period in the history of the city. Dealers in all kinds of builders' materials report an active demand for their goods, and the claim is even made that many projects are being somewhat retarded by reason of the shortage of supplies. Some of the builders hold the view that if the present activity is maintained for a few months more, there is likely to be difficulty in obtaining brick, to say nothing of other building materials, and there are also intimations of a scarcity of workmen in certain lines. Of course, just how long the present condition of things is likely to continue is a mere matter of conjecture.

Superintendent J. A. A. Brown of the Bureau of Building Inspection reports that for the month of July permits were issued for 197 buildings, involving an estimated expenditure of $1,717,075, these figures comparing with 234 permits for buildings, estimated to cost $749,000, for July of last year. The July report of the Allegheny Bureau of Building Inspection shows 599 permits to have been issued, calling for an estimated outlay of $203,300. This showing is referred to as being exceptionally good for this season of the year.

The Kelley & Jones Company are about erecting, on Water street, Pittsburgh, a ten-story steel frame fire proof brick warehouse, which will be the tallest structure on that street and will add very much to the appearance of the river front, where large and modern structures are few and far between. A fine apartment house is soon to be erected on Forbes street, East End, by William Witherow, proprietor of the Hotel Duquesne, which will be first class in all respects. It will cover an area 100 x 180 feet and will cost several hundred thousand dollars. It will be of steel frame construction, finished throughout in hard wood, heated by steam, lighted by electricity and equipped with high-speed elevators.

A great deal of work is being done in the way of developing suburban property, and the operations under way aggregate a large total. One of the largest projects undertaken in Allegheny in many years is about to be commenced in the Perrysville avenue district, where it is expected 46 houses, costing in the aggregate about $190,000, will soon be under way. In the Herron Hill district, arrangements are being made to erect 20 brick buildings costing about $75,000, while in the Riverview Park district, Allegheny, 15 brick houses are contemplated.

St. Louis, Mo.

The latter part of July and the first half of August, usually counted as a dull season in the building business, opened up better than for years past, but the indications are that business will fall off some, to be recovered later on. The extremely hot weather had a bad effect on investments and was a factor in renting also. Builders have, however, been unprecedentedly active, thousands of contracts having been closed in the past three months, and work will be carried on to completion. The steel strike is affecting the building industry to some extent, and if continued will affect it seriously. Bricklayers, plasterers and men of other crafts are in good demand at wages in advance of the union scale.

Valuations of building permits issued in July amount to $1,498,283, against $441,727 last July—an increase of $1,056,556. The valuation of new brick buildings authorized in July was $1,386,603, against $350,620 a year ago.

While no concerted action will be taken by master builders regarding attendance at Buffalo on Architects and Builders' Day, quite a number of contractors expect to be present on that occasion.

San Francisco, Cal.

Our correspondent, writing under date of August 6, states that with nearly 25,000 men on strike in San Francisco and nearly all the shipping and transportation business of the city crippled in consequence, it is not to be expected that building operations would be up to the usual standard of activity, although thus far none of the important building trades are involved.

The San Francisco Federation of Labor has, however, called out the union sand teamsters and will attempt to tie up building operations by stopping all deliveries of sand, rock, cement, &c. The union painters in San Francisco and Oakland have also struck for a minimum wage scale of $3.50, instead of $3. The latter strike, it is believed, will not be general, as many employing painters are already paying the higher rate. Trade is quite active in brick and stone and in wood. The building contracts for July show a healthy growth as compared with preceding months, a large part of the showing being for flats and small residences for renting purposes.

According to the law passed by the last Legislature, all architects practicing in this State will, after September 23, be obliged to have a certificate of proficiency in their profession. The State Board of Architects is divided into two sections, one with headquarters in this city and the other with headquarters in Los Angeles. Regular examinations will be held on the first Tuesdays of January, April, July and October.

Salt Lake City, Utah.

Salt Lake City has been afflicted with a brick famine for several months past, says our correspondent, under date of August 6. Manufacturers find it impossible to keep up with their orders, and building in this line is somewhat demoralized in consequence. In the meantime there seems to be no let up in the demand for builders and building material. Contractors state that building mechanics are coming to Salt Lake in unusual numbers, no less than 40 carpenters having reached the city within the last month. This has relieved the situation somewhat as to workmen, but the question of materials is still an unsolved one.

Scranton, Pa.

The building business of the city is not as brisk as it might be just at this season, although there is more or less work in the way of dwellings. A few large buildings are being erected, but these are what might be termed continuances from last year. The agreement between the Master Masons' Association and the Journeyman Bricklayers' Union, and that between the journeymen and Master Carpenters' associations, which were entered into a short time ago, provide that all differences shall be settled by arbitration, and that there shall be no strike against the employer individually or collectively, or in sympathy with any other trades.

The Builders' Exchange adjourned in July and will not meet again until September 8, so that nothing very definite can be ascertained as to the number of members likely to attend the Pan-American Exposition on Architects and Builders' Day, September 11. A bulletin, however, has been posted calling attention to the matter, and quite a number of the builders have expressed their intentions of attending on that day.

Seattle, Wash.

Seattle builders are beginning to complain that the strikes in the iron trade are having a serious effect on building. Structural steel for the larger class of buildings is hard to get in some cases, and delays have caused construction to be delayed for months. Another serious effect of the strikes that is feared, though not yet very evident, is the falling off in residence building that is sure to result from the prolonged idleness of a considerable portion of the laboring population.

This city, which has hitherto been free from the modern skyscraper, is now going to make a first step in that direction. The Moore Investment Company have matured plans for an eight-story building to be erected here, and there is talk of putting up another structure several stories higher.

Spokane, Wash.

Everything indicates that Spokane will make a bigger record in the matter of building permits this year than in 1900. Last year 357 building permits were issued during the first six months, making a total of $498,045 represented, but this year there have been 582 permits issued from January 1 to July 1, making a total showing of $923,061 for the first six months. Last year there were 20 per cent. more building permits issued during the latter part of the year than during the first half, and if this holds true this year it will make the total amount about $2,076,887.

Worcester, Mass.

Building operations continue in a quiet way, as might naturally be expected at this season of the year. The report of Superintendent C. H. Peck shows that for the month of July 50 permits were granted for new buildings, estimated to cost $315,200, and 13 permits for alterations and repairs, estimated to cost $9455, making a total for the month of $324,655. The work consisted for the most part of tenement houses and dwellings.

It is probable that the Builders' Exchange will be creditably represented at the Pan-American Exposition on September 11, which is Architects and Builders' Day, although there will be no concerted action looking to the members attending in a body.

Youngstown, Ohio.

The Youngstown Builders' Exchange is said to have accepted an invitation from the Central Labor Union to take part in the Labor Day celebration at the Fair Grounds. It appears that a short time ago an invitation to participate was extended to the Builders' Exchange, as the Central Labor Union desire to make the occasion a success, and it is believed that the presence of the employers in the building trades would have much to do with accomplishing the desired end. The Builders' Exchange, through President Charles A. Collins and Secretary George T. Bert, accepted the invitation, and desired to be informed of the arrangements that are being made. Labor Day is therefore likely to see employers and employed uniting in the celebration of the day set apart as sacred to the interests of labor.

Notes.

The directors of the Builders' Exchange at Atlantic City, N. J., voted at a recent meeting that on and after Monday, August 5, eight hours shall constitute a working day for carpenters. This action, we understand, is in fulfillment of a promise made by the contractors to the men, who stood by them during the carpenters' strike for eight hours last spring.

Building activity is increasing in Manchester, N. H., and while the amount of new work which has been executed during the first half of the year is not startling when compared with other cities, it shows a gratifying gain over the same period of a year ago.

Janesville, Wis., has been enjoying one of the biggest building booms that the city has ever known in a single year. It is said that there are in course of construction and in contemplation nearly half a million dollars' worth of buildings.

A LOCAL paper is authority for the statement that a new record for speed in the setting of granite in Chicago was made in the work on the new Post Office Building. In a month's time 22,000 cubic feet of granite were put in place and 300,000 brick were laid on the walls.

THE ART OF WOOD TURNING.—XX.

(SECOND SERIES.)

By Fred. T. Hodgson.

THIS description completes the cutter in its simplest form, and it will now be necessary to show the method by which the whole of the working parts are governed and placed under complete control. This is effected by the worm wheel and the tangent screw, the former attached to the boss behind the face plate, while the frame which carries the screw is hinged to work on a vertical projection fixed to the collar on the square stem. A back view of the instrument is shown in Fig. 141, which will at once convey to the reader an idea of the construction.

The instrument as completed in its primary form, or as we have it, as already described, produces a large number of very beautiful figures of the description confined to very fine line tracery, and, as said before, there is practically no limit to the extent and variety to which such work can be developed, and the excellence of all such patterns is always more advantageously exhibited when printed from the blocks cut in the lathe. Ornamental designs for fine lace and textile fabrics and paper and other ornamentation may be, and often are, obtained from these blocks, besides the gratification it affords in producing them.

Beautiful, however, as are such results, the instrument is limited somewhat in value, from the fact that in this state it is confined to this class of work; only a certain depth beyond the actual printing line may be cut; by the principle upon which the construction of the instrument is carried out, anything of an appreciable depth creates a considerable strain on the many parts and is likely to produce complications of the same. If the instrument is provided with the means now about to be explained, the same patterns, when they are suitable in design, may be cut to such a depth that the whole effect is entirely changed, first by cutting the design deeply into the surface of the work, and then removing the surplus material, by which the work or figure is left in relief on the surface, instead of in intaglio.

To effect this result it is obviously necessary that the combined motions of the instruments are made to travel precisely the same course, but at a slow rate of speed, which the introduction of the present arrangement provides, and it will be clearly seen that by its employment the two parallel movements are in no way influenced with regard to their value one to the other; but the speed at which they move is placed entirely under the control of the operator, by conducting motion to the same by a winch handle. By this means a slow, continuous traverse or a series of partial rotations may be obtained, to accommodate the class of work it is desired to decorate.

The above brief description will, I hope, make clear the advantages of completing the instrument to this extent, and by following the drawings and details it will be found a simple thing to accomplish.

Fig. 142 shows the worm wheel, which is made of gun metal and is turned out at the center to 1 3-16 inches diameter, the hollow at the back of the bars on plate being very carefully turned down to receive it, leaving a shoulder or face for the wheel to receive and bear against it; it is then fixed to the bars by two screws with countersunk heads, A A, Fig. 142. These screws must have their heads either perfectly level with the face of the wheels or, preferably, slightly under the surface, as they have to pass the vertical plate during the revolution of the wheel. On the periphery of the wheel, the diameter of which must be 2¾ inches and whose width is ⅝ inch, 140 teeth are cut, and the edge is divided into equal parts to denote its semirotation.

We have now the wheel attached, and from this the projecting plate, Fig. 143, may be attached and fixed in its place. Reference to the drawing will show that it is cut out at A to fit over the square stem, and is fixed to the face of the flange attached in the solid to it (the stem) by a screw on each side, each countersunk into the plate. The latter is carried upward sufficiently high to admit of the frame, Figs. 144 and 145, being placed across the stem at a right angle, in order that the tangent screw may assume a like position when in gear and ready for use.

The screw is fitted to the metal frame in the manner shown in Fig. 146; it is the simplest and most effective way. The right hand end of frame is cut out, as seen in Fig. 145, to receive the plain fitting turned in the screw, Fig. 146, at A. This must fit well between the two faces B and C, Fig. 144, and the face of the screw is retained in its place by a small center screw, D, at the opposite end, as shown in Fig. 147. The collar of the screw is chamfered at B, Fig. 146, to receive the divisions which form the micrometer to subdivide the movements, and the end terminates in a square, for the purpose of carrying a winch handle. The micrometer is divided into four equal parts and figured 0, 1, 2, 3.

With the frame and screw thus far completed, we may proceed to get it hinged to its place. To do this first lay the screw and frame in gear with the teeth of the wheel square across the top, then drill a hole below the center line, which allows the screw to become released with less elevation. When this hole is drilled, again lay the screw in its place, and when correctly adjusted, mark off the hole in the frame E, Fig. 144, which is tapped. Care should be taken to have the plain hole in the steel plate larger than the outer diameter of the screw, as by that means we get a longer face for the screw to bear against. The screw is then well fitted to B, Fig. 143, and so adjusted that when home in its place a bearing between the face of the metal frame and the screw head is created, and it is between these two surfaces that the frame is hinged and works. Proceeding, we come to the manner of holding it in and out of gear, whichever position is required. A short curved slot, seen at C, Fig. 143, is cut out, being described from the center of the hole B, which receives the screw that forms

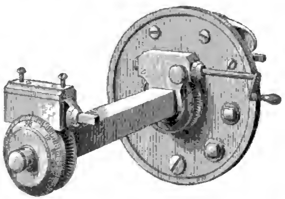


Fig. 141.—Rear View of Epicycloidal Cutter.

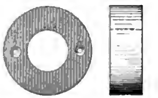


Fig. 142.—Blank for Worm Wheel.

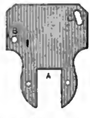


Fig. 143.—The Projecting Plate.

Figs 144 and 145.—Side and End Views of Frame.

The Art of Wood Turning.

the hinge. A milled head screw, Fig. 148, then passes through the plate into the frame, and by this it is clamped, either in or out of gear, as follows: When it is required to move the tangent screw from contact with the worm wheel release the milled head screw, and by this raise the frame until free of the screw, and again clamp it to the plate. This done, it will be seen that the instrument remains the same as before the introduction of the wheel—that is, perfectly independent of it, and free from any obstruction whatever. On the other hand, when the slow movement is required, we have only to lower the screw into gear and refix it, by which all or any movement of the main plate is stayed, except when under the influence of the winch handle. It will be seen that the end of the screw, Fig. 146, is lengthened, which is necessitated because of the throw of the winch handle, which is required to pass the extreme diameter of the main plate when in motion. Having thus far completed the instrument, let us see the result of our additions. We find that by turning the winch handle, when the screw is in gear, the tool box and, of course, the cutting tool therein, traverses over exactly the same course as when revolved by the band from overhead in the usual way, and this without reference to the train of wheels that may be employed; these are quite uninfluenced by what we have added. Reference to the shaded engrav-

Fig. 146. Stem Screw.

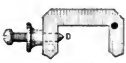


Fig. 147.—Back of Frame. Fig. 148.—Mill Headed Screw.

The Art of Wood Turning.

ing, Fig. 141, will show the full view of the arrrangement in gear, with the winch handle ready for use.

It may be well now to briefly consider the developments referred to, which consist in the ability to divide and subdivide the work in hand. It has been shown that the worm wheel is provided with 140 teeth, the periphery of the same being also divided by a line at every tooth, giving a corresponding number of reading lines, with numerals at every tooth line, and an indicator at every intermediate fifth line, in the shape of a small dot over it. As described, the chamfered collar of the tangent screw, Fig. 146, being divided into four equal parts, we have the facility for obtaining almost any subdivision of the pattern that can be required.

A steel index is fitted to the end of the tangent frame, as seen in Fig. 144, marked H, and fixed with a small screw. It is made to fit round the edge of the wheel and extend a short distance, as seen.

We have now before us the power of conducting the course of the tool over work at a suitable speed, coupled with the necessary means of dividing and subdividing the work into as many equal parts as may be desired to execute, and it will now devolve upon me, in conclusion, to give some details regarding the making of revolving tools to be used in conjunction with this instrument, and to notice the requirement of the overhead motion to facilitate the efficient working of the machine.

THE Division of Forestry has just issued what is known as Bulletin No. 30, entitled "A Forest Working Plan for Township 40," in which the working plan proper is preceded by a discussion of conservative lumbering and the water supply, by Frederick H. Newell, hydrographer, United States Geological Survey. Another important feature of the bulletin is the working plan for conservative lumbering on Township 40, Hamilton County, New York State Forest Preserve, prepared by the Division of Forestry in co-operation with the State of New York. This is said to be the first instance of co-operation in practical forest management between the Federal Government and that of any State. The bulletin is also notable in that it contains the first detailed study of a problem in lumbering by a practical lumberman, to be published by the Division of Forestry or elsewhere, as far as known.

Theory and Practice in House Designs.

It is evident from the experience of those who have come in contact with people who are about to build houses for their own use that certain theories, which, when advanced, are apt to receive practically universal assent, are almost as generally treated as mere abstractions when the chance comes to put them into actual practice. This is illustrated in providing for such a common feature of a house as its ventilation. There is no one who claims to be civilized but will agree that there should be abundant facilities for light and air in all dwelling houses, and yet when the opportunity comes to give a practical demonstration most people abandon their theories without a sigh rather than to go without some freak of fashion which they know is in the houses of their neighbors.

In the same way people will be uncomfortable in their person and suffer actual pain rather than not to wear some article of clothing which happens to be in the style. The degree to which fashion dictates the kind of house one should build, and how it should be furnished, is quite as far reaching and fully as arbitrary and tyrannical as any edict of the sort relative to wearing apparel. However, at this time, when building plans are apt to be considered, it might prove to be of help to some one who is trying to rid himself or herself of the tyranny of fashion or of public opinion, or whatever it may be that makes one do things contrary to his judgment and good sense, to lay emphasis on the importance of giving prime consideration to climatic conditions in the planning of houses.

A house that is not comfortable in summer, or at least as much so as is possible, is not a suitable living place for the average resident of this city, says a Washington paper. There should be wide openings, and the sashes so hung that practically the entire spaces can be used, and then there should be a chance for the air, in the event any is moving, to sweep through the house from end to end. The series of boxes of the average city interior provide habitations about as livable during the hot season as the sunny side of a tin roof.

Labor Situation in Great Britain.

IN a recent bulletin issued by Carroll D. Wright, United States Commissioner of Labor, some interesting statistics are given covering the labor situation in Great Britain in the year 1899. One remarkable fact developed by these statistics is that of the total changes in the line of increase of wages and reduction of the hours of labor only 3 per cent. were secured through strikes. Of 1,175,576 individuals affected by such changes in the year 1899 only 34,273 had their wages increased in consequence of strikes, and of the whole number affected by changes in wages only 1132 had their wages reduced. The net results of all the changes last year showed an aggregate increase in the wages of working people in Great Britain of over $442,000 per week, the average increase per week for each employee being 37½ cents. Another interesting feature connected with this showing is that 53 per cent. of the employees affected by changes had their wages increased as the result of direct negotiation. In 32 per cent. they were the result of arbitration, mediation or other forms of conciliation, and in 15 per cent. they were the result of the automatic action of sliding scales. The improvement in the condition of the British workmen during the past seven years has been remarkable, wages having steadily increased during that period, while the hours of labor have been cut down in corresponding ratio.

HINTS ON ESTIMATING PAINTING.

THE general subject of estimating is one in which builders and contractors are always interested, and while they are not called upon to do the work of painting, it is desirable that they should know how to estimate the amount of surface to be covered by the painter. The suggestions offered by a correspondent of the *Painters' Magazine* touching this matter may not be without suggestion to many of our readers: Be careful, in estimating from plans, to read the carpenter's, mill man's and stair builder's specifications to see if, by any chance, there may not be some wood work which will require painting, but which is not mentioned in the painter's specifications nor indicated on the plans. Things to look for particularly are wainscots, sets of drawers in closets, kitchen and pantry dressers, hall or window sets, storm sash or storm doors, inside blinds, panel backs and boxes for inside blinds, and bathroom and storeroom fittings. Find out whether you will be required to finish the mantels. Look carefully to see whether dimensions of moldings are specified under the head of mill work, and try to gain some idea of their general form. If you have never bid in that office before, question some mill man who has worked from that architect's drawings, to find out whether the moldings are apt to be broad and simple in their lines or whether they will be full of quirks and narrow fillets. There's a good deal of difference in the amount of time required for finishing a 5-inch window trim that is an almost flat surface or one that is reeded or broken up into deep hollows and small members.

Look carefully under the mill man's specifications to find whether any of the doors are to be glazed. This is frequently mentioned under mill work and not under the painting, even when the painter takes the contract to furnish the glass.

Look under the carpenter's specifications to see whether shingle stains are called for. Some architects always mention the stains when specifying the quality of the shingles, but the carpenter will not include them in his bid, and will rightly hold that this work belongs to the painter.

Count the windows carefully, both on plans and elevations, and check up one against the other. Sometimes the same window appears on the plans for two different stories, if it happens to be between the two. If there is any discrepancy which you cannot reconcile, ask the architect. It is better to be sure before you hand in your bid than to find out afterward that you had not included several large lights of plate glass, or lose the contract by counting them twice.

Look in the specifications for wooden cornices, ceilings, picture moldings and chair rails. A few words under the head of mill work may often mean a good deal of work which you might readily overlook.

If any plaster work is to be painted, look over the plasterer's specifications to see whether there are cornices, centers or other elaborate work.

Where glass dimensions are not figured, but where brick openings are, look under the mill work to see whether the frames of the windows are to be plank front or reveal. If the former, you can safely deduct 12 inches from the total width of opening as the total width of glass, and 14 inches for the hight. If this is in more than one light, deduct ¼ inch for each muntin and 1 inch for the meeting rail. If the frames are reveal, you can count on the total width of the glass opening being from 7 to 8 inches less than the opening figured for brick work. The total glass hight will be about 9 inches less. Do not, in any case where brick openings are figured, count upon the mill man favoring you so that glass sizes will come out even. The openings are figured to run even bricks, which are much harder to cut than glass, and not one draftsman in a dozen will think of the painter when it comes to working up the full sized details.

When estimating on repainting an existing building, if it is brick, an approximate estimate of the hight, which is very close to being absolutely accurate, can be made by counting brick courses. Philadelphia pressed bricks, and most common bricks, will run 2½ inches to each brick course, including the mortar joint. For Pompeiian and Roman bricks measure five courses and divide by five, to get the average. In counting it is much easier to count the vertical joints than the horizontal. Take the next row of joints to any corner—where the half brick comes—and count. It will help you if you point with a rule or pencil as you count. Twice the number of vertical joints will be the number of brick courses. First count from the bottom up, and then, to check up the measurement, begin at the top and count down.

To get at the hight of a frame building, measure the width of one of the clapboards—not the bottom one—and count the number of boards. Sometimes the spacing varies a trifle to make the boards come even at the windows, but it will be less than the width of one board in the whole hight of a building.

To estimate the hight of a steeple, chimney or other tall object which you will have to repair, and which will probably require scaffolding, take two poles, one 10 feet long and the other 3 feet long. Get a man to hold the 10-foot pole perfectly vertical—a plumb bob will be of service—at a distance from the foot of the steeple roughly equal to its hight. It may be nearer or further off, depending on circumstances. Then move backward, and set the 3-foot stick vertically on the ground at such a distance that, sighting over the top of it and over the top of the 10-foot pole, you will just see the top of the chimney or steeple. A tack or pin on top of each make convenient points to sight over. Next measure the exact distance between the two poles and between the point at which the 3-foot stick has rested and the foot of the steeple. Of course, this can be done only on level ground. Multiply the total distance from your eye to the base of the steeple by seven—the difference in hight of the two poles—and divide the product by the distance between your standpoint and the base of the 10-foot pole. By adding 3 feet (or the hight of the short pole) to the quotient, you will get the hight of the chimney or steeple. If you use a tape divided into feet and tenths, the arithmetical operations will be simpler than if you use feet and inches.

A Concrete Pile Foundation.

A most interesting form of pile for the foundations of heavy buildings, piers, bridges, docks, &c., has recently been brought out in Chicago in the shape of what is known as the Raymond concrete pile. This form of foundation was recently tested with such satisfactory results that concrete piles were specified instead of wooden ones to support the nine-story apartment house now in process of erection at Fiftieth street and Ninth avenue, in accordance with plans drawn by S. S. Beman, a prominent architect of the city named. This structure will rest upon 350 piles which have recently been put in place by the Raymond Concrete Company of Chicago. The concrete pile is made of taper form and is produced by means of a steel core closely fitted with a shell made of a thin steel plate or heavy paper except in wet soil, where it would become moistened, driven in the same manner as wooden piles are forced home in foundation work. The core is then reduced and withdrawn, leaving the shell in place to maintain the cavity until it is filled with concrete. The pile, however, is not driven to hard pan, as in the case of a wooden pile, owing to the fact that the friction of the tapered sides against the earth will hold such an enormous weight that it is unnecessary to go so deep, the taper being calculated according to the character of the soil.

Experiments which have recently been made show that the concrete answers all the requirements of a wooden pile, and at the same time is less expensive. It was found that at a given blow the penetration of a tapered steel core 20 feet long, 18 inches in diameter at the butt and 6 inches at the point, was only 1 inch, while that of an oak pile of same length, 12½ inches at the butt and 10 inches at the point, was 5½ inches. It is claimed that the concrete pile may be used in any kind of soil without regard to the water line and will therefore save the expense of excavating, which is often very great. Wooden piles, it may be stated, must be submerged below the water level, which in some instances is many feet below the surface of the earth, and often after they have been thus submerged the water level has in many instances been lowered, thereby exposing the tops of the wooden piles to decay, and tending to destroy their usefulness. Concrete piles are especially desirable in those localities where the teredo is a destructive agent.

Causes of Paint Cracking and Peeling on Houses.

A house was built in 1890 and primed with yellow ocher and allowed to remain for two months, when it was painted white with two coats of strictly pure white lead and linseed oil. In 1899 it was again painted white with ready mixed paint, which was found by analysis to contain 75 per cent. of zinc oxide in the pigment and mixed with strictly pure linseed oil. In 1901 the paint commenced to crack and peel off, especially under the porches, where it was protected from the sun.

In reply to a correspondent who asks why the paint on the house cracked and peeled under the conditions named above, the *Painters' Magazine* says:

During the past ten years or so many experienced and observing painters have pointed out the effects of priming with yellow ocher alone, and have recommended that when ocher is to be used for priming it should be mixed with from 50 to 70 per cent. of pure white lead and thinned with pure raw linseed oil only, or at most with the minimum quantity of dryer. Ocher, consisting for the most part of silica or sand, is at best a brittle pigment and cannot hold its own with white lead as a priming. When covered with an elastic white lead paint, it will remain fixed longer than when a more brittle paint is used over it, but sooner or later it will split, throwing off the top coats of paint. If this has happened in your case, you can determine by examining the back of the peeled off strips of paint, as well as the bared wood, both of which would show a yellow color. We believe that the lead paint had perished to such an extent that the lead and zinc paint obtained a direct hold on the ocher priming, which had also lost its adhesion to the lumber, and there not being oil enough for all, caused the cracking and subsequent peeling or scaling. The only other cause that the trouble could be attributed to would be a damp surface on painting.

International Exhibition of Modern Art Products.

We have received from Gen. L. P. di Cesnola, director of the Metropolitan Museum of Art of New York City, a copy of the programme for the first international exhibition of modern decorative art, which is to be held in the city of Turin, Italy, in the year 1902. General di Cesnola, who is commissioner-general of the exhibition for the United States, is anxious that American manufacturers engaged in the lines which will be represented should be made aware of the favorable opportunities offered in connection with this enterprise for the exhibition and introduction of their goods into foreign countries. The undertaking is under the patronage of the King of Italy, and his cousin, the Duke d'Aosta, is president of the same. In connection with the programme the statement is made that the exhibition is not to be merely a reflection of other industrial exhibitions so often repeated, neither is it intended to show reproductions of styles already known, nor simply industrial productions that are wanting in artistic merit, but it is opened solely to original productions tending to the improvement of the artistic form in modern decorative art. The departments which will be of more especial interest to our readers are those of warming apparatus and accessories, such as stoves, registers, fire dogs, fire guards, &c., lighting apparatus of all kinds, and metal work, engraved, embossed, beaten or cast. These are included in the first class of exhibits under the general heading of "The Modern House and Its Decorative Elements." Information regarding the proposed exhibition can be obtained either from General di Cesnola, Metropolitan Museum of Art, Central Park, New York City, or from the Exhibition Committee, 28 Via Ospedale, Turin, Italy.

A Royal Kitchen.

We are accustomed to barbaric splendors at the Russian imperial court, but it is not generally known that the kitchens at the Palace of St. Petersburg form a magnificent part of it, says a writer in the *Westminster Gazette*. The walls and ceilings of these establishments are of black marble, covered with valuable ornaments. The kitchen utensils are of solid gold, and date back to the time of the Empress Catherine. Their value is £10,000, and there are among them several saucepans worth £50, while a fish kettle is worth £1000. The kitchen staff consists of 267 persons, and the head cook receives a salary of £10,000 a year. Six other cooks earn each from £1000 to £1500. From these figures it appears that, next to the Spanish court, that of the Great White Czar is the most luxurious in Europe.

But all these splendors pale before those of the kitchens of the Shah of Persia at Teheran. There the meanest vessels are of gold, and every article of the dinner service is incrusted with precious stones. No wonder the Shah's kitchen battery is valued at £1,000,000.

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COTTAGE ERECTED FOR MR. CHARLES W. OAKLEY, WESTFIELD AVENUE, ELIZABETH, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1901

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OCTOBER, 1901

Some Local Building Improvements.

If the opinions of local architects and builders are any criterion the present year is likely to be one of the most notable in the history of the city as regards the erection of buildings intended for business purposes. The improvements are not confined to any one locality, although they largely follow the general line of Broadway, excepting in the lower portion of the city, where many new structures are found just to the east of this great artery of metropolitan traffic. The interested visitor cannot fail to notice in passing to and fro the number of instances where old buildings are being demolished to make room for more modern and imposing structures. He will also observe the many cases where foundations are being sunk to bed rock by means of enormous iron or wooden caissons, as well as the many examples of steel skeleton frame construction which are rapidly moving skyward. Commencing at the foot of Broadway, he will find facing Bowling Green the immense foundations for the new Custom House; at Broad and Wall streets the active operations incident to the new ten-story Stock Exchange building, the corner stone of which was laid a few days ago; on Liberty street, close by, the foundations of the monumental structure to the erected by the Chamber of Commerce; on Broadway, opposite Rector street, and running through to New, the caissons of the 20-story Century Building are being sunk, while at Cedar and William streets, one of the landmarks of the last 40 years, the old iron fronted Kemp Building is being torn down to make room for a 15-story office structure. At Broadway and Maiden lane are to be seen the preparations for the 18-story Jewelers' Building, and at Pine and Nassau streets the site is being cleared for the 22-story office structure of the Hanover National Bank. Further on, at the corner of Sixteenth street and Union square, progress is being made on the foundations for the 16-story building of the Bank of the Metropolis, and at Twenty-third street are the yawning excavations for the 20-story structure which will occupy the site known as the "Flat Iron," from its resemblance in outline to this well-known article.

The greatest improvements, however, are to be found at Herald square, where work is in progress which will change the whole aspect of that locality. On Broadway, between Thirty-third and Thirty-fourth streets, excavations are being made for the Saks Building, which will be eight stories in hight, while in the next block above the foundations are being sunk for what will be the largest department store in this country, if not in the world. This will cover a vast area and rise to a hight of ten stories. These are only some of the more important improvements which are now under way in the city, and it is estimated that the amount of capital invested in buildings contracted to be ready for occupancy by the first of the coming May, and which will radically alter the sky line of the city, reaches the enormous total of at least $30,000,000. In the upper part of the city vast sums are being invested in flats and elevator apartment houses, many of which are on a scale of magnificence never before attempted.

Six Months' Building Operations.

From the figures available it is evident that the various builders of the city are being fully occupied, for from January 1 to the middle of September permits were taken out in the boroughs of Manhattan and the Bronx for 2148 building improvements, estimated to cost $94,069,600, as compared with 1320 permits for buildings to cost $42,237,710 in the corresponding period of last year. In this connection it is interesting to note the report of the Department of Buildings, covering the first six months of the present year, showing, as may be inferred from the figures just cited, that the operations in the city have been on a much more elaborate scale than during the same period of 1900. Taking the five boroughs constituting the Greater New York, we find that applications were filed for new buildings and alterations estimated to cost $97,020,645, as against $46,618,591 for the first half of last year. As may naturally be supposed, the greatest proportionate increase is found in the figures for the boroughs of Manhattan and the Bronx, where the estimated cost of improvements is placed at $81,218,427, as compared with $35,652,548 for the first six months of 1900. In Brooklyn there has also been a gratifying increase in building operations, although the improvement is not as marked as in the case just cited, the figures standing $12,879,628 for the first half of this year, as against $9,156,677 for the corresponding months a year ago. Some idea of the extent to which flats and tenement houses are being put up may be gathered from the statement that in the first half of the present year plans were filed for 1832, estimated to cost $53,484,154, while the estimated cost of dwelling houses, not including those of wood, was $7,072,080, and for frame dwellings, tenements and other wooden structures the estimated cost was $4,832,-246. In the first half of the year plans were filed for 33 hotels and boarding houses, to cost $7,298,150, and for manufactories, work shops, &c., 123 permits were issued, calling for an estimated outlay of $3,955,725. In the second quarter of the year 21 office buildings were projected, costing $4,061,750, and 54 stores, estimated to cost $1,645,375.

Incorporation of Labor Unions.

One effect of the great steel strike which was in progress for something over two months, and in many instances, by reason of a scarcity of material or sharp advance in prices, caused an interruption to building operations in various parts of the country, has been to revive the subject of the incorporation of trades unions. It is stated on what seems to be good authority that the great industrial interests with which a well-known financier is identified will in future enter into no negotiations with labor leaders unless the latter can show that they represent an incorporated union which can give satisfactory guarantees for the faithful performance of its contract obligations. The contention that under present circumstances labor unions, as unincorporated bodies, are lacking in responsibility, is borne out in the case of the Amalgamated Association of Iron and Steel Workers. On the one side of the present struggle are a great industrial corporation, whose responsibility is unquestionable and who can be kept closely to their contracts, and on the other side a body of men voluntarily acting together, without legal or financial basis of responsibility, and from whom no damages can be secured for breaches of contract. In other words, responsibility is opposed by irresponsibility. When the tremendous interests involved in the present contest are considered, it is but natural that those who, by reason of their corporate character, could not evade their contract obligations if they would, should demand that the parties opposed to them be placed under similar responsibility. The incorporation of labor unions would, after all, give them a standing and dignity which would impart a new importance to the whole labor movement. And this view is held by many of the more thoughtful and broad minded among the wage earners, who see that the best interests of labor would be more satisfactorily served if their unions assumed the dignity of incorporation. The only apparent argument against such a course is one that would be unworthy of honest men—viz., that incorporation would deprive them of the liberty to violate their contract obligations.

Builders' Day at Pan-American Exposition.

The gathering of builders which was held at the Pan-American Exposition, Buffalo, on Wednesday, September 11, proved to be a very interesting occasion, delegations being present from Rochester, N. Y.; Philadelphia, Pa.; Youngstown, Ohio; Boston, Mass.; Pittsburgh, Pa., and St. Louis, Mo.

The Rochester aggregation added much life and interest to the occasion, about 250 builders and friends from the "Flower City," accompanied by the Fifty-fourth Regiment Band, arriving at the exposition about 10 o'clock on a special train. They immediately began to liven things up, and to forcefully impress on the memories of the inhabitants of "Laughing Lane" that September 11 was "Builders' Day." The other delegations arrived a little later. An informal gathering was held in the rooms of the Buffalo Builders' Exchange at 10 o'clock in the morning.

A formal reception to the officers of the National Association of Builders and the officials of the Pan-American Exposition was tendered at 2 p. m. President Geiger of the Buffalo Association, together with a special committee of Buffalonians composed of Messrs. Feist, Coppins and Carl, received and entertained the guests. Their task was made easier by the presence of the Fifty-fourth Regiment Band, which rendered a number of splendid selections.

Later in the afternoon the band headed the whole delegation while making a tour of the midway. The Filipino and Hawaiian villages were visited, together with a number of other attractions, many of the concessionaires giving special performances, with special builders' names and building terms applied to many of the acts.

At 5 p. m. the delegation assembled in the banquet room of "Alt Nuernberg," where a bountiful spread was served to about 100 delegates. Director-General Buchanan, with several other Pan-American officials, together with Mayor Diehl, attended as guests of the local association. After the inner man had been satisfied, President Geiger, acting as toastmaster, called on Conrad Diehl, Mayor of the city of Buffalo, for a few remarks. Mayor Diehl responded briefly, thanking the builders for the privilege of attending their festivities and congratulating the builders of Buffalo on the number of live, active men belonging to the building crafts.

John Stevens, president of the National Association of Builders, was next introduced. He referred to the good work already done by the National Association, reminding all that the uniform style of contract now in general use in this country had been prepared, and its adoption urged, by the National Association of Builders. He ventured the statement that every builder present had probably been saved thousands of dollars by the insertion of the strike clause in the "Uniform Contract," and asked if that alone did not entitle the National Association of Builders to the interest and support of all builders' exchanges.

J. N. Scatcherd, chairman of the Executive Committee of the Pan-American, was the next speaker. He congratulated the Buffalo Exchange for the active part its members had taken in advancing the interests of the Pan-American, saying that the builders generally had shown great faith in it; that the Exposition Company had been their debtors to the extent of many thousands of dollars at times, yet they had vigorously pushed their contracts to a timely completion; that it was the ability and skill of the twentieth century builders and their associated craftsmen that had made the beauties and wonders of the Pan-American possible, and said he voiced the sentiment of the Pan-American Executive Committee, and the thousands of people who had and would yet visit the exposition, when he said all honor and glory to the builders of the Pan-American and to the builders who do so much toward beautifying our cities everywhere.

William H. Sayward of Boston, secretary of the National Association of Builders, was next presented. Mr. Sayward, in his usual genial way, dwelt on the history of the association, saying while the national body might not be as active as it had been in the past, yet it had possibly performed its principal mission; that it was still in a strong flourishing condition, and that should there be any special work for the National Association of Builders to perform, it would be ready and armed to do it.

F. P. Stallman of Rochester, president of the New York State Association of Builders, was the next speaker. He briefly told of the merits of State associations, and urged all exchanges of the different States to form a State association.

C. A. Rupp of Buffalo spoke last, saying that he wished the programme prepared for the delegates had been a little more lengthy and elaborate one; that he wished even more that the finances of the Buffalo builders had permitted them to raise $8000 or $10,000 to entertain the delegates; but he said that notwithstanding the fact that Buffalo men had executed over 75 per cent. of all Pan-American building, yet their financial policy was a conservative one, of necessity.

The delegations then adjourned, marching in a body to the Esplanade, where the illumination was viewed, the party then scattering to follow individual tastes.

House Painters' Convention.

The eighteenth annual convention of the National Association Master House Painters and Decorators of the United States will be held in Pittsburgh, Pa., February 11, 12 and 13 of the coming year. The executive board have voted to have as a feature of the convention an exhibition of practical work, sketches, &c., and members are invited to prepare samples of plain or ornamental work, lettering, graining, marbling, &c.

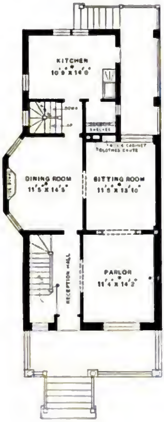
Changing the Color of Blue Prints.

Anthony's Bulletin gives the following practical method of turning blue prints to a rich brown color: A piece of caustic soda about the size of a bean is dissolved in 5 ounces of water and the blue print immersed in it, in which it will take on an orange yellow color. When the blue has entirely left the print it should be washed thoroughly and immersed in a bath composed of 8 ounces of water, in which has been dissolved a heaping teaspoonful of tannic acid. The prints in this bath will assume a brown color that may be carried to almost any tone, after which they must again be thoroughly washed and allowed to dry.

AN "OLD ENGLISH" COTTAGE IN A CHICAGO SUBURB.

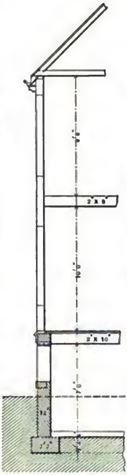
THE subject which we have taken for the basis of our supplemental plate this month is a cottage of the "old English" style of architecture, which was erected not long since in Ravenswood, one of the many suburbs of which the city of Chicago can boast. The first story of the house and the piers below the columns of the front veranda are of red pressed brick, laid with white putty joints, resting on a rubble stone foundation. Above the first story the body of the house is of grayish white cement, with dark green cross beams, cornice, moldings, &c. The gables are of the same light body, with dark green trimmings. The front veranda columns are white, the railings and moldings dark green and the faces of the brackets white. The roof of the house is moss green in color.

Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.



Section Showing Hights of Stories

Scale, ⅛ Inch to the Foot

Front Elevation.—Scale, ¼ Inch to the Foot.

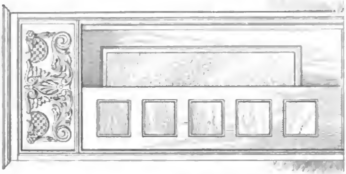
An "Old English" Cottage in a Chicago Suburb.—William L. Klewer, Architect.

The floor plans presented herewith show the general arrangement of the interior, indicating upon the first floor a parlor, sitting room, dining room and kitchen, with ornamental arches connecting the principal apartments. On the second floor are four sleeping rooms and bathroom, and in the attic there are some finished rooms. The half-tone supplemental plate gives an idea of the appearance of the completed building, while the details upon the pages which follow indicate the style of finish.

According to the specifications of the architect, William L. Klewer of 1506 Schiller Building, Chicago, Ill., the girders in the basement are 8 x 8 inches, supported on brick piers; the first-story joist are 2 x 10 inches; the second story joist 2 x 8 inches; the rafters 2 x 4 inches, with 2 x 4 inch collar beams every fifth rafter, and ceiling joists and studding 2 x 4 inches, all placed 16 inches in centers. The wall plate is 2 x 12 inches, bolted to the brick work. The roofs are laid with 6-inch dressed boards, having 1-inch open joints and covered with shingles exposed not more than 4 inches to the weather.

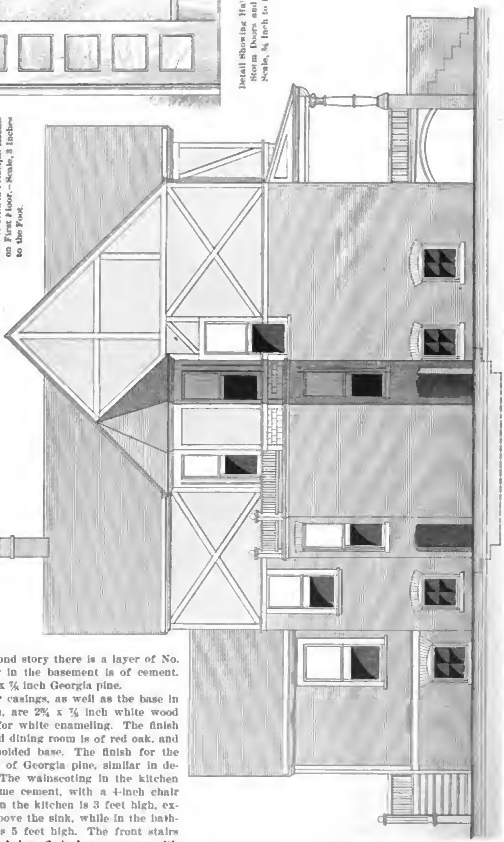
The floors are double, the under one of the first and second stories consisting of matched and dressed fencing flooring, while the finishing floor of the parlor and sitting room is of pine. The floor of the dining room is of oak and those of the kitchen, rear hall, second story hall, bathroom and pantry are of maple strips 2½ inches wide, closely laid and blind nailed. Between the flooring on the first and second story there is a layer of No. 1 felt paper. The floor in the basement is of cement. All other floors are of 4 x ⅞ inch Georgia pine.

All door and window casings, as well as the base in parlor and sitting room, are 2¾ x ⅞ inch white wood with architrave heads for white enameling. The finish of the reception hall and dining room is of red oak, and they have a 10-inch molded base. The finish for the balance of the house is of Georgia pine, similar in design to the oak trim. The wainscoting in the kitchen and bathroom is of Acme cement, with a 4-inch chair rail. The wainscoting in the kitchen is 3 feet high, extending 2 feet higher above the sink, while in the bathroom the wainscoting is 5 feet high. The front stairs are of oak, the newels being 6 inches square, with molded cap and base. The front door is 2 inches thick, of veneered oak, while the outside storm doors are of pine, 1¾ inches thick, and fold back into a recess forming paneled door jambs. The doors in the rooms finished in Georgia pine have white pine stiles and rails with five cross panels of Georgia pine.



Detail Showing Half Elevation of Storm Doors and Front Door. Scale, ¾ Inch to the Foot.

Detail of Trim in Principal Rooms on First Floor.—Scale, 3 Inches to the Foot.



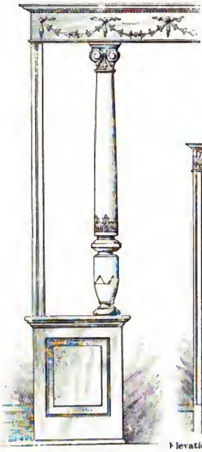
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

An "Old English" Cottage in a Chicago Suburb.—Elevation and Details of Construction.

The kitchen is fitted with an 18 x 30 inch white enameled iron sink and a 30-gallon galvanized iron boiler. In the bathroom is a 5-foot white enameled iron tub with roll top rim, a 14 x 17 inch oval marbleized wash bowl, and a 12-inch Italian marble back piece. It is also equipped with a porcelain washout closet with large copper lined cabinet finished siphon tank, all the plumbing fixtures having Fuller's nickel plated trimmings. The house is piped for gas, the position of the principal fixtures being indicated by stars upon the floor plans.

The entire exterior wood and metal work of the house is treated with two coats of pure white lead and linseed oil, and the shingles of the roof were stained after laying. The interior wood work of the parlor, dining room and reception hall has one coat of filler and two coats of American Varnish Company's granite varnish. The balance of the wood work in Georgia pine has two coats of varnish. The maple floors of the kitchen, bathroom and front stairs have two coats of Florine, while the oak floors of the reception hall, parlor and dining room have one coat of vegetable filler and

Plan and Elevation of Sideboard, in Dining Room.—Scale, ¼ Inch to the Foot.



Detail of Arch between Parlor and Sitting Room.—Scale, ¼ Inch to Foot.

Elevation of Oak Door, Showing Trim in Principal Rooms on First Floor.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of an "Old English" Cottage in a Chicago Suburb.

two coats of Florine. All glass in the building is double thick American, while that of the front door is bevel plate, and the large light in the parlor window is plate glass.

Renovating a Painted Brick Front.

The method usually pursued in repainting brick fronts is to use bent steel scrapers, where the paint is soft or scaly, following with stiff brooms or brushes, removing all the loose paint and allowing the balance to remain, as it will not show when the front is painted in flat color. Burning off with a torch would be the quickest and surest method in some cases, but where there are marble sills and trimmings care must be exercised to keep the flame away from them to prevent their being scorched.

There are many ways to remove paint without burning, but these preparations make such a mess on a brick front that the dry way of scraping and brooming is the best.

Code of Scranton Builders.

We take the following rules, which are said to govern the practice of builders in Scranton, Pa., from a paper published in that city:

1. All brick veneered residences are known as "carpenter jobs."

2. In slate roof buildings the master carpenters figure the "entire" roof in estimating.

3. The master masons figure only mason work in a "carpenter job."

4. The painting and decorating of a building belong to the master painters. Any general contractor who hires journeymen painters to do this part of the work is violating the "golden rules of contracting and building."

5. There are three branches of the building trade in Scranton that have agreements between employer and employees—the master carpenter, the master plumber and the master brick stone masons. Each have the exclusive clause in their agreement, whereby the journeymen will work for none but members of the master associations, and the contractors hire only journeymen members of the journeymen's association, and all differences are settled by conference committees.

6. All wooden buildings are "carpenter jobs," and the master carpenters bid in general; all sub-bids are submitted to them to be included in the general bid.

7. All brick, stone or brick veneered buildings, excepting brick veneered residences, are "mason jobs," and all sub-bids are submitted to the master masons.

8. The master painter submits his figures for painting to the master carpenter in both mason and carpenter jobs.

9. The master plumbers, master steam fitters, gas fitters, tinners and steel ceiling and hot air heating contractors submit their figures direct to the general contractor.

10. A mason contractor figures no carpenter work. A carpenter contractor figures "no" mason or brick work.

ACOUSTIC PROPERTIES OF BUILDINGS.

THE subject of acoustics is one upon which a great deal has been written, but the troubles often encountered by architects and builders are such as to make it a topic of ever recurring interest. Some comments which appeared not long ago in one of the London architectural papers have in them so much of suggestive value that we present them herewith.

One of the questions which primarily has to be considered is the power of the voice or the dimensions of a building in which a speaker can be heard without difficulty. Writers have generally referred to the natural diffusion of sound in the open air on a calm day. Saunders showed by his experiments that when a person read from a book on a still day on an open plain he could be heard 92 feet in front, 75 feet on each side and 31 feet behind, and if we draw these boundaries we have a circle flattened behind the speaker. Sir Christopher Wren gives more reasonable distances—viz., 50 feet in front of the speaker, 30 feet on each side and 20 feet behind, a circumscribed area large enough to seat about 1000 persons—a more useful standard. With galleries, a hall or church could on this calculation well accommodate about 2000—the extreme number that can see and hear comfortably in a church.

Direct Radiation of Sound.

Speaking first of direct radiation of sound, the principle upon which a large class of buildings depend for sound—as theatres, halls—hight and shallowness of depth are desirable. A larger quantity of air than absolutely necessary is to be avoided, as the more air there is the more vocal exertion is required to set it in vibration, to say nothing of disturbing causes like ventilating appliances, which cause a contrary current to be established in the auditorium. M. Lachez and many other experimentalists have established the fact that a large amount of air above and behind a speaker, which his voice has to set in motion, is objectionable; and the same rule applies to the size of the auditorium: hence an approximate rule for ordinary rooms is that, other things being the same, the room or hall should be low in proportion to the width. By restricting the room at the platform end, making it low and without too much space behind the speaker or vocalist, its length may be increased; and this is practically effected by a lecture room with a platform or orchestral recess or apse.

One writer says: "For lecture and school rooms a hight of 2, a depth of 3 and a breadth of 4 has proved extremely satisfactory, the speaker being on the longest axis. For small churches, court or other rooms, when the speaker is on the shortest axis, a hight of 1, width of 2 and depth of 3 has proved good." The same authority says also: "On account of the nodal points established by the columns in nave and aisle churches, a length of 4 or 5, width of 2 and hight of 1 to 1¾ works well. This is for cubical contents; but on account of the lower ceiling in the aisles the nave ceiling may be greatly increased in hight over the above proportions." The proportions given by the above figures give a rather low building, but a hight of three can be given on account of the low aisles, and this proportion will agree with the proportion of many modern churches of this type. For theaters a hight of 3, breadth of 4 and length of 5 is said to be satisfactory, and many of the Chicago theaters are of this proportion.

Form of Floors and Ceilings.

The form of floors and ceilings has a considerable effect on the acoustic properties of a building, though they cannot always be adopted. The seats are arranged on a concave curve called the "isacoustic" or equal hearing curve, and this plan has been adopted in some lecture halls and churches. According to this curve, the seats dip down a little near the platform, and then gradually rise, so that all the lines of sight converge to one point—that of the speaker. The curvature required will vary according to the hight of speaker. The position and hight of speaker being determined, and that of the first auditor's head, a line is drawn from the lecturer's mouth to the first auditor's head, and at horizontal distances 2 feet 6 inches between the backs of seats; and allowing 18 inches for each successive seat in hight, a series of points are fixed which form the curve.

In the formation of ceilings much also can be done to improve the radiation of sound. Where they are flat they should never join the walls at right angles, but have coves or springing curves; and these curved portions of the ceiling should be brought down as low as possible round the platform. The volume of air is thereby reduced and unpleasant echo avoided. In theaters the ceiling of the auditorium should be as nearly as practicable raked from the proscenium arch to a point over the highest gallery sufficient to give head room. This slope may be curved, and the ceiling stepped and coved to prevent reverberation from the rear wall of theater. Indeed, a good acoustical ceiling would follow the proscenium arch for some distance, and not, as generally the case, form a deep break between them.

Gothic Churches

Speaking of the pillars, aisles and timber roofs of Gothic churches, Lord Grimthorpe observes, so far are these from "being worse for hearing in, they are generally better than the wide spread buildings, all under one span, like a railway station, which it was the fashion to erect in large towns," and he observes that "some of the worst places for hearing in that I know of are buildings all under one roof, and of far less capacity than many churches, both old and new, of the nave and aisle construction, in which large congregations can hear perfectly well." This opinion is born out by many churches of which we know. The explanation is that in these wide spanned and lofty roofs there is a large and unnecessary volume of air to set in motion, which the nave and aisle construction avoids. The open timber roof and arcades, if not too lofty, also prevent reverberation and echo in many instances which the large, smooth surface of a long and wide span roof often creates. The kind of roof that is most favorable for sound is one ceiled or boarded around the braces and collars which cut off the triangular space above, and many of our polygonal shaped church roofs are of this description.

Arrangement of Walls.

Walls also can be so arranged as to facilitate the conveyance of sound. In fact, theoretical considerations would point to an inclosure of a flattened circular or elliptical form. We know, indeed, that the ancient Greek theater was a very perfect form for large audiences and sightseers. They heard by direct radiation of the voice. The seats were arranged in slopes on the amphitheatrical plan above one another, and were continued in a horseshoe or semicircular form till they met the wall of the proscenium—a plan that has been followed in several theaters and orchestras, like the Handel orchestra at the Crystal Palace; also in the planning of lecture theaters, in which the seats are arranged in semicircular form around the lecturers and raised on the principle of the isacoustic curve, by which each auditor has uninterrupted sound and vision. But as we have before hinted, buildings with curved walls do not come often within the practical requirements of the architect, and can only be adopted for theaters, amphitheaters and for concert halls of a large and special class.

IT is said that sod houses are being built in large numbers in Eastern Colorado. They are made of oblong pieces of sod cut from the prairie, about 18 inches in length, 7 inches broad, and from 3 to 4 inches thick. No foundation is required, the sods being simply laid on the prairie, and up goes the structure. This form of house is said to be cool in summer and warm in winter, and when the snow-laden wind is whistling without a cozy sod house in which there is a good corncob fire is not to be despised.

DETERMINING THE STRESSES IN ROOF TRUSSES.—II.

By F. F. KIDDER, Consulting Architect.

HAVING determined the loads at the joints, the next thing to do is to make a skeleton drawing of the truss, which we call the "truss diagram." This should be made by drawing center lines through the principal members of the truss—in this case the rafters, tie beam and center tie rod. Next draw lines through the center of the rods 2-6 and 4-8. This will give the points 2 and 4 in Fig. 4, which represents the truss diagram for truss 1. Then draw lines from 2 and 4 to point 7, to represent the braces. These last lines will not quite coincide with the actual center lines of the braces, but in order to draw the stress diagram correctly it is necessary that all the lines in the truss diagram meet at points representing the centers of the joints. In constructing the truss the short ties and braces should be located so that their center lines will intersect on the center lines of the principals as nearly as possible and get a practical joint. When all the lines of the truss diagram are drawn the loads at the various joints should be indicated by arrows and figures, as shown in Fig. 4. The upper figures at joints 2, 3 and 4, represent the roof loads at these joints, and the figures in the second line the ceiling loads directly below. As far as the stresses in the struts and tie beam are concerned it makes no difference whether the ceiling loads are considered as applied at the top or bottom of the truss, but as it simplifies the stress diagram considerably to consider the ceiling loads as applied at the top, we shall do so in all of the problems explained in these articles. The roof and ceiling loads should always be put down separately, however, and added together, as in Fig. 4. When the ceiling loads are added to the roof loads they must also be added to the stresses in the vertical rods, as determined by the stress diagram, because the rods have to transmit this load or stress to the top joint.

If the rods are not plumb the ceiling loads cannot be added to the roof loads, but must be shown separately in the stress diagram. As a reminder to add the ceiling loads to the stresses in the rods, they should be put beside the corresponding rod on the truss diagram, as shown.

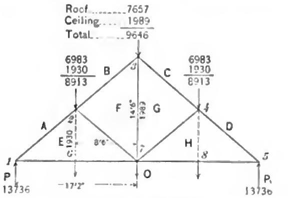


Fig. 4.—A Truss Diagram.

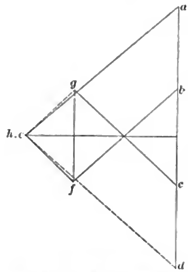


Fig. 5.—The Stress Diagram.

Determining the Stresses in Roof Trusses.

Members Not Subject to Stress.

It often happens that a truss contains members which receive no strain when the truss is considered as loaded only at the top, or when the loads are perfectly symmetrical. Such members cannot be represented in the stress diagram, and hence should be shown in the truss diagram by dotted lines, or if there are no ceiling loads they may be omitted entirely.

The rods 2-6 and 4-8 in the truss, Fig. 1, would not be needed if the loads were all at the top, and should be represented by dotted lines in Fig. 4, as shown. These rods, however, have to support the ceiling loads at 2 and 4, and hence the loads should be indicated beside the dotted lines, as shown. This is the only stress in these rods.

After the loads have been indicated on the truss diagram the reactions at the ends of the truss should be computed. When a truss or beam rests on two walls or posts, the latter must afford a resistance upward equal to the weight of the truss and its load. These reactions are considered as forces, and will hereinafter be called the "supporting forces."

For trusses symmetrically loaded the only kind will be considered in these articles—each supporting force will equal one-half of the total joint loads. In the example we are now considering the supporting forces are 13,736 pounds each. The supporting forces should be represented by lines with arrow heads pointing up. They are also often designated by the letters P and P_1.

Lettering the Truss Diagram.

Finally the truss diagram should be lettered according to a peculiar method, known as "Bow's notation." The essential principle of this method of lettering is to letter the spaces inclosed by the truss members and also the spaces between the external forces so that a line or force on the truss diagram is designated by the letters on each side of it. Fig. 4 is lettered in this way.

The bottom half of the rafter on the left is designated as A E. The left-hand brace as E F and the king rod as F G. The tie beam consists of two parts, O E and O H. The supporting force at 1 is O A and the load at 2 is A B.

The advantage of this method of lettering is that in the stress diagram the same letters come at the end of the corresponding lines, so that each member and the line representing the stress in it are designated by the same letters to distinguish the member from its stress. Capitol letters are used on the truss diagram and small leters on the stress diagram. In lettering the truss diagram any letters may be used, in any order, and no attention is paid to members represented by dotted lines.

In actual work it is not necessary to number the joints, as in Fig. 4, but in describing the methods of procedure it is necessary to have some means of indicating the different joints.

Drawing the Stress Diagram.

When the truss diagram is completed, as above described, we can proceed to draw the stress diagram, by which the stresses in the different members of the truss may be determined. The stress diagram is based upon the principle of mechanics, that for a point to be in equilibrium, lines drawn parallel to the forces acting on that point and representing their magnitude to a scale must form a closed polygon, the lines being drawn in the same order as the forces.

Each joint of a truss is supposed to be a pin, and each full line on the truss diagram a force; the forces are supposed to act on the pin, as if they were hinged, and consequently for the joint to stay in its proper place, or to be in equilibrium, the forces acting on any joint must balance each other.

To draw the stress diagram it is necessary to first draw the forces acting on one of the end joints, then those at the first joint above and thus proceed from joint to joint until all of the forces have been represented. The whole process, when once understood, is quite simple, but is not so easy to explain in a printed article, where the stress diagram must be shown completely drawn. To understand the following description the reader should reproduce on a sheet of paper the truss diagram, Fig. 4, at about twice the size of the illustration, and then draw the stress diagram, line by line, according to the following directions, lettering each line as it is drawn.

The paper should be tacked to a drawing board and all lines in the stress diagram drawn exactly parallel to the corresponding lines in the truss diagram.

Drawing Stress Diagram for Fig. 4.

First draw a vertical line, equal to 13,736 pounds, measured to a scale of, say 4000 pounds to an inch,* and

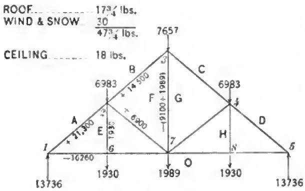


Fig. 6.—The Truss Diagram Completed.

Determining the Stresses in Roof Trusses.

letter the bottom of the line *o* and the top *a*, as shown in Fig. 5. This line will represent the supporting force at joint 1. Next, from the upper end *a* draw a line parallel to the rafter A E, and from the bottom end *o* a horizontal line intersecting the other line, and mark the point of intersection *e*. We then have a triangle, *a e o*, which represents the three forces acting on the joint 1. Next, from *a* measure down on *a o*, 8013 pounds, the load at 2, using the same scale of 4000 pounds to the inch, and letter the point thus formed *b*. Then from *b* draw a line parallel to B F,† and from *e* a line parallel to E F, lettering the point where the two lines intersect, as *f*. The lines *e a*, *a b*, *b f* and *f e* then represent the four forces acting at joint 2 (the load being considered as a force) and the number of pounds each force must exert to produce equilibrium.

Next, from *b* measure downward, 9694 pounds, the load at 3, and letter the point thus obtained as *c*. From *c* draw a line parallel to C G, and from *f* a line parallel to F G (vertical) and letter the point where the two lines intersect, as *g*. The lines *f b*, *b c*, *c g* and *g f* then represent the forces acting on joint 3. We have now the stress in the king rod, and in all the pieces to the left, and as the truss is symmetrical the stresses in the right side of the truss will be the same as those in the left side, and it is not necessary to represent them in the stress diagram. If we did so we would get the dotted lines shown in Fig. 5, which would make the diagram symmetrical.

To obtain the stress in the different members of the truss in pounds we measure each line of the stress diagram by our scale of 4000 pounds to the inch, or the same scale that was used in laying off the line *o a*. Doing this we find *a e* measures 21,300 pounds, *o e*, 16,260 pounds, *f g*, 9100 pounds, and so on.

These figures should now be put on the corresponding lines of the truss diagram, as in Fig. 6. The truss diagram, as finally figured, gives all of the data necessary for determining the size of the pieces. The weights per square foot of roof and ceiling used in computing the joint loads should also be put on the truss diagram for future reference. The stress diagram is now no longer needed and can be destroyed.

The total stress on the center rod is 9100 pounds, obtained by scaling the line *f g* of Fig. 5, plus 1989 pounds, the load at the bottom, or 11,089 pounds. The sign + before the stresses denotes that the piece is in compression and the minus sign that the piece is in tension.

* For this purpose an engineer's scale, graduated to fortieths of an inch, will be found most convenient.

† It should be remembered that capital letters refer to truss diagram, Fig. 4, and small letters to the stress diagram Fig. 5.

Meaning of the Term Apartment House.

In referring to building operations in the more important cities where apartment houses are erected in large numbers, the term of designation is often misapplied. It is interesting, therefore, to note what an authority like Russell Sturgis, the well-known architect, has to say regarding this point. In the "Dictionary of Architecture and Building" compiled by him, the following definition appears.

Apartment. A. A room, or a room with ante-chamber or with alcove and closets; especially in English usage, such as a room with appurtenances when occupied as a bed chamber.

B. A number of rooms with necessary corridors, passages and the like, occupied as a dwelling by one inhabitant or one family. This usage is in connection with the French term, *appartement*.

The sense A is uncommon except in writing of some pretension; the sense B is comparatively rare in England, but has become very common in cities of the United States since the introduction of the apartment house, about 1865. It is generally held that an apartment, technically so called, contains a complete establishment, with private hall and complete inner communication between the different rooms comprising it. There are, however, apartments which have no kitchen, the occupants being expected to use the rest of the house.

Apartment Hotel.—A building divided into suites for families, but without private kitchens and the like, the guests being supposed to use the rest of the house. This term is coming into use to mark the distinction between this class of building and the ordinary apartment house, in which each apartment is a complete dwelling.

Apartment House.—A building intended to be occupied in separate apartments, especially in American cities since 1870; a home for independent housekeeping by generally more than two families, the rental for an apartment exceeding $300 per annum. Low priced apartments are frequently called flats. (For the popular distinction made between apartments, flat and tenement, see Tenement.)

Unfortunately, the section of the dictionary containing "Tenement" has not yet been issued.

Reports from Charleston, S. C., indicate that rapid progress is being made in the work of preparation for the South Carolina Interstate and West Indian Exposition, to be held in that city from December, 1901, to June, 1902. The construction of the buildings is well under way and the grounds are being graded and laid out in a manner that promises especially attractive and artistic surroundings for the forthcoming show. The main building will be a magnificent Cotton Palace, which, together with the Transportation Building and the Machinery Palace, will form a fine group of buildings in the Court of Palaces on the north bank of Lake Juanita.

The six most lofty structures in Europe are the towers of Cologne Cathedral, now 516 feet 9 inches high; the towers of Rouen Cathedral, 491 feet 8 inches; the tower of St. Nicholas, at Hamburg, 473 feet 1 inch; tower of Anvers Cathedral, 472 feet; cupola of St. Peter's, Rome, 469 feet 2 inches, and the cathedral spire at Strasburg, 465 feet 2 inches.

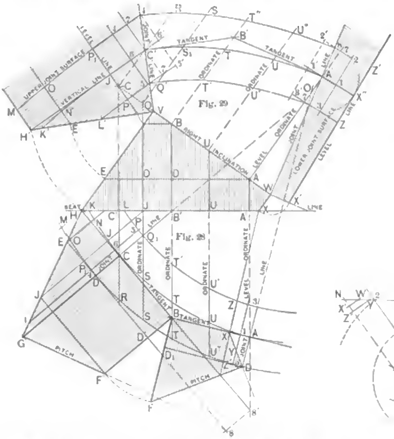
THE SCIENCE OF HANDRAILING.

BY C. H. FOX.

FINALLY we take up the explanation of the construction of a cardboard representation of a solid, showing the inclination and position, together with the development of the sections of the face and joint surfaces of a rail, the plan of which is less than a quarter circle, while the inclination of the section plane of the face mold is taken unequally over the tangents of the plan. This is a problem very similar to that explained by means of the diagrams shown in Figs. 22 to 27. The plan indicated in Fig. 28 is taken less than a quadrant. The greater rise has been placed over the lower tangent, while in the model last constructed this was placed over the upper one. The center used in drawing the plan curves is indicated at Q of Fig. 28, while A-B-C represent the tangents respectively to the points A-C in the center curve, at which joints are desired.

We have already explained that in order to show the the plan; then by joining C-A the right inclination of the section plane of the face mold may be projected. Square over the ordinates, find the points through which to trace the elliptical curves of the face mold, project the tangents A'-B'-C', and square with them the joint lines V-4" and W-8. Then project the surfaces, and develop the elliptical curves of the right section, which belong to the joint surfaces over A and C of the plan. Also construct the representations of the tangent planes, which form two sides of the model in the manner fully explained for similar constructions in connection with preceding models. This done, cut out the model to its desired shape, and bring the sides together; fold over the inclined surfaces of the section planes, with the lines on the exterior, and the representation of the solid may be obtained. In the manner already explained cut the full size joint sections and the duplicate face mold, placing them in their proper positions in the model. The twist, &c., of the rail may then readily be seen.

In Figs. 30 and 31 is shown the method which may in practical work be adopted for developing the curves of the face and joint molds. The plan is given in Fig. 30, where O represents the plan center, A-B-C the tangents, O-A and O-C the joint lines, and B-D the assumed



Figs. 28 and 29.—Construction of a Cardboard Representation of a Solid, Showing the Actual Inclinat on and Position, Together with the Development of the Section and Bevels of the Face and Joint Surfaces of a Rail, the Plan of Which is Less than a Quadrant, and the Inclination of the Section Plane of the Face Mold is Taken Unequally Over the Plan Tangents.

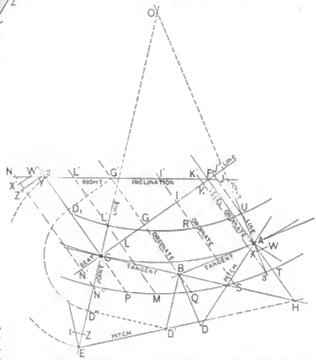


Fig. 30.—Practical Method of Developing Curves of the Face and Joint Molds.

The Science of Handrailing.

surface of the lower joint the ground plan requires to be raised above that of the base model. Assuming now that A-A of Fig. 29 and A-D of Fig. 28 are equal to the hight desired, we may proceed to find the direction of the directing ordinate of the plan and that of the seat line.

In Fig. 28 produce the upper tangent C-B, as shown in 8'; then set off 8'-8 equal to A-D, and through 8 draw 8-D'-E parallel with 8'-B-C. Having now produced the joint line O-C, and parallel with it the line B-F", set off D"-G equal to the total rise of the rail, and D'-F" equal to the rise of the rail over the lower tangent B-A. Now draw G-8 through F", and parallel with the joint line O-C draw 8-8'; then, joining 8' with A and producing it, the position of the level directing ordinate of the plan may be obtained. At any convenient point, as A' of the seat line, draw A'-H square with 8'-A', and the projection of the seat line may be obtained. Set off C'-C and A'-A of Fig. 29, equal respectively to A-D and C-G of

rise of the rail over the lower, and D"-E that over the upper tangents, while A-D and D'-E show respectively the assumed pitch of the section plane over the tangents. This understood, producing the pitch E-D' to meet the tangent C-B produced in H, then joining H with A, and the position of the directing ordinate of the plan may be obtained. Square with this through C draw the seat line. Then square up and set off C-2, equal with C-E, the total rise of the rail. Joining 2 with the point given in F, at which the ordinate through A meets the seat line, the projection of the right inclination may be obtained. Produce the plan ordinates to meet this; then in Fig. 31 set off J-F-V', &c., equal to J-F-K', &c., of the right inclination of Fig. 30. Square over the ordinates, making the length of these equal to that of the corresponding ordinates of the plan, and through the points given in T-S-Q, &c., trace the elliptical curves of the face mold. Then join A-B-C, and square with them draw the joint lines U-V and Y-Y', which will complete the mold.

Now to find the direction of the plumb line at the joint surfaces proceed as follows: In Fig. 31, parallel with the ordinates, draw U'-U, V'-V of the lower, and Y_1-Y, Y'-Y" of the upper joint lines. In Fig. 30 set off N-W, equal to U'-V', and N-Y, equal to C-Y of Fig. 31; parallel with the seat line draw Y-Z' and W-X'. Then set off E-Z, equal with N-Z', and parallel with C-B draw Z-1, and square with D-E draw E-1. Now, taking C of Fig. 31 as the center and E-1 of Fig. 30 as the radius, draw an arc in 1; then take Y as the center and the half width of the rail, as C-L of the plan, as the radius, and cut the arc in 1. This gives in Y_1-C-1 the angle of the plumb bevel required at the upper joint surface in order to enable the operator to "square the wreath." Now at the lower joint over A draw A-W, square with D-A, set off A-X equal to N-X' above, and parallel with A-B draw X-W. Now, taking V of Fig. 31 as the center and A-W of Fig. 30 as the radius, draw an arc in T. Then with U as the center and the full width of the rail, as U-3 of the plan, as the radius, cut the arc in T, which gives in U-V-T the angle of the plumb bevel as required at the lower joint surface. These angles may be transferred

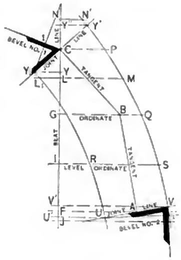


Fig. 31.—Finding Direction of Plumb Line at Joint Surfaces.

The Science of Handrailing.

to any portion of the drawing, and the sections of the joints may be developed in the manner previously explained.

If the student has fully mastered the geometrical principles involved in the construction of the representations of the seven solids already projected, he should now be able to construct a representation of a solid of any problem in practical handrailing that may be met in actual practice. We have in the construction of the models introduced the leading or principal problems met with in "The Tangent System of Handrailing"—viz., the "level tangent," the "equal rise over tangent," and the "unequal rise over the plan tangents." There is hardly an example in practical handrailing but what contains one or the other of the three problems given in our constructions. Of course, hundreds of examples may be given in which the plans or rise may be of varied lengths and hight—that is, the length of the radius of one plan at which the rise over the tangents may be equal may be greater or less at another example of the similar problem. This applies equally to either of the problems, but either one or the other of the three leading problems above enumerated will be contained in any one of the several problems or examples which may be given in actual work.

(THE END.)

The Appellate Division of the Supreme Court in New York recently handed down a decision in a case involving the question of what constitutes movables and fixtures in a building. A man named Brennan built three apartment houses in the uptown district of New York. He carpeted the halls and stairways and put in ranges and refrigerators, awnings and shades, as well as clothes racks on the roof, ash cans, &c. Another party subsequently came into possession of the houses on a foreclosure and refused to give up any of the articles mentioned. The plaintiff Brennan then brought suit for conversion. A decision was given against him in the lower courts, but the judgment was reversed in the Supreme Court, which ordered a new trial. The Court held that the carpets, window shades and ranges were movables as a matter of law, also probably the drying frames and awnings. Some of the other items, including the refrigerators, may have been fixtures, but that would depend on the facts to be ascertained at the trial.

Strength of Broken Stone and Gravel Concrete.

In discussing the question why gravel is not better than broken stone in making concrete, a recent issue of *Municipal Engineering* offers the following in the way of comment:

The proportions of the materials in concrete must be varied according to the kind of cement used and the duty required of the concrete. A concrete made of 1 part natural hydraulic cement, 3 parts sand and 6 to 7 of broken stone would not prove satisfactory for very many uses. The proportions for natural cement are seldom greater than 1 cement, 2 sand and 4, 4½ or 5 of stone or gravel.

For concrete the amount of mortar should be sufficient to just fill the voids in the stone or gravel used. The amount of cement can be varied with the strength required in the concrete. In the "Directory of American Cement Industries and Hand-Book for Cement Users," many specifications for all kinds of work are given. For arch work, as at Kansas City and Indianapolis, the proportions required were 1 sand, 2 Portland cement and 4 broken stone or gravel, in arches, or 7 to 8 parts in foundation. The Illinois Central Railroad specifies 1, 2 and 5 for natural cement, the same for Portland cement concrete in arches, and 1, 2½ and 6 for Portland cement concrete in bodies of piers and abutments, wing walls, &c. For foundations of cement walks, Pittsburgh uses 1 Portland cement, 3 sand and 6 broken stone or gravel. Indianapolis uses 1, 2 and 5; Milwaukee, 1, 3 and 5. In concrete floors, 1 Portland cement, 3 sand and 6 broken stone is good. Ordinarily, 1 Portland cement, 4 sand and 6 to 8 of broken stone or gravel is sufficient.

Average specifications for the best foundation work may be stated, for natural cement, as 1, 2 and 4 to 5, and for Portland cement, as 1, 2½ and 5 to 6. Good concrete for less duty can be made with a smaller proportion of cement if the proportion of mortar to stone is kept the same.

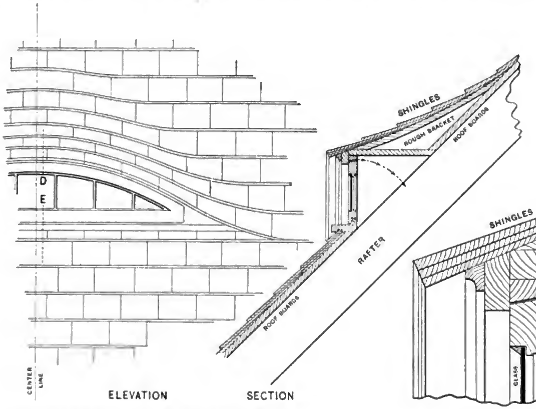
Experiments on the relative merits of gravel and broken stone for concrete indicate that with natural cement the broken stone concrete is materially stronger than gravel concrete, but that with Portland cement the difference is less and may even be in favor of gravel. The gravel stones are harder and tougher than the usual broken stone, but the adhesion of the mortar to the rough surfaces of the broken stone is greater than to the smooth gravel surfaces. The older the concrete, if it is well made, the closer the bond and the stronger the concrete becomes. Dirt has even more effect in preventing good bond in gravel than in broken stone, and strict cleanliness should be demanded.

In the recently completed Third street tunnel in Los Angeles the specification for the concrete used in the walls called for one barrel of Portland cement in the packed condition in which it is sold to six barrels of the same size of the aggregates—*i. e.*, sand, gravel and broken stone shoveled full but not otherwise compacted. As interpreted by the contractors, this is but little stronger than the mixture 1 cement, 3 sand and 6 broken stone or gravel, and is considered by the engineers who supervised the construction to make very strong concrete for the thickness of the walls used.

In concrete masonry for locks the general proportions for Portland cement concrete are 1 part Portland cement, 4 parts gravel and 4 parts broken stone. In particular situations this is increased to 1, 3 1-3 and 3 1-3 respectively. Natural cement concrete is made in the proportions 1, 2½ and 2½ of the materials named.

CONSTRUCTION OF EYEBROW AND CASEMENT WINDOWS.

We present herewith some details showing the construction of eyebrow and casement windows, the drawings being to a sufficiently large scale to clearly indicate the important points involved. It may be stated at the outset that eyebrow windows, as ordinarily constructed, are not always regarded with favor from an artistic point of view; but if they are carefully proportioned so as to avoid too great a hight at the center and the reverse curve being made to die out on the roof without unseemly hump or break, they can be made to present a not unattractive appearance. The fact, however, that they are often used in roofs of houses for the purpose of lighting and ventilating unfinished attics and are the basis of inquiries from our readers is sufficient warrant for devoting a little space to the subject at this time.



Front Elevation and Section of Eyebrow Window.—Scale, ¼ Inch to the Foot

Construction of Eyebrow and Casement Windows

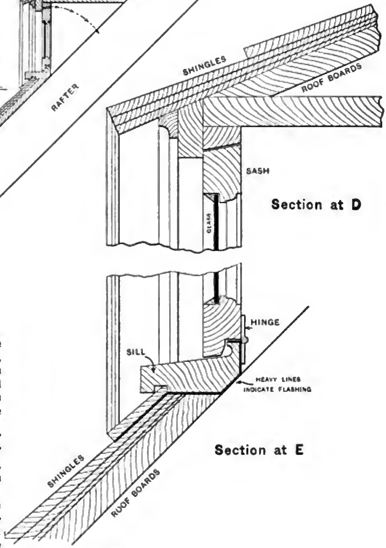
The dormer shown is swelled out with the aid of rough brackets, nailed to the rafters, through the roof boards. These brackets are sheathed with ⅞-inch stuff, to which, after receiving the roofing paper, the shingles are nailed.

The sash swings in, as indicated by the dotted line in the section, and is hinged at the bottom, as shown in the large detail. The section at D is taken through the head of the sash and dormer at line D on elevation. While the section at E is taken through the sill at the line E of the elevation. In this detail the sill is hollowed out as shown, to prevent water from entering under sash. The flashing in cheap and medium grade work is of tin, and in the first grade work of copper or sheet lead.

In connection with pivoted casement windows it should be stated and the point emphasized that they should never be used in positions exposed to severe storms, as it is practically impossible to make them weather proof, especially about the pivots. The casement shown in the accompanying illustrations has been designed to overcome, so far as possible, this objection.

The dotted line A upon the elevation indicates the cut from which the detail section through the head of the window is taken. A wood lintel is built in over the top of the window to relieve the stone arch in front of it. Furring strips are set upon the inside of the wall, and to these the lath and grounds are nailed. The grounds act as a gauge to plaster to and as nailing for trim and other interior wood work.

In the section showing the sash open the stop beads are cut at A and B. The outside stop above A and the inside stop below B are fastened to the frame, while the outside stop below A and the inside stop above B are fastened to the sash. The projecting part of frame marked C is cut away between the points A and B to allow the sash to turn as shown.



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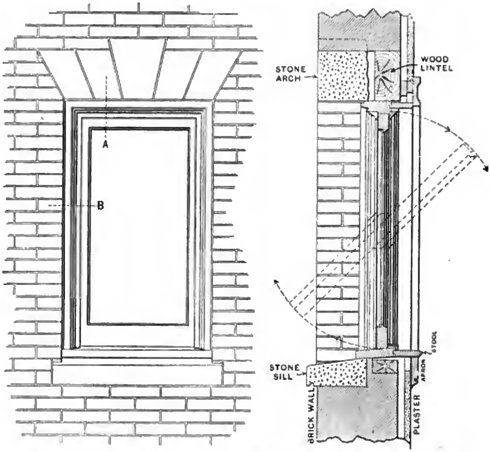
Details of Window Taken at D and E of the Elevation.—Scale, 3 Inches to the Foot.

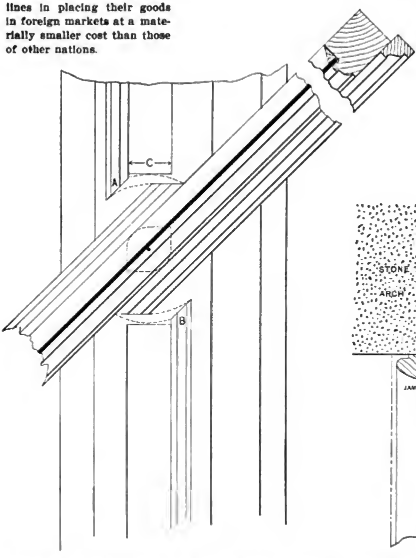
We shall be very glad to have our readers criticise the construction shown, and discuss the subject in the light of their own methods of doing similar work.

At a recent meeting of the Austrian Industrial Union statistics were given to prove that water power was cheaper to use and much cheaper to operate than

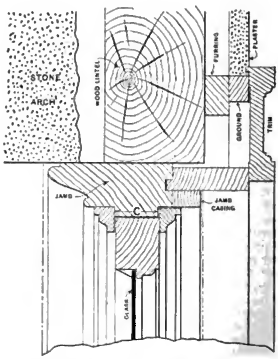
steam power, and that the general utility of the former was substantially as great as that of the latter. The following test case in the Tyrol was mentioned: A factory was equipped with both water and steam power of exactly the same volume. The water power cost 65 cents per horse-power and the steam power 73 cents. In the cost of operating, however, the difference was much greater. With water the expense was 0.07 cent per horse-power per hour, while with steam and cost was 0.61 cent. The saving in a year by the use of water at this factory amounted to $203,812, representing approximately a capital of $4,060,000. Water power is a highly important factor for cheapening the cost of manufacturing in the mountain region of Austria. Many streams abound, all of which are utilized in turning the wheels of industry at a small cost. This is the secret of the success of Austrian manufacturers in certain lines in placing their goods in foreign markets at a materially smaller cost than those of other nations.



Front Elevation and Vertical Section of Casement in a Brick Wall.—Scale, ¾ Inch to the Foot



Section Showing the Sash Swung Open.—Scale, 3 Inches to the Foot.



Section through Head and Jamb of Window Showing Details of Construction.—Scale, 3 Inches to the Foot.

Construction of Eyebrow and Casement Windows.

CORRESPONDENCE.

Construction of Cove Ceiling.

From M. WILLIAMS, *Scranton, Pa.*—The accompanying diagrams show three different methods of obtaining the form of an angle bracket for cove molding placed in the angle made by the intersection of the side wall and ceiling of a room, and are presented in answer to the inquiry of "G. A. N.," Owatonna, Mich., which appeared in the issue of the paper for September. In Fig. 1, A B C represents the level bracket and A' B' C' the angle bracket. To obtain the form of the angle bracket draw parallel lines across the level bracket, continued to the intersecting angle of the corner shown at A' B' C'

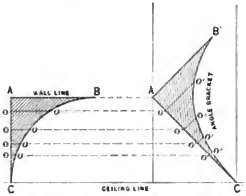


Fig 1.—Showing Method of Obtaining the Angle Bracket.

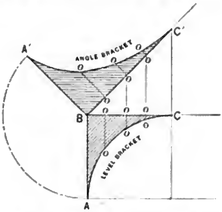


Fig. 3.—Another Method of Doing the Work

From the points of intersection square over the lines o' o', o' o', o' o', &c., and make each equal in length to its correspondent on the level bracket, as shown. Through the points thus obtained draw the curve B' o' o' o' o' C', which will form the angle bracket required.

In Fig. 2 make B D equal to the diagonal of the level mold B C, and assume it to be the semimajor axis of an ellipse, the semiminor axis being equal in length to A C of the level molding. The curve of the angle bracket will be the quarter ellipse, as shown. In Fig. 3 is another method similar to the ordinary method of developing the center line of rail in hand rail construction, the development of the quadrant in this case forming the angle bracket for the corner.

From O. A. S., *Elgin, Ill.*—I send a sketch, Fig. 4, showing a method of obtaining a hip circle, for the benefit of "G. A. N." of Owatonna, Mich., and which I trust will prove satisfactory. The first thing to do is to lay out an elevation of the cove or quarter circle, in this case shown at A B, and divide into any number of parts. A plan of the corner must then be made, showing the direction of the desired curve by the diagonal. An elevation for the desired curve must also be drawn, having a vertical hight for the curve equal to the distance B C, and a horizontal distance equal to the diagonal on the plan. The operation of finding the curve can then be commenced from the divisions on the curve A B, drawing first some lines from the divisions, cutting the line B C, and transferring the distances thus found to the line D E on the elevation for the desired curve. Taking next the first divisions, we can draw lines to meet the diagonal from each point, and transfer the points thus found on the diagonal to the line F D. From the points on the line D E draw lines to meet those from the points on the line F D, when a curve traced through the intersections of these lines will give the desired curve.

Designs Wanted for Verandas.

From J. S. F., *Deerfield, N. Y.*—Have any of the readers plans for upper and lower verandas for an octagonal building 10 feet on each side and with 18-foot posts?

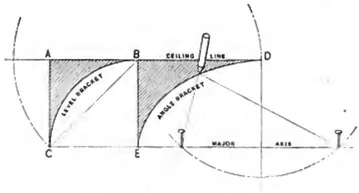


Fig. 2.—Making Use of Major and Minor Axes.

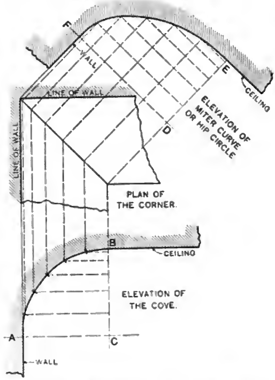


Fig. 4.—Method Suggested by "O. A. S.," of Elgin, Ill.

Construction of Cove Ceiling.

The building was erected upon a camp meeting ground and used for a speaker's stand. It is now contemplated converting it into a dormitory with upper and lower verandas extending entirely around it. I think verandas suitable for various purposes would be an interesting topic for consideration by the practical readers, and trust they will submit designs for publication.

Elliptical Louver in a Circular Tower.

From BUILDER, *Mississippi.*—I have a piece of work involving the construction of an elliptical louver in a circular tower, and come to the Correspondence department for the aid of some of my brother chips. Will those who have done work of this kind tell me how to lay it out?

Finding Bevels of Valley Rafters in Roofs Where Ridges Do Not Intersect.

From T. W. B., *Brooklyn, N. Y.*—The problem submitted by "W. B. J." in the issue for August may be solved practically and with very little drafting, provided the architect has correctly laid down on the plan the seat line of the valleys; if not, the workman may determine the correct point of intersection at his job without the aid of drawing instruments, because they are not usually part of a carpenter's working kit.

In Fig. 1 of the diagrams will be found a correct and simple method for determining the side cut of a rectangular hip, valley or jack rafter, on roofs of equal pitch. A piece of stuff the same thickness or width as the rafter to be cut is placed on edge, parallel to the plumb cut; the point X is marked, then square over to Z, connecting Y and Z, and we have the correct side cut.

In Fig. 2 it is assumed that the architect did not correctly locate the seat of the valley rafters in the plan. Adopt any convenient scale, say 1 inch to the foot. This will be found best for jobs, because steel squares are invariably marked on one side with inches subdivided into twelfths.

The lines in the diagram, Fig. 2, are numbered in the order in which it is intended they should be drawn, the lines Nos. 10, 11 and 12 being essential only to illustrate the method of application. In practice the place of these lines is taken by the rafters to be cut.

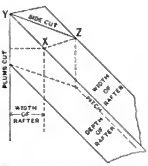


Fig. 1.—Method of Determining Side Cut of Rectangular Rafter on Roofs of Equal Pitch.

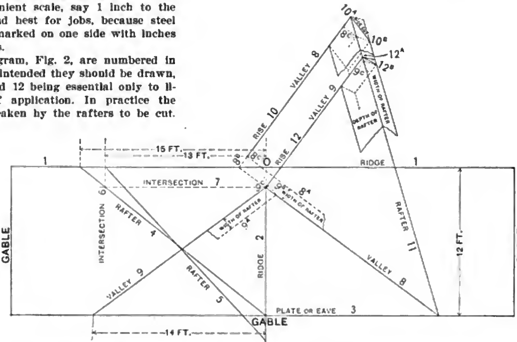


Fig. 2.—Diagram in which it is Assumed the Architect did not Correctly Locate the Seat of Valley Rafters in the Plan.

Finding Bevels of Valley Rafters in Roofs Where Ridges Do Not Intersect. Scale, 1/8 Inch to the Foot.

The side cut of jack rafters to intersect these valleys is obtained on the same principle; therefore it would be superfluous and confusing to illustrate them. The same method may be used for octagon hips and jacks.

Draw the line 1, 1, indefinitely, representing the ridge of the roof with the highest pitch; line No. 2 for the lowest ridge; line No. 3 for the side or plate of narrow section, and draw No. 4 from a point on line No. 2, 12 feet from O, line No. 1, to a point 15 feet from O, line No. 1. This will give the profile of the common rafter to the highest ridge. The drawing of line No. 5 will obviously be the same as No. 4, except dimensions. From the intersection of No. 1 and No. 5, square down to No. 4, making line No. 6. Parallel to No. 1, from the intersection of No. 4 and No. 6, draw No. 7. The intersection of lines No. 2 and No. 7 will be the correct intersection of the valleys under the circumstances suggested by "W. J. B.," and the seat lines No. 8 and No. 9 may then be drawn to their proper places on the plate.

To obtain the side cut of valley No. 8 against ridge No. 1 and valley No. 9 against valley No. 8, proceed as follows: Take a piece of stuff the same width or thickness as the material to be used for the valleys and place it against and parallel to valley No. 8, to obtain the line 8^{A} to a point square with 8^{B}. Take the distance on 8^{A} from lines No. 1 and No. 10, marked 8C' and square from the plumb line on the rafter, as shown at 8C", to the edge of the rafter; square over to 10^{B}; join 10^{A} and 10^{B}, giving the side cut of valley No. 8 against ridge No. 1. Adopt the same course with dimensions 9^{A}, 9^{B} and 9^{C}, to get the cut of valley No. 9 against valley No. 8. The lines No. 8, No. 10, No. 11 and No. 12, if carefully drawn, will give the lengths of the valleys No. 8 and No. 9 accurately.

Do Planks Shrink Endwise?

From E. E. L., *Kittery, Maine.*—I would like to ask through the columns of the Correspondence department if boards or planks shrink endwise. Some people hold that they do, and others that they do not. If they do, how much would a hard pine plank shrink that is 3 inches thick and 6 inches wide and 24 feet long—that is, how much per foot? I would like to have some definite authority for decision.

Note.—As our correspondent desires an authority to cover his case, we would refer him to "Kidder's Building Construction and Superintendence," Part II, where he will find beginning on page 21 extended comments on the shrinkage of wood. We quote as follows:

"When a short piece of wood fiber is dried, it shrinks: Its walls grow thinner, its width becomes smaller and the cavity larger, but the hight or length remains the same. The thinner the walls of the fiber, the less also is the shrinkage. The end walls of the fiber also shrink in the same way as the sides, but as the length is often a hundred or more times as great as the diameter the effect of the longitudinal shrinkage is inappreciable. The pith or medullary rays also have a marked effect upon the shrinkage of wood. The cells of the pith rays have their length at right angles to the direction of the wood fibers, hence as the pith rays dry they pull on the longitudinal fibers and try to shorten them, and being resisted by the rigidity of the fibers the pith ray is greatly strained. The fibers also shrink at right angles to the pith rays, and the latter in opposing this prevents the former from shrinking as much as they otherwise would. The construction of the pith rays parallel to the length of the board is probably one of the causes of the small amount of longitudinal shrinkage which has been observed in boards. This longitudinal shrinkage, however, is so very slight that in practice it is customary to assume that the length of a timber is not affected by shrinkage."

The subject is one which offers opportunity for discussion, and we shall be glad to have our practical readers give their views on the shrinkage question.

Does the Barn Harmonize with the House?

From O. A. S., *Elgin, Ill.*—I send a few sketches showing a possible improvement to the barn about which "Rural Scratch Awl" of Smith Center, Kan., writes

Fig. 1.—Front and Side.

Fig. 2.—Front and Side.

Fig. 3.—Front and Side.

Fig 4.—Front and Side.

Does the Barn Harmonize with the House?

under the heading, "Does the Barn Harmonize With the House?" Judging from the pictures the house seems to be white and the barn a dark color, perhaps deep red, and I should say it is not harmony, but a severe contrast. A light color to the body of the barn would, I think, have been much better. In design the barn appears rather stiff, and it would improve it to have an octagon cupola instead of an oblong one, while a slight curve in the roof lines would add some to its beauty of outline. The front projection looks rather insignificant, and could be improved by running the roof down with different variations. The wide expanse of roof should be broken, this being accomplished by the addition of small dormers in place of the small windows on the front. The belt course around the house should have been left off, and placed instead on the line of the main cornice, as in Fig. 3. A gable extension with an extension of the main floor is shown in Figs. 1 and 2, while Figs. 3 and 4 show a gable extension without changing the main floor but the position of doors and windows.

Painting Tin Roofs Before They Rust.

From M. M. C., *Millbrook, N. Y.*—Why is it that so many owners of houses allow the tin of the roofs to become rusty before painting them? I think some very interesting comment might grow out of a discussion of the question.

Note.—The probable reason many tin roofs are allowed to rust is because the paint on being applied holds better than if an attempt was made to paint the roof as soon as completed. A little time also allows the rosin used in soldering to crack off and permits the paint, when applied, to cover the tin in all places. In coating the plates with tin, palm oil has been largely used as a flux, and as long as this grease is on the surface the paint for the protection of the tin does not get down to the material and is likely to peel off or readily scrape off. It is a simple matter to give the roof a wash with turpentine, which will remove all the greasy substance. If the bulk of the rosin with which the roof has been soldered is scraped off previous to this turpentine wash there will not be enough rosin left to interfere with the paint adhering directly to the metal.

Different experienced men make the following remarks about allowing a new tin roof to rust. One says: "To allow a new tin roof to become rusty before being painted is like closing up the bunghole of a barrel while the liquid is flowing off from the spigot. A rough surface secures the paint better but gives the tin a start toward rusting and the rust will sooner or later destroy it." Another says: "After an experience of 30 years, my advice in the matter of roof painting is, to begin with, a new roof should not be allowed to accumulate any rust before painting." Another expert points out that if a layer of hydrated oxide (ordinary rust) be allowed to form, the successive coats of paint will peel off, their separation from the tin being merely a question of time, during which time the rust has been spreading under the paint. From this it may be readily inferred that an iron surface, even though coated with tin, should not be left exposed to the weather until rust has formed before painting, because, once started, its action is liable to continue even though paint be applied.

Regarding the time that should elapse after a tin roof is laid before it is painted, much depends on circumstances. If the tin is greasy from the palm oil flux so as to render the paint liable to peel off, the roof may be left exposed until the oil has been washed off, although some roofers recommend that as soon as a roof is finished the rosin should be removed and the surface should be washed with turpentine, benzine or an alkali, to remove all traces of the palm oil or other grease. Another method is to sprinkle sand over the roof and sweep it off with a broom. In localities near the sea coast, where coal is largely used for fuel, tin plate exposed to the weather is soon corroded, and when the cheaper grades of roofing plates are used the surface soon becomes covered with a rust. Consequently it is advisable to clean the roof so that a good paint will adhere and paint it as soon as possible.

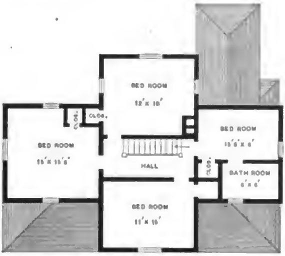
An expert roofer points out that the value of a paint is in its oil, and economy consists in purchasing a good oil paint, the best and purest to be obtained. He says that the use of 15 to 20 per cent. of a pure fish oil, free from any adulteration with kerosene or coal oil, will not detract from the value of a pure linseed oil. The principal reason for the adulteration is that the more plastic the first coat is the more durable, but the greater the tendency to crack the second coat. The weather coat should always be more flexible, containing more non-drying oil. But a man of good judgment will discriminate. The most flexible, in the true sense, of good oils is boiled oil, but if too thick it will stand mixing with raw oil or with turpentine. As a priming coat, such oil mixed with a little red lead, if not put on too thick, will stick tight to the roof. A little boiled oil thoroughly mixed with raw oil increases its elasticity but probably increases the chances that the paint will wrinkle and curl a little, although if care be taken in mixing and in using it any such effect should be so small as to be imperceptible. There is a strong reason for using more or less of boiled oil—that is, the pigment, particularly lead pigment, will the more thoroughly unite with and harden the oil.

Finishing Cedar Chests.

From M. W. G., *Kansas.*—Some time ago I noticed an inquiry from a correspondent about the finishing of cedar chests. While perhaps it is a little late to do him any good I would suggest that he use a suitable filler not too dark in color and light in body and then shellac in the usual way.

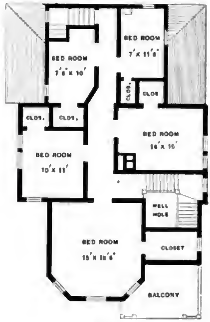
Plans for Farm Houses.

From G. M., *Breckenridge, Mich.*—I send plans of two cheap farm houses in reply to the requests of "D. L. P." and "H. L. W.," which appeared on page 68 of the March number of the paper The plans show the general arrangement of rooms, and the farmer can put on as much stye as individual taste may suggest, at the same time making the rooms larger or smaller as circumstances demand. I send only the plans, as these are what are requested.

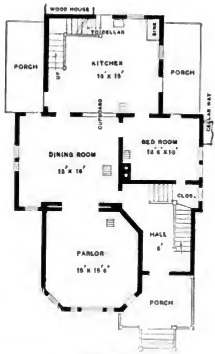


Second Floor.

First Floor.



Second Floor.

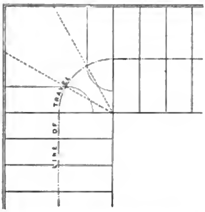


First Floor

Plans for Farm Houses.—Scale, 1-16 Inch to the Foot.

Position and Paneling of Newel Posts.

From I. H. W., *Seattle, Wash.*—In answer to the request of "W. H. M.," Woodlawn, Ala., regarding the setting of newels, I would like a little space in "our paper," as I call it, for comment. With two balusters on a tread, they are placed one-half the width of the tread apart between centers, and if there are three balusters to a tread they are placed one-third the width of the tread apart. The newel is variously fixed in its relation to the steps adjoining. In ordinary cases it is placed on the floor, and when so set its center should be in line with the center of the first riser. The same rule applies to the relation of the angle newels



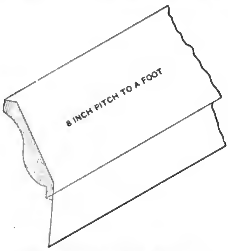
Position and Paneling of Newel Posts.

to the risers. Working from centers in stair building is almost a maxim. The center of the hand rail is to be at the center of the newel; so also is the center of the stringer. Now, as the center of the newel is at the center of the first riser and the center of the second baluster is at the center of the second riser, the newel takes the place of one baluster, and from the center of it to the center of the first baluster is the same as the distance between any two balusters on centers.

I submit a little sketch which I believe will prove useful not only to "W. H. M.," but also to many others who have stairs to build. An inspection of the diagram will show that at the line of travel the width of the tread is equal, and yet there is quite a platform left which may be used in several ways.

Mitering Rake and Level Moldings.

From W. S., *Paterson, N. J.*—If the readers are not tired of my questions, I have one which I think has not appeared in the paper for at least several years past. What is the proper method of procedure in laying out a molding on a rake to intersect with one on a level



Mitering Rake and Level Moldings.

standing plumb? The inclosed sketch shows the profile of the molding.

Note.—This question is one which occurs at intervals and has in the past been answered at considerable length. It seems, however, that the younger generation of building mechanics are encountering much the same difficulties as their predecessors in certain lines of work, and it is not strange, therefore, that many questions of the past are being repeated at the present day. We lay the inquiry of our correspondent before the readers for their attention, as each doubtless has his own particular way of doing the work.

Finding Bevels of Valley Rafters in a Roof Having Two Pitches.

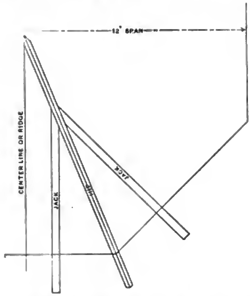
From J. F. W., *Danville, Pa.*—I notice that "W. S." gives in the September number the bevel of valley rafters in connection with my plan, which appeared in the August number. I am glad to see that the readers take an interest in such work, but would say by way of explanation that by moving the bevel from P to F in the diagram he will have the correct bevel. The bevel marked at P was misplaced.

Designs Wanted for Barns.

From W. B. P., *Nord, Ill.*—I have been an interested reader of your journal for over one year, and I now think I can scarcely get along without it. I am very much interested in barn framing and would like to ask some of the more experienced readers to submit drawings of a barn 32 x 60 feet, with posts of suitable hight, and have shown the proper pitch for the roof with a break in it, or a "camel back," as some would call it.

Finding the Back Cut on Jack Rafters for Octagon Roofs.

From W. H. M., *Woodlawn, Ala.*—I am looking for a simple rule for finding the back cut or bevel on jack



Finding Back Cut on Jack Rafters for Octagon Roof.

rafters for octagon roofs. I want a rule which can be correctly applied to any pitch of roof, in order to give the right bevel. I inclose rough sketch which will, perhaps, indicate more clearly just what I desire.

Pressure, Friction and Weight in Pumping.

From C. J. D., *Petoskey, Mich.*—A tank in a garret two stories above a kitchen is supplied from a hand force pump in the kitchen. The pump has a 1¼-inch inlet and the discharge is the same size. The man who placed the pump reduced the discharge to ¾ inch, claiming that the pump had to lift all the water in the pipe at every stroke and that the small pipe reduced the weight to be lifted. Is this correct, or is the pressure on the valve determined by the hight of the pipe rather than by the size of the pipe and the weight of the water in it, friction not considered? Which size pipe is better?

Answer.—The force to be exerted in working the pump is governed by the pressure per square inch on the piston valve due to the hight the water is to be lifted. The hight is the same whether a large or small pipe is used, and consequently the pressure is the same on the piston, which remains the same size. The small pipe presents an obstruction by reducing the discharge outlet and also increases the friction. The larger pipe is better.

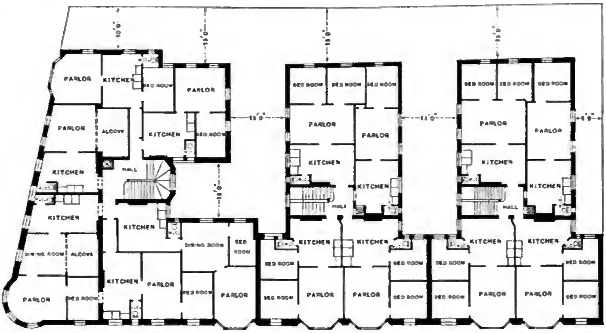
Polishing White Marble.

From B., *Plainfield, N. J.*—Will some of the readers of the paper who have had experience in this line, inform me as to the best method of polishing white marble?

Building Under the New Tenement House Law.

Ever since the new tenement house law for Greater New York went into effect it has been the subject of much animated discussion by architects and builders, who find many of its features a source of great objection to them. To such an extent has this been carried that in Brooklyn, it is stated, very few permits have been taken out for houses which would come under the provisions of the law, one of the claims made being that the law practically prevents the use of a 20-foot lot without a large increase in the cost of construction as compared with what was the case last March. Protests have been entered and efforts are now being made to bring about a revision of the law.

In the borough of Manhattan, however, a number of tenement houses are in contemplation, and we take pleasure in presenting herewith a typical floor plan of one of the first intended to be put up under the new law. The tenement, which was designed by Sass & Smallheiser, architects, of 23 Park Row, is to be erected at the corner of Broome and Mulberry streets, with a frontage of 46½ feet on the former and 141½ feet on the latter street.



Floor Plan of a Tenement House to be Erected Under the New Law.

Building Under the New Tenement House Law.

An inspection of the floor plan shows wide open courts, as compared with the old method of diminutive air shafts, and every room opening to the outside air.

Concrete Foundations and Floors.

Only the best brand of Portland cement should be used for these purposes, and their proportions may be as follows:

One part cement, 3 parts of clean, sharp sand, and 5 parts of stone, broken small enough to pass through a 2-inch ring. In preparing the concrete the sand and broken stone must be first carefully washed clean immediately before being used. Then the cement, sand and broken stone are mixed together and an additional amount of water added by means of a spray to form a pasty matrix, the whole being well worked over and incorporated, and immediately deposited in position. It must be well tempered. In heavy work the layers should not exceed 12 inches in thickness, and should be allowed to set for 24 hours before the succeeding layer is deposited. For making one cubic yard of concrete, mixed in the above proportions, the following quantities of material will be required:

1 barrel of cement.

½ cubic yard of sand.

1 cubic yard of broken stone.

Basement floors are usually finished with a ½-inch coat of imported cement in the proportion of two parts cement to one part of fine, clean, white sand, and finished with a floated surface; but for heavy work the coat should be 1 inch in thickness.

A coat 1 inch thick will require for each superficial yard, 0.182 barrel of cement and 0.091 barrel of sand. If ½-inch thick, one-half the quantity will be required.

The body of the concrete should not be allowed to dry before the finishing coat is applied.

Modern Buildings for Japan.

Something more than a year ago we referred in these columns to the fact that a steel palace for the Crown Prince of Japan was being designed by architectural engineers in this country and that the steel skeleton frame construction was likely to revolutionize building in that far away section of the world. It is well known that the Japanese are a progressive people and are desirous of keeping abreast of the times even in such matters as this, and it is interesting to note that there has recently arrived in New York City, for the purpose of studying modern building construction, Y. Tsumagi, a civil engineer and architect of the Home Department of Japan. While in New York City he will be the guest of the Japanese Consulate, and, in speaking of his mission in this country to a representative of the New York *Tribune*, Secretary Y. Ohki of the Consulate said:

Our Government has sent him here to study your wonderful buildings. Japan is going to build new customs houses at Yokohama and other ports along the coast. The present buildings are very old, and are not large enough to care for the business of the Government monopoly in tobacco. The new buildings will have all sorts of modern improvements, such as elevators and electric lights. Mr. Tsumagi will study the most improved methods of making buildings fire proof and various problems in steel construction.

He was in New York 16 years ago, and is much surprised at the wonderful building developments. There were no skyscrapers then. Such tall buildings could never be built in Japan on account of our terrible earthquakes. They would be tumbled down, no matter how strong they were built. Although Japan is an island, it is decidedly larger than Manhattan, and we are not so crowded for room that we have to build up into the sky. Mr. Tsumagi will spend four weeks in this city watching building operations. Then he is going to Washington for a month, to study public buildings.

WHAT BUILDERS ARE DOING.

THE amount of money which is being put into building improvements in the city of Cincinnati, Ohio, shows a large increase for August as compared with the same month of last year. Work under way at the present time consists for the most part of dwellings, although there are quite a number of structures being erected for business purposes. A ten-story office building is under way, the two lower stories of which will be occupied by the *Commercial Tribune*. The Cincinnati Traction Company are contemplating the erection of a 12 or 15 story steel frame building involving a considerable investment of capital. Altogether the prospects for the remainder of the season are very bright in the building line, and labor is likely to be fully employed.

According to the report of Charles A. Tooker, Inspector of Buildings, there were 383 permits issued for building improvements during August, involving an estimated expenditure of $311,915, as against 321 permits for buildings estimated to cost $145,934 in August of last year.

Des Moines, Ia.

Recent advices are to the effect that building was never more brisk and steady than it has been the past summer in Des Moines. The bulk of the operations consisted of business houses and flats, and there are now in process of construction 18 or 20 two-story flats, ranging in cost from $4000 to $32,000. A stone Congregational church, estimated to cost $160,000 is also under way, and what is said to be the largest storage warehouse west of Chicago is to be put up this fall for the Hawkeye Transfer Company of Des Moines. A number of fine residences costing from $3000 to $5500 are also contemplated, together with a large number of smaller houses for the laboring people. Our correspondent advises us that carpenters obtain from 32½ to 35 cents per hour, with a few getting 40 cents, a day consisting of eight hours; bricklayers get 50 cents per hour; tenders $1.75 a day; an ordinary laborer $1.50 to $1.75 per day; plasterers $3.50 to $4, and plumbers $3 to $3.25. The city is having nothing that might be designated as a "boom," but a steady growth.

Detroit, Mich.

The building situation is keeping up to the expectations of the earlier part of the year, and there seems to be no reason why the remainder of the season should not equal that of the past. The work under way consists largely of dwellings, with some store buildings, manufactories and public schools in progress of construction. We understand that a large aquarium is to be built on Belle Isle.

According to C. W. Brand, Permit Clerk, there were 225 permits for building improvements issued during the month of August, estimated to cost $634,400, these figures comparing with 179 permits for buildings to cost $594,100 for August of last year.

Erie, Pa.

The building situation in the city is comparatively quiet just at the present time, although there are under way a number of building improvements.

The Erie Builders' Exchange, now about five months old and with a membership of over 100, is in a most flourishing condition and probably as prosperous as any of the other exchanges when the size of the city is considered. Assistant Secretary B. W. Schafer visited several outside exchanges during the week commencing September 2, among them being those at Cleveland and Columbus, Ohio. The trip resulted in his securing a great deal of valuable information regarding rules and regulations governing the workings of builders' exchanges, which will doubtless be utilized in connection with the local body. At the meeting held Monday evening, September 9, the Rule Committee with the aid of the assistant secretary presented a number of favorable rules, which were adopted as read, and the meeting also adopted the Code of Practice, recommended by the National Association of Builders.

Everett, Wash.

The new buildings now under construction in Everett run all the way from a $1000 residence to a $50,000 opera house. There is a crying demand both for store and office buildings and for homes, and it is claimed by contractors that every available mechanic is at work. The most notable buildings now being put up are the Colby Avenue Opera House, to cost $50,000; the Rucker Bank block, to cost $40,000; the Colby block; the Seattle Feed Company's mill, to cost $15,000; the W. H. Miller mill, $15,000, and the new High School building, $10,574. The new residences average about $2000 each.

Grand Rapids, Mich.

One of the features of the present activity in building and real estate operations is the demand for workingmen's houses. A significant indication of the prosperity which pervades nearly all sections of the country, and Grand Rapids in particular, is found in the larger payments the working classes are able to make on their homes. Whereas they formerly paid down sums ranging from $50 to $200, it is stated that now it is not uncommon for them to make payments of $300 to $500. Another feature of the building situation is the advance in the most of materials of all kinds which enter into the construction of houses. One interest is reported as having 30 houses in the city all plastered and ready for finishing, but which have been standing idle for weeks, because they cannot get the material and have the work done any sooner. Labor, too, is scarce, and builders who formerly contracted to put up a workingman's cottage for $700 are now asking $1000 and upward to do the work. The summer's real estate business has been much better and more satisfactory in every way than for a long time past. While there is no semblance of a "boom" there is a great deal of property changing hands, and a particularly desirable feature is the fact that people are in nearly every case buying for actual use, either for factory sites, stores or residences, while not a few vacant plots are being taken up for the erection of flats.

Great Falls, Mont.

The conclusion of a successful wool season has prepared this city for an unusual activity in the line of building. A large number of residences and other small buildings are to be put up this fall. There are also several large office and other business blocks now building or about to be commenced. The new Conrad Bank building, to cost $60,000, will be completed by October 1, and will then be the handsomest and most costly building in the city.

Los Angeles, Cal.

Los Angeles had a narrow escape from a building strike a few weeks ago, partially due to a disagreement among the labor unions and partially to concessions made by employers. During the month of August the number of building permits issued reached a total of 235, involving an expenditure of $337,607. This shows an increase of 50 per cent. over the permits issued in August, 1900. The building activity which has been in progress during the summer is not confined to any one part of the city, nor to any one class of structures, although an increase is to be noted in the amounts expended for flats and for buildings to be devoted to wholesale purposes.

The following table of wages, prepared from data obtained from both contractors and labor unions, appears in the *Herald*, and shows the increase in wages during the past year, the rate for August 1, 1900, having been the same as on January 1 of the present year:

	Present.	January 1, 1901.
Carpenters	$3.00	$2.50
Plumbers	3.50	3.50
Bricklayers	4.50	4.00
Painters	3.00	2.50
Plasterers	5.00	4.00
Cement workers	4.00	3.50
Cement workers' helpers	3.00	2.50
Hod carriers	3.00	2.50
Mortar men	2.50 to 3.00	

For overtime the contractors pay from time and a half to double time.

In the smaller towns of Southern California a similar condition of activity exists. Pasadena and Riverside both note unusual progress in the matter of new buildings. F. O. Engstrum reports a total of $255,500 worth of building contracts secured for buildings in Southern California. These include a $54,000 High School and a $14,600 car barn at Santa Barbara, a $32,000 depot at Los Angeles, a $15,000 Masonic Temple and a $45,000 warehouse at Oxnard.

New Orleans, La.

The friction which for some time past has been developing among builders, architects, plumbers, painters and the various building trades unions of the city culminated the last of August in a general lockout of all the trades unions by the associated employers. At a meeting of the latter 100 employers are said to have signed an ironclad agreement to refuse all recognition to the various trades unions, but all agreed to grant an eight-hour day. The master builders contend that the changing demands of the men have rendered it impossible to bid on contracts with any certainty.

Oshkosh, Wis.

There is considerable building at present in progress, consisting for the most part of residences ranging in cost from $1500 to $5000. The Ladies' Benevolent Society is building a new home to cost $15,000, and a new High School is expected to be finished in the not very distant future.

The Builders' Exchange has a membership in good standing of 70, with officers for the year consisting of William McNaughton, president; M. Mertz, vice-president; F. Kitz, treasurer, and E. H. Frank, of the E. H. Frank Hardware Company, secretary.

Pittsburgh, Pa.

The activity in building continues on a most gratifying scale, with no indications of a let up for some time to come. The figures contained in the report of Superintendent J. A. A. Brown of the Bureau of Building Inspection shows that for August there were permits issued for 288 buildings estimated to cost $1,314,420, which is an increase over the same month last year of 92 in the number of permits granted and of $691,752 in their estimated cost. The erection of dwellings continues on a large scale in the suburban districts, and new plots are constantly being developed and improved.

Sacramento, Cal.

About a quarter of a million dollars is now being expended on new buildings in Sacramento, and contractors report that the present activity is likely to continue, at least through the remainder of the year. Most of the new structures are residences, although several business buildings are in course of construction. Architects report that there has been a marked improvement in the class and style of dwellings built. Fourteen houses, chiefly one and two story frame dwellings, are being put up by Contractor W. T. Murcell, and seven more will be started by him shortly. F. W. Book, another contractor, states that within the last six months he has put up 21 houses of an average cost of $2000.

Salt Lake City, Utah

Reports from Salt Lake City dated September 1 state that contractors have not within a decade had such a busy season as the present. Contractors are not, however, without their troubles. They allege that all the money they have made has gone to the carpenters, bricklayers and other workmen. Moreover, they are badly hampered by a lack of some kinds of material. Facing brick is hardly to be had at any price just at present, and almost all materials have advanced in price. The supply of structural steel is still holding out, but it is understood that a continuation of the steel strike will necessitate postponing the erection of some large buildings now contemplated.

San Antonio, Texas.

The San Antonio Builders' Exchange has recently been incorporated by Henry Pauly, P. L. Shields, O. A. Balcom, Jacob H. Wagner and others.

San Francisco, Cal.

Until the labor troubles are settled no activity in building can be expected here, writes our correspondent under date of September 7. The large structures of the year are being held back in consequence of the strike, and many small buildings cannot be commenced until late in the autumn or until next spring. The lumber fleet is practically tied up in the harbor and there are supposed to be more than 50 lumber vessels, with upward of 25,000,000 feet of lumber aboard, now idle in the stream. The local yards are naturally running very low, though as yet no actual shortage in any lines is reported. This is due, of course, to the fact that the demand has decreased almost in proportion to the decrease in the vessels' unloading.

The calling out of the sand teamsters by the strike leaders almost a month ago has shut off to a large extent supplies of sand, cement, rock, &c., needed for building operations. The Building Trades' Council has refused to countenance the present strike and is threatening to organize another sand teamsters' union in order that building operations may go on without interruption.

St. Louis, Mo.

Advices under date of September 9 show that the building business in the city has not yet fully recovered from the effects of the severe heat of the past two months. There are a number of plans on the boards of architects, however, on which bids will be invited in the course of the next few weeks. The report of the Building Department shows that during the month of August permits were issued for 106 brick buildings, estimated to cost $659,451, and 63 permits for alterations, additions and repairs, to cost $84,771, as compared with 92 permits for buildings costing $465,871 and 45 permits for alterations, additions and repairs costing $134,792 for the corresponding month of 1900. In August of the present year there were also 132 permits issued for frame buildings, involving an outlay of $29,250, and 46 permits for alterations, additions and repairs, to cost $11,699, as against 95 permits for frame buildings costing $22,750 and 20 permits for alterations, additions and repairs costing $4953 in August of last year.

Labor matters are very quiet, there having been but a few comparatively insignificant strikes in the recent past. There is still a dearth of skilled labor, more particularly bricklayers, plasterers, sheet metal workers and electric wire men.

Preliminary surveys and cross sectioning have been completed and ground broken for the coming World's Fair. Operations will necessarily be pushed to the utmost in order to insure opening the fair on May 1, 1903. It is possible that the scarcity of all kinds of labor may prove a serious problem, although we understand that contractors just at present are willingly paying a rate of wages somewhat in advance of the union scale.

St. Paul, Minn.

According to the figures given out by Building Inspector Wheeler, permits were issued during August for 181 building improvements, involving an estimated outlay of $1,177,075, as against 88 permits for buildings to cost $482,275 in August last year. The new building code went into effect on September 1, one result of which was a rush to file permits during the last two days of August.

There are 300 divisions of the new Building Code, some of the more important provisions of which are that no frame or brick veneer building shall be erected within the fire limits; all buildings more than five stories high must be fire proof; no livery or boarding stable will be allowed in blocks laid out for residence purposes, unless two-thirds of the property owners within a radius of 100 feet give their assent; all hotels or lodging houses occupying an area of 5000 square feet or more shall have two separate stairways for egress; all buildings above three stories high, except private residences and apartment houses, hotels and lodging houses having two separate stairways, must be equipped with fire escapes; all theatres, jails, police stations, hospitals, public asylums or public institutions of any kind must be fire proof, and no fence on a street line shall be permitted higher than six feet.

LAW IN THE BUILDING TRADES.

LIABILITY WHEN ONE BUILDING IS ON TWO LOTS OF DIFFERENT OWNERS.

The holder of a mechanic's lien for materials furnished for the construction and erection of a building on two lots, under an agreement with the separate owners, may enforce his lien against the property of each by showing the proportionate amount and value of material used in each part.—Minn., 65 N. W. Rep., 447.

WHEN CONTRACTOR IS NOT LIABLE FOR INJURY TO WORKMAN.

Where one who was engaged in raising timbers, which were being used in the construction of a house, by means of a derrick, and whose duties were to stand on a scaffold and receive and detach such timbers from the derrick, was injured by the giving way of the derrick, and claimed that the ropes which were used to stay the derrick (one of which broke) were too small, and that they had been in a cellar where there was an accumulation of acid, he cannot recover, as he knew the ropes were too small and had been in the cellar, but had continued to work with them after his attention had been called to the defects, since by continuing to use them he accepted the risk.—No. 36, S. E. Rep., 304.

A contractor is not liable for an injury to a workman caused by his fall from a staging by reason of its being defectively attached to the building, when the workman had built and attached the staging, and had not asked or received any instructions from the contractor.—Mass., 57, N. E. Rep., 200.

DETERMINING VALUE OF EXTRA WORK.

Where the terms of a building contract called for a gross sum for all the work to be performed under same, for the submission of differences to the arbitration of designated persons, and that payment for extra work should be governed by the contract price, it was proper for the arbitrators to determine the value of such extra work by the current market price for same.—S. S. 56 S. E. Rep., 299.

LIABILITY OF SURETY OF "ARCHITECT AND CONTRACTOR"

The architect who prepared the plans and specifications of a building, and afteward became the contractor and agreed with the owner to put up the building according to the plans and specifications, is responsible for any defect or insufficiency in the specifications; and the surety company who sign his bond to guarantee the safe execution of his contract as "architect and contractor" are equally responsible.—La. 39, So. Rep. 223.

FINALITY OF DECISION OF ARBITER.

Where one contracted to build a school house for a city, and agreed that the superintendent of buildings for such city should be the arbiter of all questions arising relative to the execution of the contract, a finding of the latter that the work was not progressing in accordance with the terms of the contract, and the city was justified in taking possession of the unfinished work, is conclusive, and in the absence of fraud will not be disturbed by the courts.—25 N. Y. Supp. Rep., 747.

WHEN EXTRAS DELAY COMPLETION.

Where the owner permitted a contractor to go on and finish a building after the time stipulated in the contract, and extra work was ordered by the owner, which required additional time, the delay in completion cannot be set up as a defense to an action for the contract price. —65 N. Y. Supp. Rep., 10.

WHEN ARCHITECT ACTS IN BAD FAITH

Under a building contract providing that the contractors shall pay $15 a day for delay in completing the building, except that where delay was occasioned by certain causes, additional time should be allowed, but no such allowance should be made unless an application in writing was presented to the architects, who should award the amount of the additional time, the contractors are not liable where the architects' refusal of additional time was in bad faith.—McDonald vs. Patterson, 57 N. E., 1027.

RECOVERY WHEN OMISSIONS ARE SLIGHT.

In an action on a building contract for the price, recovery may be had for the proportionate part, where the work has been substantially done in accordance with the contract, the omissions and variations being slight.—Kane vs. Winson, 4 O. D., 509.

THE ART OF WOOD TURNING.—XXI.

(SECOND SERIES.)

By Fred. T. Hodgson.

In the case of the old fashioned overhead motion, arranged on the suspension plan and fixed to the left hand side of the lathe, it has been found in practice that, no matter what amount of spring is provided, it is impossible to obtain sufficient rise and fall to admit of the instrument following the varying course from point to point throughout a looped figure, and it will be obvious that any extension of the eccentricity employed carried with it increased inconvenience in this respect. At first this was rather inclined to be regarded as a drawback to the application of the instrument should the lathe be provided with an overhead motion of this character.

To overcome this, under the circumstances a fairly strong flexible rubber band may be employed, about 3-16 inches in diameter, when the objection will vanish. It will be seen that with this attachment the tension upon the cutting point will be maintained to a certain extent, as the distance from the center varies in accordance with the movement of the instrument. At the same time it is obvious that the pressure brought to bear on the same is less at the shorter distance than at the opposite point. The method works very well, but is not by any means as satisfactory as it might be.

The more complete kind of overhead motion, having two standards, which was introduced some years ago, fulfills all the requirements necessary. Some reference to it has been made before in these papers, but it has not been fully described, so further allusion to it at this point may be of considerable service. It is shown in its complete form in Fig. 150. As thus made it is quite obvious that the tension bar with its guide pulleys and counterbalance weight causes the pressure upon the pulley of the revolving cutter to be equal at every point throughout its rotation, whereby any uneven or undue strain is prevented, with the result that the tool works in every way satisfactorily. The advantages of this particular class of overhead motion do not apply to it as connected with the epicycloidal cutter only, but the same smooth and equal pressure is maintained in all and every revolving instrument that can be employed in ornamental turning.

The spanner shown at Fig. 149 has been found much more convenient than if made straight, for there are occasions when it is quite impossible to use a straight shanked spanner, whereas the bent shanked one can be used on all occasions.

The cutter employed in connection with the instrument described in the last paper, when in its finished state, may be considered as a sort of carving machine. The bolder patterns, especially those in relief, are very much admired, and the only thing that prevents a great many owners of lathes having one of these instruments as an attachment is the cost of them. When made to order there is no avoiding the fact that they they are costly, but it is hoped that many owners of foot lathes will be able to make machines for themselves if the descriptions given are strictly followed.

What is now required is the details of the manner in which the two supplementary revolving instruments are made that work in conjunction with the worm wheel and tangent screw.

The first, then, will be a miniature drilling instrument, which, although apparently complicated, is in reality not so, as will be seen. A piece of cast steel about ¾ inch in diameter must be centered and turned down, as shown in Figs. 151 and 152, in the first place. The stem A has ultimately to be filed to fit the tool box of the eccentric cutter, and must be left sufficiently large in diameter to admit of the necessary size being obtained, and it must not be forgotten that the center line of the stem is required to be accurately in the same plane as the axis of the tool or cutter when in action. By reference to Fig. 152 some idea of the diameter may be gathered, to which the stem in the first place must be turned. Before, however, reducing the stem to fit the tool box all the work to the front part must be executed, retaining the back center free for this purpose.

It will be seen that the front referred to is turned to an obtuse cone at B, and the front projection C is also turned to a taper. The front is drilled up and tapped to receive a screw for the purpose of retaining the pulley, Fig. 153, in its place, and this will be the next to do. This pulley must also be made of cast steel of the diameter shown. It should be very carefully bored and turned at D and E to correspond exactly with B and C, Fig. 151, leaving sufficient to grind both to a perfect fitting, when hardened. Having thus made the two to correspond so far, the pulley is fitted to a short steel arbor, and the external parts finished, a short screw, or nose, is cut with a fine thread at F. Great care and attention must be given to this, as it may be required to receive more than one socket. This we shall see when this part is done and the V-groove made. The front is turned out to a recess, and the head of the screw that goes into the fitting C, Fig. 151. The recess may be made as large as consistent with strength—in fact, the larger the better, as the pulley is held to its fitting between the face of the screw head and the obtuse cone B, Fig. 151.

The best way to go about the work is shown at Fig. 154, which is turned from a piece of steel 3 inches long. The object of the extra length of the steel is for the purpose of being able to fix a carrier to it, by which it

Fig. 149.—Bent Shank Spanner

Figs. 152 and 151.—End and Side Views of Drill Chuck.

Fig. 153.—Steel Pulley.

Fig 154.—Stem and Cone.

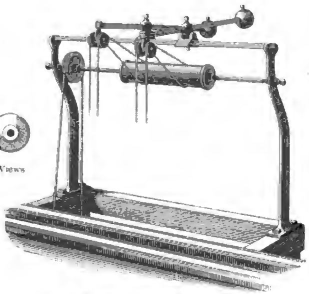


Fig 150.—Improved Overhead Motion.

The Art of Wood Turning.

is so much more convenient to hold when grinding the two parts together. The only difficulty in thus doing it is the liability of the part that has to be filed to fit the tool box becoming hardened when the front is subjected to that process. This, with care, can be avoided, and the best way to prevent anything of the kind occurring is to have a vessel of water of sufficient depth to barely cover the cone, and if the surface of the vessel containing the water is large enough to move the object well about, keeping it in the vertical position, all should go well. Should any doubt be felt on the part of the operator, it will be best to finish off the stem first. This will do equally well, but the advantage of the holding power will be lost.

The stem, Fig. 151, should be kept as short as possible from the face D to the extremity E, in order that when complete the point of the drill will not be unduly extended from the face of the eccentric cutter into which it is placed. It is imperative that this part must be subjected to the process of hardening; from the very diminished size of the front pulley it must necessarily run at a very high rate of speed, and, if soft, would soon wear out and be useless.

When the pulley, Fig. 153, is fitted to its place, leaving sufficient to bring up the bearings when ground, it must be hardened before fitting. Care, however, must be exercised with regard to the finishing of all its parts for the reason that, once hardened, nothing more after grinding can be done to it. In hardening these steel pieces heat them to a deep blood red, and immerse in clean cold water. There is some little risk in this process that some fracture may occur, but this cannot be avoided, and should it occur, the only way to do is to make another one.

With the parts hardened, the next thing will be to grind them together. It is possible that the expansion resulting from hardening will leave more to be ground than was anticipated; if so, it will simply take a little longer time, and that is better than finding insufficient material has been left to "bring up" the bearings when fitted. When the screw is fitted to the front and the fitting completed, if the stem has been left on the piece of steel, as shown at Fig. 154, it must be separated and the stem filed, as before suggested. Care must be exercised to keep the line not only to the center, but in a perfectly parallel plane. For instance, if any error should exist in this respect, although the stem to all appearances fits the tool box, it will become raised or depressed at the point of the tool according to the amount of deviation from actual parallelism.

New System of Construction in the Netherlands.

In a recent report to the State Department Consul Frank D. Hill, writing from Amsterdam, states that the "Amsterdamsche Fabriek van Cement Yzer Werken" furnished his office with the following description of a new system of construction, which is used in the Postal Savings Bank Building, now approaching completion in the city named:

In the "Monier" system of building an iron frame work (looking much like a bird cage) is entirely enveloped in concrete of Portland cement, which prevents the iron from getting rusty and at the same time renders the concrete elastic. The iron, or rather steel, acts entirely in tension; the concrete, in pressure. This construction is at once strong, fire proof and water proof, and entails no outlay for repairs.

Patents have been taken out in various countries and in Germany a joint stock company have been formed. This company have made a number of experiments, resulting in the application of the T construction, described as an economic substitute in many cases for T constructions generally used heretofore.

Floors without beams measuring 7½ x 7½ m. (24.6 feet) and 8½ x 8½ m. (27.9 feet) have been constructed for the Postal Savings Bank at Amsterdam; and a floor of 300 sq. m. (3228 square feet), constructed as a whole (with beams), is about to be made for a Government building at The Hague.

Complicated formulæ being required in the calculation of concrete-iron floors and beams, the directors of the company have had some graphic tables drawn up, which enable them to find at a glance the necessary data for the work. These calculations and tables are kept strictly secret. This system is growing rapidly in favor in all European countries in the construction of government buildings and in manufactories.

The Persian Dwelling House.

There is still probably in the minds of most people who have not been in the East, says the *British Medical Journal*, a glamour of poetry about the very name of Persia, doubtless traceable to the "Arabian Nights." But, alas, medical science is terribly realistic, and not all the fabled perfumes of Araby can make a Persian town sweet to a sanitarian nose.

According to Dr. M. G. H. Paschnyan of Tauris the ordinary Persian dwelling house is the very negation of comfort as well as hygiene. Hidden away behind high mud walls the houses themselves are low and narrow, and have but one opening—to wit, the door. They are caves or holes rather than houses. They are usually some steps below the level of the ground, and the mud roof, which is flat, forms a terrace where the people sleep in summer. The latrines are in a courtyard just outside the dwelling.

The typical room is small, with a narrow window, or rather hole, without glass, and a low door which often does not shut. Air and light penetrate with difficulty, consequently the houses are always damp. There is scarcely any furniture, except a bed, which is on the ground, and is large enough to hold the whole family.

In the houses of the wealthy the floor is covered with the large, soft carpets for which Persia is famous, but in the ordinary houses the floor is formed by the earth, which is bare, or covered only with coarse matting. Along the walls, which are plain mud, not whitewashed, are cushions, but there are no chairs, tables or curtains. The people sit on the ground on their hams, or with their arms crossed in the Turkish manner, and at meals the cloth is laid on the floor. The fire is in the middle of the room. The *tandour*, which takes the place of a stove, consists of a brazier, into which are put small pieces of charcoal, and a square wooden table standing over the brazier, and covered with a large cloth, which hangs down over the sides. It is not surprising to learn that children are often asphyxiated by the carbonic acid and carbon oxide from the smoldering charcoal. These *tandours* are a common cause of rheumatism, owing to the great difference of temperature in them and in the rest of the room. Within the *tandour* it is from 40 to 60 degrees C., while in the apartment it may be as low as 10 to 15 degrees. Only the wealthier Persians have a stove and chimney. There is another *tandour* underground where baking and cooking are carried on. The smoke escapes how it can.

The poorer Persians have little in the way of cooking utensils, while the rich, who possess them in plenty, are utterly indifferent as to their cleanliness. By reason of the extreme filthiness of the dwelling and its furniture, the want of light and air, and the confined space, Persians suffer much from anæmia, phthisis and other diseases depending on insanitary conditions.

THE latest idea in connection with the designing of dwelling houses, especially of the more pretentious kind, or, at least, in those of such ground area as to permit of it, is a sick room. It is placed in some quiet part of the house, where the patient may be isolated. Excellent lighting and ventilation are planned and some means adopted to darken the windows when necessary. The floor is made of hard wood or tiling and both floor and wall are painted, so they may be easily washed. If such a room be furnished with iron bed, wood or cane furniture and muslin curtains, it can easily be cleaned and disinfected.

NEW METHOD OF HEATING GREENHOUSES.

AN interesting description of what is referred to as a new method of steam heating for greenhouses was recently contributed by T. Eckhardt to the *Florists' Exchange*, the matter being supplemented by comments by Prof. L. R. Taft of the Michigan Agricultural College. The method appears to have been invented and inaugurated in Belgium by two amateur gardeners, Messrs. De Meyere and Van der Stichelen, the one a civil engineer, the other an explorer and traveler, who have been studying and experimenting for some time to reproduce artificially in our greenhouses those atmospheric and soil conditions which in the tropical countries create the wonderful growth of plants. The article says:

The new method of steam heating, which I have had an opportunity of studying under the guidance of its inventors, has been applied to a commercial greenhouse establishment of considerable dimensions for over ten months, and has proven its superiority over older methods in many ways.

The inventors have primarily sought to provide bottom heat to the beds in which palms and foliage plants are cultivated, and they have succeeded not only in doing so in an economical way, but they have overcome the disadvantage of the drying out from the bottom, and even supply subirrigation along with the heat. The structural arrangement of the benches is easily explained by the two sketches, Figs. 1 and 2. The dimensions adopted in this may, of course, be altered according to circumstances to suit the conveniences at hand.

Solid beds are constructed, about 50 feet in length, with brick sides and ends, say 2½ feet high. Up to 16 inches they are filled with dirt, with a layer of drainage material (broken stones) on the top. On this four canals are built, of porous material—soft bricks and tiles. Above the canals enough room is left for the bed, Fig. 2, and between them a space of about 1 inch, which is filled with broken stone, bricks, cinders, or the like, to provide drainage for the bed. As shown in Fig. 1, each two adjoining canals together form a circuit in which steam and air are to circulate. The flow canal is provided with a receiver, R, Fig. 3, which consists of four or more concentric rings placed, telescope-like, over one another, so that about ½ inch space is left between each two succeeding ones. Into the smallest one, of about ¾-inch internal diameter, the steam is introduced through a very fine mouthpiece out of an orifice of about 1-50 inch. In order to avoid the stopping up of this small aperture by dust, &c., the steam is conducted through a little box, B, Fig. 1, and there, as the direction of the current is changed, any foreign matter drops, and through a removable bottom the little box can be cleaned whenever required.

The steam is furnished by a conveniently placed boiler under the pressure of, say, 59 pounds per square inch. It can be carried, as is well known, irrespective of direction, a thousand feet or more from the boiler without appreciable loss of heat, and pipes of comparatively small diameters may be used. A ½-inch supply pipe would be amply sufficient for four or even more beds, each 50 feet long.

The steam under the pressure named issues from the small orifice with a velocity of about 1700 feet a second, and at a temperature of about 300 degrees. In the receiver it expands and mixes with a large volume of air, which it draws through the rings, and only a few inches away from the receiver its temperature is reduced to gentle heat. In the Belgian establishment 80 degrees F. were maintained. In a second the vapor charged and conveniently heated air will have traveled through the whole circuit of 100 feet in length. Thus we find at all points of the canal practically the same temperature, as long as the steam is kept on. The air in the canal is quickly overcharged with moisture, and the surplus of saturation condensing is deposited on the porous walls of the canals; it permeates these, and thus is communicated to the soil and plants above.

The ten months' experience has proved that the results are excellent. Indeed, the fundamental idea of the inventors is that palms and tropical plants in general should be planted out in beds constantly warm and moist, and be kept growing on the same spot until the marketable size is reached. Then they should be potted, and the pots plunged into the same or similar beds, and finally sufficiently hardened off. Fine, healthy, vigorous plants are the result.

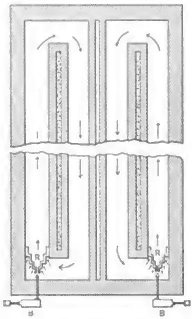


Fig. 1.—Plan of Plant Benches

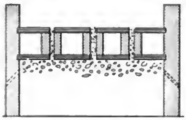


Fig. 2.—Elevation of Plant Benches.

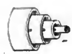


Fig. 3.—The Receiver.

New Method of Heating Greenhouses

In the canal system there is no loss of caloric, and the heat is given off absolutely uniformly to all parts of the beds. Besides that, the warm vapor arising from the bed and its walls keeps the atmosphere not only conveniently saturated with moisture, but the whole surface of the bed acts like a large radiator and heats the atmosphere in the greenhouse.

In the Belgian climate (the test, winter 1899-1900, was a very severe one, the temperature falling as low as 5 and 6 below zero) the heat of the bed has in all but the severest weather kept the house temperature at the required point; only in exceptional cases have separate radiating pipes been turned on.

Not the least important feature is the subirrigation which is provided by this system. By practical experience it has been found that the moisture derived from the condensed steam of the canals is very nearly sufficient; only occasionally (every week or ten days) have palms been syringed with the hose to clean the foliage, and that has been the only addition of water that the benches received. The drainage between the canals is provided to carry off any excess of water that might occur from that source.

During warm or summer weather the steam is not kept on continuously, but two or three hours heating a day are then sufficient, without causing any appreciable variations in the temperature of the bed, which is not surprising if the large area heated and the absorbing capacity of the material be considered. The actual average cost of heating 10 square feet for 24 hours to 70 or 75 degrees has been 150 grams of soft coal, or for a bed 50 x 4 feet and 6 inches deep, for the whole year, a little over 1 ton.

The value of this new system can hardly be overestimated, even if the method only found application where bottom heat is required. The old fashioned way of building up hot beds with manure, leaves or tan has many obvious disadvantages. It is expensive, the heat is not uniform in a bed of same size, and not at all constant, which make a renewal and much work necessary. Here the first cost is small, the installation permanent, and the heat is comparatively cheap and at all times under control.

The degree of heat must be regulated by the quantity of steam discharged into the canal in a given time, and the diameter of the receiver and canal; it is evident that the less dense the vapor in the circulating air the lower its temperature will be; thus the pressure, also, though in a lesser degree, influences the temperature.

This same system could, without doubt, be successfully applied to greenhouse heating in general. A sufficient number of canals would require to be built to furnish the necessary radiating surface. As the difference of temperature between the radiators and the atmosphere in the house would be constantly smaller than is the case in the ordinary steam pipe system, the radiating surface would have to be five or six times as large.

For the majority of cultures the system would offer great advantages. It would automatically regulate the moisture of the air, and we would avoid the strong direct radiation from steam pipes, which often have to be placed in proximity to the plants, and which are the cause of disease and insect pests. The new method in a measure combines the good points of the old steam and water systems. The heat can be distributed from a central station over a large area very economically, and the radiators of large surface give out a gentle heat.

Instead of the brick and tile canals, as described above, for the heating of the beds suitably constructed terra cotta pipes could be employed for the house heating, and this would most likely bring the first cost of the installation considerably below either a steam or hot water apparatus. In moderate weather it would be sufficient to turn the steam on for a limited time. The volume of the radiants being large and their material a good absorber of heat, they would continue to give off heat for a considerable time.

There may seem to be a disadvantage in the fact that a certain degree of moisture is always imparted to the atmosphere so heated, and that for some special cultures it might prove an excess and detrimental; but it will hardly prove to be so. If we consider the cultivation of roses, for instance, very little, if any, syringing will likely be necessary after the heating apparatus is once brought into action, and thus a very large amount of water will not be wasted on the walls, in the paths and underneath the benches. Again, if the necessity should arise, glazed pipes could be used for a part of, or the whole, system, and the condensed water could be drained off. It is worth noting that the air canals or pipes, whichever is employed, may be laid in any direction and inclination; and provided there are not too many bends, the circulation will be perfect.

In response to some inquiries Mr. Eckhardt has furnished the following additional information: In order to insure a given temperature in the canal, a certain proportion between the cubic capacity of the canal and the steam issued in a second has, of course, to be established. That is to say, if the steam pressure is given at 59 or 60 pounds per square inch and if the size of the canal is given by the size of the bench which is to be heated, the temperature is regulated by increasing or diminishing the diameter of the orifice from which the steam is supplied. In the Belgian establishment an even temperature of 86 degrees was obtained in the canal, and a few degrees less throughout the bed. To nicely determine the size of the orifice, practical tests will have to be applied; at least your correspondent does not know of any previous experiments by which the calculation could be made. But with the sizes given in the article, it would not be difficult to come to precise results.

The concentric rings may be made of any metal—sheet iron riveted, or better, cast iron or brass. They should be inserted into the flow canal to their entire length, or nearly so. Similar contrivances are in use in steam injectors, and where steam is issued into water in order to heat the latter without causing noise.

The little box B, the only function of which is to receive the deposits of dust or rust which the steam may have carried along, could, cheapest, be cast of iron, I suppose. A removable bottom would have to be held in place by bolts, clasps or the like.

As to the transmission of the heat generated in the canals to the atmosphere in the house, of course the soil and the heated parts of the bench walls become mediums of radiation. But there is a vast difference between this system and the old one of burying hot water and steam pipes in the bed.

This new system has many features which do not present themselves until it is practically tested. While the bed heat directly warms the atmosphere, the plants growing on a warm bed will indirectly influence the temperature by absorbing but a limited amount of heat, or even by becoming radiants themselves; for they will derive a good supply of heat from their roots.

Professor Taft comments on the foregoing article as follows:

I have read with much interest the manuscript of Mr. Eckhardt, and while I cannot be very enthusiastic about anything that I have never seen, I am of the opinion that such a system as he has described will be of value, not only for tropical plants, but for many commercial greenhouse crops that are benefited by bottom heat and sub-watering. I have had excellent results with these and with aeration, both singly and combined, and I have every reason to believe that if a circulation of warm, moist air can be secured in our greenhouse beds, in canals such as are described by Mr. Eckhardt, or through porous drain tiles, a marked benefit can be secured with most greenhouse crops. Such a system could undoubtedly be arranged to provide all of the bottom heat and water that would be required by any crop, but it seems best adapted merely as an adjunct system so far as providing the heat needed by the house is concerned, in cold weather at least. The principal drawback to its use seems to be the requirement of a high steam pressure for its successful operation, while low pressure is ordinarily used for greenhouse heating; but in large establishments a special boiler could be installed to provide the bottom heat, and low pressure steam could be used in the coils. If the merits of the system have not been overstated, it might be feasible in small ranges of houses to use a high pressure boiler, and reduce the pressure of the steam used for the coils.

Architectural Education in Dublin.

A novel scheme of practical education for intending architects has recently been inaugurated by the Architectural Association of Ireland, says a late issue of the *Irish Builder*. The scheme is one of technical demonstrations, to be held each Friday at the workshop of some leading firm connected with the building and decorating trades. Each trade will be taken in rotation, commencing with the bricklayer and finishing with the glazier, and at these demonstrations the craftsman will be seen at work, and experiments will be conducted on the various materials used by him. Such practical instruction will be of great value to the student when practising his profession in later years. It is to the credit of this young Dublin society that it has drawn up so advantageous a scheme for its members on lines which have never been so broadly tried on the other side, and also of the manufacturers and builders who have readily placed their time and plant at the association's disposal.

Telephone Systems in Private Houses.

It is not uncommon at the present day to find in many of the more pretentious private houses a modern telephone system connecting the various departments of the household with each other. The main advantage of the telephone over the speaking tube is that one outlet or one 'phone can be used to communicate with all the different stations, whereas with the speaking tube a separate mouthpiece was needed for each and every station. In locating these outlets for the telephone great care should be taken in placing them where they will be most convenient for the use of the household, and also where they will not interfere with any of the fittings of the house which are to be installed at a later date, such as radiators, sideboards, &c. A very convenient place is near the casing of the door, where it is almost impossible to place any heavy article of furniture, but caution should be used in first ascertaining which way the door is to swing.

The wire cable which is used in connecting the various stations should run as far from the water pipes as possible, on account of breaks in the pipes which are liable to occur and the moisture from which would injure the wires, make cross connections, cause leaks of current and soon destroy the vitality of the battery. A cable having a weather proof insulation is preferable, not only on account of the properties which prevent moisture from entering it, but also because a cable of this kind is not attacked by rats or mice. These animals gnaw the insulation, and, while they do not injure the wires, in the ordinary cable they frequently cause crossing or grounding of wires which are difficult to locate and is very annoying both to the owner and the electrician.

Wall pockets or receptacles for holding the telephone are very useful at the outlets, for while keeping the telephone fully covered they do not deface the walls, and by their use many of the connections can be made inside and a buzzer or bell can be placed within for the purpose of calling that station. The telephone itself can be very small and compact, as shown in Fig. 1, and by using the hand microtelephone in connection with a selective switch, Fig. 2, an instrument having a capacity of 15 stations will occupy a space of only 4 or 5 inches square. These two simple instruments, which are obtained from the Ericsson Telephone Company of 296 Broadway, New York City, are well adapted for household purposes, and can be finished as regards the wood work to match the finish of the room, and thus the telephone can be made an ornament as well as a great convenience. In some mansions the wooden cases have been made of solid ebony, rosewood or other costly woods, while the metal parts have been gold plated.

There is no limit to the flexibility of a system of this description, as any station can call all the departments or it can be so wired as to call only a certain number. Arrangements should be made for bringing the cable to a point where it can be attached to wires going to the stable, greenhouse, &c., these connections being especially convenient for the lady of the house, as in ordering the carriage for a drive, &c.

By a simple attachment in the owner's chamber the telephone system can be instantly converted into an alarm system, and all the bells be made to ring at one time by the simple pressure of a special lever. This can be used in case of fire, burglars or sickness, and is valuable in suburban residences.

The cable itself should be installed while the house is in process of construction, and should be put in place before the studding is covered with lath and plaster. The instruments themselves should not be placed on the wall until all workmen have left the building for good, as a telephone is apt to be regarded as an object of curiosity by the men doing other work and oftentimes considerable damage is done by their carelessness.

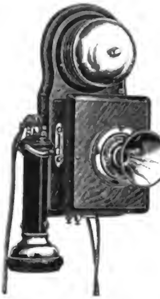


Fig. 1.—General View of Telephone for Private House.

Fig. 2.—The Microtelephone with Intercommunicating Switch.

Telephone Systems in Private Houses

Damp Proof Walls.

There are quite a number of ways to make a wall damp proof. If only surface water is to be guarded against, cement or asphalt applied to the outside is sufficient. If it is not desired that the cement should show above the ground, the cement grouting should be stopped at the grade line. Asphalt applied to the outside of the wall when boiling hot is considered a durable and serviceable coating, says *Cement and Slate*. Its color does not harmonize well with either the brick or stone work, hence it is usually put on from the grade to the bottom of the footing. When cement or asphalt are applied the walls should be built as carefully as possible, with the joints well pointed. The walls should be thoroughly dry before the coat of asphalt is applied, but it is a good plan to wet them thoroughly before applying the cement. These coats may be applied to the inside of the wall, but they answer their purpose better if applied on the outside.

A damp proof course may be put into the wall about 6 inches above the highest level of the soil touching any part of the outer walls, and should not be broken at any point in its length. It should run at least 2 feet into all cross walls, and if the ground is very wet it should be continued through all walls. Damp proof courses may be made of hot asphalt and coal tar. They should be mixed in the proportion of 9 parts of asphalt to 1 part of coal tar, and put on in a ⅜ inch layer or the thickness of a mortar joint. As noted in our last issue, slate has been used for this purpose very successfully. Two thicknesses with overlapping joints, laid in cement mortar, make a perfect moisture joint which protects the wall above from all dampness. This is easier to handle and is not so liable to produce a weak spot in the wall, as might be the case when tar is used.

The Rochester Mechanics' Institute.

The Mechanics' Institute of Rochester, N. Y., has favored us with a copy of the annual Circular of Information on the courses of instruction for the seventeenth year of the institution, which begin September 26, 1901, and close April 26, 1902. The institute is now housed in the new Eastman Building, the gift of George Eastman, which covers nearly an entire block, and which was specially designed for the purpose of giving instruction in a variety of courses by day and evening classes, covering general education and practical subjects. The classes which are of special interest to our readers are wood turning, pattern making, clay modeling, architectural, free hand, pen and ink and mechanical drawing, chip carving and electricity. There is also a department of domestic science and art for women. The cost of the instruction in the different courses is nominal and is not sufficient to bar any ambitious young person. The institution is equipped to do a valuable work and cannot fail to be of great benefit to those who avail themselves of its advantages. It is calculated to make its impress for the public good widely felt.

Tests of Fire Proof Building Material.

An interesting series of tests of fire proof building material were held a few weeks ago, under the auspices of the Building Department of New York City, in the yard of the Sanitary Fireproofing Company in East 106th street, near the East River. Each manufacturing concern were required to erect a one-story building, 10 feet 6 inches in width and 15 feet 6 inches in length, on a 3-foot brick foundation, the sides and roof to be of the fire proof material manufactured by them, with an iron grate resting upon the foundation and an iron or fire proof door in the front and center of the building. Flues and chimneys were also required. In each of the buildings a fire was started and kept going for one hour, showing during that time, or a part of it, a heat of not less than 1700 degrees F. At the end of the hour a stream of water at a pressure of 45 pounds was thrown into the building, against the sides, for a period of five minutes, in order to show what effect water would have upon the fire proof partitions after having stood the extreme heat.

The test was under the direction of the engineers of the buildings departments of the boroughs of Manhattan and Brooklyn. The first building to be tested was that erected by the White Fireproof Construction Company, which, after going through all the requirements of the test, was found to have withstood them, with the exception of a little bulging on one side. The next test was that of the Norman Company building, with almost similar results to the first one. The third was the building of the Metropolitan Company, in which a part of the partition came down. The fourth test was made on a building erected by H. W. Bell on the Bell system, the showing in this case being good. The Union Fireproof Construction Company's building, next tested, was found at the close to be in good condition, although the degree of heat at one time exceeded 1900 degrees. The Moslein system, consisting of metal laths plastered on both sides, was next tested on a building erected by Mr. Moslein. The metal laths withstood the heat, but the plaster was forced from them to some extent. The Brinkman system, which uses material made of solid terra cotta blocks, was the subject of the succeeding test, and, excepting a slight bulging on one side, the building stood it satisfactorily. The Sanitary Fireproof Company building was also tested with equally satisfactory results. The interior of this building was partly plastered with the plaster of the Platt Company, and, while in other buildings the plaster was almost entirely destroyed, it seemed to be hardly affected by the fire. The ninth and last building to be tested was one erected by Jacob Schratweiser of Brooklyn, this being constructed of the Schratweiser metal laths, with plaster in and outside the same, and a door of similar construction. The test of this building was very satisfactory.

Protecting Blue Prints from Moisture.

If blue prints are liable to discoloration by rain or dropping water they can be protected by applying paraffin. The best way of applying it is to dip a number of cloths about one foot square in melted paraffin until saturated, in which condition the cloths can be stored. Then transfer the paraffin to the blue print by spreading a waxed cloth on a smooth surface, nonabsorbent preferred, putting the blue print on this, and a second paraffined cloth on top. Use a moderately hot flatiron to melt the wax and cause the paper to absorb it. The lines of the drawing are intensified, the paper does not shrink or become distorted, while at the same time it is translucent and water proof.

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AN "OLD ENGLISH" COTTAGE ON HERMITAGE AVENUE, RAVENSWOOD, CHICAGO, ILL.

WILLIAM L. KLEWER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, OCTOBER, 1901.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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NOVEMBER, 1901

The Modern Apartment House.

A feature of the present building movement in this city which cannot have failed to attract more than passing attention has been the rapid increase in the number of apartment houses, more especially those rising above five stories in hight and equipped with passenger elevator service. It was not very many years ago that buildings of this character were something of a novelty, but at the present day the demand for family apartment houses is such that notwithstanding the extent to which they have been erected and are now in progress in the residential sections of the city, the number is still growing with great rapidity, and many of them are often fully rented long before the structure is completed. This style of building has been designed in some measure to take the place of the private house, furnishing all its conveniences and comforts as well as some others which even the most pretentious never afforded. The improvement which has been made in this class of dwelling during the past three or four years has been very marked, and each year seems to have developed some novelty in the equipment or arrangement of these houses all calculated to increase the comfort and convenience of living in them. The courts and halls are wide, light and airy, while the rooms are large and designed to meet the requirements of people who have been accustomed to the spaciousness of private houses. Careful attention has been given to the heating, ventilating, lighting and cooling systems, while every apartment has telephones to the office and for long distance service. There are glass lined refrigerators supplied with cold air from a plant in the basement, mail chutes, a fireproof safe in the principal bedroom of each suite, roof garden on the top of the house and automobile storage and charging room in the basement. In several of the houses the garbage is disposed of by being sent through chutes to a large receptacle in the cellar, where it is frozen and then carted away in that condition. In some houses there is a marble lavatory in every bedroom with closet overhead; in others the kitchen is equipped with a stationary marble table constructed of a thick slab and a wall piece, this being fastened to the wall adjoining the sink and supported on marble brackets extending to the floor.

Interior Finish of Apartments.

So, too, in the modern apartment houses of the more pretentious kind, there are often large conservatories as well as rooms in which the tenants may entertain their guests at a ball or reception for which their own rooms would be entirely inadequate. The halls of the building are wainscoted, the floors are inlaid and the wood work in the different rooms is of oak, mahogany, bird's-eye maple, or some other variety susceptible of a beautiful finish. Many of the dining rooms are finished with ceiling beams and high wainscoting in the Dutch style. The bathrooms are capacious and the floors and walls are covered with tile. A portion of the house is divided into sleeping rooms for the servants who cannot be accommodated in the apartments, and for these there are bath and dining rooms and servants' starcases leading from the laundries and drying rooms in the basement to the roof. Then again these family apartment houses contain many luxurious features which are common to all the occupants, such as the restaurants for the use of those who do not wish to "keep house," and handsomely appointed dining rooms in the houses where there is a hotel annex. The extent to which elevator apartment houses are being produced in the upper sections of the metropolis, especially above Fifty-ninth street on the West Side, has had an important influence on land values, and it is expected also that the new tenement house law and the completion of the Rapid Transit Subway will tend to increase the income from this class of property.

The Trade School Season

The attention of many young men who are ambitious to master some trade as a means of securing a livelihood is now directed to the trade school, this being the time when most of these schools open their course of instruction for the winter season. The advantages derived by those who take a trade school course are demonstrated in the popularity of such institutions wherever they are in operation. When a young man receives instruction in his chosen trade under the superintendence of an expert, who explains the best methods of doing work and watches the pupil so that none of the bad habits of independent study are acquired, it is not strange that the pupil acquires a remarkable degree of proficiency, not only in handling the tools, but in giving a finish to his work that is fully equal to that shown in general practice. From the fact that the courses of instruction almost always include a series of lectures dwelling in detail on the principles involved and explaining the reason for doing work in a given way, it can be readily seen that a knowledge of the trade in all its details, both theoretical and practical, may be impressed indelibly upon the mind of the student in a comparatively short time, while if left to be gained from practical experience in the regular way many important features might still be left untouched.

Need of Trade Schools

A new season has just opened at what is regarded as the most successful and popular of the trade schools of the country, and, following the example set by Colonel Auchmuty in founding this school, several similar ones have been put in operation in the metropolitan district. In a number of the large cities, however, movements to secure trade schools have not met with the same success that has attended this institution. This is much to be regretted, for, in view of the passing of the old apprentice system for training young men in the manual arts, the trade school is doing an invaluable work as a substitute for that system. The opposition which has been raised to trade schools on the ground that the ranks of the different trades are already sufficiently filled and the trade school product menaces the livelihood of journeymen already in the field, when viewed in a broad, liberal way, will not be considered a sufficient reason for delaying the early establishment of a well equipped trade school in all of the larger cities. The first consideration should be given to the coming man. It is essential to his moral as well as his physical welfare that he should be as well equipped as possible with the means of supporting himself in a manner useful to the community. While trade schools already exist in several cities and there is evidence that the number is to increase, their growth has by no means kept pace with the demand. The manual training school as a part of the common school educational system, the trade school and the advanced technical school are all parts of a new educational system that cannot be too widely adopted in a progressive country.

Convention of Architects.

The thirty-fifth annual convention of the American Institute of Architects was held, according to programme, in the Assembly Hall of the New York State Building at the Pan-American Exposition, Buffalo, the first week in October. After some routine business the meeting was called to order by President Robert S. Peabody of Boston, who introduced John B. Milburn, president of the exposition, who welcomed the architects to Buffalo and to the exposition. His remarks were followed by the annual address of President Peabody, which was received with marked attention and full appreciation.

A number of interesting subjects were presented for discussion and papers from various authors were read. Among these may be mentioned one on "Effectiveness of the Tarsney Act and Suggestions for Modifications," by W. A. Boring of New York, and John H. Rankin of Philadelphia. The report of the Board of Directors was presented and of the chapter and the standing and special committees. These concluded the first day's session. In the evening a banquet was tendered the visiting members and their friends, previous to which there was a gathering of the visitors on the Triumphal Bridge to witness the turning on of the lights and to listen to an address on the subject of the scheme for the lighting of the grounds and buildings by Henry Rustin, who had charge of that part of the work.

The second day's programme included the reading of papers on "Some Phases of Exposition Making," by Carleton Sprague of Buffalo; the "Management and Design of Expositions," by Thos. R. Kimball of Omaha; the "External Color Effects of the Pan-American Exposition," by C. Y. Turner; the "Electric Lighting and Decorative Effects of the Pan-American Exposition," by Luther Stieringer, and "Government Architecture at the Exposition," by E. A. Crane. It was voted to amend the by-laws so as to add the Board of Directors to the Executive Committee.

The election of officers resulted as follows:

President, Charles F. McKim of New York City.

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

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

Directors for three years are Walter Cook, W. S. Eames and Cass Gilbert.

The auditor for two years is William G. Preston of Boston, Mass.

The convention adjourned to meet next year in Washington, D. C. Saturday of convention week was given up to a trip to Niagara Falls and Lewiston, taking in all points of interest.

Convention of Brick Manufacturers.

Announcement has been made by the Executive Committee through T. A. Randall, secretary, that the city of Cleveland has been decided upon as the place for holding the sixteenth annual convention of the National Brick Manufacturers' Association, the meeting to be held February 10 to 15, inclusive, 1902. The geographical location of Cleveland makes it particularly acceptable as a place of meeting owing to the fact that it is in the very heart of the clay working industry. Cleveland facilities for entertaining visitors are also such as to insure a most enjoyable time for all who attend.

An Architectural Competition in Mexico.

In order to encourage the erection of fine buildings on the new extension of the Cinco de Mayo, which is intended to be the leading thoroughfare of the city, the municipality has opened a competition and offered prizes to both proprietors and architects for the three best buildings on the new street. The prizes to be awarded to the architects consist of a gold, a silver and a bronze medal, and of commemorative tablets, which will be set into the *façades* of the buildings winning the prizes. The prizes awarded to proprietors will be $5000, $3000 and $2000, respectively. The buildings must be completed within two years from the time the avenue is opened. The jury of award will consist of three distinguished Mexican architects, to be appointed by the Commission of Improvements and Embellishments. The jury reserves the right not to award any prize at all, if it seems clear that none of the edifices are worthy of a prize.

Settlement of Labor Disputes in France.

A report to the State Department from United States Consul Skinner at Marseilles gives some details of interest regarding an organization established in that city by the French Government for the adjudication of disputes between employers and employees. The undertaking appears to be to some extent tentative in its nature. The mission of the new Council of Labor is to give advice upon all questions bearing upon labor; to prepare reports at the request of the Minister of Commerce and Industry; to publish the current and normal rate of wages; to determine the current and normal length of the work day; to seek means of preventing or terminating strikes or lockouts; to prepare reports upon the division of allowances made by the public to institutions of patrons and employees; to investigate and report upon the execution of laws, decrees and orders concerning labor and modifications which might prove beneficial thereto. For the present the Council is only granted advisory powers, the right of ultimate settlement still being left to the established authorities; but the idea is to enlarge its functions in the future.

The Council is formed of three elements—employers, employees and *Prudhommes*, the latter class being members of the *Conseil des Prudhommes*, which has had an uninterrupted existence in Marseilles since the period of the Roman occupation. This body has for its duty the conciliation of differences between employers and workmen. It judges all complaints relative to contracts with apprentices, and in default of express stipulation regulates the amount of indemnity due in case of violation of such contracts. Complaints relative to the accounts of employees, trade-marks and patents are also considered by this court. The *Conseil* is composed of employers and workingmen in equal numbers, with a president and vice-president, the members thereof being elected by their fellow employers and employees. The parties to complaints presented to the *Conseil des Prudhommes* plead themselves, without the intervention of attorneys.

In the Council of Labor organized in Marseilles the board of *Prudhommes* is represented, but the majority are members elected from the various syndicates of employers and workmen. The syndicates of employers must have at least ten members to cast one vote, and these syndicates elect employing councilors. Syndicates of employees must have at least 25 members to have one vote in selecting employee councilors.

The Pennsylvania Building at the exposition to be opened in December at Charleston, S. C., will be in the Spanish style of architecture, and constructed of stone. It will measure 100 x 80 feet in area and have a circular court 50 feet in diameter, surrounded by a colonnade. There will be four towers 50 feet high, one at each corner of the building. The interior will be ornamented tinted plaster work. The structure was designed by Philip H. Johnson of Philadelphia, and the contract for its erection has just been awarded to McCarrell & Sloan of Charleston.

SINKING THE FOUNDATIONS FOR AN OFFICE BUILDING.

WE have from time to time referred in these columns to the many towering office buildings which have been erected in New York City, and in a general way to the manner in which the foundations for them have been carried down to bed rock, this often necessitating going to a depth of 50 feet or more below the level of the street. One of the more recent examples of foundation sinking possessing features of novelty is that in connection with the new ten-story Stock Exchange Building now in process of erection on Broad and New Streets in accordance with plans prepared by architect George B. Post. There are probably a large number of readers of this journal, more especially those residing at a distance from important cities, who have never seen work of this kind in progress, and a short description of the way in which the foundations of the building in question are being sunk may not be without interest to them, as well as possibly to others, who, having witnessed the operations, are not altogether familiar with the details.

In our double page plate we show several views made from photographs taken while the work of sinking the foundations was in progress. The upper one of the two smaller pictures represents a near view of an air lock, while the lower one is a portion of the excavation, showing the location of several of the many caissons. The large picture occupying a page by itself is a general view of the excavations as seen from New street looking toward Broad street. In the reading pages, Fig. 1 is a view looking down Broad street from Wall street, the 20-story office building just beyond the excavation being that of the Commercial Cable Company. Fig. 2 is a general view of a rectangular caisson for the wall; Fig. 3 is a partial plan, while Fig. 4 is an isometrical view of pneumatic caissons. In Fig. 5 is shown a circular caisson with its air lock as it appears while work is in progress. Fig. 6 is a plan showing the location of the numerous caissons which it was necessary to sink to afford support for the foundations of the building.

The plans followed in this instance were those of the contracting engineer, John F. O'Rourke, and mark a long step in advance in the construction and employment of pneumatic caissons in work of this character. He was the first to design and use caissons built of wooden staves, the latter being arranged vertically and forming an oval, circular or rectangular caisson in cross section, according to the requirements of the work in hand. The staves are secured to interior angle iron frames or braces, the whole making a structure of ample strength which is air tight, and the exterior of which is perfectly smooth.

The plans call for the construction of a masonry wall, or dam, extending entirely around the site, and reaching to bed rock, a vertical distance of over 50 feet from the lowest or Broad street curb. The previous experience of Mr. O'Rourke had demonstrated to his entire satisfaction that wooden caissons were the proper kind to use in this instance, as he had found wood to be stronger within the limits in which steel would be employed, and more available in the sense that it could be better adapted to the requirements here found necessary. In these caissons steel is employed for the ribs, roofs and cutting edges, so that the benefit arising from the use of steel is secured in all places where steel is best, while wood is employed in all cases where that is best. Along the line of the wall rectangular caissons are used, these being 8 feet in width, and of a length dependent somewhat upon their location. On top of the caissons are the cofferdams, built in two sections, each 15 feet in hight.

The rectangular caissons are built of 4-inch yellow pine, the meeting edges being rabbeted and the joint being calked. The outer surface of the lower edge of the caisson is provided with a steel plate, which serves as a cutting shoe. An important feature is found in what we may term the arrangement of this shoe. It is not entirely in a horizontal plane, the inner edge, or that toward the interior of the excavation, being somewhat higher than the outer edge, or the one next to the adjoining building. This is done so as to control the outflow of compressed air beneath the cutting shoe of the

Fig. 1.—View Looking South from Wall and Broad Streets.

Fig. 2.—Rectangular Caisson for Wall.

Sinking the Foundations for an Office Building.

caisson, so that it will be guided out where the disturbance of the surrounding soil will do the least damage. In other words, if the entire shoe were in the same level the escape of air would be uniform all around provided the material through which the caisson was passing was of uniform consistency throughout. That this is an exceedingly important consideration in making excavations beside the foundation of heavy buildings will be appreciated. The top of the caisson is built of curved steel plates, which may be removed after the caisson has reached its destination and it becomes necessary to fill it with concrete. Through this roof extend the air shafts which terminate in the air locks.

The circular caissons, which are shown in position on the plan, Fig. 6, are also built of yellow pine staves, the joints being grooved and tongued. While the rectangular caissons are braced with angle irons and wooden struts placed crosswise, the circular ones are strengthened by circular angle irons to which the staves are secured. The circular caissons constitute the piers in the interior of the building, and also carry the Wall street extension, as shown in the plan. After the caissons have been sunk to bed rock they are filled with concrete, which is mixed in the proportion of 1 cement, 3 sand and 5 broken stone. The wall is finished by the masonry placed in the cofferdams on top of the caissons.

The rectangular caissons are sunk one at a time, the plan being as follows, reference being had to Fig. 6. The caisson D was sunk first, C and E next, then B. A was the last on the New street side. On the north side they were sunk in this order: E, F, G, H and J. On the east side L was first and K was sunk after J. After L the order was M, N and P. In each caisson near the bottom is a removable section or door. These are so placed as to form an opening from one caisson through the walls to the next one. These doors in the ends pull in or out, as indicated by the arrows in the drawing; thus it is seen that the north end of B is opened in and then the south end of C is opened from B. One caisson at a time is filled with concrete with the exception of a small space around the door. This space is afterward filled from the adjoining caisson. This forms a continuous and unbroken masonry wall.

The caissons are sunk as nearly as possible to the same level, but it is not necessary that they should be sunk absolutely to the same level. This is for the reason that the removable wall sections are made sufficiently large to insure the registration of some part of the opening in one wall with some part of the opening in the other wall when the sections of the two walls have been removed.

The air locks, also the design of Mr. O'Rourke, possess many features of unusual interest. The air shaft is 3 feet in diameter, the lock, Fig. 5, being about 5 feet in diameter. Each door, at the top and bottom of the lock, is made in two parts of sheet metal. Each half of each door is curved or saucer shaped, so that when the door is closed and the two parts are brought together the surface forms a continuous curve. Each half of each door is mounted upon a shaft which extends through the side of the lock and carries a lever upon its outer end. The levers are counterweighted so as to balance the weight of the doors. Rubber gaskets around the edge of the door and at the center serve as packing to prevent the escape of air. At the center of the mitering edges of each door is an opening through which the hoisting rope passes, a packing device about the rope serving to hold the air. The caisson itself is practically a box

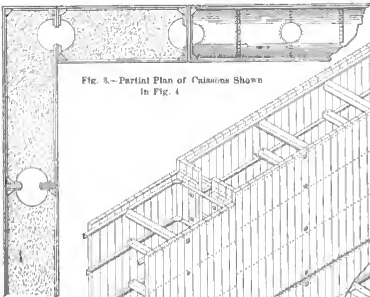


Fig. 3.—Partial Plan of Caissons Shown in Fig. 4

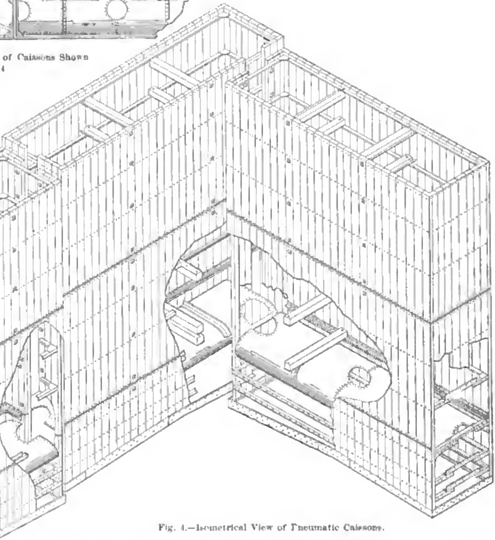


Fig. 4.—Isometrical View of Pneumatic Caissons.

Sinking the Foundations for an Office Building.

open at the bottom. The air lock at the top provides means for ingress and egress both for men and material. When the caisson is sunk through wet ground or below tide level compressed air is admitted at a pressure equal to or a little above that due to the head of water. By this means all water is forced

Fig. 5.—Circular Caisson with its Air Lock.

out at the bottom of the caisson, the earth being left firm and dry.

Excavation is carried on at the bottom of the caisson, the work progressing from the center toward the sides. As soon as the material has been dug out sufficiently the caisson sinks under the combined effect of its own weight and the weight with which it is loaded. Buckets remove the excavated material through the air lock.

The advantages possessed by wooden caissons constructed in the way above described are many. The perfectly smooth exterior surface reduces the friction to a minimium as the caisson sinks through the ground. There is therefore less disturbance of the earth, as there is but little tendency of the latter to cling. It may be said without exaggeration that the movement of the ground is confined strictly to that portion embraced within the cutting shoe of the caisson, the outside earth not being disturbed. In the common form of steel caisson there are rivet heads and joints to which the earth clings, and in addition the metal surface offers a better hold for the earth than wood.

The work can be prosecuted much more rapidly when the adjoining ground is not moved. This is particularly the case in a location surrounded by buildings, the foundations of which must be protected at all times.

Slate for Roofing.

In discussing the subject of slate and slate roofing a writer in an exchange makes the following comments which may not be without interest to some of our readers: The most prominent feature of slate is its cleavage along parallel lines. Roofing slate is prepared by splitting the blocks of slate as they come from the quarry into thin slabs. For this purpose a broad, thin chisel is used, and the blocks are split first into two more or less equal parts, each part split through the middle again, and so on until the entire block is divided into slabs of the proper thickness. During this process the edges of the block are kept moist, to facilitate the accurate cleavage of the stone.

After the slates are split to the proper thickness they are trimmed to size by a sort of cleaver process, the cleaving instrument being struck across the plate over a shearing edge on a block. Ordinarily this process is operated by hand power machines which are set to trim the slates to any size desired.

Slates ordinarily occur in such colors as dark blue, bluish black, purple, gray and green. Reddish and lighter yellowish color slates are also occasionally found, but are not as common, and are consequently considerably higher in price for the same quality of slate. Some slates are marked with spots of a different color. For instance, dark purple slates frequently have spots in them of light green. These spots are not injurious to the quality or durability of the slate as a rule, although they mar its appearance.

A good slate should be hard and tough, although liability to abrasion does not always indicate an inferior material. Some softness indicates good weathering qualities. If it is too soft it will absorb moisture, nail holes will become enlarged, and the slate becomes loosened. A good slate should give a sharp, metallic ring when struck. It should not splinter under the slater's axe, nor should it be tender or friable at the edges. It should not absorb water to any appreciable extent. An excellent test is to place a slate on edge half its depth in water, and if after 12 hours the line of absorbed water has reached the top of the slate, it should be rejected. If it does not rise more than ½ inch, it may be considered as practically nonabsorbent. Good slate should not absorb more than one-half of 1 per cent. of its weight of water.

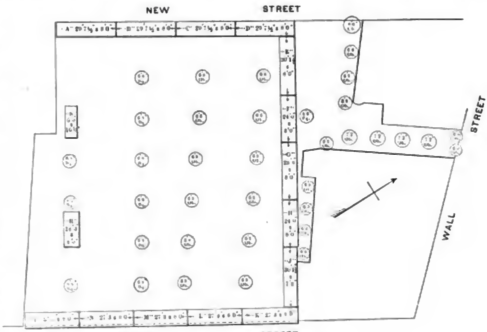


Fig. 6.—Plan Showing Location of Caissons.

Sinking the Foundations for an Office Building.

Slates are made of a wide variety of sizes, the larger sizes being used upon large areas of roof, such as factory buildings. The small sizes are more commonly used on residences and roofs of lesser area. A common size for house roof is from 6 x 12 inches to 10 x 14 inches.

Bands, ribbons or veins of a darker color running entirely through a slate are always dangerous, especially when they run along the length of the slate, as the slate will nearly always break or split along such a line. Even if this does not occur, these bands will generally decompose on exposure to the weather, causing a failure in the slate and a leak in the roof.

Slates are generally laid on wooden sheathing, preferably of fair thickness, matched and dressed, covered with a tarred paper or felt. Sometimes the slates are laid on roofing laths nailed to the rafters at such intervals as to permit of nailing the slates to them. This, however, does not make as good a roof. On iron roofs slates are frequently laid directly on small purlins spaced like the roofing laths, and in this case the slate is fastened with wire passed through the holes in the slate and twisted around the purlins. Special forms of metal fasteners are also on the market for this purpose.

In laying slate on wooden sheathing copper composition or galvanized iron nails are ordinarily used, about 1¼ inches long, with ragged shank, driven through holes punched for the purpose in the slates, one near each corner. Some skill is necessary in properly nailing slates to a roof, as if the nails are not driven snug enough the slates will have some play upon the nails, while if they are the least bit too tight there is danger of the slate cracking, either when the nails are placed, or afterward, due to some movement in the roof surface.

The top courses of slate along all ridges and hips upon roofs, and also from 2 to 4 feet from gutters, should be bedded in some proper cement that will make these parts entirely water proof, throughout all joints and miters. Care should be taken that the lower edge of every slate fit as closely as possible to the exposed surface of those below it, and that the vertical joints between slates be as close as possible, and occur only on the center line in the next course below.

Modern Heating and Ventilation

The new office building of the Armour Packing Company on the Kansas side of the State line at Kansas City, Mo., says the *Star*, has a system of heating and ventilation heretofore unknown in the West. There are a few buildings in the East and one in Chicago which have the same system, but it is new even there, and this is the first building west of the Mississippi River that has it.

In the whole building there is not a movable window. The glass is set solid and can neither be raised nor lowered. There are a few transoms that can be moved, but they won't be opened often, for the only purpose they can serve will be to let in the odor which belongs to the packing house district. Fresh air comes in another way.

The temperature and atmosphere of the building are manufactured down stairs in the basement and will come to the office through open registers in each room. Two huge chimneys, each 8 feet square, rise above the building so high that they will escape the greater part of the smoke that fills the atmosphere of the West bottoms. In the basement are fans run by electricity which draw the air down through these chimneys and long alleys at the bottom with a force that will take a man's hat off. The current is like the wind before a severe summer storm.

At the foot of the chimney the current turns and runs through a brick conduit that extends the length of the building. First it goes through a spraying room where a hundred sprays are throwing water in fine rain. The water is hot or cold according to the season. In hot weather it is cold and in cold weather it comes from the boilers. This water is expected to wash the air. It takes out of it particles of coal and dust that may be flying and precipitates these atoms. It literally washes the air and goes a long way toward purifying it besides, changing the temperature a few degrees, according to the season.

After passing the sprayers the air rushes through a series of spiral tubes which dry it, taking out the moisture that came from its recent washing. Then over the big electric fan it goes and past coils which heat or cool it as the conditions require. These coils are so well controlled by valves and connected with the hot air chambers and cold blast that it is possible for the air when it leaves them to have a uniform temperature the year round, no matter whether the temperature outside is 105 in the shade or 26 degrees below zero. There is an automatic thermometer connected with a device in compressed air that can hold the temperature exactly to order.

With the two machines running normally the air in the building will be changed every ten minutes. It will always be fresh air, free from dust or smoke particles and of the temperature that is most comfortable in season.

Cheap Lodging Houses in Milan, Italy.

In a recent report to the State Department, United States Consul William Jarvis, at Milan, Italy, gives a description of a cheap hotel or lodging house after the style of the well-known Rowton Houses in London or the Mills hotels in New York City, which has just been built and opened in Milan. The expense of the building has been provided by a society formed for the purpose. The hotel was opened June 18 and has been in working order for two months. It was at first thought that the majority of those who used it would be men of the laboring classes, but experience so far shows that almost the entire custom comes from the poorer paid clerks, shop assistants and others of that class.

The hotel is restricted to men only. The cost of a room is 10 cents per day, with an extra charge of 2 cents for bed linen, but if taken for a week the cost is 70 cents without the extra charge. There are 530 sleeping compartments, all of the same dimensions—viz., 5 feet 10 inches by 7 feet 6 inches, with divisions between the cubicles and corridor 7 feet 10 inches high, leaving a space of 2 feet between the division and the ceiling. Each room has a window 5 feet by 1 foot 10 inches. The furniture consists of a bed, chair and clothes pegs. Electric light is provided for use during the time for dressing and undressing. The floors of the bedrooms are made of cement, and all the partitions are enameled hollow cemented bricks. The whole edifice is heated by means of hot air pipes, and excellent sanitary arrangements are located on each floor. The bathrooms are open night and day for the use of the inmates, a complete bath costing 4 cents, while a shower bath can be taken for 2 cents. On the basement floor, near the bathrooms, are wash stands, consisting of marble slabs, in which the basins are fixed. Each basin has a hot and cold water tap and a discharge pipe underneath. A laundry is also provided in the basement. Access to the bedrooms is only allowed from 7 p.m. to midnight, and the lodgers are expected to leave the rooms not later than 9 o'clock in the morning. No personal possessions are permitted to be left in the rooms, store closets with separate keys being provided for each guest, where he may deposit all his clothing or other belongings.

The building is of five stories and basement, and the roof forms an extensive terrace. The architecture is described as simple but in good taste. In addition to the sleeping compartments there are large rooms reserved for dining, reading and smoking. All these rooms are lighted by electricity, the dining room being a particularly attractive apartment. To the dining room are joined two large kitchens with heat always ready. Each lodger is permitted to buy his own provisions outside and use the kitchens, the hotel providing the necessary cooking utensils. If desired, however, food may be bought ready prepared at the hotel at the cheapest possible price. The men may also do their own laundry work or have it done for them in the house at a fixed price.

DETERMINING THE STRESSES IN ROOF TRUSSES.—III.

By F. E. KIDDER, Consulting Architect.

AS a further illustration of the method of drawing stress diagrams we will, for Example II, determine the stresses in the truss illustrated by Fig. 7. From the plan and section of the roof we obtain the following data: Span of truss, 36 feet; distance between trusses, which are uniformly spaced, 15 feet; distance a = 9 feet 10 inches, b = 13 feet 4 inches and c = 12 feet 2 inches.

Lines drawn through the center of the truss rafters, the top chord and tie beam give the diagram shown in Fig. 8, the center lines for the braces being drawn to connect joints 2 and 7 and 5 and 8, although they would not exactly correspond with the actual center lines of the braces, for reasons already pointed out in the last article. The diagonal braces B B in the center panel are omitted from this diagram because they have no stress when the loads are symmetrical. The roof will consist of 2 x 6 inch spruce rafters, 16 inches on centers, covered with ⅞-inch sheathing and common cedar shingles. The ceiling will be framed with 2 x 6 inch joists, 16 inches on centers, lathed and plastered, and supported by purlins at joints 7 and 8. The weight per square foot of roof will be as follows:

Shingles	2½ pounds.
Sheathing	3 pounds.
Rafters	2¼ pounds.
Purlins	2 pounds.
Truss	3 pounds.
Allowance for wind and snow	30 pounds.
Total	42¾ pounds per square foot.
Allowance for ceiling	20 pounds per square foot.

Using the above figures, the roof load at joint 2 will be 9 5-6 × 15 feet × 42¾ pounds, or..... 6,306 pounds.
Load at 3, 13 1-3 × 15 feet × 42¾ pounds, or..... 8,550 pounds.
Load at 7, 12 1-6 × 15 feet × 20 pounds, or..... 3,650 pounds.

These loads should then be placed on the truss diagram, as shown, and the loads at 7 and 8 put beside the vertical rods, to show that they are to be added to the stress given by the stress diagram, as explained in the previous article.

Each supporting force will equal one-half of the load on the truss, or 18,506 pounds. The diagram should be lettered according to the principle explained in the previous article and as shown on the diagram.

To Draw the Stress Diagram

On the same sheet of paper as the truss diagram, and a little to the right, draw a vertical line, $o\ a$, equal in length to the supporting force P (18,506 pounds), at a scale of, say, 4000 pounds to the inch.* The bottom of this line should be lettered o and the top a. Then from a draw a line parallel to the rafter A F and from o a horizontal line intersecting the first line, and mark the point of intersection f.†

The reason the point of intersection is lettered f is because F is the other letter designating the lower half of the rafter and the left hand end of the tie beam.

The lines $a\ f$ and $f\ o$ show the stress in the corresponding members of the truss.

We must next consider the forces acting at joint 2, of which there are four. One of these, $f\ a$, is already drawn. For A B we measure downward from a a distance equal to 6306 pounds and letter the point thus obtained b. To find the stresses in B H and H F we draw from b an indefinite line parallel to B H, and from f a line parallel to F H, until it intersects the line from b, and letter the point of intersection h.

The next step is to draw the stresses at joint 7. Of the stresses acting at this joint we already have $o\ f$ and $f\ h$, and from the other two we draw a vertical line through h, and at the point where it intersects the line $o\ f$ place the letter k. The polygon of forces for joint 7 is then $o\ f$, $f\ h$, $h\ k$ and $k\ o$. Although $k\ o$ lays over $f\ o$, it should be considered as a separate line.

Next determine the polygon of forces for joint 3. We already have $k\ h$ and $h\ b$, so from b measure downward 12,200 pounds, which in this case comes at o; but we also put here the letter c, as $b\ c$ represents the load at 3.

There now remains only one unknown force, C K, and as we already have the point k, the line $c\ k$ must represent this force or stress, thus showing that the stress in C K is the same as in O K. As the truss is symmetrically loaded, the stresses in the other half of the truss must be the same as in the half we have determined, hence it is not necessary to carry the stress diagram further.

Applying our scale of 4000 pounds to the inch to the lines of the stress diagram, we obtain the values given

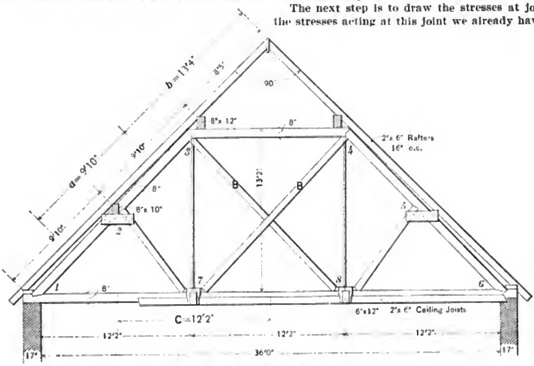


Fig. 7.—Truss Illustrating Example II.

Determining the Stresses in Roof Trusses.

*To thoroughly understand the method of drawing the stress diagram, the reader should take a sheet of paper on a drawing board, and with T-square, scale and triangle draw the truss diagram, for which all necessary measurements are given in Fig. 8, with the utmost accuracy. Having drawn the truss diagram, draw the stress diagram line by line, according to the directions, being careful to draw the lines perfectly parallel with those in the truss diagram.

† The reader will please remember that small letters refer to lines in the stress diagram and capital letters to lines in the truss diagram.

in Fig. 9, which should either be put on the stress diagram or on the corresponding members of the truss diagram. To the stress obtained by measuring the line *h k* must be added the ceiling load at 7, thus making the actual stress in the rods 6930 pounds. How to proportion the timbers and rods to the stresses will be explained in a succeeding article.

Example III.

We will now determine the stresses in the horizontal truss, Fig. 10. The trusses are supposed to be uniformly spaced, 15 feet 8 inches center to center, and the rafters and ceiling joists span from truss to truss and rest directly on the top and bottom chords, as the horizontal pieces are called. The weight per square foot of roof surface we find to be as follows (see the September issue):

	Pounds.
Five-ply gravel roofing	6
Sheathing	3
Rafters	3
Truss	4½
Snow	30
Total	46½

The roof being flat, there will be no wind pressure. The load at joint 2 will equal

$$\frac{8 \text{ feet } 4 \text{ inches} + 7 \text{ feet } 10 \text{ inches}}{2} \times 15 \text{ feet } 8 \text{ inches} \times 46\tfrac{1}{2}$$

pounds = 5885 pounds.

until it intersects the first line. This point of intersection should be lettered *h*, because H is the letter common to the brace and the tie beam in the end panel. The triangle *o a h* o then represents the forces or stresses acting at joint 1.

Next draw the polygon of forces at joint 2. We already have the stress in A H, represented by *h a*, and from *a* we measure downward to *b*, a distance equal to 7869 pounds—the load at 2. Then through *b* draw a line parallel to B K, and through *h* a line parallel to H K, until they intersect, and letter the point of intersection *k*. The figure *h a b k h* is then the polygon of forces for joint 2.

We must next complete the polygon for joint 3. Here we already have the lines *o h* and *h k*, and from *k* we draw a line parallel to K L and extend the line *o h* until the two intersect, lettering the point of intersection *l*. The lines o *h*, *h k*, *k l* and *l* o then represent the forces acting at joint 3.

Next draw the polygon for joint 4, which is formed by the lines *k b*, *b c*, *c m* and *l m*.

For the polygon forces at joint 5 we have o *l* and *l m*, and we draw *m n* and o *n*. We now have the stress diagram for all of the truss members to the left of the center, and as the stresses in the members on the right

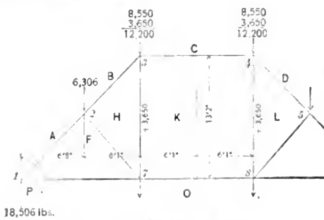


Fig. 8.—Truss Diagram

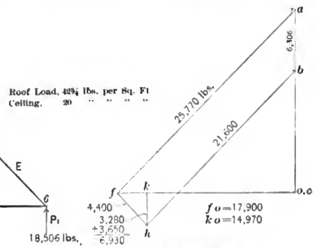


Fig. 9.—Stress Diagram.

Load at joint 4 equals 7 feet 10 inches × 15 feet 8 inches × 46½ = 5704 pounds.

Load at joint 6 equals that at 4, or 5704 pounds.

The actual weight of the ceiling joists, lath and plaster will be about 13 pounds, but we will allow 3 pounds extra and use 16 pounds per square foot for weight of ceiling.

The load at 3 will then equal 8 feet + 7 feet 10 inches × 15 feet 8 inches × 16 = 1984 pounds.

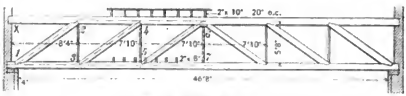


Fig. 10.—Horizontal Truss.

Determining the Stresses in Roof Trusses.

Loads at 5 and 7 equal 7 feet 10 inches × 15 feet 8 inches × 16 = 1968 pounds.

The truss diagram will be as shown in Fig. 11 and the joint loads should be indicated as shown, the ceiling loads being added to the roof loads, as explained in the October number. The figures beside the truss lines in Fig. 11 are the stresses, obtained from Fig. 12, and, of course, cannot be put on the truss diagram until the stress diagram is completed.

The supporting forces will each be equal to one-half of the joint loads, or 19,377 pounds.

In lettering the truss diagram it should be borne in mind that the center rod supports only the ceiling load at 7, and hence cannot appear in the stress diagram when the loads are considered as applied at the top. The line representing the center rod should therefore be dotted, and the same letter should be used on both sides of this dotted line.

To construct the stress diagram, we begin by drawing the supporting force at 1, which is represented by the vertical line *o a*, Fig. 12. From *a* draw an indefinite line parallel to A H, and through *o* a horizontal line

side must necessarily be of the same magnitude, it is not necessary to go further with the stress diagram. By continuing the process, however, we would obtain the dotted lines below o *n*, making the complete stress diagram, which if correctly drawn will be symmetrical about the line *o n*.

Measuring the lines in the stress diagram by our scale, we obtain the stress given on the corresponding lines of the truss diagram. The first of the figures on the vertical lines are the stresses obtained from the stress diagram, and the other number is the load at the joint below, which must be added to the stress to give the full strain in the rod.

(To be continued.)

THE plans have recently been completed for a new passenger station for the Pennsylvania Railroad Company, to be erected at thirty-second and Market streets, Philadelphia, Pa., which will cover an area 112 x 78 feet, and will be two stories in hight. It will be constructed of granite and terra cotta, with trimmings of terra cotta and copper and tile roof. The first floor will contain vestibule, large general waiting room, baggage room, ticket office, women's waiting room, &c. The main waiting room will be open to the roof and flanking it on either side at the second story level will be small rooms to be used as offices.

Some Points on Chimneys.

Chimneys are required to produce draft for combustion and to carry off the spent gases. The influence of a chimney on the fire and on the economy of a heating plant is a factor of great importance. A poor draft is a source of continual expense and trouble. Chimneys should be large enough in cross section to carry off the gases at a moderate velocity, and high enough to produce sufficient draft for rapid combustion. The capacity of a chimney depends on its hight, its cross sectional area, and the difference in temperature between the flue gases and the external temperature. To increase the draft the hight of the chimney or the temperature of the flue gases must be increased, says J. L. Bixbey, Jr., in a recent issue of *The Metal Worker*. To increase the hight of the chimney is the cheapest and most effective way to increase the draft. The increased hight is more effective than chimney caps.

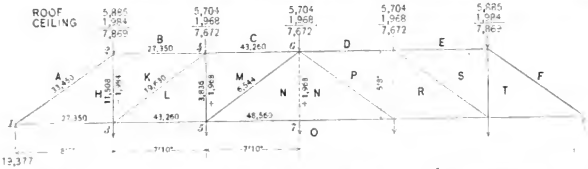


Fig. 11.—Truss Diagram with Joint Loads Indicated and Illustrating Example 11.

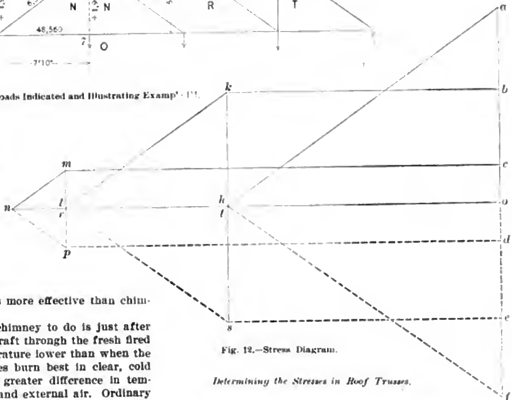


Fig. 12.—Stress Diagram.

Determining the Stresses in Roof Trusses.

The heaviest work for a chimney to do is just after firing, as the friction of the draft through the fresh fired coal is greater and the temperature lower than when the fire is well under way. Fires burn best in clear, cold weather, because there is a greater difference in temperature between flue gases and external air. Ordinary fires consume about 500 cubic feet of air per pound of coal. Chimneys for burning soft coal or wood should have 25 per cent. more area than for hard coal.

Beams or pipes sometimes pass through the chimneys, which increases the risk from fire and destroys the efficiency of the chimney. Wood requires the least draft; fine coal or slack the most. The temperature of flue gases from closed stoves should not exceed 200 degrees. Indirect draft stoves require a stronger draft than direct ones. The lower the temperature of the flue (but not lower than the temperature of water or steam within the boiler), the more economical the apparatus.

The following table shows the draft power required for different fuels, in inches of hight:

Sawdust	0.20	Hard coal	0.50
Straw	0.30	Soft coal	0.90
Wood	0.35	Slack	1.25

The velocity of the draft increases as the square root of the pressure. Thus, to double the velocity the pressure would have to be four times as great. To give three times the velocity would require nine times the difference in temperature. The pressure varies directly as the hight. Double the hight and the draft is doubled. The capacity varies as the square root of the hight. The velocity in a 200-foot chimney equals twice that in a 50-foot one. For example, $\sqrt{\frac{200}{50}} = 2$.

The capacity also varies directly as the area of the cross section and as the square root of the diameter. The effective area of a chimney for a given power varies inversely as the square root of the hight.

It is a bad practice to put a ventilating pipe into the chimney. It not only decreases the area of the chimney, but is a catch basin for soot and is liable to bring the foul air into the rooms instead of taking it out of the house. Provide a separate flue for ventilating work. The inside of a chimney should be perfectly smooth to prevent the lodgment of soot and to insure a good draft. Bear in mind that the effective area of a chimney is the area at its smallest part or cross section.

Shape of Chimney.

The tendency of smoke in an inclosed shaft is to rise in a spiral column. Round flues are best, consequently other shapes nearest approaching them give best results. Octagon, hexagon or square shapes are next best, and of relative value in the order given. Long, narrow flues are practically useless, as they have large wall surface for loss of heat, increase friction and are of small capacity compared with a square or round flue with equal circumference. Nine-tenths of the diameter of a round flue equals the side of a square one of equal capacity. A smooth, straight flue of proper shape from the cellar floor to 3 feet above the surrounding roof is sure to give satisfactory results. A flue on the inside of a building will give better results than one on the outside, besides dispensing heat in the building. Outside chimney walls should be at least 8 inches thick; if 4 inches thick they must be tile lined or covered on the outside to give good results.

Chimneys laid up with lime mortar are not as good as cement laid, as the action of sulphuric acid on the lime and silicate will soon decompose the lime, leaving nothing but sand to hold the bricks together. This action is helped by exposure to the weather and is undoubtedly the cause of many fires. The use of the tile lining greatly lessens the risk from fire and insures a good draft. Smoke pipes should never be made with 90-degree bends, but curves and branches should connect at an angle of 45 degrees.

The ascending volume of flue gases consists of matter which, if of the same temperature, would be heavier than the surrounding air, such as soot or fine carbon, carbonic acid, sulphur, &c.; consequently the particles must be kept at a relatively high temperature to insure an upward current.

Smoky Chimneys.

Chimneys of the very best design and construction sometimes smoke, owing to surrounding objects, which the wind strikes, causing an eddy at or near the chimney. Chimneys often cause stoves to smoke when first started, for the cold chimney cools the gases down to a low temperature before they reach the exit, the smoke decreasing as the chimney becomes dry and warm. A sure cure for a smoking chimney is to locate and remove any hindrance that prevents the natural tendency of heated air to rise. Some chimneys smoke from the absence of an air supply to the room in which the stove is located. Weather strips and double windows and doors lessen the chance of a good draft.

It is of the utmost importance that chimneys should have solid foundations. If improperly supported and one side settles the weight on the low side increases with the settling of the chimney. When house chimneys settle they crack plastering, crack themselves, increase danger from fire and weaken the draft by inlet of cold air.

It is possible to get a chimney too large, especially if it is a low one, for with a small volume of gas in a large chimney there is invariably a down draft, the amount of heat being insufficient to warm the chimney walls. There is no danger of getting the chimney too high, as far as draft is concerned. It is very easy to check a strong draft, but very expensive to improve a poor one. To prevent creosote forming, the temperature of the gases must be kept above 700 degrees.

Chimney tops should be protected by stone, iron or lead caps, otherwise frost and flue gases are liable to loosen the brick work. Guy wires should be attached at two-thirds the hight of a chimney.

Flue Tiles.

Square smoke flue tiles are listed by outside dimensions, round ones by inside diameter. The ends of tiles are squared off to fit close together and require little if any mortar to make a tight joint. Flue tiles are about ¾ inch thick and supplied in 2 feet lengths. They should be incased in 4-inch well laid brick work and built in as chimney is erected. Being perfectly smooth inside tiled flues collect less soot than brick ones, thus insuring a better draft for same area. A well jointed tiled flue is more effective than a brick one of larger size. Absolutely fire proof flues may be made by leaving 1 inch space between the tile and the brick work, and filling in with soft mortar.

Chimney Flues.

Chimney flues should start at least 4 feet below the smoke pipe entrance and be provided with clean out doors at the base. Have an independent flue for each heater and a separate clean out door for each flue. Each open fire must have a separate flue; each stove ought to have one. Heater and furnace flues should be at least 12 x 12 inches in size, plumb, smooth and independent of all other flues. See that each flue starts at the bottom of the chimney and continues to the top, and that the several flues are not merged into one flue near the top. Also that there is no connection between the several flues at the base or other parts of the chimney, or that one clean out door is not used for all the flues.

From the foregoing it will be seen that defective chimneys may be the result of any of the following conditions:

Insufficient area and hight.

Surrounding buildings deflecting the air currents.

The chimney being contracted or enlarged at some point.

The tops or caps having caved in.

Being plugged with soot or rubbish.

Clean out doors or flue openings being open or loose.

Chimneys being badly cracked, thus checking draft.

A beam or pipe passing through the flue.

Being robbed by a chimney with a stronger draft.

Too abrupt offsets.

Insufficient space for soot to collect.

Connection of ventilating flues.

The chimney being too large for stove in use.

Several flues in one chimney being connected together.

Flue being long and narrow instead of round or square.

The inside of flue being rough and poorly laid up.

Hooking up ash pit and flue dampers so that they work against each other.

Two or more smoke pipes entering same flue.

Two flues entering chimney at opposite points.

Smoke pipes being pushed too far into chimney.

Flues being twisted (a given side being at right angles on floor above).

Long smoke flues or ones of poor design.

Defective chimney caps or the lack of a good one.

Carelessness or lack of ordinary good judgment in design and construction and as a result of not inspecting the inside of the chimney occasionally.

When absolutely necessary to offset the chimney flue, make it as long a slant as possible, for good results never more than 30 degrees from the plumb line, and as much less as possible. When there are two inlets into one chimney the upper one should be provided with an inverted hood or an earthen elbow pointing up. When two pipes enter a main flue at opposite points there should be a partition plate at the center.

Chimney tops should be made to throw up any transverse current of air and cause it to pass over the flue instead of into it. In several styles of chimney tops that give good results the principle of construction is such that any current of air that strikes against them will cause an upward current in the flue. Vertical plates or partitions should be inserted between the cones of the cap. These vertical plates prevent any current of air from passing from one side to the other of the ventilator, and insure an upward current. Chimney tops, when required, should be of fire clay or terra cotta, as they are not affected by flue gases or weather. They are also more ornamental. It is advisable to increase the hight of chimney rather than to use chimney tops, except as a last resort. They are not ornamental and if of metal are short lived.

Painting Shingled Roofs.

More shingle roofs are painted now than ever before in the history of building in this country, says a writer in the *Lumberman*. It is mostly seen in cities and suburban towns, although in the country it is by no means rare. Considerable inquiry has led to the conclusion that many have their roofs painted to add to their appearance, which in many cases it certainly does, while others labor under the impression that the paint acts as a preservative to the shingles. The latter are probably right, provided the paint is renewed as often as it needs to be. If the roof is allowed to remain with the paint partly worn off, the shingles will retain more moisture, and consequently decay sooner than they would were they not painted at all. On the score of durability little can be gained in cost by painting. A good shingle roof unpainted will last a great many years, and the expense of painting a few times would replace it. One painter, who had painted the roof of his own house, when questioned, used good logic from his standpoint. He thought that painting a roof would add somewhat to its length of life. "You see," he said, "that I have painted mine. I do for myself what I desire to do for others. If I did not, the influence would be bad."

A BUILDING operation, which will include 220 three-story houses, is about to be commenced at Yeadon, Pa. The plans have recently been completed by M. H. & C. S. Dickinson, architects and engineers, of Philadelphia. The houses will be of Pompeiian brick with pebble dash and shingle work, slate roof, cemented cellars, tiled bathrooms, &c. All the houses in this operation will be lighted and heated from central plants, plans for which have been prepared by the same architects, who will supervise the construction.

MOVING A BRICK OFFICE BUILDING.

WE have at different times in the past referred to notable operations in the way of moving heavy structures of brick and stone, and we present herewith illustrations showing how a large office building in the city of Cleveland, Ohio, was raised and moved several hundred feet with entire success. The building was the property of the Brown Hoisting Company, and is used by them for office purposes. It occupied a site which the company desired to utilize in the reconstruction of their works, which were some time since destroyed by fire. The building measures 43 x 72 feet, is four stories in hight, and is constructed of heavy stone up to a hight of 10 feet, above which it is of brick. It contains a large vault, 12 x 18 feet, extending from the basement to the top story. The weight of the building is 1250 tons, the vault representing half of this weight. The building was raised 2 feet and moved 430 feet in a straight line, and afterward taken 35 feet sideways. The contract was successfully carried out by Harvey Sheeler of the Chamber of Commerce Building, Chicago, Ill., who has executed many interesting pieces of work of this character, a notably example being the moving of the Immanuel Baptist Church in Chicago, weighing, as it did, nearly 6650 tons. The Cleveland contract gave Mr. Sheeler two months in which to complete the work. He left Chicago July 4 to begin operations, and the task was finished on September 1. An idea of the magnitude of the undertaking may be gained from an examination of Fig. 1, which shows the building supported on the cribbing.

Fig. 1.—General View of the Building as it Appeared During the Operation of Moving.

In the removal of this building heavy cribbing was used, consisting of 12 x 12 inch timbers and 6 x 6 inch blocks. The building was supported on the cribbing by steel beams, while steel rails were used as tracks, of which seven were required. Steel rollers were used which ran on the tracks, the rollers comprising seven sets. The rollers were 25 inches long and 2 inches in diameter. In moving the building the heel timber was anchored by chains to the cribbing under the building, the weight of the building thus forming an anchor. The shoving screws were 5 feet in length.

Fig. 2.—View Showing the "Shoving Screws" and the Patent Hook for Taking Up Slack in the Chains.

Moving a Brick Office Building.

A special feature of the building, as shown in the foreground of Fig. 2, is the use of Mr. Sheeler's patent hook, which is designed to take up the slack of the chain and to do away with the use of the "dead men" commonly employed. It will be seen that the hook can easily be moved forward to take another grip on the chain and thus keep it always tight. The use of this hook saves a great deal of time. The building was moved an average of 12 feet a day, and an average of 30 men was employed in the work.

The building was used all this time by the company's force of 400 clerks. All water, gas, telephone, telegraph, electric light and sewer connections were maintained during this entire period. The pipes were so connected that the progress of the building did not interfere with their use, and the wires for telephone, electric light, &c., were arranged on spools which unreeled as the work went on. The removal was accomplished without the development of a crack, even the stone sills of the windows and doorways being in perfect condition when the task was completed.

Mr. Sheeler is now engaged in a very delicate undertaking in the city of Pittsburgh, in connection with the building of the First National Bank. This building has a vault which extends down into the basement. Below the vault is a sub-basement, used for machinery for electric lighting. The banking room is 7 feet above the sidewalk. It was desired to remove the vault in the basement to secure more room for office purposes. The foundation had to be cut away to increase the size of the room. The upper floor of the vault is to be supported on beams and columns. In accomplishing the work of inserting the beams and columns it was necessary to lever across the old foundations, as it was impracticable to disturb any part of the sub-basement with its machinery. The insertion of the steel columns to support the vault above requires the use of not over 2 square feet, while the removal of the vault enables 10 feet square of additional space to be gained.

Severe Test of Fire Proof Construction.

There have been several cases recently in the city of Chicago where fire proof construction has been subjected to very severe tests. Probably one of the most severe was in the eight-story building fronting 180 feet on Market street and 140 feet on Lake street, which was erected about two years ago, and was occupied by a firm of wholesale grocers. The fire originated about midnight by some unknown means in the southeast corner of the first floor in some waste or rubbish which had been swept to that place to be hauled away in the morning. The fire penetrated to a mezzanine story above 23 feet wide and 125 feet long, which was closely packed with wooden ware, including buckets, baskets, tubs and other light articles. These with several hundred barrels of sugar beneath were consumed. Experts estimate that at times there were 2000 degrees of heat at one place, yet notwithstanding the conditions the fire was under control in half an hour. The firemen expressed the opinion that had the building not been of fire proof construction the entire structure and contents would have been destroyed.

The building was designed and erected under the supervision of architects D. H. Burnham & Co. of Chicago, who describe the construction as follows: The foundations of the east wall of the building were built on what is known as the cantilever system, resting on piles. The columns supporting the mezzanine story, which was 7 feet 3 inches in the clear, were of heavy cast iron and were bricked in square. The beams were of cast steel, having a segmental arch of hollow tile fire proofing. The arches were supported by skewbacks, which protected the lower flange of the beam. The floors were of two thicknesses of wood laid in concrete on wooden sleepers. The south end of the mezzanine story was composed of large wire glass transom lights 6 feet tall and the full width. Piled up against these transoms was the burning merchandise, but it is stated that the glass was only cracked.

The loss was adjusted on a basis of $31,536, and of that amount only $3869.34 was set aside as the damage to the building. Much of the damage represented by this amount, however, was done by smoke, and by the firemen in getting into the building, as well as in the cleaning up and putting other than the burned section into good condition. Superintendent Tinsley of the firm of architects estimates the value of that part of the building which was really destroyed at $200, the rest of the loss being attributable to the causes indicated.

In the opinion of insurance men, owners, investors and builders this was a most remarkable test of fire proof construction, and shows what advances have been made in this direction in the last few years.

Peculiarities in House Building.

In commenting upon some of the peculiarities in house building as evinced by individuals of pronounced ideas, a writer in a recent issue of the Mississippi Valley *Lumberman* presents the following:

I was conversing the other day with a man who has money enough to indulge in building a house every year according to his own particular whims and notions. He is an experimenter in building woods, and one of the very few men I have met here who was not scared at a new idea. In a house built last year, instead of siding it up the usual way with 4 or 6 inch siding, he shingled it all over with the best red cedar shingles he could buy. For the cornices, corner boards, base and belting courses he used B Select S 1 S, and instead of turning the surfaced side out, he turned it next to the wall, thus showing the rough side to correspond with the shingles. I saw the house when it was building, and, if I had not know the man who was doing it, I certainly would have thought it some one who had "wheels in his head," or was trying to see how different he could be from the ordinary. You may suppose such a rough surface would preclude all ideas of painting, but he didn't paint it at all as we understand a painted surface to be. Instead he treated it with several coats of a kind of stain which after it was on and the whole completed presented a beautiful appearance, and at a distance the effect is much finer than you would suppose.

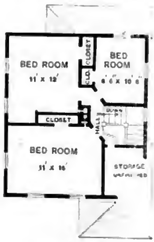
Speaking with him on this point he said that the treatment of wood in that way was much better and more lasting than the common method of painting on a smooth surface. I can well believe this, for I have noticed many times when I was living in Nebraska that wind mill towers that were put up with rough lumber and painted with a coarse grade of red paint seemed never to show signs of deterioration. Paint seems to penetrate the pores of wood as it comes from the saw much better than when from the smoothing process of the planer. Paint never will peel off from a rough surface as it does from a smooth one. It is no use, however, to talk of such a method coming into common use. People wouldn't have it anyhow because of its looks. Utility is sacrificed for the sake of appearance as ofen in building matters as it is in the matter of the clothes we wear. City and town people will persist in wearing high collars in hot weather, but there's no sense in it all the same.

To return to this crank on house building, I want you to know the result of his experiment with fir for his porch flooring. To a good many of my readers in the trans-Missouri country the use of this wood for such purposes is no new thing. It has passed beyond the domain of experiment for them. But there are many living east of there who do not know much about it, and it is for these I am writing. The fir flooring on this particular porch was laid last September. It got a good soaking rain on it soon after it was laid and before any dressing was put on it. It was very dry when laid, and naturally it would be supposed that it would have swelled up, but such was not the case. When it got dry enough to paint there was not a sign of shrinkage in all that large floor. The house fronts to the south, and is not over a third of a mile from the lake, and therefore during the summer months this porch floor is subjected to the extremes of wet and dry. The outer edge of it more so than next to the house wall. But even this severe test does not make any difference in the tightness of the joints. It is the best example I ever saw of the utility of Douglas fir for outside exposure.

DESIGN FOR LOW COST FRAME COTTAGE.

THE elevations, floor plans and constructive details which are presented herewith relate to a low cost frame cottage having a rather neat exterior and arranged with three rooms on the first floor and three sleeping rooms on the second floor. An inspection of the plans shows the main stairs so located as to economize space and render the sleeping rooms on the second floor readily accessible.

The cottage was designed by Charles E. Sargent of Ware, Mass., who states in his specifications that the foundation walls are of pasture stone, laid dry and pointed on the inside. The underpinning and chimney are of common brick, laid in lime mortar. The frame and partitions are of spruce. The covering boards for the roof and outside walls and under floors are of hemlock. The first story of the house is clapboarded with No. 2 spruce, while the gables are covered with cedar



Second Floor.

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

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

Design for Low Cost Frame Cottage.—Charles E. Sargent, Architect, Ware, Mass

shingles, laid 3½ inches to the weather, and the roof shingles are laid 4½ inches to the weather. The outside finish, including window frames, cornices, porches, &c., is what is known as native pine, all moldings being of stock pattern.

The inside finish of the house is of North Carolina pine, very plain, and all moldings, doors, &c., of stock pattern. The pantry and china closet are fitted with shelves, and clothes closets are provided with cleats for supporting hooks.

The plastering is one-coat work of lime and hair mortar, finished with a skim coat. The kitchen is provided with a sink connected with water supply, and this drains to the cesspool, in case there is no sewerage system.

The outside of the house is painted two coats of lead and oil, and the inside has two coats of hard oil finish with filling.

THE annual report of the Massachusetts Bureau of Statistics, covering the year 1900, gives some interesting information about strikes in that State. Of the 189 cases of labor troubles occurring last year 10 were ocasioned by questions relating to hours of labor alone, 28 to hours of labor and wages, 90 to wages alone and the remaining 61 were occasioned by a variety of causes. Of these 189 strikes 53 were successful, 10 partially successful, 25 were compromised, 74 failed, 14 were adjusted to the satisfaction of both parties and the balance were pending at the close of the year. Expressed in percentage, 28.04 per cent. of the contests terminated successfully for the employees, 5.29 per cent. were partially successful, 39.15 per cent. failed and 7.41 per cent. were satisfactorily adjusted.

Some Practical Hints on Insulation.

In these days when cold storage or refrigeration is so extensively employed it is interesting to consider the relative value of the materials adapted for use as a means of insulation. Investigation shows the literature of the subject to be extremely limited, yet it is one offering an excellent field for discussion. A recent article written by Robert T. Rasmussen for the *Architects' and Builders' Journal* presents some hints on insulation which may prove of interest to our readers, and we therefore make use of the following extracts:

Most architects and engineers have pet hobbies of their own. One says spruce lumber and pitch, another charcoal, another sawdust, and so on through the long list of materials commonly supposed to be good insulators.

That insulation is of the utmost importance cannot be denied, and if it is not of the very best the cold air will escape at such a rate that it soon disgusts all concerned with their penny-wise pound-foolish policy. The use of a cheap article reduces first cost, but increases current expenses as long as the plant is operated. Manufacturers of refrigerating machinery long ago realized the lack of positive knowledge in insulation, and in order to make sure their machines would do the required work they often installed them of 50 per cent. more capacity that is actually required if the insulation were right. The result is larger coal bills, more piping and after all greater first cost.

The following table shows the relative insulating value of the materials now in use, based on actual tests made at the Massachusetts Institute of Technology. The eminence of this institute should be a sufficient guarantee of their correctness. The figures given are not the actual ones as published by the institute; they have been changed and modified by the writer so as to be readily understood by uninitiated minds. The relative values are the same, however, and can be relied upon.

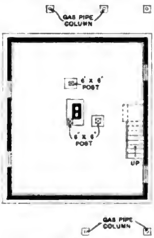
Assuming a dead air space to be perfectly sealed (a practical impossibility) and its rate of heat transmission to be 1.00 B. T. U., then the relative values are:

Dead air space	1.00
Sheet cork, 1 inch thick	1.14
Sheet cork, 2 inches thick	0.95
Sheet cork, 3 inches thick	0.87
Carbonate magnesia, 1 inch thick	1.45
Sawdust, 1 inch thick	1.24
Charcoal, 1 inch thick	1.22
Asbestos, 1 inch thick	1.49
Coal cinders, 1 inch thick	1.50
Hair felt, 1 inch thick	1.51
Hard pine, 1 inch thick	2.72
Oak, 1 inch thick	2.65
Spruce, 1 inch thick	3.40
Spruce, 2 inches thick	1.81
Spruce, 3 inches thick	1.02
Brick wall, 4 inches thick	4.17

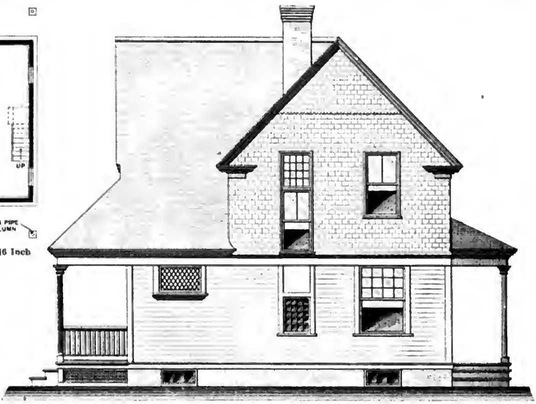
proximately 43 cents, showing the greater value of cork. In addition, the weight of the spruce and dead air partition would be about 20 pounds per square foot, while the spruce and cork would weigh but 8 pounds per square foot.

By comparing the given values of these partitions with the values of the different materials in the table there should be no difficulty in arriving at the efficiency any portion would have constructed of any of the materials. The great saving of space by the cork partition should prove valuable in itself. As will be noted, it is more than one-half.

A cube containing 1000 cubic feet made on the three dead air spaces principle as above would measure outside 11 feet 10 inches by 11 feet 10 inches by 11 feet 10 inches, and naturally would have an efficiency of 2.52 B. T. U. Now, if this cube were altered, still retaining the outside measure, but substituting the cork construction of 3 inches with the 2-inch spruce, the contents of the cube would be increased by 1331 cubic feet—over one-fourth. This applied to large buildings would mean that by properly insulating them their capacity could be increased one-fourth or more without covering additional ground space.



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



Side (Right) Elevation.—Scale, ¼ Inch to the Foot.

Design for a Low Cost Frame Cottage.

These figures show that sheet cork is the best nonconducting material, hence the best insulator.

Now as to the method of using these materials. One partition construction consists of two 1-inch tongued and grooved spruce boards, with water proof paper between; 1 inch dead air space, then two 1-inch spruce boards with paper again, and so on until three 1-inch dead air spaces have been formed, making a partition 11 inches thick and consisting of eight 1-inch spruce boards, with three 1-inch dead air spaces. The efficiency of this partition would be 2.52 B. T. U.—that is, it would transmit 2.52 B. T. U. per degree difference per square foot per 24 hours, and would cost approximately 59 cents per square foot.

The cork partition to displace this would consist of two 1-inch tongued and grooved spruce boards, with 3-inch sheet between, and one layer of water proof paper on each pipe, making it 5 inches thick. This construction would transmit 2.13 B. T. U. per degree difference per square foot per 24 hours, and would cost approximately 43 cents, showing the greater value of cork.

An insulating plan that came to the writer's notice in Washington a short time ago deserves mention. It consisted of one 1-inch spruce board, a 1-inch dead air space, 2-inch spruce board, 4-inch dead air space filled with cinders; 2-inch spruce board, 4-inch dead air space filled with cinders; 2-inch spruce board, 1-inch dead air space, 1-inch spruce board, making in all 18 inches, with a supposed efficiency of 2.25 B. T. U. Cinders, it is well known, have great capillary attraction. The result is they lose after becoming damp from 30 to 60 per cent. of their efficiency when dry. Most loose materials are open to the same objection, while at the same time being extremely hard to pack to the proper density. The only claim for asbestos is that it is fire proof. Mineral wool, thought by many to be the ideal insulator, is 25 per cent. less efficient than sheet cork, besides being dangerous to handle; and after having been in use for any length of time it will be found to have settled to one-half its former bulk.

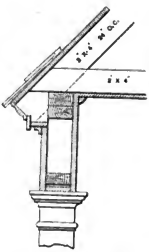
Sheet cork is the ideal insulator. It has no capillary attraction, is practically fire proof and odorless, easily applied and very light in weight. It contains innumerable air cells that are closed by the binding substance, thus securely entrapping the air and forming the only dead air space that can be depended upon. In conclusion, it has been found that an air space 1 inch deep is as efficient as one 3 inches or more. The depth has nothing to do with the efficiency, but, as has been stated, it is next to impossible to hermetically seal any dead air space—it is safe to say absolutely impossible—therefore no dependence should be placed on dead air construction.

The St. Louis Exposition.

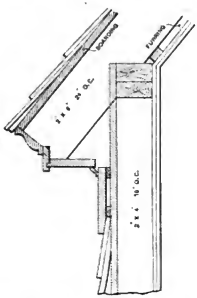
The buildings of the Louisiana Purchase Exposition, which will be held in the city of St. Louis in 1903, will occupy a site embracing the unfinished half of Forest Park, said to be one of the largest public parks in the world. The portion to be used contains 668 acres, and about 300 acres of surrounding property will be added so as to bring the total area of the site up to about 1000 acres. The main buildings will be larger, it is stated, than those of any previous exposition, and it is expected that the working drawings will be ready by November 1. The letting of contracts aggregating about $11,000,000 for construction work on the buildings and grounds will begin about December 1. There is to be an agricultural building, 700 x 2000 feet; a manufactures building, 600 x 600 feet; a liberal arts building, 600 x 1200 feet; a social economy building, 550 x 700 feet; a transportation building, 600 x 1200 feet; an education building, 550 x 700 feet; an art building, 300 x 600 feet, with two wings, each 200 x 300 feet; a mines and metallurgy building, 600 x 1200 feet; an electricity building, 600 x 550 feet; and a Government building to cover 100,000 square feet. The estimated cost of these buildings is $7,000,000. To these will probably be added buildings for fish and fisheries, for machinery, for forestry and for horticulture.

The work will be in direct charge of Isaac S. Taylor of St. Louis, who is at the same time chairman of the Commission of Architects and Director of Construction and Maintenance. This is said to be the first exposition in which the same man who led the planning of the exposition had the chieftaincy in carrying out the construction. Mr. Taylor has been in St. Louis all his working life, and has erected some of the largest buildings in the city, besides doing much work in Illinois and Texas.

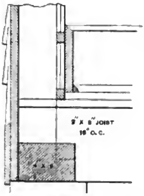
It is stated that the plan which will be followed in the construction of a building at the exposition will be to let the entire construction under a single contract, the contractor to have control of all subcontractors.



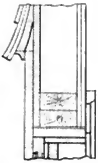
Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.



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

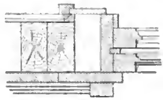


Detail of Water Table.

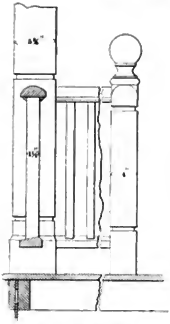


Belt Course.

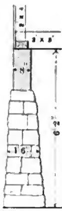
Scale, 1 Inch to the Foot.



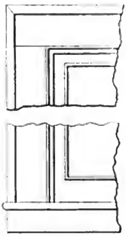
Horizontal Section through Second-Story Window Frame.—Scale, 1½ Inches to the Foot



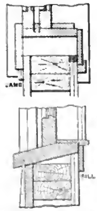
Details of Porch Balustrade and Post.—Scale, ¾ Inch to the Foot.



Section through Foundation Wall.—Scale, ½ Inch to the Foot.



Detail of Interior Window Trim.—Scale, 1 Inch to the Foot.



Details of Main Story Windows.—Scale, 1 Inch to the Foot.

Miscellaneous Constructive Details of Low Cost Frame Cottage.

CORRESPONDENCE.

Finding Bevels of Valley Rafters Where Ridges Do Not Intersect.

From L. G. KEYES, *Kansas City, Mo.*—The following diagrams and explanation are sent in answer to the request of "W. B. J.," Charlotte, N. Y., which appeared in the August issue of the paper. Fig. 1 of the diagrams shows a partial plan and elevation of a roof with the ridge on one part higher than that on the other; one part having a rise of 15 feet to a run of 12 feet, while the other has a rise of 13 feet to a run of 14 feet. The diagram is drawn to illustrate a simple and accurate method for locating the seat or run of valley rafters in ordinary roofs where the ridges do not intersect. When not able to take the rise and run directly from the square, and when there are no roof plans at hand, the common way is to draw a plan of part of the roof having the higher ridge, showing the ridge and plate, as indicated by 1 2 and 3 4. This drawing may be to any suitable scale, according to convenience. The next step is to draw the line of the other ridge, as D' B'. Now at the required pitch, 13 or 14 inches in this case, draw an elevation of the lower roof, as indicated by A B' A', which shows the line A B' produced to a hight equal to the rise of the higher ridge, as to B. The next step is to draw B D parallel to the ridge line B' D'. The point at D is where the longer valley must cut the line of the line of the ridge produced as to *d* and draw the line A *d*. Produce the line A D indefinitely and make A B' equal to A B. Draw B' *d*. A bevel set at B' along A B' and B' *d* will give the required side bevel of this valley to fit against the ridge, as at B in Fig. 2.

The length and bevel of the short valley are found as shown at A' B'' in Fig. 3. The side bevel of the short valley is found in the same manner as for the longer one, but to keep the lines within the limits of the sheet a line O O' is drawn parallel to A' B'' at the pitch of the short valley, and the line A D is produced as to *d'*. The line O' *d'* is drawn square from A' D'. A bevel set at *b'* along O *b'* and *b' d'* will give the angle of side bevel of this valley to fit against the side of the longer one, as at B' in Fig. 2.

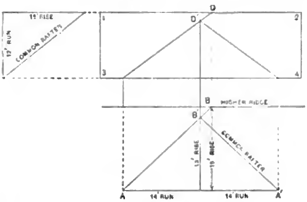
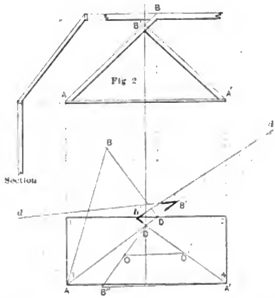


Fig. 1.—Diagrams Showing Method of Seating Valley Rafters in Roofs where the Ridges Do Not Intersect.



Figs. 2 and 3.—Finding Side Bevels of Valley Rafters in Roofs where One Ridge is Higher than Another.

Finding Bevels of Valley Rafters in Roof where Ridges Do Not Intersect.

ridge 1 2, and the distance 1 D is the distance from the end of the ridge to the point of intersection of the valley and ridge.

If "W. B. J." will study the diagram a little closer he will have no trouble in locating the seats of valley rafters in this class of roofs, but I wish to remind him, and also others, that his method of obtaining side bevels for hip or valley rafters—that is, taking the run on one arm of the square and the length on the other—will not do for roofs of two pitches. It is correct only where the seat or run of the hip or valley forms an angle of 45 degrees with the sides, as in square cornered buildings with roofs of equal pitch.

In Figs. 2 and 3 I show a method of finding the side bevels in this class of work, being simple and absolutely correct with seat at any angle and with rafters at any pitch. The general principles of this method were explained on page 131 of the issue of *Carpentry and Building* for last May. Fig. 2 represents a vertical section through the lower roof and a sectional side elevation of the ridge on the higher roof. It also shows a section of the higher roof, this roof having the same pitches as that shown in Fig. 1. In Fig. 3 is represented the plan of the ridge, plate and also the seat of the valleys, which are located as explained in Fig. 1. In Fig. 3 the length of the longer valley rafter is indicated by the line A B, the angle at B giving the down bevel and that at A the bottom bevel to fit on the plate.

In order to find the side bevel of this rafter proceed as follows: From A on the line D A square up to the

Finding Back Cut on Jack Rafters for Octagon Roofs.

From T. D. G., *Council Bluffs, Iowa.*—If "W. H. M." of Woodlawn, Ala., will take the distance from the hip along the plate of his octagon building to the first jack rafter, and the length of the jack at right angles to the plate, he will have the bevel to fit the hip in any pitch of roof. I always aim to conceive the superficial shape of a roof in order to comprehend the various bevels. For instance, take his sketch in the October number of the paper, and we will presume the distance from the corner to the first jack to be 7 inches (of course it is likely to be more than this); then the run of the jack would be 17 inches; presuming further that the pitch of the roof is one-half, or 45 degrees, then the length of the jack would be 24 inches; hence we have 24 and 7. Marking along 24 would give the side bevel of the jack.

Remodeling an Old Dairy Barn.

From G. H. K., *San Francisco, Cal.*—I am just remodeling an old dairy barn, 113 x 60 feet in size, and wish to arrange it so as to run a hay carrier. I inclose a diagram of the framing, which I have purposely left incomplete. Will Mr. Kidder or some other authority suggest the best construction for the purpose? The ordinary ties interfere more or less with the carrier, so it is customary here, where we have no snow, to knock out the ties in the main barn where the "lean to" is well tied to the main posts, using only a small cross tie 2 or 3 feet from the comb. This appears to me to be insufficient bracing for an 18 or 20 foot rafter. We usually have 75 to 100 inches of rain annually where this building is located, besides very heavy and sometimes very violent winds. Some one has suggested to me a modified scissors truss arrangement made of 1 x 6 yellow fir in conjunction with a 2 x 6 tie 4 feet from the comb. This brings the construction rather high in the roof to be very effective, but I do not want any tie lower than 4 feet. All the illustrations of scissors trusses given so far in *Carpentry and Building* are unsuited for my purpose, as they have no hay carrier in contemplation, and are not considered with reference to a "lean to." Also they are built to withstand heavy snows and weighty roofs.

My roof will be covered by redwood shakes 3 feet long, laid shingle fashion 1 foot to the weather and upon 1 x 6 inch redwood sheathing placed 6 inches apart. The purlin I have indicated is never used here, but I think it adds life to the roof by stopping wind vibration. I will have considerable material from the old building in the shape of 2 x 4 and 2 x 6 inch spruce scantling, which, perhaps, could be worked in the new building where the strain is not very great. I also have 52 most excellent seasoned 8 x 8 redwood posts, 14 feet long, which I did not seem to be able to use to advantage in this construction, but would like to do so. As they are hewed, they are hardly true enough to be used as sills, otherwise they are better than anything I can buy. I would use more fir in this building, but cannot get any that is seasoned, while the green is liable to be honeycombed by insects. Small sills are used very generally now, as they are less liable to rot out with their own sap when used in an unseasoned state. Redwood is not as strong, but much more lasting and the least liable of all woods to shrink by seasoning in this cool coast climate. The building rests on ocean drift sand, which makes a good foundation when kept from shifting. Referring to Fig. 1, which represents four panels of the side framing, I would say that the bottom sill is 6 x 8 inches and 113 feet long, while the round timbers A A are 10 x 8 and 10 x 12 inch Douglas or yellow fir. The top floor ties are supported by the separate posts, as shown. The post B is of 6 x 8 inch redwood and 20 feet high. The plate is yellow fir, 4 x 6, and the sill is 6 x 8 inches.

I shall be pleased to have my whole plan criticised from a constructive standpoint. I understand, of course, that the outside posts and loft ties are unnecessarily heavy, but I use them because they are good material already on hand. Some of the readers may say "raise your building and make more room for the hay," but in reply I would state that we can only get cattle to eat hay here about six weeks in the year, and as the building is more for milking purposes than for feeding, I do not want any more loft room.

Answer.—We submitted the inquiry of our correspondent, with his diagrams, to Mr. Kidder, who presents the following in reply: The method I would advise for trussing the rafters over the center span is that indicated at the left of the central dotted line in Fig. 2, the portion at the right representing the original sketch of the correspondent. This leaves the center clear, requires but little lumber and gives as stiff a construction as is possible without a tie beam across from the upper plates. It will give all the rigidity necessary and at the same time a good support for the rafters and for the hay carrier.

The frame work inclosed between the points D, E, F constitutes a cantilever truss supported at the point F, each half of the loft being self supporting. The rafters will be in tension and the strut S in compression. The rafters over the posts should, therefore, be tied together so as to form a continuous tie from the lower plate to the ridge.

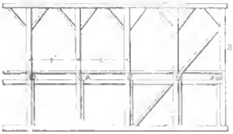


Fig. 1.—Four Panels of the Side Framing

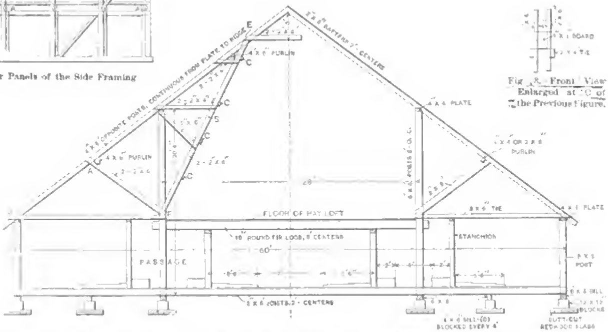


Fig. 3.—Front View Enlarged at C of the Previous Figure.

Fig. 2.—Elevation Showing at the Right of the Central Dotted Line Our Correspondent's Sketch, while at the Left is the Construction Recommended by Mr. Kidder.

Remodeling an Old Dairy Barn.

By slightly increasing the size of the timbers this construction could be used for any roof loads. The only criticism I have to offer regarding the framing shown by the correspondent in question is that I think the purlin at A should be 4 x 6 inches, and the sill at B, Fig. 2, should be raised on edge. The original sketch does not clearly show whether it is on edge or flat wise.

Construction of a Shuffle Board.

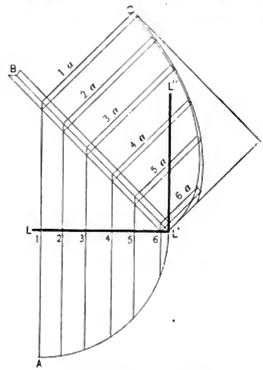
From J. A. L., *Santiago, Cuba.*—Will some of my fellow chips tell me how to build the table of a shuffle board? I desire especially to know the size of table, kind of weights, &c., which are necessary.

Constructing a Chimney of Concrete.

From J. S. N., *Onaway, Mich.*—I wish to build a chimney of concrete, the hight being about 34 feet, measured from the base in the cellar. The flue will be 8 x 8 inches and the walls of the chimney about 4 inches thick. I would like to know what proportions of Portland cement, sand and broken stone should be used. Any information on the subject or any suggestions will be very much appreciated by an interested reader of the paper.

Construction of Cove Ceiling.

From E. R., *Roxbury, Mass.*—I send the inclosed in answer to the inquiry of "S. A. .," Owatonna, Minn., which appeared in the September issue of the paper. Referring to the sketch, let L L' L" represent the plan



Construction of Cove Ceiling.

of the corner of the room. Mark out the shape of the common bracket and then draw as many lines as the circumstances would seem to require, as 1, 2, 3, 4, &c. These lines should run from various points of the curve to the center line of plan of the angle bracket. Extend these lines from the center B to C, making them the same length as those from A to L'. Next draw the curved line from C to L' through these points, which gives the curve of the edge of the angle rafter or bracket. The lines 1*a*, 2*a*, 3*a*, &c., show how to get the splay or chamfer, if required, of an external rafter. This rule applies for external or internal angles, either large or small, where they are lathed and plastered and have angle rafters.

Framing a Tower Roof.

From E. C. G., *Pittsburgh, Kan.*—Having constructed a number of tower roofs similar to this in the past, and as I never saw anything in any mechanical work pertaining to this particular construction or met with a mechanic who said he knew how, I send my method for comment among my brother Chips, and use for the purpose figures taken from the plans of the new County High School, finished January 1, 1901, at Columbus, Kan. Referring now to the plans, the base of the tower is 13 x 13 feet square and the diameter of the lantern or octagon is 3 feet 8 inches, or 44 × 5 ÷ 12 = 18 4-12 inches, the side of the octagon.

The part marked No. 1 shows one of the eight hips, which stand at an angle of 39 degrees, with a run of 7 feet 5 inches and a rise of 9 feet 6 inches. This gives a work line of 12 feet 1 inch, the length of hip rafter. Now square up half the run and half the rise where they intersect, and at the work line set off 1 foot 3 inches. Now a circle through the three points gives a radius of 14 feet 9 inches, or the outline of hip, which makes a good curve for shingles. Continue the line of half the run to the opposite side. Place No. 1 as No. 2 at an angle of 45 degrees, square up to half the rise and connect the two lines, and we have 11 inches and a work line for the common rafter. No. 3 is the common rafter, with a run of 4 feet 8 inches and a rise of 9 feet 6 inches, which gives a work line of 10 feet 7 inches—the length of the common rafter. Now from the intersecting points of half the run and rise set off 11 inches, and a circle through the three points gives a radius of 15 feet 3 inches, the outline of the common rafter, from which to cut cripples and jacks, as the dormer windows make them all cripples. I find it best to work opposite to the customary rule and cut the hips first, because there are no whole common rafters. I find it best to miter the heels so they join well, as it increases the rigidness of the structure, and for practical work only one-quarter of the lines are necessary. I have, however, used all to make it plain, as this is the only plan of which I know. Perhaps it will bring some better one to the front.

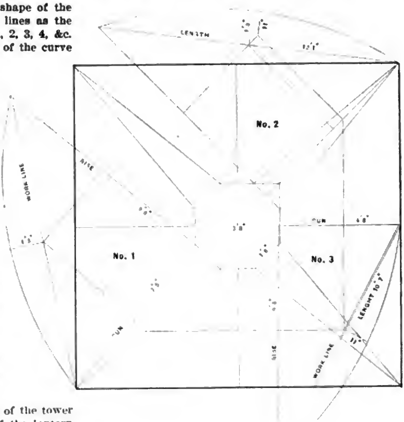
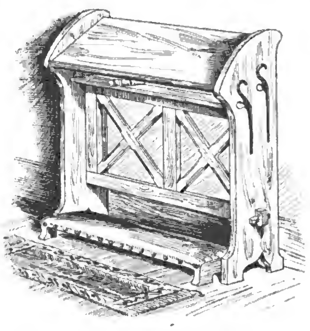


Diagram Showing Method of "E. C. G." for Framing a Tower.

Design for a Prayer Desk.

From Paul D. Otter, *Chicago, Ill.*—A short time ago a correspondent made inquiry in these columns for a "Priedieu," or prayer desk, and as I have seen no answer published to the request, I inclose a pen and ink drawing which may be of service to him. In the construction of a prayer desk for a home the use of the Gothic style would seem, by its distinctive character, not quite in keeping with the interior furnishings of the present day, and so the plain surface and slight changing of outline shown in the sketch, which is typical of the early American mission furniture, is deemed more appropriate for a house. The construction, it will be seen, is of a very simple and direct character. There is no set size, but a hight of 36 inches from the floor to the upper edge of the sloping top, with outside width of 32 inches, gives about the right proportions. The ends are to be 12 inches at the widest part of the outline at top and bottom, and the stock is to be 1¼ inches thick. The top is to be placed at an angle of 40 degrees, and the lower edge provided with a slight projecting quarter round strip.

On top of the open frame or screen work is placed a 6-inch shelf for books. The lower rail of this screen is intended to pierce the ends and be secured by wooden



Design for Prayer Desk Contributed by Paul D. Otter.

pegs. The knee rest is made separate from the general construction, but fitting between the end pieces, or it may be fixed with a dowel and groove to allow of sliding back when not in use. The top of the stool may be padded and upholstered with carpet or other goods. I think from the measurements which I have given and the general description, the carpenter who is handy with his tools will have no trouble in making the piece of furniture here illustrated.

Method of Sound Deadening.

From C. D. S., *Montana.*—I would like to ask the readers of *Carpentry and Building* to make suggestions on the following plan of a building: The building is a

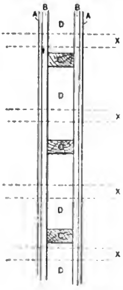


Fig. 1.—Plan of Partition.

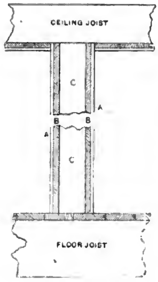


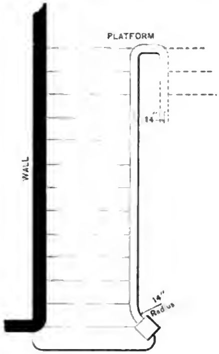
Fig. 2.—Vertical Section through Partition.

Method of Sound Deadening.

double one-story structure, built entirely of lumber, as lath and plaster are very expensive here. The cause of the trouble is that the sound is carried by the lumber and the party living on one side is disturbed by the people living on the other side, and *vice versa.* To remedy this trouble several suggestions have been made. One is to lath and plaster the division wall. Another suggestion is to line the division wall with deafening felt and line the ceiling with the felt on the upper side—that is, by going in between the roof and ceiling and lining same. The partition wall is built as shown in the sketch, A being cotton lining and wall paper, B ⅞-inch sheathing, C are 2 x 4 inch studs, D space between sheathing on each side of studs. This space has been filled with cross cut sawdust up to the ceiling and no effect was produced in deadening the sound. The ceiling and floor joist are one continuous piece of floor lumber and carry the sound very readily. Any suggestions the readers may offer will be gladly received.

Laying Out Face Mold for Stair Rail.

From C. E. G., *Frederick, Md.*—I would be glad to have some of the old stair builders explain, through the columns of the Correspondence department, their method of laying out the face mold for stairs having a turn out at starting and a straight string in the center of the well. The sketch which I inclose will explain what I mean. The radius for the turn out is 14 inches



Laying Out Face Mold for Stair Rail.

for center of rail and the distance from center of rails at the well hole is also 14 inches. The risers are 7¾ inches and the treads 10 inches. Now, if Mr. Williams or the correspondent signing himself "C. B. H.," whose answers to a similar question appear in the July and August numbers, will be willing to again take up the subject of handrailing, I for one will appreciate it very much.

Fastening Sheet Iron Roofing to Sheathing.

From H. C. HANER, *Indianapolis, Ind.*—A correspondent of *Carpentry and Building* asks for a method of fastening sheet iron roofing to the sheathing, at the same time finishing with a lock seam, and soldered. The method given is not very satisfactory, and here is the way it is put on flat roofs around the mills and factories: The sheets are turned up on edge ¾ inch and clips nailed to the sheathing and bent over the standing edge. The next sheet is bent 1¼ inches and then turned down on the ¾-inch edge and clip, and both then turned down to a ½-inch standing seam. This method does not put a nail in the iron and no leaks can result if it is properly soldered.

Lombardic Columns.

In commenting upon the design of Lombardic columns, a writer in a London paper states that the capital was larger in proportion to the rest of the column, thereby affording a greater surface, or impost, for the arches to rest upon, and also combining the appearance of security at that point with general lightness of appearance. The shaft was mostly plain, yet frequently highly ornamental, striated or carved in different ways, and sometimes twisted, either singly or with two stems twining spirally around each other. Columns furnishing examples of all these different modes occur in the cloisters of San Paolo and San Giovanni Laterano at Rome, and the capitals present quite as much variety, it seeming to have been the aim on such occasions to introduce as much diversity as possible, instead of so arranging the columns as to have two of the same kind placed together, a practice probably originating in making use of columns and fragments taken from other buildings, and afterward retained as conducing to variety and richness. Although the arches were as frequently as not quite plain and without archivolt moldings of any kind, the use of archivolts was by no means uncommon, sometimes consisting of merely a single molding inclosing a plain border around the arch, at others divided into *faciæ*, and more or less enriched, as in the front of the cathedral of Pisa, in which building the arches describe more than a semicircle above the capitals of the columns, being prolonged downward by a deep abacus, consisting in some places of two, in others of a single plain block resting immediately on the capital, a mode certainly preferable to that of placing a mere lump of entablature upon the column, and not ungraceful in itself, because it gives greater hight and importance to the arches, which, being narrow, would else appear stumpy, depressed and overloaded by the ornament around them. Similar blocks, or abaci, occur in the remains of Frederick Barbarossa's palace at Gelnhausen, where small heads or masks are introduced immediately above such abaci, so as to fill up the space there between the arches, and continue in some degree the vertical lines produced by the columns.

Chinese Architecture.

The columns and rafters used in the construction of Chinese houses are rather the bars of a light cage than the support of heavy weights—the perpendicular beams serving less to support than to unite the cross timbers or horizontal rafters. The framework of the roof is only a light fabric of bamboos placed one above another, supported by ledges and diminishing in size as they rise. The ends of these transverse rafters rise either out of the column which they cross, or from the walls themselves, and sustain that part of the roof which overhangs the building. Columns in China have no capitals; two reasons having prevented the adoption of this universally admitted part of the pillar, says a writer in a London exchange. The first consists in the absence of both architrave and entablature; the second in the use of double roofs. The first or lower roof being generally only a lean-to or pent-roof, the slope of which necessarily conceals the hight of the column, every species of figure, whether for use or ornament, not only appears superfluous, but has not perhaps entered the mind of the architect.

Bricks are made in great perfection. The Chinese join them together beautifully, so as to form triangles, squares, circles, figures or flowers, &c., which gives to the exterior a very finished appearance. The bricks in size are about 10 inches long, 4 inches wide, and rather more than 2 inches thick. A one-brick wall will, therefore, have a hollow of 2 inches between the stretchers of its two faces. Those of the Great Wall are reported as being 15 inches long, half that in width, and nearly 4 inches thick.

The walls of their houses are generally about 18 inches thick. On the foundations they lay three or four layers of bricks entirely solid. After which they dispose them on the two faces of the wall frontways and lengthways (as headers and stretchers) alternately, so that the front ones meet and occupy the whole breadth; but between those that are disposed lengthways there remains a void space in the middle of the wall. On this first range they lay a second, disposing the bricks lengthways, observing to cover the joints of the front bricks in the first range with a whole brick in the second, and so they proceed alternately from the bottom to the top, and by this means the expense both of labor and materials is considerably diminished and the weight of the wall much lessened.

It is uncommon to see anything built even of stone beside bridges and memorial arches, which adorn the streets of the principal cities in each province; and marble is generally applied for pavements, thresholds of gates, the foundations of some of the pagodas and the lining of canals.

The Roman Amphitheater.

It is not quite clear, says an English writer, whether the arena was no more than the solid ground, or whether it had an actual flooring of any kind. The latter opinion is adopted by some writers, who suppose that there must have been a souterrain or vaults, at intervals at least, if not throughout, beneath the arena, as sometimes the animals suddenly issued apparently from beneath the ground, and machinery of different kinds was raised up from below and afterward disappeared in the same manner. That there must have been some substruction beneath the arena, in some amphitheaters at least, is evident, because the whole arena was upon particular occasions filled with water and converted into a naumachia, where vessels engaged in mimic sea fights, or else crocodiles and other amphibious animals were made to attack each other. Nero is said to have frequently entertained the Romans with spectacles and diversions of this kind, which took place immediately after the customary games, and were again succeeded by them; consequently there must have been not only an abundant supply of water, but mechanical apparatus capable of pouring it in and draining it off again very expeditiously. The arena was surrounded by a wall, distinguished by the name of podium, although such appellation perhaps rather belongs to merely the upper part of it forming the parapet or balcony before the first or lowermost seats nearest to the arena. The latter, therefore, was no more than an open oval court, surrounded by a wall about 18 feet high, measuring from the ground to the top of the parapet, a hight considered necessary in order to render the spectators perfectly secure from the attacks of the wild beasts. There were four principal entrances leading into the arena; two at the ends of each axis or diameter of it, to which as many passages led directly from the exterior of the building, besides secondary ones intervening between them and communicating with the corridors beneath the seats on the podium. The wall or inclosure of the arena is supposed to have been faced with marble, more or less sumptuous, besides which there appears to have been, in some instances at least, a sort of network affixed to the top of the podium, consisting of railing, or rather open trellis work, of metal. From the mention made of this network by ancient writers little more can now be gathered respecting it than that in the time of Nero such netting, or whatever it might have been, was adorned with gilding and amber, a circumstance that favors the idea of its having been gilt metal work, with bosses and ornaments of the other material. As a further defense, ditches, called euripi, sometimes surrounded the arena. The term podium was also applied to the terrace or gallery itself immediately above the lower inclosure, and which was no wider than to be capable of containing two, or at the most three, ranges of movable seats or chairs. This, as being by far the best situation for distinctly viewing the sports in the arena, and also more commodiously accessible than the seats higher up, was the place set apart for Senators and other persons of distinction, such as the Ambassadors of foreign parts; and it was here also that the Emperor himself used to sit, in an elevated place called suggestus or cubiculum, and likewise the person who exhibited the games, on a place elevated like a pulpit or tribunal (editoris tribunal). The vestal virgins also appear to have had a place allotted to them in the podium. Above the podium were the gradus or seats of the other spectators.

THE ART OF WOOD TURNING.—XXII.

(SECOND SERIES.)

BY FRED. T. HODGSON.

WE now take up the socket, or nozzle, which is screwed to fit over the screw on the pulley, as shown in Figs. 155 and 156. Here again cast steel is the best material to use, and, when screwed, it is hexagon at the edge for the purpose of enabling a small spanner to be employed in tightening it up. When boring or turning out the recess it must be left deep enough to allow the head of the screw, which fits the stem, Fig. 151, to revolve freely. The outer part may all be turned at the same time as the screw is cut. This must be considered its primary stage, and when it is first fitted it must be put together and held by the stem and rotated from the overhead motion, when the whole is again turned to perfect truth and the front bored out to a taper hole about ⅛ inch in diameter. The object of this will be at once clear, as it is to insure perfect concentricity of the drill, which, like all of a similar nature, must run true, and to insure this the only way is to turn each in its place.

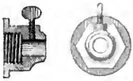
It is quite evident that in this miniature drill spindle we have many and delicate fittings to contend with, each of which must be true in itself. Any slight error in one will multiply as we proceed to such an extent that when we arrive at the point of the drill we may find it so increased that, after all our labor, it will be practically useless; hence the necessity of the utmost care during the whole making of the tool.

To complete the instrument another addition is necessary in the shape of a small eccentric cutter, which in a finished state I show in Fig. 163, and which will materially assist in the clearer understanding of the details. The front part may be made to take the place of the socket on the stem of the drill spindle, thus saving the trouble of making it complete in itself. As far as the stem and pulley, Figs. 151, 152 and 153, are concerned, they are just the same as just described, so further description is unnecessary; so we will assume the stem and pulley to be ready. It is not necessary to have a forging in this case, as a piece of cast steel 1¾ x ¾ x ⅝ inch will answer our purpose. The first thing to do is to line the work all out and dispose of the superfluous material. The block of steel is shown in its primary form at Fig. 157. Surface the face true and mark a line from end to end, as shown by the dotted line, which should be rather above the center of the material, but at the precise axis of the instrument. When finished carry the line to the other side with a scribe and then mark off the center of the bars A. This has now to be chucked for the purpose, turning away the metal at B B, Fig. 158, to leave the boss C the required length. The boss is then threaded, as shown, to fit the pulley, and this must fit well and bed well home to the face; especial care must be given to this when it is made to transfer to the stem that holds the socket of the drill spindle. When each is made separate the front is seldom removed except for oiling and cleaning purposes. Next is to place it on the stem, and while being driven from overhead the center must be formed at the front, and a small hole drilled and countersunk. As this hole is simply a guide to obtain the precise axis, the smaller the better. This done, mark a line at the center from end to end, and file away the upper part until the face left is as seen in A, Fig. 159. The readiest way to hold the block of steel while the boss is turned and threaded is to solder it to a small metal face chuck, taking care to see that it is properly centered before it is fastened on. The parallel mortise A, Fig. 158, will be the next to work out. This must be set out and a series of round holes drilled as close as possible together, and then with a suitable file the slot must be worked out perfectly true and square.

The main screw should follow, and, like all kindred screws, must have a definite value of ten to the inch, thus necessitating a screw of four threads. This will have to be less in size than that employed for the eccentric cutter of increased dimensions. The tool box will form the succeeding part. This is made as shown in Fig. 160, and fitted to slide in the parallel mortise A, Fig. 158; then, as seen in Fig. 160, the inside is removed again, forming an open mortise into which a gun metal nut is fitted, so that the tool box may rise and fall to accommodate the various tools that fit into it. A nut and washer, Fig. 161, will complete this, and all that remains to be done is to fix the end plate and turn a milled head on the screw, which is then divided into ten equal parts. This done, we have the epicycloidal cutter in its most complete form.

Fig. 160.—The Tool Box.

Fig. 159.—The Traveler.



Figs. 155 and 156.—Steel Socket or Pulley.

Fig. 157.—Steel Block in the Rough.

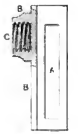


Fig. 158.—The Finished Block.

Fig. 161.—The Tool Adjuster.

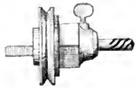


Fig. 162.—The Drill Socket.

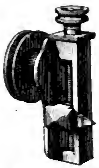


Fig. 163.—The Drilling Attachment Complete.

The Art of Wood Turning.

It will be in order now to give some few instructions as to the manipulation of this instrument, and for these I am largely indebted to Mr. Evans' "Ornamental Turning," just as I have been for the greater portion of the description of the epicycloidal cutter. Quoting directly as to the position of the cutter: "The flange and frame should be placed at right angles, while the latter is set vertical to the lathe bed. To effect this correctly it is necessary to employ a back square, which when placed on the lathe bed the frame is adjusted to the blade. This will bring it to the position above named. This proceeding, however, will be useless unless we have provided the means of determining the process horizontally. To do this, when the positions have been decided, two distinct lines must be marked, one across the top of the collar on the stem, a second on periphery on the boss of the gun metal or main plate, against which it revolves in close proximity, the actual bearing being against the steel collar which projects slightly beyond the face. When these two lines agree the micrometer of the tangent screw on the stem, also that of the flange, are adjusted to their respective zeros.

"Now it may, and as a matter of fact does, occur with some trains of wheels that those on the removable order will not properly engage with those that are permanent. In this case the worm wheel may be partially rotated until the wheels gear, but in like manner to the instrument previously detailed, the future readings of the micrometer must be taken from the line at which it stands when so adjusted with reference to the divisions.

"Unless these primary details are arranged there can be no further move, and no movement must be given to the flange, which, being at zero, the eccentric cutter also at center, in fact, all the instrument centered, there will be only a dot produced on rotation.

"Let us now adjust the two eccentrics—viz., the flange and the eccentric cutter—and upon rotating the instrument it will be shown that the wheels are simultaneously moved on their respective axes. This results in the eccentric cutter revolving in either direction, that chosen depending on the carrier wheel employed."

If eccentricity be given to either the flange or eccentric cutter only, the figure cut will be a plain circle only, the radius of the same being equal to the eccentricity. If both are moved, the tool will trace a series of loops, the character of which will depend upon the amount of eccentricity given to each and the train of wheels used in conjunction with them, their direction being varied by the interposition of the second carrier wheel.

In alluding to the small eccentric cutter as capable of extending the decoration of curves or looped figures traced by the combined action of the instrument, it is also of great service in producing a second series of circles over the loops so traced. This is done by equally spacing out the pattern by consecutive circles. By aid of the divisions on the worm wheel attached to the back of the main plate, the circles are by this means taken over the same course precisely as the line traced by the complete rotation of the plate.

This particular style of decoration is not confined to simply training lines, but may be deeply cut, forming the well-known barleycorn pattern; by using right or left hand side tools, single anglo or even a wider variation may be obtained by the use of different shaped cutters. By using the drill alone a series of beads and other devices may be produced, all of which follow the same course.

The following table indicates a few of the changes that can be made in the combination of loops and circles. The column marked L signifies loops; that marked A is the first wheel on the removable arbor, while B refers to second wheel on same. A, gearing with the 40-wheel on the eccentric cutter, the second wheel of the pair engaging with the 32 on arbor running on stud. L. of course, representing the number of loops made in each revolution.

L	A	B	L	A	B
2	32	48	8	32	36
3	48	48	9	60	40
4	48	36	10	40	36
5	60	30	11	44	36
6	60	32	12	32	40
7	42	36			

This table might be extended indefinitely, and as many loops as may be desired can be obtained by a proper manipulation of the wheels. The table, however, is quite sufficient for most purposes.

I need not say to the readers that the attachments described in these papers are ample for the formation of almost any ornamentation required that can be executed upon the lathe, and while there are many other attachments that are sometimes employed for lathe work, it would extend these papers beyond reasonable limits to discuss them here. I may, however, take some of them up in single papers hereafter if the subject proves of sufficient interest. Before closing, however, I must say a few words concerning the subject of swash turning. This kind of turning was, at one time, very much in demand. It consists of having all the members on the spindle or newel post to be on the rake of the stairs, or other structure. It is generally turned on a lathe that is fitted up with oscillating centers, in the same manner as described in the November, 1900, number of *Carpentry and Building*. The material to be turned moves to and fro in the direction of its length each revolution, the distance moved being just enough to form the proper rake on the baluster or spindle being turned. The movement is regulated by a swash plate or disk, which is attached to the tail block of the lathe and is adjustable for any angle. The mandrel of the lathe is pressed against the end of the material by a spring, as described in a previous paper, and an attachment is screwed on the tail center, having a small wheel attached to the arm that travels around the swash plate and which is kept in place on the plate by the pressure of the spring at the head block. The operation is simple, and turnings of this kind—particularly in stone—are often pleasing to the eye.

A patent was taken out some years ago, in Washington, for a new machine where the tool oscillated instead of the material, but I have been unable to get a drawing or description of the tool or I would have reproduced it in these pages.

I now conclude these papers, but, as before stated, I may, from time to time, offer a few descriptions of other lathe attachments and the manner of using them; also, improved methods of executing difficult work. The subject is by no means exhausted, but what has been placed before the readers of *Carpentry and Building* is thought to be quite enough for the present.

Color in Brick.

When a brick is selected for its color it is desirable, of course, that it should retain its color in the work—either unchanged or else only softened by age and exposure, says a writer in the *Architectural Review*. Dark colored bricks can in general stand some stains without detracting much from the appearance of the work, but light bricks which have turned green or greenish yellow and then a dirty gray, or which are so porous that dust and soot literally wash into them at every rain, soon present an appearance of faded finery which is far from pleasing, regardless of any excellence in the design and original color scheme.

With the exception of long time tests, the best guide to the selection of a bright colored brick which will not change seems to be the degree to which the brick is burned. If in order to get the color desired the brickmaker has to burn off his kiln while the bricks are still far short of vitrification, it is almost certain that they will become discolored in the work. The more nearly vitrified the brick the more permanent is its color likely to be. Fire flashed bricks of all shades seem to be quite permanent, which is probably due to the fact that the face in this case is practically vitrified. However, even vitrification may not always be a sure preventive of discoloration; though the writer has never seen a vitrified brick change color himself, he is informed that such cases are on record and well authenticated. On the other hand, many bricks which are not vitrified are very permanent in their coloring.

The only safe rule is to use no brick for a large and important building which has not demonstrated its permanence by long time tests; let the new bricks as they come on the market be tried in small buildings, and thus compelled to demonstrate their merits at the least cost to the consumer.

When it comes to durability there can be no doubt of the value of vitrification. If a brick is perfectly impervious, not only will dust and soot wash off instead of into it, but frost can have no effect on it, and the chemical agencies of the atmosphere can destroy it only by infinitesimal degrees, if at all. It is probable that there is considerable merit in some of the methods for rendering brick work impervious by depositing an insoluble substance in the pores after the wall is completed. Where this does not change the color it is worthy of trial, if impervious bricks of the right shade are not obtainable.

Many of the softer building stones stain bricks very badly when used for sills, lintels and trimmings. Where this cannot be cured by cutting drips on the stones, such stone should not be used except with impervious bricks. If the desired architectural effect cannot be obtained by the use of materials which will make it permanent, some other effect should be sought.

WHAT BUILDERS ARE DOING.

THE reports which have come to hand from various sections of the country indicate continued activity in the building trades, in some instances upon a scale which breaks all records for corresponding periods. The increase in the cost of building materials seems to offer little if any check to active operations, and it is probable that the volume of building in the aggregate will exceed that of any recent year. Labor troubles are comparatively unimportant, and the outlook is for an amicable adjustment of difficulties where they now exist.

Chicago, Ill.

With the exception of the year 1892, it is probable that the 12 months of this year will witness a larger volume of business in the building line in the city of Chicago than any corresponding period in the past decade. Building of all kinds has increased to a material extent and the indications are that the expansion will continue until the close of the year. During September permits were taken out for the construction of 942 buildings, having a frontage of 14,024 feet and estimated to cost $2,914,160, this being an increase over September of last year of 31 buildings, 12,090 feet of frontage and $566,960 in cost. Carrying the comparison still further and noting the figures for September, 1899, it is seen that the improvement has been very marked.

During the nine months just past permits were taken out for the construction of 4714 building improvements, having a frontage of 132,377 feet and involving an estimated expenditure of $27,073,715. These figures compare with permits for 2465 building improvements, having a frontage of 66,583 feet and costing $10,687,960, for the corresponding nine months of last year.

Columbus, Ohio.

The contracting stone masons, plasterers and bricklayers, together with dealers in builders' supplies, recently held a meeting in the rooms of the Builders' Exchange and formed a permanent organization, to be known as the Contractors' and Material Dealers' Protective Association. The object of the body is to secure mutual benefits to all the members arising from the harmonious arrangement of their business affairs. The association is said to be the result of the recent trouble whereby one of the dealers in plasterers' supplies was boycotted for selling material to a contractor giving employment to nonunion labor. A constitution and by-laws was adopted at a meeting held October 15.

Erie, Pa.

The building situation in Erie has recently taken a decided change and the outlook for the fall and winter months is very encouraging. Ground is changing hands and architects are busy making drawings. Quite a number of buildings are being started by local contractors. Among those of most importance is the Presbyterian Church, to cost $25,000; Constable Bros. Company, contractors; Fred. Jarecki, residence, to cost $20,000, Henry Shenk, contractor; an addition to the Metric Metal Works, to cost $10,000, Kirschner Bros., contractors; an addition to the Erie Lithographing Company, to cost $4000, Wm. Ackerman, contractor. Building Inspector Henderson reports that for September 57 permits were issued. The estimated cost of new brick and stone building was $8513; of wooden building, $38,940; additions and repairs, $12,538, making a total of $60,000.

Honolulu, H. I.

Building in Honolulu has been greatly hampered recently by the shortage of materials and supplies, which has resulted from the almost stoppage of sailing transportation between the islands and San Francisco on account of the strike. The lumber fleet from the coast has, however, come in with considerable regularity. This has enabled the building of frame structures to proceed. The building records show that almost all the permits issued during September were for frame buildings. Several large buildings are, however, now under way. Among these are the new office and sales building of the Honolulu Iron Works, to cost about $12,000; the new warehouse of Lewers & Cooke, which will cost about the same; the new Waitey Building and the new Hall Building.

Indianapolis, Ind.

There has been a great deal of building going on in the city during the past season, the figures issued by Inspector Bedell showing 202 permits for building improvements for September, estimated to cost $711,907, as against 226 permits for building improvements, costing $214,863, for September of last year. The largest permits for September were for the Indianapolis Hotel Company, calling for an expenditure of $500,000, and for a brick and stone apartment house for Joseph Rink, costing $7000. There were also two permits for $5000 residences, 16 permits for dwellings costing from $2000 to $4500, 33 permits for buildings ranging in cost from $1000 to $2000, and 40 permits for cottages and structures costing less than $1000. The total building improvements for the nine months of the year up to September 30 involved an estimated expenditure of $3,274,970.

Los Angeles, Cal.

On October 1 the Los Angeles Millmen's Association voted to ignore the demand made upon them by the Wood Workers' Union for an eight-hour day with nine hours' pay, and the millmen further decided not to recognize any organization of their employees. So far the union has taken no action in return, but there is some fear that a strike will result. In the meantime building is going rapidly ahead. The September report of the Superintendent of Buildings shows a total of new work amounting to $313,947, which is nearly twice as great as the amount of new work started in September, 1900. Of the new buildings started two were brick buildings, valued at $16,000; 46 were two-story frame buildings, valued at $115,000, and 104 were one and one-half story frame buildings, valued at $116,000. There was one church started, to cost $8900, and some frame flats, to cost $27,300.

Milwaukee, Wis.

The report of the Building Inspector of Milwaukee shows September to have been a banner month so far as building operations are concerned. There were permits issued for 109 buildings, estimated to cost $761,226, as compared with permits for 113 buildings, costing $192,935, for the corresponding month of last year. From these figures it will be seen that the buildings now going up are more expensive than those of a year ago, and include a number of important structures for business purposes. Taking the figures for the nine months of the present year ending September 30, it is found that the estimated cost of the improvements was $3,957,396, as against $2,325,953 for the same period a year ago.

The last day or two of September witnessed an unusual degree of activity in the way of securing building permits, owing to the fact that the new ordinance went into effect on October 1. In the future an applicant will pay for the permit according to the cubic contents of the building, while heretofore he has had to pay according to his own estimate of the value of the building.

Pittsburgh, Pa.

There seems to be no let up in the building activity in the city of Pittsburgh, for, according to the report compiled by Superintendent J. A. A. Brown of the Bureau of Building Inspection, the total estimated cost of building improvements for which permits were granted in September makes a record which is the best for any similar month in the history of the bureau. The figures show that 389 operations were commenced in September, of which 269 were new buildings, estimated to cost $1,474,820, while those for additions, alterations and repairs bring the total amount to $1,535,580. This is an excess of 119 in the number of permits and $888,135 in the estimated cost as compared with September of last year. Of the new buildings 98 were brick, 95 brick veneer, 72 frame, two iron clad, two brick and stone and one of steel construction. New work was started in nearly every ward of the city, being about equally divided between the brick and frame and brick veneer structures. The city is showing a steady growth, and Superintendent Brown is sanguine that his prediction made early in the year to the effect that the $20,000,000 mark will be reached if not passed by January 1 is likely to be verified.

Reading, Pa.

The Builders' Exchange of Reading is in a flourishing condition and the members are taking an active interest in many matters pertaining to the material welfare of the community. At the last meeting, held early in October, a copy of an ordinance in force in Philadelphia and Lancaster, providing for the protection of subcontractors when furnishing material and labor to contractors, was read and brought out an interesting discussion. It was decided to make an effort to have the local council pass a silimar ordinance for the city.

San Francisco, Cal.

The big strike of teamsters, longshoremen, stevedores, sailors and the affiliated labor unions which has been going on in the city for more than two months, was settled by a compromise on October 1.

The proposed new building code of the city which has been drafted by the Board of Public Works is now being sharply criticised by the architects, and the San Francisco chapter of the American Institute of Architects has protested against the adoption of the code.

St. Louis, Mo.

The building situation in St. Louis has again assumed an activity that was not altogether unexpected by observers who have closely watched developments during the past few months. There is an active demand for detached houses renting from $25 to $35 per month which exceeds anything heretofore known, and it is therefore expected that the construction of dwellings of this class will be on a large scale. Contracts have just been placed for miles and miles of street, alley and sewer construction, preparatory to what may be designated as a new St. Louis. Charter amendments will be voted upon during the month of October, and it is safe to assume that the passage of amendments by vote of the people will result in turning what is now a barren waste into the semblance of a growing city.

The labor problem is still serious, and while there are good mechanics arriving in St. Louis every day, there is still a dearth of first-class workmen in all branches, more particularly carpenters, plasterers, plumbers, steam fitters and sheet metal men.

An idea of the volume of building operations now in progress may be gathered from the records of the Building Department, which show that for September of the present year there were 88 permits issued for brick buildings, estimated to cost $417,619; 71 permits for additions, repairs and alterations, costing $95,543; together with 126 permits for frame buildings, to cost $23,321, and 43 permits for additions, repairs and alterations, costing $5808, making a grand total of $542,291, as against building improvements costing $275,086 in the corresponding month of last year.

SOME PRACTICAL SUGGESTIONS FOR FARM BUILDINGS.

THOSE of our readers who have considered the question of farm buildings, more particularly as regards their arrangement and general location, are likely to find much that is of interest and value in a Bulletin issued by the United States Department of Agriculture, under the title of "Practical Suggestions for Farm Buildings." It is known as "Farmers' Bulletin No. 126," and has been brought out to meet a well defined demand for information on the subject, and contains plans and specifications for inexpensive farm houses and barns, together with a number of suggestions relating thereto, which, it is thought, will prove of assistance to a large class of people scattered throughout the agricultural districts of the country. One of the first points considered is the location of the buildings, which should be on dry, well drained soil, and not far from a strip of timber, or at least in near proximity to a few fine shade trees.

The plans show two houses, the first of which has on the main floor a parlor, living room, kitchen and one bedroom, while on the second floor are three bedrooms. This house is estimated to cost $1100, and in connection with it are given two bills of materials, the first providing only for the main building and for a style suitable only to the extreme southern portion of the country. The second design provides for a somewhat more commodious house and one capable of being enlarged eventually, if so desired. The first-floor plan shows a living room, kitchen and two bedrooms, while the second floor completed gives a hall, two bedrooms, a bathroom and what is designated as a garret or storeroom. A single chimney with two flues is so placed as to make it possible to have a stove in each of the rooms on the first floor, while a large heater placed in the hall on the second floor will give sufficient heat for those rooms. A bill of materials is given for the house and shows the cost to slightly exceed $1000. The house is susceptible of a number of improvements and additions, and comments are given showing how the changes should be made to advantage.

Suggestions for Doing the Work.

In the description of the construction of the house the country carpenter and builder will find specific directions for doing the work to the best advantage, and illustrations show many of the features of framing, such as the method of supporting floor joist, the framing of the corners of the building, the cross bridging of the floor joist, the cornice construction, the method of building the water table, &c.

It is suggested that all chimneys should start from the ground, and that in a properly designed house of moderate size, one, or at most two chimneys, containing several flues, will serve every purpose. If possible a flue should be provided for each stove, as much better drafts are obtained thereby. The chimney should have a solid foundation of brick or stone, and, if of brick, an extra footing course should be laid. The exterior walls should be two bricks thick and the division walls one brick thick. In case it is necessary to carry a stove pipe any distance inside a partition to reach the chimney a terra cotta thimble should be used, and where a pipe passes completely through a partition it should be protected by a ventilated thimble.

In regard to the floors it is suggested that in all but the mildest climates the first floor should be laid double, the under one being of comparatively rough material brought to an even thickness and laid diagonally, while the top floor should, if possible, be of 4-inch matched flooring, laid tight and smooth.

It is suggested that the roof should have a pitch of not less than one-third, or, better still, one-half, as the roof with the latter pitch is less likely to leak, while at the same time the outward pressure on the walls is less. Shingles are recommended as a covering for the roofs and should be laid not more than 5 inches to the weather. Shingle roofs, it is stated, should never be painted, as the paint serves merely to retain the water under the shingle and so causes the roof to decay much sooner than would be the case if it were left unpainted. If it is desired to color the shingles, they should be completely dipped in pure but thin paint, or some shingle stain prepared for the purpose. In planning a house, it is pointed out that the simplest roofs are the best.

In covering the outside of the house there are three essentials to a satisfactory wall—good sheathing, good paper and good weather boarding. Placing the sheathing diagonally is advocated, as when so placed every board is a brace which will serve to stiffen and strengthen the frame. A good quality of building paper should completely envelop the outside walls, fitting closely around all openings, and this in turn should be covered with clapboards put on with the old fashioned cut finishing nails.

In commenting upon interior finish the statement is made that the interior of a house should be almost free from paint, the kitchen floor, walls and ceiling and the bathroom walls being the only places where it should be found. The wood work should be sandpapered and one coat of filler and one of hard oil applied.

A very important portion of the work of building a farm house is the painting, for not only does the appearance of the structure depend very largely upon it, but also its durability and comfort. The best siding manufactured will deteriorate rapidly if left unpainted, posts and pillars will crack and check, and wood work will shrink and warp. The author points out that it is the poorest kind of economy to slight this part of house building, or to make use of inferior materials, and that whether the work of painting be done by the farmer himself or by contract, it will almost invariably pay him to purchase his own materials.

Mixing the Colors.

The colors may be bought dry or ground in oil, absolutely pure linseed oil being used for mixing. The first or priming coat should be mixed very thin, a cheap ocher answering every purpose for color and body. It should be worked well in and "brushed out," as the painters put it, and allowed to dry thoroughly. The sooner it can be applied after the siding is in place the better. The second coat should be somewhat thicker, of the proper color, and smoothly laid on. The third coat should be still thicker, and should not be put on until the second coat is thoroughly dry and hard. In fact, it is best, in the author's opinion, to wait six months before applying the final coat. If any cracks or checks have occurred, it will fill them, or they may be puttied, and if the materials have been of the best, it will almost enamel the wood and leave it in a condition to withstand all kinds of weather for years.

There are also given in the Bulletin two plans for barns, one of which is estimated to cost $450 and the other $275. There are bills of materials for each, together with elevations showing method of framing. Some interesting comments on bank barns, quarters for the cows, light and general sanitary arrangements are to be found among the closing pages. In regard to floors the Bulletin states that the most convenient one for a stable is of cement. The ideal floor is made of cement with movable plank floors for the stalls. In localities where the soil is of a clayey nature a natural soil will make a very satisfactory floor if the stalls are floored with planks and plank gutters provided. When hay, &c., is to be stored above the stock, as is often the case, a tight second floor of matched lumber should be provided in order to prevent the chaff from sifting down, and in any event such a floor will go a long way toward conserving warmth in the stable.

THE *Bulletin* of the New York State Department of Labor for the quarter ended June 30, 1901, just issued, says that the returns from the labor organizations in New York for the months of April, May and June show that employment was better than it has been in any of these months for the past five years. Only 2.3 per cent. of unionists were idle in that quarter, as compared with 9.4 per cent. in 1900, and 3.7 in 1899. It was the lowest percentage hitherto recorded by the Bureau of Labor Statistics. The improvement in the condition of the labor market was very general, extending to nearly all industries except the printing business.

Small Power for Carpenter Shops.

For a long time past the question of small power for carpenter shops and wood working establishments of moderate equipment has been one of unusual interest to readers of this journal, and records of experience which have from time to time been presented have attracted more than ordinary attention on the part of carpenters, builders and contractors. In all parts of the country there are shops where a motor of small power is required to operate a few machines and where the expense of operation must necessarily be kept at a low point. Experience seems to have shown that engines using oil, gas or gasoline as a fuel are well adapted for this purpose, and as showing what may be accomplished by the use of a small power engine in running the equipment of a carpenter shop, we present the following relative to the establishment of N. F. Harding, a carpenter and builder at Medfield, Mass. We also show in Fig. 1 a partial longitudinal section of the shop, and in Fig. 2 a plan of the main floor, indicating the position of the various machines and their connections with the engine. In the elevation, E represents the engine, C a circular saw table, S a scroll saw, M an irregular molding machine, L a lathe, G a grindstone and P a pump. The shop equipment is operated by a 4 horse-power Shipman engine using oil as a fuel, and in relating his experience with this power Mr. Harding says:

I run a circular saw, cutting 2-inch plank, and a scroll saw on 2-inch bracket stuff at the same time, with ease, and can cut through 5 inches of oak without any trouble whatever. I have belted to my engine from the main shaft a scroll saw which will take stuff 6 inches thick;a wood turning lathe about 4 feet in length, an emery grinder, a small circular saw and molding machine, also a countershaft to the story below. From this counter I run a long horizontal belt to a circular saw countershaft, and from the latter to the saw table I can easily run an 18-inch cutting off saw or a 14-inch rip saw. From the main countershaft I also run a pump with 3-inch cylinder and a grindstone, the connections being as shown in the sketch. I can run my circular saw, operating on a 2-inch plank, and any two or three small machines at the same time, or the circular saw and a large scroll saw, which is a Beach No. 4, together, which I have often done. Another point that may be of interest is that when I have a small job, such, for instance, as getting out a white oak outside threshold, I can get up steam, do the sawing, which takes 5 or 6 inches of saw cut, shut down and clean up the engine in 30 minutes, and without using over three quarts of oil. In order to do the work by hand it would require several hours' time and hard work at that.

After nine years of use my engine works as well as when first set up, and after 15 minutes' time in starting and oiling it, is ready to run four or five hours without further attention, being automatic in its fuel and water supply, keeping up a full head of steam whether using one or several machines, or running idle. All this with an expenditure of 1 gallon of oil per hour, or less, according to the amount of work done, for which the fuel and water supply, steam and speed are automatically regulated.

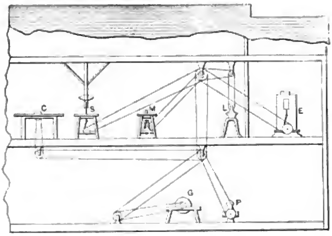


Fig. 1.—Partial Elevation Showing Belt Connections.

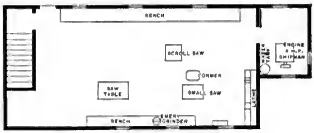


Fig. 2.—Plan of Main Floor of Shop, Showing Relative Position of the Various Machines.

Small Power for Carpenter Shops.

New Publications.

SCHOOL ARCHITECTURE. By Edmund M. Wheelwright. Size 7½ x 10½ inches; 350 pages; illustrated by 250 engravings; bound in heavy board covers. Published by Rogers & Manson. Price, $5, delivered.

This work has been prepared by one who has had a wide experience in the designing and construction of schools and is generally regarded as an authority on the question of school architecture. It is in effect a general treatise for the use of those interested in the construction of modern school buildings, and within the covers may be found typical examples of schools in most of the countries in which public education is well developed. In preparing the matter the author states that he has sought to keep within the province of the architect, and not to trespass upon that of the educator or of the engineering, sanitary or hygienic expert. His object has been to compile a compact handbook useful for those interested in the subject, and he has in most cases avoided detailed descriptions of buildings, owing to the fact that the plans and other illustrations presented would seem to furnish all necessary data.

The basis of the work was a series of articles by the author which appeared in the *Brick Builder* a few years ago, the success of which suggested putting the matter in book form. The original material has been recast and the scope of the subject greatly expanded. It is comprised in 12 chapters, the first of which deals with the general requirements and features of schools. The second takes up the subject of elementary schools of Germany, Austria, Switzerland and France, followed by those of Scandinavian countries, as well as of England and the United States. In Chapter VI the author makes a comparison of the leading features of elementary schools, after which he considers the development of secondary schools of Northern Europe and England, as well as of his own country.

A feature of the book which will appeal very strongly to a large class at the present day is the question of manual training, to which an entire chapter has been devoted. Several of the leading schools where manual training is taught are described at considerable length, views being presented of the interior of a number of the departments, and a list given of the tools with which the shops are provided. Special reference is made to the St. Louis, Toledo and Cambridge manual training schools, as well as to the Mechanic Arts High School of Boston. The chapter which follows deals with the subject of training schools for teachers, while Chapter XI gives attention to the heating, ventilation and sanitation of school houses. The last chapter in the work presents specifications for an American school which will be found of special interest and value to architects and builders.

While the details of school construction are considered at some length, the information is so handled as to be confined within the limits of a convenient handbook and made readily accessible by an unusually complete index alphabetically arranged. The work as a whole is a valuable contribution to the literature of school house architecture and construction, and should find a place in the library of every architect and builder who is interested in the subject.

HOW TO FRAME HOUSES. By Owen B. Maginnis. Size 7½ x 10½ inches; 96 pages and 80 illustrations. Published by the author. Price, $1, postpaid.

This is a revised edition of a well-known work which has been before the trade for some years and shows in a comprehensive manner the various steps necessary in framing a building. The work is divided into three parts, the first of which deals with balloon framing, the second tells how to frame the timbers of a brick house, while the third is devoted to roof framing, in which are presented the best methods of laying out the work, obtaining the various cuts, &c. This part covers hip and valley roofs, pyramidal roofs, hexagonal roofs, octagonal or circular roofs, as well as roofs of irregular plan. An interesting chapter entitled "Practical Hints for Carpenters" refers to the importance of accurate measurements, gives specific directions for laying of floors, putting on hardware, nailing parts of framing together, &c. The matter has been prepared by a practical man, and put in such shape as to render it of special interest and value to carpenters, builders, journeymen and others.

Resistance of Concrete.

When certain conditions are imposed for the manufacture of concrete two very important errors are frequently made, says a writer in an exchange. First, the employment of screened stone is insisted on, although the use of unscreened stone would be preferable. Second, the proportion of the mortar is fixed independent of the spacing between the stones. Screened stones give a larger proportion of spaces than the unscreened, and consequently they require more mortar, and produce a more expensive concrete for the same volume of stones. W. A. Hawley and R. F. Krahl have recently made a series of experiments in order to determine the resistance of a concrete, according to the relations existing between the space measurement and the quantity of mortar. In these experiments the proportion of spaces filled was, 125, 100 and 75 per cent. By increasing the proportion of mortar by 25 per cent., the crushing point was increased by 53 per cent. and the breaking point by 15 per cent.; a decrease in the proportion of mortar brought about a diminution in these two resistances of 21 and 35 per cent. respectively. In practical work the most economical form is that having a proportion of mortar equal to 125 per cent.; because, by an increase of 14 per cent. on the net cost an increase in resistance of 33 per cent. is obtained; while by a 14 per cent. diminution on the net cost a decrease in resistance of 30 per cent. is brought about.

Aberdeen Architects and the Building Trades.

Advices from abroad state that the recent action of the Aberdeen architects has created considerable interest among the employers of the various branches of the building trades. Some time ago they issued notices to the effect that, in order to protect their interests and to prevent persons who were not qualified architects from engaging in architectural work, they would issue schedules for buildings through the recognized societies of the employers, and to no firms of individual employers who were not members of their respective trade societies. At the time this notice was issued there was no Master Slaters' Society, but a new association was formed. It was complained, however, that only a portion of the master slaters had been invited to join this society, and a second association was accordingly formed. Although not antagonistic to the architects' pro sal on the whole, the opinion was expressed by men .ers of the second association that every man in busine should have a free hand. This opinion was shared by a number of others in the building trade, and a meeting of those in favor of resisting the action of the Architects' Society was held on June 14, when there was a large attendance of those interested in the building trade. It was pointed out at this meeting that there are 34 architects, or firms of architects, in Aberdeen, but of these only 14 belonged to the Society of Architects, and that the work that passed through their hands during the last two years only amounted to about one-third of the whole work done by the building trade in the city during that period. Resolutions were unanimously agreed to in condemnation of the action of the Architects' Society, and strongly disapproving of any firm or firms pledging themselves to the architects. It was decided to continue the present committee to watch over the different interests represented at the meeting.

AMONG the important building improvements in the city of Bridgeport, Conn., may be mentioned the new plant to be erected on what is known as the Southern avenue extension by the Eaton, Cole & Burnham Company of that place. We understand that they will at once erect a steel and brick foundation building, 400 feet long and 150 feet wide, together with power plant and buildings for tumbling barrels, cores, pattern storage, tapping department sorting, storage shop, &c. Contracts for the entire work have been awarded to the Berlin Construction Company of Berlin, Conn.

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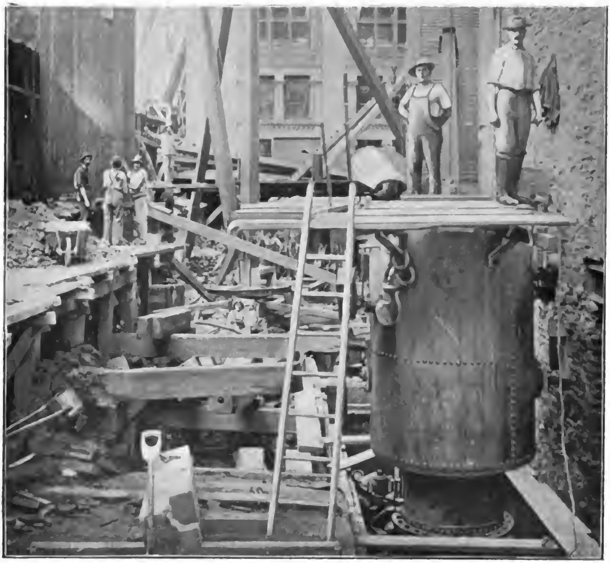
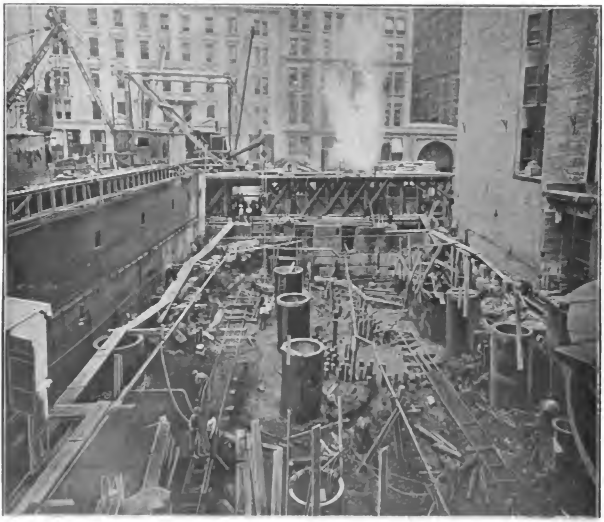
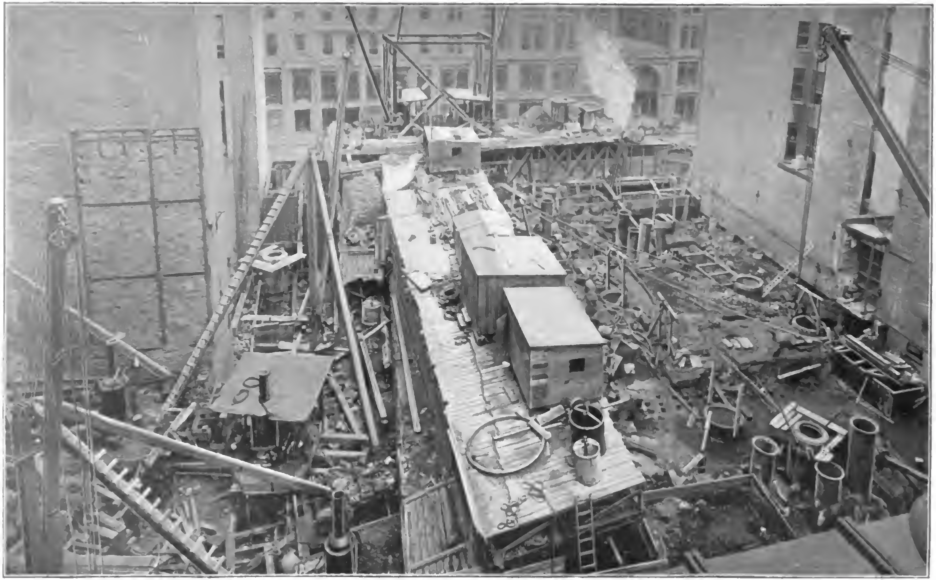


VIEW SHOWING AIR LOCK.



A PORTION OF THE EXCAVATION, LOOKING TOWARD BROAD STREET.



SINKING THE FOUNDATIONS OF THE NEW YORK STOCK EXCHANGE BUILDING.—THE EXCAVATION AS VIEWED FROM NEW STREET.

GEORGE B. POST, ARCHITECT. JOHN F. O'ROURKE, CONTRACTING ENGINEER.

SUPPLEMENT CARPENTRY AND BUILDING, NOVEMBER, 1901.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

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DECEMBER, 1901

Prize Competitions for 1902.

We desire to call the attention of our readers to the announcement found on the colored pages which accompany this issue relative to some of the more important matters which will constiute leading featnres of *Carpentry and Building* for the new year. Prominent among these are two competitions for which cash prizes are offered aggregating several hundred dollars in value. One of the contests relates to modern farm houses of moderate cost, while the other deals with floor plans for an eight-room house. These will be conducted on the same general lines as previous contests managed by this journal, but in the case of the floor plan competition the prize winners will be determined by ballots cast by the readers of the paper. Matters of this kind have always proven very popular in the past, and, as the competitions are open to all, they offer an excellent opportunity for those interested in the subject of house design to show what they can do in the direction indicated. We extend a cordial invitation to all our architectural friends to participate in these contests, and shall be glad to have them bring the matter to the attention of others likely to be interested.

Compulsory Arbitration.

Considerable interest has been shown the world over in the system of compulsory arbitration of labor disputes in vogue in New Zealand, reference to which was made in these columns some months since. It was believed in some quarters that the adoption of this system would furnish a satisfactory solution to the problem of the prevention of strikes and the adjustment of labor disputes. It seems, however, that the New Zealand system has not in all respects worked out to the satisfaction of either the employers or the employed. According to a statement made by J. Grattan Grey, a prominent New Zealander now in the United States, the system of compulsory arbitration as operating in his country is by no means a success. In fact, he says it has proved so ineffectual as to leave strong doubts as to the desirability of its continuance. The accusation is made that the members of the Board of Arbitration are in the habit of prolonging cases in order to secure the fees that are paid to them each day in which they are occupied thereon. Mr. Grey says further that the arbitrators encourage disputes, with the result of making capital timid and arresting the development of industrial enterprise. Of 90 cases brought before the Board of Arbitrators in the ten years from 1890 to 1900 only 29 were settled. Thus it would seem that the enthusiastic reports of the beneficial effects of the compulsory arbitration system in New Zealand published from time to time should not be completely relied upon. New Zealand has for many years been held up as a criterion in labor matters. The workingman there is in the ascendant, and her legislature is practically controlled by the labor vote. Yet the millennium of labor and capital still seems afar off, even from the point of view of the worker in that country.

Arbitration in the United States.

In the report of the Industrial Commission on labor disputes and arbitration, just issued, the commisson note a growing movement in favor of conciliation and arbitration between organizations of employers and employees in the United States. This system has been adopted in a number of single industries throughout the country or throughout sections where the conditions of business are generally similar. The report gives great credit to the State boards of arbitration, which are doing much toward furthering industrial peace. Representatives of employers and workingmen, however, who testified before the commission almost uniformly opposed any system of compulsory arbitration. Several State boards of arbitration also have expressed their opinion against the adoption of the principle, although the New York, Indiana, Ohio and Illinois State laws provide for compulsion in certain cases, as where life and public welfare are in danger or great inconvenience or loss is entailed on the public, as in railroad strikes.

The Hanover Bank Building.

The financial section of the city will soon have another member added to the present large colony of towering office buildings which are to be found on the lower portion of the island of Manhattan. The new structure will be erected by the Hanover National Bank on the site at the corner of Nassau and Pine streets occupied by that institution for many years past. The old buildings have now been torn down and work is being rapidly pushed forward upon the foundations of the new structure, which will cover an area about 100 x 112 feet, and rise to a hight of 21 stories, or 332 feet above the level of the curb. It will be of steel skeleton frame construction with an exterior facing of Milford granite. In the style of its architecture it will follow the generally accepted rule for tall buildings, which is a base, a shaft and a capital, the base and capital being ornamented while the shaft is left perfectly plain. Architect James B. Baker has given very careful attention to the working out of the details, and the result is what will probably be the most pretentious building of the kind in New York City. The treatment of the exterior involves the decoration of the upper part of the structure with a series of Greek columns having highly ornate capitals and an elaborate cornice, the angularity of the average sky scraper being avoided by rounding the edges. Of course it has been necessary to some extent to exaggerate the detail of the upper portion of the building, owing to the distance from which it is viewed, while the base being close to the street and therefore to the eye of the beholder, is more studied and finer in its general effects. The building will be fitted with ten elevators, five of which will be express and five local to the eleventh floor only. The Hanover Bank will occupy the first story as well as the two upper floors, one of the latter being utilized for kitchens, dining rooms, recreation rooms, &c., for the use of the bank clerks. These two floors will be in direct connection with the bank itself by means of a private elevator. The remaining portion of the building will be devoted to business offices, and will be divided to suit future tenants. The basement will be occupied by a safe deposit company, and will contain what is said to be the largest and strongest vault ever constructed in the city, a feature being the new form of circular doors. Special attention will also be given to the heating, lighting, ventilating and plumbing systems.

The contractor for the new structure is Charles T. Wills, who is also erecting the new building for the New York Stock Exchange, reference to the foundations of which was made in our issue for last month.

Electrical Heating.

The time when an electric wire can be run into a building and connected with an apparatus for heating the various rooms it may contain depends entirely upon how soon the cost of producing electricity can be brought down to a level at which it can compete with other methods of heating. At a recent exhibition of the Street Railway Association in Madison Square Garden, New York, where several manufacturers displayed the newest things in electrical heaters adapted for street car use, one manufacturer announced that he had in course of completion an electrical heater adapted for heating rooms. This heater is intended to be used very much the same as a direct-indirect steam or hot water radiator. It is so constructed that its use is practicable wherever there is an electric lighting system, it being necessary merely to disconnect the wires from the ordinary illuminating globe and connect them with the electric heater. This device is designed to be placed in the window in such a way that on raising the window slightly a current of air will pass over the electric heater and flow into the building warm enough to maintain a comfortable temperature. It would seem that in a room having several windows one of the heaters would be necessary for each window, should the temperature drop to a sharp cold. These heaters, however, are designed only for use in moderately cold weather, and are not intended to supplant the usual heating apparatus when severe winter weather sets in.

Central Station Heating.

If a building cannot yet be effectively and economically heated by pressing a button, a very substantial convenience in heating homes has been made available from electrical power stations. To generate electricity power is necessary, and this has been derived from the generation and use of steam in the engines that run the dynamos. Instead of allowing the exhaust steam from these engines to go to waste in the atmosphere, as was done in the past, it has been gathered in as one of the by-products of the power station, and saved in order to reduce the cost of producing electricity. A number of cities and towns throughout the country at the present time have street heating systems which derive their heat from electrical power stations. In some cases the exhaust steam direct from the engines is being circulated along the streets, and through the mains and branches is carried into the residences and buildings of customers. Another method of using this steam is for heating water, which is similarly circulated through street mains and carried into the buildings of customers for heating purposes. The latter method seems to be gaining in popularity, as being more economical than steam heating. It is also found that there is less difficulty from expansion and contraction in the street mains and the branches leading from them. The customer, moreover, is not only furnished with heat without trouble to himself, but gets it in the degree suitable to the weather. Through expert supervision of the water heaters at the power station the water is circulated at a higher temperature when the weather is cold and at a lower temperature during mild spells. In consequence, the customer has no occasion to open or close a valve, but his house is heated to a proper degree under all changes of the weather. In view of the convenience derived from such central heating systems the desire for direct electrical heating loses much of its urgency.

Labor in Japan.

According to United States Consul-General Bellows at Yokohama there is wide complaint in Japan of the lack of skilled labor. This want, it is claimed, is a serious hindrance to the introduction of foreign capital, so earnestly desired by progressive Japanese. While wages are low in Japan, it is pointed out by the local advocates of skilled labor that there is a great difference, as compared with Europe and America, as to the amount and quality of the work produced by the present poorly paid Japanese workmen. If this is taken into consideration, it is found that wages are relatively higher in Japan than in Europe and America. At present the condition of labor is deplorable. According to a native writer on social economics, children under ten years of age are largely employed in factories, and both men and women are generally made to work for injuriously excessive hours. Fourteen, 16 and even 18 hours a day are often worked in factories. There are more than 320 working days in the year, and yet the pay for this labor is infinitesimal, the amount in many cases being not more than \$5 or \$6 a month for from 14 to 17 hours' work a day. In many factories no provision whatever is made for suitable ventilation or sanitary facilities. Japan has no laws for the protection of labor or the restricting of the employment of women and children. But the subject is now being considerably discussed, and it is believed that some legislation of the kind will be introduced at the next session of the Japanese Diet. It is interesting to note in this connection that the agitation which has arisen for the betterment of the conditions of the Japanese laborer comes principally from the educated and professional classes, rather than from the laborers themselves.

Recommendations Adopted by American Institute of Architects.

At their recent convention in Buffalo the American Institute of Architects adopted the following recommendations: That Congress be urged to provide for a United States supervising architect who shall have charge of all Government buildings and who shall act as the representative of the Government in all matters relating to buildings; that the actual designing and supervision of Government buildings be given to architects in the open field, as is now done for certain buildings under the Tarsney act; that the institute take steps for a World's Congress of Architects, to be held at the Louisiana Purchase Exposition at St. Louis in 1903; that after 1902 all admissions to membership in the association shall be by examination, the applicants to take an examination similar to that of colleges which award a diploma in architecture, the association to grant a similar diploma; that the pay of all experts employed in heating, ventilating and electrical engineering shall not be taken from the fees of the supervising architect, but shall be paid by the owner.

Officers of Lumber Trade Association.

At the annual meeting of the New York Lumber Trade Association, held October 16, the following officers were elected:

President, Richard S. White.
First Vice-President, Albro J. Newton.
Second Vice-President, W. P. Youngs.
Treasurer, Charles E. Tell.

THE trustees of the New York Public Library a short time since invited three architectural firms in the city to carry out the work of designing and supervising the construction of the 42 branch libraries, which are to be established in New York City through the generosity of Andrew Carnegie. The firms invited were McKim, Mead & White, Carrere & Hastings and Babb, Cook & Willard.

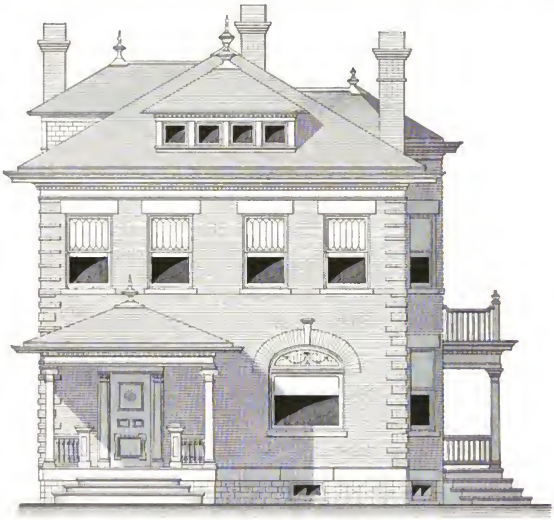
BRICK RESIDENCE IN A CINCINNATI SUBURB.

THE double supplemental plate which accompanies this issue represents a brick residence lately erected in Clifton, one of the many beautiful suburbs of which the city of Cincinnati can boast; the interior view showing the main stairs as they appear to a person standing at the outer entrance to the reception hall. The half-tone engravings are direct reproductions from photographs taken especially for the purpose, and give an excellent idea of the general treatment of the design both within and without. The ample porches at the front and rear are noticeable features of the exterior, and, as the architects put it, "make life pleasant during the summer season and afford much protection in inclement weather." The materials used in the construction of this residence are red pressed brick in connection with buff Rock Castle stone trimmings. The underpinning is of deep blue limestone with foundation walls resting on a bed of cement concrete. The roofs are covered with extra heavy Virginia black slate, the main roof having 12 x 20 inch slate, and the dormers 6 x 12 inch slate.

The first story is divided into parlor, dining room and kitchen, with main or stair hall of sufficient size to be used as a reception room. The parlor communicates with the dining room and front hall through sliding doors, while the kitchen is so located that the front door may be reached from it without passing through other rooms. The disposition of the stairs is such as to give ready access from the kitchen to the cellar and second floor without the necessity of using the main flight. On the second floor are three sleeping rooms of ample dimensions with commodious closets, a bathroom and linen closet. A feature which differs somewhat from the general run of second-floor plans and which will commend itself as a most convenient arrangement is found in connection with the bathroom and the placing of the water closet. In this case the latter is accessible even though the bathroom is in use. The plumbing fixtures include washstand with decorated bowl of gray Knoxville marble, Murkle Bros. siphon jet closet with combination tank, enameled iron bathtub and nickel plated fixtures, with exposed piping.

The interior finish is thoroughly in keeping with a house of this character, and the appointments are first-class throughout. In the reception hall the finish is in birch, the floor being of quartered oak. The parlor is finished in white enamel, with a floor border of maple, while the dining room has a floor border of cherry.

The residence here shown is pleasantly located on Whitfield avenue, in Clifton, and was erected for Frederic Closs in accordance with plans drawn by Architects Dornette & Sheppard of Cincinnati, Ohio.



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

Brick Residence in a Cincinnati Suburb.—Dornette & Sheppard, Architects, Cincinnati, Ohio.

Tile Roofs in China.

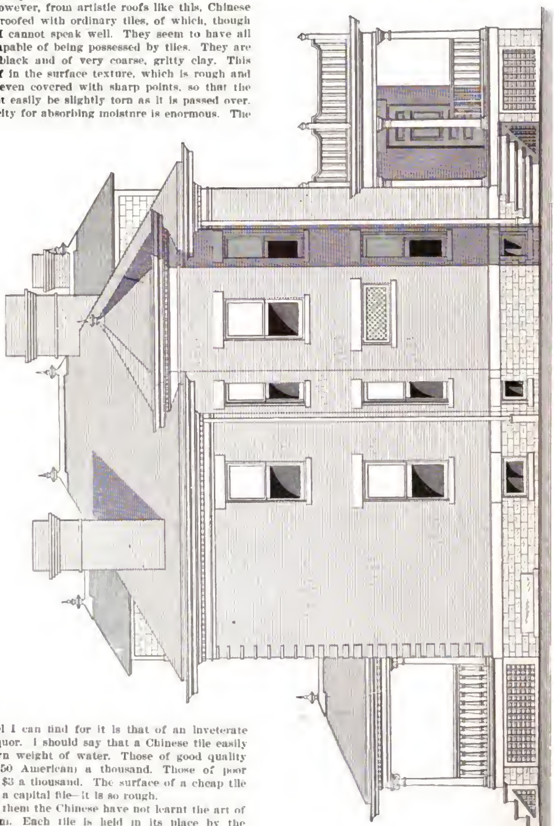
In an article dealing with the general method of roof construction followed in China, C. E. Darwent, in the *Slate Trade Gazette*, presents some comments which may not be without interest to readers in this country. Among other things, he says:

The Chinese have no slates; had slates existed in the country no doubt the Celestials would have found out the use of them, as they have of every other natural product of their astonishing, rich country. Failing slates they early took to roofing their houses with tiles. These are used universally, except in the poorer class of houses, which are thatched with straw or reeds; or, in the case of the huts of the huge beggar population, with anything that comes handy. I have seen a roof made of an enameled iron advertisement of Nestle's milk, some straw, old tarpaulin, a side of a Gossage's soap box, the lid of a kerosene oil tin and some sods. A patent for that roof is about to be applied for!

Apart, however, from artistic roofs like this, Chinese houses are roofed with ordinary tiles, of which, though no expert, I cannot speak well. They seem to have all the vices capable of being possessed by tiles. They are invariably black and of very coarse, gritty clay. This shows itself in the surface texture, which is rough and sometimes even covered with sharp points, so that the finger might easily be slightly torn as it is passed over. Their capacity for absorbing moisture is enormous. The only parallel I can find for it is that of an inveterate toper for liquor. I should say that a Chinese tile easily holds its own weight of water. Those of good quality cost $5 ($2.50 American) a thousand. Those of poor quality cost $3 a thousand. The surface of a cheap tile would make a capital file—it is so rough.

In laying them the Chinese have not learnt the art of pegging them. Each tile is held in its place by the weight of the tile above it. It can easily be seen that to enable the tiles to keep their place at all they must overlap one another very considerably. They do so, in fact, to such an extent that each tile overlaps quite three-quarters of the one below it. The result of the extreme porosity of tiles and of this want of pegging is disastrous for the roof in two directions. First, it adds enormously to the weight of the roof, and in the case of a large building it is normally great, and when rain falls heavily, as it can do in China, the weight is something terrible, often leading to the complete collapse of the building.

When Shanghai was first founded Chinese tiles had to be employed for foreign houses; but the use of galvanized roofing—cheap, clean, fast, secure—is becoming universal for such houses. This may be grievous news for the master slaters of Great Britain, but truth must out. I am writing this shielded from a heavy rain by a galvanized roof. Another consequence of the loose character of Chinese tiles is that Chinese roofs are in a chronic state of disrepair. They never look tidy, as cats, in their nightly gambols, displace the tiles. The roof is a favorite place for the Chinaman in hot weather for fresh air; he climbs the roof to gain a vantage point to witness fires, and every step across a roof displaces a tile or two. If a typhoon does manage to get under a tile it plays havoc with the roof, and from one cause or another these Chinese roofs always look untidy. The



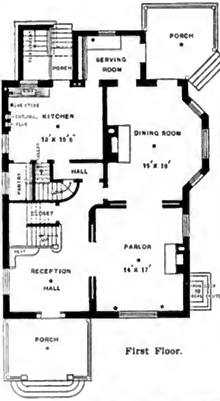
Brick Residence in a Cincinnati Suburb.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

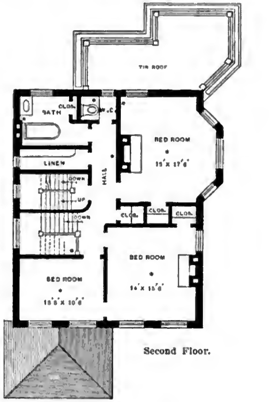
country ought to be a paradise for that *bête noir* of the slater—viz., the "jobbing bricklayer." But a roof must show daylight through it before the average Chinaman will have it mended. He is like the Irishman with whom a traveler remonstrated one day on the state of his roof. "Why don't you mend it?" "I can't," said Pat, "it's wet." "Why, then, don't you do it in dry weather?" "Sure," said Pat, "what's the good when it's dry?" Only the Chinese have the pull over Pat as to weather. In this climate, with its months of splendid dry weather, roofing is not of the importance that it is in Britain.

I have not seen any tiles shaped like the English red pantiles. They are all simply concave, and are laid one on the other with the concave side uppermost. They are laid in lines with a gutter between each line. The bottom tile of each row is slightly raised by a closed end, upon which appear designs, beautifully chased, of flowers, or gods and goddesses, and these give a pretty finish to the roof. As to the laying of tiles a Chinese contractor tells me that a workman will lay about half a faung a day, a faung being 10 feet square. This means that he lays 200 tiles a day. Wages are low. A man building is constructed as the Temple at Jerusalem seems to have been—in a series of open courts, alternating with covered buildings.

The native banks are very strong and solid institutions. The Chinese have had our banking facilities for ages, such as drafts, bills, &c., and you can send money to any part of the empire by them. That you can do so is proved by the fact that missionaries in the most outlandish places get their salaries regularly.

In conclusion I may add that while my description of ordinary Chinese roofs is, I think, correct, I must, in justice, say that when all the lines of tiles are in order they look well; while the roofs of the temples are frequently very beautiful. On quite ordinary temples and guild houses the ridge of the roof has the most attention lavished on it. The ridge of the Guild House of the Shansi bankers in Shanghai is made of exquisitely colored porcelain. The symbol of the sun is in the center with a sacred dragon at each side. Such roofs, with their yellow, red and blue tiles, with their quaint dragons and monsters and their graceful upturned gables, are as fine as any in the world; while one of the great temples





Brick Residence in a Cincinnati Suburb.—Floor Plans—Scale, 1-16 Inch to the Foot.

earns 30 or 40 cents a day (15 or 20 cents American), according to circumstances.

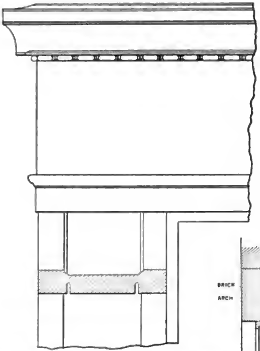
In a cheaper style of roofs the tiles are set up edgeways all along the ridge. This, of course, adds enormously to the weight.

The Guild House of the Shansi bankers is one of the best Chinese buildings in Shanghai. The front of the building is very fine, the stones forming a cut diamond surface, and the masonry is so good that you can hardly see the mortar between the stones. The building looks as if it were heavy and were cut out of one solid block of stone. The carving over the central door is very fine, consisting of gods, &c.

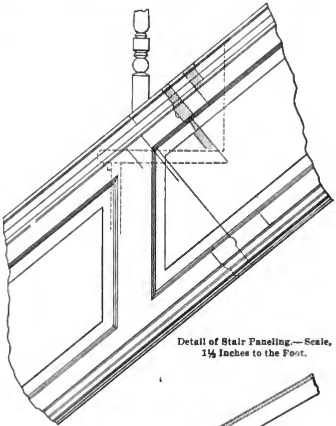
Most of the native banks are run by men from the province of Shansi, which is up north, and is the province now decimated by famine. Somehow they have collared the native banking business, and they seem great at finance. Every Viceroy and Provincial Governor has a Shansi accountant. Here, of course, we have a number of them, who hold their meetings in the Guild House—trade meetings and religious services. Then, also, the building serves to store up dead Chinamen from the provinces until they can be sent to Shansi. A Chinaman always wants to be buried in his ancestral town or village. There is a big business here in freightage on corpses sent to their last ancestral home. The whole in Pekin, with its roof of delicious sky blue tiles, is one of the sights of the world—that is, if the allied troops, during their civilizing (?) campaign in that city, have not totally destroyed it and robbed the world of one of the choicest productions of human art.

The Use of Roofing Tile Abroad.

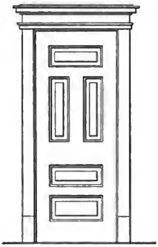
In describing the manner in which roofing tiles were used in Greece and Rome, a writer in an exchange states that flat tiles with raised edges extended from rafter to rafter, the upper end having a rib which entered a groove formed on the under side of the tile placed above it. After these were laid the joints above the rafters were covered with other tiles, each formed like the half of the frustrum of a hollow cone, so that they were able to lap upon each other, their edges lying snugly to flat tiles on the roof. The end of these ridges was terminated with an ornament. Tiles, both flat and curved, were in great demand in Roman architecture. Roofs were covered with the flat and curved tiles alternating. Tiles 2 feet square, with a foot at each angle, were used to line the thermæ, so that an air space between them and the wall should prevent the absorption of water by the latter.



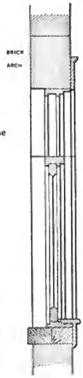
Detail of Interior Trim.—Scale, 3 Inches to the Foot.



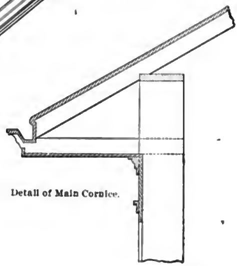
Detail of Stair Paneling.—Scale, 1½ Inches to the Foot.



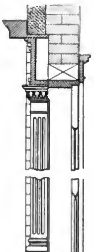
Elevation of Interior Door.



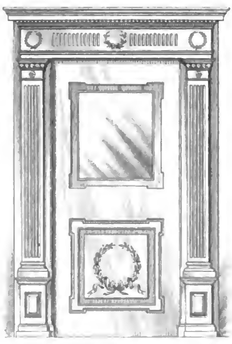
Vertical Section through Arched Window in First Story.—Scale, ¾ Inch to the Foot.



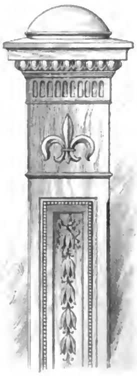
Detail of Main Cornice.



Section of Front Door.—Scale, ½ Inch to the Foot.



Elevation of Front Door.—Scale, ¾ Inch to the Foot.



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

Miscellaneous Constructive Details of Brick Residence in a Cincinnati Suburb.

DETERMINING THE STRESSES IN ROOF TRUSSES.—IV.

By F. E. KIDDER, Consulting Architect.

THE stresses in the truss shown in Figs. 10 to 12 inclusive can be computed by Rules 1 to 10, given on page 187 of the issue of this journal for July, 1900, and it will be good practice for the student to make the computations and compare them with the stresses obtained by the graphic method. Fig. 13 gives the necessary data for making the computation. By the graphic method it is impossible to determine the stresses below 100 pounds with much accuracy, as with a scale of 4000 pounds to the inch 100 pounds is a very small division, and if a scale of 1000 pounds to the inch is used it makes the lines so long that it is difficult to get them absolutely parallel to the lines of the truss diagram. As a rule the writer uses such a scale of pounds as will make the line representing one supporting force from 3½ to 6 inches long. For roof trusses a variation of 100 pounds in the stress of any member would not affect the proportioning of the parts.

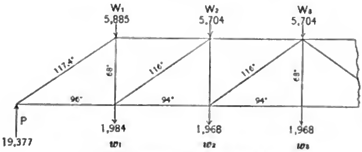


Fig. 13.—Diagram for Computing Stresses.

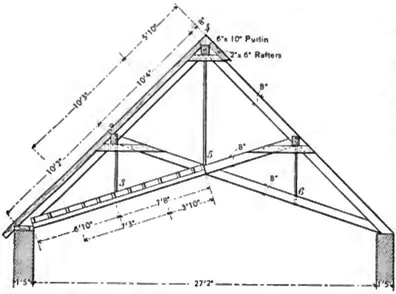


Fig. 14.—Simple Scissors Truss Where the Trusses are Placed 12 Feet on Centers.

Determining the Stresses in Roof Trusses.

Example IV.

We will next determine the stresses in a simple scissors truss, as shown in Fig. 14. This truss is intended to support a shingle roof and plastered ceiling and the weight per square foot of roof surface will be as follows:

For	Shingles.............	2½ pounds.
	Sheathing	3 pounds.
	Purlins	2 pounds.
	Rafters	2¼ pounds.
	Truss	3 pounds.
	Wind or snow.......	30 pounds.
	Total................	42¾, or say 43 pounds per square foot.

The actual weight of the ceiling would be about 12¼ pounds per square foot, but to allow for possible additional loading we will allow 16 pounds per square foot. The trusses are to be spaced 12 feet apart from centers. The roof load at joint 2 will equal

10 ft. 3 in. × 12 ft. × 43 lbs. = 5289 lbs.,

and at joint 4,

11 ft. 8 in. × 12 ft. × 43 lbs. = 6020 lbs.

The ceiling load at 3 will equal

7 ft. 3 in. × 12 ft. × 16 lbs. = 1382 lbs.,

and at joint 5,

7 ft. 8 in. × 12 ft. × 16 lbs. = 1472 lbs.

As the ceiling loads are supported by vertical rods we can assume that they are applied at the upper joints as in the previous example.

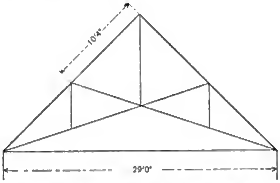


Fig. 15.—Measurements for Truss Diagram.

The necessary dimensions for drawing the truss diagram representing the center lines of the truss members are given on the diagram, Fig. 15.

In Fig. 16 is represented the truss diagram properly lettered and with the loads indicated. Each supporting force is equal to one-half of the joint loads.

In order to construct the stress diagram we first draw a vertical line, o a, Fig. 17, equal to and representing the supporting force at joint 1. A scale of 3000 pounds to the inch will be the most suitable for this diagram. Next, through *a* draw an indefinite line parallel to A D of Fig. 16 and through *o* a line parallel to O D and intersecting the first line. Letter the point of intersection *d*. Then *a d* represents the stress in the bottom of the rafter and *o d* the stress in the tie beam.

We must next complete the polygon of forces for joint 2. The first line of this polygon will be the line *d a*, already drawn. From *a* measure downward 6681 pounds, the load at 2, and letter the point thus obtained *b*. Through *b* draw a line parallel to B E, and through *d* a line parallel to D E, and letter the point of intersection *e*. The four-sided figure *d a b e d* is the polygon of forces for joint 2. The vertical rod 2 3 merely transmits the ceiling load to the rafter and cannot be represented in the stress diagram, or in other words, the stress diagram is drawn as though there were no such rod in the truss.

We must next draw the polygon of forces for joint 4. The first line of this polygon, *e b*, is already drawn. From *b* measure downward 7492 pounds, the load at 4, and letter the point thus obtained *c*. Through *c* draw a line parallel to C F, and through *e* draw a line parallel to E F, and letter the point of intersection *f*.

We now have the stress in the center rod, and for all the members to the left. The stresses in the truss members to the right will be the duplicate of those already found. If the stress diagram has been correctly drawn a horizontal line through o will bisect the vertical line *e f*. Measuring the lines of the stress diagram we obtain the figures given on the lines of the diagram, which are the stresses in the corresponding truss members in pounds. The total strain in the center rod will be 13,850 pounds plus the load at 5 (1472), or 15,332 pounds. The stress in each of the other two vertical rods will be merely the ceiling load at 3 or 6, or 1392 pounds.

This method of determining the stresses may be applied to all symmetrical trusses in which the ceiling loads are transmitted to the top of the truss by vertical rods. When the rods are not vertical, but inclined, the ceiling loads cannot be added to the roof loads, and it is necessary to show the ceiling loads separately in the stress diagram. The stresses in any true truss may be determined by means of stress diagrams, but as the trusses become elaborate the method of drawing the stress diagram becomes more complicated and should not be undertaken without a thorough understanding of the subject.

Give Street and Number in Address.

The extent to which correspondents omit the number and name of the street when giving their address is the cause of no little trouble and annoyance to those receiving their communications. Many writers also appear to labor under the impression that there is only one city or town bearing the name of the place in which they live, and that therefore there can by no possibility be any mistake on the part of the recipient as to the proper address. In this they grievously err, as a casual examination of a United States Postal Guide will quickly show. As indicating in some measure the extent to which this form of annoyance is carried, we present below a letter from a local architect who has business dealings with builders in many cities of the Union, and who, as a consequence, is in receipt of letters from widely scattered sections. Among other things he says:

"Any one will notice from even a casual examination of the letter heads of many firms, and even of private individuals, that in perhaps the majority of cases they omit the street and number in their address. Sometimes they give the number of the room in a public building where their offices are located, but often they simply give the name of the building, with no further address except that of the city and State. Now, this may be all well enough for a citizen in their locality, but when a stranger desires to see these parties, or writes them, it is another question.

"In correspondence, usually the name of a building is a long one, and it takes a great deal of time to write it out, and one is more apt to make a mistake. For example, I correspond with parties in the 'Metropolitan Life Insurance Company Building,' also with parties in the 'Keith-Perry Building,' whereas the number and name of the street would be more simple. Or, in another case, the person lives on the corner of 'Commonwealth avenue and Washington street.'

"Now in my travels I have visited many cities, trying to find people located in some of these buildings, and while in Cincinnati a short time since, with the letter head of the kind above mentioned in my possession, I asked a policeman where such a building was located, and he directed me some six blocks away. I showed him the letter head and spent about an hour trying to find the place, and to my surprise, as well as disgust, the building I was looking for was directly across the street from the corner where I asked the policeman. Now if the street and number had been on that letter head I would not have had to ask questions, and anybody could have directed me to the street, and it is only a question of intelligence to follow up the number.

"I spoke to a gentleman yesterday about this matter, and showed him his letter head, and he replied, as everybody does, 'Why, everybody knows where the Benedict Building is.' To prove this I asked a policeman and a hotel clerk and neither of them knew where it was.

"Now you see this takes a great deal of valuable time. People should give their number and street address. It saves time in writing it out and looking it up. It seems to me that this subject is an important one, and I trust others will express their views regarding it."

Pittsburgh's New Warehouses.

Something of a departure in warehouse construction in Pittsburgh, Pa., will be inaugurated in connection with the erection of 40 warehouses now contemplated in that city. In order to make room for the improvements 40 seven-story buildings will be demolished, some of which were the first erected in that part of the city, known as "The Point." The foundations of the new warehouses will be absolutely water tight, and will extend above the street level nearly 2 feet, so that in times of flood it will be necessary for the water to rise higher than it has been for 30 years in order to get into the basements. The exterior of the buildings will be of Pompeiian brick, with terra cotta trimmings, and the structures will be seven stories in hight, so arranged that each floor may be rented separately if desired. There will be one system of sewerage throughout the 40 warehouses, and it will be so constructed that it can be shut off to prevent inflow of water when the river is high. The power will be furnished from a central station, thus avoiding separate lighting and heating plants in each building. The aim will be to construct the houses as nearly fire proof as possible, and in each will be two elevators operated by electricity. It is the expectation of those interested in the enterprise that the buildings will be made of such a character that they will be equally desirable 50 years hence.

The representatives of 28 firms handling maple flooring agreed, at a meeting recently held in Grand Rapids, Mich., to form a central company capitalized at $250-000, to handle the entire output of the mills of the association, amounting to 107,000,000 feet per annum. W. T. Oliver of Ludington, William H. White of Boyne City and Henry W. Carey of East Lake were appointed a committee to locate the headquarters of the new company.

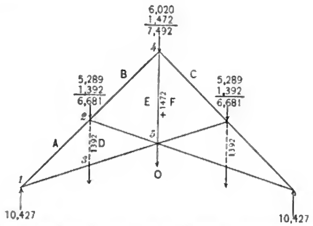


Fig. 16.—Truss Diagram Lettered and with Loads Indicated.

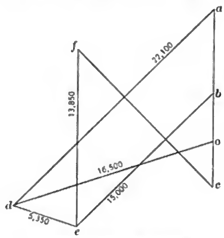


Fig. 17.—The Stress Diagram.

Determining the Stresses in Roof Trusses.

CONCRETE IN BUILDING CONSTRUCTION.

WHILE the use of concrete in substitution for masonry is constantly becoming more prevalent, there has not come to our notice an example where its use is so extensive in the construction of industrial buildings as in the instance of the new car shops which are now being built at Elizabethport, N. J., by the Central Railroad of New Jersey. With a single exception, all the buildings in this plant are being constructed with concrete walls. In the case of three buildings and a large fresh water reservoir concrete is employed in building the roof as well as the walls and foundation. The great machine shop has concrete foundations and brick walls. This is the only building of the group where the brick construction was adhered to.

Throughout the entire work a series of interesting experiments were instituted. One thing that is strikingly at variance with the ordinary practice in concrete construction is the entire exclusion of trap rock in the mixture. In various portions of the work different mixtures are employed, but they are either of cinder, furnace slag, sand and cement, or gravel, sand and cement. For the foundations and heavy work the latter composition is employed. In some of the walls the cinder mixture is used. In every instance the mixture is approximately four to one. Work on the buildings has been in progress several months, and it is not expected that those now under way will be completed much, if any, before the first of January.

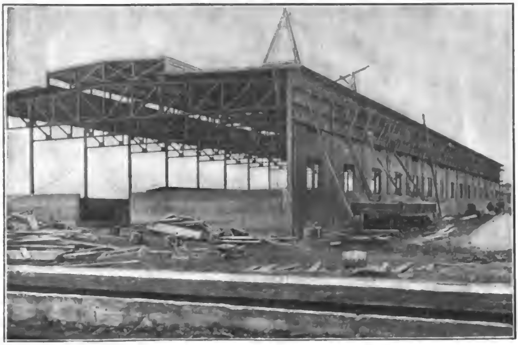


Fig. 1.—Showing Method Employed in Construction of Forge Shop.

Concrete in Building Construction.

Probably the most conspicuous portion of this undertaking is the large roundhouse, the walls of which are now approaching completion. This building is of the usual semicircular construction. It is to be 400 feet in diameter. Half of the wall is now ready for the roof; the other half is about up to the windows. This building is being constructed entirely of concrete up to the roof. The roof will be of wood, with an upper surface of tar and gravel. The concrete wall is being built 8 inches in thickness. Owing to the wide spaces between the windows the wall is considered sufficiently safe to stand without bracing, with the exception of the westerly section, which is to be permanently supported by means of timber bracings. In the construction of this building the foundations and wall up to the window line were first finished, being built in the ordinary manner by pouring the concrete into molds built of tongued and grooved pine boards. For the construction of that portion of the structure above the window sills special wooden frames were built. These were just the proper hight to extend to roof line from the finished portion of the wall, and were of sufficient width to allow for the molding of three windows with each set of frames. The window spaces were cut out of each frame. The frames were properly supported so that two stood directly opposite one another, and they stood exactly 8 inches apart. As the concrete was filled in between each pair of frames small strips were nailed along the sides of the window spaces, and thus the intervening spaces were filled in solid with the concrete mixture. The frames then remained for three or four days until the mixture hardened. Then they were removed and shifted to another portion of the wall, where the process was repeated. In this manner half a dozen sets of frames are being made to serve for the construction of the entire wall, with the exception of the west end, where a special frame with extra supports is erected. Fig. 3 shows a portion of the wall of the roundhouse constructed by means of the sectional frames, and a number of the frames are shown lying on the ground, having just been taken from the wall. Fig. 4 shows the special frame and bracing employed in the erection of the west wall. Here the concrete was hardening at the time the photograph was taken.

The pits in the roundhouse are also being constructed of concrete, and Fig. 2 shows a pair of the wooden molds preparatory to the pouring of the track beds. It will be observed that these molds are resting on solid foundations of concrete. This is about 12 inches thick, and rests on a sheet of expanded metal, which is calculated to aid in obtaining a solid bottom for the foundations. It may here be remarked that this kink is employed in connection with all foundations throughout the plant, as the grade at this point is about even with tide level and water is encountered a few feet below grade. Consequently throughout the entire work the foundations have necessarily been planned wide and flat rather than deep. In pouring the track beds long 1-inch bolts are imbedded vertically in the mixture at proper intervals, and to these the shoes holding the rails are fastened. Directly in front of the roundhouse there is a peculiar little structure which presents the appearance of a solid block of concrete 180 x 70 feet. It is of concrete—walls, roof and all. It will be used as a storage house for oils. One little sunken doorway surrounded by concrete wall is its only opening.

Looking east from the oil house the transfer table, 170 feet wide, runs in a northerly direction for 400 feet. As this is comprised entirely of a series of parallel foundations, it is constructed throughout of concrete. The also a concrete subway running through the entire length of the building, which contains frequent manholes. In this the electric wires, pipes, &c., will be carried, and the manholes allow for entrance to any point, so as to permit inspection or adjustment of the wires at will. From this will be gathered, of course, that the machinery is to be operated electrically.

In back of the machine shop the forge shop is being

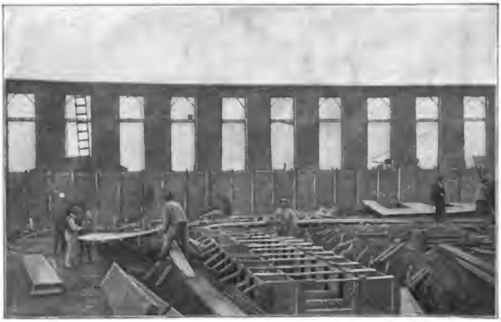


Fig. 2.—Interior of Round House. Wooden Boxes in Foreground are Molds for Concrete Track Beds.

Fig. 3.—Exterior of Round House Walls, Showing Wooden Frames Used in Construction.

Concrete in Building Construction.

pits are similar to those in the roundhouse and the same method of construction is employed.

East of the turntable the big machine, erection and boiler shop looms into view. This building is 700 feet long and 160 feet wide. As previously stated, the foundations are of concrete and the walls of brick. The structure is of steel skeleton construction. The foundation is built of a cinder-slag mixture and is 10 feet wide at the base, rising to a hight of 6 feet above grade and tapering to a width of 2 feet on top. Here commences the 12-inch brick wall. This is surmounted by a roof built of planking and tar and gravel. The foundations for the various machine tools to be installed in this building are also constructed of concrete. There is erected. This building will be 175 x 300 feet and will be built of concrete around a steel frame to the roof. The roof will be of planking, tar and gravel. The walls are 8 inches thick. This building is illustrated in Fig. 1. This engraving shows the method employed in the construction. The wooden frame, about 6 feet high, will be observed at the top of the side wall. A similar frame is on the reverse side of the wall, and the two are raised simultanously as the work advances. It will also be noted that the foundations of this building were completed to a hight of 6 feet above grade before the work on the walls was commenced.

The power house, which is represented by Fig. 5, is the only building in the entire group in which any attempt at ornamentation was made. Plain as it is, the favorable appearance of box column effect will be readily appreciated. This is another structure entirely of concrete. Floor, walls and roof are all of the cement composition. The foundations for the boilers and the

Fig. 4.—Bracing Used in Constructing West Wall of Round House.

two stories high. It is surrounded by a platform built to the hight of a car floor. The structure is 100 x 300 feet, and at the lowest point 18 feet high above the car platform. The double story portion of the building is 25 feet high above the car platform.

As soon as possible after the construction of these buildings is completed a number of others will be erected. They will include a freight car shop, a passenger car shop and a paint shop. The transfer table will be extended to 800 feet. George Hill of 150 Fifth avenue, New York, is the engineer and architect in charge of the work.

Architects for the St. Louis Fair Buildings.

In our last issue we made some reference to the Louisiana Purchase Exposition, which is to be held in St. Louis in 1903, giving in connection therewith a list of some of the more important buildings. The work of designing them has been assigned to the following architects:

Agricultural Building, Isaac S. Taylor; Manufacturers' Buildings, Nos. 1 and 2, Eames & Young; Social Economy Building, Barnett, Haynes & Barnett; Liberal Arts Buildings, Nos. 1 and 2, Carrere & Hastings; Transportation Building, Widman, Walsh & Boisselier; Education Building, Theodore C. Link; The main division of the Art Building and its two wings, Cass Gilbert; Mines and Metallurgy Building, Van Brunt & Howe; Service Building, Isaac S. Taylor; Electricity Building, Walker & Kimball; United States Government Building, J. Knox Taylor. A uniformity of eave line will be observed at a hight of 65 feet.

A NOVELTY in architecture is a building to be erected at the great Dusseldorf Exhibition for next year. The

Fig. 5.—The Power House, Built Entirely of Concrete.

Concrete in Building Construction.

engine bed are also built of concrete. The building is 175 x 22 feet and attains a hight of 25 feet. Alongside of the power house there is a storage reservoir for retaining rain water drained from all of the buildings and for use in the boilers. It is about 100 feet in diameter and is 15 feet deep, being built almost entirely underground. It is constructed of concrete, the roof included.

The last building of the series is known as the office and storehouse. This structure, too, is constructed solely of concrete, and the walls are of but 4 inches thickness. The building is irregular in shape, a portion being

building is intended to show the products of an asbestos manufacturing establishment, and is a picturesque cottage of half timber work, the panels between the timbers filled with sheets of asbestos, with sheets of cork fabric inside. Construction of such material makes a warm house.

IN Germany new houses are being supplied with floors made of compressed paper. They are soft to step on, and having no cracks of any kind harbor no dust.

BLUE PRINTING BY ELECTRIC LIGHT.

In large manufacturing establishments the short and frequently dark and cloudy days of winter are the occasion of great inconvenience and delay in the production of blue prints. A printing plant suitable for making the required number of prints in summer will be entirely inadequate for the same production in winter. Unfortunately this is a department which ordinarily cannot be worked overtime in order to make up for the loss. Suffering much on this account because of the large number of blue prints required, the General Electric Company, says H. G. Reist, some time ago tried several methods of printing by electric light. In one plan a small room was arranged with nine arc lamps, placed about 18 inches apart, suspended from the ceiling, and by a suitable arrangement of reflectors a large portion of the light was thrown downward on printing frames arranged on trucks, being the same frames which are used ordinarily for printing by sunlight. The reflectors are hinged so that the light may be thrown to the position wanted. With a rapid printing paper the time required for printing with this arrangement is from six to eight minutes.

Printing Apparatus.

Another arrangement for printing, and one which is being used extensively with somewhat more satisfactory results, consists of two lamps, each being a standard 5 ampere 110 volts inclosed arc lamp, inclosed by a metal hood a little larger in size than the printing frame. The hood is strongly constructed of sheet iron, with parabolic sides, which are finished on the inside with white enamel, having good reflecting power. The hood is supported on the lamps, and in order to prevent the parts from overheating an effective ventilating device is provided at the top. There are also handles on the side, so that it may conveniently be moved along the track. The lamps in turn are supported on a small trolley arrangement, made from the parts used for sliding folding doors, and on each side there is a conducting wire from which a small trolley wheel carries the current to the lamps. The tracks on which the lighting device is supported are of sufficient length so that five printing frames can be set under each of them and the lamps readily moved to cover any one of them. The printing frames which we are now using are the standard frames used for sun printing, although they can be somewhat simplified if they are made specially for printing by electric light. The lamps are inclosed in white opal globes. This diffuses the light and the white interior of the reflector projects it downward, so that the area over the print to be made is very uniformly lighted, there being no perceptible difference in the tone of the print in the middle from what it is in the corners. When the first print has been exposed a sufficient length of time the light and the hood are moved along the track to the next frame, while work is begun on the first one to replace the printing paper or tracing, as the case may be.

The time required for printing naturally varies widely with different tracings and different makes of paper. In general it may be stated that the time required is three or four times as long as with bright sunlight. With one grade of paper which we are using the time by sunlight in the middle of the day during February is about 35 seconds, and by electric light one and one-half minutes. It will readily be seen that there are great advantages in having a printing establishment which is independent of the season or of the condition of the weather. With an electric equipment blue prints may be put into the factory almost immediately after the completion of the tracing, regardless of the time of day.

Printing in Summer.

In summer it is possible to print all the time during office hours, and the per cent. of time lost on account of cloudy and rainy weather is small. In winter it is not practical to print after about 4 o'clock in the afternoon, and the amount of bad weather is a large part of the total time. In the belt in which I live it is cloudy as much as 60 per cent. of the time during the months of December and January. In cloudy weather the time required for printing is about eight to ten times as great as on a clear day, and on a rainy day it is not possible to print at all out of doors, except by a specially devised water proof printing frame; but at such times the time required for changing prints is greatly increased, as the frame has to be wiped to keep from injuring the tracing.

From curves of the actinic value of sunlight for different times of the day and for different seasons, I have calculated that with a paper so rapid that it will print in eight seconds in the sun at noon during the month of July, the mean time required for making a print in January for the hours from 8 to 12 and from 1 to 4 is 2.33 minutes. Similarly, in July the mean time for the hours above, except that the time is extended to 5.30 in the afternoon, is 0.59 minute, or the mean time for clear days during the year is 1.40 minutes.

Taking all the above into account, I find that the average number of prints made by one operator in winter per day is 26.4. In summer the number of cloudy days is about 25 per cent., and the average number of prints that may be made by one operator is 57.3, or more than twice as many as can be made in winter.

The cost of making prints by electric light is much smaller than one would expect, and the following figures indicate that it is cheaper to use artificial light than sunlight for this purpose.

In printing by electric light it is assumed that the cost of electricity is 12 cents per kilowatt hour, which, I believe, is a fair commercial rate. The lamps are turned off when not in use. They are in use only 85 minutes for each operator, as shown in the table below. Each lamp requires 550 watts and the cost is 18.7 cents per day.

Labor is assumed at the rate of $1 per day:

	Sunlight. Cents.	Electric light. Cents.
Number of prints per day, mean per year.....	41.9	56.5
Cost of printing, per print..................	2.39	2.09

The time required for changing a print in sunlight is a little longer than when the artificial light is used, because the whole frame has generally to be moved and the frame has to be adjusted to the proper angle to get the most effective sunlight. The time allowed for changing prints is seven minutes when printing by electric light, eight minutes when printing by sun, while when printing during a rainy day as much as 20 minutes may be required. It will then be found an advantage to use electric light printing as a supplement to the ordinary method, even if the latter method is not entirely superseded. Among other advantages may be mentioned the smaller space required for an installation for a given output than for sun printing; also, there will be less paper wasted, as the time for printing is much more uniform.

This method of making prints will especially appeal to manufacturers who are located where there is a tendency to have fogs or where tall buildings may interfere with the normal sunlight.

Lichen on Stone Buildings.

The green or black covering which forms on light colored stone after some time has been found by Dr. Fruhling to be a lichen, and if once developed is hard to remove. Its formation, however, may be prevented by painting the stones with a diluted sulphide of potassium solution at intervals of one year. Leitzmann has attempted to wash off the houses with hydrochloric acid, and found that this was effective for three to six years.

There has recently been cut what is believed to have been the largest walnut tree in Ohio, and one of the largest now left in the country. This tree measured a little over 8 feet in diameter at the stump, and the body of the tree, suitable for cutting into logs, was 74 feet long. This will make two carloads of export logs, in addition to a large quantity of squares which will be cut from the limbs.

THE ART OF DOVETAILING.

By Frederic Reissmann.

Good dovetailing is quite an art, especially where the article in question is to be made of hard wood and afterward is to be polished or varnished. Dovetailing consists of a number of flaring tenons adapted to fit into mortises with receding sides, to prevent withdrawal in the direction of the tension to which it will be exposed in the structure. Both mortises and tenons must fit snugly together, as otherwise the work might as well be nailed, as a loose dovetail not only looks bad, but also fails to hold the work properly together.

I shall here describe two methods of dovetailing, and, in order to do so more thoroughly, I shall take for my subject an ordinary tool chest with panel lid. I will assume that the interior dimensions of the chest are to be 36 inches long, 20 inches wide and 18 inches deep, and the boards of which it is to be constructed ⅞ inch thick. The first step is to cut the side and end pieces about 2 inches longer than actually required, or, in this particular case, cut the sides 40 inches long and the two end pieces 24 inches long and gauge them to 18 inches in width.

boards should be marked, placed in the clamp, and how to separate them after the glue is applied to the joints. In order to make the drawings more clearly understood I have marked the six boards as indicated in Fig. 1 of the drawings. To pile these boards properly together, preparatory to having the glue applied to the joints, place board No. 2 on top of No. 1; No. 3 on top of No. 2; No. 4 on top of No. 3; No. 5 on top of No. 4, and the sixth board on top of No. 5, as shown in Fig. 2 of the drawings.

Apply the glue to the five joints on each side as quickly as possible, place the boards in the clamp, and proceed as follows: Grasp all six boards at the same time, drop No. 1, the bottom board, against the edge and back of clamp, as shown in Fig. 3; then drop board No. 2 against the inner edge of No. 1, next drop board No. 3 against the inner edge of No. 2, board No. 4 against the inner edge of No. 3 and so on until the last board is disposed of in the clamp. It will thus be seen that the work may be done with the utmost rapidity and without confusion.

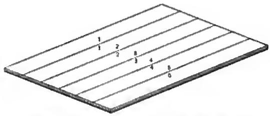


Fig. 1.—Method of Marking the Boards.

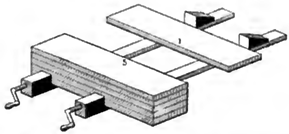


Fig. 3.—Showing How the Boards are Placed in the Clamp.

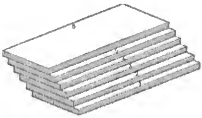


Fig. 2.—Method of Piling the Boards.

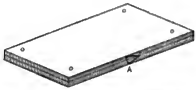


Fig. 4.—Method of Fastening Together the Two Sides of the Tool Chest.

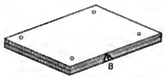


Fig. 5.—The Two End Pieces Tacked Together Ready for Cutting the Dovetails.

The Art of Dovetailing.

If the lumber on hand is less than 18 inches wide and the pieces require jointing and gluing, great care must be taken to secure good glue joints. To obtain a first-class glue joint the following requisites are necessary. See that the plane iron of the jointer, or fore plane, is nearly straight across its width, as a round iron makes a poor joint, also see that the plate of plane iron is set close enough to prevent the joint from tearing. It may also be well to add that it is essential that the bottom of the plane be straight in its length; in fact, just a trifle round is preferable, as this insures a joint that will be slightly hollow in the center. The plane should also be straight in its width across the bottom and at the same time be out of wind.

Before the pieces are jointed they should be properly marked, more especially when five or six boards are to be glued together at the same time, as this will prevent the wrong joints from being placed against each other and also prevent delay in gluing. In this connection it might be well to state that I consider it quite a trick when four, six or eight boards are to be glued together at one time, as may be the case with a large table top, to mark the boards and properly pile them on top of each other, having them ready so as to apply the glue as quickly as possible, and then separate them and place them together in the clamp with as little delay as possible.

Figs. 1, 2 and 3 show how a table top consisting of six

I will now take up the matter of glue joints. In making a long glue joint I consider it best to use a small straight edge about 24 inches long, 1¼ inches wide and about ⅜ inch thick, which is held with the left hand under the bottom of plane and against the face of board. This straight edge is used for the sole purpose of steadying the plane in pushing it along the joint, thus insuring a joint without short hollows or rounds. A good many mechanics in making glue joints do not use the try square for squaring the joints, but simply reverse the boards, or, in other words, the edge of the first board is jointed from its face side, and the edge of the second board from its rear side, which is brought to face the operator. Nearly every mechanic in jointing the edge of a board planes it a trifle out of square one way or the other, and by reversing the boards this difference is equalized.

No matter whether the joints are short or long, always make sure that they are slightly hollow in their length, and when put on top of each other that the ends will be perfectly tight on both sides, or, in other words, will be out of wind. Where a number of glue joints are to be made it is considered advisable to prepare fresh glue, care being taken that the glue is of the right consistency—that is, just a trifle thicker than water.

If the glue is too stout it will be next to impossible to produce good work, as the glue forms a sort of film between the edges, and the result will be black and at the same time poor joints. It should be understood that in gluing joints the glue must always be boiling hot, and except during the summer months the joints should also be heated over a stove (taking care not to scorch the joints) before the glue is applied. If this is neglected the glue will curl and cool off when applied to the cold edges of the boards, and thus cause poor and black joints, while a first-class joint should hardly be seen after the boards are smoothed off.

We will now proceed with our tool chest. After the side and end pieces of the chest are cut according to dimensions given, place the two sides on top of each other and tack them together by means of four wire finishing nails about 1½ inches long, as shown in Fig.4. Keep the nails about 4 inches from the ends and about 2 inches from the edges, so as not to interfere with the cutting of the dovetails, then place the two end pieces of the chest together in the same manner as the side pieces, all as indicated in Fig. 5 of the illustrations.

Now mark the edges which are to represent the bottom of the chest as shown respectively in Figs. 4 and 5 and indicated by the letters A and B. The necessity of marking the edges in the manner indicated will be explained later on. Take the steel square and proceed by marking the side pices 38 inches long and the end pieces 22 inches long, the marks to be carried across both the face and edges. Now cut the pieces off carefully with a sharp panel saw according to the dimensions given. Take a good sharp fore plane and plane the ends of both side and end pieces of the chest perfectly square, lengthwise and crosswise. This done, take the thumb gauge and gauge the thickness of one of the end pieces, which is ⅞ inch, across the face of the side pieces. After this is done gauge the same thickness across the face of the end pieces. Proceed by marking the two side pieces with an ordinary sliding tee-bevel, as indicated in Fig. 6, and square these marks across the ends. Place the two side pieces in a vise, take a sharp back saw and cut the marks down as far as the gauge line, taking care not to go beyond this line. Continue by cutting the extreme outer mortises of the side pieces with the back saw, and after this is completed separate the two side pieces by placing a chisel between them and withdraw the four nails which held the two sides together. Take the thumb gauge and mark the thickness of the ends of the chest, which is ⅞ inch, across the inner surface of the sides from their ends.

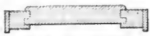


Fig. 9.—Section of Lid.

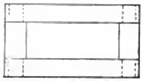


Fig. 10.—Horizontal Section through Lid of Chest.

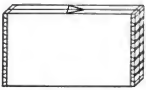


Fig. 6.—Showing the Markings for the Dovetails.


Fig. 7.—Appearance of Side Pieces when Dovetails are Completed.


Fig. 8.—Appearance of End Pieces when Completed.

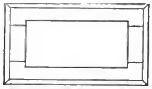


Fig. 11.—The Finished Lid.

The Art of Dovetailing.

We are now ready to cut the mortises. It may be well to state here that in dovetailing chests and boxes the mortises are always placed on the side pieces, and the tenons on the end pieces, and while for looks this seems to be a better way, I believe if the mortises were cut on the end pieces and the tenons on the side pieces, the result would be a much stronger chest or box, inasmuch as, in my opinion, the strain on a chest or box when filled is more against the sides than the ends, and by placing the tenons on the sides it would be impossible to force them outward. As new ideas, as a rule, are always looked at with more or less skepticism by the general public, I shall confine myself to the method employed at the present time.

Proceed by forming the mortises with a sharp chisel, cutting down to about one-half the thickness of the side pieces and after both ends of the side pieces are done turn the two boards over and cut out the other halves, taking care not to go beyond the gauge line. Fig. 7 shows how the side pieces should look when completed. To prevent the different pieces from becoming mixed in laying out the tenons and afterward putting the pieces together, the bottom edges of the side and end pieces of the chest should be marked as already stated and shown by letters A and B in Figs. 4 and 5. It will be observed that the points are all in one direction, and that the pieces thus marked are not liable to get mixed in marking them or in putting the chest together.

This done, take either one of the side pieces and hold it over and flush with the tops of the two end pieces. Take a scratch awl, penknife or sharply pointed pencil and mark the end pieces for the tenons by transferring the hollow spaces or mortises onto the top of the end pieces. Then take the other side piece, reverse the two end pieces and mark them in the same manner, taking particular care that the marks on the bottom edges of the end and side pieces always point in the same direction. Square the marks thus obtained on top of the two end pieces down on both sides to the gauge line and continue to cut the tenons by barely touching the marks, or, still better, do not touch the marks at all, but cut just outside of them, so as to get a tenon that will fit snugly into the side pieces. This being accomplished, take a sharp chisel and cut out the wood between the tenons from both sides, taking only half the thickness of the wood from each side. Fig. 8 shows how the end pieces should look when completed. Now smooth off the inside surfaces of both sides and end pieces, sandpaper them and the chest is ready to be glued together.

Apply the glue, which by the way should be very strong, on the tenons of end pieces only and drive the side pieces home, one at a time, and in doing this do not touch the sides with the hammer, but use a piece of hard wood long enough to reach across the side piece. As soon as the sides are driven home, square the chest and put on the bottom with 10-penny wire finishing nails, after which let the chest dry for four or five hours before planing off the sides and ends.

The method explained above in placing the two side pieces together and marking and cutting the mortises of both side pieces at the same time is to my mind a quicker and more accurate way of dovetailing than the old plan, by which the tenons were laid out and cut first on the end pieces one at a time and the mortises on the side pieces were marked and cut after the end pieces were completed.

Figures 9, 10 and 11 indicate how to construct a strong lid for a chest—one that will not warp or twist.

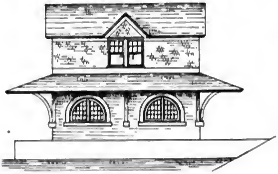
THE plans which have been drawn by Davis & Brooks of Philadelphia, Pa., for the Memorial Library Building to be erected at the Normal Agricultural Institute, Hampton, Va., call for a structure shaped like a Greek cross, and two stories and basement in hight. It will be constructed of brick with limestone and copper trimmings, and have a Spanish tiled roof. It will cover a plot 107 x 68 feet, and will contain a stock room, librarian's room, reference room, &c.

CORRESPONDENCE.

Design for a Boat House.

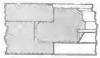
From THOMAS LLOYD, *Pittsburgh, Pa.*—In the September number of the paper "Constant Reader" asked for a sketch of a boat house, and under separate cover I have mailed drawings showing elevations and floor plans with details of the sliding doors. The foundation of the building is to be of hard stone laid in mortar, composed of one part Portland cement and two parts sharp sand. The walls are to be 24 inches thick and carried up to the under side of the platform. The platform supports are to be of wood, floored and lined on the sides with flooring 1⅝ inches thick, the sides to run below the low water line. The sills are to be 6 x 8 inches; the first-floor joist of sound oak 2 x 12 inches and placed 16 inches from centers; the studding 2 x 4 inches, and the window frames of the first story are to be molded on both sides, and the sash is to be hinged in two folds each and to open outward, at the same time being practically water proof. The second story frames are to be double boxed, the sash to be hung with hempen cord over pulley axles. The front door is to slide on tracks into boxes, a detail of this door being shown on the drawings. The other doors are to have not less than five panels each. The stairs are to be of yellow pine, with nosings and scotias, molded rail and turned balusters. The dressing room is to be equipped with hat and coat hooks.

Front Elevation.



Side Elevation.

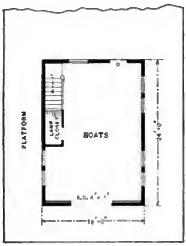
Scale, 1-16 Inch to the Foot.



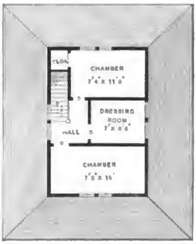
Section of Door on Line A A.

Section of Door on Line B B.

Scale, 3 Inches to the Foot.

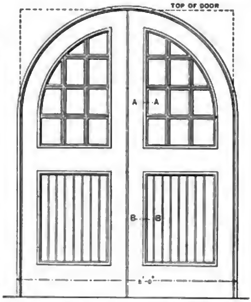


Main Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.



Elevation of Sliding Doors.—Scale, ⅝ Inch to the Foot.

Design for a Boat House.—Contributed by Thomas Lloyd, Pittsburgh, Pa.

rafters 2 x 8 inches, placed 2 feet from centers. The collar beams which form the ceiling of the second floor are to be 2 x 6 inches, and the second-floor joist 2 x 10 inches, placed 16 inches from centers. The frame of the building, including the roofs, is to be sheathed with hemlock boards, which in turn are to be covered with siding for the first story and 18-inch white cedar shingles for the second story, as well as gables, dormers and roofs. The 2 x 4 inch studding for inside partitions on the second floor may be placed the 2-inch way. The lamp closet partition under the stairs is to be made of beaded flooring; also the door to the closet. The first and second story floors are to be of yellow pine 3 inches in the face, the first story to be 1⅝ inches thick.

The interior walls and ceilings of the first story are to be lined with ¾-inch yellow pine flooring, smoothed and beaded, the boards to be laid vertically on the walls, with cross bridging every 2 feet to which to nail the boards. The second story is to be plastered. The

Constructing a Chimney of Concrete.

From T. F. H., *Toronto, Can.*—Answering the inquiry of "J. S. N." of Onaway, Mich., with regard to constructing a concrete chimney, I would suggest that he make sure and have a good foundation, giving it not less than 2 x 3 feet surface, and making it of stone or concrete well rammed in place. Start the chimney on a solid bottom the full size of the shaft, which, according to the correspondent's figures, will be about 16 x 16 inches in section. Then make a mold giving dimensions of flue—that is, 8 x 8 inches—and 4 inches for walls. This mold may be made a foot or 14 inches deep, and may be held together at the corners with angle irons, and across the top with iron bars or braces. It must be made strong or it will be forced apart by the pressure of the concrete when forced in the mold. When the mold is ready place it on the solid part of the shaft and fill the wall portions of it with the concrete, which must be put in place in layers and gently pounded with a rammer of some kind. Before putting the concrete in the mold the top of the solid shaft must be well wet with clean water. It will be a little difficult to remove the mold until the inside has been greased or well rubbed with soap. This difficulty, however, may be overcome by making the outside box in two pieces hinged at one vertical joint, and at the other diagonal corner a strong iron hasp or other fastening, so that when the mold is full and the concrete has had time to set, the hasp may be removed and the molds opened a trifle by swinging them on the hinges. The inside box or mold may be made collapsible, or it may be made slightly taper and drawn out, and the inside of the flue may be straightened up with a small trowel and cement. When one course of cement is set the mold may be placed again and another course laid, until the shaft is completed. Care must be taken to keep the work plumb, both inside and out, as it progresses. The mold can be held in place while being filled by a loose wooden frame nailed together that will slide up and down easily on the outside of the shaft. This frame is held in desired position by two or more thin wooden wedges inserted between the frame and the outside of the shaft. In making the concrete use one and one-half parts Portland cement, one-half part cinder slag, about the size of a white bean, or that will pass through a ¼-inch mesh, and one of sand. If cinders cannot be obtained use fine gravel, but do not make use of limestone gravel. Mix all dry until thoroughly incorporated; then wet just what is required for one course at a time. A capital flue and shaft can be made by this method and the thimbles put in as the work progresses. Why not build a round shaft and a circular flue? It is as easily done and is much better and handsomer.

Laying Out Face Mold for Stair Rail.

From Morris Williams, *Scranton, Pa.*—In the October number of *Carpentry and Building* appears a query from "C. E. G.," Frederick, Md., as to the method of laying out a face mold for a stair rail having a stretchout stringer at the starting and a straight rail connecting the two flights, or, in other words, having a square well hole. Referring to the accompanying diagrams, let Fig. 1 represent the plan and elevation of the stretchout portion at the starting and one step adjoining. Draw the pitch of the straight rail touching the nosings of the steps. From the point *c* on the plan erect the line *c c'*, cutting the pitch line in *c'*. Revolve the tangent *c a* of the plan to the ground line X Y, as shown by the dotted curve *a a'*. Upon *a'* erect the line *a' a"*, and draw the

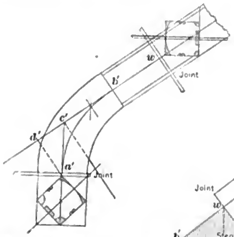


Fig. 2.—The Face Mold.

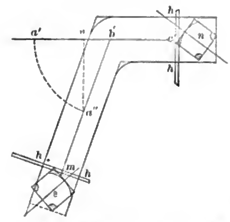


Fig. 4.—The Face Mold.

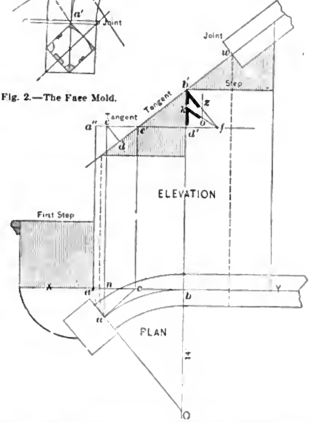


Fig. 1.—Plan and Elevation of the Stretchout Portion at the Starting and One Step Adjoining.

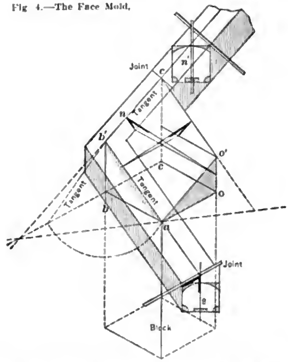


Fig. 5.—Perspective View of Block Cut to Pitch of the Tangents.

Laying Out Face Mold for Stair Rail.

level line *a" c'*. From *a* of the plan erect the line *a e*, cutting the level tangent in *e*. From *e* draw the line *e d* square to the pitch line of the upper tangent *c' b'*, which in this case is the same as the pitch line of the flight. The pitch of the tangents is now shown at *b' c'* and *c' a"*, the tangent *c' a"* being level.

To find the two bevels that are necessary to square the wreath, take the length *a n* of the plan as the base of a triangle. In the elevation this length is shown at *d' f*. For the altitude of the triangle take the length *d e* and connect *e f*, the bevel being shown at *k*. Again take *d' b'* for the altitude, and the same base, *d' f*; connect *b' f*, and the bevel is shown at *b' z*. Draw the line *z o* across the bevels, as shown in the elevation, at a distance equal to half the width of the rail.

To draw the face mold proceed as follows: Referring to Fig. 2, draw a straight line, and mark upon it the points taken from the pitch line of the tangents in the elevation, Fig. 1, as shown at $w\ b'\ c'\ d'$. Draw $d'\ a'$ square to $d'\ c'\ b'\ w$. Make $c'\ a'$ equal to the length of the level tangent in the elevation, Fig. 1. Make the joint at a' square to $c'\ a'$, and at w square to $c'\ b'\ w$. The portion $b'\ w$ is straight, and is therefore outside the curve of the wreath. The wreath of the face mold at a' is taken from the bevel $b'\ d'\ f$ of Fig. 1. On each side of a' place the distance $b'\ z$ of the bevel, Fig. 1. The width of the mold at $b'\ w$ of Fig. 2 is taken from the bevel $e\ d'\ f$ of Fig. 1. On each side of b' place the distance $k\ o$, taken from the bevel of the elevation, Fig. 1. The curve may be drawn either with ordinates, trammels or string and pins.

In Fig. 3 is shown the plan and elevation of the square well hole, which is 14 inches from center to center of the rails of the two flights adjoining. The wreaths will be in two pieces jointed at c, the center of the well hole. To find the angle between the tangents of the face mold, draw the line $o\ a''$ square to the tangents $b'\ c'$ and $c'\ d'$, revolve the bottom tangent $b'\ a'$ to a'', as shown, and then connect $a''\ b'$. The angle $a''\ b'\ c'$ will be the angle of the tangents upon the face mold. From the point o draw the line $o\ o'$ parallel to the tangents $b'\ c'$. Draw $o'\ f$ parallel with the ground line X Y; revolve the bottom tangent $b'\ a'$ to w and connect $w\ b'$. From o' as center with radius cutting this line, as shown by the dotted curve, turn to 8; connect 8 f, and the angle at 8 will be the bevel for the end a'' of the face mold. Again from the center o' extend to the tangent $b'\ c'$, and turn to n, connecting n with f. The angle at n will be the bevel to be applied at the end c' of the face mold.

Referring to Fig. 4, draw a straight line, as $c'\ b'\ n\ a'$, and make the distance equal to $c'\ b'\ n\ a'$; revolve a' to a''; connect $b'\ a''$, and make $a''\ m$ equal to $a'\ m$ of Fig. 3. On each side of m place $m\ h$ at a distance taken from the bevel 8 and equal to 8 h. On each side of c' place the distance $c'\ h$ taken from the bevel n, and shown there at $n\ h$. Now from these points draw parallel lines, as shown, thus completing the face mold. The angle at the intersection b' may be eased, as shown by the dotted curve.

In Fig. 5 is shown a perspective view of the block cut to the pitch of the tangents as indicated in Fig. 3. It also illustrates the principle of the bevels. A comparison of the position of the tangents in Fig. 3 and their position in this diagram will greatly simplify the apparent confusion of lines made use of in Fig. 3.

The face mold for the upper wreath will be exactly the same as the bottom face mold, because the pitch of tangents of the two wreaths is equal. The thickness of the plank from which to cut the wreaths is, in all cases, the diagonal of a square section of the straight rail.

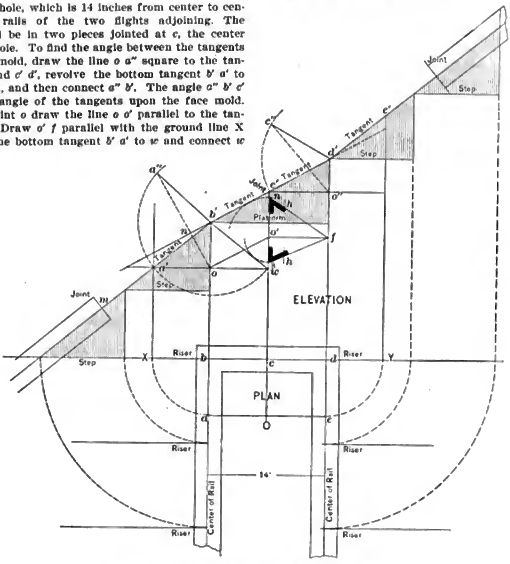


Fig. 3.—Plan and Elevation of the Square Well Hole.

Laying Out Face Mold for Stair Rail

Preventing Show Windows from Sweating.

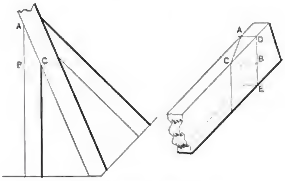
From J. W. C., *Hanover, Pa.*—Can you or any of the readers give me some good suggestions through the columns of the paper how to prevent the sweating of show windows? The windows to which I refer are in a drug store lighted with gas, and despite every effort to prevent, they persist in sweating to such an extent as to completely obliterate the displays on the inside.

Note.—The remedies which have been adopted in the past for overcoming the difficulty complained of by our correspondent have involved the ventilation of the space on the inner side of the window, so as to create a free circulation of air. This can be accomplished in a variety of ways, local conditions determining largely the plan most convenient for the purpose. The trouble mentioned is one of frequent occurrence, and we have no doubt that many of our readers have had experience in solving problems similar to the one presented in this case. With the suggestions above we lay the question before our readers and shall be glad to have them discuss it in the light of their own experience.

Finding Back Cut of Jack Rafters on Octagon Roofs.

From C. S. J., *Mamaroneck, N. Y.*—I inclose an answer to the inquiry of "W. H. M.," Woodlawn, Ala., which appeared on page 259 of the October number of the paper. Using the sketch which he furnished, the addition of a few lines to explain my system will show how simply the side bevel of any jack can be found. Right here let me say that this rule is the simplest of which I have knowledge, and will work under all conditions on any roof regardless of pitch or location of rafters. Referring to the sketches, square across the back of the rafter from C to B, as indicated in Fig. 1, which should be the exact thickness of the stick to be used. Next take the distance from A to B in Fig. 1, and square from the plumb cut, D B E of Fig. 2, as shown by the dotted line C B of the same sketch. Now square across the back of the rafter, as A D, and draw the diagonal A C of Fig. 2, which is the cut of the jack.

From A. O. C., *Lake Charles, La.*—In reply to "W. H. M." of Woodlawn, Ala., I send a sketch, Fig. 3, in explanation of my method for finding check cut on jack rafters for an octagon roof. First draw the foundation plan, as represented in the sketch by A B C D, then draw B E and C E for the run of the hips. Square up from E to F the rise of the roof, and connect F and B, which gives the length of the hip. Draw E J for the run of the common rafter, and square up from E to I for the rise of the roof. Connect I and J for the length of the common rafter. Next check the length of the common rafter I J, and erect a perpendicular line of the same length, as G H. Connect H C, and we have the hip in position for finding the length and bevels of the jacks, as 1 2 3. A bevel set at 8 will give the check cut, and a bevel set at I will give the top cut of the common rafter. A bevel set at J will give the bottom cut. The same applies to hip rafters.



Figs. 1 and 2. Submitted by "C. S. J."

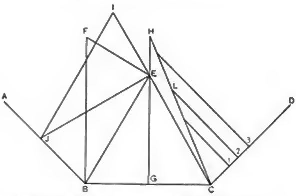
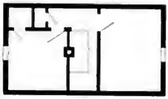


Fig. 3.—Diagram Accompanying Letter of "A. O. C."

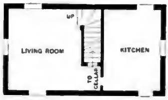
Finding Back Cut of Jack Rafters on Octagon Roofs.

Remodeling a Small House.

From J. D. R., *Parry Sound, Ont.*—I inclose floor plans of a small house which I wish to enlarge. The building is 14 feet 6 inches by 26 feet, using 14-foot studding. The ceiling is 8 feet 6 inches. I wish to change the front, but it must not be larger or project beyond the present foundation. I wish to have a parlor, hall and also a pantry, the door to the pantry to be where the window in the front now is. What I want are floor plans and roof plans which will look well. The present door and window need not be taken into consideration unless they are in a suitable place. I hope the architectural friends of the paper will respond as well as they did to the inquiry of "Builder," whose inquiry appeared a few months ago.



Second Floor.



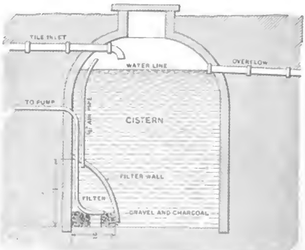
Main Floor.

Remodeling a Small House.

Making a Cistern Filter.

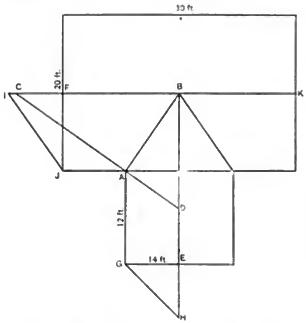
From A. H. P., *Glen Cove, L. I.*—I give herewith a sketch of a kind of cistern filter which I have found very satisfactory in a number of years' experience. Although I have used it in connection with round cisterns, it can readily be used in connection with filters of other shapes. The cistern should be built of the desired size and coated on the inside with cement mortar ½ inch thick. The cistern should be allowed to stand until it is hard and dry enough to hold a man's weight and then some short boards should be placed in the bottom to stand on.

Now is the time to start the filter. It is best when made to occupy but a small section of a round cistern and to assume a beehive shape. After a few courses of brick have been laid, place three bricks in the middle of the filter chamber for the pump pipe to rest on; then take a pail of gravel and a pail of charcoal broken about the size of black walnuts and pour it into the chamber and spread it around so that the top of the bricks is above the charcoal and gravel. Place the perforated end



Making a Cistern Filter.

of the pump pipe on the brick, as shown in the cut, and continue the filter wall, arching it over through the side wall of the cistern. Don't coat the filter chamber when finished with the cement mortar. The brick will filter the water. Have the pump pipe pass out of the cistern wall just before the arch is turned to form the top. The inlet pipe and the outlet pipe should connect with the cistern near the crown of the arch and the inlet pipe should always be a few inches higher than the outlet pipe. Tile pipe should be used for both of these connections



Finding Bevels of Rafters in Roofs of Unequal Pitch.

so that they can be cemented securely to the wall. The connections in the tile pipe should be calked with oakum to prevent the cement used in filling the hub from entering the pipe and obstructing it. There is an advantage in having an air pipe of ½-inch galvanized iron or lead pipe run from the top of the filter chamber to a point above the water line in the cistern and having the upper end protected by a wire guard.

The filter chamber should extend in from the cement wall about 2 feet at the widest point, and should extend us so as to connect with the side wall of the cistern about 3 feet above the bottom. Galvanized pipe is best for the pump pipe. If lead pipe is used care should be taken in making the bend, and also in protecting the pipe against sagging from its own weight. The pipe should also be filled with sand so that it will not flatten out at the point where it is bent.

Such a filter arrangement with gravel and charcoal and air pipe will keep the water in the cistern pure and sweet. The cistern should be made with a mouth at the top large enough so that a man can readily enter. The opening should be covered with a flat stone laid in cement. This will enable the cistern to be cleaned. In the course of four or five years the filter wall should be taken down and cleaned carefully and new charcoal placed in it after the chamber and bricks have been thoroughly cleaned.

Finding Bevels of Rafters in Roofs of Unequal Pitch.

From C. N. C., *Decatur, Ind.*—I have been taking considerable interest in the correspondence which has appeared on the subject of bevels of rafters in roofs of unequal pitch, and I notice that some of the readers have an erroneous idea regarding the matter. I think "G. L. S." of Temple, Ind., is wholly wrong. For equal pitches I would use the length of the valley rafter on the blade of the square and its run on the tongue; cutting by the blade. The reason for this is that if the line be run at right angles to the seat line of the hip or valley until it meets the seat line of the ridge, it will be equal to the seat line of the hip or valley, owing to the fact that the seat line of the hip or valley is at an angle of 45 degrees to the ridge line. On the same principle the bevel of a hip or valley in roofs of unequal pitch can be found.

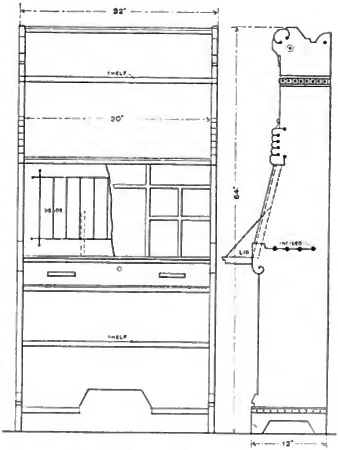
Referring to the diagram which I inclose, I would say that it represents a building, 20 x 30 feet, connected with which is a addition, 12 x 14 feet. The seat line of the valley rafter is indicated by A B. Run a line from A at right angles to A B until it meets the ridge line F K. Then take the length of the valley on the blade of the square and the length of the line A C on the tongue and mark by the blade for the bevel against the ridge F K. By the same method find the bevel on the other side. Take the length of the valley on the blade of the square and the length of the line A D on the tongue and mark by the blade. This will give the cut to fit against the ridge E B.

Constructing a Cold Storage Room.

From P. J. B., *Rouse's Point, N. Y.*—A client of mine is building a private residence, and he desires to have in it a small room something similar to a dry air cooler, for the purpose of keeping in it milk, butter, eggs, &c. I am at a loss to know just how to construct it in a way which will give entire satisfaction. The point which perplexes me is how to ventilate it so it will not be too damp when the ice is packed on top of the little chamber. If any of the readers who have had experience in constructing rooms of this kind will send a description of how the work can be done, together with drawings indicating the method of ventilation and insulation, it will be, I doubt not, of great interest to others besides myself.

Design for Writing Desk and Bookcase.

From W. G. M., *Admire, Kan.*—Those readers who have been making inquiries about bookcases may possibly find some suggestions in the design which I send herewith. It can be executed in almost any kind of wood. If walnut, oak or pine is employed, it will probably cost in the neighborhood of $8 or $10. It is, however, of such a nature that it would be easy for any ordinary mechanic to make one. It will be noticed that



Design for Writing Desk and Bookcase.

there are shelves above the writing desk proper, and also shelves below the drawer. If desired, curtains can be placed in front of them in order to keep the dust from the books or whatever the shelves may support.

WHAT BUILDERS ARE DOING.

THE figures covering building operations in the city of Boston during the month of October show a gain as compared with the previous month, although the significance is not as important as it would be under different conditions, the total for September being exceptionally small. The total number of permits issued for October of the present year was 143, there being 41 for brick buildings and 102 for frame structures, these totals comparing with 131 permits for the corresponding month of last year, when 59 permits were issued for brick buildings and 72 for frame houses. In the corresponding month of 1899 the total number of permits was 142 and in 1898 it was 216.

Cincinnati, Ohio.

The outlook for continued activity in building operations is encouraging, the work under way consisting largely of business buildings. There are, however, in progress several large school houses and many fine residences. According to Charles A. Tooker, Inspector of Buildings, there were 327 permits issued for building improvements in October, involving an estimated outlay of $362,865, as compared with 334 permits for improvements costing $124,165 in October of last year. Taking the figures for the first ten months of the respective years the showing is equally gratifying. Up to November 1 of the present year, 3789 permits were issued for improvements costing $2,810,790, as compared with 3179 permits for buildings costing $1,785,890 in the first ten months of 1900.

Cleveland, Ohio.

The annual meeting of the Builders' Exchange was held on the evening of Monday, November 4, when a new Board of Directors was elected and other business transacted. The occasion was the star event of the year and was largely attended by representative builders of the city. The election was conducted by the Nominating Committee, who acted as judges and counted the votes. The polls were open from 11 o'clock in the morning until 8 in the evening, and the result was announced after the business session.

The report presented by the retiring Board of Directors reviewed the work of the year and was most enthusiastically received. The reports of officers and various committees showed a good financial gain as compared with last year, as well as a most flourishing condition of each department of the organization. A short recess was taken after the regular business of the evening, the members gathering around the punch bowl and enjoying a brief interval of social intercourse. On reassembling President Hunt delivered his annual address, which was of a most interesting character and was heartily applauded. The result of the election of directors was announced as follows: Henry Taylor of the W. Bingham Company; Wm. H. Hunt, general manager of the Cleveland Hydraulic Pressed Brick Company; E. W. Palmer, secretary and treasurer of the Cleveland Window Glass Company; C. W. McCormick of the Cleveland Stone Company; Sherman W. Watterson, a mason contractor; Henry T. Williams and W. H. Fry, carpenter contractors; J. H. Libby, cement contractor; H. C. Bradley of Barkwill & Bradley and F. G. Hogen of Auld & Conger. After the announcement of the election of the Board of Directors the meeting adjourned to the dining room, where luncheon was served, the cigars passed around and the evening spent in social intercourse.

The new Board of Directors met on Thursday, November 7, for the purpose of electing officers for the ensuing year. Wm. H. Hunt was unanimously re-elected president of the exchange, J. H. Libby was elected vice-president, and E. W. Palmer and Edward A. Roberts were re-elected treasurer and secretary, respectively.

Detroit, Mich.

The building situation in the city is rather quiet just at present, although it is somewhat improved as compared with the same date last year. According to C. W. Brand, Permit Clerk, there were issued in October permits for 270 buildings, estimated to cost $484,400, as against 242 permits for buildings costing $403,200 in October of last year. Taking the figures for the ten months ending October 31, 1901, there were 2210 permits issued for buildings estimated to cost $4,787,300, as compared with 1620 permits for buildings costing $3,310,100 for the same period of last year.

Lowell, Mass.

There is a considerable amount of building being done at present, and members of the Builders' Exchange are well supplied with contracts. Much heavy work is more or less delayed owing to the scarcity of Southern pine. We understand that the directors of the exchange are debating the question of incorporating into the by-laws the following clause:

"That no member of the Builders' Exchange draw plans and write specifications or do any work that naturally belongs to an architect, except that a member may plan and build for his own personal use."

The directors of the exchange are also planning a "smoker" for the members, to be held on November 14, and to be preceded by a short business session dealing entirely with the topic of the hour—the labor question.

New York City.

A considerable amount of building in the aggregate is still in progress in the boroughs of Manhattan and the Bronx, and while there is nothing in the situation to warrant more than passing comment the volume of business for the year will be pretty well up to expectations. In visiting that portion of the city below Fifty-ninth street, one cannot fail to notice the many instances where old buildings have been or are now being torn down to make room for modern structures of a more pretentious character. Plans are every now and then being filed for towering office buildings, a considerable number of which are under way, while above Fifty-ninth street apartment houses equipped with passenger elevator service appear to show a steady increase. Some of the more important improvements for which plans have lately been filed include a 14-story office structure, to be erected by the Knickerbocker Trust Company at the northwest corner of Thirty-fourth street and Fifth avenue, on a portion of the site formerly occupied by the A. T. Stewart mansion; also a modern apartment hotel, to cover the balance of the Stewart mansion site, fronting 75 feet on Thirty-fourth street and 25 feet on Thirty-fifth street, and the Terminus Hotel, to be erected in Park avenue, extending from Forty-first to Forty-second streets, and to cost in the neighborhood of $2,500,000. According to the architects, Warren, Wetmore & Morgan, work will be commenced as soon as the old buildings now on the site can be demolished. Property has been acquired adjoining the store of Simpson, Crawford & Simpson with a view to erecting a large addition in harmony with the present structure. Down in the financial district a site has been secured, fronting on Wall street and Exchange place, on which it is intended to erect an office building 21 stories in hight, which will, in its construction and appointments, equal the best in that section. According to the figures of the Bureau of Buildings there were 2366 permits issued for building improvements in the boroughs of Manhattan and the Bronx from January 1 up to the end of the first week in November, the estimated cost of which was a trifle over $88,000,000, these comparing with 1657 permits for new buildings, costing $49,456,555, in the corresponding period of last year.

In the borough of Brooklyn the showing is not quite so favorable for the month, although the year thus far is ahead of 1900. During the month of October there were issued by the Department of Buildings 128 permits for brick structures and 206 permits for frame buildings, involving a total estimated outlay, including alterations, of $1,416,111, as compared with building improvements costing $2,017,933 in October of last year. The total number of permits issued for new buildings from January 1 up to the second week in November was 2913, estimated to cost $16,374,277, as against 2601 permits for buildings, costing $14,271,794, in the corresponding period of last year.

Portland, Oregon.

The master builders of Portland, Ore., have now perfected an organization known as the Master Builders' Association of Portland. Thirty-five of the leading business firms of the city are enrolled. J. B. Bridges has been elected president and J. W. Gordon secretary. The objects of the association are to alleviate the evils which have grown up around keen competition in the building trade. The association is also opposed to carpenters and others who are not really contractors taking contracts for building.

The prospect for building in Portland during the next half year is splendid. Besides a large number of small buildings and residences, already planned for, several large buildings, such as the Studebaker Bros. Building and the Deering Plow Company Building, are to be erected.

Sacramento, Cal.

The various building firms of Sacramento have formed an organization to be known as the Builders' Association of Sacramento County. The purposes of the new association are set forth to be the better understanding of the necessities of the building business and the arbitration of disputes among members. The founders of the association embrace the leading builders of the capital city. The directors are J. J. Siller, G. E. Hook, F. W. Book, C. J. Matthews and A. Anderson.

San Francisco, Cal.

The San Francisco building trades are quiet at present, though some important buildings are scheduled for commencement in the early part of next year. The San Francisco Architectural Club was organized by some of the leading architects on October 23. The purpose is the promotion of architecture and the allied arts. The club started with a charter membership of 30. The officers are: A. O. Johnson, president; A. G. Headman, vice-president; H. N. Smitten, secretary, and M. M. Friedman, treasurer.

St. Louis, Mo.

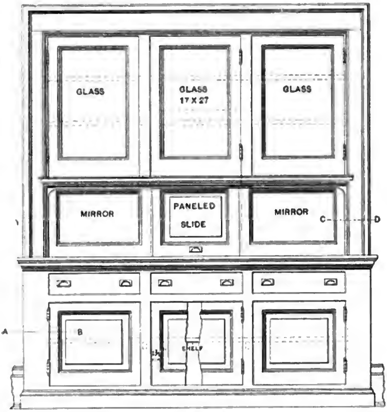
Advices from St. Louis under date of November 13 are to the effect that the city is now experiencing one of the most active seasons of building known for many years. Work in connection with the World's Fair is going forward as rapidly as possible, and while there are no "boom" indications, neither has there been any wild speculation such as was the case previous to some of the recent fairs held in other cities. Plans and specifications for a large amount of work are now in the hands of architects and prices of material are showing an advancing tendency. The labor question has not materially changed since our last issue, although there are some sympathetic strikes in different parts of the city.

The figures of the Building Bureau show that during the month of October permits were issued for 147 brick buildings and 159 frame buildings, estimated to cost $1,012,819, which is nearly double the value of the building improvements for the corresponding month of last year. At that time permits were issued for 88 brick buildings and 104 frame buildings, involving an expenditure of $538,029.

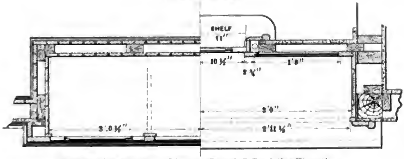
Design of Sideboard in Natural Wood.

A feature of dining room equipment which offers an excellent field for variety of treatment is the sideboard or buffet, as the case may be. In some instances they are combination affairs, and are often built in as a part of the room, owing, perhaps, to lack of space for a portable sideboard. The design which we illustrate herewith belongs to the former class, and was executed for the bachelor officers' quarters at Fort Harrison, Mont., in accordance with drawings made by architect Frank J. Grodavent, at that time stationed at Helena, but since assigned to Fort D. A. Russell, Wyoming, which is his present address.

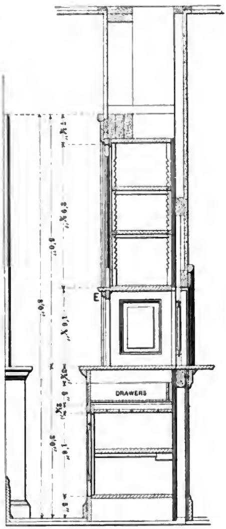
The design was carried out in tamarack, a native lumber, and was finished in the natural wood with handsome effect. The details which are presented herewith show so clearly the construction employed that extended comment would seem to be unnecessary.



Front Elevation.



Horizontal Sections on Lines A B and C D of the Elevation.



End and Vertical Section

Design of Sideboard in Natural Wood.—Scale, ¼ Inch to the Foot.

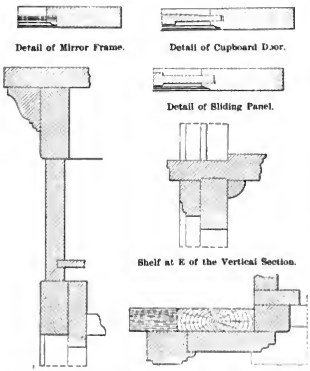
Sheet Metal Roofing.

One of the effects of the late steel strike that has been felt by manufacturers and dealers in sheet metal goods during the past season is a falling off in the sales of iron and steel roofing, metal shingles and tin roofing plates. The high price of sheet iron and terne plate and a scarcity of those materials due to the prolonged shut down of the mills conspired to limit the consumption and to stimulate the use of other roofing materials to a considerable extent. In respect of tin roofing, however, a gradual decrease in the use of terne plate for roofing purposes has been noted for some years past in various parts of the country, particularly in the East, where popular favor has been running more to metal and wood shingles, slate, tin and gravel, felt and other prepared roofings. This fact is conceded by tin plate jobbers throughout the Eastern section of the country, and it is also more or less noted in the Southern and Central States.

From many parts of the country come reports to the effect that slate roofing has made considerable progress in popular favor during the past season, and it is said that in a number of districts in the Eastern, Middle and Southern States slates have been placed on the roofs of new buildings in cases where formerly tin would have been used. Manufacturers and dealers in roofing slates refer to a decided increase in the demand for this material, and their reports are confirmed by the fact that the stocks of roofing slates have become depleted to an extent not known for years past, notwithstanding that the production has kept up to normal figures and in some cases has been increased over that of past years, while the export trade in slate has fallen off.

There is no doubt that the metal shingle has grown materially in popularity as a substitute for tin roofing during the past few years, while the various prepared roofings that are now offered in the market have secured considerable attention. In the Southern States, in particular, metal shingles have come into vogue in preference to tin plate. The reason advanced for this preference is that it has been found that tin roofing was expensive, owing to the climatic conditions which make it necessary to paint the tin roof every year. The use of metal shingles and sheet iron roofing in Southern cities is restricted to some extent at the present time, however, owing to their relatively high cost, due to excessive freight rates. This, however, is only a temporary condition, which, it is expected, will soon be relieved.

In districts where tin is still largely used for roofing purposes there has been a marked increase in the demand for the heavily coated old style plates in preference to the cheaper grades, which have not been found to stand the test of time and weather satisfactorily. The complaint is made in some quarters that much of the terne plate now produced deteriorates far more rapidly than that used in years gone by, the contention being advanced that the steel sheets of which most of the present day roofing plates are made corrode more readily than the iron sheets formerly used, and that the coating does not adhere as closely to the steel sheets as to the more fibrous iron sheets. A growing demand for tinned iron sheets is said to be a feature of the roofing trade at the present time, and some of the tin plate manufacturers are preparing to meet this call.



Detail of Mirror Frame. Detail of Cupboard Door. Detail of Sliding Panel. Shelf at E of the Vertical Section. Vertical Section through Cornice of Counter Shelf. Detail of Side Casing.

Design of Sideboard in Natural Wood.—Scale, 3 Inches to the Foot.

Making Cement Walls by "Pouring" the Material.

Some time ago an article appeared in one of the well known periodicals by Thomas A. Edison in which he suggested the building of houses and other structures by "pouring" the material, and in order to demonstrate the practicability of this form of construction John R. Pisel of Akron, Ohio, has lately built the basement walls of several of his houses by this method. In executing the work Mr. Pisel states that he used planks 16 feet long, 2 inches thick and 12 inches wide, two planks being bolted with three iron bolts, so that the space between the planks was 12 inches, this, of course, giving a 12-inch wall. The planks were laid lengthwise on the ground where the wall was built, and the space was filled in between them with a mixture of 1 part cement and 3 parts coarse sand or pebbles. This mixture was "poured" in slush form and then boulders, or, as they are termed in that locality, "nigger heads," were dropped in. When the space was filled more plank was put on and the lower set removed, this operation being continued until the proper hight was reached. Wooden pins were used through the wall at points where it was desired to put in pipes for water, gas or sewer, as after the mixture had set it was almost impossible to penetrate it.

Mr. Pisel states that the running length of the wall was 110 feet, and that the cost of this process was only a little more than half what a brick contractor demanded for building an 8-inch wall.

Provision for Heating Apparatus.

Many who are engaged in the heating business will sympathize with the following criticism made by a local expert in the Sioux City *Journal* on the space allowed for the heating plant and other apparatus by architects in buildings which they design:

Not every architect is well posted in regard to the disposition of the various kinds of machinery that the modern building and its conveniences require, and there are several instances in Sioux City, even in structures planned by architects in Chicago or elsewhere, where there was a disregard of the practical conditions which were bound to develop in the operation of the heating and lighting plants. Chief Kellogg's comments were of course directed more particularly to the danger of fire from giving the heat of the boilers easy access to wooden walls or ceilings; but this is not the only direction in which some of the fine business blocks in Sioux City fall short of being what they ought to be in their arrangements in the basements.

There are so many architects who devote themselves almost exclusively to the artistic appearance and arrangement of the superstructure of the buildings and neglect the merely mechanical requirements in the basement. For instance, there is a handsome block in this city in which it is evident the architect did not have in mind at all the necessity for providing adequate quarters for the furnace and boilers to supply the heat and power. For the boiler room there had to be taken what was originally intended for a handsome basement office. Within a few feet of the furnace stands a beautiful safety vault door, copper trimmed and with a time lock on it—something which of course demonstrates that the room wasn't intended for the heating plant. And the arrangements are such that if it became necessary to take out any considerable part of the machinery for repairs a main wall of the basement would have to be torn away. In the same building the two drums on which the cables of the elevators are wound are placed one above the other, so that if either has to be repaired its mate must stop running in the meantime, thus depriving the building of any advantage from having duplicate elevators; and the packing of the hydraulic piston of either would compel the stoppage of the other.

In another of the handsomest blocks in the city there is the same condition with reference to the elevators; and the boilers are so placed that it looks as if the architect supposed they were immortal. If one of the plates in either of them should kink by reason of scale forming in the bottom it would be necessary either to take out a part of the main wall of the basement to let a workman get at the plate to remove it, or else take out the boiler flues in order to let him crawl into the boiler from the top.

In one of the more recent buildings, when they came to put in the boilers it was found that so little room had been left for them that some of the joists supporting the first floor had to be cut away so as to afford room for the steam dome and safety valve of the boiler, and the boiler was reduced in size so it will scarcely heat the building. The arrangement is for the return of the condensed steam from the heating system by gravity to the boiler, but the water level in the boiler is higher than the foot of the return pipes, and there is no check valve between the pipes and the boiler to prevent strong pressure in the latter from filling the former with water instead of steam.

Still another instance of how the architect did not take into consideration the necessities that must arise in operating a heating and power plant is afforded in the basement of another large block. The boiler tubes are 18 feet long, but the space in front of the boilers is only 6 feet and at the rear only 4 feet, and when it becomes necessary to take out any of the tubes and substitute another a hole must be cut in one of the walls of the building.

DETAILS OF BAY WINDOW CONSTRUCTION.

THE drawings here given show two methods of constructing bay windows, one being built in a frame wall, Fig. 2, and the other in a brick wall, Fig. 6. The bay window may be carried to the floor and ceiling, as shown in plan, Figs. 4 and 5, or it may finish on the inside wall of the room as one large window with a broad stool, forming a deep window seat, as in Figs. 7 and 8. In the latter case the head casing is finished as a paneled ceiling, as indicated by the dotted lines in Fig. 6.

Plain jambs may be paneled in wood, or plastered, according to the cost of the work. In fine work the jambs are often finished with pilasters carrying an arch or an entablature at the ceiling of the bay below the ceiling of the room. In the details, Figs. 4 and 5, are shown plain ordinary construction. A ground casing is shown on the inside of weight box, to which trim is nailed, and this should not be omitted except in very cheap work.

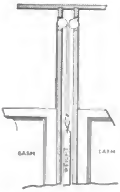


Fig. 1.—Method of Hanging Two Sash to One Weight.

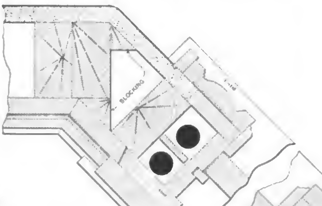


Fig. 4.—Section at A of Fig. 2.

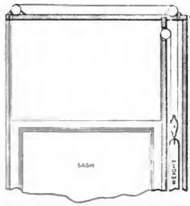


Fig. 3.—Showing How Sash May Be Counterbalanced with Pulleys When Weight Box is on One Side Only.

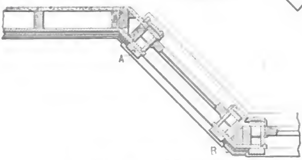


Fig. 2.—Plan of Bay Window in Frame Wall.

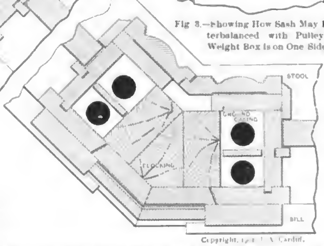


Fig. 5.—Horizontal Section Taken Through the Frame at B of the Plan, Fig. 2.

Details of Bay Window Construction.—Frame Wall.

The inside of the studs is lathed, and then plastered to the inside surface of the ground casing. The outside of the studs is covered with spruce or hemlock sheathing boards about 8 inches wide, laid diagonally, and well nailed to each stud. This is covered with a good quality of sheathing paper or quilt, and then receives the shingles or clapboards. If clapboards are used they should be securely nailed to each stud.

In the details, Figs. 7 and 8, is indicated the construction of a frame bay in a brick wall.

In Fig. 1 is shown the method of hanging two sash to one weight as required in the section, Fig. 8, owing to the necessity of having very small mullions. It is also necessary in this case to have lead weights made to fit the box, as the ordinary weight, heavy enough to operate both sash, would be too large.

Bays projecting from masonry walls should always be well anchored to them, and while there are several very good anchors on the market, the iron jamb screw anchor, as shown in Fig. 7, is largely used. Furring strips are set on the inside of the wall to receive the lath and plaster, and grounds are nailed to the furring to give a nailing for the trim and as a gauge for the plaster work.

In Fig. 3 is a section showing how a sash can be evenly counterbalanced with the aid of pulleys, when it may be possible to have a weight box only at one side. The details of heads and sills are not shown, as in construction they are in no way different from the heads and sills of plain windows.

The Cost of Heating Houses.

The constant worrying of people who, because they had purchased a furnace, expected to heat their houses with little or no fuel drove me, says a correspondent of the *Morning Oregonian* of Portland, to write the following article:

A well-known citizen, who lives in a large modern house, was complaining to a friend of the expense and inefficiency of present methods of heating, as compared with those in vogue "down East," when he was a boy; which methods consisted of a fire place in the sitting room and a big cooking stove in the kitchen, by means of which every one used to keep warm and correspondingly happy.

His friend, who is of a mathematical turn of mind, and who graduated "down East," by the aid of the heat from a fire place and a kitchen stove, reminded him that he had forgotten the icy blasts that used to sweep into the sitting room from the hall whenever the door was opened, and how his very toe nails used to turn blue with the cold on going to bed in the cheerless bedroom; and how it felt to crawl out of bed in the morning with hoar frost on the windows and ice frozen in the water pitcher. He then went on to say that houses were now better heated, had better plumbing and better water supply, and in every way were more healthful and cheerful places of abode than they ever were before, and then he proceeded to give him some bottom facts relating to heating houses, and the cost of fuel, and suggested that those who have heating systems in their houses cut it out and paste in their hats to refer to when the coal and wood bills begin to come in on the first of the month.

Were there no loss of heat from a room there would be no necessity for the using of fuel to warm it or keep it warm. In fact, were there no loss of heat by any source, our houses would retain the temperature generated by July weather, and in that case, instead of using coal and wood to keep us warm, we should be purchasing ice all winter to keep us cool enough. We find, however, by bitter experience that we do buy fuel to keep warm, as well as for other reasons, and, therefore, must conclude that our houses do lose heat.

There are three principal sources of loss of heat calculated by heating engineers—namely, loss by glass exposure, by outer wall exposure, and by hygienically necessary changes of air per hour whereby warm air is taken from the room and its place taken by chilly air. To maintain a temperature of comfort, with the outer air at an uncomfortable temperature, we must provide enough artificial heat to compensate for the losses above enumerated, as follows: For each square foot of glass surface we must provide 40 units per hour of heat (or the amount of heat needed to raise 1 pound of water 40 degrees F.) to maintain a temperature of 70 degrees F. in a room reasonably well built, with out of doors temperature at 30 degrees; for each square foot of outer wall surface 10 heat units, and for each 50 cubic feet of air 40 heat units. Now suppose, for example, we have a room 15 x 15 x 10 feet high, with two windows, 3 x 7 feet each, and two walls exposed to outer air. We would require for the maintenance of an inside temperature of 70 degrees, with outer air at 30 degrees, and no wind: For loss of heat by glass exposure, 42 feet, 1680 heat units; for wall exposure, 300 feet, 3000 heat units; for cubic contents, 2250 feet, or two changes per hour, 4500 cubic feet, 3600 heat units; or a total per hour for the room described of 8280 heat units. Now, supposing we have about seven rooms such as are described, it takes but slight skill in mathematics to demonstrate that we need per hour 57,960 heat units.

Allowing that coal is the fuel used in the generating of the artificial heat, the United States Government tests show that the maximum amount of heat obtainable from the best bituminous coal sold in the market is about 9000 heat units, and from the poorest about 5000, or an average of 7000. Dividing the total, 57,960 heat units, required per hour, by 7000, we find that about 8 pounds of coal is required per hour, were it possible to so burn the coal as to have absolutely no waste. Any large users of fuel of any description will tell you that if you can get 70 per cent. of its caloric or heat value from fuel you are far exceeding their obtained results with the best fuel saving devices known; but if we are optimistic enough to take it at 70 per cent. we still find that the fuel required for our seven-room house for 15 hours is 156 pounds per day. Of course, our winter weather is not always at 30 degrees, and perhaps we do not keep our house, in all seven rooms, at 70 degrees for 15 hours daily, in which case our fuel consumption will be proportionately less; but whether wood or coal be used its cost per 1000 heat units is about the same, and if the people who think they should burn no more fuel in the warming of their newly erected palatial mansion of 12 or 15 rooms, about half of which consist of outer wall and glass surface, than they used to burn to heat the kitchen, dining room and sitting room with the range and a fire place or an air tight, will refer to the facts they will find that under ideal conditions of building and heating it requires 4680 pounds of coal per month to heat a house of seven rooms to a temperature of 70 degrees, with an outside temperature of 30 degrees, and if they are getting along on a less amount of fuel than that they are doing better than they have a right to expect.

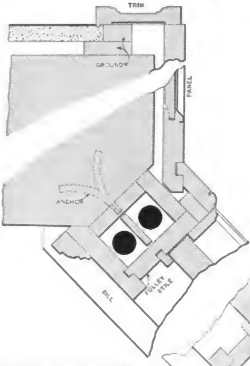


Fig. 7.—Detail Showing Horizontal Section through Window Frame and Brick Wall at C of the Plan

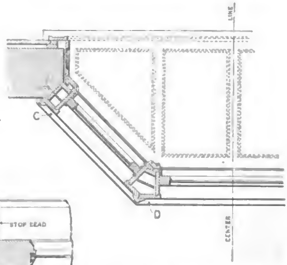


Fig. 6.—Plan of Bay Window in Brick Wall.

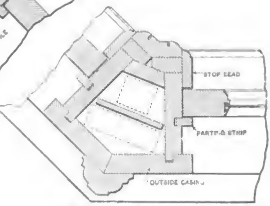


Fig. 8.—Horizontal Section at D of the Plan.

Details of Bay Window Construction.—Brick Wall.

A good story is told by an English trade journal of a master builder, who, having heard that the men did not start work at the proper time, thought he would drop down about half-past six one morning and see. Going up the yard he caught sight of a joiner standing smoking, with his kit not even opened. Simply asking his name, which he found to be Malcolm Campbell, he called him into the office, and handing him four days' pay, ordered him to leave at once. After seeing the man clear of the yard, he went up to the foreman and explained that he had made an example of Malcolm Campbell by paying him off for not starting at the proper hours. "Great Scott, sir!" ejaculated the foreman, "that chap was only lookin' for a job."

Drawing an Ellipse.

A method of drawing an ellipse of any size when the circumference is given is described herewith. There are several ways of defining the ellipse. In appearance it is similar to a circle, but has one diameter greater than the other, the two diameters, or axes, as they are termed, being at right angles to each other. The proportions of the shorter diameter or minor axis of the ellipse to the major axis may vary from a length almost equal to the major axis down to a distance next to nothing. In other words, an ellipse may be nearly round or it may be very much elongated. It must be borne in mind, however, that whatever may be its

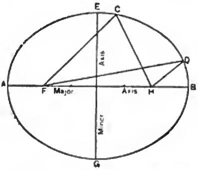


Fig. 1.—Illustration of an Ellipse.
Drawing an Ellipse.

proportions, it is an exact figure; and that whatever method be employed in describing it, the result will be the same as that obtained by any other regular method.

If upon one of two lines intersecting each other at right angles one-half the greater diameter be set off each way from the intersection, and upon the other one-half the shorter diameter be similarly set off, the four principal points of the ellipse will be established; and although the outlines of several oblong figures may be made to pass through these four points, only one perfect ellipse can be drawn through them. Its shape is such that the sum of the distances from two fixed points on the major axis, called the foci, to any point in its perimeter is the same as the sum of similar distances measured to any other point in its outline.

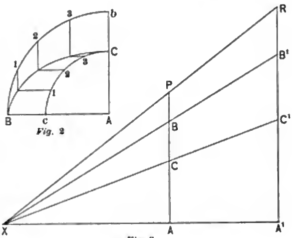
In Fig. 1 of the annexed diagrams F and H are the foci, and their positions are determined in the following manner: With one-half the major axis as radius and E or G as center strike arcs, cutting the major axis in either direction at F and H. Then F and H will be the foci of the ellipse, and the sum of the distances from these two points to any point in the perimeter, as C, will be equal to the sum of the distances from F and H to any other point, as D. The ellipse may therefore be drawn in the following manner: First place a pin at each of the foci, and a third one at E or G. Now pass a cord around the three pins and fasten the ends together, then remove the pin at E or G and, substituting a pencil for it, pass the pencil around the two remaining pins, keeping the cord taut. The ellipse is also an oblique section of a cone of a cylinder, and may be derived by making projections from the same at any desired angle.

There are several methods of approximating the form of the ellipse by means of arcs of circles, but as such figures are only approximations they are not to be regarded as ellipses.

The circumference or perimeter of an ellipse may be computed in figures from the major and minor axes when their lengths are known—viz.: Add together the squares of the two diameters and multiply the square root of half the sum by 3.1416. Thus, if the major diameter is 8 and minor 6, their squares are 64 and 36, the sum of the squares is 100, and half the sum of the squares is 50. The square root of 50 is 7.071, which multiplied by 3.1416 gives 22.2142, the required perimeter. It is proper to state first that no ellipse, be its circumference known or unknown, can be drawn until the relative proportion between the two diameters is established; but as this may be easily fixed without reference to actual dimensions, the major diameter may be made 2, 3 or 4 times the minor, or they may be to each other as 2 is to 3, 3 to 4, &c., at pleasure. Under these conditions, then, the operation of finding the circumference above given may be reversed in the following manner: Suppose that the given circumference is 24, and that the ratio of the two diameters is as 3 to 2. Twenty-four divided by 3.1416 gives 7.65, the square of which is 58.5. Two times 58.5 are 117, which is the sum of the squares of the two required diameters. This sum must now be divided so that the square roots of the factors shall be to each other as 3 is to 2. Therefore, obtain the sum of the squares of 3 and 2 as in the first operation. $3 \times 3 = 9$. $2 \times 2 = 4$. $9 + 4 = 13$. Dividing 117 by 13, we obtain 9, which, multiplied respectively by 9 and by 4, gives 81 and 36. These factors then are the squares of the required diameters. Therefore 9 and 6 are the two diameters of an ellipse whose specified circumference is 24.

The problem may, however, be solved in a manner more in accordance with pattern cutters' methods—viz.:

Supposing the relative lengths of the two diameters of the desired ellipse are to each other as A B and A C of Fig. 2. First set off those distances on the two arms of a right angle, as there shown, and draw the quarter ellipse B C by any regular method. In the absence of a trammel for the purpose, perhaps the simplest method is to draw from A, as center, two quarter circles B *b* and C *c*, whose radii are A B and A C. Divide each quarter circle into the same number of equal spaces, numbering the points in each to correspond. Now from each of the points in the outer arc drop vertical lines intersecting lines of corresponding number drawn horizontally from points in the inner arc. The quarter ellipse may be traced through the points of intersection. Next draw any horizontal line, as X A' in Fig. 3, and at any convenient points, as A and A', erect two perpendiculars. Upon the perpendicular at A set off from A the length or stretchout of the quarter ellipse B C, as shown by A P. Also set off the distances A B and A C of Fig. 2, as shown by A B and A C. Now upon the perpendicular at A' set off one-quarter of the length of the given perimeter for which it is desired to find the diameters, as shown by A' R, and from R draw a straight



Diagrams Showing Method of Drawing an Ellipse from a Given Perimeter.

line through P, continuing the same till it intersects the base line prolonged, as at X. Finally, from X draw lines through points B and C on the perpendicular A and continue them till they cut the perpendicular at A', at points B' and C'. Then will A' B' and A' C' be respectively one-half the major and the minor axes of the desired ellipse.

THE first stone of Cologne Cathedral was laid on August 15, 1248, and the body of the edifice was not opened until August 15, 1848, 600 years later to the very day. It was not, however, until August 15, 1880, that the splendid structure was finally completed, having thus occupied in building the "record" time of exactly 634 years.

New Publication.

MILL BUILDING CONSTRUCTION. By A. G. Tyrell. Published by the Engineering News Company, 1901.

This little book of 40 pages is divided into three chapters, and goes straight to the matter in hand without preface or prefatory note. The first chapter deals with Loads, with paragraphs devoted to roof loads, floor loads, crane loads, snow and wind loads, miscellaneous loads, and a summary. There are two diagrams showing weights of roof trusses. In the summary there is a table giving the weight in pounds per square foot of seven different styles of roof construction. A table showing the weights of merchandise, taken from C. J. H. Woodbury's book on "Fire Protection of Mills," gives 37 items, with weight in pounds per cubic foot, so that pressure on floors sustaining such material in bulk can be estimated. A table is also given which shows the weight in pounds which will come on end wheels of traveling cranes when fully loaded trolley is at the same end. The chapter concludes with a table giving the normal pressures from wind on roofs of different slopes, for an assumed pressure of 30 pounds per square foot against a vertical plane.

Chapter II deals with General Design, and enumerates some general considerations. Walls and roof trusses, with sketches of seven forms of common roof trusses, are given, followed by remarks on spacing of trusses, jack rafters, and roof coverings, the latter paragraph containing a table showing the least pitch of roof required for various kinds of roof coverings, 12 of which are enumerated. Next come considerations of Truss Connections, Rafters, Bottom Chords, Purlins (with sketch of clip connection between purlin and rafter), Unit Stresses, Lighting and Ventilation, and the Estimating of Cost. This latter paragraph contains a very useful table of approximate prices for brick work, rubble masonry, earth excavation, steel beams, sash glazed and painted, pipe railing, corrugated iron roof, &c., 37 items in all, covering practically the whole field of ordinary mill construction. We are told that, "Roughly speaking, the cost of one-story buildings complete is, for sheds and storage houses, 40 to 60 cents per square foot of ground; and for such buildings as machine shops, foundries and electric light plants, that are provided with traveling cranes, the cost is from 60 to 90 cents per square foot of ground covered."

The third chapter is concerned with the Design of Structural Details, and is illustrated throughout. Foundations and anchorage, with table, is the opening paragraph, after which follows ground floor construction, in which the method of making floors of concrete, asphalt and wood, either separately or in combination, is discussed and illustrated. Under the head of Upper Floor Construction the writer gives information on steel trough floors, steel girders and timber floors, with illustrations. The "slow burning wood floor" is a form of construction entirely of wood, the idea being to concentrate the timber into the least number of large pieces, so that a minimum surface will be exposed to the attack of flames. It is based upon the principle exemplified by the fact that books, which are composed of easily inflamed pages, burn most slowly, especially if placed upon shelves where the surface exposed is the least possible. The illustration of a slow burning wooden floor shows joists 10 x 12 inches spaced about 8 feet centers and covered with 5-inch floor planks.

Roof coverings are very fully specified, with tables of size and weight. Among the various kinds may be mentioned slate roofing, asphalt, slag and gravel, corrugated iron, sheet steel, crimped, sheet roll, tin and terne plate, metal shingle, rubber, asbestos, and wood shingle roofing, with a table of comparative cost.

The concluding ten pages are devoted to miscellaneous structural details, well illustrated, and containing numerous useful tables.

Altogether the book contains information of value to the designer and contractor, as well as being useful to the prospective mill owner, or others concerned in the construction, repairs or maintenance of such buildings as are here described.

The Hampton Institute.

WE have received the thirty-third annual report of the Hampton Normal and Agricultural Institute of Hampton, Va., covering the year ending June 30, 1901. This report shows that the institution is doing excellent and valuable work imparting instruction in the trades to colored youths. During the past season 165 students were taught the blacksmithing, wheelwrighting, carpentry, painting, tinsmithing, steam fitting, machinists', brick laying, shoemaking, tailoring and upholstering trades in the Armstrong-Slater Trade School, which was opened a few years ago as a memorial to the late General S. C. Armstrong, the founder of the Hampton Institute. The industrial department of the institute is given special prominence in the curriculum of the school. Since 1868, when the school was founded, about 5000 young men have gone out of the institution equipped with the wherewithal to earn their living at some manual trade. Of the students who have been taught trades about 70 per cent. are said to be now either working at them or teaching them. Many of these have opened shops in various parts of the South, and have succeeded in building up a good business and thereby earning more than a competence.

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VIEW IN STAIRCASE HALL IN RESIDENCE OF MR. FREDERIC CLOSS CLIFTON, CINCINNATI, OHIO.

DORNETTE & SHEPPARD ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1901

BRICK RESIDENCE OF MR. FREDERIC CLOSS, IN CLIFTON, A SUBURB OF CINCINNATI, OHIO.

DORNETTE & SHEPPARD ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1901

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