CARPENTRY AND BUILDING

VOL. XV.—1893.

NEW YORK:
DAVID WILLIAMS
96-102 READE STREET.

INDEX.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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JANUARY, 1893.

Modern Steel Frame Construction.

A feature of construction which is becoming prominent in various parts of the country in connection with the erection of tall buildings designed for office or other purposes is to make the frame-work or skeleton of iron or steel, and incase the supporting members in masonry of brick, terra cotta or stone. This method, which may be designated as steel frame construction, possesses advantages which render it especially adapted for use in locations where ground space is an important consideration, and where buildings are run up to a great hight. An interesting example of a building constructed on this plan is shown in one of our supplement plates. the picture representing the Betz Building of Philadelphia as it appeared during the process of erection. The construction employed in connection with buildings of this character has excited the attention of the architectural and engineering papers not only in this country, but in foreign lands as well. Our English contemporaries, however, do not apparently regard this system of construction with any great degree of favor, although they seem to recognize the advantages of such a method, viewing it from a purely business standpoint. Some of the foreign papers commenting upon the subject have gone so far as to designate this form of architecture as a "business style" in contradistinction to those styles laid down in books and everywhere recognized by writers on architectural topics.

English Comments.

The London *Builder* in its issue for October 15 of the year just closed, commenting on the building which we illustrate this month, gives expression to the following:

"As to the 'architecture' which surrounds this mass of steel-framed business burrows, the architect, W. H. Decker of Philadelphia, defines it as 'modern Romanesqe,' elaborately ornamented. This description seems really to mean a variety of Richardsonesqe, with the inevitable three colonnettes in a row, and blocks prepared for carved capitals on the Byzantine-like outline with flat carving which Richardson brought into vogue. From the make of the floor framings it was evident that above the second floor the building was to be carried up to considerable hight in that kind of system of a series of lofty bay windows, repeated through several stories, which is rather a favorite with the architects of these tower-like American office blocks. Probably, on the whole, the architectural treatment will be fairly representative of the best class of American city buildings of this type. The question raised in the English mind is as to the *rationale* of the whole system. This deliberate building up of masonry architecture, for mere conformity with precedent, around a structure which is independent of it, seems an extraordinary example of the force of heredity in architecture. Why build up all this granite and carved stone screen around the real structure, merely as a concession to ancient superstition? This certainly is not architecture in any true sense. It would surely be more reasonable to treat the work as a steel structure with terra cotta filling, where filling was required, and show the steel piers, and endeavor to find an appropriate artistic treatment of such a structure, instead of building an inappropriate one around it. As the thing stands, it represents one of the most audacious and costly descriptions of sham which the history of architecture has to present."

A Philadelphian's Views.

A gentleman connected with the architectural and trade press in Philadelphia, who has watched the progress of the Betz Building from day to day since it was started, and who has read the comments made thereon by the London journal named, writes us as follows: "The *Builder* thinks this system of construction 'one of the most audacious and costly descriptions of sham which the history of architecture has to present,' and asks 'Why build up all this granite and carved stone around the real structure merely as a concession to ancient superstition?' The charge of audacity is only what might be expected from our English friends, who seem to be bound in everything so closely by precedent, but the charge of 'concession to ancient superstition' is, to say the least, a little surprising. The American people are so familiar with improvements that they readily fall into changes, and are inclined, perhaps, to sometimes give too little thought to precedent. If, to-morrow, it were found to be really more advantageous to build from the roof down, it is certain that such a system would readily be adopted, ancient 'superstition' notwithstanding.

Where is the Sham?

"Where is the sham in using steel framework in the construction of buildings? The iron frame is simply the skeleton over which the flesh and outer skin of brick and stone are built, and it is not 'sham' architecture because the 'skeleton' is concealed. It must be remembered that in office buildings light is a very essential requisite and large windows are necessary. Piers of brick and stone are not strong enough to hold up 12 or 14 story structures if large window space is given. A simple calculation of the crushing strength of brick and stone will show that very large piers would be necessary to carry the weight of such high structures, and the practical effect of this would be that the offices would be so dark that they would not rent. But more important than this are the requirements of fireproof construction. It has frequently been noted that the great objection to iron or steel is the liability to bend under heat, with the subsequent collapse of the building. Hence the structural iron work must be concealed beneath a fire-proof and slow combustible substance. Experience has taught that brick work or terra cotta fulfills these conditions and its use is a structural necessity and very far from a sham, as the *Builder* supposes."

Hygiene and Sanitation.

One of the features of the Department of Liberal Arts at the World's Columbian Exhibition, to be held in Chicago, is a Bureau of Hygiene and Sanitation, which has been organized to prepare a collective exhibit illustrative of the present condition of sanitary science. We understand that the aim of this bureau will be to show as fully as possible the position at the present day of the theory and practice of hygiene, and to this end it is expected that universities and colleges, boards of health, scientists, inventors, manufacturers and the public generally will heartily co-operate in the endeavor to make the exhibit worthy of the science and of the country. It is natural to expect that with such varied sources of supply a great diversity of results will follow. The general classification of the Bureau of Hygiene and Sanitation shows a wide range. That of dwellings embraces buildings, or large models of buildings, in connection with which will be indicated defects and unsanitary conditions, as frequently found in houses; proper modes of building, draining, ventilating and warming houses on sanitary principles; school houses of sanitary but economical construction, tenement houses, flats, city and country residences, club houses, court rooms, theaters, churches, &c. Another division is that of Hygiene of the Workshop and Factory, and this department of the Columbian Exposition is likely to be one in which architects, carpenters and builders generally will be greatly interested.

The Armour Institute.

For some time past there has been in course of erection in Chicago an ornamental structure five stories in hight, the purposes of which have only recently become known to the general public. This structure is intended as a manual training school known as the Armour Institute, and represents, with a handsome endowment, the gift of Philip D. Armour, well known to the commercial world from his connection with the meat-packing interests of the west. The building is 175 x 65 feet in size and is divided by heavy fire walls into three portions of nearly equal area. The exterior is Romanesque in style of architecture and so designed as to give an imposing effect. The basement and first story are of brown sandstone, while the upper portion is of red pressed brick and terra cotta. The structure is covered with a steep slate roof, which rises to a hight of 126 feet. What is known as the south pavilion will be used for manual training, the rooms being finished as workshops and equipped with the appliances necessary for the purpose. There is also a machinery room, a hand workshop and one for wood-working purposes. In a one-story wing of the building are engines and boilers, one Corliss engine being used to run machinery and the other the electric-light plant. It will be a part of the course of instruction to teach the students the practical operation of steam engines, pumps and electrical appliances, and for this reason all such machinery will be placed where it will be open to inspection. The library is a room 54 x 60 feet, with ceiling 15 feet in hight and magnificently lighted on three sides. There is a capacity for 25,000 volumes. There will also be classrooms, mechanical and physical laboratories, lecture rooms, gymnasium and departments devoted to cooking and dressmaking. Mr. Armour's idea of manual training is that it shall be taught in such a way that the muscles shall not be more thoroughly trained than the moral character and the perception of truth and duty. The teachers will form a faculty of the highest standing obtainable in the country. The library will be supplied with books bearing not only on the English language and literature and the more polite fields of learning, but also on the theory and practice of the steam engine and those things which are supposed to be more in the line of manual training schools. The cost of the building, exclusive of furniture, is over $200,000, and it is expected that it will be ready for occupancy by September 1 next.

A Proper Attitude.

The Builders' Exchange of Buffalo sets an excellent example to all associations of employers in its dealings with the labor problems and the relationships between employer and workman. No opportunity is neglected to improve the knowledge on both sides of the obligations that each owes to the other. During the past month a communication was received by the Buffalo exchange from the Building Trades Council of the city asking for the appointment of a committee to confer with a committee of the council upon matters of importance. It was the unanimous opinion of the directors of the exchange that the request be granted and the conference held. As the result of this action the two came together and transacted their business in the utmost harmony and with renewed feelings of security and confidence in each other. Such a course as this could be followed with profit by every organization of employers in the country, for it is unquestionably easier to adjust matters upon which there is a difference of opinion than it is to settle a dispute or quarrel. In the majority of cases where a difference occurs between workmen and employers, some kind of a meeting is sooner or later bound to take place, and it is much better for all concerned to meet with feelings of friendliness and a desire to correct at once any wrong that may exist, than to wait until forced into unwilling meeting when the mental attitude of each side prevents justice prevailing.

The Past Year.

It appears from correspondence with the secretaries of the various builders' exchanges in the more important cities throughout the country that the year just closed has been a generally satisfactory one, both from the standpoint of profitable business and that of the relationships between employers and employed. The closing year marks the end, it is thought, of the period of depression which has existed in a greater or lesser degree in the building business in the territory lying between the Mississippi River and Rocky Mountains, in which district the builders appear to be assured of an improved condition of affairs in 1893. Throughout the Middle States and extreme East business has been steady and profitable, and builders evince a feeling of satisfaction at the result of the season's work. Leaving out New York City and the great granite region of New England, the past year has been remarkably free from labor troubles. The questions of difference between employers and workmen are being treated more intelligently every day, and where in the past abrupt demands were the custom, preventive measures are now being taken by both sides. Arbitration is taking its proper place as the best solution of questions that must and should be solved in harmony and amicability. Good wages have prevailed in a large majority of the cities, due in a measure to the joint action of employer and employed, rather than to the power of the demands of the unions, as was frequently the case in other years. In the business methods of builders a gradual and steady change for the better is taking place. Recognized codes of practice establishing honorable methods and relationships between the builders themselves, and between builders and architects, governing the treatment of bids and similar business conditions, are being brought into operation, to the great benefit of all concerned. The new year seems to promise well as regards business, and if the same rate of progress is maintained in the future with relation to the treatment of labor questions, builders and workmen may begin to hope that positive security from upheaval will soon become an established fact.

The Williamson School.

The Williamson Free School of Mechanical Trades, founded by Isaiah V. Williamson, for the purpose of giving poor and deserving boys a good English education, for training them in habits of morality, economy and industry and for teaching them mechanical trades, is now in operation in Delaware County, Pa. Each scholar is given a preparatory course in wood working and mechanical drawing, in connection with studies in the schoolroom, and extending through six months. At the end of that period he is placed at one of the following three trades, the selection of which is made by the trustees, due regard being given to the inclination and adaptability of the boys to the trades to which they are assigned. Wood working in its various branches, such as carpentering, pattern making, cabinet making, &c.; building, including bricklaying, tile, range and boiler setting, &c., plastering and stone masonry; machine trade, in all its usual details, including practical training in steam and electrical engineering, steam fitting, &c. Each scholar takes but one of the trades named, and his instruction in mechanical drawing, which continues during his entire course, tends in the general direction of his trade.

Manual Training.

The training of young men in the manual arts is receiving more and more attention at the present day, and it is evident to the most casual observer that a course of study of this character is calculated to strengthen and develop the youth of the country in a way nothing else can, while at the same time fitting them to comprehend and direct the industrial progress of the age. Manual training does not consist merely in the ability to make different things, but is rather to be associated with instruction in the usual course of studies. A proper estimate of its value can only be determined when it is considered with reference to its place and share in the general education of the young men of the land. Discoursing upon the general subject of manual training in schools, Prof. James McAllister, principal of the Drexel Institute, advances the idea in a paper lately read before the Schoolmasters' Association, that the power and strength of the present civilization depends upon its industrialism quite as much as upon intellectual attainment. Critics of manual training in the schools, he says, object to the use of tools. The latter, in his estimation, hold the same place in manual training that apparatus does in physics or vessels in chemistry. In the hands of an artisan, says Professor McAllister, the tool is a noble instrument. The man who uses tools to build an engine fit to drive a great ship or factory puts them to grand use. The tools and the man are now the epic of the world, not "arms and the man." In an industrial age tools are the best instruments of education. The use of tools properly directed furnishes a means to clear perception. It gives to the man a training for the perceptive powers; it contributes to stronger and more active intelligence in dealing with questions of all kinds, and it helps a boy more than anything else to do a thing as it should be done. The useful activity of mind cultivated by the right kind of manual training fills young men with the spirit and tendency of the times. It disposes them toward broad, practical views of social and economic questions. They are trained to deal with everything from an enlightened standpoint and are helped to realize in themselves the ideal of a full and harmonious development.

COTTAGE OF A. B. BARKMAN AT FOREST HILL, NEW JERSEY.

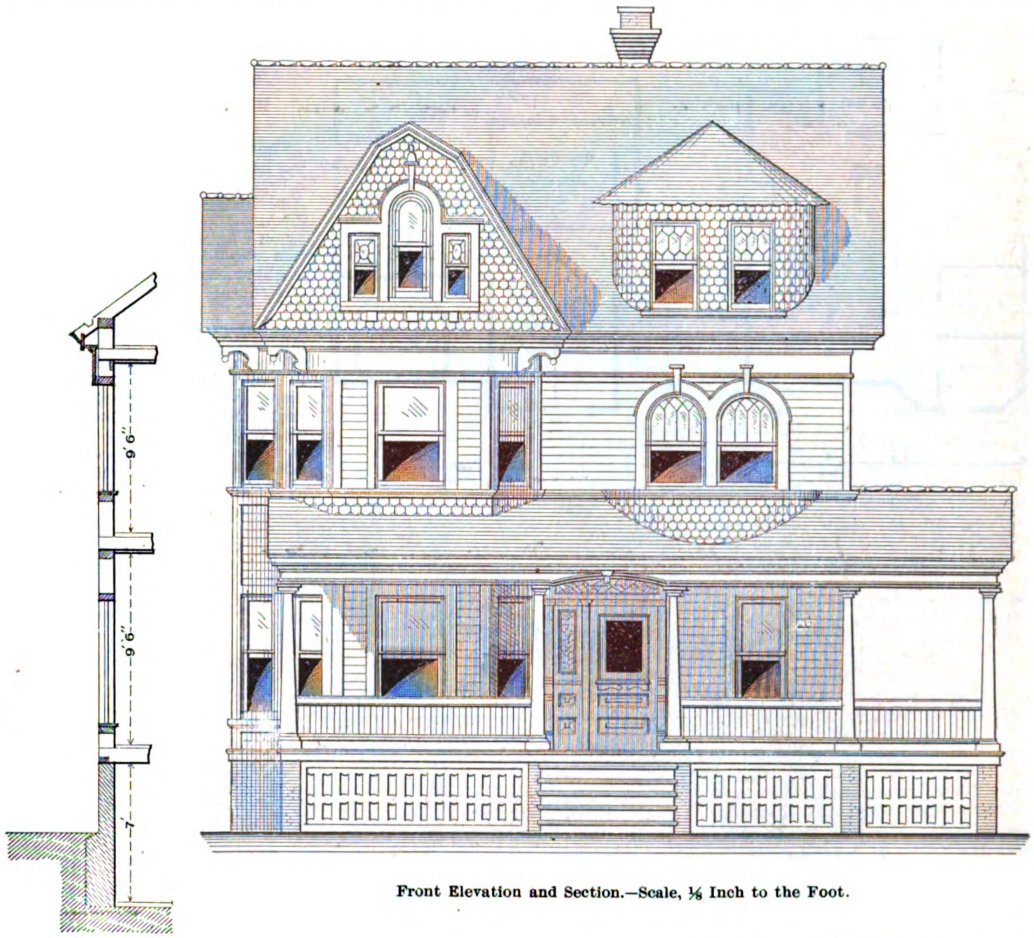
H. GALLOWAY TEN EYCK, Architect

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1893.

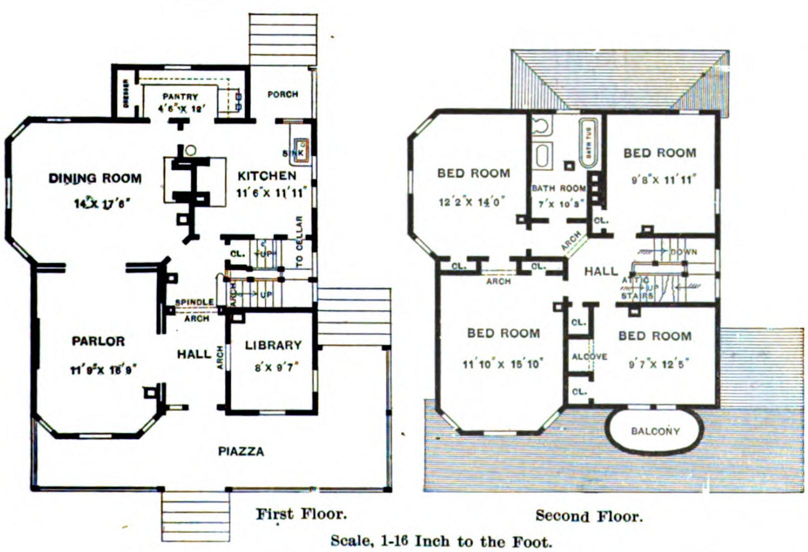
A SUBURBAN COTTAGE.

THE two-story frame cottage which we illustrate by means of elevations, floor plans and a selection of details, was erected last winter for A. B. Barkman at Forest Hill, a suburb of Newark, N. J., from plans prepared by H. Galloway Ten Eyck of Market and Broad streets, Newark, N. J. This suburban residence, a general view of which is presented in one of our supplement plates, is thoroughly built throughout, and from an inspection of the floor plans is seen to provide four commodious apartments on the first floor and the same number of sleeping rooms, together with a bathroom upon the second floor.

The cellar has a hight of 7 feet, the first story 9 feet 6 inches, the second story 8 feet 6 inches, and the third story or attic 8 feet. The timbers employed are of the usual size for structures of this kind, the building being sheeted with 1-inch hemlock boards, put on diagonally. These are covered with clear white pine clapboards and shingles are used as indicated in the elevations. The roof is covered with cypress shingles.



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

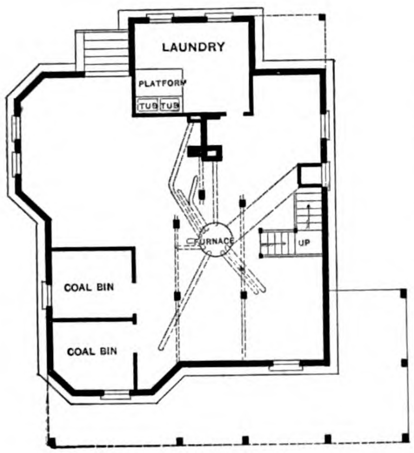


First Floor. Second Floor.

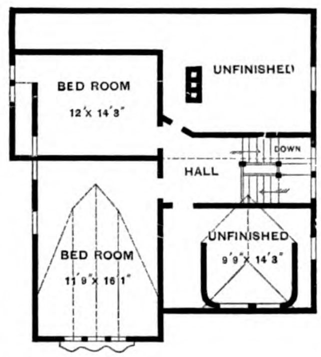
Scale, 1-16 Inch to the Foot.

A Suburban Cottage.—H. Galloway Ten Eyck, Architect, Newark, New Jersey.

Referring to the first-floor plan, it will be seen that there are rooms on each side of the main hall, which is reached from a piazza extending across the front and partly upon one side of the house. At the right of the hall is the library, which is entered through an arched opening. To the left of the hall is the parlor, with bay window extension, while in the rear is the dining room, the two apartments being connected with folding doors. In each of these rooms is a quartered oak mantel, the dining room being provided also with an open fire place, with tile hearth. The position of the kitchen is such that the front door of the house may be reached without passing through other rooms, a feature to be commended, and also one which cannot fail to be fully appreciated, especially by those employing servants. Direct communication between the kitchen and dining room is established by means of a door, and indirectly through a commodious pantry, fitted with the modern conveniences. Ascending to the second floor, the four sleeping rooms are found arranged in such a manner as to be readily accessible from the hall while utilizing space to the best advantage. The main stairs ascend from a point directly in the rear of the library, and reach the second floor at a point which is practically the center of the house. The bathroom is at the rear, between two sleeping rooms, and in close proximity to chimney flues. It is fitted with the latest sanitary specialties, the plumbing being exposed and the fittings of brass nickel plated. The trim throughout the house is of white wood, finished in natural color. The staircase is of ash, while the sash by the front door and the staircase landings are glazed with colored leaded glass, producing pleasing effects. The heat is furnished from a hot-air furnace, the position of the registers being indicated on the floor plans. The laundry, it will be observed, is in the basement. This house, we understand from the architect, can be built in Newark for $3,800.



Basement Plan.



Attic Plan.

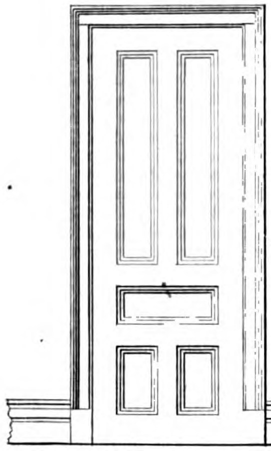
Side (Right) Elevation.

A Suburban Cottage.—Basement and Attic Plans.—Scale, 1-16 *Inch to the Foot. Elevation.—Scale,* 1/8 *Inch to the Foot.*

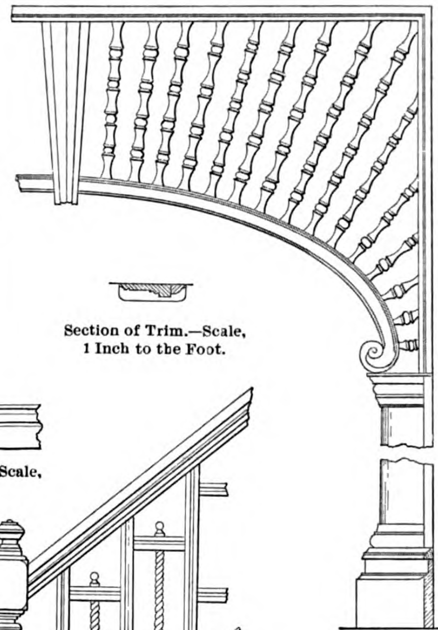
AN ADDITION having a frontage of 30 feet and a depth of 60 feet is being made to the house of Architect T. F. Schneider of Washington, D. C. The new building will be three stories in hight, constructed of white Indiana limestone and finished with a tower. The front room on the first floor will be used as a reception room, at the back of which will be a studio 35 x 30 feet, and having a hight of 22 feet. On one side will be a stone arch 17 feet wide resting on triple columns, it being the intention to have a recessed fire place beneath the arch with circular nooks at each side. Running from one of these nooks will be a winding staircase of bronze leading to a gallery over the fire place and looking into the studio under the arch. We understand that when this addition is completed Mr. Schneider's house will be one of the largest in the city.

What Constitutes a Building.

The question of what constitutes a building has frequently come up in the English courts, and is one of no little interest to American readers. It has recently been discussed in one of our foreign exchanges by an English lawyer, who says the question should, perhaps, be put as, "What ought to be a building—that is, what sort of structure ought to be built up of walls, of brick or stone, with a slate or tile roof and proper foundations, instead of being put together with timber? The last case of the kind was certainly a bold attempt to evade the statute. The structure in dispute was a large erection, part shop and part timber stage. The defendant's case was that, being merely a timber stage, it could not be a "building" within the act. But from the evidence it appears that the structure is 17 feet wide, 42 feet long and 32 feet high. It stands upon timbers for a foundation, and has revolving shutters at the lower portion, and in these are retailed, besides lengths of timbers, various wooden manufactured goods, such as step ladders, cornice poles, meat safes, &c. The magistrate went into the facts, and pointed out that each case must be decided upon its merits. He was not going to hold that all timber stages are buildings. But this was a good deal more than a timber stage, for it was permanently used as a shop, and even had revolving shutters in front for that purpose. It is true the sides of the structure were left open, but that was really done for the convenience of its owner, and did not in the least degree alter the fact that the structure in its lower portion was used and occupied as a shop, and that permanently. More than this, the structure was in the High-street, Kingsland, and so it abutted upon houses and shops in which many people resided. So the order was made that the requirements of the district surveyor be complied with, and thus the ingenious argument that this wooden stage and shop over 30 feet high did not come within the act as a building has, so far, failed."

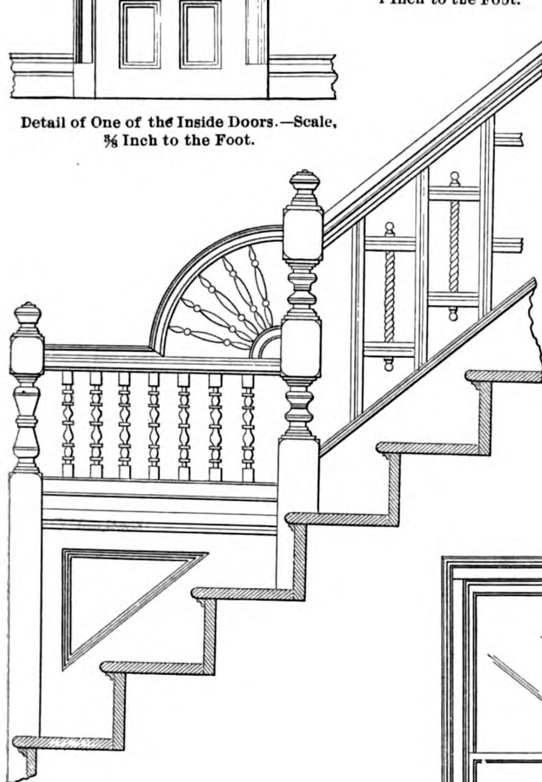


Detail of One of the Inside Doors.—Scale, ⅜ Inch to the Foot.



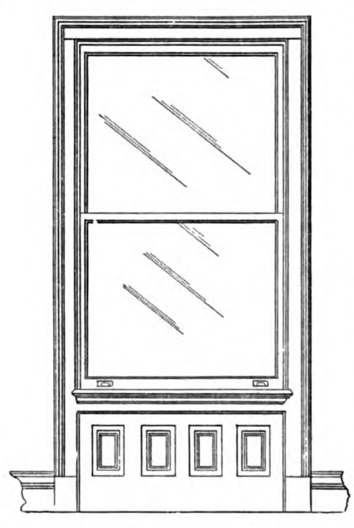
Section of Trim.—Scale, 1 Inch to the Foot.

Detail of Arch in Hall. — Scale, ¾ Inch to the Foot.



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

Section of Base.—Scale, 1 Inch to the Foot.



Detail of Panel Back Windows.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Suburban Cottage.

Steam or Hot Water for Greenhouse Heating.

In order to determine whether steam or hot water is the best for heating greenhouses, a series of experiments were made at the Agricultural Experimental Station in connection with Cornell University a short time since in which the following conclusions were reached : 1. The temperatures of steam pipes average higher than those of hot-water pipes throughout the entire circuit for the entire period of test. 2. The higher the inside temperature in steam pipes the less is the proportionate warming power of the pipes at a given point. The heat is distributed over a greater length of pipe, and as steam is carried at a higher temperature than hot water, it has a distinct advantage for heating long runs. 3. When no pressure is indicated by the steam gauge, the difference between the temperatures of the riser and the return is greater with steam than with hot water. 4. Under pressure the difference is less with steam than with hot water. 5. There is less loss of heat in the steam risers than in the hot-water risers, and this means that more heat in the steam system is carried to the further end of the house, and more is spent in the returns as bottom heat. 6. This relation is more uniform in the steam risers than in the hot-water risers, giving much more even results with steam than with hot water. 7. When the fires are operative the fluctuation in the temperature of the risers at any given point is much greater with hot water than with steam. 8. An increase in steam pressure raises the temperature in the entire circuit, but the temperature does not rise uniformly with the pressure. 9. The first application of the pressure increases the temperature of the returns much more than that of the risers. 10. Steam is better than hot water for long and crooked circuits. 11. Pressure is of greater utility in increasing the rapidity of circulation of steam and in forcing it through long circuits and over obstacles. 12. Unfavorable conditions can be more readily overcome with steam than with hot water. 13. Hot water consumed more coal than steam, and was at the same time less efficient. This result would probably be modified in a shorter and straighter circuit with greater fall. 14. Under the conditions here present steam is more economical than hot water and more satisfactory in every way, and this result is not modified to any extent by the style of heaters used.

The Mercantile Club House.

The new building of the Mercantile Club, which is to be located on Broad street, Philadelphia, is expected when finished to be one of the finest and most complete establishments of its kind in the Quaker City. The structure will cover an area of 175 x 60 feet and when completed will have entailed an expenditure of nearly $500,000. The building will be modeled after the Colonial style of architecture and constructed of Pompeian brick, terra cotta, Indiana stone and granite. The ground floor will contain a number of rooms essential to the convenience of members of a club of this kind, the banquet hall having a capacity for over 1200 people. One of the leading features of the building will be an entertainment hall, fitted up with all the appointments of a first-class theater. On this floor will also be a library, reading, reception and conversation rooms, together with private dining rooms and a large buffet. The third floor will be devoted to billiard, chess and card rooms, while the fourth floor will be given up to gymnasium, baths, servants' rooms, &c. The entire structure will be as nearly fire proof as possible, heated by steam and lighted by electricity.

MODERN STEEL FRAME CONSTRUCTION.

THE BETZ BUILDING. (For Illustration see Supplement Plate.)

IN THE more important cities of the country, where ground space is costly and large office buildings are carried to a great hight, often extending upward for 14, 16 and 18 or more stories, a form of construction is employed which is attracting no little attention, both in this country and abroad, and which seems likely to be adopted in all places where light and space are important considerations. The system has been largely used in the erection of many of the tall edifices which constitute such an interesting feature of Chicago architecture, and by many this plan of putting up buildings has been designated as "Chicago construction." The system consists essentially of a framework of steel or iron girders, columns and joists connected together in much the same way as they would be in a bridge, but without struts or ties, while the floors, roofs and partitions are formed of hollow brick or terra cotta. The exterior walls are put up entirely independent of the iron work, and are, therefore, considerably lighter in construction than would be the case if they were required to sustain the weight of upper stories. In many cases the walls of the latter, however, are carried by the steel frame-work independently of the walls below, but this is the exception rather than the rule.

As affording our readers a very good illustration of this form of steel frame construction, we present in one of our supplement plates a view of the Betz Building in Philadelphia, reproduced from a photograph taken during the process of construction. An interesting feature of this picture is that it shows the greater portion of the skeleton work without the encasing masonry. It will be remembered that a strike among the New England stone cutters occurred during the past summer which delayed the work of the masons on practically all jobs in the Eastern States, while in the case of the Betz Building no stone could be obtained for a number of weeks. This condition of affairs however, did not prevent the iron workers from continuing, and on July 1 of the year just closed the building presented the rather extraordinary appearance of a lofty skeleton framework of steel raising itself above surrounding buildings, as indicated in the picture.

THE BETZ BUILDING.

The Betz Building, located in the heart of Philadelphia adjoining the U. S. Mint and immediately facing the Public Buildings, is 13 stories in hight, exclusive of the basement and cellar It has a frontage of 104 feet 2 inches on Broad street, and a frontage of 100 feet 2 inches on South Penn Square. The hight from the pavement to the top of the cornice is 220 feet. The walls of the lower stories are erected in granite and the remainder in limestone. The main columns are octagonal in section, and are supported by blocks of stone 3 feet 4 inches square and 2 feet deep, the stones resting on beds of concrete. The main girders carrying the floor joists are 20-inch steel beams, 80 pounds to the foot, and rest on steel base plates on the center of the columns. All of the girders are tied together at the joints by steel plates ½ inch thick, measuring 24 x 16 inches, one on each side, secured with bolts, there being 12 ⅞-inch bolts to each joint. At the sixth floor level the steel girders in the east and south party walls are of two 15-inch steel channels, 32 pounds per foot, with ¾ x 9 inch steel plates top and bottom set into the 20-inch steel beam girders, secured with angle plates and bolts. At the seventh floor level the wall girders are made of two 15-inch steel channels, 51 pounds to the foot, with ½ x 9 inch steel plates top and bottom set into and secured to the 20-inch steel girders, as on the floor below. The eighth and upper floor girders are of the same construction, but with steel channels, 32½ pounds to the foot. The partitions are of 6-inch steel channels, 7 pounds to the foot, put together with angle plates and secured to the beams at top and bottom.

USE OF HOLLOW BRICK.

The roof and all of the floors, excepting the basement, are formed of hollow bricks, in such a way as to leave a perfectly level ceiling. The bricks used in this case are 8 x 12 x 12 inches, and are joined with a mixture of Portland and Rosendale cements. The bricks are provided with dovetail grooves on all sides, with a lip at the bottom which covers the flange of the girder and protects it from fire. The small steel beams that carry the arches are 5 feet from center to center. Upon the arches is a bed of concrete 3 inches deep and in this are bedded the small wooden joists to which the floor boards are nailed. In the corridors, passages and halls tile floors are used. The brick arch floors are guaranteed by the contractors to bear safely a weight of 2200 pounds per square foot.

The partitions are all built of 6-inch hollow bricks, of square section, laid in cement mortar and held in position at each end by the steel channel irons before mentioned. Around each column is a fire-proof covering of brick that is of material advantage in preventing damage to the structure by incipient fires. Wherever necessary porous terra cotta is used for nailing the wood work. This is made by mixing sawdust with clay. The Betz Building will contain, when completed, 304 offices of large size, and arranged so as to give the greatest possible amount of light and air to each apartment. All the offices are finished with oak floors. Three hydraulic lifts are provided and a system of electric lighting supplied. The estimated cost of the building when completed is $1,500,000.

Fire in a Fire Proof Building.

Present methods of fire proofing were discussed at a recent meeting in Chicago of the Illinois Chapter of the American Institute of Architects. Henry Ives Cobb, architect of the Athletic Club building, which had been partly destroyed by fire the previous week, gave his views on the subject of fire proofing. The building is ten stories high, of steel frame-work and porous terra cotta fire proofing, with side and rear walls of solid masonry. The building was unfinished at the time of the fire, with about 70,000 feet of lumber stored on the fourth and fifth floors. The fire was the work of an incendiary and broke out in a number of places at once. The test thus made of a supposedly fire-proof building was a very severe one, and has attracted much attention on that account. In the work of rebuilding it has been found necessary to take down only a slight portion of the steel frame. The fire did not burn through the floors of terra cotta fire proofing, but passed through the elevator and other openings to the upper floors.

On the eighth floor the fire proofing around the columns came off and the iron was twisted, the fire being fed by a wooden staging. The terra cotta and stone front of the building, the fire proofing and the iron work in exposed places were damaged. The porous terra cotta fire proofing and cement work lost its strength where it was exposed to the fire, while the brick walls were blistered, but not greatly damaged. A few days after the fire the lower members of the fire proofing dropped off in many places that right after the fire appeared sound. Where plaster was laid over fire proofing both were destroyed, the iron in most cases remaining uninjured. A 40-foot iron girder spanning the front of the building was deflected ¼ inch.

After more of minute detail of damage, Mr. Cobb summarizes the results of the fire: "With our present system of construction," said he, "it is not safe to have a hot fire in any building. I find also that terra cotta fire proofing should be secured in place more thoroughly than as at present." In reference to the fire-proofing material, Mr. Cobb stated that thick walls of cement were cracked by the expansion and contraction of the iron columns that pass through them. The columns in the solid brick front were unaffected by the heat, but cement, considered solid, peeled off in layers.

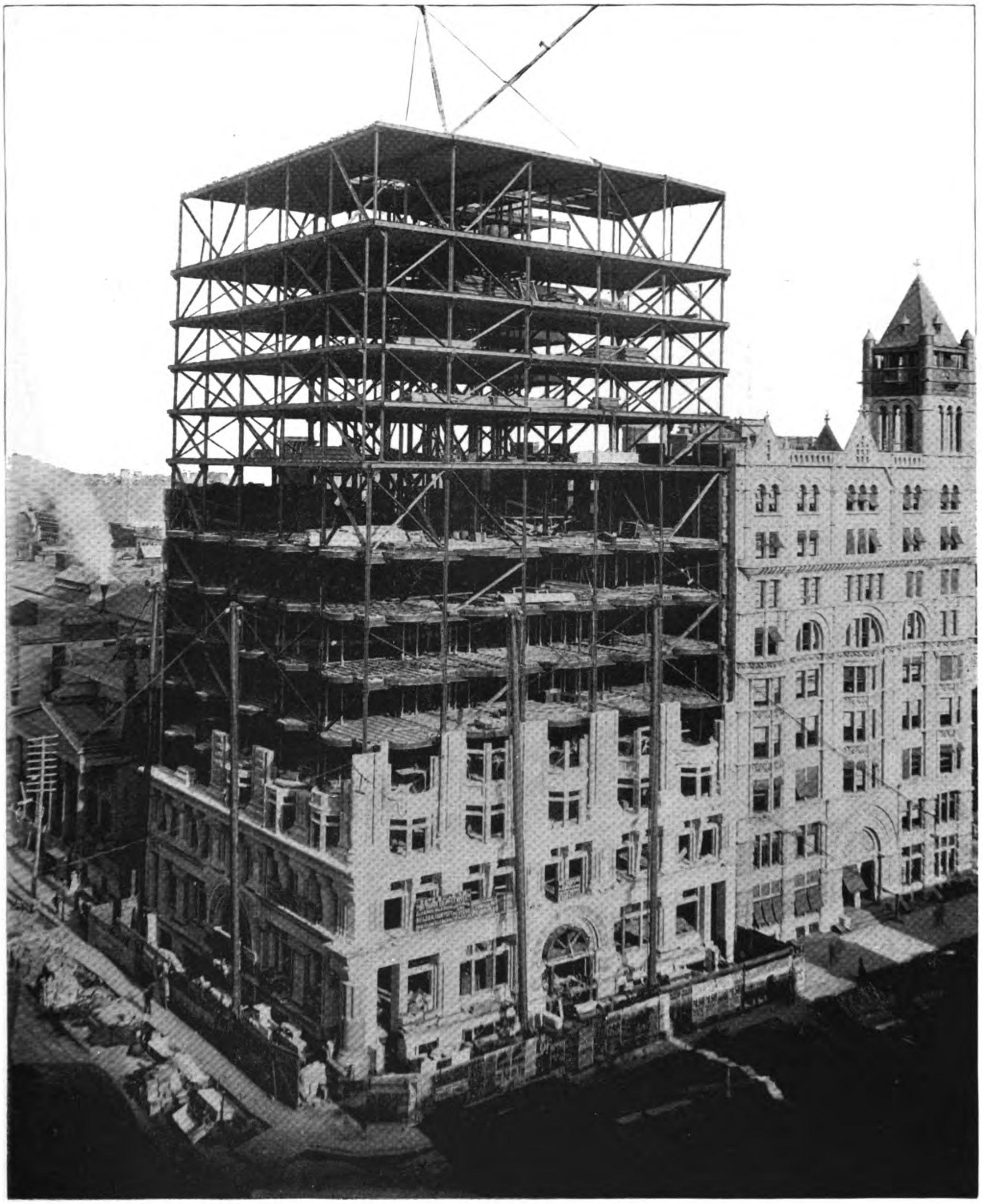
"If the fire had been allowed to burn itself out," said Mr. Cobb, "the building would not have been so greatly damaged, as the result of streams of water striking the hot fire proofing was more disintegrative than it would otherwise have been. Had it not been for the protection afforded by the terra cotta, however, the water thrown against the steel beams would have contracted them so that the building would have been pulled down. But in saving the whole a part was destroyed. I would use terra cotta as before, but would provide against water as well as fire."

Large Cold Storage Warehouse.

What is said to be the largest cold storage warehouse in Europe, if not in the world, has been designed by Sir Frederick Bramwell and H. Graham Harris, and erected at Lambeth. The building may be roughly described as a brick box 150 feet long by 150 feet wide and 40 feet deep, buried in the ground to the extent of 20 feet. The only openings into the structure are at the top. Incased in brick is a wooden box disconnected from the brick work and having six wooden floors in it, these being so constructed that cold air can circulate through them. This structure is said to be capable of holding, when dressed, 270,000 sheep. The lighting is done by electricity, and the cooling is affected by two De la Vergne engines and apparatus, and by two of Haslam's cold air machines.

White Brick.

In the erection of dwelling houses at the present day one of the objects constantly held in view is the ornamentation of the exterior walls in such a way as to produce the most pleasing architectural effects while adding to the picturesqueness of the locality in which the building may be erected. The monotony of the red brick front, says a recent issue of the *Brickmaker*, has become of a character to be somewhat offensive, and it is not therefore to be wondered at that many people paint such walls all sorts of colors. A white brick, made as in the old style red brick, and said to be as durable in all respects, has been introduced, and it is thought that it will lead to the manufacture of bricks of other colors. There is talk among some of the builders of introducing the white brick in Harrisburg, where the rivalry to secure ornamental house fronts has resulted in a great deal of artistic work of this kind, and which is calculated to place the capital of Pennsylvania in the front rank of beautiful cities of the interior. According to the authority quoted this is what can be truly called the ornate period in dwelling house erection in all parts of the country.



MODERN STEEL FRAME CONSTRUCTION.—THE BETZ BUILDING, PHILADELPHIA.

FROM A PHOTOGRAPH TAKEN DURING PROCESS OF ERECTION.

W. H. DECKER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1898.

FRENCH VENEERING.—I.

By HENRY DAUBE.

THE PROCESS of French Veneering is one which will doubtless interest many of the readers of *Carpentry and Building*, consisting as it does of a branch of cabinet making which has received of late too little attention. It is a work which can be done successfully only by hand, as the writer has discovered from his own experience. It is the object of this article to lay before the readers of the paper the most practical method of insuring a first-class piece of work in the shortest possible space of time, while pointing out the many troublesome things that are apt to occur, together with the best means of preventing them. How many carpenters or cabinet makers are there to-day who with any degree of confidence, and without experiencing all sorts of visions of warped, winding and twisted panels, blistered surfaces, due to uneven pressure, &c., while gluing, will take hold of a dozen black walnut panels, 5/8 inch thick, which are to be French veneeered on one side only? These obstacles can all be overcome by a systematic treatment of the work through the various stages.

As stated before, we will take for an example 12 panels, 2 feet wide and 4 feet long, to be veneered and having a 2 inch bevel and cove frazed around the edges. For these 12 panels we need six or seven cauls or boards, Fig. 1, which it is necessary to heat to a high temperature in a steam or hot box, and between which the panels are subsequently screwed down by means of hand screws. To begin with, French walnut veneers can rarely be obtained in such large pieces as 2 x 4 feet, and consequently joints will have to be made. Considerable difficulty is likely to be experienced by the cabinet maker in obtaining a good joint, owing to the crinkled condition of the veneers. To overcome this, take as many sheets as may be required and with a small whisk broom sprinkle them on both sides with clean water. When this is done screw them firmly down between two boards which have been heated in the box, and let them so remain until the boards are cold. Now is the time to make any joints or to fill any holes that are broken out. For these holes iron punches or dies of irregular shape, illustrated in Fig. 2, are used. A hole is punched and the opening filled by a piece punched from a scrap of veneer In doing this care must be taken, however, to glue a piece of stiff paper on the back of the patch. To make a good joint take a small board about 4 inches wide and from it make a perfectly straight and square edge. The veneer will now lay perfectly flat and even, due to the pressure it has received. Take two sheets and lay them face to face in the manner it is desired to join them, and then with the small straight edge just referred to and a good sharp chisel, 2 inches wide, run the chisel along the straight edge through the two sheets of veneer, or as shown in Fig. 3 of the illustrations. Never, under any conditions, employ a plane to make a veneer joint, as it will tear out.

The veneer, being still a little damp from the sprinkling, is so soft as to allow of its being cut very easily. Joints made in this manner can be of any length and produce by far the best results. In order to glue the joint lay the two sheets edge to edge, driving in a few wire nails to keep them in position, and then take a strip of paper 1 inch wide and glue it across the whole length. As French veneers are generally figured very prettily it is always desirable to have the joints in the center of a panel, as this will give it a beautiful effect when the panel is finished and polished. After all the joints have been made and the holes punched and filled in lay the sheets to one side.

The next thing to be done is to prepare the cauls for the steam box. These should be of white pine without any knots or sap, as the knots will stick out beyond the other surface when heated and leave an indentation in the veneer, which can rarely be taken out. The cauls must be the full width and length of the panels, of an even thickness throughout, in order to insure a uniform pressure and when thoroughly heated must be rubbed over their entire surface with beeswax. The object of this is to prevent the panels from sticking to the cauls by the glue oozing through the thin veneer. Some cabinet makers use soap instead of beeswax, but the writer deems it inadvisable, as soap becomes brown from excessive heat and does not melt as readily as wax. Others, again, employ newspapers between the caul and the panels—a method which is equally objectionable, as the glue will force itself through the paper and become glued to the caul. Another objectionable feature of this method is that it will very seldom allow a panel to be removed without tearing up the veneers. Paper employed in this manner is also very troublesome to remove from the face of a panel, and while many resort to the use of water for the purpose of soaking it off, it rarely operates without at the same time softening the glue underneath the veneer and causing the blisters referred to in the early part of this article. Blisters are also caused by the cauls having holes or dents in their surfaces. Too much care cannot be exercised in the selection of cauls, for on these depend a great deal of the ultimate success of the work.

The glue with which to do good work must be neither too thick nor too thin, but of a consistency to run freely from the brush without stiffening. Care must be taken that no shavings, chips or other foreign materials get into the glue pot, as these have been the cause of much loss of time and money to both employer and employed.

Now as everything is ready except the panels themselves, we turn to them. If the factory where the work is done has a planer the mechanic will receive his stuff of uniform thickness direct from the machine. If the factory does not have a planer the workman must be very careful to plane the panels to an even thickness. Make a pencil mark about 1½ to 2 inches around the edges of the panel, toothing the whole panel with a toothing plane. The pencil mark will serve as a guide for laying on the glue, of which no more should be put on than is actually necessary. When this is done, take a wet rag or sponge and thoroughly wet the back of the panel with water. This must never be forgotten, else the panel will surely warp. Everything is now ready for veneering, but before gluing the workmen should see to it that all the hand screws are ready and opened to the required width, for, after the glue has

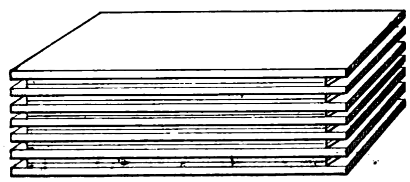


Fig. 1.—Cauls for Use in Veneering Panels.

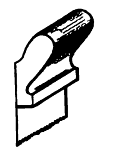


Fig. 6.—Small Hand Saw.

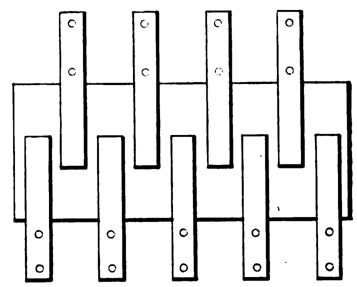


Fig. 4.—Plan View, Showing Manner of Adjusting Hand Screws.

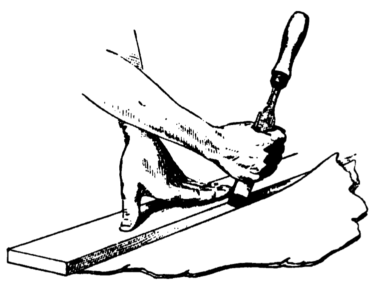


Fig. 3.—Cutting Two Sheets of Veneer with a Chisel.

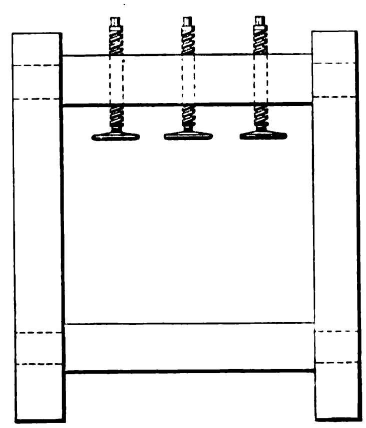


Fig. 5.—Form of Brace Used in Large Factories.

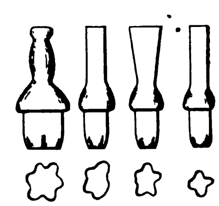


Fig. 2.—Various Forms of Iron Punches.

French Veneering.—Sketches Illustrating the Process.

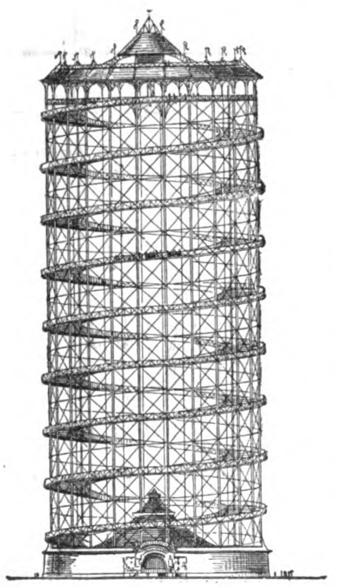
once been put on, no time is to be lost in screwing down. The cleaning of veneer is also a very particular piece of work and much caution is necessary to be exercised, else the entire work which may be all right up to this point may be ruined. If the workman has a good fine-set iron plane with a small mouth very good results can be obtained. Some mechanics use the scraper, but this is all a matter of choice.

Referring to the illustrations, Fig. 4 shows in plan the way the hand screws are adjusted, beginning at the middle and working outward. Fig. 5 represents a very good form of brace generally used in large establishments, the screws being worked by a large wrench. Fig. 6 illustrates a small hand saw often used in cutting the harder veneers, such as rosewood, mahogany, &c. It is manipulated in the same manner as indicated in Fig. 3, which shows the method of cutting with a chisel. If the suggestions set forth are carefully followed any carpenter or cabinetmaker can do work in French veneering which will be entirely satisfactory in every particular.

(To be continued.)

The World's Fair Tower.

The contract for the erection of a steel tower 560 feet high and 210 feet in diameter has been awarded and the structure will be put up on the grounds of the



The World's Fair Tower.

World's Columbian Exposition at Chicago, by the Phœnix Bridge Company of Philadelphia. The work is to be pushed forward as rapidly as possible and completed by April 1.

An illustration of the tower is presented herewith. The type of construction is original with Karl L. Lehman, engineer in charge of construction and by whom the design has been patented. Standard shapes of structural material will be used exclusively. The tower will rest directly on 2000 piles, with no masonry intervening. The structure will be anchored securely to the piles, the absence of masonry enabling the anchors to be easily inspected, so as to guard against weakness in case of rust. An inclined railway will extend from the bottom to the top of the tower on the outside, which will be of truss construction, and will add to the strength of the structure, bracing it against wind storms. The inclined railway will also be used from the start, to support a traveler designed and patented by Mr. Lehman, which will be used for elevating and placing construction material. The adoption of standard shapes and the use of the traveler in this way will make the erection of the tower possible in the short time specified. The diagonal braces seen in the cut, which are used to stiffen the structure, have been the subject of a very laborious investigation in order to secure the requisite number and yet avoid a superfluity. The railway is placed on the outside of the tower to enable passengers to have a clear view of the surroundings. The grade is a little less than 8 per cent., the track is a mile in length from bottom to top, and nine complete turns are taken in the ascent. An observatory is located at the top. The quantity of material to be used is from 3000 to 3500 tons of structural iron and steel, 200 tons of ornamental iron and 500,000 feet of lumber. The lumber will be used mainly in the construction of a restaurant to occupy the ground space. For a portion of the ascent hanging gardens will be arranged along the railway.

Contracts are now about being closed with the General Electric Company for the electric equipment. The cars, designed by Mr. Lehman, will be propelled by electricity in trains of five and a motor. Each car will hold ten persons. Ninety trains are expected to be in continuous operation, half of them ascending and half descending. The power station will be located outside the grounds. It is estimated that 10,000 lights, principally incandescent, will be required to properly illuminate the tower. A Siemens-Halske search-light of great power will be placed on the top. It is the intention of the company to make the tower a permanent institution and not merely a feature of the fair.

An Ancient Pulpit.

The old Dutch pulpit which nearly two and a half centuries ago was brought over the sea for the First Reformed Dutch Church in Albany has been repaired and restored to its original condition, and given place in the auditorium of the present church which the society occupies. A description of the pulpit, with the story of its wanderings, is told by the Albany *Journal* as follows :

The pulpit is constructed of oak, is octagonal in form, 4 feet high and 3 feet in diameter. It stands on a carved pedestal 4 feet from the floor and is reached by a winding staircase. Within its confines is a seat of oak, which is fastened by heavy hinges and which can be turned up when the dominie is preaching. On the left side, in an iron frame attached to the pulpit, is the ancient hourglass, while on the desk rests the well-worn Dutch Bible, with its brass corners and clasps.

The first house of worship of the Reformed Protestant Dutch Church of this city—a wooden structure—stood near the steamboat landing. As the town grew northward it was decided to abandon this church, and a new one—also of wood—was erected at the intersection of State street and Broadway. It was for this house that the pulpit was imported in 1656, and it was continued in use in the stone structure that was erected on the same spot in 1715. This stone church was demolished in 1806, and the pulpit was then removed, with portions of the old steeple, sections of stained glass windows, contribution bags and poles, trunks containing Indian wampum, Continental currency, church money, &c., to the belfry of the present church, on the corner of North Pearl and Orange streets.

At the end of about fifty years a new Sunday-school building was erected in the rear of the present church, and at the suggestion of the Rev. Dr. Rogers, who was pastor at that time, search was made for the old relics in the belfry with the intention of placing them as objects of interest in the new Sunday school room. To the disappointment of those interested, nothing was found but the octagonal body of the old pulpit, and even that had been sacrilegiously despoiled of portions of its quaint carvings and moldings. Upon investigation it was learned that the old winding staircase had been used for kindling purposes—a case somewhat similar to that of the sexton of St. Peter's Church during the administration of Bishop Potter, who, when he wanted paper to kindle furnace fires, had recourse to the room where the old records were kept.

As it would not be in harmony with the interior of a new Sunday school room to place therein an unsightly wreck, it was sent to a furniture warehouse for repairs, where it was made as good as new, minus the stairs. It was then placed in a corner of the Sunday school room, where it has been viewed as an ornament and a curiosity for 35 years, excepting on an occasional anniversary or memorial day, when it was brought forward and placed on exhibition.

Improved Ice-House Construction.

Some interesting examples of improved ice-house construction are a series of buildings now in process of erection at Coeymans, N. Y., by John M. Briggs, an experienced ice cutter. The houses consist of 16 rooms, each 42 x 78 feet in size and measuring 39 feet in hight. The extreme front of the buildings is 385 feet and the depth 178 feet, the total hight being 58 feet. The total capacity is said to be 44,000 tons of ice. The timber employed is first quality Georgia pine, and the boarding is of Canada white pine, selected clear of sap, which is said to be unusual for this class of buildings. The structures will cover nearly two acres of ground and will have a tight hayloft floor over the entire area. The ventilation is secured through windows on all sides of the haylofts. The boiler and engine house will be of brick, 20 x 34 feet, two stories in hight and covered by a tin roof. The power will be employed to drive twin elevators to carry the ice from the river up to the galleries, along which it slides to the various rooms, the capacity of the elevators being about 15 tons a minute. The friction room, occupied by the machinery elevator attendants, will be heated by steam, and a steam pipe will run in the angle under each elevator chain, in order to prevent the formation of ice on the chains or wood work adjacent thereto. The elevators will be supplied with corrugated places, of Mr. Briggs' invention, which, it is claimed, will reduce the cakes of ice to an even thickness while corrugating the surfaces, thereby reducing the expense of house labor. The buildings, engine room, galleries and feeding canal will be lighted by the incandescent system of electricity. The sawdust walls will be 24 inches thick from 1 foot below the sill to the hayloft floor above.

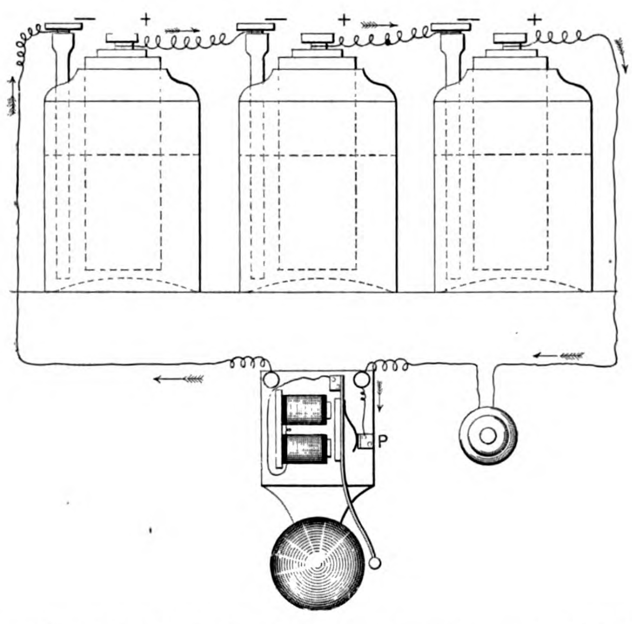
AN INGENIOUS DEVICE, which is said to turn out 16 feet of well-finished cornice work inside of half an hour, is employed in Italy for the cutting of stone cornices, molding, balustrades, &c. We understand that the general features of the machine are very similar to those of the ordinary metal-planing machine, the stone to be operated upon being firmly clamped on the bed, to which a reciprocating motion is given by proper mechanism. The cutting tools are carried on a saddle plate and given a horizontal movement by means of a screw and handle. The slide carrying the saddle plate is capable also of vertical adjustment by means of bevel gearing and screws.

CORRESPONDENCE.

Simple Electric Bell Circuit.

From "Push Button," *East Hampton, L. I.*—I would like to ask how to connect electric bell with batteries and push buttons as per plan inclosed? Also how to connect a series of batteries together. Please give me a general idea of battery work?

Answer.—In putting up a simple electric bell circuit, such as is suggested in our correspondent's diagram, all that is required is one bell, one push button, a sufficient length of wire to extend a little more than twice the distance from the bell to the button and as much battery as may be found necessary. If Leclanche battery be used, one cell will do for any distance not more than 50 feet. The Leclanche battery is probably the best battery for this purpose, being economical and requiring but little attention. It consists of an outer glass jar, narrowed at the top, leaving just room enough to allow the cylindrical porous cup to be put in or taken out, which, when in place, almost closes the opening, thus diminishing the evaporation of the liquid. The narrow part of the jar is furnished with an orifice, through which the negative element of the cell—a zinc rod—is passed, and which is also convenient in pouring out the liquid. The porous cup, containing a mixture of crushed peroxide of manganese and broken carbon surrounding a carbon plate, is the positive element. The carbon plate is fitted with a binding screw for connecting the wire, and this is termed the positive pole of the battery. The binding screw on the zinc rod is termed the negative pole.



Simple Electric Bell Circuit.—Fig. 1.—Showing Manner of Connecting Cells of the Battery.

Much confusion has existed in the minds of many people with reference to the terms positive and negative elements and positive and negative poles. This may be dispelled by observing that the term element or plate applies to that part of the plate which is in the liquid; and the term pole applies to that part of the plate that is without the liquid and to which the conducting wire is connected. The element or pole from which the current proceeds is termed positive, and the element or pole to which it flows is termed negative.

To set up the battery, the zinc rod and the porous cup should be put in position and the jar filled about half full of a solution of salammoniac in water. If more than one cell of battery is required, the battery having been put in place the positive pole of one cell should be connected to the negative pole of the next by a short piece of wire, the free poles being connected with each other through the wire, bell and button, as shown in the diagram, Fig. 1.

Referring to our correspondent's diagram, shown in Fig. 2, the battery may be located on a shelf situated at A. After the battery is set up and put in the position it is to occupy, the bell should be screwed to a support at the place it is wanted, as at B. The button should be secured at D (some place within easy reach of the desk C), by means of two small screws through the back, as shown in Fig. 3. Before screwing the button to the wall, the screws X X should be loosened and the ends of two wires clamped under them.

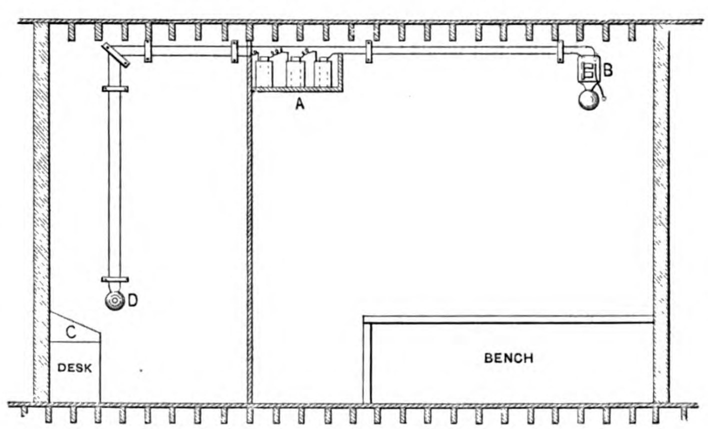


Fig. 2.—Diagram Submitted by "Push Button."

After the button is in place, the two wires which are fastened under the screws X X of the button may be run from the top of the button directly up to the ceiling and then along the ceiling through the partition to the battery shelf beyond, one wire being bared of its covering for a short distance from the end and fastened to one of the free poles of the battery, the other continuing to the bell, where it is clamped under one of the binding screws of the bell. A wire is now run from the other binding screw of the bell to the remaining free pole of the battery, and the construction is complete. In making connections to the binding screws of the bell, button or battery, the wire should first be bared of covering for a short distance from the end and then scraped clean and clamped tightly under the binding screw. In making a joint in the wire the wire should be bared and cleaned in the same manner and the ends tightly twisted together and the joint soldered to avoid loosening. The joint should then be covered with some insulating material to avoid leakage of current.

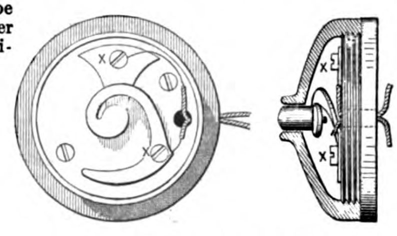


Fig. 3.—Views of Push Button.

Referring to the diagram, Fig. 1, the circuit may now be easily traced: Commencing at the positive pole of one cell, and following the arrows, the circuit is first to the negative pole and negative element of the second cell, then through the liquid to the positive element and positive pole of the second cell, in like manner to the positive pole of the third cell, to the button, where it is ordinarily open, from the button to one binding post of the bell, to the points P and armature lever, through the magnet coils to the other post of the bell, thence to the negative pole of the first cell, to the positive element of the first cell, through the liquid to the negative element and positive pole from whence it started.

The contact breaker, or, as it is commonly called, the button, is a contrivance for making and breaking the circuit at will. It consists of a back piece of wood, to which are attached two pieces of brass, of such shape as to stand apart from each other when not forcibly held together by a push on the button. The pieces of brass are held in place by means of the screws X X, under which the wires should be secured, the whole being covered by means of a cap screwed on to exclude dust and support the button.

The action of the bell is simple. When the circuit is completed by pressure on the button the current enters one binding post of the bell and then proceeds to the points P, to the armature lever, through the magnet coils, and out from the other binding post. On the passage of the current through the magnet coils the magnet cores become strongly magnetized and attract the armature to them, which breaks the circuit by separating the points P. When the circuit is broken the magnet cores lose their power to attract and consequently the armature is pulled back by means of a spring, completing the circuit by bringing the points together. As the circuit is completed, the armature is attracted as before and continues to be attracted and pulled back as long as the pressure is continued on the button. This vibrating bell may be changed to a single stroke bell by so adjusting the points P that they are not separated when the armature lever is attracted to the magnet.

For good work, the wire used should be covered with cotton saturated with paraffine, or if there is any chance of dampness the wires should be covered with some water proof insulation. The wires may be secured in place under small staples or under cleats manufactured for the purpose. If staples are used, care should be taken not to cut the insulation. Not more than one wire should be placed under one staple, as there is danger of the staple cutting through the covering and short circuiting the battery. It may be found advisable to coil the ends of the wires around a lead pencil or other round object before making connections with binding screws, as this gives a neat appearance and affords sufficient slack in case of a broken wire.

Plans for Carpenter Shop.

From A. U., *Monticello, Ill.*—I would like very much to see in *Carpentry and Building* plans of carpenter shops equipped with machinery and fitted with five or six work benches.

Note.—The request of this correspondent is of such a character as to permit our practical readers to employ some of their leisure of the long winter evenings in furnishing that which will prove both interesting and instructive. We have no doubt that every builder has his own idea as to the proper arrangement of a carpenter shop, and we trust that all who are interested in the subject will contribute an answer to the request of our correspondent. A full discussion of the question, together with illustrations of floor arrangement, disposition of work benches, and other features, cannot fail to serve the interests of many who are engaged in the building trades.

Framing a Roof of 12 Inches Rise to the Foot.

From J. M. D., *Lincoln, Ill.*—In answer to the inquiry of "N. E O.," Portsmouth, N. H., asking the proper way of framing a roof of 1 foot rise and published in *Carpentry and Building* some months ago, I submit several sketches. With regard to finding the lengths of common, hip and jack rafters with their plumb and foot cuts, also bevels of hip and jack rafters, I offer a rule which will hold good for any roof, whatever may be the rise per foot. Speaking of common rafters, it is necessary in the first place to determine the width of the building as well as the rise of the roof per foot run. Take for example a building 20 feet wide and 40 feet long, with 12-inch rise to 12-inch run. Take 12 on the tongue of the square and 12 on the blade, as indicated in Fig. 1 of the sketches, and run 10 times, or half the width of the building. This will give the length of the common rafter, as well as the plumb and foot cuts. Fig. 1 of the sketches also shows how to apply the square any number of times. Run the hip rafters the same number of times as the common rafters, but instead of using 12 inches for the foot cut, use 17 inches as indicated in Fig. 2, for the reason that 17 inches is the hypotenuse of 12 inches and 12 inches. When the hips are at an angle of 45° to the wall plates, 17 inches for the foot cut will always cut the foot of the hip rafter with any rise per foot of the common rafter. Fig. 2 also shows the application of the square any number of times required. In order to obtain the length of the longest jack rafter, run it eight times in the same manner as the common rafter in Fig. 1, less half the thickness of the hip rafters. Run the next rafter six times, always dropping two applications of the square and this will space jack rafters at 2 feet between centers. In order to obtain the bevels on hip and jack rafters, take half the width of the building, which in this case is 10 feet, and the length of the common rafter, which in the example under consideration is 14 feet 2 inches. Now take 10 inches on the tongue and $14\frac{2}{12}$ inches on the blade, as indicated in Fig. 3, and scribe that part of the square on which is taken the length of the common rafter. An examination of Fig. 3 of the sketches will explain what I mean.

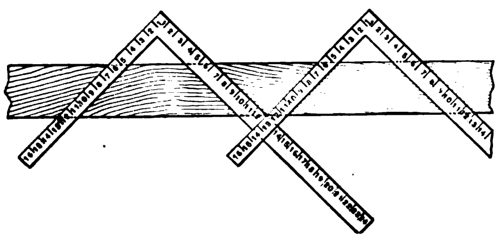


Fig. 1.—Showing How to Apply the Square a Number of Times.

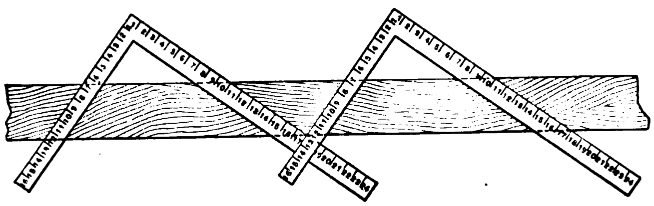


Fig. 2.—Showing How to Apply the Square Any Number of Times, Using 17 for the Foot Cut.

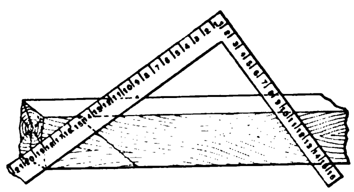


Fig. 3.—Another Application of the Square.

Framing a Roof of 12 Inches Rise to the Foot as Suggested by "J. M. D."

Interesting Mathematical Problems.

From E. A. M., *Painesville, Ohio.*—I saw a communication in a recent issue of *Carpentry and Building* from "E. B. G." inquiring how to ascertain the length of a hoop without getting it with a traveler wheel. In reply I would suggest that if he will multiply the diameter by $3\frac{1}{4}$ and add $\frac{1}{81}$ of the amount it will give him the length of the hoop. I do not know how much the iron takes up in bending, but he can ascertain this by trying on the bottom hoop. If it proves too short, it will be still long enough to work above. Will some reader of *Carpentry and Building* give me a simple rule for squaring the circle?

Note.—Our correspondent asks in the last sentence above for something which the mathematicians have been searching for ever since there was a science called mathematics. If squaring the circle, taking the question just as our correspondent presents it, were as simple a thing as he seems to assume, it would be easy to answer, but it is safe to say it is a question upon which many a man of high attainments has spent his life, and with the result that mathematicians at present take great pains to tell us how impossible it is to square the circle, using the term in this case in the mathematical sense.

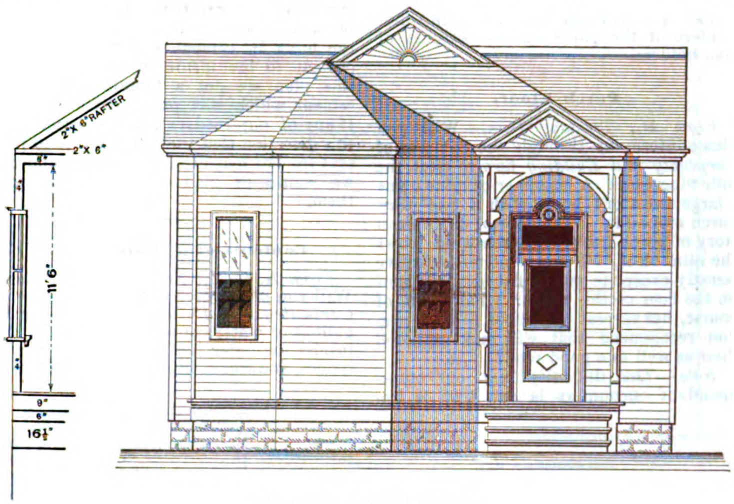
Referring to the directions which this correspondent gives for finding the length of a hoop without measuring it by mechanical means, we would remark that he presents a rule which has been used satisfactorily by many mechanics, and which, perhaps, is sufficiently accurate for practical purposes. That our correspondent does not have full faith in its accuracy, however, is evidenced by the suggestion that if on trial the hoop made for the large end of the tank is not large enough it will still answer for the small end of the tank. There is a vast difference between mathematical accuracy in matters of this kind and the results of rules which are sufficiently close to answer all practical purposes. The ratio between the diameter and circumference of a circle is expressed by 3.1416+, and the decimal above indicated has been extended to, we do not know how many places without any chance of the exact value being indicated for there is always a remainder. But it is ridiculous to compare the small difference of a fourth, or, perhaps, the fortieth, place decimal with the small difference between the actual length and what a mechanic finds satisfactory for the purpose. Mechanics in almost all lines of trade have certain arbitrary allowances in mind that they make, which answer very well for the slight difference between the results given by their rules of thumb and the required length as determined by mathematical processes, and which further answer for taking up any difference in metal or other variations of the material with which they are working. Almost all mechanics and engineers have hand-books of tables of diameters and circumferences. Given a diameter expressed to a very small fraction of an inch, there is found directly opposite the circumference, also expressed in feet, inches and minute fractions of an inch. If any of our readers see fit to experiment with the rule given above by this correspondent they have the chance of determining its value and measuring its accuracy by a comparison of this kind. Or, if they are disposed to make their own calculations instead of depending upon a hand-book of tables, let them take the ratio 3.1416 + as a basis and make their estimates thereby. The advantage of the fraction $\frac{1}{7}$ in the rule given above is that it is the rearest common fraction to 0.1416. Adding $\frac{1}{31}$ to the product is the means taken to correct the error. Rules of this kind are of value simply because they are a little more easily comprehended by mechanics of small skill in figures than rules that use decimals.

Sharpening Molding Planes.

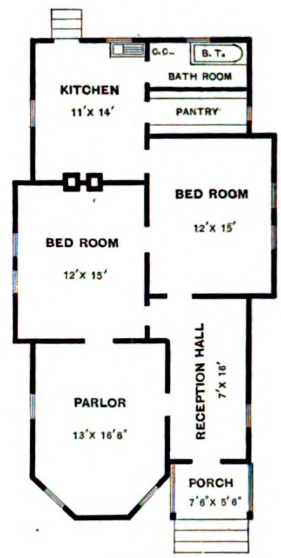
From T. B., *Headingly, Manitoba.*—I would ask some of the practical carpenters who read the paper to explain through its columns the proper method of sharpening molding planes. The irons of these tools have irregular edges, and I desire to know how they can be ground or even sharpened on an oilstone.

Houses for Workingmen.

From A. J. E., *New Orleans, La.*—In answer to "F. G." of Fort Gratiot, Mich., whose request appeared in a recent issue of the paper, I take the liberty of sending a design for a one-story house, showing floor plan, front and side elevations, which will make a comfortable home for any workingman. The arrangement of the rooms and the general construction are so clearly indicated by the drawings which I send that detailed description would appear to be unnecessary. As "F. G." asks for comfortable houses for workingmen, I trust this design will meet with his approval.



Front Elevation and Section.



Floor Plan.

Side (Left) Elevation.

Houses for Workingmen.—Design Submitted by "A. J. E."—Elevations—Scale, ⅛ Inch to the Foot.—Floor Plan.—Scale, 1-16 Inch to the Foot.

A Menace to Carpenters.

From W. B. V., *Newark, N. J.*—One of the many dangers threatening all trades, and the carpenter's trade in particular, is, to my mind, the influx of foreign unskilled labor. In traveling through the city one cannot help being surprised at the great number of foreign carpenters who are willing to work like horses ten or twelve hours per day for the meager sum of one or two dollars. If this influx continues at the present rapid rate the result, according to my way of thinking, will be to either drive American mechanics to lower wages or from the field altogether. The only remedy for this, I believe, is organization—working with a vim and earnestness. Give American boys the preference in learning trades; give them a show on fine as well as rough work, which is not often done in these days of rush and greed, and we will eventually force these foreigners back where they belong—to their old vocations of selling peanuts and blacking boots.

Designs of Tool Chests.

From F. E. B., *Concord, N. H.*—I have been a reader of *Carpentry and Building* for several years, but have never before contributed anything to the Correspondence Department. I would like at this time to say a few words about tool chests, giving in the first place a description of my chest, which is the fourth I have made for myself. I have yet to find an arrangement more satisfactory than the one embodied in the chest I now have. The inside measurements are 3 feet long, 21 inches wide and 22 inches deep. The body is of ⅞-inch Michigan pine, trimmed with Western cherry, which makes a very pretty contrast, if one cares for the outside appearance. The inside is finished in mahogany, all tills being dovetailed together, as are also the body and trimmings. Referring to the sketches, Fig. 1 represents a front view with a section removed, showing the tills inside, together with the runs on which they slide backward and forward. Fig. 2 represents a sectional end view, A A A A A″ being the tills, which slide back and forth. B is a saw till, which also slides, while C C are spaces partitioned off lengthwise of the chest for heavy tools and those least used. Till A″, in the front side of the chest, under the saw till, may be removed and the space C used for molding tools if desired. Fig. 3 represents a top view with slides over the tills omitted. The tills in the rear of the chest are 7½ inches wide and of the following depths inside: The first is 1⅜ inches, the second 2¾ inches, the third 2 inches, the fourth 2⅜ inches and the fifth 3¼ inches. The saw till is 7⅞ inches, while the tills at the front side are 4 inches wide, inside measurement. The cover is paneled, the inside being sunk and the outside a flat surface, which may be covered with zinc if so desired. The tills are partitioned off to fit the different tools, there being a place for everything and everything in its place. The arrangement of my chest is such that I can go to it in the dark and lay my hand on any tool I may need.

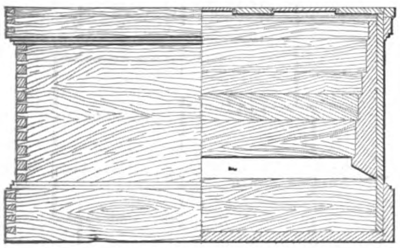


Fig. 1.—Front View with Portion Broken Away, Showing Tills Inside of Chest Constructed by "F. E. B."

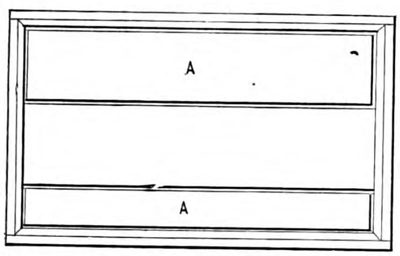


Fig. 3.—Top View with Slides Over the Tills Omitted.

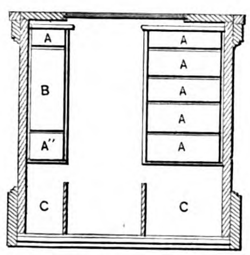


Fig. 2.—Sectional End View.

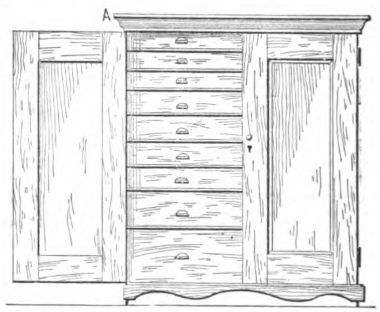


Fig. 4.—View of Tool Chest as Made by "W. C. H."

Designs of Tool Chests Contributed by Different Correspondents.

From W. C. H., *Chicago, Ill.*—I notice in the March number of *Carpentry and Building* an article on tool chests, and as the subject is interesting to all carpenters I send a rough sketch, Fig. 4, and description of a chest I am using. Living in a flat in this city, where every inch of room is utilized, I wanted something that would be easy of access without taking up too much room and at the same time would not be as unsightly as an ordinary tool chest. It is simply a chest of drawers with two paneled doors hiding them so that when it is closed it looks like a piece of furniture. The outside frame and doors are made of ½-inch oak filled and varnished. The total hight is 3 feet 6 inches, the width outside 3 feet and the depth 12½ inches. The bottom drawer is 9 inches and is used for a saw till as well as for iron miter box and saw clamp. The next drawer is 6 inches and is used for planes. The next 4 and the other 3 inches. The molding at the top and scroll work at the bottom give an ornamental appearance. The top A is hinged so as to leave an opening for any flat tools. Some of the drawers may have trays fitted inside, if desired; flush handles are fitted on the sides. My chest has eight drawers, although the sketch I send herewith shows nine. The number, however, is immaterial. I can pack double the number of tools in it than in an ordinary chest, and I can find anything I want without turning out the entire contents. I would like to hear from other readers of the paper on the subject of tool holders.

Porch Floor.

From D., *Trenton, Tenn.*—Will you please inform me through the columns of *Carpentry and Building* how to treat the following case? A customer of mine owns a large two story house with a two-story porch around it. The floor of the second story of porch leaks when the wind blows the rain on it. I know of no effective remedy except to put a flat-lock tin roof on the floor of the porch. This plan, of course, has several objections. What can you recommend that will make a good floor as well as a good roof?

Note.—The difficulty that our correspondent encounters is one that is frequently met in building construction. We saw a job only a short time since where conditions were very similar to those outlined above, with this difference, that the underside of the porch floor was plastered, coming over an inclosed space. What was done in this case was to lay first a floor, reasonably tight, of thin lumber. On this was placed several layers of a good quality of roofing felt. Then over this, in turn, was laid a new floor of narrow stuff, 1¼ inches thick, tongued and grooved, with each joint laid in paint, and then, in turn, the top of the floor was soaked in oil and finally painted with several coats of good paint. The work in question has not yet had sufficient trial to warrant an opinion whether or not this is entirely satisfactory, but it was the plan pursued by an old builder in view of considerable experience in the past.

Leaky Cisterns.

From C. F. S., *Trenton, Tenn.*—Will you please publish for the benefit of your readers a plan for stopping leaks in cisterns? In this section of the country cisterns are usually plastered directly on to the earth, and it sometimes happens when there has been much rain that the water at a small place in the side will break through the cement before it hardens. It is possible to have a good cistern with a place no larger than a half dollar that lets in water while the cistern is empty and, in turn, lets out water when the cistern is full. The question is, how to repair places of this kind.

Note.—We had some experience years ago with cisterns constructed in the way in which they are described above. In some cases the cement was applied to a hard clay soil, and in others to a mixture of gravel and clay. We encountered the same difficulty that this correspondent names, but never found any plan of overcoming it save that of supplying better construction. In our estimation a cistern of the kind named is a makeshift rather than a satisfactory piece of work. Sooner or later it gives trouble. In one case in the effort to correct the fault we built a brick wall inside the old cement, laying the brick in cement and then applying cement to the inside of the brick. By this plan we got a foundation for the cement which was proof against seeping. If any of our readers have experience in this direction that they would like to present for the benefit of this correspondent, we would be glad to have letters from them.

Contents of a Water Tank.

From A. C. Y., *New London, Conn.*—Will you please give in the next issue of *Carpentry and Building* the number of gallons of water contained in a tank the inside diameter of which is 23 feet 6 inches, and whose hight is 17 feet 4 inches? I should also be glad to know the rule for finding the contents.

Note.—We assume from the letter of our correspondent above that the tank is of the same diameter at the top as it is at the bottom, and this being the case the problem resolves itself into one of finding the volume of a solid cylinder the diameter of which is 23½ feet and the hight 17⅓ feet. The rule for computing this in United States standard gallons is to multiply the area of the base by the hight, which gives the contents in cubic feet. Then reduce the cubic feet to cubic inches and divide by the number of cubic inches in a United States gallon. As the area of a circle, which may be considered the circumference of the tank, is obtained by multiplying the square of the radius by 3.1416, we ave the following equation:

11.7 ×h3.1416 × 17.333 ×÷ 2 1728 31 =56,52234.5²gallons.

Cabinet and Desk for Laboratory.

From D. C. M., *Duluth, Minn.*—I inclose drawings of a desk and cabinet, which, I trust, may be of use to "W. C. R.," whose inquiry appeared in the June issue of *Carpentry and Building*. The upper portion of the cabinet represented in Fig. 1 contains eight small drawers, the inside measurement of each of which is about 1½ x 8 x 8 inches. On either side of these small drawers is a small space closed by a door. In the lower portion is a slide, which may be used while at work, or it may be pushed back out of the way. The drawers in the lower part vary in depth from 3 to 8 inches. While at work the operator may use an ordinary chair on which to sit. If "W. C. R." has any valuable tools I would advise him not to leave them in the cabinet with the chemicals, because there is always more or less vapor arising from the bottles, and it collects on the metal, thus ruining the tools in the course of time. The dimensions of the desk, front and side elevations of which are shown in Fig. 2 of the sketches, are 4 feet wide, 2 feet 6 inches deep and 4 feet 2 inches high. In the bottom portion there are three drawers, which measure 5 inches deep inside, and one drawer which is 7 inches deep. There are also two small cupboards inclosed by panel doors. These cupboards could be divided into pigeon holes if it would better suit the purpose. There might be several pigeon holes also in the cupboard in the upper part of the desk. The shelf on the top might be used for books or ornaments. Both the desk and the cabinet are plain, but by beading the edges of some of the pieces and carving the panels they would be greatly improved. Any kind of wood may be used, but I think oak produces the best effects. I trust more questions and answers will appear in the Correspondence department of the paper, especially regarding the cabinet-making business.

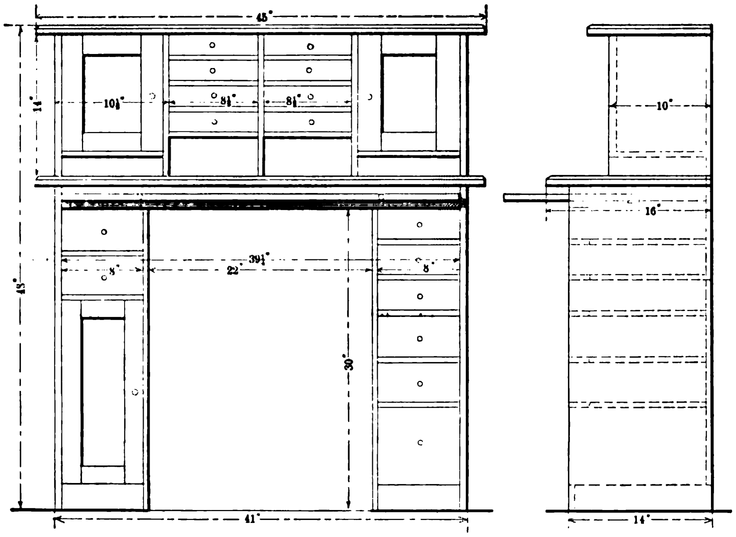


Fig 1.—Front and End Views of Cabinet.

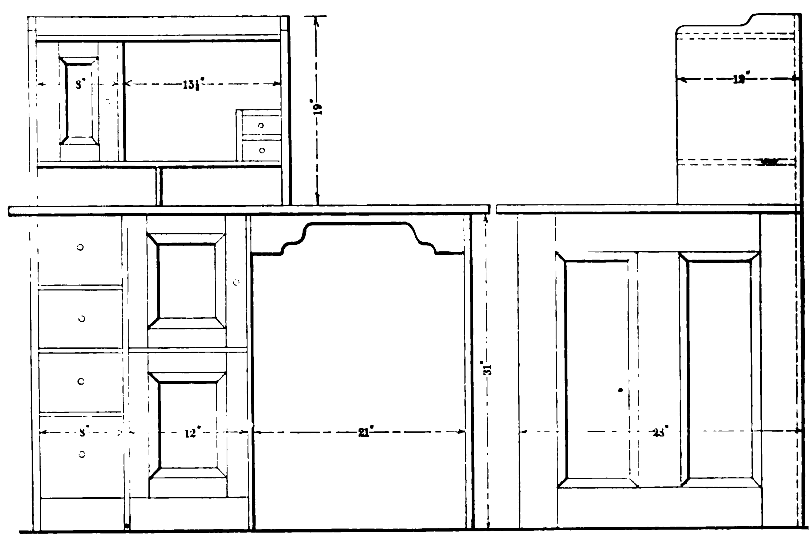


Fig. 2.—Front and End Elevations of Desk.

Cabinet and Desk for Laboratory as Made by "D. C. M."

Chest for Books.

From OLD BACHELOR, *San Francisco, Cal.*—I am a bachelor living in rented rooms, and sometimes find it desirable to move about. I would like to ask some of the practical readers if they can give me a design for a chest in which to keep books. I want something that will answer the purpose of a regular bookcase while in the room, and yet is always ready to pack up at a moment's notice. I would like to ask if a combination lock is preferable to any other.

Combination Lead and Felt Roofs.

A novel style of roof construction which is likely to prove more or less interesting to American readers, has recently been brought to the attention of the foreign world by an invention of Herr Siebel of Dusseldorf, the history of which is decidedly entertaining. The inventor was well aware no doubt that the best protection against dampness rising from the ground into walls is a sheet of lead, and that on account of the great expense of a protection of this kind of sufficient thickness to support the weight of the superstructure without tearing, it is common in these days to substitute a sheet of tarred felt. Bearing these things in mind he conceived the idea that both materials might be employed to advantage by inclosing a thin sheet of lead between two thicknesses of tarred felt.

In this way the metal, although thin, acts as an impentrable barrier to dampness and is not liable, as is the case with felt when used alone, to gradual decay. It is given out that the combined lead and felt, taking into account the thickness that it would be necessary to use, is much cheaper than lead alone and although patented the method is available so far as the cost is concerned for buildings of the moderate class. While engaged in perfecting his invention, says the *American Architect and Building News*, it occurred to Herr Siebel that the felted lead would make a very impervious roof covering, and perhaps a durable one, and thorough tests seem to confirm this idea. The felted lead is sold in the same form as ordinary roofing felt, and applied in the same manner, receiving the usual protecting coating of tar and gravel on top; but the metal protects the felt under it so completely from the evaporation of the volatile portions of the tar, which is the principal cause of the deterioration of composition roofs, that it is said to remain tight for an indefinite period. Even when the lead is exposed, from the decay of the felt over it, nothing is necessary but to lay over it new felt, with tar and gravel finish, to make the roof as good as ever, while an ordinary felt roof which has once begun to rot is not usually worth repairing. The practical man will think of other details, such as the facility with which flashings, gutters and zinc or copper edgings can be soldered to the lead of the roofing, which seem very much in favor of the new material. It is, however, difficult to roll very thin lead, and it is hard to understand how sheets inclosed in felt could be sold for roofing at a price to compete with a tin roof, which would be better in most respects.

Meeting of Brick Manufacturers.

According to official announcement of the National Brick Manufacturers' Association, the seventh yearly meeting will be held at Louisville, Ky., beginning Tuesday, January 24, and will continue for the balance of the week. The selection of the place named was, we understand, largely due to the cordial invitation extended by the Louisville brick manufacturers, who are taking an active interest in the association, and are doing everything in their power to make the coming convention among the most successful which the association has ever held. It is expected that the attendance will be unusually large owing to the location of the city named, and also to the opportunity offered for an exchange of opinion by those engaged in the industry.

FRIDAY EVENING, December 16, Franklin W. Smith, of Boston, known to the readers of this journal on account of his famous building, Pompeia, at Saratoga, N. Y., recently described in detail in these columns, delivered a lecture in the chapel of the Union Theological Seminary, 9 University place, this city, on a "National Gallery of History and Art." This address was a repetition of that before the Boston Art Club and Brooklyn Institute, the Maryland Institute, Baltimore, and the Drexel Institute, Philadelphia. The design was illustrated by a large drawing, the gift of Messrs. Renwick & Aspinwall, of New York, and by several paintings of the galleries and courts proposed and by stereopticon views of other details.

WHAT BUILDERS ARE DOING.

THE amount of building done in Boston during the past year does not figure as great a total as either of the two preceding years, but builders are very well satisfied with the result. Such contracts as have been begun during 1892 were largely obtained at good prices, and while competition has been ordinarily close, there seems to have been a fair profit in the work. But little interruption has occurred on account of differences with the workmen, and at present the labor market is in good condition. The Mason Builders' Association, under a joint agreement with the bricklayers, the stonecutters and the building laborers, have prevented any trouble in these branches of the trade through arbitration. The form of agreement under which this condition of affairs exists, and which has appeared in *Carpentry and Building*, has proved to be the most satisfactory solution of the difficulty in the settlement of disputed points that has ever been tried in Boston. An effort is being made to extend the plan to other branches of the trade. The operation of the new building law for the city has proved to be very satisfactory, as a whole. There are some of the minor clauses with which fault has been found and the law is doubtless susceptible of improvement in some of the smaller details of its working, but as an ordinance for the benefit of the city it is a success. There has been no hesitancy about projecting large operations under the new law, for several important buildings are now about being erected. New England generally seems to have had a fairly prosperous year in the building trades outside of the granite industry. Reports from the smaller cities show that about the usual amount of building has been done and that nothing occurred to make the year a remarkable one either way. The granite interests have been practically paralyzed during the greater part of the season, to the equal injury of both quarry owners and workmen. It is thought now, however, that affairs between the two have been adjusted in nearly all localities so that the coming season will be free from serious disturbance. The Master Builders' Association of Boston has had an unusually successful year and demonstrates every day the value of a properly administered association to the builder. A membership in this association is a practical guarantee, both to the public and to the members, of honorable dealing and skillful performance of work. The association takes an active part in all questions of interest to the city which are capable of action by such a body; is a member of the Boston Associated Board of Trade, which is composed of representatives from 20 organizations of business men in the city, and is generally recognized as one of the stirring, progressive institutions of Boston. At the annual election the Australian ballot system of electing officers was tried for the first time. The following list covers the nominations for officers named, who were probably all elected, although the date of the annual meeting occurs while this issue is in the hands of the printer.

For president, James I. Wingate; for vice-president, E. Noyes Whitcomb; for secretary who treasurer, William H. Sayward; for trustees, for three years—Ira G. Hersey, Charles W. Parker; for two years—Lyman D. Willcutt, C. Everett Clark; for one year—Ottomar Wallburg, S. Fred Hicks.

Baltimore, Md.

Secretary E. D. Miller of the Builders' Exchange of Baltimore writes, in a very interesting letter, regarding the situation among the builders, that the amount of business done in that city during the past year was above the average and that the members of the exchange congratulate themselves upon a more than usually satisfactory and successful season. The outlook for work at the beginning of the year was remarkably good, but the demand by the carpenters for an increase in wages and a shorter day caused a break which somewhat disturbed the prospects. The Master Builders' Association, which is composed principally of carpenter contractors, with the support of the Builders' Exchange, offered to concede the advance in wages, but declined to discuss the question of eight hours for a day's work. A strike followed in which the carpenters secured the assistance of the bricklayers and granite cutters' unions, they also striking to aid the carpenters in securing the eight-hour day. After a partial stoppage of work for nine weeks, during which time several large projected investments were withdrawn from the market, the unions yielded and the men returned to work. The members of the Master Builders' Association claim that they were able to secure an abundance of non-union men during the strike, who were first-class workmen, and that the work done during the trouble was fully up to the standard. The association was much gratified at the way in which the members proved their loyalty to their organization, only two or three defections occurring in a membership of nearly 62. The Builders' Exchange was not directly engaged in the trouble except to indorse the stand taken by the Master Builders' Association; the support given was unanimous in every case notwithstanding the fact that the exchange is composed of about one-sixth general contractors and the rest subcontractors and material dealers.

The relations between the builders and the architects in Baltimore are exceptionally pleasant. The Exchange at its quarterly meetings generally serves a dinner at which many architects have attended and by means of which many pleasant social friendships have been established. This form of meeting between the two, the builder and the architect, has drawn them closer together than ever before and business is transacted between them with increasing promptness, pleasure and absence of friction. The builders, however, find a great need for the better establishment of the custom for publicly opening bids for large contracts and the architects seem slow to recognize the importance of such a course in the interest of perfect fairness to all bidders. The fault, in a measure, lies with the members of the Exchange, which, as an organization, strenuously advocates the insistence by the bidder upon such as practice, the individual members failing to carry out the recommendation. There seems to be no opposition to such a plan by the architects, and only a general laxity prevents it becoming generally adopted. In closing his letter Mr. Miller says that the exchange finds much benefit in the recommendation of the National Association, and in referring to the efficacy of an exchange puts the question in a nutshell as follows: "The exchange is just what its members make it; if they are live, energetic, thoughtful men the exchange will be a power in any community, but if the members do not uphold it by complying and helping to enforce its rules and by availing themselves of the benefits to be derived from such enforcement, then they must not blame the exchange, but take the failure home, each man to himself."

The quarterly meeting and dinner of the Builders' Exchange was held on December 6. First Vice-President Noble H. Creager presided and E. D. Miller was secretary. E. D. Miller, Israel Griffith and George Mann were elected delegates, and P. M. Womble, Jr., S. B. Sexton, Jr., and Isaac Filbert alternates to the meeting of the National Association of Builders, which will be held at St. Louis on February 14 next. N. H. Creager, as delegate-at-large, holds over. At the suggestion of Mr. Creager a resolution was adopted, authorizing the appointment of a committee to confer with the Mayor and City Council, with a view of introducing the building trades, such as bricklaying, masonry and plumbing in the Manual Training School and for the election of a representative of the exchange to Board of School Commissioners as far as it relates to that school. Over 100 members were present.

Buffalo, N. Y.

The Buffalo builders have had an unusually active and profitable season. The volume of business has been large in the city, and the work in outlying towns has been very active. At Niagara the amount of building has been particularly large, and most of the work has been done by Buffalo contractors. The following from the *Express* of November 30 indicates in figures the amount of work undertaken in the city up to October 1:

"How the city has thriven is indicated by the amount of building which has been done. It is difficult to make a close estimate in this regard or an exact comparison with former years. Moreover, a good deal that really belongs to Buffalo, like the building at Depew and elsewhere, cannot be reckoned at all. The influence of suburban railroads must be left out of the calculation, greatly as they bear upon the city's growth. But beginning with this year a record of building has been kept by the new Bureau of Buildings of the Department of Public Works; and this record says that during the ten months from January to October permits for nearly \$4,500,000 worth of building within the city limits have been issued, not to speak of repairs, alterations, &c., to over \$800,000 worth more. And of this \$4,500,000 worth of new buildings over one-third is in the form of two-story frame houses, which represent the dwellings of the common people, upon which the prosperity of a place depends. To put it exactly, during the last eight months permits have been granted for the erection of frame dwellings costing \$1,820,061.

"This record, of course, does not represent exactly the actual amount of building which has been done or is in progress now. But it must approximate it very closely. It is founded upon that provision of the charter which requires the owner of any building which is to be constructed or remodeled to file with the Superintendent of Buildings a sworn statement about it, and forbids the erection or alteration of any building without the superintendent's written permit. The record of the Bureau of Buildings ought to be quite near the truth and its figures none too large."

Secretary Almendinger of the Builders' Exchange, in referring to the condition of affairs in the business generally, says that it has been remarkably favorable throughout the season. No trouble has been experienced with the workmen, and the contractors and architects are on the most friendly terms with each other. The joint committee of the Building Trades Council and the exchange is working amicably on the request of the former that the latter employ only union men. A decision is expected shortly after January 1. At the last quarterly meeting of the exchange a committee was appointed to prepare, in the form of a report, a scale of discounts in favor of the contractor, to be submitted to the dealers in building material. A petition was presented on behalf of the charity organization of the city, asking that a member of the exchange be appointed to act as a committee in conjunction with John Feist, superintendent of buildings, to devise plans for a suitable system of tenement house construction. George Deuscherer was appointed as such committee.

On January 2, 1893, will occur the annual election of officers of the exchange. If the necessary arrangements can be made voting will be conducted through the medium of the Myers voting machine. Two tickets will be placed in nomination as follows:

President, H. C. Harrower; vice-president, F. T. Coppins; treasurer, Charles A. Rupp; secretary, J. C. Almendinger; trustees, L. P. Beyer, Jacob Reimenn, John Lannen, Alvin W. Day, Henry L. Jones, A. Machwirth, George Donaldson, Conrad Hoeffler, W. L. McClennan, John Hurley; arbitration committee, E. L. Cook, Henry Rumrill, Jr., George W. Maltby; delegates to the national convention, James Boland, J. J. Churchyard, Charles J. Close.

President, George Deuscherer; vice-president, W. H. Schmidt; treasurer, Charles A. Rupp; secretary, J. C Almendinger; trustees, Jacob Davis, Joseph Metz, J. H. Tilden, John A. Wolsey, Carl Meyer, C. B. Jameson, John Loewer, W. J. Schirmann, Wells Dygert, Lawrence Ginther; arbitration committee, Henry Schaefer, Alfred Lyth, John W. Henrich; delegates to national convention, Charles A. Rupp, John Feist, John W. Henrich.

Chicago, Ill.

The remarkable amount of building which has been carried on in Chicago during the past year seems to suffer little diminution on account of the winter months, and the contractors are busy among an active people. The employers and employees in all branches of trade are at present enjoying the most friendly relations and but little disturbance of any kind has occurred between the two during the season. Such troubles as have arisen were individual cases, and at no time have all the trades, or all of any one branch, been involved. There were one or two occasions in the structural iron and galvanized iron trades that required adjustment, and within the past month there was a threatened strike among the steam fitters. All, however, were settled by arbitration and without serious hindrance to the progress of work. It is the almost universal custom in Chicago to settle differences between employers and workmen by arbitration. Good-fellowship prevails among the builders in a general sense and an effort is being made by the Builders' and Traders' Exchange to secure the co-operation of the architects in the adoption of a code of practice based upon the one recommended by the National Association. The builders are at present awaiting the appointment of a committee from the architects, to take action on the subject.

At a special meeting of the exchange held Monday, December 14, it was decided to remain in its present quarters for another year with lease to be drawn for one year with privilege of four more. The landlord has promised to make necessary changes and will put the exchange rooms in presentable shape for its visitors next year.

Cincinnati, Ohio.

The amount of building done in Cincinnati this year, according to the report of the Building Inspector, will probably fall off about \$1,000,000 from the total of last year's work. There are several causes for such a condition of affairs. The business last year was very good throughout almost the entire season, while this year several large jobs were abandoned, owing to the labor troubles of the early spring and the general advance in wages which occurred on August 1, in accordance with the agreement made between employers and workmen when the spring differences were settled. The relations between the employers and workmen have been harmonious since the settlement referred to, and no other trouble has occurred during the season. Contractors generally get along very well together, the carpenter being the general contractor and the rest subcontractors. The exchange is in good financial condition, and is one of the institutions of the city. The master builders have consented to a conference with the Amalgamated Building Trades Council upon the subject of the enforcement of the State law governing the employment of apprentices.

The membership of the exchange is now and always has been composed of the most reputable contractors in the city, and the rules governing the exchange are such that a contractor not straight in his dealings cannot become a member. The business done by members in the year ending January, 1892, amounted to $2,923,381.70, as per secretary's report for that year. The statement for the business of this year has not yet been made up.

Cleveland, Ohio.

The amount of building done in Cleveland in 1892 did not fully bear out the prospects of the early spring, although most of the contractors were kept busy throughout the season and it is thought with fairly profitable results. There were no strikes or labor disturbances during the year, and so far as this phase of building is concerned everything went along as smoothly as could be desired. The feeling among the builders is much more friendly at present than it has ever been before, a fact largely due to the influence of the Builders' Exchange. The builders and architects are gradually growing to feel less antagonistic, although there seems even yet to be more or less friction between the two. There are several causes for this condition of affairs, the principal one being a lack of a well-defined and observed code of practice regarding the submitting and opening of bids for work. The Uniform Contract is used almost exclusively and has the united approval of both architects and builders. The Builders' Exchange is in good condition financially and seems to be gaining ground as one of the institutions of the city.

Denver, Col.

The building season in Denver has not been as completely successful, from the contractors' point of view, as might be desired. The amount of work in the market was not very large, and the competition has been very close throughout the year, builders figuring so low that little or no margin of profit remained. The wages of the workmen have remained the same as in the more successful years of the past, and the employers and employees seem to get along well together. This state of affairs has been felt in a measure by the Master Builders' Association, which has lost in membership, although the builders stand well together in most cases. An effort is being made to secure improvements from the architects in the manner in which bids are treated. The prospects for next year's business are fair.

Indianapolis, Ind.

The Indianapolis builders are happy over the result of their year's work, the amount of building done in that period having exceeded that of any other year in the history of the city. All the contractors have been busy throughout the season and the majority still have all they can attend to. Employers and workmen have preserved the most harmonious relations during the past season, the same wages that were paid the year before having prevailed. There have been no strikes and everything is serene at present. The Builders' Exchange reflects the conditions of business in having enjoyed a profitable and progressive year. The scope and benefit of the organization is continually extending and the membership increasing. The 'change hour is being more firmly established, most of the members being found in the rooms between 12 and 1 o'clock.

Louisville, Ky.

The Louisville builders have had a good year and look forward to another one in 1893. But few labor troubles have disturbed the relationship between employers and workmen, and none of those which did crop out caused any serious damage to the progress of work. The annual meeting of the Builders' and Traders' Exchange occurred December 9, and the attendance was full and reports encouraging. The president, Mr. Murphy, among other things of interest in his report, said that the rules of the exchange had been sustained by the courts in a recent suit wherein it was decided that an architect is the owner's agent, and the latter is responsible for the former's acts so long as he does not exceed his instructions.

The annual report of Secretary Kaufman reviewed the work of the exchange for the year. The membership is 95, a net increase of 24 new members, though some of the other members lapsed. The receipts of the year were a little over $2000, and the disbursements about $1900. The progress of the plan for the erection of the exchange building was reviewed and the condition of it shown. All is favorable, and a permanent home will doubtless soon be erected. The efforts to secure a fair mechanics' lien law have not been without return and the Legislature has promised a hearing before final action is taken in the matter.

The secretary recommended that all honorable men engaged in the building trades be induced to join the exchange, believing the builder, the architect and the owner would alike be benefited. The report was received and the recommendation indorsed.

Then came the election of officers for 1893. Several tickets were in the field, and after considerable balloting the following officers were elected: President, John E. Carpenter; first vice-president, Geo. L. Smith; second vice-president, Louis Lussky; Messrs. J. H. Murphy, retiring president; Thomas Armstrong and Alexander Mitchell were elected to the Board of Directors, and Mr. George L. Smith was chosen to represent the exchange at the coming convention of the National Association of Builders.

Milwaukee, Wis.

Building in Milwaukee has been very satisfactory during the past year, there being enough work in the market to keep the contractors busy, and fair prices have prevailed. No trouble has been experienced with the workmen, and the best of feeling in the fraternity has existed throughout the season. The members of the Builders' and Traders' Exchange are delighted with the prospect of being able to occupy their handsome new home by February 1. Nothing has been spared that would in any way contribute to the perfection or convenience of the building as a home for the exchange and every one is elated at the satisfactory manner in which the undertaking has been carried through to completion. The opening ceremonies will be appropriate to the occasion, and a most enjoyable time is anticipated. The opening of the new building, it is expected, will greatly enhance the value of membership in the exchange and will also increase the interest and attendance.

Minneapolis, Minn.

While most of the Minneapolis builders have been busy during the year, the amount of work done in the city has been small as compared with past years. Most of the larger contractors have been at work outside in the neighboring cities—Duluth, Ashland, West Superior and even Chicago. A few large contracts have been undertaken in the city, but not enough to call the past year a good one for builders, so far as the amount of business goes. There have been no strikes in the city, and nothing has occurred in 1892 to disturb the present good feeling between the employees and workmen. The greatest harmony exists between contractors and architects and among the builders themselves, and the year has passed off without anything occurring in the exchange to mar the pleasant relationship which exists throughout the trade. The attendance of members at the exchange during the 'change hour is good, and the organization is in excellent financial condition and increasing in membership.

New York City.

The condition of affairs in the building trades of New York City seems to be better at present than at any time during the past year. The several serious strikes of 1892 have resulted in the organization of the employers, and in place of practically none, which was the case at the beginning of the year, there are now 15 associations properly organized and in shape for any emergency. Since the end of the big strikes of last year, which were reported in these columns from time to time, and which were mostly failures both from the workmen's point of view and from the standpoint of permanent, equitable adjustment there have been no disturbances of any magnitude. The only recent strike was that of the electric wiremen, which was of comparatively short duration and was finally settled by a compromise without greatly delaying the progress of work. Many of the big contracts, however, are much delayed and are not nearly so far advanced as they should be at this season of the year, owing to the difficulty of securing teamsters and workmen of all kinds during the continuance of the strikes mentioned. The architects and owners have appreciated the situation and the two interests have proceeded without unusual friction. The prospects are better for the next year's work than they have been for some time past, the employers being in a position now to meet with the workmen and act in concert upon subjects of importance. It is stated that the employers have not organized for the purpose of being able better to oppose the workmen, but in the interest of improved conditions and for the purpose of facilitating the settlement of differences which in so large a city are bound to arise. The Mechanics' and Traders' Exchange, which closed the year in excellent financial condition, is agitating the question of moving from its present quarters, which it has occupied for so many years, to some location further up town. The value of the Building Trades Club, as a leaven of friendliness in the building trades of the city is increasing every day. The influence of the social intercourse which is a feature of its management is making itself felt in many ways throughout the fraternity. Builders know each other personally to-day who never knew each other formerly save as competitors, and the result is a bond of fellowship in the craft which is as delightful as it is new. The rooms of the club are cozy and convenient; the *café* is excellent and various sorts of entertainment are offered to bring the builders together in the evening. In the daytime facilities are afforded for estimating plans and the transaction of private business, and altogether the institution is most satisfactory and one that could be copied with benefit by every large city in the country.

Omaha, Neb.

The condition of affairs in the building trades of Omaha is much better at present than it has been at any time previous during the year, and exceeds the promise of the early season. During the spring but little was done, and it was not until the summer was well advanced that the present activity was commenced. The prospect for next year is excellent, there being under contract at present eight public school buildings, to cost $300,000 in the aggregate, besides two more to be begun in the spring, which will cost about $100,000. The telephone company are also erecting a building to cost $75,000, and among the other improvements are two brewery buildings to cost $750,000; a public library, $100,000; two churches, to cost about $75,000 each, and a large number of fine residences. The amount of building permits for the year up to December 1 was $2,300,000. The exceptionally fine weather, which has been almost continuous this fall, has greatly assisted the contractors, making it possible to lay brick up to the first of the year with but very few interruptions. The condition of affairs between employers and workmen has been undisturbed by any serious troubles, such questions as have arisen having been quickly adjusted through the assistance, in most cases, of Mr. Wedge, secretary of the Builders' and Traders' Exchange. The carpenters and masons are still discussing the question as to which should be the general contractor, but are in good feeling, and the builders and architects generally are on the most friendly footing with each other. The Builders' and Traders' Exchange is in good shape and has increased in membership over 50 per cent. during the past year, and is to be congratulated on its success. Such a record of growth during the dull period is very creditable. The building and plumbing ordinances, which are being revised by a committee from the exchange in conjunction with a committee from the city council, will be ready to submit shortly after the new year. Taking all things together, the outlook for Omaha builders for 1893 is very good.

Philadelphia, Pa.

The condition of the building business in Philadelphia has been very good during the past year. Work was a trifle slack in the beginning of the season, but later it picked up, a number of large operations being commenced and the city putting several large contracts in the market. The total amount of building exceeded that of 1891, but fell short of that of 1890. Operative building has been brisk. The employers and workmen have been on friendly terms all the season, the only disturbance of moment being in the sheet-metal working branch. A short strike resulted, which, however, was adjusted with but little delay. It is stated that the workmen generally are reorganizing the unions upon a firmer basis. The Builders' Exchange has created a harmony among the builders such as never existed before, which has proved practically beneficial in many instances. The members spare neither time nor money to assist each other in maintaining their rights. A case in point is cited of a verdict obtained in the courts for $13,000 in favor of the estate of one of the deceased members, due largely to the efforts of the members of the exchange, who devoted time, money and energy in securing justice. The relations between the builders and architects appears to be amicable and pleasant. The exchange has been at work considering the recommendations of the National

Association, having taken them up *seriatim*. At the last corporation meeting a code of practice based upon the form advocated by the national body was adopted, and is now one of the rules of the exchange. Other subjects are on the programme for discussion. The exchange is in most excellent condition, and is steadily increasing in importance and numbers. The trade school, which has been frequently referred to in *Carpentry and Building*, is doing a work that sets an example to every organization of builders in the world. The exhibition department of the exchange, which comprehends the finest collection of building materials in the country, is being constantly augmented and improved. A neat little folder artistically printed has recently been issued as showing the value and progress of the exhibit.

Providence, R. I.

The building interests of Providence have never been in better condition than during the past year. The contractors have had all they could attend to, and good prices for work have prevailed. The majority of the work has been in the residence portion of the city, an unusual number of fine dwellings having been erected. In the business part there have been several important contracts and a large amount of alterations and repairs. The city generally has taken on a refreshed and improved appearance. Good wages have been paid the workmen throughout the season and the relations between employers and employed has been without break with the exception of the strike of the plumbers and granite workers. The strike of the granite men was felt somewhat at the beginning of the season, but the matter was so handled that little delay in the execution of work resulted. Most of the architects and owners of buildings under contract being in sympathy with the quarry owners and contractors, the latter were not pushed during the time of the strike. The plumbers' strike assumed rather large proportions at one time, and threatened to be a serious affair, but the two sides finally met and by a few concessions from each the matter was settled, most of the men being taken back, and are now busily engaged in finishing the summer's work. The journeymen carpenters have recently been holding meetings in the interest of shorter hours. Both carpenters and masons are at present working ten hours per day and a request for nine hours is expected by the employers. There will probably be little or no opposition on the part of the contractors and the matter will doubtless be settled without a strike. The use of the Uniform Contract has been urged upon its members by the Builders' and Traders' Exchange; but it makes little headway and its use is limited. There has prevailed a remarkable degree of good feeling among the contractors this year, and the architects and builders have also been on more friendly terms than ever before. The exchange has had a year of fair prosperity and is steadily growing to the standard which it hopes ultimately to attain. The project of building a home which was agitated some time ago keeps continually cropping out and there is no doubt but that it will take definite shape in the near future. The outlook for next year is very good, there being already several large contracts in prospect, which with the work begun this fall will make a good starter for the season.

St. Louis, Mo.

The amount of building done in St. Louis in 1892 was about up to the average and the builders are fairly well satisfied with the season's business. The workmen and employers have had no serious disturbances to settle and the present relations between the two are harmonious. Most of the contractors are busy finishing their jobs for winter and are looking forward to a good year for 1893. The members of the Builders' Exchange are at present fully occupied with the preparations for the coming convention of the National Association. Arrangements are being made for providing the delegates with every convenience and attention during the meeting, and in fact the committees have been at work for several months perfecting all details of both business and entertainment. Nothing will be left undone that might assist the work of the convention or add to the comfort and pleasure of those in attendance. The entertainment promises to be elaborate.

St. Paul, Minn.

The building business in St. Paul has been better this year than it was last, owing partly to the erection of several large factories and incidental work. The employers and workmen have gone through the season without unusual disturbance, the only matter which came to an issue being some demands by the plumbers which were granted and no further trouble ensued. Builders and architects get along nicely together, the latter professing to favor, as much as possible, the members of the exchange. The contractors themselves stand well together and try to make their exchange as beneficial as possible. The Uniform Contract is very generally used, the architects being supplied by the exchange.

Notes.

It is stated that the Builders' Exchange of Pittsburgh is projecting a convention of all the builders' exchanges in the surrounding cities, to be held in Pittsburgh January 17. Wheeling, Youngstown, Washington, Pa., Uniontown, Greensburg and other cities are mentioned as proposing to participate.

The directors of the Builders' and Traders' Exchange of Kansas City have appointed as members of the joint Columbian Exposition Committee of the Commercial Club, the Live Stock Exchange, the Real Estate Exchange and Builders' and Traders' Exchange, W. A Kelly, A. A. White, A. O. Smith, George Bonfield and W. W. Taylor. The joint committee will consider ways and means of representing Kansas City at the World's Fair.

Contractors belonging to the Toledo Builders' Exchange report work enough to keep them busy until spring. There is a great deal of work on hand left over from last season yet to be completed. The builders' banquet will be held about January 20,

Bridgeport, Conn., builders are trying to secure some universal practice to govern the letting of sub-contracts. Fault is found with the manner in which some of the general contractors obtain their figures.

The Builders' Exchange of Baltimore has recently issued a very neatly printed and bound hand-book, containing much valuable information. Its contents include a history of the exchange, the Baltimore building and sanitary laws lien law of Maryland and much other data of importance to builders

Luminous Paints.

Various articles have been published about luminous paints, and different lines of manufacture are employing them. One of our German contemporaries presents a series of receipts for paints of this kind, showing how they may be prepared in different colors. At the outset it is remarked that all the paints mentioned below can be used in the manufacture of colored papėr if the varnish is entirely omitted and the dry mixtures ground to a paste with water.

The luminous paints can also be used as wax colors for painting on glass and similar objects by adding, instead of the varnish, 10 per cent. more of Japanese wax and one-fourth the quantity of the latter of olive oil. The wax colors prepared in this way may also be used for painting upon porcelain, and are then carefully burned without access of air. Paintings of this kind can also be treated with water glass.

For orange luminous paint, 46 parts varnish are mixed with 17.5 parts prepared barium sulphate, 1 part prepared Indian yellow, 1.5 parts prepared madder lake and 38 parts luminous calcium sulphide.

For yellow luminous paint, 48 parts varnish are mixed with ten parts prepared barium sulphate, 8 parts barium chromate and 34 parts luminous calcium sulphide.

For green luminous paint 48 parts varnish are mixed with 10 parts prepared barium sulphate, 8 parts chromium oxide green and 34 parts luminous calcium sulphide.

A blue luminous paint is prepared from 42 parts varnish 10.2 parts prepared barium sulphate, 6.4 parts ultramarine blue, 5.4 parts cobalt blue and 46 parts luminous calcium sulphide.

A violet luminous paint is made from 42 parts varnish, 10.2 parts prepared barium sulphate, 2.8 parts ultramarine violet, 9 parts cobaltous arsenate and 36 parts luminous calcium sulphide.

For gray luminous paint 45 parts of the varnish are mixed with 6 parts prepared barium sulphate, 6 parts prepared calcium carbonate, 0.5 part blue, 6.5 parts gray zinc sulphide.

A yellowish-brown luminous paint is obtained from 48 parts varnish, 10 parts precipitated barium sulphate, 8 parts auripigment and 34 parts luminous calcium sulphide.

Luminous colors for artists' use are prepared by using pure East India poppy oil in the same quantity instead of the varnish, and taking particular pains to grind the materials as fine as possible.

For luminous oil-color paints equal quantities of pure linseed oil are used in place of the varnish. The linseed oil must be cold pressed and thickened by heat.

Solid or Hollow Brick Walls.

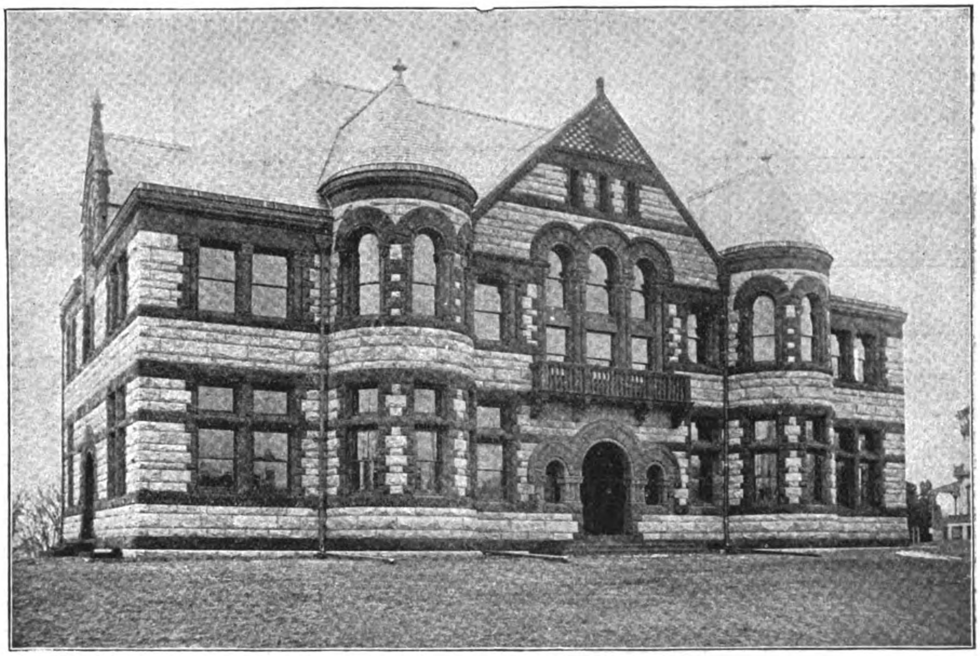
It is obvious to the most casual observer that notwithstanding this country is essentially a land of timber, the merits of brick as a building material are rapidly becoming better understood. Experience has shown that the durability and strength of brick make its use cheaper in the end, although the first cost may be greater than that of wood. The extent to which brick has been employed in the erection of the cheaper class of buildings where the choice has been between timber and brick or stone has been governed very largely in the past by geographical conditions. In sections of the country where an abundance of excellent brick clay is found the majority of buildings have been erected in brick, but with the rapidly increasing facilities for the transportation of freight, it is perfectly natural to suppose that brick will be employed in places remote from brick-making centers and that, too, in the most common kind of buildings. In the erection of structures where low cost is the essential factor, timber is often employed to the exclusion of brick simply because to use the latter and at the same time keep the cost within the prescribed limits would mean employing brick of inferior quality and which would not endure much longer than timber There is a way of using good brick, says the *Brickmaker*, and yet of keeping the cost low, and that is, by making use of hollow bonds.

The bonds can only be used in one-brick walls. There are two methods of laying them. The first is to lay all the brick on edge, laying first a header and then a stretcher, and so on throughout the course. The course above is laid exactly in the same way with the headers in the center of the stretchers below them; the ends of the courses being closed up with closers of the necessary length. The second method of forming hollow bond is first to lay a course of headers, and then upon it a course of stretchers on edge. This is followed throughout the wall, there being headers flat and stretchers on edge alternately. Both systems of laying brick produce a fairly strong wall that will safely carry all ordinary weights. For fence walls they may be used with advantage and for a number of other purposes may be safely employed. Hollow bonds are not recommended to take the place of solid walls, excepting where it is necessary to keep the cost low, and where it would be necessary to use an inferior brick if the wall were built solid. Hollow walls erected of good brick are much superior to solid walls constructed of poor brick.

AT THE 07th annual election for officers of the General Society of Mechanics and Tradesmen of the City of New York, held at Mechanics' Hall, on Wednesday, December, the following gentlemen were selected to serve for the ensuing year: President, Guy Culgin; vice-president, John . Hamilton; second vice-president, Warren A. Conover; treasurer, Richard T. Davies; secretary, Stephen M. Wright.

HOT-WATER HEATING AND VENTILATION.

THE USE OF HOT WATER in the heating and ventilating of school buildings is not so general as to make a description of any typical system unentertaining to a large class among our readers. Further, heating by hot water on the indirect plan is so little understood at the present day that an account of a successful experiment of this kind would seem to have no little interest and value for all engaged in the building trades. A complete system of heating and ventilating, using hot-water circulation as the basis, was installed not long since in the Williams Memorial Institute of New London, Conn., by the Hopson & Chapin Mfg. Company of that city. The performance was such that some months after it was put in a public test was made, an account of which was prepared by the well-known heating engineer, John J. Hogan, and published in the columns of *The Metal Worker*. Subsequently it was arranged in pamphlet form for distribution by the company named. In this connection, the result of the test in the building in question was contrasted with a similar test made in another school building in the same city employing hot air as the basis. The space at our command will not permit a contrast of the two systems, nor the presentation of some of the details which Mr. Hogan found it interesting to give for the benefit of heating engineers and steam fitters. What follows, however, covers the essential part of his report relative to the hot-water system, with a number of tables, reductions of diagrams, &c. A careful perusal, it is believed, will be found of interest to architects and builders alike. Mr. Hogan commences with a description of the building, an engraving of which, made from a photograph, is among the illustrations presented in this connection. He afterward describes the boilers and piping, referring to the cuts by way of illustration, and then he details the operation of the system and the records made during the test. The latter are summarized in the tables which are presented below.



Hot-Water Heating and Ventilation.—Fig. 1.—General View of the Williams Memorial Institute, New London, Conn.

DESCRIPTION OF THE BUILDING.

The Williams Memorial Institute and School is situated on the top of a hill in the town of New London, Conn., and is shown in general view in Fig. 1 of the cuts. The front of the building faces north. Here there is an entrance door with vestibule between two semicircular extensions, which are the full hight of the main building. By this entrance the main halls on the first floor and stairways are approached. These halls are 16 feet wide, extend the full length of the building east and west and have vestibules and entrances at each end. On the first floor is the principal schoolroom, some 66 feet long by 45 feet wide, with 16 windows, six of which have a western, six an eastern and four a southern exposure. The library is east of the schoolrom and south of the main hall, while the lavatory is on the same side of the hall and west of the schoolroom. At the north side of the building are three classrooms, two of which have semicircular extensions, and one room in the northwest corner is used as a coatroom. The library and lavatory have each two windows facing south and one each respectively with an east and west exposure. The location of the windows in the class and coat rooms can be ascertained by reference to Fig. 2, which is a plan of the cellar of the building, the rectangular figures marked W A indicating the position of the windows. All the rooms on the first floor are 16 feet high. The total quantity of space on this floor inclusive of halls and vestibules is 103,672 cubic feet, with 1255 square feet of glass and 4855 square feet of exposed wall.

SECOND FLOOR.

On ascending the stairway to the second floor one finds the large main hall, 102 feet long by 17 feet wide. The lecture room is over the schoolroom and is the same length and width as the latter. The hight, however, is greater, as may be seen by reference to Fig. 3, which is a sectional elevation of the building. The ceiling takes the shape of the roof on all sides in this room. The trustees' room is east and the teachers' room and toilet room are west of the lecture room. Sliding doors are arranged so that the lecture room and main hall may form one large floor. At each side of the stairway and facing to the north or front of the building are the music room, northeast corner, two classrooms with semicircular extensions and the studio on the northwest corner. The windows on this floor are located the same as on the first floor; the position of the windows in the east wall of main hall can be seen by reference to Fig. 3, the windows in west wall being similarly placed. With the exception of the lecture room the hight of the rooms and the main hall on this floor is 14 feet. This floor contains 125,134 cubic feet of space, has 1114 square feet of glass and 4392 square feet of exposed wall.

The attic extends over the main hall and contains about 46,000 cubic feet of space, within about 2500 square feet of exposed wall. This part of the building was not to be heated, but it will be readily understood that a fair portion of the heat is taken up by this part of the building, whether the doors are kept closed or otherwise.

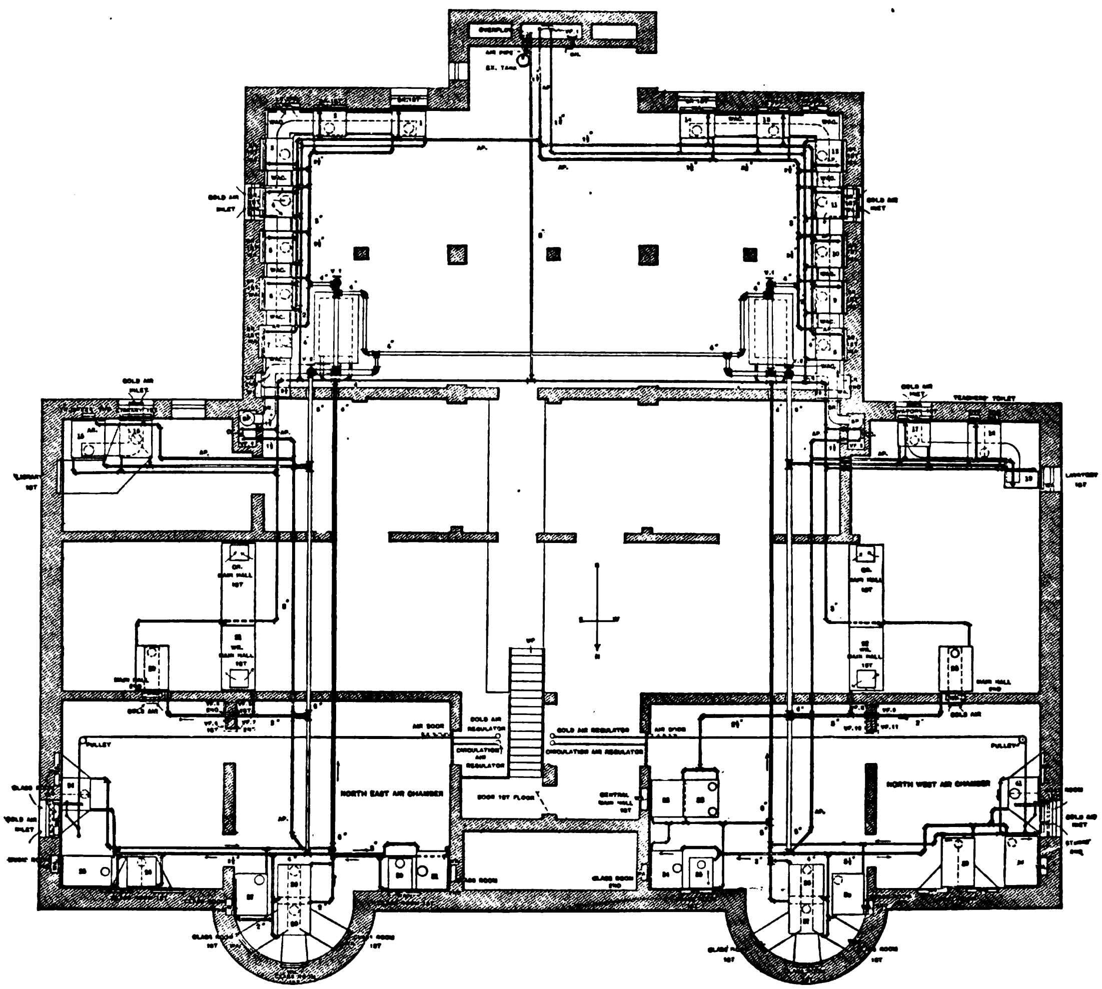
The hill on which this building is situated is nearly all solid rock, so that as little excavation as possible was undertaken. By referring to Figs. 2 and 3 it will be noticed that the cellar is 8 feet high under only a portion of the principal schoolroom at the south end. The space beneath the rest of the first floor is only 4 feet, excepting a passageway about 5 feet wide, which forms an entrance to the cellar from the stairway at front end of building.

BOILERS AND PIPING.

There are two boilers of the Pequot square fire box pattern used for heating. They are located in the south cellar, one at the northeast and the other at the northwest corner, Fig. 2. These boilers have 13.34 square feet of grate surface and 650 square feet of boiler heating surface. They are set in brick, and each boiler occupies a floor space 7 feet 4 inches long by 4 feet 8 inches wide. Each has a separate iron smoke pipe, S P, Figs. 2 and 3, connecting to vertical smoke flue of clay or tile pipes in ventilating flues, V F 2 and V F 3, Fig. 1. Each smoke pipe is fitted with a damper, which is controlled by an automatic damper regulator. From the boilers the flow and return pipes are conducted as shown on plan, Fig. 2. The mains are of 6-inch pipe. The valves V 1, V 2 regulate the flow to the sections of the system. The system, it may be said, is divided into four sections, two south of the boilers and two north of them. On the main flow pipes near each boiler are the "special" hot-water thermometers. Between the two boilers are equalizing flow and return pipes 4 inches in diameter. The object of these pipes and the valves V 1, V 2 on each boiler is to maintain a uniformity of temperature throughout the system at all times, regardless of the condition of the fires in each boiler. In Fig. 3 it will be noticed that the return main is shown as if at a lower level than the flow main, but this is not the case in reality, as the two pipes are on the same level. The object in showing it in the manner described is to convey a clearer idea of its relative location and connections. The equalizing return pipe between the boilers is on the same level as the flow and return mains. By this arrangement either boiler may be used, and there will be no circulation through the boiler which has no fire. From the equalizing return pipe the 3-inch pipe to expansion tank, "ex. pipe," Figs. 2 and 3, is taken. The expansion tank, "ex. tank," Figs. 2 and 3, is located above the ceiling of second floor and near ventilating flue V F 1. The expansion pipe, the cold-water supply, the overflow and the air pipe from top of the expansion tank are all located in this ventilating flue, Figs. 2 and 3. The reason for placing the expansion tank so high was in order that it might be available for the three vertical circulating coils C C, C C, C C, in ventilating flues V F 1, V F 2 and V F 3. These coils are of 1¼-inch pipe, about 30 feet long, and are used to accelerate the current of air through the ventilating flues. They are connected to the main flow and return pipes by 1½ inch pipe. Each 1½ inch flow pipe, it will be noticed by reference to Fig. 3, extends to near the top of the ventilating flues above the level of the expansion tank and is left open at top. The lower part of these 1½-inch flow pipes is connected to the air pipes A P, A P, A P, which air pipes are connected to the highest points on radiators and main pipes, thus clearing the whole system of air without the use of air valves or cocks. When radiators have not air pipes care has been taken to make the pipes and radiators incline so that the air will pass off through the nearest air pipe connection.

FRESH-AIR SUPPLY.

The admission of fresh air is indicated in Fig. 2 by the location of the cold-air inlets. From these inlets the fresh air passes into ducts of galvanized iron, which are connected to the cold-air spaces beneath each radiator by circular openings. These main inlets are fitted with dampers so as to control the incoming of the air. Under the radiators in the northwest and northeast corners the galvanized cold-air ducts have been dispensed with. These radiators supply the classrooms and coatroom and the central main hall on first floor, and the music and class rooms, studio and main hall on second floor. The chambers in which the radiators are suspended supply each radiator directly without the use of cold-air ducts, the fresh air entering through the cold-air inlets. The radiators, Nos. 21 and 22, which heat the main hall, first floor, circulate the air of the hall through the radiators without any supply of fresh air. Such a supply is not necessary here, as the opening of the doors of the vestibule will admit sufficient for all purposes. By reference to Figs. 2 and 3, it will be seen that the arrows denote a descending current to the circulating registers C R, C R, and to the circulating air duct C A, Fig. 3, through which the air is reconveyed to the radiator and when heated ascends into the main hall through the warm-air registers W R, W R. Fresh warm or heated air is supplied to the main halls through the warm-air register W R in the central main hall. When the fresh air passes from the cold-air ducts and cold-air chambers through indirect ventilating



Hot-Water Heating and Ventilation.—Fig. 2.—Basement Plan of Building, showing Heating Apparatus and Pipe System.

RADIATION.

There are 41 stacks or sets of indirect ventilating pin radiators, varying in size from 9 to 21 sections each. Each set is inclosed in wood casings of 1 inch thick matched stuff, covered with galvanized iron, forming a warm air space above and a cold-air space below the radiators. They are suspended from the ceiling by heavy bolts carrying horizontal bars on which the radiators rest, the casing being independent of the radiator supports. The total surface in all the radiators is 5600 square feet. This quantity gives a proportion of 420 square feet of indirect ventilating radiating surface to 1 square foot of grate, of 8.6 square feet of indirect radiating surface to 1 square foot of boiler heating surface, and 1 square foot of indirect radiating surface to 42 cubic feet of space.

pin radiators, it is heated by contact with the surfaces of the hot-water radiators, and ascends into the warm-air ducts marked W A, W A, and then enters the rooms through the warm-air registers W R, W R.

REGISTERS.

The position of the warm-air registers is indicated by arrows and the letters W R, W R. The warm-air registers in main hall, first floor, are in the floor, while the register in central main hall is in the wall, near the floor. All the other warm-air registers, W R, W R, on the first floor are at the windows, about 3 feet 6 inches above the floor; these registers are 42 inches long by 4 inches wide and are set horizontally. On the second floor the warm-air registers W R are in the walls near the floor and are set vertically. These registers are usually located against external or exposed walls of the rooms except those in the main hall. Where one stack of radiators supplies heated air to more than one warm-air flue to first floor the air space above the radiators is divided for each flue and register. A

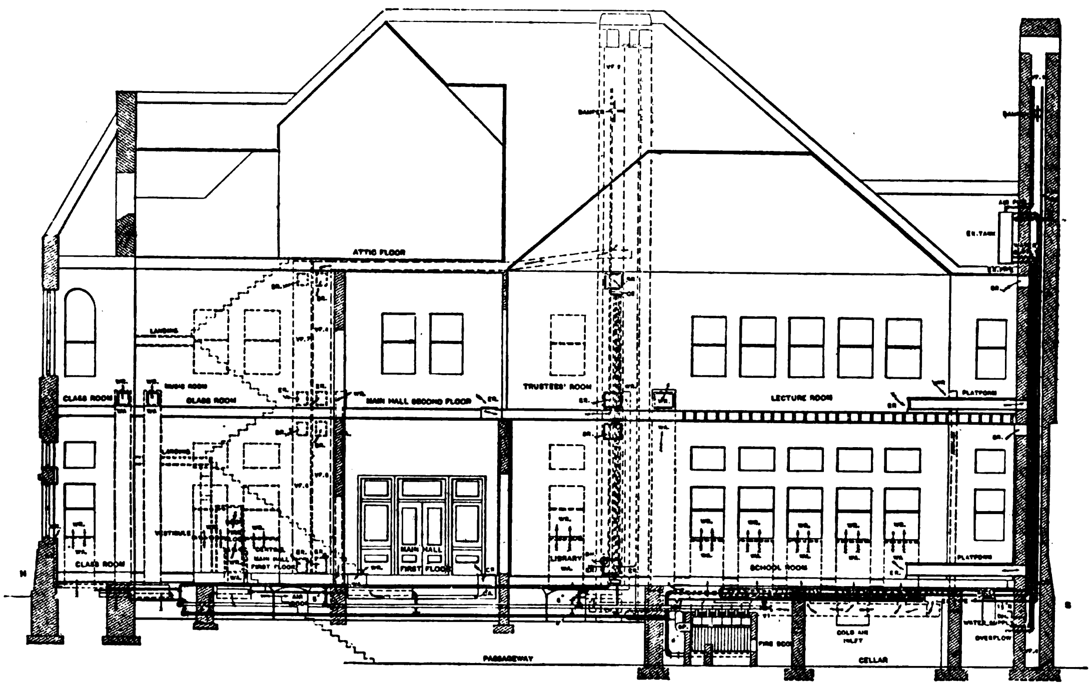
INDIRECT RADIATORS.

Nos. 1 to 14 inclusive supply lecture and school rooms.
No. 15. Trustees' room, second floor.
No. 16. Library, first floor
Nos. 17 and 19. Lavatory, first floor.
No. 18. Teachers' room and toilet, second floor.
Nos. 20 and 23. Main hall, second floor.
Nos. 21 and 22. Main hall, first floor.
Nos. 24 and 26. Northeast classroom, first floor.
No. 25. Music room, northeast, second floor.
Nos. 27 and 31. Classroom, east, second floor.
Nos. 28, 29 and 30. Classroom, east, first floor.
Nos. 32 and 33. Central main hall, first floor.
Nos. 34 and 38. Classroom, west, second floor.
Nos. 35, 36 and 37. Classroom, west, first floor.
No. 40. Studio, northwest, second floor.
Nos. 39 and 41. Coatroom, northwest, first floor.

The warm or heated air having been conveyed to the rooms in the manner de- flues to the main hall second floor, two classrooms on first floor and the music room and classroom on second floor. Flue V F 3 ventilates the schoolroom and lecture room, the lavatory on the first floor and the teachers' and toilet rooms on the second floor directly, and the classroom and coatroom on first floor, the classroom, studio and main hall on the second floor by means of connecting flues. Near the top of the three brick ventilating flues V F 1, V F 2 and V F 3 are dampers, which are operated by handles marked D H, D H, Fig. 3. The handle for flue V F 1 is in the cellar, and those for flues V F 2 and V F 3 are in the schoolroom near the east and west exhaust registers E R, E R.

OPERATION OF THE SYSTEM.

The operation of the system is now easily described and understood. When the surfaces of the radiators are heated by the circulation of hot water, the fresh air admitted through the cold-air inlets when the dampers are opened is heated and ascends into the rooms. As this air



Hot-Water Heating and Ventilation.—Fig. 3.—Sectional Elevation of Building, showing Heating System.

single stack supplies one flue and one register on the second floor, except in the lecture room. The schoolroom on first floor and lecture room on second floor are heated by 14 stacks of radiators, connected to 18 warm-air flues, 14 to schoolroom, marked S R 1st WA, and four to lecture room, marked L R 2d W A. Stacks 1 to 4 inclusive supply four warm-air flues to schoolroom and one to lecture room, the warm-air space above these stacks being connected by warm-air connecting flues W A C. Stacks 5 to 7, 8 to 10 and 11 to 14 are similarly arranged. By closing the warm-air registers in the lecture room all the heated air passes into the schoolroom, and by leaving the registers in lecture room open and those in schoolroom closed the former room receives all the heat, or the registers in each of the rooms can be adjusted so that the two rooms may receive heated air at the same time. It was not intended to heat the two rooms at the same time, but during the winter it was demonstrated that without pushing the system the requisite temperature in the lecture room and schoolroom can be maintained with ease.

The heated air is supplied as follows:

scribed, the method of withdrawing the vitiated air deserves attention. In this case three brick ventilating flues, V F 1, V F 2 and V F 3, Figs. 2 and 3, were provided in the design of the building. The areas of these flues are sufficient, but their location is not quite satisfactory. To overcome this defect in location, the heating and ventilating engineers had to provide eight additional flues, V F 4 to V F 11, of galvanized iron. These galvanized iron flues are separated, see Fig. 3, and connected to the main brick ventilating flues V F 2 and V F 3 by horizontal flues in ceiling of second floor. The ventilating flues are of ample area and connected to the several rooms by means of 20 registers, marked E R, exhaust or exit registers. These exit or exhaust registers are placed vertically in the walls near the floor, while above each of these registers E R is a summer register, S R, through which any surplus heated air may be allowed to escape. The ventilating flue V F 1 is connected with ducts to registers E R, E R in schoolroom and lecture room in front of platform. Ventilating flue V F 2 exhausts the schoolroom and lecture room and library and trustees' room directly, while it is connected by separate

is cooled in the room and vitiated by being breathed, it is drawn out or exhausted through exit registers near the floor into the ventilating flues, the dampers in which are open, and the velocity of the ascending currents increased by the presence of the circulating hot-water coils C C, C C. If few persons are in the rooms the entrance of cold air is controlled by the dampers and regulators at cold-air inlets, and the velocity of the air in the ventilating flues is also regulated by the dampers near the top of the flues. The admission of warm air, the exit of vitiated air and surplus heated air are under control in each room by the use of the valves in the warm-air registers W R, the exhaust register E R and the upper or summer register S R. If the dampers in the three brick ventilating flues are closed the velocity and therefore the volume of incoming fresh air is reduced, because if the doors, windows, &c., of the building were perfectly air tight no air could go out, and therefore none could enter through the cold-air inlets. At night or at times when there are no scholars in the rooms ventilation is not needed, and during these periods it would be a waste of fuel to continue to heat 500,000 to 600,000 cubic feet of air each hour from the outside temperature to 70° F. In this building there is provision for preventing this waste. First the three dampers in the brick ventilating flues are closed by using the handles D H in schoolroom and cellar. The "door first floor," Figs. 2 and 3, leading from first floor to passageway in cellar, is fixed open. The cold-air regulators near stairway to cellar are operated to close dampers and cold-air inlets of the northwest and northeast air chambers. The circulation air regulators are set to open "air doors," Figs. 2 and 3. By this adjustment the circulation of the air in building as it cools is downward to the air chambers and up through the radiators to be reheated, the temperature of the building being thus maintained with a very small expenditure of fuel. The fresh air which enters through the galvanized cold-air ducts in the school, lecture and other rooms is enough to keep the air fresh, because ventilating flues being closed the circulation of air into and out of the building is practically stopped.

QUANTITIES, VELOCITIES AND TEMPERATURES.

In Table I the quantities, temperatures and velocities of incoming air are given, while Tables II and III show the records of the readings of the thermometers, which were placed in a fixed position in each room. They are termed "stationary" thermometers to distinguish them from other thermometers in the rooms which were used to ascertain the variation of temperatures as given in Table V. From these readings the extreme variations of temperature are made out and the average temperatures calculated.

Table IV gives the extreme variation throughout the building, which in 24 hours shows the greatest variation to have been 10°. The table also shows the average temperature of the water to have been 132.8° from 9 a.m. to 4 p.m.

TEMPERATURES AT DIFFERENT ELEVATIONS AND POSITIONS.

Table V gives information of some importance, the temperatures in different parts of some of the rooms being recorded. In column C the time at which these readings were made is given. In the next column, D, the temperature recorded on the stationary thermometer is repeated. The next five columns give the positions and temperatures, and in column J it is shown that the variation of temperature in the rooms heated by the hot-water system was 5.5°. Column N gives the average temperatures near outside wall.

TEMPERATURES AND CONDITION OF THE WEATHER.

Friday, 8 p.m., temperature 30°, wind northwest, cloudless, velocity 6 miles per hour.

Saturday, 8 a.m., temperature 30°, wind northwest, partly cloudless, velocity 4 miles per hour.

Saturday, noon, temperature 41°, wind northwest, cloudless, velocity 4 miles per hour.

Saturday, 8 p.m., temperature 36°, wind northwest, cloudless, velocity 1 mile per hour.

Number.	Name of apartment.	Temperature at: Friday, 4 p.m.	Temperature at: Saturday, 7 a.m.	Loss of temperature in 15 hours, 4 p.m. to 7 a.m., in degrees	Temperature at: 8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 noon.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	Highest temperature between 9 a.m. and 4 p.m. in each apartment.	Lowest temperature between 9 a.m. and 4 p.m. in each apartment.	Average temperatures between 9 a.m. and 4 p.m. in each apartment.	Greatest increase in temperature between 9 a.m. and 4 p.m. in each apartment.	Time occupied in attaining average temperature. Hours.	Time occupied in attaining 70°. Hours.
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Schoolroom.	71	63	8	63	67	70	72	72	72	73	73	74	74	67	71.62	7	−4	3
2	Library	70	59	11	59	64	68	78	72	74	76	72	71	78	64	71.87	14	+3	+3
3	Classroom..........	71	60	11	62	69	72	75	74	72	71	70	70	75	69	71.62	6	+2	−3
4	Bay classroom....	73	62	11	63	67	69	71	71	71	71	71	71	71	67	70.25	4	+3	+3
5	Bay classroom....	70	61	9	61	64	65	69	67	66	67	66	68	69	64	66.5	5	+3	...
6	Coatroom..........	68	60	8	60	62	66	69	69	67	68	68	67	69	62	67	2	+3	....
7	Lavatory..........	.....	..	....	.....	..	..	.....	...	.....	..	.....	..	...	...	.....	......	....	....
8	Corridor	69	62	7	62	63	66	68	69	69	69	69	69	69	63	66.5	6	+3	....
	Average temperature each hour...	70.28	61	9.28	61.42	65.14	68	71.71	70.57	70.14	70.71	69.85	70	....	....	69.5	......	....	...
	Highest temperature........	73	63	....	63	69	72	78	74	74	76	73	74	78	69	.....	14	..	....
	Lowest temperature	68	59	...	59	62	65	68	67	66	67	66	67	69	62	....	2	....	....
	Extreme variation.	5	4	....	4	7	7	10	7	8	9	7	7	9	7	.....	12	...	..

Average temperature in degrees Fahrenheit from 4 p.m. to 7 a.m ....65.64°
Average temperature in degrees Fahrenheit from 7 a.m. to 9 a.m..... . ...62.52°
Average temperature in degrees Fahrenheit from 7 a.m. to 4 p.m...... .... .67.85°
Average temperature in degrees Fahrenheit from 9 a.m. to 4 p.m............. .... .69.5 °

Table II.—Temperature in Apartments and Rooms, First Floor. Thermometers Stationary.

Numbers.	Name of apartment.	Exposure.	Contents of each apartment in cubic feet.	Area of exposed wall in square feet in each apartment.	Area of glass in square feet in each apartment.	Actual temperature of air entering at warm-air registers in degrees.	Area of warm-air register in square feet.	Velocity of warm air at register in feet per minute.	Cubic feet of air per minute at actual temperature = H × I.	Cubic feet of air per hour at actual temperature = J × 60.
A	B	C	D	E	F	G	H	I	J	K
	First Floor.									
1	Schoolroom. .	N.W.—S.E.	44,880	1,694	501	106	10.21	161	1643.8	98,628
2	Library	S.E.	3,712	408	97	102	1.46	194	283.2	16,992
3	Classroom.......	N.E.	5,408	460	129	95	2.92	139	405.8	24,348
4	Bay classroom	N.E.	8,080	353	111	102	2.39	147	351.3	21,078
5	Bay classroom..	N.W.	8,080	353	111	93	2.39	150	358.5	21,510
6	Coatroom	N.W.	5,408	460	129	93	2.92	175	511.0	30,660
7	Lavatory... ...	W.	3,696	474	80	93	1.12	126	141.0	8,460
8	Corridor.	W.—N.E.	24,208	653	147	104	3.89	148	575.7	34,542
	Total	....	103,472	4,855	1,255	......	27.30	......	4270.3	256,218
	Averages......	....	....	......	......	98.5	.....	155	....	....
	Second Floor.									
9	Lecture room..	N.W.—S.E.	62,810	1,581	351	93	15.56	161	2505.1	150,306
10	Teachers' room	S.E.	3,416	361	89	95	1.11	65	294.1	17,646
11	Music room	N.E.	4,830	422	99	100	2.04	88	587.5	35,250
12	Bay classroom.	N.E	7,196	311	95	97	2.04	246	501.8	30,108
13	Bay classroom .	N.W.	7,196	311	95	95	2.04	203	414.1	24,846
14	Studio	N.W.	4,830	422	99	94	2.04	270	550.8	33,048
15	Lavatory......	W.	3,276	291	61	93	0.83	262	217.4	13,044
16	Corridor........	W.—N.E.	31,580	693	223	95	4.08	131	534.5	32,070
	Totals.....	....	125,134	4,392	1,114	....	29.74	......	5605.3	336,318
	Averages....	....	....	......	.....	95.25	.....	228.2	... .	....
	Grand totals....	....	228,606	9,247	2,369	....	57.04	......	9875.6	592,536
	Averages......	....	....	... ..	.....	96.8	.. ..	191.6	... .	....

Numbers.	Name of apartment.	Velocity of warm air per second in feet at register $\frac{I}{60}$	Number of degrees of difference between actual and average temperature = G − 70.	Decrease in volume for total difference in temperature $\frac{N}{480}+1$.	Total cubic feet of air admitted through register at 70° temperature = $\frac{K}{O}$	Number of times air in each apartment is changed in one hour = $\frac{P}{D}$	Number of pupils in each apartment.	Cubic feet of space per pupil in each apartment = $\frac{D}{R}$	Cubic feet of air per pupil per hour = $\frac{P}{R}$	Cubic feet of air per pupil per minute = $\frac{T}{60}$	Time at which data in columns G and I were ascertained.	External temperature when data under G and I were ascertained.	Temperature of water in radiators when G and I were ascertained.
A	B	L	N	O	P	Q	R	S	T	U	V	W	X
	First Floor.												
1	Schoolroom.	2.68	36	1.0750	91,746	2.04	130	345	706*	11.76		Average external temperature 38° from 9 a.m. to 4 p.m.	
2	Library	3.23	32	1.066	15,930	4.29	.....	....	.....	.....			
3	Classroom	2.31	25	1.0520	23,144	4.28	15	360	1543	25.71			
4	Bay classroom	2.45	32	1.0666	19,761	2.44	20	404	988	16.46	12 15 p.m.		131°
5	Bay classroom	2.50	23	1.0479	20,526	2.54	20	404	1026	17.10			
6	Coatroom	2.91	23	1.0479	29,258	5.41	......	....	... ..	......			
7	Lavatory	2.10	23	1.0479	8,073	2.18	......	....	....	.... .			
8	Corridor	2 46	34	1.0708	32,258	1.33	......	....	... ..	......	to		
	Total	... .	....	...,....	240,696	2.32	185	....	839	13.98			
	Averages	2.58	28.5	1.0593	241,874	2.33	.....	359	.. ...	.....	1.15 p.m.		127°
	Second Floor.												
9	Lecture room	2.68	23	1.0479	143,435	2.28	.....	.....	......	.. ..			
10	Teachers' room	4.41	25	1.0520	16,773	4.91	......	... . .	......	......			
11	Music room	4 80	30	1.0625	33,176	6.86	......	....	......	.. ...			
12	Bay classroom	4.10	27	1.0562	28,505	3.96	20	359.8	1425	2 .75	2.30 p.m.		124°
13	Bay classroom	3 38	25	1.0520	23,617	3.28	20	359.8	1180	19.66			
14	Studio	4.50	21	1.0500	31,474	6.51	......	....	.....	.. ...			
15	Lavatory	4.36	23	1.0479	12,448	3.79	......	....	.....	......			
16	Corridor	2 18	25	1.0520	30,488	0.96	......	....	.....	......	to		
	Totals	......	.. ..	....	319,916	2.55	40	....	1303	21.7			
	Averages	3.80	25.25	1.0525	319,542	2.55	.....	360	.....	......	3.30 p.m.		125°
	Grand totals	....	....	.... ..	560,612	2.45	225	....	921	15.35			
	Averages	3.19	26.8	1.0558	561,219	2.45	.....	359.2	.....	.....			

Hot-Water Heating and Ventilation.—Table I.—Quantities and Velocities.

Numbers.	Name of apartment.	Temperature at Friday, 4 p.m.	Temperature at Saturday, 7 a.m.	Loss of temperature in 15 hours, 4 p.m. to 7 a.m., in degrees.	Temperature at 8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 noon.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	Highest temperature between 9 a.m. and 4 p.m. in each apartment.	Lowest temperature between 9 a.m. and 4 p.m. in each apartment.	Average temperature between 9 a.m. and 4 p.m. in each apartment.	Greatest increase in temperature between 9 a.m. and 4 p.m. in each apartment.	Time occupied in attaining av. temp're	Time occupied in attaining 70°.
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
9	Lecture room..	72	61	11	60	62	66	70	70	72	72	73	74	74	62	69.87	12	—4	4
10	Teachers' room.	70	59	11	60	66	70	72	72	74	76	76	72	76	66	72.25	10	+5	3
11	Music room.....	77	63	14	64	70	74	74	73	72	72	72	73	74	70	72.5	4	+2	2
12	Bay classroom..	72	62	10	63	66	70	71	71	70	70	70	70	71	66	69.75	5	—3	3
13	Bay classroom..	71	62	9	63	65	68	71	71	70	69	69	70	71	65	69.12	6	—4	—4
14	Studio..........	68	61	7	61	64	67	70	69	69	69	69	70	70	64	68.37	6	—4	
15	Lavatory	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	...
16	Corridor	69	62	7	62	65	66	69	69	69	69	69	69	69	65	68.12	4	—4	...
	Average temperature each hour..	71.28	61.42	9.85	61 85	65.42	68.71	71	70.71	70.95	71	71.14	71.14	....	....	70	.....	...	...
	Highest temperature.......	77	63	....	64	70	74	74	73	74	76	76	74	76	70	.....	12	...	...
	Lowest temperature	68	59	.....	60	62	66	69	69	69	69	69	69	69	62	.....	4	...	..
	Extreme variation	9	4	. ...	4	8	8	5	4	5	7	7	5	7	8	.....	8	...	...

Average temperature in degrees Fahrenheit from 4 p.m. to 7 a.m.......66.35°
Average temperature in degrees Fahrenheit from 7 a.m. to 9 a m.......62.89°
Average temperature in degrees Fahrenheit from 7 a.m. to 4 p.m.......68.33°
Average temperature in degrees Fahrenheit from 9 a.m. to 4 p.m.......70. °

Hot-Water Heating and Ventilation.—Table III.—Temperature in Apartments and Rooms, Second Floor. Thermometers Stationary.

how to improve business methods and establish a better system of credits were made by the leading men of the city in the stone, lumber, brick, cement and lime trades.

W. S. Alsip, M. B. Madden, Alexander Prussing, James A. Hogan, F. E. Spooner, F. Van Inwagen and E. J. Tomlins were appointed a committee to provide for the incorporation of a Building Material Dealers' and Manufacturers' Association with a capital stock of $5000. The main object of the association will be to establish a local system like that of Dun or Bradstreet, to prepare and keep records showing the financial standing of those who buy from building material dealers. Five hundred shares of the capital stock will be sold at $10 each. Headquarters will be opened at some central point in the city. It is expected that the new organization will drive irresponsible dealers out of business and raise the standard among honest business men.

Three months ago a committee was informally appointed by local dealers to pave the way for a larger organization, and the movement of last night was the outcome.

At the banquet W. S. Alsip acted as toastmaster. Theodore Sutton spoke of common brick. W. B. Ketchum spoke for the lumber trade. R. B. Sears responded to the toast "Cement," while F. E. Spooner represented the lime trade. J. J. McKenna's subject was brick. M. B. Madden responded to the toast "Our City's Growth, and S. S. Kimball spoke of financial benefits of co-operation as pertaining to the trade, his re marks receiving the close attention of all.

Music was rendered during the evening by the Columbian Quartet.

From United States Signal Service Report.

Average external temperature:
From 4 p.m. to 9 a.m., 30°.
From 9 a.m. to 4 p.m., 38°.

The total units of heat usefully employed during the 24 hours, when based on the quantity of air which passed through the ventilating shafts and exhaust ducts, were 5,629,199.39 units.

A fair conclusion to derive from the test in the Williams Memorial Institute is that hot water employed upon the indirect system possesses the advantage of economy, while affording an equable temperature, easily controlled. As hot-water heating is better understood by architects and those having to do with the decision in regard to heating apparatus in buildings of various kinds, it is likely to come more and more into general favor.

	Temperature in degrees Fahr. at Friday, 4 p.m.	Saturday, 7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 noon.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	Extreme variation in degrees.	Average temperature from 4 p.m. to 4 p.m. Degrees Fahr.	Average temperature from 4 p.m. to 7 a.m. Degrees Fahr.	Average temperature from 7 a.m. to 9 a.m. Degrees Fahr.	Average temperature from 7 a.m. to 4 p.m. Degrees Fahr.	Average temperature from 9 a.m. to 4 p.m. Degrees Fahr.
Highest temperature...........	77	63	64	70	74	78	74	74	76	76	74	15	.....	.....	.....	.....	....
Lowest temperature	68	59	59	62	65	68	67	66	67	66	67	9	.....	.. .	.. .	.....	. .
Extreme variation.......	9	4	5	8	9	10	7	8	9	10	7	6	.....	....	.	. . .	.....
Average temperature.....	70.78	60.71	61.63	65.28	68.35	71.35	70.64	70.54	70.85	70.49	70.57	..	67.08	65.99	62.70	68.09	69.75
Temperature of water in heating surfaces.....	.. ..	95	112	133	152	146	131	127	124	125	125	..	.....	.... .	113.3	127.	13.28

Air inlets opened at 8.15 a.m.

Table IV.—Average Temperatures of Building. Thermometers Stationary.

Building Material Men Organize.

Representatives of the building material interests of Chicago and vicinity held a banquet at Kinsley's, in that city, on the evening of December 20. Speeches on

Number.	Name of School and apartment.	Time.	Temperature on stationary thermometers.	Position of thermometer.	Temperatures at. Floor. Deg.	4 feet above floor. Deg.	12 feet above floor. Deg.	15 feet above floor. Deg.	Extreme variation in one room.	Variations in number of degrees above lowest temperature. 4 feet above floor.	12 feet above floor.	15 feet above floor.	Average temperature near outside wall.
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Shoolroom........	10.30 a.m.	71°	Near outside wall ..	69	71	73	74	.....	2	4	5	71.75
				Near center of room.	69	70	72	74	5.5	1	3	5	.
				Near inside wall......	68.5	69	71	73	. . ..	0.5	2.5	4.5	.....
4	Bay classroom....	11.30 a.m.	71°	Near outside wall....	69	70	74	74.5	......	1	5	5.5	71.8
				Near center of room.	69	70	73	74.5	5.5	1	4	5.5	......
				Near inside wall......	69	70	73	74	......	1	4	5	.....
	Averages	... .	.. .	....	......	......	......	.....	5.5	.....	.....	.....	. . .

Table V.—Temperatures at Various Elevations in a Few Apartments, Taken on Staff in Different Positions.

OHIO will build a mineral cabin in the Mines Building at the World's Fair to illustrate its mineral resources. Arrangements for it were completed recently by Executive Commissioner D. J. Ryan and National Commissioner William Ritchie of the Buckeye State. The cabin will be 32 x 61 feet, and 23 feet high. It will be constructed entirely of Ohio building material, the principal elements being the mineral products of the State.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Art of Roof Framing.

(Continued.)

CURVED OR MOLDED ROOFS.

HAVING presented to the reader a practical system for almost every conceivable form of straight work in roof framing, the next step will be to show an easy system of framing curved, or molded, roofs, as they are sometimes called. Curved roofs usually take the form of concave, convex or ogee. An ogee is a form having a double curve, and is both concave and convex. Fig. 91 shows a conical tower roof, the rafters being of the concave form. Fig. 92 shows

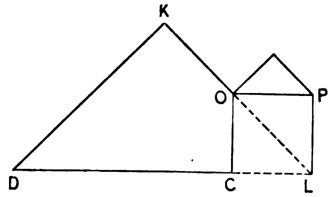


Fig. 90.—Diagram showing Starting Point of Valley between Gables Joining Diagonally.

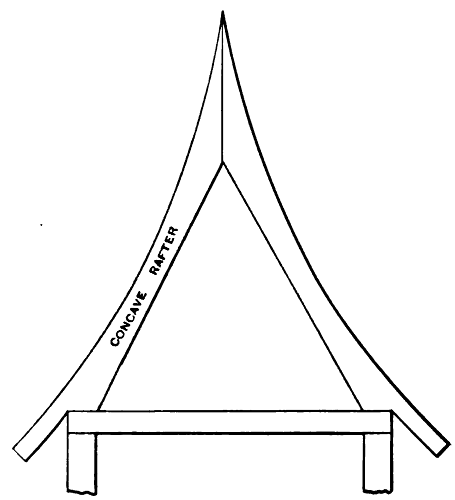


Fig. 91.—Conical Tower Roof with Rafters Concave in Form.

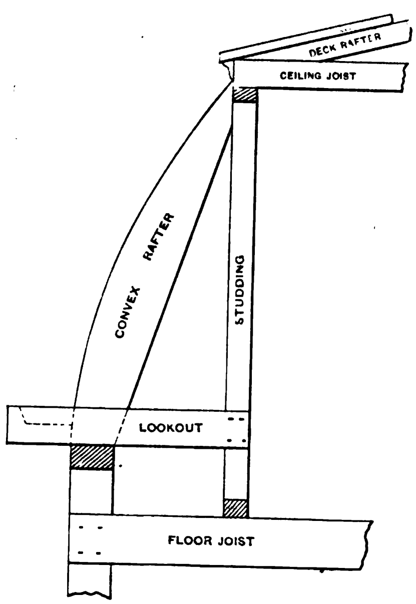


Fig. 92.—A Convex Mansard Roof.

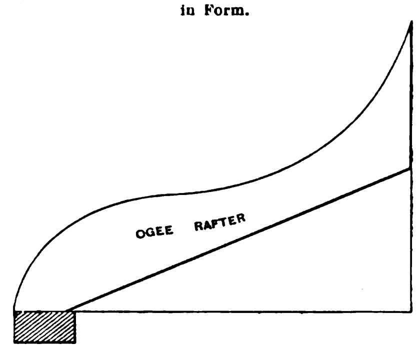


Fig. 93.—An Ogee Veranda Roof.

The Builders' Guide.—The Art of Roof Framing.

a convex mansard roof. Fig. 93 shows an ogee veranda roof. These are the principal forms, of curved or molded rafters, though they are variously combined and applied. The lengths, bevels and shapes are, however, developed in much the same manner, and when once it is understood how to develop the shape in one form any shape desired can be readily worked by the same method. The plan, Fig. 94, represents the corner portion of a roof with ogee rafters. The lines A B and B C represent the wall plates and D E and D F the deck plates. A D is the run of common rafter, D E the rise, and A E the length of common rafter on the working line. This line governs the pitch of roof and the bevels. E is the down bevel at the top and A the bottom bevel. Connect B D for the run of the hip, square up the rise, D G, and connect B G for the length and working line of hip rafter. G is the down bevel at the top and B the bottom bevel. To lay out the curved rafter, referring now to Fig. 95, set off the run A D, the rise D E, the length and work line A E. Draw the desired curves, as shown. H I indicates the bottom edge of the rafter, and J H shows the width of lumber necessary for making the curved rafter. To economize in the width of lumber, the convex portion above the work line may be worked out separately and nailed on. As a guide in laying out the corresponding curves in the hip rafter divide the length of the common rafter on the work line into any number of equal spaces, as 1, 2, 3, &c. From these points on the work line square up or down, as the case may be, to the curve line of the rafter.

Now we are ready to develop the shape of the hip. Referring to Fig. 96, set off the run B D, the rise D G, and connect B G for the length and work line of the hip. Divide the work line of the hip into the same number of equal spaces as numbered on the work line of the common rafter 1, 2, 3, &c., and square up or down, as the case may be, the same distances as shown on the common rafter. Then a line traced from B through these points to G will be the profile of the hip rafter. Fig. 97 represents the corner portion of a roof having two pitches. In this the angle and run of the hip are changed, without changing the method of finding the profiles of the rafters. Take the run, rise and length of common rafter on one side of the hip, and draw the desired shape. Then find the profile of the common rafter on the opposite side of the hip by dividing the work line into the same number of spaces and proceeding as before. The run of the hip being changed, we obtain a different length for the work line. When this is divided into the same number of equal spaces as were the common rafters, and the curved lines traced through the points, we obtain the shape of hip which will correspond to the profiles of the common rafters from either side. In roofs of two pitches it is evident that there must be two sets and two bevels of common and jack rafters. Now in curved roofs the lengths and bevels may be found by following the work lines of the common rafters, which may be drawn straight, as has been shown in Fig. 95.

The lengths and bevels of the jacks for the different pitches may be found as shown in Figs. 62, 63 or 64. Again, it is evident that a jack rafter must be the same shape as the common rafter on the same side of roof from the bottom, or plate, up to the point where it joins the hip. Hence its length may be found in the following manner by measuring on the work line of the common rafter:

Referring now to Fig. 98, A D is the run of the common rafter, D E the rise and A E the length and work line. To find the length of jack, set off the run of jack A B and square up the rise B C to the work line of the common rafter; then A C is the length of jack on the work line. This method is very simple, yet as it is a new and novel way of finding the length of jack rafters it will be well to point out a common mistake which the inexperienced might chance to make. Bear in mind that A E is the length of common rafter. B C is not the length of jack, as some might suppose, but the rise of jack ; A C is the length of jack. The down bevel is the same as that of the common rafter. To find the bevel across the back set off from D the length of common rafter to F, and connect F with A, which shows the work line of the hip. Now continue the line B C to the work line of the hip, and the bevel at G will be the bevel across the top of jack. B G is also the length of jack, and will be found to be the same as A C.

When the bevel of the jacks is known all that is necessary is to square up the rise of each jack from the base line of common rafter A D to the work line A E and take the length from A to the point where the rise of each jack joins the work line of common rafter, as shown. Many lines and much time may be saved in finding the bevels of jack rafters on roofs of different pitches by using the plan shown in Fig. 60, which is the simplest and easiest of all to remember and is applicable to roofs of any pitch.

ROOF FRAMING BY THE STEEL SQUARE.

The lengths and cuts of any rafter, hip, valley or jack on roofs of any pitch may be easily found by a

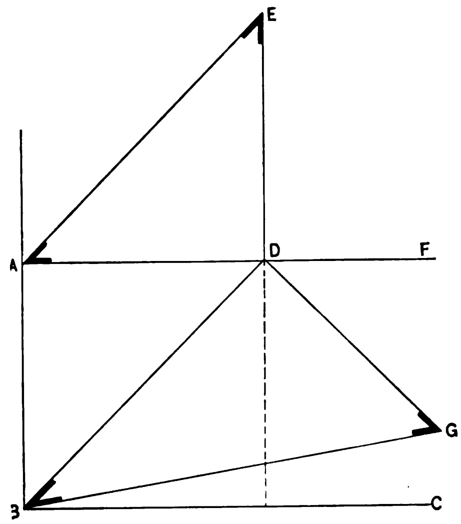


Fig. 94.—Plan of Corner of a Roof with Ogee Rafters.

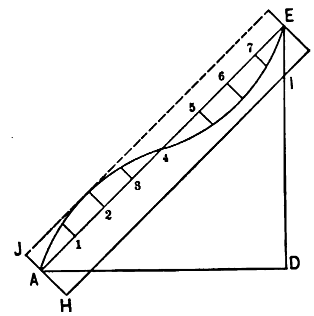


Fig. 95.—Laying out a Curved Rafter.

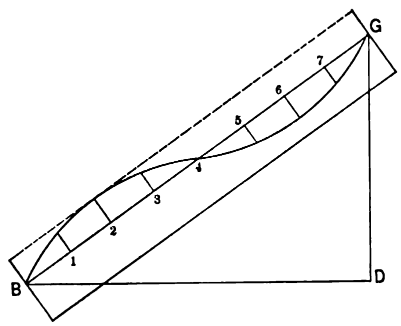


Fig. 96.—Developing the Shape of the Hips.

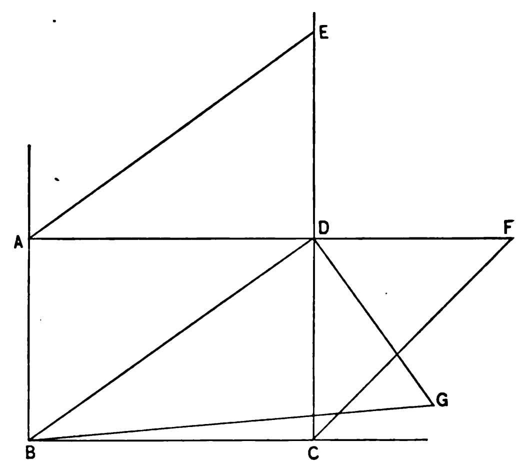


Fig. 97.—Plan of Corner Portion of a Roof having Two Pitches.

The Builders' Guide—The Art of Roof Framing.

proper application of the steel square and 2-foot rule. There are a few simple facts which if remembered will serve to make hip and valley roof framing so plain and easily understood that no one need have any difficulty in finding the length and cut of any rafter. The pitch of a roof is always designated by the number of inches it rises to the foot run, hence the cut of a common rafter is always 12 for the bottom cut and for the top cut is the rise of the roof to the foot. The cut of a corresponding hip or valley of equal pitch is always 17 for the bottom cut and for the top cut the rise of the common rafter to the foot. Thus if 12 and 8 cut the common rafter, 17 and 8 will cut the hip or valley. The top bevel of a jack rafter is always 12 on the tongue of a square and the length of the common rafter for a foot run on the blade. The blade gives the cut. In other words, the run of the common rafter on the tongue and the length on the blade will always give the top bevel of jack rafters on roofs of equal pitch. The plumb cut inches, 17 and 8 giving the cuts. The blade gives the bottom cut and the tongue the top cut. To find the bevel across the top of jacks, take the length of common rafter, 14 7-16 inches, on the blade and the run, 12 inches, on the tongue, and the distance across also represents the length of hip or valley. This merely changes the position of hip or valley in order to obtain the bevel across the top of jacks, which is 12 on the tongue and 14 7-16 on the blade. The blade gives the cut. The plumb cut or down bevel is the same as that of the common rafter.

The lengths of the jacks may be obtained in the following manner: Take the run of common rafter on the blade, 12 inches, and the length, 14 7-16 inches, on the tongue, and lay a straight edge across, as shown in Fig. 101. Space the jacks on the blade of the square, which represents the run of common rafter, and measure perpendicularly from the tongue to the straight edge on the line of each jack for their length.

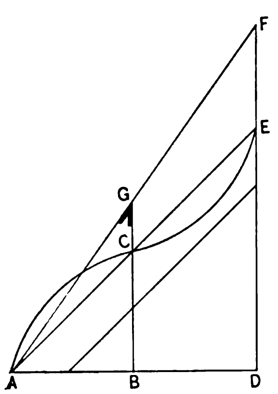


Fig. 98.—Finding Length of Jack Rafters.

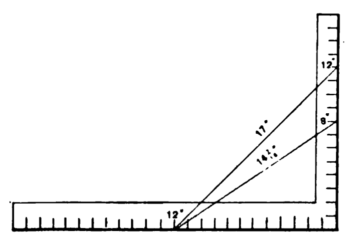


Fig. 99.—Finding Length of a Common Rafter by means of the Steel Square.

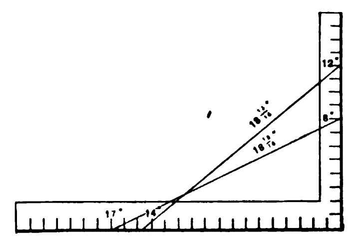


Fig. 100.—Finding Length of Hip or Valley Rafter.

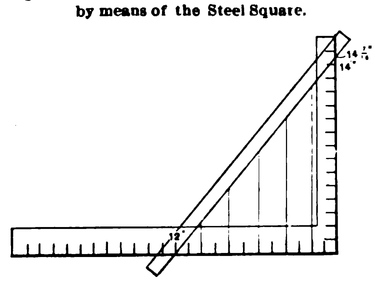


Fig. 101.—Obtaining the Lengths of Jack Rafters with the Steel Square.

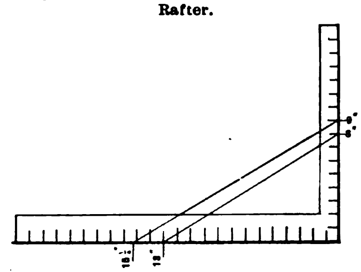


Fig. 102.—Finding Lengths and Bevels of Rafters on Roofs of Unequal Pitches.

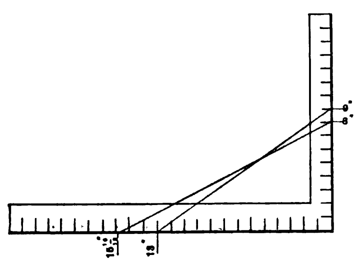
The Builders' Guide—The Art of Roof Framing.

or down bevel of a jack is always the same as that of the common rafter.

Referring now to Fig. 99, to find the length of a common rafter, take the run on the blade of a square and the rise on the tongue, measure across, and we have the length. For example, if the run of a rafter is 12 feet and the rise 8 feet, take 12 inches on the blade and 8 inches on the tongue and measure across, which will give the length, 14 7-16 inches, equal to 14 feet 5 ¼ inches, 12 and 8 giving the cuts. The blade gives the bottom cut and the tongue the top cut. To find the length of a corresponding hip or valley, take the run of the common rafter on both blade and tongue and measure across, which will give the run of hip or valley, which is 17 inches. To avoid confusion by cross lines, refer now to Fig. 100. Take 17 inches on the blade and the rise, 8 inches, on the tongue and measure across, which gives the length of hip or valley 18 13-16 inches, equal to 18 feet 9¾

The lengths of hips, valleys and jacks on roofs of unequal pitches may be found in the same manner by taking figures on the blade and tongue of a square which will represent the different pitches. For example, suppose a roof hips 9 feet on the right side of the hip and 13 feet on the left and has a rise of 8 feet, what will be the lengths and bevels of the rafters? Referring to Fig. 102, take 13 inches on the blade of a square and 8 inches on the tongue and measure across. This gives 15¼ inches, equal to 15 feet 3 inches, which is the length of the common rafter on the left side of hip. Now, 13 inches on the blade and 8 inches on the tongue give the cuts, the tongue giving the top cut and the blade the bottom cut fitting the plate. Now take the length of common rafter on the left side, 15¼ inches, on the blade, and the run of the common rafter on the right side of hip, 9 inches, on the tongue and the blade will give the cut across the back of the jack rafters on the left side of the hip. The lengths of the jacks may be found in the following manner: Divide the length of common rafter by the number of spaces for jacks. This will give the length of the shortest jack and the second will be twice that length, the third three times, and so on till the required number are found. Each side of the hip may be worked in the same manner till all the different lengths and cuts are found. The whole thing boiled down results in a few simple facts: 1, that the run of the common rafter on the tongue of a square and the length of the common rafter on the blade will always give the bevel across the back of a jack rafter on roofs of equal pitch. 2, if the roofs are of different pitches the length of the common rafter on the blade and the run of the common rafter on the opposite side of the hip or valley on the tongue will give the cut of the jack on the side of the roof from which the length of the common rafter was taken. The blade gives the cut. Hence the bevels of jack rafters on roofs of different pitches may be found as easily as on roofs of equal pitch.

The next step will be to show a simple plan for obtaining the length and cuts of the hip rafter by means of the square and 2-foot rule. As the run of common rafter on the left side of hip is 13 inches and on the right side 9 inches, we will take figures on the blade and tongue of a square which will represent



The Builders' Guide.—Fig. 103.—Obtaining Length and Cuts of Hip Rafter by means of Steel Square and Two-Foot Rule.

the runs of the common rafters. Referring to Fig. 103, take 13 inches on the blade and 9 inches on the tongue and measure across and we have 15 10-12 inches, equal to 15 feet 10 inches, the run of the hip rafter. Now take the run of the hip, 15 10-12 inches, on the blade and the rise of the roof, 8 inches, on the tongue and measure across and we have the length of the hip rafter, 17¾ inches, equal to 17 feet 9 inches. Now, 8 inches on the tongue and 15 10-12 on the blade will give the cuts. The tongue gives the down bevel at the top and the blade the bottom cut fitting the plate.

ROOF FRAMING WITHOUT DRAWINGS.

The system to which we shall now refer is one by which the lengths of common rafters, hips, valleys and jacks, with all their different bevels, on roofs of equal pitch, may be easily found without the aid of drawings. It is so simple that any one can understand it and find the lengths and cuts in less time than it takes to describe the operation. The system consists of a table, given below, from which the lengths and cuts of any rafter may be determined at once:

Rafter Table.

1	2	3	4	5	6
Pitch of roofs.	Common rafter, 1 foot run.	Corresponding hips or valleys.	Common rafter cuts.	Hip and valley rafter cuts.	Jack rafter cuts.
Inches.	Feet.	Feet.	Inches.	Inches.	Inches.
6	1.12	1.50	12 and 6	17 and 6	18½ and 12
7	1.16	1.53	12 and 7	17 and 7	13⅝ and 12
8	1.20	1.56	12 and 8	17 and 8	14⅜ and 12
9	1.25	1.60	12 and 9	17 and 9	15 and 12
10	1.30	1.64	12 and 10	17 and 10	15⅝ and 12
12	1.42	1.73	12 and 12	17 and 12	17 and 12
15	1.60	1.88	12 and 15	17 and 15	19¼ and 12
18	1.80	2.07	12 and 18	17 and 18	21⅝ and 12

Column 1 shows the pitch of roofs in the number of inches rise to the foot run. Column 2 shows the length of common rafter to a foot run. Column 3 shows the length of a hip or valley corresponding to a foot run of the common rafter. Column 4 shows the figures to take on the square for the top and bottom cuts of the common rafter—namely, 12 for the bottom cut, and for the top cut the number of inches the common rafter rises to the foot run. Column 5 shows what figures to take on the square for the top and bottom cuts of a corresponding hip or valley, which is always 17 for the bottom cut and the number of inches the common rafter rises to the foot run for the top cut. Column 6 shows what figures to take on the square for the top bevel of the jack rafters, which is always 12 on the tongue of a square and the length of the common rafter for a foot run on the blade. The blade gives the cut. The plumb cut or down bevel is always the same as that of the common rafter.

To avoid a complication of fractions the figures given in columns 2 and 3 are in feet and decimals. To find the length of common rafters, hips, valleys and jacks it is only necessary to multiply the run by the figures given corresponding to the pitch.

We will now give a practical example showing how to find the lengths of rafters by means of the table.

Example.—What will be the length of rafters on a building 16 feet wide, with roof of 7 inches pitch, hipped to the center and rafters placed 16 inches from centers?

Analysis.—The run of the common rafter is one-half the width of the building, which is 8 feet. Multiplying the run by the length of rafter for 1 foot, 7-inch pitch, column 2 of the table, and pointing off the product as in multiplication of decimals, we have the length of rafter in feet and a decimal of a foot. The decimal must be multiplied by 12 to reduce it to inches.

Operation—$1.16 \times 8 = 9.28$ feet. 0.28 12 = 3.36 inches. Thus the length of the common rafter is 9 feet 3.36 inches. The 0.36 is a decimal of an inch, and if great accuracy is desired it may be called ⅜ inch. The table is made to give the length in full, so that very slight decimals may be disregarded altogether. The corresponding hip or valley may be found as follows: $1.53 \times 8 = 12.24$ feet. $0.24 \times 12 = 2.88$ inches. The decimal 0 88 may be called ⅞ inch. Thus the length of the hip would be 12 feet 2⅞ inches.

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San Francisco, Cal...William N. Miller.
Syracuse, N. Y.......J. E. Baker.
Wilmington, Del..... A. S. Reed.
Worcester, Mass......C. D. Morse.

STANDING COMMITTEES.

Committee on Uniform Contracts.

George C. Prussing, Chairman, Chicago.
H. H. Edgerton, Rochester, N. Y.
James I. Wingate, Boston, Mass.

Legislative Committee.

J. W. L. Corning, Chairman, St. Paul, Minn.
Jeremiah Sheehan, St. Louis, Mo.
N. B. Hussey, Omaha, Neb.

Committee on Resolutions

George W. Libby, Chairman, Minneapolis, Minn.
W. W. Batchelder, Providence, R. I.
A. S. Reed, Wilmington, Del.

Committee on Statistics

S. D. Tippett, Chairman, Cincinnati, Ohio.
Paul Reisen, Milwaukee, Wis.
J. E. Baker, Syracuse, N. Y.

Committee on Building Law.

Stacy Reeves, Chairman, Philadelphia, Pa.
Alexander Chapoton, Jr., Detroit, Mich.
A. A. Berrick, Buffalo, N. Y.

Committee on Lien Law.

John S. Stevens, Chairman, Philadelphia, Pa.
Arthur McAllister, Cleveland, Ohio.
John J. Tucker, New York, N. Y.
C. W. Gindele, Chicago, Ill.
J. Milton Blair, Cincinnati, Ohio
C. D. Morse, Worcester, Mass.
Edward E. Scribner, St. Paul, Minn.

To Secretaries.

Secretaries of all filial bodies are requested to prepare full reports of the ground covered by their exchanges during the past year for presentation at the coming convention. It is intended to follow the plan inaugurated at the last convention, of having as full a report as possible from each filial body; these reports to be made one of the prominent features of the programme. Much benefit was afforded the exchanges by the relation at the last convention, of their experiences, and frequent cases have come up during the year where an exchange has been able to profit by the experience of some other filial body. Secretaries are requested to make their reports cover all action by their exchanges as thoroughly as possible in order that the information for all concerned may be full and complete.

The Seventh Convention of the National Association of Builders.

To all Filial Bodies of the National Association of Builders:

The seventh annual convention will take place at St. Louis, Mo., beginning Tuesday, February 14, 1893.

1. Exchanges already affiliated are entitled to representation in accordance with the constitution, as follows:

Article VII.—Representation at Conventions.

Each exchange affiliated with this association shall, at annual or other conventions, be entitled to representation as follows:

One delegate at large, who shall be the director chosen at the preceding convention, and one delegate in addition for each 50 members or fractional part thereof.

Each delegate shall have one vote, and may be represented by alternate or proxy.

No delegate shall hold more than one proxy.

2. New exchanges or associations desiring representation at this convention may send one delegate for each 50 members in their respective organizations, application for membership being made to the Board of Directors in accordance with the constitution, as follows:

Article III.—Membership.

Membership in this association shall be established on the basis of associations or exchanges, as follows:

Properly incorporated or duly organized builders' exchanges, representing, collectively, employers in the various trades concerned in the erection, construction and completion of buildings, shall be entitled to membership in this association upon application and acceptance by the Board of Directors.

Not more than one exchange in any city or town shall be admitted to membership. Individual members of exchanges thus affiliated shall be considered members *de facto* of the National Association.

3. Each delegation must present a credential signed by the secretary or president of the association they represent, giving names of all delegates. These credentials must be upon blanks provided for the purpose by the National Association, copies of which accompany this notice.

Issued by order of the
Executive Committee.
Wm. H. Sayward, Secretary.

Circulars relating to transportation arrangements, to programme and other details of the convention will be issued as soon as possible.

Amendments Proposed to the Constitution.

The following amendments to the constitution have been offered, in accordance with the requirements of Article X, and will be proposed for action at the coming convention:

Article IV.—Officers and Directors.

The management of the affairs of this association shall be vested in a president, two vice-presidents, a secretary, a treasurer and one member at large from each city represented, who shall be named by the delegation from said city, who, together, shall constitute a Board of Directors. These officers and directors shall be elected at the annual convention, and at such election they must receive a majority of the votes cast.

They shall enter upon their duties immediately upon the adjournment of the convention at which they are elected.

They shall have authority to fill any vacancies that may occur in their numbers.

The secretary shall be paid a salary for his services, to be fixed by the Board of Directors, and must be able to give sufficient time to the association to efficiently carry out its purposes.

To the second clause of the foregoing article it is proposed to add the words " and serve until the election of their successors."

Article VII.—Representation at Conventions.

Each exchange affiliated with this association shall, at annual or other conventions, be entitled to representation as follows:

One delegate at large, who shall be the director chosen at the preceding convention, and one delegate in addition for each 50 members or fractional part thereof.

Each delegate shall have one vote, and may be represented by alternate or proxy.

No delegate shall hold more than one proxy.

The proposed amendment to Article VII. comprehends the addition of the words " upon which membership *per capita* tax has been paid 30 days prior to the election of delegates to the annual convention " to the second clause. Also by the addition of the following clause: " The presidents of local bodies should be delegates by virtue of their office, and ex-presidents of the National Association should be delegates to all conventions by virtue of having held office."

Article IX.—Annual Dues.

The annual dues for the ensuing year shall be assessed by each convention, upon the recommendation of the Board of Directors. It shall be assessed *per capita* of membership in exchanges or organizations that have gained membership in this association, and be payable through the officers of the exchanges. This assessment will be due and payable at the annual convention, and must be paid within 30 days next ensuing. Default in paying this assessment shall forfeit membership and representation.

It is proposed to amend Article IX. to read: " The annual dues for the ensuing year shall be assessed by each convention upon the recommendation of the Board of Directors. It shall be assessed *per capita* of membership in exchanges or organizations that have gained membership in this association, and be payable through the officers of the exchanges. This assessment will be due immediately upon the adjournment of the annual convention, and must be paid 30 days prior to the election of delegates to the next annual convention. Default in paying this assessment shall forfeit membership and representation.

" Payments may be made on account of the *per capita* tax during the year."

Issued per order of the President.
Wm. H. Sayward, Secretary.

Deadening Floors.

Instead of loading the floor with plaster for the purpose of deadening sound, a method suggested by a writer in one of the French trade papers is to fill in the space between the boarding and the plastering of the ceiling with shavings, which have first been rendered incombustible by dipping them in a tub of thick whitewash. It is a well-known fact that soft substances in closing air spaces form a good non-conductor of sound, and the writer in the paper referred to is of the opinion that shavings so treated will be found of great service, while their incombustibility adds in no small degree to the fire-resisting properties of the building. When it is desired to disinfect the space between the floor and the ceiling the shavings are saturated with chloride of zinc or the latter may be added to the lime wash.

WRITING DESK AND DRAWER.

A VERY USEFUL combination of writing desk and drawer, which we have no doubt many of our practical readers will be interested in duplicating for their own use or that of some of their friends, is illustrated in the accompanying engravings. The construction is so clearly indicated by means of the details presented herewith that comparatively little description is necessary. In Fig. 1 is shown the general appearance of the drawer when opened and employed as a writing desk. Fig. 2 presents it partially closed, while in Fig. 3 is shown the desk and drawer shut. In order to close the drawer and desk, the front half of what may be designated as the writing flap is raised, as indicated in Fig. 2, until it assumes an upright position, when it is held fast by a simple mechanism and then pushed into place, as represented in Fig. 3. In order to open it two catches are released, allowing the front flap to fall and is maintained in a firm horizontal position by the hinge and dovetail, as indicated. The drawer can be prevented from being entirely withdrawn by extending the back board in a slight degree, both at the top and bottom, in such a way as to catch against the horizontal division across the frame or wall in which the drawer is fitted. By referring to Figs. 4 and 5, which represent sections through the front when opened and closed, it will be seen that the lower edge of the drawer front is rabbeted, there being also a corresponding rabbet on the front edge of the other half of the drawer. The lower edge of the drawer front is secured to the outside face of the sides by means of a pair of brass hinges, as shown in the cuts. A pair of eyes engage with small springs in the sides, while facing the inside of the drawer are two brass disks which, when pressed upon, release the eyes. From an inspection of Figs. 1 and 2 of the engravings it will be seen that there are numerous pigeon holes, as well as small drawers, for keeping stationery, writing materials, &c.

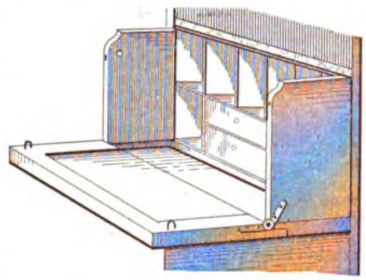


Fig. 1.—Appearance when Open.

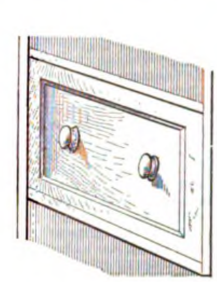


Fig. 3.—Appearance when Shut.

Fig. 5.—Section through Front when Closed.

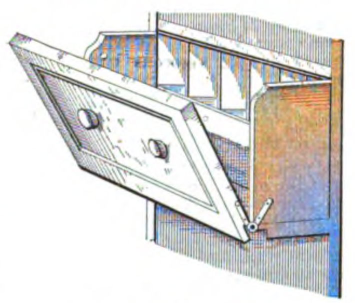


Fig. 2.—Partially Closed.

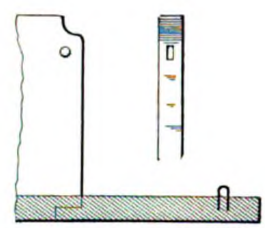


Fig. 4—Section through Front when Open.

Writing Desk and Drawer.

The Eight-Hour Law.

The secretary of the National Association of Builders has been in receipt, since its passage, of numerous inquiries from contractors on Government work regarding the extent of operation of the eight-hour law, passed by Congress, August 1, 1892. Contractors have been unable to determine, from the reading of the new law, how far it affects their business. In cases where Government work is merely incidental to the performance of many contracts, the stock for all being manufactured in one plant, as in a stone quarry or wood-working mill, the contractors are uncertain as to whether, under the law, they are compelled to restrict all their workmen to eight hours, or whether they are obliged to employ a gang of men to work eight hours per day, who shall be employed only on the work pertaining to the Government contract. Of course, there is no question as to the obligation to work eight hours in cases where the contractor is working directly for the Government and upon Government work only; but the law having been variously construed by attorneys to cover widely different ground, the directors of the National Association at the mid-year meeting authorized the secretary to secure from the United States Attorney-General an official opinion of its operation. In reply to the secretary's request the Attorney-General stated that it was inconsistent with the law creating his office to answer questions save from the President of the United States, or the heads of Departments, or to interfere with the administration of a law by committing the Government beforehand through his opinion. Inclosed in his reply, however, was the following opinion on the law given at the request of the Secretary of War, which practically covers the ground upon which the inquiries of the contractors to the secretary of the National Association were based:

GENERAL ORDERS No. 61.

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
WASHINGTON, September 6, 1892.

By direction of the Secretary of War the following opinion of the Attorney-General is published for the information and guidance of all concerned:

DEPARTMENT OF JUSTICE,
WASHINGTON, D. C., August 27, 1892.

The SECRETARY OF WAR:

SIR.—I have the honor to acknowledge the receipt of the note of the Acting Secretary of August 12, transmitting a copy of the act of Congress of August 1, 1892, entitled "An act relating to the limitation of the hours of daily service of laborers and mechanics employed upon the public works of the United States and of the District of Columbia."

In this note you ask my opinion upon the questions:

1. Does this act apply only to such laborers and mechanics as are employed by the Quartermaster's Department upon public works, or does it include all other laborers and mechanics employed in the Quartermaster's Department performing the usual and ordinary service of that character in that Department?

2. Does it include teamsters, watchmen, engineers and firemen employed in the public service in the War Department, and all engineers, firemen, deck-hands, mates and seamen on Government vessels in the service thereof?

THE ACT.

The act, which is short, reads as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the service and employment of all laborers and mechanics who are now or may hereafter be employed by the Government of the United States, by the District of Columbia, or by any contractor or sub-contractor upon any of the public works of the United States or of the said District of Columbia, is hereby limited and restricted to eight hours in any one calendar day, and it shall be unlawful for any officer of the United States Government, or of the District of Columbia, or any such contractor or sub-contractor whose duty it shall be to employ, direct or control the services of such laborers or mechanics to require or permit any such laborer or mechanic to work more than eight hours in any calendar day, except in case of extraordinary emergency.

"*Sec.* 2. That any officer or agent of the Government of the United States or of the District of Columbia, or any contractor or sub-contractor whose duty it shall be to employ, direct or control any laborer or mechanic employed upon any of the public works of the United States or of the District of Columbia who shall intentionally violate any provision of this act, shall be deemed guilty of a misdemeanor, and for each and every such offense shall upon conviction be punished by a fine not to exceed \$1000 or by imprisonment for not more than six months, or by both such fine and imprisonment, in the discretion of the court having jurisdiction thereof.

"*Sec.* 3. The provisions of this act shall not be so construed as to in any manner apply to or affect contractors or sub-contractors, or to limit the hours of daily service of laborers or mechanics engaged upon the public works of the United States or of the District of Columbia for which contracts have been entered into prior to the passage of this act."

THE FIRST QUESTION.

The first question for decision is whether this law applies only to labor performed upon public works, or whether, as to laborers and mechanics employed directly by the Government or the District of Columbia, it is general and applicable in all cases. Upon the reading of the law, the question is by no means clear, and one which, without great violence to the language of the statute, might well be decided either way.

1. In the first place, the title—"An act relating to the limitation of the hours of daily service of laborers and mechanics employed upon the public works of the United States and of the District of Columbia," clearly favors the more restricted meaning. While this is by no means conclusive, it is a circumstance worthy of consideration. "Where doubt exists as to the meaning of a statute, the title may be looked to for aid in its construction."—(Smythe *vs.* Fiske, 23 Wall, p. 380).

On the other hand, the punctuation of the act supports the opposite view. If the law were read with a comma after the word "sub-contractor" as first used in the first section, then the phrase, "upon any of the public works of the United States or of the said District of Columbia," would qualify all the preceding part of the section, and it would be clear that the law should be applied only to labor upon the public works. If, on the other hand, it be read without such comma, the opposite conclusion would seem to be correct. In the law itself, both as enrolled and as printed, there is no such comma. In the reports of both the Senate and House Committees recommending the passage of the bill, in stating the substance of the bill, such comma is used, thus favoring a construction apparently at variance with that indicated by the punctuation of the act itself. It is true, as matter of law, that "punctuation is no part of a statute," and "that courts in construing acts of Parliament or deeds should read them with such stops as will give effect to the whole" (Hammock *vs.* Loan & Trust Company, 105 U. S., page 84). At the same time, it is true, that by using or omitting the comma after the word "sub-contractor," as above, the grammatical reading of this statute is changed. Without the comma, the clause "public works, &c.," qualifies only the part relating to contractors and sub-contractors; with the comma it qualifies each of the three clauses of the series. So far, then, with the title on the one side and the punctuation on the other, the argument is perhaps fairly balanced.

But another evidence of the legislative intent, more persuasive than either title or punctuation, must be considered. In 1868 Congress passed an act now standing as section 3738 R. S., as follows:

"Eight hours shall constitute a day's work for all laborers, workmen and mechanics who may be employed by or on behalf of the Government of the United States."

This act, without question, was general, applying to all "laborers, workmen and mechanics" in the direct employment of the United States. In practical administration, however, this section has been held to be merely directory and has not been enforced.

In 1886 another act was passed (Supplement R. S., page 582), containing the following:

"And the Public Printer is hereby directed to rigidly enforce the provisions of the eight-hour law in the Department under his charge."

Such was the state of the legislation upon this subject when the act now under consideration was before Congress. It is matter of public history that ever since the enactment of the statute of 1868, efforts have been made to procure legislation from Congress imperatively requiring the enforcement of that act.

An examination of the debate in the House of Representatives, which was quite extensive (*Congressional Record*, 6357, &c.), shows that both the supporters and opponents of the bill understood its purpose to be two-fold. 1, to render the act of 1868 effectual by imposing penalties for its disregard. 2, to extend that act to the District of Columbia and to contractors and sub-contractors of the Government and the District; in short, that the purpose was to make a working day of eight hours for all laborers and mechanics in the employ of the United States or the District of Columbia wherever employed, and to make a like day for contractors or sub-contractors upon the public works; and by proper penalties to enforce the observance of such working day. In the Senate the bill was passed without any considerable discussion. (*Congressional Record*, 7638.) But the reports of the committees of both Houses of Congress (Senate 948 and House 1267), while not directly discussing the question here at issue, clearly evince an understanding of the scope and purpose of the act as above stated.

INTERPRETATION OF THE LAW.

The statute, while in one sense restrictive and in derogation of the common right of parties to contract, is nevertheless in the broader sense remedial, and is entitled to a fairly liberal construction.

In view, therefore, of the previous legislation upon the subject; of the alleged evils sought to be corrected; and in deference to the legislative understanding and purpose apparent in debate and reports of committees while the act was under consideration—the act itself, without violence to its language, being susceptible of either construction—I am constrained to hold that the law, as to laborers and mechanics in the direct employment of the Government and of the District of Columbia, is general; and that the limitation to public works applies only to such persons as are in the employ of contractors and sub-contractors.

2. As to your second question, pertaining to particular employees, I beg to suggest that its answer depends upon matters of fact not stated, and not within my cognizance. If the employees named are ordinary laborers or mechanics, working for the Government for wages under ordinary conditions, the statute would seem to apply. At the same time, it is quite apparent that, as to some of them, it might frequently happen that they would be within the emergency exception named in the statute; and as to others, as, for instance, sailors, or others on shipboard, or teamsters, their employment being peculiar, they might well be held to be, as matter of fact, neither laborers nor mechanics within the meaning of this law. Respectfully,

W. H. H. MILLER, Attorney-General.

By Command of

MAJOR-GENERAL SCHOFIELD:
R. WILLIAMS, Adjutant-General.

Plating a Tower with Aluminum.

An interesting feature in connection with the erection of the City Hall in Philadelphia is the plating of the iron work of the tower with aluminum. Something over a year ago the architect suggested that the tower be coated with aluminum, and this meeting with the approval of those in charge of the work, the erection of the necessary plant was at once commenced. The plating process used is that of J. D. Darling of New York City and provides for the preparation of the iron work in baths of caustic acid, of dilute sulphuric acid and of copper solutions before being plated with the aluminum. The surface of the iron work of the tower is said to be 50,000 square feet, and since April, 1892, about one-eighth of the work has been completed. The electroplating plant embraces half a dozen tanks arranged in the center of the building and of a size sufficient to receive the largest castings, such as the columns and pilasters that are to surround the clock tower. The plating current is furnished by four dynamos.

THE TANKS.

The tanks, each 28 feet long, 4 feet wide and 5 feet deep, are arranged in two rows of three each. Each holds about 3800 gallons, with the exception of that intended for the aluminum solution, which is 8 feet deep for special work, and has a capacity of 7000 gallons. Over each row of tanks are I-beams on which trolleys are run with hoisting block attached. The column or pilaster to be plated is lifted by the tackle from the truck upon which it is run into the shop, and lowered into the first tank, which contains a strong solution of caustic soda heated by a steam coil. Here it is boiled for 24 hours until all the oil and grease is dissolved off, after which it is thoroughly washed with water and lowered into the second tank, where all the rust and scale are dissolved and loosened by 24 hours of pickling in dilute sulphuric acid. Then it is thoroughly cleansed by the vigorous use of steel brushes and water.

COATING WITH COPPER.

This operation over, the column is lowered into the third tank, which contains a cyanide-plating solution, and receives its first thin coat of copper. It rests there for 40 hours, is then taken out, and any holes on the surface are soldered. The inside is coated with paraffine wax, and the column is then ready to receive its heavy coat of copper (about 16 ounces to the square foot) in the fourth tank, which contains a strong acid bath. In this tank it lies undisturbed for 72 hours, and when taken out is boiled to eliminate the paraffine.

It is then ready for the fifth or aluminum tank, where it lies for 72 hours, and receives a deposit of 3 ounces to the square foot. In the sixth and last tank it is washed with pure water, then given a dull finish, and run out on a truck into the yard, ready for removal. The operation occupies 11 days for each column or pilaster, but one is turned out every four days.

THE WORK ACCOMPLISHED.

Up to a comparatively recent period 12 28-foot pilasters, 8 28-foot columns and 32 10-foot bases for columns and pilasters have been finished. All these pieces are parts of the clock story. The upper portion of the tower, now being erected in the yard of the works, will soon be taken down and subjected to the plating process. It will require 20,000 pounds of aluminum to plate the entire surface of 50,000 square feet.

The electric appliances are particularly efficient. The four large dynamos which supply the plating current to the tanks are connected with them by copper conductors 6 inches wide and ½ in thick. The columns and other pieces are brought into the electric circuit by wires passed around them like slings and attached to a conducting brass bar over the tanks.

WHAT IS SAID to be the oldest brick house in America is now occupied by a doctor in St. Augustine, Fla. It is said to have been built by a Frenchman in the year 1560 and is now in a very good state of preservation.

CONTENTS.

MACHINE-MIXED MORTAR.

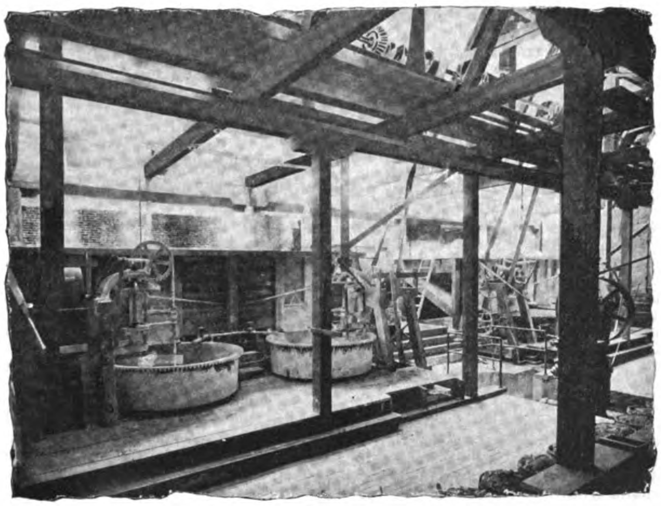
IF THE reader has watched the work of putting up one of the large buildings now so often erected in the principal cities he must have been impressed with the progress made in late years in the application of machinery in building operations. The bricks, mortar, beams and columns all elevated to their positions, and the stone work delivered ready to be placed where it is wanted by means of cranes, are among the modern methods that bring about rapid building. If the reader, with the impression on his mind of the perfection of these mechanical methods, turns to watch the process of mortar making he will probably come to the conclusion that it is as incomplete and primitive a method as could well be conceived. A laborer mixing the mortar and sand by means of a hoe cannot produce a thorough admixture of the materials—a fact which can readily be ascertained by examining the mortar of either old or new buildings. Almost without exception the mortar will be found full of small particles of lime that have not been properly slacked, while in perhaps nine cases out of ten the plaster work will be found to "pit" or blow out on the surface from the same cause.

The latest utilization of machinery on a large scale in connection with building trades is in the manufacture of mortar. For a long time mortar mills have been used in connection with building, but their employment has been largely confined to the utilization of some waste product to take the place of sand. The departure from old methods practically creates a new industry in which all grades of mortar are prepared and delivered to the building in course of construction by means of shute wagons in any quantity required.

THE WARNER PROCESS.

Since April, 1891, a process known as the Warner process of making machine-mixed mortar has been in successful operation at Wilmington, Del., and this has led to a new company being formed at Philadelphia, known as the Quaker City Mortar Company. The capacity of these works when completed is given in the official announcement of the company as 2,000,000 pounds of mortar daily, while it is stated that 7,500,000 pounds of lime paste are held constantly in stock. It should here be stated that there is nothing in connection with the process such as machinery, &c., that is patented, although a patent is held on the process itself.

The factory of the Quaker City Mortar Company is located at Twenty-third and Filbert streets, Philadelphia, Pa. Approaching from the road one may see at almost any time during the day lime being unloaded from the cars and sand being shoveled from barges on the Schuylkill River adjoining the factory. At another part of the factory are seen wagons loading with mortar, which descends from large shutes on the first floor directly out of the mortar pans in which it is mixed. These operations give a keynote to the whole process. From the time the lime and sand are unloaded they are untouched by hand until they descend into the wagons in the shape of mortar. Every operation of slacking the lime, of screening the sand and of mixing is done by machinery, and the materials travel during the process a distance of over 1000 feet.



Machine-Mixed Mortar.—Fig. 1.—View in the Slacking Room.

While the exact operations as carried on at this factory might be considerably modified in other factories as necessitated by the size and shape of the buildings and other conditions, a detailed description of them will probably prove interesting and will indicate the principles upon which the different mortars are prepared. To fully comprehend the process it will be convenient to trace each of the materials through its course and we will commence with the lime.

PROCESS OF MIXING.

Cars containing the lime are brought on a siding directly adjacent to the slacking room and the lime shoveled through openings leading to bins in the slacking room. Inside this room are four of these bins immediately above the same number of slacking pans or mills in which the lime is slacked. This room measures 50 x 60 feet, a general view of it being shown in Fig. 1. A slacking machine consists of an iron pan, some 6 feet in diameter, that revolves about four times in a minute. Descending vertically into it are three iron arms or paddles that revolve in the same direction, but much more rapidly, making about 30 revolutions in a minute. Close to these arms is a curved iron plate that may be raised or lowered vertically, the object of which is to prevent the lime from being carried around with the pan and to hold it in a mass for the revolving arms to break it up. In the middle of the pan is a large plug which may be raised when desired by means of a link chain passing over a toothed wheel operated by a lever. A 3-inch water pipe discharges into the pan. At the back of the machine is the lime bin, which is made with a sloping bottom, and a vertically sliding door is provided, with a long handle, so that when the door is raised the lime descends by virtue of its own weight into the pan.

Two men operate the four machines. One of them raises the door in the bin and the lime falls through quickly until 10 bushels are in the pan. He then closes the door, pours on water and starts the machine. The pan revolves and the arms go rapidly around churning the lime up fine and mixing it thoroughly with the water. In exactly ten minutes the 10 bushels of lime are all slacked and are converted into what may appropriately be termed "lime-milk," that is, fine portions of lime held in suspension by the water.

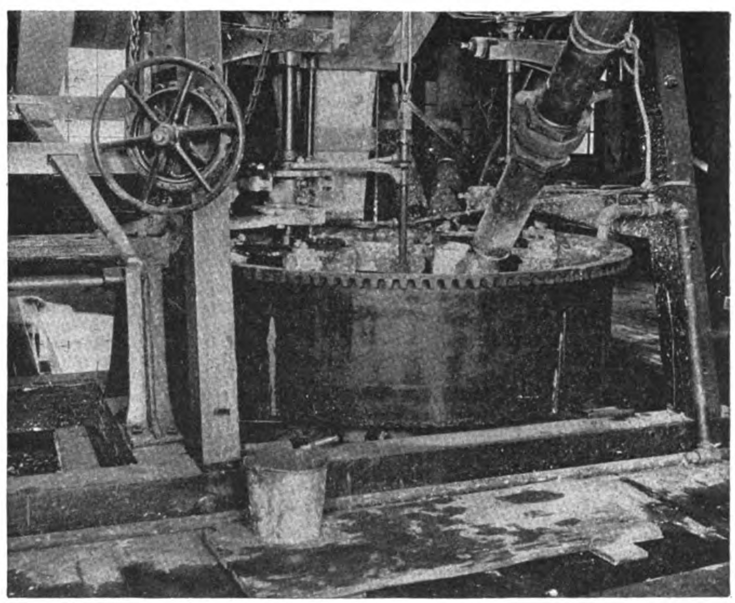


Fig. 2.—One of the Mortar-Mixing Machines.

The operator now pulls the lever which raises the plug in the bottom of the pan, and the hot, steaming lime milk runs out and discharges into a channel or gutter that slopes down toward the central pit or well. This channel is provided with two iron screens or gratings, varying in width, and the lime passing through them leaves behind it all the larger impurities or core.

The gutter discharges into a pit which is covered with a No. 12 wire screen, and the lime milk pouring through this is strained from all the finer core which may have passed through the channel gratings, so that the pit is filled with pure lime milk. When plasterers' white coat paste is being prepared finer screens than No. 12 are used, so as to insure absolute freedom from impurities. The four slacking pans may be run at the same time by two men, and together are capable of slacking 2000 bushels of lime in one day.

Connected with the pit is a large force pump which empties it as fast as the lime milk is poured in. The pump is connected with a number of 6-inch iron pipes, discharging into various vats located in the upper part of the building. There are no less than 42 vats in all, holding 600 bushels each, or sufficient to retain 25,000 bushels of quicklime or 7,500,000 pounds of seasoned paste. The capacity of the vats in the aggregate is about 100,000 cubic feet.

TIME REQUIRED FOR SLACKING.

The lime milk which is pumped into these vats remains at least 21 days or even longer and during that time every particle of the lime becomes thoroughly slacked, the heat which is retained aiding in producing this result. Thus a very important difference exists between the lime prepared by this process and that ordinarily used in building. In the latter case the object is to get rid of the heat and water as quickly as possible, while in this process the heat and water are retained, both aiding in producing a thorough slacking. At the expiration of three weeks the lime becomes a somewhat thick homogeneous paste of a putty-like consistency, every particle of which is slacked and which by that time is entirely free from heat.

In the large vat rooms on the lower floor each vat is provided with a 3½-inch syphon, which, when standing upright, reaches above the top of the vats. This is protected on the top with a wire cover to prevent large foreign material that might have found its way in from passing through it and it is hinged at the bottom so that it may be lowered to any depth required to draw off water when necessary. After the lime milk has been standing a day or two the lime becomes settled, leaving the water on top, which effectually prevents the lime from hardening. When it is desired to draw off the water the syphon is lowered and the water runs through it to a central pump, by which it it is forced to a settling room heated by exhaust steam. From this settling tank the water is used a second time, for it is obvious that water impregnated with lime is much better than fresh water for slacking purposes.

The 42 vats above mentioned are on the second, third, fourth and fifth floor of the factory. Under ordinary circumstances the lime milk is pumped to the upper vats directly over the mixing room, presently to be described, but when the lime is slacked faster than it is used the lower vats are employed for storage purposes.

The large vat room on the lower floor is used for storage, and is supplied with a system of gate valves by which the lime milk may be discharged into any vat desired. When the paste is kept more than 21 days a little more of the lime milk is pumped on it to keep it in a plastic condition. We have now seen the lime slacked and pumped into the vat room. As all of the lime must obviously be taken to the upper portion of the building so as to descend with the sand into the mixing machine, we inquire the means provided to raise it from these lower vats. We find that all the vats on the lower floor are provided with iron gates. On these gates being raised the paste runs slowly out—slowly because it is somewhat thick—on to a rubber belt conveyor, which takes it as fast as it is required for use in the factory down to the central pumps. There the conveyor passes close to a rubber scraper, which scrapes off the paste, and it is then pumped to the room immediately over the mixers, where it is ready to descend by gravity. The pumps are similar in construction to those used in the more improved paper mills for pumping paper pulp.

THE SAND.

Having traced the lime throughout its course and seen the machinery used to convey it, we will now turn to the sand. We make our way to the bank of the Schuylkill River, where we find men unloading barges and throwing the sand on the banks. Between the river and the factory are railroad tracks and it is necessary to provide means for conveying the sand across them. This is done by means of a rubber belt conveyor which is carried underneath the railroad at a slight inclination. The sand is shoveled on to the belt and is discharged into a receptacle inside the works itself. Here it is carried up to the top of the building by means of a large bucket conveyor, where it is screened and a portion of it carried to the mixers, while some of it is discharged into the conveyor room ready for those who desire to purchase the sand. The bucket conveyor will take up no less than 1000 tons of sand a day.

Coming to the top of the building we find the bucket conveyor discharging into a hopper, which in turn discharges into a large wire screening machine. This machine is made in the form of an octagonal prism, 11 feet long and 5 feet in diameter. Each long side is covered with No. 5 wire screen and the machine is set at an angle of about 20° and revolves rapidly, throwing the sand from side to side and freeing it from all large stones, &c. The screened sand passes through the wire on to a 20-inch rubber belt conveyor, while the stones, &c., are discharged from the inside into a box provided for the purpose.

The belt sand conveyor is nearly 200 feet long and it carries the sand to a similar belt running at right angles, where it is carried directly to the hoppers over the mixing room. The total distance traveled by the sand is nearly 1000 feet. At the sides of the belt connected with the screening machine are wooden shutes, and when it is desired to discharge the sand to the sand room, triangular iron scrapers are let down close to the belt, which scrape off the sand and cause it to pass down these shutes.

THE MIXING PROCESS.

Having now seen both sand and lime dealt with, we will proceed to the mixing room and watch the interesting process of actually making the mortar. Coming to this room, we find four large mixing mills not unlike the slacking machines in general appearance. A very good idea of the construction of these machines may be had by carefully examining Fig. 2, which is made from a photograph of one of them. A large iron pan revolves five times a minute. In it are two iron mixers or paddles, each having three arms that revolve 45 times a minute. In the center of the pan is a large plug operated by an endless chain, and when this is raised a hole is exposed through which the mortar descends directly into the wagons below. Discharging into the pan are four 9-inch iron pipes that convey the lime paste from the different vats on the upper floor. A 2-inch water pipe is provided, and at the back of the pan is the wooden shute leading from the sand hopper.

The paste and sand having been put in the mixer, it is started, only a little water being added at first to prevent splashing. By the two revolving mixers and the revolution of the pan itself the materials are thoroughly mixed in a very short time. Then the plug is raised, and the mortar passes out of the hole into the wagons beneath. The machine is not stopped, but as the three armed mixers pass in their revolutions over the whole space of the bottom of the pan exactly to the edge of the circular hole all the mortar is carried out

COLORED MORTAR.

When colored mortar is required the color is added to the mixture from pails. Some red mortar, mixed by hand in the ordinary way and placed in the mixer, shows a very decided red color, but after it has been mixed by the machine a great deal of the color disappears and the mortar becomes almost white. This result is explained as follows: In hand-mixed mortar there is a large portion of the bulk that is made up of comparatively large lumps. When the mortar is colored these lumps become colored on the outside only, giving the color to the whole mass. Now, when the same mortar is mixed in the machine these lumps are reduced to much finer particles, thus exposing the uncolored portions of the interior, and requiring much more mortar color to tint the mass. Nearly three times as much color is usually required.

THE WAGONS EMPLOYED.

Going to the ground again, we find the wagons loading up from a shute descending from the mixing room. These wagons are specially made for the purpose somewhat on the same principle as ordinary shute carts used for coal. The wagons hold 5500 pounds each, and from them the mortar may be readily shot down either inside or outside a building, as may be required. The mortar is also delivered in boxes suspended from specially made vehicles by chains. These boxes hold 5000 pounds of mortar, and may be carried inside a building, being, therefore, most used for conveying plasterers' mortar. The mortar is also delivered by rail in car-load lots.

GRADES OF MORTAR.

The Quaker City Mortar Company make eight different kinds of mortar, which they regularly keep on hand. They also mix by their machinery any proportion of materials desired. Their regular mortars are back front, or rough mortar, buttered stretcher mortar, press brick mortar, first coat plastering mortar, second coat plastering mortar, white coat mortar, sand finish, or rough cast mortar, and marble dust, or steel mortar. They also make colored mortars, such as brown, buff, red and black.

The plasterers' mortars do not differ from those made in the ordinary way and mixed by hand, except in the thorough mixing of the hair and perfect slacking of the lime, as already explained.

ADVANTAGES OF MACHINE-MIXED MORTARS.

The advantages claimed for machine-mixed mortar are many. To the architect it is advantageous because he is certain of getting good material while the necessity of watching the contractor to see that the materials specified are actually used is altogether done away with. To the contractor, whether he be bricklayer, plasterer or stone mason, the advantages of mortar mixed as described are also important.

From a constructional point of view there is another advantage in using machine-mixed mortar, and that is the perfection of the mortar joint. The perfect screening by machinery of the lime removes all sticks and stones and produces a mortar that consists only of small particles. In setting bricks with ordinary mortar the mason frequently comes across pebbles, sticks, &c., that make it necessary to raise a brick after it is laid in order to remove the obstruction. This necessity is entirely done away with, resulting in a saving of much time. It is estimated that a bricklayer can lay from 300 to 500 more bricks in a day when using machine-mixed mortar than he can when using that mixed by hand. In plastering a good mechanic can lay from 5 to 15 yards per day more than he could by the old method and this with a marked absence of "that tired feeling" of the wrist. The foregoing figures are based on the experience of contractors who are using the material.

When machine-mixed mortar is used

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

FEBRUARY, 1893.

We beg to announce that Mr. A. O. Kittredge has severed his connection with *Carpentry and Building* as its editor. This will involve no change in the character of the journal, which will continue on the same lines and be controlled by the same principles as in the past. The field which we mapped out for it fourteen years ago is still peculiarly its own, and in the future the same energy and liberality which have given it the position it has so long occupied may be counted on to maintain its standard of interest and value. All communications intended for the editorial department should be addressed, "Editor of *Carpentry and Building*, 96-102 Reade street, New York"

DAVID WILLIAMS.

National Convention of Builders.

The seventh annual convention of the National Association of Builders, to be held in St. Louis during the current month, promises to be one of unusual interest. The programme covers three days' sessions and presents a series of subjects for discussion which the seven years' existence of the association have proven to be the most interesting and important to the builder at large. These conventions are, in a sense, experience meetings of a large number of men all engaged in the same line of business in widely different localities and in accordance with varying customs and conditions. Under the direction of the National Association delegations representing the best interests of the builders of their own cities come together annually for the purpose of sifting out of the experience of the whole the best methods for securing the establishment of equitable and profitable business practices. Through the consideration of the various means in use in the different cities for accomplishing this end, builders are enabled to compare the customs in vogue in their own community with those that exist elsewhere. By means of these comparisons the good is sifted from the bad, formulated for practical application and recommended to the whole for actual use.

Results Accomplished.

Prior to the establishment of the National Association the builders of the country were compelled to depend largely upon their own experience for the lessons which brought the necessity of improvement, while now every builder who is a member of a filial body of the association has the benefit of the experience of his fellow-craftsmen all over the country. It remained for the national body to bring about the facilities for universal consideration of the needs of the builders, and each year since its organization has shown the result of the increased knowledge which its councils have by steady and actual improvement, upon the lines recommended, provided. Out of the experience of each convention has come a better knowledge of the means to be adopted in order to make the meetings most profitable to all, and the programme for the gathering in St. Louis seems to offer exceptional opportunities for ascertaining the needs of the craft. The result of the detailed reports from filial bodies presented at the last convention has been most beneficial, many exchanges having profited by the experience of their sister organizations. At the St. Louis meeting it is proposed to have full reports of the experiences of the year from each filial body and appropriate consideration of features adopted by any exchange that would be beneficial to the craft as a whole. The means by which the National Association secures the information upon which its recommendations are based are such that the methods which it advocates must of necessity be practical rather than theoretical, and are capable of actual application to individual cases with the positive assurance of the best results if enforced.

Exhaust Steam for Heating.

A realization of the economy resulting from the use of exhaust steam for heating buildings has led an electric lighting company in one of the cities of the West to utilize the exhaust steam of the engines at their power station for heating several adjacent blocks of buildings. The scheme includes the heating of 2,000,000 cubic feet of space; and as for each square foot of heating surface the company receives 25 cents per annum, if an average of 1 square foot of radiating surface be allowed for each 100 cubic feet of space, the company are selling their exhaust steam for $4000 per year. On the other hand, allowing that in a non-condensing engine of the best type 4 pounds of coal per horse-power per hour will be used, and that 1 horse-power of boiler capacity will supply 100 square feet of radiating surface, we find that the 20,000 square feet of radiating surface running full from October to March inclusive, say 130 days, leaving out Sundays and holidays, represents a coal consumption of about 800 pounds of coal per hour, or a little more than 9½ tons per day of 24 hours, which, as compared with the coal consumption in ordinary boilers used for heating is, at most, not more than about 57 per cent. of the latter. In the absence of the knowledge of the price of coal delivered at the city named, all that can be said concerning the economy of this heating to the consumers is that they must be saving nearly 50 per cent. of what it would cost them for fuel to heat their buildings by steam in the ordinary way. There must be a great many places where exhaust steam can be similarly disposed of to the enhanced profit of those who now permit it to run to waste. If sufficient heating surface be supplied, the heating of buildings by exhaust steam is just as efficient as though 40 pounds pressure were maintained. The amount of heat wasted from the nozzles of exhaust steam pipes in every large city is enormous. On a day cold enough to rapidly condense and render conspicuous escaping steam, from some high point overlooking any large city, let one attempt to count the streams of heat thus thrown out, and to estimate, even in a rude way, how much coal would be required to generate this wasted energy; the observer soon abandons the attempt as futile, but is startled at the magnitude of the loss.

A Two Years' Fair.

The question of preserving the World's Fair buildings at Chicago as one of the attractions of the city is just at present in process of discussion. There has probably never been a great exposition with its special buildings of enormous extent and more or less pretention to architectural beauty that has not suggested this idea to the persons interested. It does seem a heartless and woeful waste of money to lavish millions on structures only intended for a season's occupancy. The Chicago buildings being confessedly superior in size and adornment to anything of their kind, the regret of the Chicago people that they should be doomed to destruction next winter is perfectly natural. Suggestions are now being made that while many of the buildings can and should be removed, some of the largest and finest ought to be preserved. A few enthusiasts have even gone so far as to advocate a World's Fair for two successive years instead of confining it to six months of 1893. The experience of all cities that have attempted to maintain so-called permanet expositions is unfavorable to such a scheme. The great attractiveness of a World's Fair arises from the fact that a host of exhibitors are stimulated to put forth their very best efforts at a particular time. This requires somewhat elaborate preparation, much thought and considerable expense. Exhibitors would not do this two years in succession. There would be no freshness to the second year's display, and with this known the attendance would be light, and financial failure would result. The glory of the first year's achievement would be sadly eclipsed by the inglorious ending of the second season.

Chinese Roofs.

It has been truly said that the Chinese are original if they are anything, and this is manifested as much in their industrial pursuits as in their manners and customs. They have their own ideas as to how things shall be done and in what sort of building they shall reside. Their methods of making roofs are novel, to say the least, and while Chinese roofs differ, a few points gathered from a Chinese paper concerning a typical roof may prove interesting. The roof is made by first putting on the roof timbers and then nailing transverse cleats from the ridge pole downward to the eaves. Upon these cleats are placed bricks made much thinner than those employed in the walls of the building, and also somewhat wider. Over these is spread a thick layer of mud mixed with chopped straw. When the material is thoroughly dry another layer of mud is spread over it, and upon this, tile are placed in line, generally in double rows, one layer curving upward while the other curves downward. The idea seems to prevail that with this thick mass it is impossible for the water to percolate, and there being so much lime, hemp and other material employed, the roof is practically imperishable. While this is the theory, the fact remains that the tile, mud and brick are all porous, and the greater portion of every rain that falls soaks into them until they are so heavy it is not unusual for the roof timbers to bend and often break under the strain. The intense heat of the sun dries the earth, which shrinks and cracks, thus forming crevices into which the rain readily finds its way. It is very evident that as soon as the roof has reached what may be termed the saturation point the water makes itself apparent to the inmates of the building. If the house is occupied by foreigners it is provided with chimneys, and around these openings the leaks are said to be most persistent. The head mason wisely remarks that it "belongs to old-time custom" for foreign houses to leak at the chimneys and there is no help for it. Repairs are made, but after each attempt the leaks are not only as bad as before, but a fresh set are created by the tramping of the workmen over the tile.

Repairing the Roof.

This condition of affairs continues for an indefinite period, or until the owner resolves to put an end to it by pulling off the entire roof and putting on a new one of galvanized iron, for example, which will neither corrode nor leak. The mere destruction of the old roof occupies a week or so, irrespective of its size or the number of workmen employed upon the job. Immense quantities of tile and brick have gone into it and there appears to have been more earth on the roof than on the ground. The Chinese workmen, however, are not experts in putting on the "strange foreign material" which the owner has decided to employ in the construction of his new roof. They want to solder its edges, then they try to rivet it, and when it comes to fitting it about the chimney they are in a quandary. They say the material is too light and is not in accordance with the *li* of the roof. This proves to be the case, for when one of the great August storms occur, the windows of the loft are blown in and the roof is lifted off as easily as a sheet of foolscap, letting in the water all over the building just as if there had never been a roof. The architect, however, who is consulted after all this takes place, usually in some out-of-the-way locality, shows that the fault was in the manner of putting on the roof and not in the material. He shows that with proper lapping of the sheets, with screws, white lead and tar mortar, together with an inside board lining, none of these accidents would happen. Repairs are therefore executed on scientific principles, the roof is restored, proving a great success, and the same Chinese who affirmed that "it was contrary to *li*," now delight to call attention to this new foreign stuff which will neither decay nor "eat water," and even go so far as to inquire what it would probably cost for a three *chein* house in case the rich man of their village should want to try it.

Revised Uniform Contract.

The following is the form of contract adopted and recommended for general use by the American Institute of Architects and the National Association of Builders, as revised by the Joint Committee, January 10, 1898:

....
Architects.

This Agreement, made the........day of ....in the year one thousand eight hundred and ninety..............by and between......................................
....
.........................party of the first part (hereinafter designated the contractor), and ....
..........................party of the second part (hereinafter designated the owner),

Witnesseth that the contractor, in consideration of the fulfillment of the agreements herein made by the owner, agrees with the said owner, as follows:

ARTICLE I. The contractor under the direction and to the satisfaction of.................
..................................architects, acting for the purpose of this contract as agents of the said owner, shall and will provide all the materials and perform all the work mentioned in the specifications and shown on the drawings prepared by the said architects for the............................
....
which drawings and specifications are identified by the signatures of the parties hereto.

ART. II. The architects shall furnish to the contractor, such further drawings or explanations as may be necessary to detail and illustrate the work to be done, and the contractor shall conform to the same as part of this contract so far as they may be consistent with the original drawings and specifications referred to and identified, as provided in Article I.

It is mutually understood and agreed that all drawings and specifications are and remain the property of the architects.

ART. III. No alterations shall be made in the work shown or described by the drawings and specifications, except upon a written order of the architects, and when so made, the value of the work added or omitted shall be computed by the architects, and the amount so ascertained shall be added to or deducted from the contract price. In the case of dissent from such award by either party hereto, the valuation of the work added or omitted shall be referred to three (3) disinterested arbitrators, one to be appointed by each of the parties to this contract, and the third by the two thus chosen; the decision of any two of whom shall be final and binding, and each of the parties hereto shall pay one-half of the expenses of such reference.

ART. IV. The contractor shall provide sufficient, safe and proper facilities at all times for the inspection of the work by the architects or their authorized representatives. He shall within 24 hours after receiving written notice from the architects to that effect, proceed to remove from the grounds or buildings all materials condemned by them, whether worked or unworked, and to take down all portions of the work which the architects shall by like written notice condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications.

ART. V. Should the contractor at any time refuse or neglect to supply a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements herein contained, such refusal, neglect or failure being certified by the architects, the owner shall be at liberty, after ....days' written notice to the contractor, to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the contractor under this contract, and if the architects shall certify that such refusal, neglect or failure is sufficient ground for such action, the owner shall also be at liberty to terminate the employment of the contractor for the said work and to enter upon the premises and take possession, for the purpose of completing the work comprehended under this contract, of all materials, tools and appliances thereon, and to employ any other person or persons to finish the work, and to provide the materials therefor; and in case of such discontinuance of the employment of the contractor he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the owner in finishing the work, such excess shall be paid by the owner to the contractor, but if such expense shall exceed such unpaid balance, the contractor shall pay the difference to the owner. The expense incurred by the owner as herein provided, either for furnishing materials or for finishing the work, and any damage incurred through such default, shall be audited and certified by the architects, whose certificate thereof shall be conclusive upon the parties.

ART. VI. The contractor shall complete the several portions, and the whole of the work comprehended in this agreement, by and at the time or times hereinafter stated...............
....
provided that........... ....
....

ART. VII. Should the contractor be obstructed or delayed in the prosecution or completion of his work by the act, neglect, delay or default of the owner, or the architects, or of any other contractor employed by the owner upon the work, or by any damage which may happen by fire, lightning, earthquake or cyclone, or by the abandonment of the work by the employees through no default of the contractor, then the time herein fixed for the completion of the work shall be extended for a period equivalent to the time lost by reason of any or all of the causes aforesaid; but no such allowance shall be made unless a claim therefor is presented in writing to the architects within 24 hours of the occurrence of such delay. The duration of such extension shall be certified to by the architects, but appeal from their decision may be made to arbitration, as provided in Article III of this contract.

ART. VIII. The owner agrees to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and in the event of failure so to do, thereby causing loss to the contractor, agrees that he will reimburse the contractor for such loss; and the contractor agrees that if he shall delay the material progress of the work so as to cause any damage for which the owner shall become liable (as above stated), then he shall make good to the owner any such damage. The amount of such loss or damage to either party hereto shall in every case be fixed and determined by the architects or by arbitration, as provided in Article III of this contract.

ART. IX. It is hereby mutually agreed between the parties hereto that the sum to be paid by the owner to the contractor for said work and materials shall be $................
....
subject to additions and deductions as hereinbefore provided, and that such sum shall be paid in current funds by the owner to the contractor in installments, as follows:
....
....

The final payment shall be made within ....days after this contract is fulfilled.

All payments shall be made upon written certificates of the architects to the effect that such payments have become due.

If at any time there shall be evidence of any lien or claim for which, if established, the owner or the said premises might become liable, and which is chargeable to the contractor, the owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely idemnify him against such lien or claim. Should there prove to be any such claim after all payments are made, the contractor shall refund to the owner all moneys that the latter may be compelled to pay in discharging any lien on said premises made obligatory in consequence of the contractor's default.

ART. X. It is further mutually agreed between the parties hereto that no certificate given or payment made under this contract, except the final certificate or final payment, shall be conclusive evidence of the performance of this contract, either wholly or in part, and that no payment shall be construed to be an acceptance of defective work or improper materials.

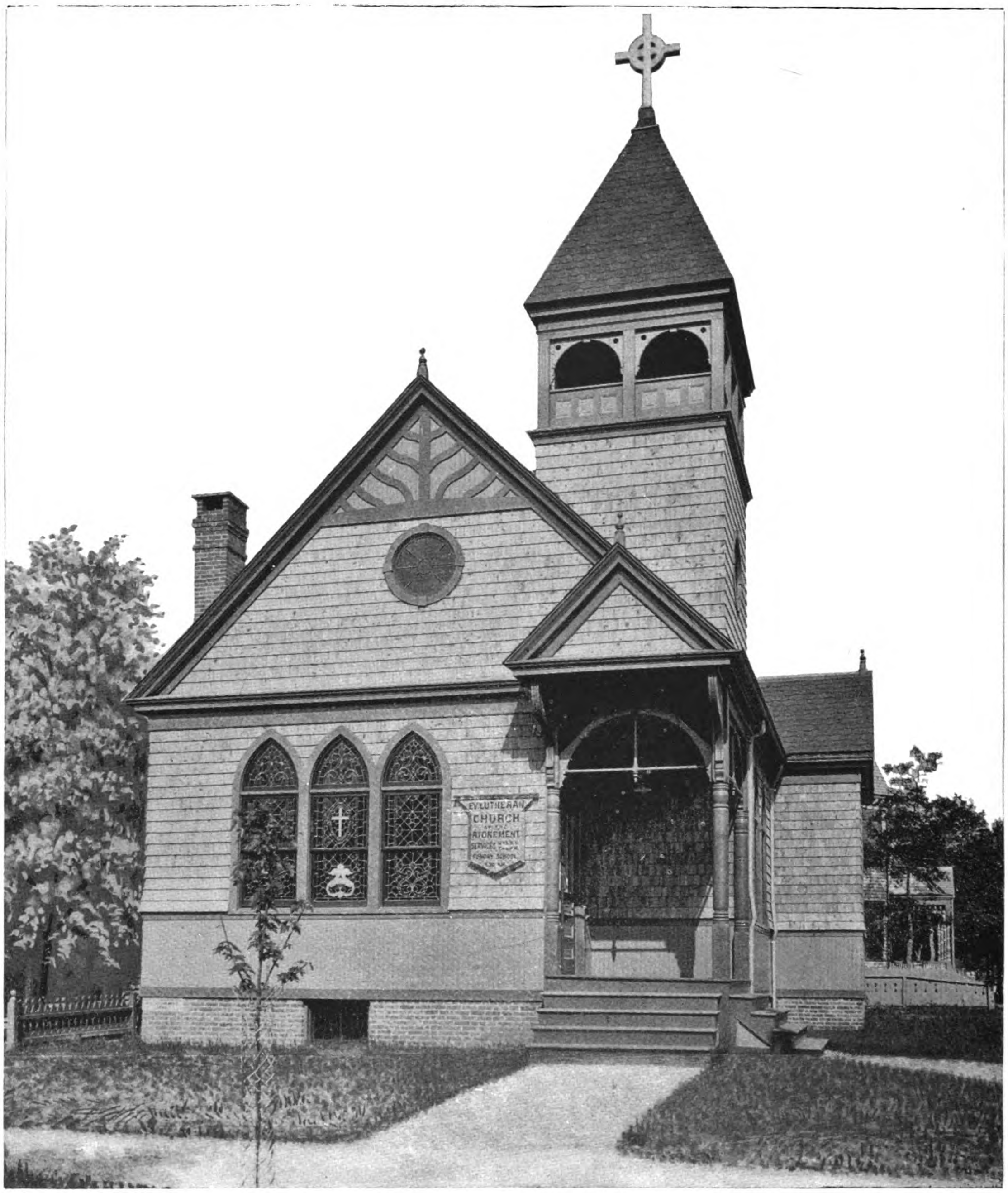
ART. XI. The owner shall during the progress of the work maintain full insurance on said work, in his own name and in the name of the contractor, against loss or damage by fire. The policies shall cover all work incorporated in the building, and all materials for the same in or about the premises, and shall be made payable to the parties hereto, as their interest may appear.
... .
....

ART. XII. The said parties for themselves, their heirs, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

In witness whereof, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

In presence of

....................[SEAL.]
....................[SEAL.]
....................[SEAL.]
....................[SEAL.]



CHURCH AT ASBURY PARK, NEW JERSEY.

WILLIAM H. CARMAN, ARCHITECT,

OCEAN GROVE, N. J.

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1893.

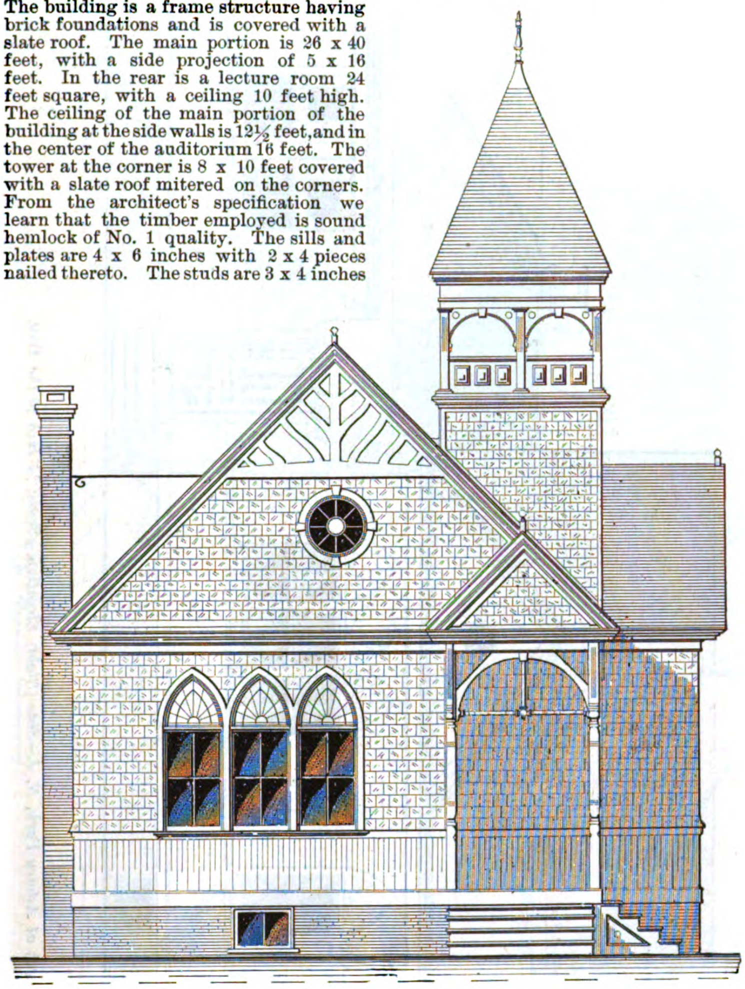
CHURCH AT ASBURY PARK, N. J.

THE CHURCH BUILDING which is represented in general view in our supplement plate this month was recently erected at Asbury Park, according to plans prepared by William H. Carman, architect, of Ocean Grove, N. J. The elevations, plans and details presented upon this and the following pages, show in a comprehensive manner the general arrangement and construction. The building is a frame structure having brick foundations and is covered with a slate roof. The main portion is 26 x 40 feet, with a side projection of 5 x 16 feet. In the rear is a lecture room 24 feet square, with a ceiling 10 feet high. The ceiling of the main portion of the building at the side walls is 12½ feet, and in the center of the auditorium 16 feet. The tower at the corner is 8 x 10 feet covered with a slate roof mitered on the corners. From the architect's specification we learn that the timber employed is sound hemlock of No. 1 quality. The sills and plates are 4 x 6 inches with 2 x 4 pieces nailed thereto. The studs are 3 x 4 inches well braced. The first floor beams are 2 x 12, with two rows of 2 x 2 cross bridging. The girders consist of four 2 x 8s, well nailed and spiked together with 2 x 3 pieces, nailed and spiked to the lower edges to suit the gaining out of the floor beams. The tower rafters are 2 x 6 inches, and the truss rafters are, as shown in the details. The rafters for the lecture room are 2 x 6, placed 2 feet on centers and the hips 2 x 8 inches. The ceiling beams are 2 x 5, with a stiffening piece of 2 x 5 running lengthwise on top of them and securely spiked to each one. About every 4 feet are two queen pieces nailed to the rafters and beams to prevent sagging. The ceiling beams are placed 2 feet on centers. The exterior face of the frame work is covered with hemlock sheeting boards put on horizontally with all joints cut on the studs. Over this is placed building paper, which in turn is covered with 5 x 18 cedar shingles laid 6½ inches to the weather. The rear of the building above the belt course is covered with No. 1 6-inch bevel siding put on with 1¼ inch lap. The construction of the cornice is clearly indicated in the details.

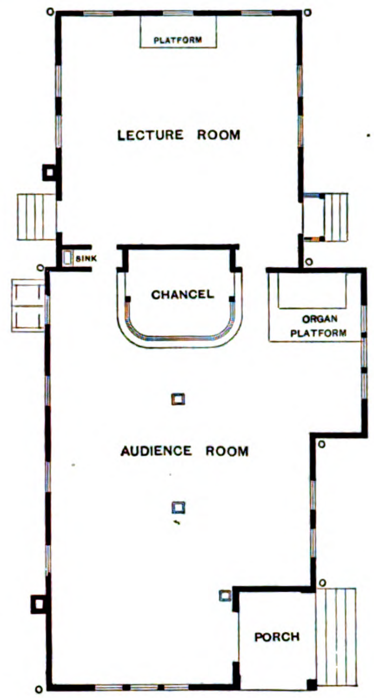
The window frames are double hung, and over the top sash is a 2-inch transom bar with a head made gothic shape and fitted with gothic transom sash. All the latter are closed with 4-inch lights, double thick American, with C C glass for the gothic transom. All the flooring is of good quality 4½-inch North Carolina pine, tongued and grooved. The trim is of the same material, 4½ inches wide and finished with corner blocks having turned centers. The entire audience and lecture rooms are wainscoted from the floor to a hight of 4 feet, with narrow North Carolina wainscot stuff, secret nailed, with a heavy 3-inch rabbeted molding run on the top. The ceiling of the audience room is lined with ⅜-inch North Carolina pine, tongued, grooved and beaded, put on crosswise of the main structure, with angles covered by a piece of 4½-inch North Carolina trim, with corner blocks every 8 feet. A small cornice of North Carolina pine is also run at the junction of walls and ceilings to cover joints. In the center of the ceiling and midway between each truss is a 2 x 2 foot perforated ventilator, finished with 4½-inch trim and four corner blocks. The rear of the building is ceiled with the same material on the level and secured to ties placed 2 feet apart.

The exterior wood work, with the exception of the shingles, is painted with two coats of best white lead and pure linseed oil.

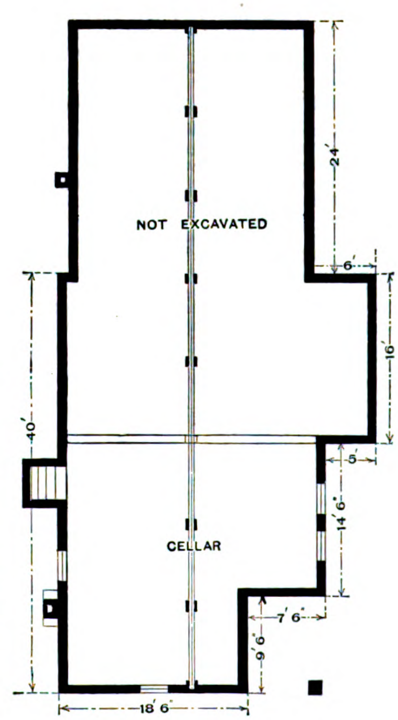
The chancel rail is 2½ x 4½ inches, the balusters 2 inches square, top and bottom, and the newels 6 x 6 inches, neatly turned,



Front Elevation.



Main Floor Plan.



Foundation Plan.

Church at Asbury Park, N. J.—William H. Carman, Architect.—Elevation.—Scale, ⅛ Inch to the Foot. Plans.—Scale, 1-16 Inch to the Foot.

of North Carolina pine. The organ platform has three 5-inch turned newels and a 2-inch rod or curtain roller fitted to newel with adjustable rosettes. We understand that the cost of the church was $2250.

Law in the Building Trades.

BREACH OF PARTY-WALL CONTRACT.

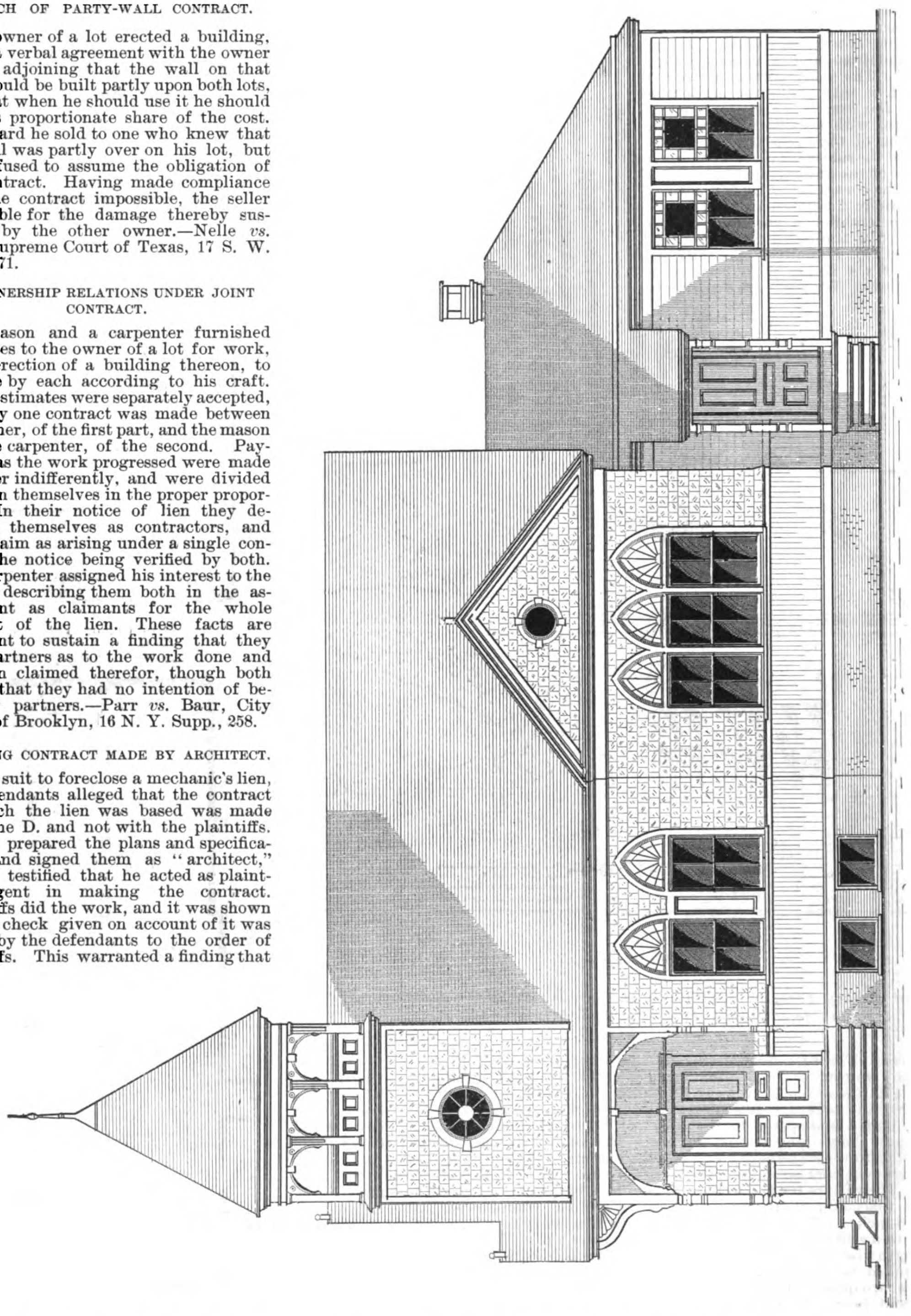
The owner of a lot erected a building, under a verbal agreement with the owner of a lot adjoining that the wall on that side should be built partly upon both lots, and that when he should use it he should pay his proportionate share of the cost. Afterward he sold to one who knew that the wall was partly over on his lot, but who refused to assume the obligation of the contract. Having made compliance with the contract impossible, the seller was liable for the damage thereby sustained by the other owner.—Nelle *vs.* Pagi, Supreme Court of Texas, 17 S. W. Rep., 371.

PARTNERSHIP RELATIONS UNDER JOINT CONTRACT.

A mason and a carpenter furnished estimates to the owner of a lot for work, in the erection of a building thereon, to be done by each according to his craft. These estimates were separately accepted, but only one contract was made between the owner, of the first part, and the mason and the carpenter, of the second. Payments as the work progressed were made to either indifferently, and were divided between themselves in the proper proportion. In their notice of lien they described themselves as contractors, and their claim as arising under a single contract, the notice being verified by both. The carpenter assigned his interest to the mason, describing them both in the assignment as claimants for the whole amount of the lien. These facts are sufficient to sustain a finding that they were partners as to the work done and the lien claimed therefor, though both testify that they had no intention of becoming partners.—Parr *vs.* Baur, City Court of Brooklyn, 16 N. Y. Supp., 258.

BUILDING CONTRACT MADE BY ARCHITECT.

In a suit to foreclose a mechanic's lien, the defendants alleged that the contract on which the lien was based was made with one D. and not with the plaintiffs. D. had prepared the plans and specifications and signed them as "architect," and he testified that he acted as plaintiffs' agent in making the contract. Plaintiffs did the work, and it was shown that a check given on account of it was drawn by the defendants to the order of plaintiffs. This warranted a finding that the contract was made with plaintiffs. The compliance with the terms of the contract is sufficiently shown by evidence that the plaintiffs offered to do any work defendants desired to have done in completion of the contract, but that defendants failed to designate any work unfinished. When the building for which the lien is claimed was erected for the use of the husband on the separate property of the wife, her assent to the contract is sufficiently shown by evidence that she was present when he spoke to the architect about building it, that she constantly saw it while building and after its completion drew her own check as payment on account of the work.—Dennis *vs.* Walsh, City Court of Brooklyn, 16 N. Y. Supp., 257.



Church at Asbury Park, N. J.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

LIEN OF MATERIAL MAN IN TENNESSEE.

The Tennessee Code, section 2739, gives a lien upon any tract of land on which a house has been built or repaired "by special contract with the owner" in favor of the "mechanic or undertaker, founder or machinist" who does work or furnishes material. By section 2746 this lien is extended to "every journeyman or other person employed by such mechanic, founder or machinist" to work on the building or furnish material for the same. Act 1860 c. 114 (Mill, &c., V. Code, section 2470) amending section 2739, so that the benefits thereof shall apply to "al persons doing any portion of the work o furnishing any portion of the material fo the building contemplated in said sec tion," in no way affects section 2746, and gives no lien to persons furnishing materials to a sub-contractor.—Bedford Stone Company *vs.* Cumberland Presbyterian Church, Supreme Court of Tennessee, 18 S. W. Rep., 406.

FILING CONTRACT TO SECURE LIEN.

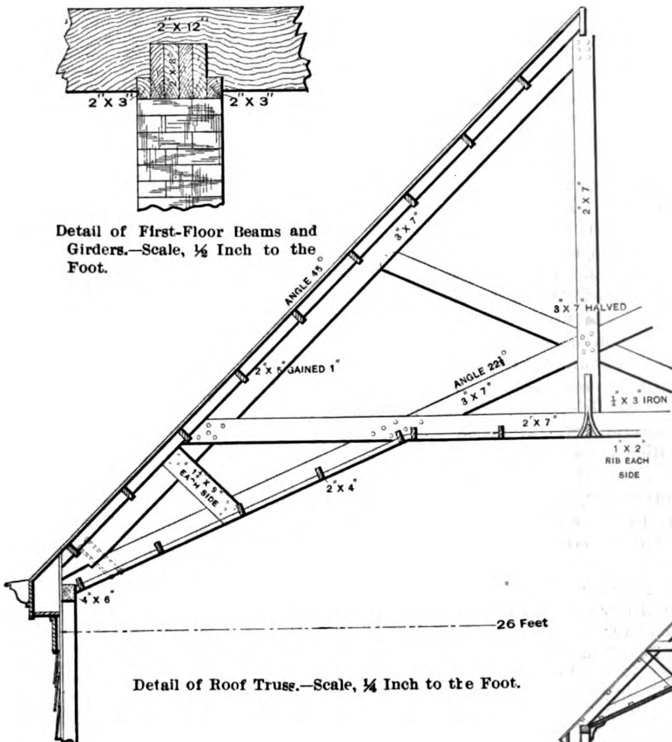
Under the requirements of the statute relating to mechanics' liens that a contractor shall file his contract in the county clerk's office "within four months after the indebtedness shall have accrued," in order to fix the lien, the contract may be filed at the time of its execution, and before or at the time the indebtedness accrues; and such filing secures a lien against the proposed building, and as much of the land as is necessarily connected therewith, which lien is superior to a deed of trust to secure a note for the purchase money of the property.—Class *vs.* Dallas Homestead Loan Association, Supreme Court of Texas, 18 S. W. Rep., 421.

SUFFICIENCY OF MECHANICS' LIEN STATEMENT.

When the mechanics' lien statute requires a person claiming a lien for labor under an entire contract for labor and materials at an entire price to file a statement of the amount due him, and provides that "the contract price, the number of days of labor performed or furnished, and the value of the same, shall also be stated," a statement which contained two items, as follows: "Labor of myself, between September 1, 1889, and May 1, 1890," and "Labor laying 1100 yards concreting, at 25 cents per yard, in the last part of August, 1890, and ending August 30, 1890," is insufficent, because these items do not show the number of days' labor performed.—Ellinwood *vs.* City of Worcester, Supreme Judicial Court of Massachusetts, 28 N. E. Rep., 1053.

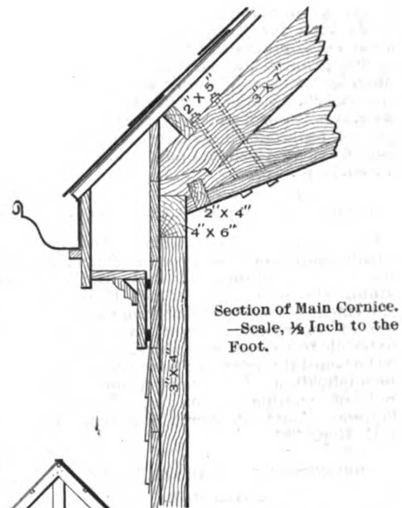
RELEASE OF LIENS BY CONTRACTOR.

A stipulation by a contractor, "to release and discharge the house from the operation of all liens for material furnished or work done in the construction of the same," is not a waiver of the lien so as to prevent a sub-contractor enforcing a lien for lumber and wood work before final settlement between the contractor and owner. (Schroeder *vs.* Galland, 19 At. Rep., 632; 134 Pa. St., 277, distinguished.) It is no defense to such lien in Pennsylvania that the aggregate amount of the liens entered against the building, together with the cost of completing the

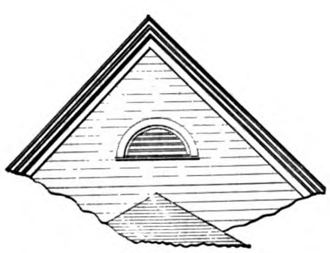


Detail of First-Floor Beams and Girders.—Scale, ½ Inch to the Foot.

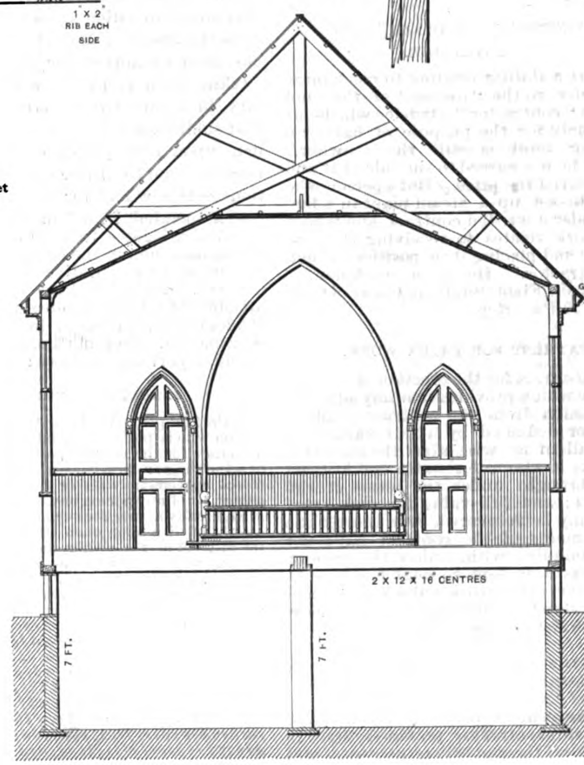
Detail of Roof Truss.—Scale, ¼ Inch to the Foot.



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



Rear Gable.—Scale, ⅛ Inch to the Foot.



Cross Section through Auditorium.—Scale, ⅛ Inch to the Foot.

Miscellaneous Details and Sectional View of Church at Asbury Park, N. J.

same, exceed the contract price, if the materials furnished were of the quantity and quality needed for its construction.—Taylor *vs.* Murphy, Supreme Court of Pennsylvania, 23 At. Rep., 1134.

INFRINGEMENT OF PATENT BY CONTRACTOR.

Where one who has contracted to erect a building lets a portion of the work to a sub-contractor, and in the prosecution of their respective parts each infringes patent rights of another, both are liable as joint infringers. Letters patent No. 263,412, granted August 29, 1882, to Peter H. Jackson for "improvements in the method of illuminating basements;" No. 269,863, granted January 2, 1883, to the same, for "iron and illuminating stairs;" No. 302,338, granted July 22, 1884, to the same, for "improvements in the construction of buildings."—Jackson *vs.* Nagle, United States Circuit Court, California, 47 Fed. Rep., 703.

VALIDITY OF BUILDING ORDINANCE.

An ordinance which provides that no person shall erect, add to, or generally change any building, without first obtaining the permission of the Board of Aldermen, is void in prohibiting the erection of buildings, irrespective of the materials to be used, and also in reserving to the board the arbitrary power to refuse the application of one person and grant that of another.—State *vs.* Tennant, Supreme Court of North Carolina, 14 S. E. Rep., 387.

DEFINITION OF "OWNER" AND "CONTRACTOR."

Where a statute relating to mechanics' liens refers to the "owner" of the land and the "contractor," a trustee who holds land solely for the purpose of having a building built is still the "owner," though he has agreed to the sale of it and has received the price. But a person who agrees to set up a steam plant in a factory under a written contract, and whose only work relates to receiving the machinery and placing it in position, is not a "contractor." He is a workman.—Hickley *vs.* Field, Supreme Court of California, 27 Pac. Rep., 594.

PAYMENT FOR EXTRA WORK.

In a contract for the erection of a house a clause which provides that any addition or omission from the contract shall be added or deducted by a fair valuation, but shall in no wise affect the contract, prevents a claim for extra work from being brought under the terms of the contract; and full value for such extra work may be recovered, even though the requirements of the contract have not been complied with, unless the regular work has been done so negligently as to render the extra work valueless.—Garnsey *vs.* Rhodes, Supreme Court of New York, 18 N. Y. Supp., 484.

SUB-CONTRACTOR'S ASSIGNMENT OF MONEY DUE.

The agreement between a contractor and a sub-contractor provided that 15 per cent. of the monthly estimates should be reserved until the completion of the work and the payment of all claims by the sub-contractor. The sub-contractor borrowed money, giving the lender, as security, a first charge on the 15 per cent. drawback, of which the lender notified the contractor. Thereafter the contractor and sub-contractor made an agreement reciting that work amounting to a certain sum had been done, and a certain amount paid, and that the sub-contractor had on hand material of a certain value, and providing that the contractor should pay him the sum to which the work done amounted, and he should credit the contractor with the amount already paid, and who should purchase the material on hand at a certain price to be delivered free of all claims, or, to pay the claims and deduct the amount paid. Under this agreement the contractor might pay the labor and material bills necessary to avail himself of the work which had been done with reference to the contract, though nothing was left for the assignee of the sub-contractor, as he occupied no better position than his assignor, except that the contractor could not, after the notice, make voluntary payments to the sub-contractor.—Fisken *vs.* Milwaukee, B. & I. Wis., Supreme Court of Michigan, N. W. Rep., 873.

Lien Law.

The great variety of lien laws in existence, combined with their complexity, have proved fruitful subjects for the consideration of every person connected with building operations from the owner to the workman. The subject has been considered deeply by the National Association of Builders, and has been presented in these columns from both the standpoint of the builder and the dealer in builders' supplies. The following extract from the report of the Committee on Lien Law of the Boston Associated Board of Trade is given as the unbiased opinion of practical business men upon an attempt to extend the field of operation of the Massachusetts law. It appears that an organization known as the Massachusetts Building Materials Association has been organized for the purpose of "taking such methods as may be necessary to insure the enactment of a law that shall secure to the material man a lien upon real property for materials furnished, on the same terms and conditions as is now had for labor." The Boston Associated Board of Trade is composed of delegates from 20 organizations of business men in the city, and is one of the most representative bodies in the country. The Committee on Lien Law, appointed for the purpose of investigating the legislation proposed by the Materials Association, after stating the facts as found, reported as follows:

REPORT OF COMMITTEE.

In the first place, the law establishes that any person who is performing labor or furnishing materials for the erection, alteration or repair of a building or structure upon real estate, in direct agreement with or by consent of the owner, or of any person having authority from or rightfully acting for such owner, shall have a right of lien upon such structure and upon the interest of the owner thereof in the lot of land upon which the same is situated. This right of lien by person directly agreeing with the owner is changed when the party doing the work contracts to do the work and furnish materials therefor for an entire price, or as an entire contract; in such event his right of lien is only for labor, the worth of which can be distinctly shown. This, it will be clearly seen, gives to the person who performs labor, or furnishes materials directly to the owner, a right of lien on the real property. Those who have performed labor with their own hands on the structure have a right of lien whether they have performed the labor for the owner direct or for some contractor or person employed by him at contract or otherwise, and this right of lien exists without necessity of notice to the owner that the laborer intends to rely for his payment upon his right under the statute. Those, however, who furnish materials to some purchaser other than the owner of the property cannot have right of lien unless, before furnishing the materials, they notify the owner that they intend to claim such right of lien. It is this particular provision of the law which the Massachusetts Building Material Association desires to have changed, and the change they desire is simple but very radical. In their letters they refer to the simplicity of their wishes in a most ingenuous fashion. They say: "Our interests are so large and our demands so modest that we feel that if we can unitedly press the matter before the law makers, that we shall get what we, in all fairness, are entitled to receive." This modest demand is the removal of the requirement of notice to the owner.

OBJECTIONS TO DEMANDS OF DEALERS.

The objections which are found to the modest demands of the material dealers are:

1. The material dealer is already as fully and thoroughly protected as he ought, "in all fairness" and in all business sense, to be, for the law permits him to have a lien when selling directly to the owner and permits him to have a lien when selling to a purchaser whom he does not feel safe in trusting, provided he takes the pains to notify the owner that he intends, under the right especially granted by statute, to lien upon the property for payment. This appears to be liberal, honest and straightforward, and that no hardship is imposed thereby on the dealer. When selling goods to reliable purchasers there is no need for notice, for there is no need for lien, and surely if a dealer feels inclined to sell his goods to unreliable purchasers he ought not to find fault if the law requires him to give fair notice to the owner of the property where the materials are to be used, if he intends to rely upon the owner and his property for payment and not upon the unreliable party to whom he wishes to sell.

2. The removal from the law of this requirement, leaving it so that the seller of material may have the right to collect his money by special grant of law, without notice or previous agreement of a party different from the one to whom he sells the goods, seems to be contrary to the principles upon which business is or should be conducted. Any enlargement of rights already granted would be dangerous and unwholesome from a business point of view, inasmuch as it would be a declaration of law that business men generally (for if this legislation is good for one kind of business it should be equally applicable to all kinds) may consider it an established business principle that the seller of goods is freed from necessity of ascertaining whether or not the purchaser is reliable, for he is to have the right to collect his money of a third party with whom he has had no connection whatever and to whom he did not sell the goods.

3. The argument made by those who urge this legislation, to the effect that an opportunity for collection of a non-purchaser granted by statute would be productive of good, inasmuch as owners would be forced thereby to employ only reliable men to do their work, seems to be an unworthy argument, for it assumes that the reliability of the purchaser must be discovered, not by the person selling the goods, but by some one else, and furthermore that that some one else must guarantee the seller against loss. This appears to be a shifting of responsibility for credits, which is totally improper.

OPINION OF COMMITTEE.

4. Your committee believes that this extension of the right of lien should not be made, for the reason that by and under it irresponsible competition, the disease from which the building business has suffered so extensively, will be largely increased. Already under the law as it is, the cupidity of dealers who are ever more and more anxious to increase their sales leads them to give credit to those who should not have it at all, owing to their lack of capital, lack of business ability, lack of comprehension of safe business methods. The temptation is already too great for dealers in building material to take the risk of selling to parties of doubtful credit, in the hope of securing the larger margin of profit which such sales always carry, and it would be a very unwise policy to offer still further encouragement to this sort of practice, with the inevitable result of enormously increasing the horde of incompetent, unbusinesslike, untrustworthy contractors in the building business.

5. Transfers of real estate are already sufficiently embarrassed by lien law requirements, and your committee believes it would be a great error to increase the opportunity to cloud titles and unnecessarily delay the accomplishment of the purpose of buyer and seller of real estate by forcing property to protect the dealer who has ignored good business principles in selling his goods.

In closing, the committee states that it considers all lien law as class legislation, and recommends that its field of operation be not increased.

SWEDEN'S BUILDING at the World's Fair has been designed on the lines of the old Norse Stave churches, but with more solidity. The building is being constructed in Sweden, and will be sent to Chicago in sections.

WIND BRACING IN HIGH BUILDINGS.

IN A PAPER bearing the above title, and read before a recent meeting of the American Society of Civil Engineers, the author, Mr. Henry H. Quimby, presents some very interesting suggestions in connection with the construction of tall buildings, for whatever purpose employed. He says:

The use of iron and steel in the construction of fire-proof buildings has developed a new type of structure, which calls for the application of the principles that govern the designs of bridges, &c. Technical and other journals, by devoting much space to descriptions of the steel skeleton type of building, have recognized the importance of the subject, and some have published good rules for the guidance of designers. Many buildings are now in course of erection in different cities which are examples of this method of construction, and these afford an opportunity to compare the designs and to see how widely the practice of architects varies. One who does compare them is forced to the conclusion that the ideas of the designers differ not merely in regard to details, but, apparently, either in apprehension of the amount and operation of the forces to be resisted or in their faith in different materials.

THE PRINCIPLES INVOLVED.

The principles that should be observed in designing metal structures are so generally well understood, and there is such a substantial agreement among engineers as to their application, that we may reasonably expect to find every important iron or steel frame building designed in accordance with them. The greatest bone of contention in this skeleton has long been the use of cast iron, which has been in large measure abandoned as material for bridges, but which is still extensively, though decreasingly, used for columns in fire-proof buildings. There is occasion for an equally vigorous discussion of the relative merits of hollow tile walls and iron or steel rods as vertical bracing in lofty structures.

The sole dependence of some architects for lateral stability in their buildings is on the ordinary partitions, weakened for such a purpose, as most of them are, by doorways through them, while others introduce stout iron rods or braces.

There will be little question of the sufficiency of brick partitions if there be many of them, when the width of a building is a large proportion of, or is equal to, the exposed hight, and the foundations are firm and unyielding or not subject to disturbance; but a building of great hight, even with a good breadth, if on yielding bottom, should be efficiently braced with elastic metal.

In the type of building mentioned the columns carry, not only the floors and partitions, but the exterior walls, which a writer on the subject recently called "mere curtains to shield the interior." This idea of their utility is measurably correct if the metal structure is provided with efficient vertical bracing, but if, as in some cases, the bracing is omitted or inadequate, masonry of some sort must be depended upon for lateral stability. As each story of the walls is supported on the girders of its own floor and carries no load from above, the walls are independent of the hight of the building and may be only 18 inches thick throughout.

A SEVENTEEN-STORY OFFICE BUILDING.

An office building recently erected has 17 stories above the pavement, giving it a height of 200 feet, and is only 60 feet wide. The party walls, which are abundantly able to stiffen the building in the direction of its length (180 feet), are 18 inches thick, presumably because of municipal requirements intended to prevent the spread of fire and contemplating the support of joists. The rear wall and the walls of a 25 x 80 foot recess, or court, at one side are 18 inches thick, but are little more than window frames because of the needed provision for light. The front from the third to the fifteenth floors is also brick and has two bay windows, the walls of which are 18 inches thick, but being bowed and of trifling width between the windows, they would offer very little resistance to a lateral force. The lower two and upper three stories of the front are of stone and terra cotta respectively. The vertical bracing consists solely of the interior partitions, which are 8 inches thick, built of hollow boxing tile with four webs each $\frac{9}{16}$-inch thick, giving a total net thickness of $2\frac{1}{4}$ inches. At four points 40 feet apart these walls, in a space 17 feet wide, are continuous and without doors or other openings from the third floor to the roof, being apparently the main reliance for lateral stability, most, if not all, the other partitions being greatly weakened by passages and windows.

The building towers above all its neighbors (the tallest in the vicinity being about six stories high and one immediately adjoining only five stories), a fact of moment in estimating the force of the wind.

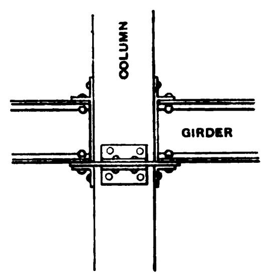


Fig. 1.—Method of Joining the Columns.

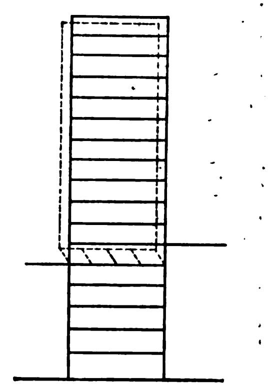


Fig. 2.—Diagram Showing Effects of Wind Against the Side of a Building.

Wind Bracing in High Buildings.

In the same city, a few blocks away, is a building partially completed, designed to have the same number of stories as the one first mentioned, but with a width of about 150 feet. It has provision for vertical bracing in the shape of double 6-inch eye bars and 15 inch heavy channel struts, contrasting very sharply with the other.

In both buildings the columns of each tier abut against those of the lower tier, with an intervening plate which forms a seat for the floor girders. The tiers are bracketed together, as shown in Fig. 1, with angle iron or bent plate lugs, a detail that is sufficient to prevent lateral displacement, but, because of the elasticity of the bracket in bending, and the large ratio of hight to base of column, contributes very little to the rigidity of the structure. This will be seen by computing the stiffness of the brackets, and by considering that the workmanship is never so perfect that a number of columns could be piled up end to end, without fastening, like children's blocks, which fact indicates that as the columns are always necessarily plumbed—temporary adjustable braces being used if there are no permanent ones—the faces are not all in perfect bearing, more especially as the plates between them are not planed and are consequently somewhat uneven, a condition which presumes some initial bending in the brackets and consequent slight initial lateral strain on the bracing.

EFFECTS OF THE WIND.

The action of the wind against the side of a building produces the effects of overturning and shear, both greatest at the highest point of external resistance, which is the roof of an adjoining building, if there be any, or otherwise the surface of the ground. The overturning or the lift on the windward side is likely always to be less than the resistance of dead weight, but the shear is liable to be overlooked and is probably the immediate cause of the collapse of most of the buildings destroyed by wind. In the type of structure under consideration, the shearing action tends to topple the columns and crush the partitions or rupture the bracing, all in one story, as indicated by dotted lines in Fig. 2, which represents a front elevation of the narrow office building referred to. The column fastenings described are not stiff enough to prevent a slight movement of the tops of the columns, which can be firmly held by the bracing alone. If this bracing is mortared work its cohesiveness is liable to be gradually destroyed by severe vibrations or many successive impacts of pressure; and if once its hold is loosened, its deterioration will be rapid.

The wisdom of depending on these tile partitions in exposed buildings is doubtful. The crushing strength of the material as tested in small pieces or single bricks, while varying according to the composition of the clay or process of manufacture, in no reported case much exceeds 7000 pounds per square inch of net section. Inquiry of manufacturers has failed to elicit any information as to the strength of a complete wall, and as these tiles are easily broken in handling and laying, they are far more liable to serious and destructive flaws than iron or steel, and, consequently, any "factor of safety" adopted for their use may, with more reason than in the case of structural iron, be called a "factor of ignorance."

What intensity of wind pressure it is proper to assume in designing a large and high structure, is an important question. The forces which we have to deal with here are not, as in other departments, limited and known, and the practice must be, to some extent, empirical. The experiments of the Forth Bridge engineers, and also those made by builders of wind engines, show conclusively that the pressure per unit of surface is less over a large area than over a small one, and probably the ascertained proportion of decrease will fairly apply to the large surface exposed by a great building. But the many instances of extensive and not lofty brick and stone buildings blown down are warnings against a too liberal allowance here, for a downward current of air will be deflected by surrounding low roofs or ground and accumulate intensity. The writer remembers a case of the demolition of a window by wind near the ground, which occurred at a moment that he happened to be looking at the particular spot. The locality was such that the force of the wind might become, and doubtless was, concentrated.

We do know that the wind sometimes develops an energy which must be far beyond what has ever been measured, and the efforts of investigators, by means of artificial and confined currents of air, have failed to obtain velocities and attendant pressure sufficient to account for some of the feats of the natural article. While we cannot know, nor be expected to build against its utmost power, the experience we have ought to induce us to estimate high velocities of wind and use low intensities of strain in materials. From 30 to 50 pounds per square foot will blow in ordinary windows. Violent storms not sufficiently destructive to be dignified with the title of tornado have registered pressures as high as 50 pounds. They are rare, but possible everywhere, and would probably give over a large surface at least 40 pounds per square foot.

In view of the constant liability of any locality to the occurrence of wind storms of destructive violence and unknown force, every tall building should be assumed to be subject to a wind pressure of 40 pounds per square foot of exterior wall surface, and be braced to resist this with iron or steel rods or stiff braces strained not over one-third their ultimate strength.

The stability of the individual columns in a framed structure is an element of resistance of considerable value if the connections are rigid. Even with the connections described above, much ultimate resistance can be counted on from the bracketed fastenings and dead load, the ratio of base to hight of each column being commonly about 12; but because of imperfect workmanship referred to above, they may at first act with, instead of against, the destroying force, and their resistance be developed only after that of the partitions is overcome or impaired. Wherever adequate rod bracing is not employed, the columns should be joined together by complete splices, making each column a unit throughout the whole hight of the building, and then failure could only follow the bending or breaking of the body of it at two points.

The foregoing observations have been confined to the effect of wind, but any force operating to produce violent or frequent shocks and consequent vibrations of buildings or foundations, should be carefully regarded and as far as practicable provided against.

OTHER CAUSES OF DISTURBANCE.

Close proximity to the track of a steam road, elevated or surface, but more particularly the elevated because of the concentration of span loads, may subject a building to destructive vibration, and the pulsations of engines or machinery, dynamos or elevators, are even more likely to be a serious menace because of closer contact and more violent shocks. The introduction of isolated electric lighting plants and elevator machinery makes the subject worthy of thorough study, and the possibility of future construction of elevated railway lines through cities, is a legitimate consideration in designing towering structures, particularly in places where foundations are laid in yielding soil like that of Chicago, where settlement must be looked for and where it is probably hastened by vibration impacts. In such localities dependence on hollow tiles for lateral stiffness may be perilous, because light masonry readily succumbs to repeated shocks, and any unequal settlement is certain to injure such walls to some appreciable extent and probably enough to impair their efficiency in the direction of rigidity. A certain high building on such soil was found before completion to have settled unequally several inches, and consequently was seriously out of plumb. Fortunately it was braced with adjustable rods which were used to draw it back into a vertical position, and because of these rods no alarm is felt for it. The unequal subsidence was attributed to an injudicious proportioning of the foundation areas under the different columns which sustain varying ratios of live to dead load. The necessity for the exercise of judgment in determining such proportions is an intimation of empiricism in the business of designing, and is an additional argument for avoiding uncertain materials in construction.

Another force that is entitled to respect, but is usually ignored in our latitude, though liable to be active at any moment and most powerful to destroy, is earthquake. A notable building in San Francisco has iron plate web bracing from top to bottom, designed as provision against seismic disturbances, which are more frequent on the Pacific Coast than in the East, though rarely severe. No part of the country can claim immunity from them, as the experience of a few years past shows, and even slight shocks are destructive to brick masonry of low buildings, while the effect of the undulations of the earth's surface increases rapidly with the hight above the ground. The only absolute security against danger from this source is in a system of bracing with some elastic material of positive strength that will so unify a structure that it will hold together even to the point of being overturned bodily, a quality which an enthusiastic writer claims off-hand for steel skeleton buildings in general, but which is probably not possessed by any yet built. A reasonable degree of security against injury from any of the causes mentioned can be obtained with the above suggested provision for wind strains, care being always taken that all details, fastening of bracing, &c., are equal in strength to the main members and competent to properly transmit components of stress.

The buildings which are probably most deficient in wind bracing are those used for manufacturing. They are not as high as some others, although in cities they are increasing in hight with the value of the ground, but they are often isolated, and always have large floor areas without partitions, and are stiffened only with small gusset braces or knees which are sometimes inadequately fastened. The regular vibrations of the machinery loosen the hold of the floors upon the walls, and set up destructive movements that make it not strange that when an occasional tornardo finds one of these structures in its path a disaster with appalling loss of life results.

This paper is submitted for the purpose of calling attention to some common faults in designing important works, with the hope that interested members of the profession will record, in the shape of discussion of the points involved, their judgment and observation, to the end that more uniform and improved methods of construction may prevail, a result that will certainly follow a thorough ventilation of the subject.

(To be continued.)

The Architectural League.

The Architectural League of New York inaugurated its eighth annual display in the new building of the American Fine Arts Society on Saturday, December 31, and continued until January 24. The display, both on account of the increased gallery space and the importance of the exhibits of decorative arts and architecture, was among the largest and most imposing which the league has ever made. The list of exhibitors was a long one and included names prominent in the artistic and architectural world. An interesting group on the western wall was the various State buildings for the Columbian Exposition. Among the Eastern ones were those of Massachusets, by Peabody & Sterns; Connecticut, by Warren R. Briggs; Rhode Island, by Stone, Carpenter & Wilson; New York, by McKim, Mead & White; Maryland, by Baldwin & Pennington; New Jersey, by Charles A. Gifford; Pennsylvania, by T. P. Lonsdale, and New Hampshire, by George B. Howe. One of the interesting events in connection with the exhibition was the competition for the league's gold and silver medals. The drawings of the prize winners and some of the other competitors were on exhibition in the south gallery. The subject represented a fountain to commemorate the discovery of America and supposed to be erected against the western wall of the reservoir in Bryant Park. Alfred T. Evans carried off the gold medal and Hobart A. Walker the silver medal. Some of the other architectural drawings included a gothic design for St. Luke's Hospital, by James Brown Lord; a country church, by W. W. Renwick; a creditable design for the Central Congregational Church at Lyon, by Little, Brown & Moore; the Colonial Club, by Henry A. Kilburn; Bleecker Street Savings Bank, by Charles W. Eidlitz; the Post Graduate Hospital, by W. B. Tuthill; Boston City Hall, by E. M. Wheelwright; Baltimore Auditorium, by Bruce Price; Grand Market at Lima, by A. P. Brown; Hotel at North Augusta, by Romeyn & Stever, and country houses by Charles P. H. Gilbert, Berg & Clark, Flagg & Benson, W. W. Bosworth and W. W. Kent.

The Cathedral of St. John the Divine.

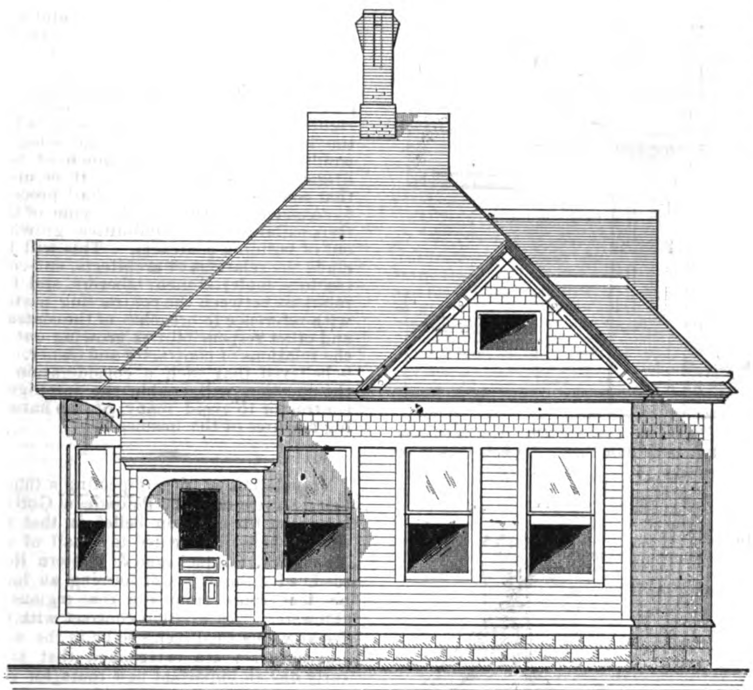
The cornerstone was recently laid in this city for what is to be known as the Cathedral of St. John the Divine, which will occupy a commanding site in the upper portion of the metropolis. The ground upon which it will stand measures 738.5 feet on Morningside Park, 715.5 feet on Tenth avenue and 589.2 feet on 118th street. The total length of the cathedral when finished will be 520 feet and the total width through the transept 296 feet. The width of the front will be 192 feet, the hight of the front gable 164 feet, the hight of the front tower 284 feet, while the hight of the flanking towers will be 138 feet. The central towers will rise to a hight of 455 feet, and the hight of the interior dome will be 253 feet. The choir which, with the ambulatory, will be 154 feet in length, will be finished first, and in this services will be held during the construction of the remaining portions of the building. The site is said to have cost $850,000, which amount has been subscribed, as well as enough to build the choir, this alone being estimated to cost $1,000,000. The total cost of the cathedral is placed at about $10,000,000.

A Farm Church.

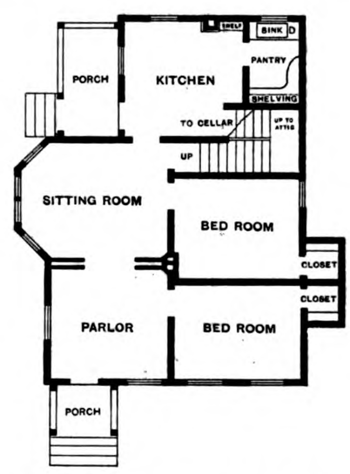
In one of the southern counties of the State of Rhode Island is a farm which is a model in its way, and in connection with which are a number of important improvements. One of these, and probably the most wonderful of all which have been made by the owner, is an attractive stone church which has just been completed, and which was opened for the first time for Christmas services. It is said that in all New England it would hardly be possible to find a country church equal to the structure under consideration. It is 28 x 40 feet in size and is constructed of cobble stones laid in cement. It has a slate roof and on its gable, fronting an avenue leading from the highway, is a graceful tower, which rises to a hight of 54 feet. This tower is surmounted by a copper cresting and finial, and in the belfry swings a sweet-toned bell weighing 400 pounds. The windows are of stained glass and the whole structure, which was designed by A. E. Cummings, who has charge of the farm, has been built without regard to expense. In addition to its sacred uses the new church will serve as a place for public meetings and social gatherings, and will contain a public library for the use of the people in the neighborhood.

A Five-Room Cottage.

Those of our readers who have recently been making inquiries for designs of cheap dwellings cannot fail to be interested in the story and a half cottage which is illustrated upon this and the following pages. The drawings were made by O. I. Fitz of Rock Island, Ill., and call for five rooms upon the main floor, consisting of parlor, sitting room and two sleeping rooms. As will be observed from the floor plan, the parlor and sitting room are connected by folding doors which may, however, be pushed back and the opening closed by portieres, if so desired. The kitchen is in the rear of the house and opening from it is a pantry of convenient size, provided with sink, shelving and other conveniences. The stairs, it will be observed, rise from the sitting room and are lighted by a window in the gable. The studding employed in the construction of this house are 2 x 4 inches and 12 feet in length, thus giving a good hight to the rooms on the first floor, while providing for considerable attic room. We understand from the author that this cottage can be erected in the locality named for $1250.



Front Elevation.—Scale, ⅛ Inch to the Foot



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

A Five-Room Cottage.—O. I. Fitz, Architect, Rock Island, Ill.

Building Contracts.

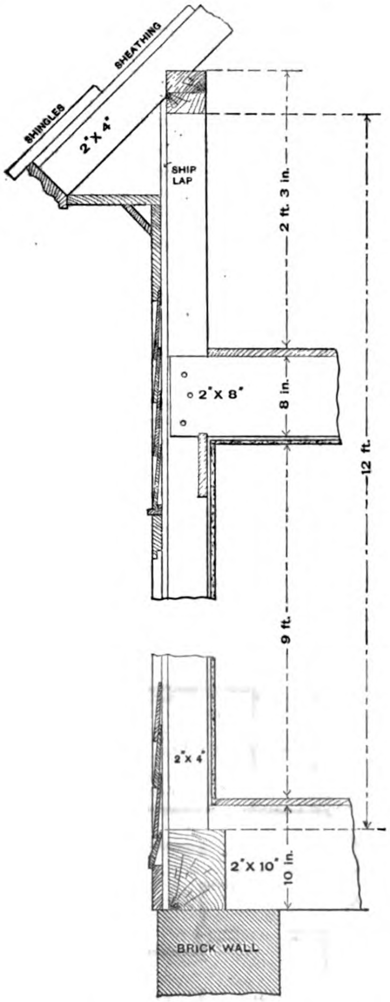
The nature of a building contract is such that it frequently happens in the course of its performance that differences arise between the parties to it which render recourse to litigation necessary. A great deal of this could be avoided if in making the contract itself greater care were used and more attention were paid to the legal principles involved. At the outset of the consideration of the subject of building contracts it may be said that there is nothing in the law that requires that the contract be in writing unless it is some special statute or provision with reference to mechanics' liens. But as to the validity of the contract itself it is as good verbal as it is written unless by its terms it is not to be performed within one year. This is owing to the operation of the statute or terms under which a contract is not valid if by its terms it is not to be performed within one year, unless it is in writing and signed by the parties to be charged. But this does not mean necessarily a contract which is not to be performed within a year, but a contract which by its terms and upon its face cannot be performed within that time. However, as a matter of safety and practical convenience, it is a fact that building contracts are usually reduced to writing. When so written great care should be exercised for precision of expression, that there may be no misconstruction of its terms, and it should carefully provide for all possible contingencies which are likely to arise. The building trade is one which is subject to fluctuations of the market, to the exigencies of the weather, and in these days to more or less interruption from labor troubles, and all these things which are of common knowledge to the practical builder should be carefully and fully covered in the contract for the erection of a building. It should be borne in mind, in entering into a written contract, that when the agreement is reduced to writing all prior verbal negotiations are merged into that writing, and if there have been any verbal negotiations which are contrary to the letter of the written contract, or if there have been negotiations which are not covered by the contract, the written agreement is supposed to have been entered into with deliberation and to have superseded those prior and informal agreements.

THE WRITTEN CONTRACT.

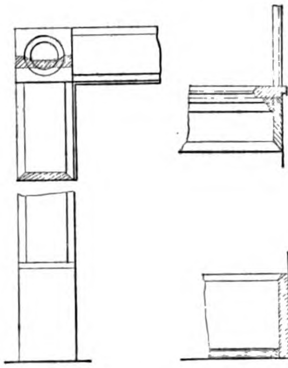
It should be borne in mind that the written contract is but the evidence of the agreement of the parties, and of itself is of no binding force. Therefore should an agreement be reached and it be reduced to writing and either party fail to sign it, that does not affect the validity of the contract itself. Either party, upon failure of the other to comply with the terms of the contract, may proceed against the other for damages as if the contract had actually been signed. Of course, this principle of the law does not apply to those contracts to which reference has heretofore been made, which are void under the statute of frauds unless they are reduced to writing and signed by the parties. It frequently becomes the duty of the court, after parties have entered into contract, to construe those contracts. In the case of agreements involving special trades, like building contracts, the language employed is frequently of a technical nature. This language, when presented to the court for construction, is subject to explanation and definition by persons versed in the trade, other than that the contract must stand for construction upon the language which is employed according to the ordinary use of the language. While it is true that the execution of a written contract thereby abrogates any verbal negotiations which may have been entered into by the parties prior to the execution of the writing, it is perfectly competent to modify that written contract after it has been executed by verbal agreement from time to time as the work progresses. For instance, where a contract provides that there shall be in no case any allowance for extra work, if extras are demanded by the owner upon a special verbal contract, they are furnished by the builder, and the recital in the contract that there will be no allowance for extras will not prevent the contractor from recovering their value, provided he can show a special verbal contract; or, if during the progress of the work the owner makes such changes in the plans and specifications that it is practically impossible to trace in them any likeness to the plans and specifications upon which the original contract was made, then the builder is at liberty to disregard his original contract both as to terms and price, and to charge for the work its reasonable worth and value, upon a contract for an agreed price.

RESULT OF VERBAL AGREEMENT.

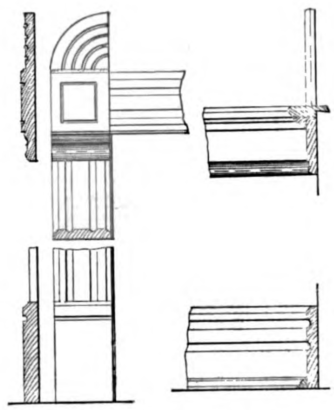
In one case a contractor found that he was losing money and refused to go on. The owner thereupon verbally agreed that he would make him good for all the labor and stock he might employ, and further said that the contractor should suffer no loss by completing his contract. This agreement, though verbal, was valid and binding upon the owner; and upon the completion of the contract, the builder was entitled to recover, in addition to the contract price, such an amount as he could show he had expended over and above the price agreed upon in the written contract. These are cases in which the contractor assents to the changes which are made. But if a contract has been entered into, with reference to certain specifications, and the work is placed under the supervision of the architect



Section through Walls.—Scale, ¾ Inch to the Foot.



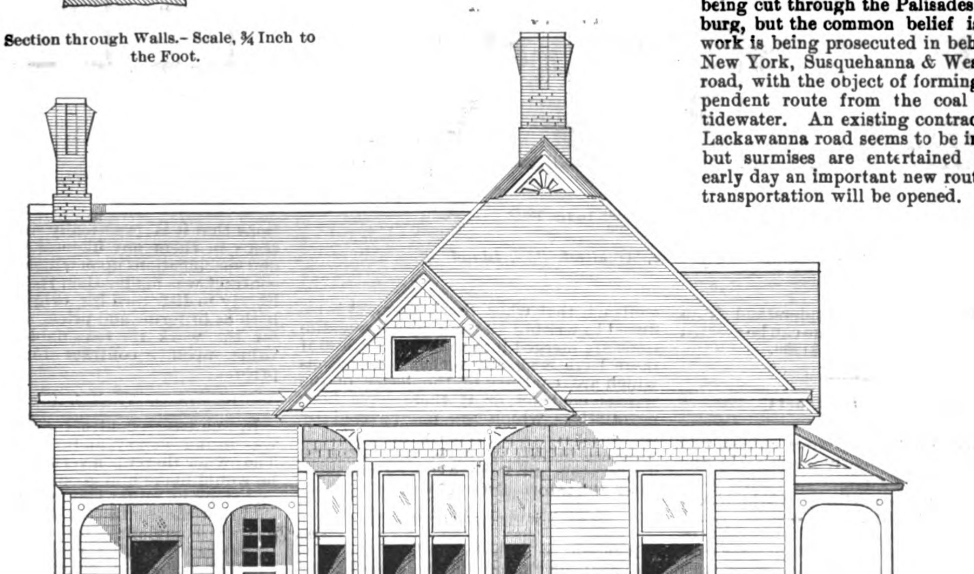
Details of Kitchen Trim.—Scale, ¾ Inch to the Foot.



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

who prepared the specifications; the architect has no right, without the consent of the contractor, to change the specifications upon which the contract was based. And upon his attempt to do so, the contractor may either abandon the work and recover for what he has already done; or, if he chooses, he may go on and charge such additional price as the changes in the work may make it worth. In making contracts with corporations for buildings, the builder should be careful that the contract is one that the corporation, or the officers who seek to make it, have the authority to make. Corporations, being special creatures of the statute, are held to a strict enforcement of their charter rights. And unless the contracts which they make are within the scope of the charter which they have from the State, it is in the power of any stockholder to proceed to restrain the completion of the contract. In general, a corporation has the right to erect all the buildings necessary to conduct the business in which it is engaged. To go beyond this they must have special authority either from the stockholders themselves or from the laws under which they operate. Having made a valid and binding contract, there are many rights and duties which grow out of it from which there springs a large amount of litigation if the parties to these contracts on both sides thoroughly understood their rights and their duties, and knew what the law requires of them and what it would enforce upon them, much of this litigation could be avoided. It is upon that consideration that we shall proceed to consider, in future articles, some of the responsibilities and liabilities growing out of building contracts. This will include the relations of architects, sub-contractors, material-men, laborers, and the relations between the contracting parties with reference to breaches of the contract and other responsibilities growing out of the relations of contractor and owner. It is believed that such a consideration of the question will enable the intelligent contractor to avoid many of the harassing features of the business.

Speculation is rife respecting a tunnel being cut through the Palisades at Guttenburg, but the common belief is that the work is being prosecuted in behalf of the New York, Susquehanna & Western Railroad, with the object of forming an independent route from the coal regions to tidewater. An existing contract with the Lackawanna road seems to be in the way, but surmises are entertained that at an early day an important new route for coal transportation will be opened.



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

Miscellaneous Details and Elevation of a Five-Room Cottage.

WHAT BUILDERS ARE DOING.

THE MAJORITY of builders are at present engaged in finishing up the work of last season and speculating upon the amount of business to be done in 1893. It is rather early yet to arrive at any definite knowledge as to the prospects for the ensuing season, but in a number of cities with which correspondence has been had there are contracts enough in sight to warrant the assumption that the coming year will be up to the average. There seems to be a feeling among the builders generally that 1893 will prove profitable, and that there will be plenty to do. Several cities are about to begin work under new building laws, which have been enacted during the past year, notably Boston, Baltimore, Buffalo and Omaha. Chicago has been at work for some time revising its city ordinance, but as yet no change has been formally adopted. It is worthy of mention that the builders have been very largely instrumental in bringing about the improvements in the laws. In Baltimore, Buffalo and Omaha the work was first undertaken by the builders in the exchanges and by them carried through to enactment with the ultimate assistance of the city authorities. In Boston one of the commissioners appointed to revise the old building law was a builder and a member of the Master Builders' Association, and in Chicago one of the component parts of the joint committee having the same work in hand is a delegation from the Builders' & Traders' Exchange. It is evident from many causes—the decrease of strikes, the growing participation in affairs of interest to their several cities, the active treatment of the problems of the business—that the builders as a class are gradually assuming the position in the community which their important occupation and immense interests warrant.

Boston, Mass.

The employing builders of Boston as represented by the Master Builders' Association have been considering the eight-hour day question during the past month. The members are practically united in the opinion that its establishment is a question of time, but are about equally divided as to the advisability of recommending the adoption of an eight-hour day at any time either near or remote. The subject was presented for discussion at a special meeting called for the purpose, and after much argument pro and con a resolution was introduced recommending the adoption of eight hours at a date about one year hence. The resolution was made the subject of an adjourned meeting, when it was laid upon the table by a narrow majority. At a subsequent special meeting the resolution is to be taken up from the table for further consideration. The burden of the argument against the adoption of the recommendation was that it would unwarrantably encourage action in the same direction by the workmen's unions. Those in favor of the resolution were of the opinion that under a system of payment by the hour, such as now exists in Boston, the desire of the workmen would work no hardship to any, provided that it could be generally adopted at a given time. In any event of final outcome the Master Builders' Association only seeks to advise its members and the special trade organizations within itself, for by its nature it cannot do more than recommend action of such a character.

On January 11 the association tendered a "Reception and Smoker" to its members and to the builders of New England. The following clipping from the *Herald* of the next morning gives an interesting account of the event:

"A reception, a banquet, a smoker, a promenade concert and an exceedingly jolly time—all in one—was the form of composite festivity which the Boston Master Builders' Association gave their friends last night, and the result was a ten storied brown stone success, erected by skilled workmen with such first-class materials as salads, ices, cake, coffee, Havanas, music, singing, flowers, champagne and unlimited hospitality.

"It was a stag party from beginning to end, but with all deference to the fair sex, in the variety of attractions which beguiled the crowds of guests throughout the evening, it was quite impossible that they should have been missed.

"Every office was lighted up in the big building at 166 Devonshire street, the home of the association, and the association rooms were decked with ivy and palms and great banks of flowers.

"In the main hall a platform had been erected, on which Tom Henry's orchestra of 14 pieces and the Whitney quartet—composed of Myron W. Whitney, William H. Fessenden, Clarence E. Hay and Herbert O. Johnson—divided the evening in a programme of popular music.

"Throughout the hall and in the gallery small tables had been arranged. The spread was artistically arranged in the Exchange room. In the corporation room President James I. Wingate, Vice-President E. Noyes Whitcomb and Secretary William H. Sayward received from 8 to 8.45 o'clock. There was also a Reception Committee composed of 41 members. The mantel and desks in this room were decked with flowers.

"In several nooks in the different rooms tables were stationed bearing bowls of iced punch, which attained a great hight of popularity.

"Over 550 invitations had been sent out for the occasion, and probably over 500 of these were accepted. Delegations came from Worcester, Lowell, Providence and Lynn, and many prominent Boston men were present.

"As the evening passed away and the quartet had finished its programme the orchestra played "Isabella," "My Sweetheart's the Man in the Moon" and "The Bowery," and the crowd helped the instruments out with one gigantic chorus. It was midnight before the last cigar was smoked, the last toast drunk and the last congratulation extended."

The affair was a most thoroughly enjoyable one, and the association promises to repeat it once a year. Many of Boston's prominent men were present, and large delegations attended from the sister exchanges in cities near by.

Buffalo, N. Y.

The Buffalo builders are looking forward to a profitable year's business in 1893, and if the present indications are fulfilled they will not be disappointed. The annual meeting of the Builders' Association Exchange, held January 12, showed the organization to be in excellent condition. The secretary's report indicated that the exchange had passed through a most useful and beneficial year both for the builders and the general community. An increase of 33 members was reported, and the financial condition was shown to be in good shape.

Among other things mentioned in the secretary's report was a list of matters of importance to members that had been considered during the year—viz.:

Code of practice, eight-hour question, manual training, conference with architects, conference with labor unions, the grading of lumber, and the matter of prices between supply men and builders.

In public affairs, the secretary showed that the exchange had taken part in the following: Revising the building laws, assisting in efforts to secure the new lien law, abolishing grade crossings, urging passage of the bill before Congress to secure local supervision and plans for Government buildings, sending delegates to New York State canal convention, requesting the Governor to appoint a railroad commissioner from Buffalo and appointing committee to meet committee of Charity Organization Society to decide upon a suitable plan for tenement houses.

Cash receipts for the year were $6,258.20; disbursements, $5257.90; in stock fund, $6800.

The following new officers were installed: President, H. C. Harrower; vice president, F. T. Coppins; treasurer, Chas. A. Rupp; secretary, J. C. Almendinger; trustees, Jacob Reimann, C. Hoeffler, Jacob Davis, John A. Wolsley, A. Machworth, George S. Donaldson, W. L. McClennan, J. H. Tilden, John Lannen, Carl Meyer.

A. A. Berrick, the retiring president, made a speech thanking the members for their hearty support of his efforts. He was presented with a silver-bound oak case containing a very handsome set of solid silver knives, forks and spoons.

Chicago, Ill.

The Builders' and Traders' Exchange of Chicago held its annual election on January 9. There were two tickets in the field—the regular ticket presented by the Nominating Committee and one under the title of "opposition ticket." The latter promised some very radical changes in the administration of the affairs of the exchange, should the opposition ticket be elected. The election was hotly contested, with the following result: President, Chas. W. Gindele; vice president, W. H. Iliff; second vice-president, C. S. Purington; treasurer, W. H. Mortimer; secretary, Henry S. Martin; directors for two years, Jno. Griffiths, F. C. Neagle, A. J. Weckler, Murdock Campbell, Alex. Gibson.

President Gindele was the only member of the regular ticket who was elected with the exception of Mr. Murdock Campbell as a director.

Retiring President W. H. Alsip, in his farewell address, took occasion to compliment the members of the exchange upon the showing for the year and for the high standard of excellence in building which they had set and maintained. He stated also that the surplus funds of the exchange had been very profitably invested, and that many progressive steps had been taken looking to the improvement of the conditions under which the business of the builder is now transacted. Mr. Alsip congratulated the Chicago builders upon the manner in which they had handled the tremendously increased business of the past year.

At a special meeting called for the purpose the following delegates and alternates to the seventh Convention of the National Association of Builders at St. Louis were elected: Delegate-at-large, C. W. Gindele; Delegates, W. H. Alsip, George Tapper (elected by acclamation), M. B. Madden, F. S. Wright, D. Freeman, D. V. Purington, J. A. Hogan, F. Blair, G. C. Prussing, William Henry, Jno. Rawle, John Griffith. Alternates, James John, George Lill, E. Kirk, Jr., T. Bird, S. I. Pope, W. E. Frost, J. L. Rutherford, E. E. Scribner, B. W. May, G. W. Manning, W. G. Oliver, J. O'Connell, J. J. Monaghan.

Cincinnati, Ohio.

The regular meeting of the Builders' Exchange of Cincinnati was held January 4. The programme included the consideration of proposed amendments to the constitution of the National Association of Builders, as well as the election of delegates to represent the exchange at the next annual meeting, to take place at St. Louis, Mo. The amendments proposed in the circular issued to members were all adopted, excepting the last clause of Article VII, which was rejected with unanimity. The ballots were then counted, and it was found that L. B. Hancook, B. W. Blair and Geo. B. McMiller were chosen delegates, with Chas. B. Stevenson, Dennis Flaherty and Wm. Magley as alternates. Action was also taken in regard to the passage of the Torrey Bankrupt Law bill now pending in Congress, and Lawrence Grace and L. B. Hancock were appointed a committee to telegraph at once to the Representatives of this district, as well as to the Ohio Senators, that it was the desire of the Cincinnati Builders' Exchange to have the bill passed, and asking that the votes and influence of the Ohio delegates in Congress be used in passing the measure. The next business transacted was in the nature of a genuine surprise to at least two persons in the hall. Thomas D. Horner, who has been assistant secretary of the exchange for the past six years, was the recipient of a very fine ivory-headed and gold-mounted cane, together with a purse containing $50 in gold. Chas. Blackburn, the gate keeper, was remembered by a substantial money token of the appreciation of his services by the members.

Detroit, Mich.

The Builders' and Traders' Exchange of Detroit, at its annual meeting, showed itself to be in excellent condition. The meeting was fully attended, and the members very enthusiastic over the showing for the year. The election of officers for the ensuing year resulted in the choice of the following: President, James Meathe; vice-president, Albert Albrecht; secretary, Joseph Myles; treasurer, George Hanley. The officers named constitute the Board of Directors, together with Charles H. Little, G. Jay Vinton, Ira A. Topping, Conrad Clippert and J. E. Bolles. Martin Scholl and G. Jay Vinton were elected delegates to the national convention, and John Finn and Robert Hutton as alternates. Joseph Myles was recommended to the convention for election as delegate-at-large to the convention to be held in Boston in 1894. President James Meathe, Alexander Chapoton, Jr., and W. G. Vinton were indorsed for membership of the Board of Trustees of the Chamber of Commerce.

George Tapper, treasurer of the National Association of Builders, and George C. Prussing, former president of that organization and a member of the Board of Directors thereof, were in attendance, and addressed the members in a happy manner.

The Board of Directors submitted their annual report, showing that during the past year five general meetings of the exchange and 20 meetings of the board were held. Fifty new members were added to the list, increasing the membership to more than double that of the previous year. The funds of the association have been increased from $315.67, which was turned over at the beginning of the year, to $1450.08, the present balance in the treasury. The assets of the exchange are $2070.08, and there is not one cent of liability.

Responses from members to letters issued by the superintendent show that the aggregate amount of business done by those in the exchange during the past year approximated the grand total of $5,500,000, and a conservative estimate of the number of hands employed by them places the figure at 5500. It is no exaggeration to say that the wages of these will average $2 per day, which would show that for every working day the members of the exchange pay $11,000, and for the year the grand total of $3,300,000 to the wage workers. These figures illustrate possibly to some of the members the importance of the industries they represent, and will prove to those outside of the organization that the reputation being acquired by the Builders' and Traders' Exchange is not undeserved.

The meeting was a long and very satisfactory one. A fitting compliment was paid to the efficient superintendent, Benjamin F. Guiney, who was re-elected for the ensuing term.

The exchange has made an arrangement for improving its quarters and more thoroughly centralizing the building interests of the city by renting an entire building three stories high and situated in a desirable location, for the use of the exchange and its members only.

Denver, Col.

At the annual meeting of the Master Builders' Association of Denver the following were elected: John D. McGilvray, president; W. J. Hill, vice-president; John Gregor, secretary; H. W. Michael, treasurer: Thomas C. Rundle, John Young, John Cooke, Charles M. McCabe and E. Ackroyd, directors; John D. McGilvray and W. J. Hill, delegates to the national convention. The newly elected officers assumed their duties January 5.

Lynn, Mass.

The Lynn Master Builders' Association at its annual meeting elected the following officers for 1893: President, Frank G. Kelley; vice-president, Benjamin H. Davidson; secretary, P. S. Curry; treasurer, Fred Stocker; Board of Directors, James Heath, James Burns, Fred A. Sparing. The annual reports presented showed the association to be in a prosperous condition, and its value to the allied trades is unquestioned.

The annual banquet, which occurred on the night of January 17, was a very pleasant and enjoyable affair. A large number were in attendance, including many builders who were present by invitation, not being members of the association, and a number of builders from outside the city.

Lowell, Mass.

The Master Builders' Exchange of Lowell has elected the following gentlemen as delegates to the national convention at St. Louis: Secretary, John H. Coggeshall, P. Conlon and C. R. Costello. The alternate delegates are Clarence H. Nelson, Charles H. Burtt and L. F. Kittredge.

Louisville, Ky.

At the annual meeting of the Builders' and Traders' Exchange of Louisville, both the president and secretary presented very interesting reports covering thoroughly the ground gone over by the organization during the past year. J. H. Murphy, the retiring president, stated that the work of the exchange in maintaining just and honorable conditions among builders in the city had accomplished enough to repay the members a hundred-fold for all the labor and money expended. The code of practice adopted for the purpose of governing the method of submitting bids and the treatment of bids after submitted has been enforced and its justice and practicability demonstrated, although not without unpleasant features.

Secretary Kaufman's report covered a wider range of detail than that of the president. After mentioning the state of the finances, which were good, he touched upon the quality of membership in the exchange. "The exchange has obtained the reputation," he said, "of being an association of honorable men, for they minutely ascertain the business methods and general reputation of those who desire to become affiliated with them in this exchange, as a membership in the exchange is a letter of credit, and any overt violation of business ethics by any member will be punished by fine or expulsion." Speaking of the enforcement of the code of practice and rules, he said: "In this connection it would be appropriate to mention the fact that your laws and rules have been indorsed by the courts. The secretary refers to the case of J. H. Murphy *vs.* Drach & Thomas and L. P. N. Landrum. This triumph of the equity and efficacy of your rules is incalculable. The court vindicated your rules of compensation. The status of the architect has also been fixed, the court stating that he was the agent of the owner, and except in cases where he flagrantly violated the authority vested in him that the owner was liable for his acts.

"Your secretary cannot dwell sufficiently on the importance of this decision, for it gives a legal sanction to those rules which you have laboriously compiled, patiently sought to have enforced, often meeting with uncalled-for opposition, and it is a great satisfaction to know that the fruits of your experience, toil and time have been admitted to be just and legal."

The secretary's and president's reports have been put in neat pamphlet form and any one desiring a copy can be supplied by applying to the secretary for the same. They contain much of value to builders' exchanges.

Milwaukee, Wis.

The members of the Builders' and Traders' Exchange of Milwaukee are busy preparing for the dedication of their new building, which is expected to be ready for occupancy about February 1. As has been stated before in these columns, the building reflects the greatest credit upon the exchange both as an evidence of the financial solidity of the institution and as a tribute to the progress of the organization. The dedication exercises will be elaborate, and an enjoyable time is anticipated by all.

The following communication was received just prior to our going to press:

The annual meetings of the Builders' and Traders' Exchange was held at the rooms over 1 Grand avenue at 3.30 January 11. The new building which is being erected by the exchange on Fifth steet and Grand avenue will be ready for occupancy about February 1, and a number of similar organizations will be provided with special quarters therein.

Among them are the Masons' and Builders', Master Plumbers' and Master Steam and Hot Water Fitters' associations.

Routine business principally was transacted at the meeting. The indications are that the present officers will be re-elected. They are: President, J. J. Quinn; first vice-president, H. R. Bond; second vice-president, Paul Riesen; treasurer, John Langenberger; secretary, A. J. Erdman.

New York City.

At a recent meeting of the managers of the Mechanics' and Traders' Exchange of New York City, it was decided to follow the drift of the building trade uptown. A part of the Kennedy Building on Fourth avenue, between Twenty-second and Twenty-third streets, has been leased by the exchange, and it will move into its new quarters before May 1.

The Mechanics' and Traders' Exchange is one of the oldest exchanges in the city, and for many years has counted among its members all of the prominent builders, contractors and masons in New York. Among them are men who erected all of the large buildings downtown. It has a membership of about 300, which it is expected will be greatly increased when the move to its new quarters uptown is made.

A certificate of incorporation of the Building Trades Club of the City of New York was filed December 30 with the Secretary of State. Its objects, which have been frequently referred to in *Carpentry and Building*, are to foster and encourage friendly intercourse among its members, to establish and maintain uniformity of action between those interested in the construction of buildings and to reconcile and redress grievances between members. The Board of Directors comprises Robert L. Darragh, Henry A. Maurer, James B. Mulry, Charles Andruss, John J. Roberts, Nathan Peck, Warren A. Conover, Henry M. Tostevin, Henry W. Redfield, Otto M. Eidlitz, Oscar T. Malkey, William E. Munroe, Ronald Taylor, Augustus Meyers and Jacob S. Browne.

Omaha, Neb.

The builders of Omaha are looking forward to a good year's business in 1893. The work in prospect together with unfinished work on hand indicate that the coming season will be the most prosperous that the builders have seen for several years. The annual meeting of the Builders' and Traders' Exchange occurred January 3. The election of officers for the ensuing year resulted in the re-election of President N. B. Hussey, Vice-President A. J. Vierling, Treasurer Henry Ittner and Secretary W. S. Wedge. After the election the usual lunch and cigars, which have proved such a pleasant feature of the regular meetings, were served and President Hussey and Secretary Wedge presented their reports for 1892. Both reports were very full and interesting and showed that the past year was the most prosperous in the history of the exchange. The president spoke of the value of the connection with the National Association to all local exchanges, and also referred to the visible and unquestioned benefit to the builders and the city of the exchange and predicted a brilliant future for the organization. He made a strong plea for better facilities for trade education of young men. In alluding to the present conditions of the exchange the treasury was shown to be in good condition with a balance on hand after all obligations had been met. He said:

"Our membership also has increased 100 per cent. in the last 12 months. The relations between the employer and the employee during the past year have been satisfactory in the main, and no disturbance of any magnitude has arisen.

"We, as a local body, have adopted the recommendations of the National Association —viz.: A plan of arbitration, and can see no reason why, if adhered to by both employer and employee, all questions arising between the two interests may not be satisfactorily settled without the expensive luxury of a strike.

"The code of practice (based upon the code recommended by the National Association) adopted by this association and subscribed to by all the architects in the city, we believe to be our bulwark and chart for guidance, which, if faithfully followed, will place our organization on a footing that will insure prosperity and permanence.

"The Uniform Contract adopted by us should be urged by every member to the end that it may become universal throughout the land. It is the product of the combined wisdom of a committee representing the National Association of Architects and the National Association of Builders of the United States. A committee from the exchange has recently turned over to a sub-commitee a building ordinance for this city, which, if completed and adopted as recommended, will be as satisfactory and perfect an ordinance as any in the country."

In his report Secretary Wedge went into the details of the year's experience of the exchange and showed how much work had been done and how much had actually been accomplished in 1892. The showing was a most excellent one, and reflects the greatest credit on the management of the exchange. The members demonstrated their hearty appreciation of Mr. Wedge's untiring efforts on behalf of the exchange by voting an increase in his salary. It was decided to continue the refreshment feature at the monthly meetings.

Philadelphia, Pa.

The Journeyman Plasterers' Protective Association of Philadelphia proposes to ask the Master Plasterers' Association for an increase in wages. They are now paid 40 cents per hour and it is proposed to ask for 45.

At a special meeting of the Master Builders' Exchange, held for the purpose, the following were nominated to fill seven vacancies in the Board of Directors: Charles Gillingham, Peter Gray, William Harkness, Jr., Thomas Marshall, Joseph E Brown, Charles H. Reeves, James Johnston, Samuel Hart, John F. Prince, Jacob Myers, Jacob R. Garber, F. A. Ballinger, Francis F. Black and Richard Watson. The nominees for delegates and alternates to the seventh annual convention of the National Association of Builders to be held at St. Louis were: Franklin M. Harris, Richard H. Watson, William H. Albertson, William B. Irvine, Samuel Hart, George Watson, William B. Carlile, Charles G. Wetter, Murrell Dobbins, John S. Stevens, William Harkness, Jr, William S. P. Shields, Charles Gillingham, John Atkinson, R. E Hastings, John Conway, Allen B. Barber and William Conway. It is likely that the 12 first named will be elected.

At the annual banquet of the Master Carpenters' and Builders' Company, held at the Master Builders' Exchange, January 18, speeches were made by the men who handle $27,000,000 spent each year in the erection of new buildings in Philadelphia. Before the banquet all the officers were re-elected unanimously. The reports submitted by the various committees were of the most encouraging character. Stacy Reeves presided over the banquet, and, after outlining the policy of the organization, introduced David A. Woelpper, president of the Lumbermen's Exchange, who enumerated the trials and tribulations of a lumberman in the hands of carpenters. Henry Vrooman, president of the Mill Association, told of the work accomplished by that organization, and F. A. Ballinger, president of the Master House Painters' Association, paid high tribute to the trade school system. George Watson, chairman of the Trade School Committee of the Master Builders' Exchange, spoke on the status of the mechanic of to day as an employer and a wage earner. During the symposium that followed George F. Payne, William Harkness, Jr., Jacob Myers, Charles Wetter, James Johnston, Joseph M. Steele and Jacob R. Garber contributed happy thoughts. A company of musicians and monologists added much to the pleasure of the evening.

Providence, R. I.

At the fourteenth annual meeting of the Builders' and Trades' Exchange of Providence, the secretary, William F. Cady, presented his report, showing a total membership to date of 101 members, eight of which are new members and eleven of which are either dead or removed. According to his report the organization is in a most flourishing condition and the future propects are better than ever before. The report of the treasurer showed a balance on hand of $350.

The election of officers for the ensuing year then followed: Richard Hayward was chosen president; William W. Batchelder, first vice-president; Spencer B. Hopkins, second vice-president; James S. Hudson, treasurer; F. C. Markham, L. Titus, M. H. Shattuck, J. P. Thornley and H. T. Cott, Executive Committee for two years.

John J. Mahoney was appointed to fill any vacancy in this committee for one year.

Richard Hayward and A. J. C. Larned were elected delegates to the National Convention of Builders, with James S. Hudson, James Sheridan and Henry F. Mason as alternates. William W. Batchelder was chosen director at large.

The question of the benefits of the National Association was then discussed at some length, af er which the meeting adjourned to Gelb & Norton's, where the annual banquet was served.

After the good things provided had been duly discussed, President Hayward called the assembly to order and introduced as the speakers of the evening His Excellency Gov. Brown, ex-Gov. John W. Davis, Richard Comstock, President O. S. Kendall of the Worcester Exchange, and others, all of whom spoke in a general way on the good resulting from a co-operative effort of the artisans.

The banquet was a thorough success and greatly enjoyed by all.

Syracuse, N. Y.

A meeting of the Builders' and Traders' Exchange was held December 28, 1893, when the following officers were elected: President, Daniel O'Brien; vice-president, George Mahlerwein; secretary and treasurer, C. F. Wisehoon, Jr.; trustees, Frank Hunt, C. H. Merrick, George R. Clarke, John J. O'Hara, Frank Scullen, Thomas J. Timmons; director National Association, Charles H. Merrick; delegate National Convention, James Curran; alternate, C. F. Wisehoon, Jr.

St. Louis, Mo.

The annual meeting of the Builders' Exchange of St. Louis occurred January 16, on the occasion of which a 12 o'clock dinner was served. The arrangements for entertaining the delegates and visitors to the seventh convention of the National Association are rapidly being perfected. The programme of the entertainment at the Lindell, the headquarters of the delegates, will include a banquet characterized by St. Louis hospitality, which will occur the night of the 16th. On the evening of the 15th a theater party will take place at the Olympic. The day of the 17th will be devoted to carriage rides through the different avenues of the city. The delegates to the National Convention appointed from the local exchange are: Jeremiah Sheehan, Charles McCormack, William S. Simpson, Richard Shinnick and H. C. Gillick. Mr. Sheehan is also chairman of the Convention Committee. Thirty six exchanges, representing nearly every State in the union, will send 125 delegates to the convention, and there will probably be as many more alternates and visitors in attendance.

Worcester, Mass.

The annual meeting of the Builders' Exchange was held January 10, at its rooms in the Knowles Building. These officers were elected: President, C. D. Morse; vice-president, G. P. Cutting; directors—Robert S. Griffin, B. W. Stone. J. F. Bicknell, for two years; P. L. Paquette, Franklin B. White, C. A. Vaughan for one year.

The report of Secretary George Bouchard showed a creditable surplus. There are 77 active members of the organization.

There have been several "talks" in the exchange recently upon questions of interest to builders generally, and on January 17, the occasion of the monthly "smoker," it was expected that O. W. Norcross would be present and speak on the labor problem. He was, however, unexpectedly called away, and his place was filled by A. P Cutting, architect, who read a paper on the construction of buildings. The paper was listened to with marked attention and contained many valuable points of interest to the fraternity.

Before the smoke talk the regular business meeting of the exchange was held, O. S. Kendall presiding in the absence of C. D. Morse, the president of the exchange.

Secretary George Bouchard was instructed to write a letter of thanks to the Employers' Liability Association of London, England, for a handsome wall clock which had been presented to the exchange through the Worcester agent, F. H. Goddard.

Arrangements were then made for the next monthly smoke talk, and the following committee was appointed to look after the event: B. W. Stone, W. E. Coffey, P. L Paquette.

Some talk was then indulged in over the forthcoming annual banquet of the exchange, which will be held some time in March, and a committee was appointed to make the necessary arrangements, as follows: E. A. Walsh, George W. Carr, George W. Lovell.

Nine members of the exchange expressed their intention of attending the national convention. A committee consisting of George W. Carr and Frank H. Goddard was appointed to look after the railroad arrangements for the convention.

Wilmington, Del.

The Builders' Exchange of Wilmington met on the first Monday in January and transacted considerable routine business. The following were appointed a committee to act in conjunction with the city engineers and architects to make a code for measuring laws: A. S. Reed, F. C. Simpson, G. W. McCaulley, J. R. D. Seeds and Harry Stuart.

Notes.

The Builders' Exchange of Wheeling, W. Va., on January 6 held its annual meeting for the election of officers. W. A. Wilson, president last year was re-elected; P. J. Gilligan, first vice-president, and J. W. Bier, second vice-president; C. Ed. Schenerlien, secretary, and Jacob Morris, treasurer. Six directors were elected, as follows: C. P. Hamilton, Lewis Hartong, Geo. W. Lutz, J. E. Clator, James McAdams and Chris Murray. The ten members of the old Board of Appeals were re-elected. Communications were received from Carpenters' Union No. 3 and the non-union carpenters, asking for an advance of wages of 20 per cent. and 50 cents a day, respectively, said advance to take effect April 1. Both communications were referred to the carpenter-contractors of the exchange. It was ultimately decided not to grant the increase, and many anticipate that trouble will result.

The carpenters of Boston are going to the Legislature to try to have an act passed that shall compel the contractors and builders of this city to employ only citizens of Boston on contracts for the city. The carpenters feel that contractors, when doing work for the city, anyway, should be obliged to employ men who are citizens only, and that they should in all cases be given the preference before alien labor.

The Builders' Exchange of Norfolk, Va., has elected the following officers: Charles H. Plummer, president; Jos Edmonds, Sr., vice-president; J. T. Blick, secretary; L. T. Blick, treasurer; L. T. Blick, P. F. McGuire and Jos. Edmonds (one year), Edward Hart and Charles Powers (two years), trustees. After the business of the annual meeting and election was finished the members went to Murray's Hill street restaurant and enjoyed an oyster supper.

The Master Builders' Association of Fitchburg, Mass., at its annual meeting Tuesday evening, January 3, elected the following officers: President, J. D. Littlehale; vice-president, W. H. Keyes; secretary and treasurer, J. S. Starr; trustees for one year, A. Dunkason, George Buckley; for two years, A. Wellington, H. B. Dyer; for three years, F. A. McCauliff, H. E. Jennison.

A rather novel undertaking is under way in Toledo, which is a project for buying a lot and putting up a handsome building to be owned and controlled by the women of that city, and to be used as a place of meeting by the various organizations in which they are interested, whether literary, musical, artistic, social or philanthropic. An auditorium capable of seating 500 people is a part of the plan, and also a room suitable for musicales, &c. The company were incorporated last spring with a capital stock of $25,000, and steps were taken to secure the amount necessary to make a permanent organization.

The New Haven Builders' Exchange has elected these officers for 1893: President, W. M. Townsend; vice-president, D. H. Clark; secretary and treasurer, J. Gibb Smith; Board of Trustees, Elizur Sperry, S. E. Dibble, Robert Morgan, F. K. Stiles, William Curley.

The annual election of officers of the Pittsburgh Builders' Exchange took place January 4, and resulted as follows: President, Samuel Francies; vice-presidents, Adam Wilson and W. R. Stoughton; secretary, H. R. Rose; treasurer, T. J. Hamilton; Board of Directors, T. W. Irwin, R. M. Morris, R. C. Miller, S. A. Steel, W. P. Getty and F. Benz; Board of Appeals, J. P. Knox, E. F. Elliott, L. M. Morris, Robert Mawhinney and Hugh Murphy. President Barnes declined re-election. The regular monthly meeting was held in the afternoon, but no business of public interest was transacted. Ex-President Fulmer does not anticipate a brisk building season, and there are no indications of any labor disturbances. The exchange at the last report numbered an even 1000 members. Since that time two have died and one new member has been admitted, making the total number now 999.

The Builders' Exchange of Scranton, Pa., met January 9 and commenced the second year of its existence by electing officers who will serve for the ensuing term. The exchange has a membership of 57 with a cash balance in the treasury amounting to more than $500. The officers elected are: President, George W. Finn; senior vice-president, J. W. Howarth; junior vice president, Charles N. Lord; recording secretary, Judson Woolsey; reading secretary, Henry Gunster; treasurer, T. E. Lyddon. Board of Directors, John Benore, George D. Brown, Charles N. Lord, William R. Williams, Conrad Schroeder, Luther Keller, John Colligan, Sam Sykes, Charles McMullen, D. P. Thomas, H. C. Hinman and T. F. Mullen. After adjournment the Board of Directors met and organized by electing Conrad Schroeder president and James Collins secretary.

Carpenters' Planes.

Of the tools comprising a carpenter's kit, none is employed so frequently as the plane, says a writer in the New York *Trade School Journal*, and there are very few jobs, indeed, where its services are not required by the carpenter. To accomplish the best results care must be taken to keep the plane iron sharp. Many who use so common a tool as the plane do not sharpen the iron until it is so dull that it will hardly cut.

When ground the iron should be given a long straight bevel. In order that the edge may sharpen quickly when the iron is rubbed on the oil stone, the heel should be raised—the veriest trifle only is necessary—about $\frac{1}{16}$-inch.

The irons of the jack plane, the short fore plane, and the smoothing plane, should be ground and kept with a slightly convex edge, while in the fore plane and jointer the edge of the irons should be ground and kept perfectly straight.

The use of the jack plane is to take off the rough or superfluous wood; the short fore plane for facing or taking the wood out of wind, the long fore plane and jointer are used to make the narrow ends of the lumber straight and square. The smoothing plane is the last the carpenter uses on his work, and as the name indicates, its purpose is to smooth off and clean the work he is preparing.

Fire-Proof Construction.

An interesting test was made not long since in England of a new form of interlocking fire-proof construction, a few particulars concerning which may not be without interest to our readers. The form of construction is that of hollow tubes of earthenware, each of which is 6 inches wide and 2 feet long, divided by a central diaphragm. On the sides of the tubes are alternating recesses and projections which furnish the interlocking arrangement that is the special point of the construction. The under side of the tubes when used for floors, and both sides when employed for partitions, are provided with dovetailed grooves for supporting the plaster, so that lathing is rendered unnecessary. As the tubes rest upon and cover the iron work, no centering is required for the construction of a fire-proof floor. For the purpose of testing the quality of the material and form of construction, small squares of flooring were put together and loaded. One specimen consisting of 2 feet square of the flooring without concrete sustained a load of 3125 pounds, while another of the same dimensions, with $1\frac{1}{2}$ inches of concrete over the tubes, carried 4168 pounds. A small shed with sides and roof constructed with the interlocking tubes is said to have successfully withstood a severe fire test.

FRENCH VENEERING.—II.

By HENRY DAUBE.

IN THE LAST ARTICLE on the above subject I brought to the attention of the readers the first kind of veneering that would generally be required of an ordinary workman. In the present article I shall go a step further and explain somewhat in detail the treatment of the more complicated cases likely to occur in every-day practice. It shall be required of the workman to veneer a quarter round of 9 inches radius and also a cove of 7 or 8 inches radius, both to be about 6 or 7 feet in length. This kind of work, I may say in passing, requires the utmost caution on the part of the person executing it. The cores are to be of white pine and must be planed concave or convex, as the exigencies of the case demand. The corresponding cauls themselves manifest after the work has been varnished and rubbed. It is always advisable to drive a few screws into the strips *a b*, as they are apt to be detached when placed in the hot box. I have very often used a circular saw for scooping out the body of the work, which is done by sliding the piece diagonally across the saw, as shown in Fig. 8. Where there is a quantity of this work to be done it will pay to use the latter method, as a great saving in time is accomplished. When the cores are all planed to the required curve, put the cauls into the hot box and proceed in the same manner as given out in my preceding article for making joints, &c. The main point to be considered is how to get the veneer into the cove or around the quarter round without split a few small wire nails through the veneer to keep it in position while screwing down. The sawdust will readily adapt itself to the required shape. The methods above described have never yet failed to give the best results. I shall next treat of the veneering of columns and pillars.

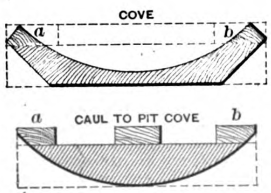


Fig. 7.—Showing How Rough Pieces are Glued Up Before Planing Down.

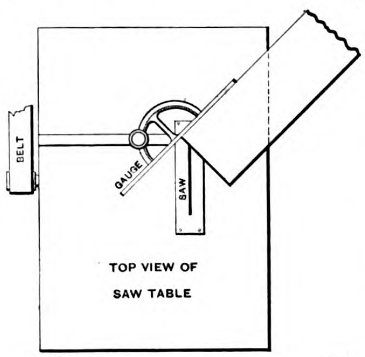


Fig. 8.—Manner of Using Circular Saw for Scooping out the Work.

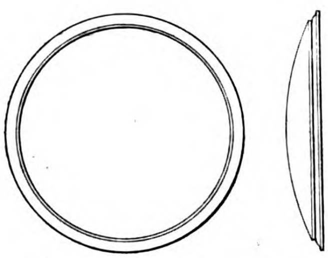


Fig. 9.—Side and End Elevations of Medallion.

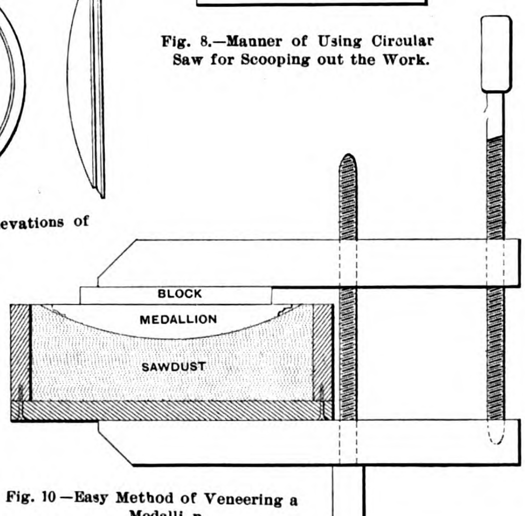


Fig. 10.—Easy Method of Veneering a Medalli.n.

French Veneering.

will naturally have to be made to exactly fit into the cores. The illustrations which are presented in connection herewith will, I trust, help to make the subject more clearly understood. Fig. 7 shows the manner in which the rough pieces are glued up before planing down. The strips represented by *a b* are glued on for the purpose of saving the expense of employing thicker plank. The planing down to convex pieces is very readily performed. In order to insure a true and perfect surface, a small gauge is used having the same curve. The concave piece is first scooped out by means of a roughing plane, after which a fore plane having a round face is employed. Great care must also be exercised that no humps be left in the surface, for these not only interfere with the equality of pressure, but also make ting. The veneer to go into the cove should be sponged with hot water on the side that goes against the glue. The veneer for the quarter round should receive the same treatment, but on the side to be finished. By this means the veneer will adapt itself readily to the required curve. I have done work in veneering which was neither concave nor convex, but which was a segment of a sphere. Suppose we have a medallion, as shown in Fig. 9, to be veneered with some inlaid work. This could also be done by having the wood worker turn a caul to correspond with the medallion. But this would require too long a time. I have a simpler and far easier way of doing it. Make a rough box, as in Fig. 10, and fill with pine sawdust, loosely packed. Lay a piece of canvas or bagging over this, and when the glue has been applied, drive

Icehouses.

A correspondent of the *Country Gentleman* writes: I can corroborate from personal experience the statement that any rough board shanty that will keep the sawdust packing in place will keep ice. On the occasion of my first visit to a butter factory in 1875 I found an icehouse of the most primitive construction, made of refuse lumber set up with poles and forked sticks. This was in August, and the supply of ice was abundant to last through the season. A few points I will mention which will be of help to the beginner. Drainage may be provided by filling a foot with stone if you have them; if not, use old rails or wood, but be sure and have plenty of sawdust between the ice and this material. Top ventilation is one of the important things about an icehouse, and the best way to get it is to have a large door or window in each gable, so as to allow a draft through. If the icehouse can be located so as to be shaded on the south and west by trees it will prevent the boards and packing from heating and reduce the waste of ice, but if shade cannot be had from trees set up posts a few feet from the building, make a pole roof and cover in June with evergreen brush. If you will plant some Concord grapevines they will in two or three years cover a trellis so as to shade the building and at the same time furnish fruit. The most essential thing to insure the ice keeping well, however, is to visit the icehouse frequently through the spring, and see that there are no air holes in the sawdust which is packed around the sides and spread over the top. These are more likely to form early in March than later, and so every day or two you should walk over the surface and feel around with a slight rammer to be sure that no air holes or cavities are left to allow the air to enter and waste the ice.

I have learned something new to me the past year which may be of value to readers living in a latitude where ice rarely forms thick enough to be handled. A gentleman in Clay County, Ky., where no available ice formed last winter, tried the experiment of filling his icehouse with snow, and that with complete success. It kept all summer, enabling them to have ice cream and cool their water and keep meat and other food. The snow was tamped solid as it was put in.

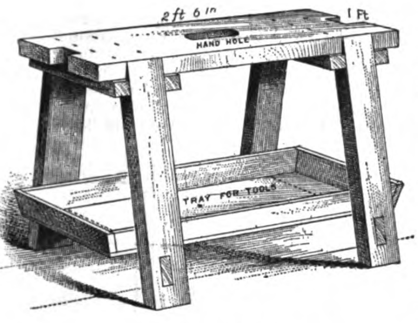
Timber Lands of Great Britain.

The woodland surface of Great Britain ten years ago was, according to returns which have recently been compiled, in the neighborhood of 2,458,000 acres. In the year 1888 the acreage was estimated to be 2,561,000, and in 1891 the measurements taken showed a further advance to 2,695,000 acres. The largest woodland area to be found in England is said to be the County of Hampshire, containing 122,574 acres. Next in order comes Sussex with 122,073 acres, while the four counties of Hants, Sussex, Surrey and Kent possess between them nearly one-quarter of the English woods and plantations. In Scotland Inverness-shire has no less than 169,000 acres, this being the largest area of timber land in Great Britain.

CORRESPONDENCE.

Trimmer's Saw Bench.

From G. N. H., *Bristol, Conn.*—Thinking it may interest some of the readers of the paper, I send a sketch and brief description of a bench which I made in the

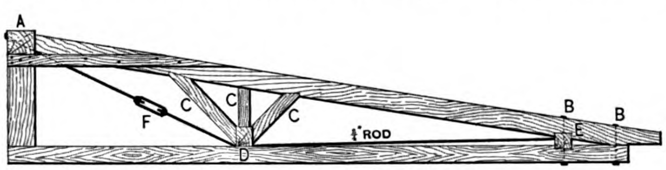


Trimmer's Saw Bench.

year 1880 and have used ever since. It is still in good shape and the only repairs found necessary during the period named have been a new top. I call it a "trimmer's saw bench," and an idea of its construction may be gained from inspecting the drawing which I send herewith. The top is 12 inches wide and 2 feet 6 inches long. The material employed is 1¼-inch stuff, with the exception of the tray, which is made of ½-inch stuff. The notches in the ends of the top are used to hold doors and windows while planing. I have used the bench for almost everything, even for framing light timbers, but it is especially convenient for trimming, as the tools are close at hand in the tray supported between the legs of the table. When I built the bench I lived in New York State, but I thought so much of it that I took it with me when I removed to Connecticut. It is very strong in comparison to the weight and I have thrown what tools I want to use into the tray; have taken it on my shoulder and marched off to my job of work, if not more than a mile away. I claim that one can put more tools into one of these bench trays than he can in a tool box or a small basket.

Roof Truss.

From J. A. G., *Nampa, Idaho.*—In the June issue of the paper "J. C. W." of Pine Hill, Pa., asks for a method of sustaining a one-sided roof and top ceiling without the use of posts. I send a sketch which I think will answer his purpose. The drawing is self-explanatory, but I will observe that the truss rods may be placed at the sides of the joists and rafters and a sufficient number inserted to guarantee strength. It would also be well to arrange for a manhole in the ceiling in order to tighten the nut at F. Numerous methods of anchoring the ceiling joist to the strain beam near the center will suggest themselves. Referring to the drawing which I inclose, A represents a square timber of suitable size, B B are bolts, C C C strut and braces, D strain beam about 6 x 8 inches, E 6 x 6 inch piece framed into the joist and rafters as shown, while F is the nut. The truss rod is ¾ inch in diameter.



Sketch of Roof Truss Submitted by "J. A. G."

Mansard Roofs.

From L. L. D., *Madison, S. D.*—I wish some of the practical readers of the paper who have had experience in building mansard roofs would put in their mite and send to the Editor of the paper some sketches of framing roofs of this kind. The subject is one in which I am interested, and I have no doubt that my brother chips in other parts of the country will also be glad to see something published on this branch of our business.

Length of Jack Rafters.

From G. D. I., *West Philadelphia, Pa.*—In answer to "W. S. S." of Woodlawn, N. Y., whose letter appeared in the December issue of the paper for 1891, I would like to make clear what he wishes to know. In the first place, he asked how the point H is obtained. This represents the length of the longest common rafter on the main roof and the valley hip must intersect at this point in order to be accurate. If the correspondent will refer to the accompanying sketch he will notice that J H of Fig. 1 is equal to G O of Fig. 2. Continue the valley until it strikes the ridge at G. Draw G F, which is the ridge line on the gauge, its accuracy being shown by J F, being the length of the longest rafter on the gable. The side bevels are not the same as the plumb cuts and it would be a grave error to take them as such. The plumb bevels are shown for both sections of the main rafter in Fig. 2 and in the gable section at F of Fig. 1. The top bevels are always the same as the long common rafters on the same ridge pole. By taking the points H and G and raising them until they meet, they will stand perpendicularly over B to their given hight.

I also send a method of cutting purlins against valleys and hips. Referring to the sketch, let B S represent the run or base of the gable and B T the hypotenuse or rafter. Square from B T, cutting T S at I. Join B I. Now take B I on the blade and B J on the tongue, and the tongue gives the cut for the face of purlin. For the edge of the purlin, take E J on the blade and F G on the tongue, and the tongue gives the cut. This will cut the purlin running at right angles to E J F to fit against the valley. The cripples may be cut by reversing the last operation and taking E F for the cut on the blade. The cut for sheeting is always the same as the edge cut of purlin laying square with the roof only. The main roof purlin is obtained in like manner by squaring from the common rafter until it cuts the line B G. This gives one side of the square, or E J. The tongue will give the cut on the face of the purlin. For the edge take H J on the blade and E J on the tongue, the latter giving the cut. Reversing gives the cut for the cripples.

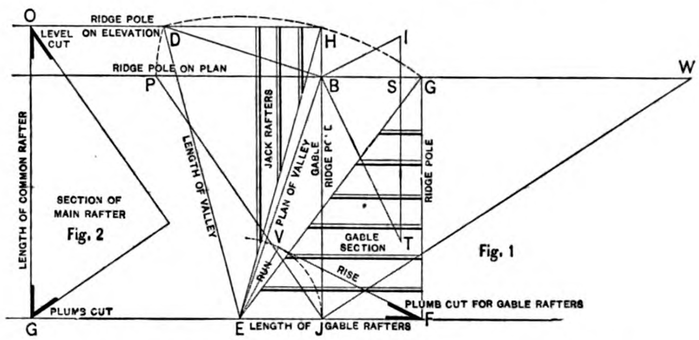


Diagram Explaining Answer of "G. D. I." to Letter of "W. S. S."

Question in Bending Moments.

From W. W. J., *New York City.*—I beg to submit the inclosed as a method for finding the size of supporting timber desired by "J. D. W." of Paterson, N. J., and published in the November issue. The answer given by C. Powell Karr applies, of course, but the one which I send is applicable to any rectangle beam, be it of wood or iron. In the formula let

W = the weight, or 13,248 pounds.
b = the breadth.
d = the depth, estimated to be 12 inches.
l = length, or 24 feet.
f = safe stress, or 12,000 pounds for iron.

The value of f can be found in any of the handbooks.

With these values we have the following formula for the size required for strength:

$$W = 4\,\frac{bd^2f}{3l}$$

$$13248 = \frac{4b \times 12^2 \times 12{,}000}{3 \times 24 \times 12}$$

$$8000b = 13248.$$

$b = 1\frac{2}{3}$ inches. Therefore the size required is 1 foot deep by $1\frac{2}{3}$ inches thick.

With the values as before and the deflection equaling $\frac{1}{40}$ (each foot) $\times$ 24 feet $= \frac{3}{5}$ as a total, and with F equaling the modulus of elasticity, which is 27,000,000 pounds, we have the following formula for the deflection:

$$\frac{5Wl^3}{32Fbd^3}$$

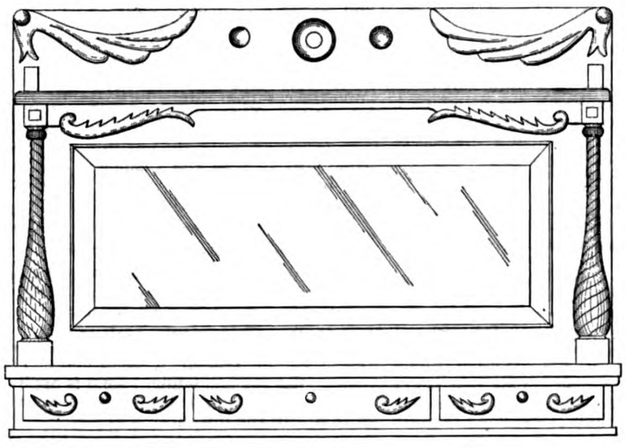
$$\frac{3}{5} = \frac{5 \times 13248 \times 24 \times 24 \times 24}{32 \times 27{,}000{,}000 \times b \times 1 \times 1 \times 1}$$

Or solving we have,

$b = 1\frac{2}{3}$, or a trifle over, as before, showing a beam 1 foot deep and $1\frac{2}{3}$ inches thick will resist the pressure and not bend more than $\frac{1}{40}$ inch to the foot in length. The modulus of elasticity given is rather high, but was taken by Mr. Karr in his estimate, so I employ it in this case. This is the value of the best wrought iron.

Designs for Furniture.

From O. I. F., *Rock Island, Ill.*—In the May number of the paper, "A. W. S." of Camden, N. J., asks for furniture designs, I have a number which I drew during labor hours, and take pleasure in sending a blue print of a dressing cabinet, shown in front and end elevation in Figs. 1 and 2. A person can place a few shelves against the wall below the cab-



Designs for Furniture.—Fig. 1.—View of Dressing Cabinet.

inet, put a brass rod on the lower edge, and on this suspend a curtain which will reach to the floor. This combination gives a very convenient place for books, papers, &c. The sketches so clearly indicate the construction that further particulars would seem to be unnecessary.

Preventing Tools From Rusting.

From P. E., *New York.*—In view of the recipes which have recently been given in the columns of the paper for keeping tools from rusting, I take the liberty of offering a few suggestions touching this point. The mixture given below is one I found mentioned in a trade paper, and am therefore not able to speak from practical experience of its merits. The mixture is made of ½ ounce of camphor dissolved in 1 pound of melted lard, and after taking off the scum it is mixed with as much black lead as will give it an iron color.

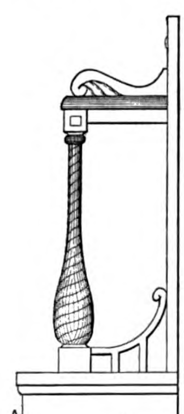


Fig. 2.—End View.

Clean the tools and smear them with this mixture. After the tools have remained so covered for 24 hours, rub them clean with a soft linen cloth. Still another plan is to take 1 quart of freshly slaked lime, ½ pound washing soda, ½ pound soft soap in a bucket and sufficient water to cover the articles. Put the tools in this mixture as soon as possible after they are used and let them remain until wanted for use, or they may be taken out the next morning and wiped thoroughly dry. A varnish which is adopted in some cases is made by mixing together 6 or 8 ounces of lard with 1 ounce of rosin and stirring until cool. When it is in a semifluid state it is ready for use. If it is too thick it can be reduced by the application of coal oil or benzine. If any of the readers desire a brown coating for preventing iron and steel from rusting they may dissolve 2 parts of crystallized iron chloride, 2 parts of antimony chloride and 1 part of tannin in 4 parts of water. This composition can be applied with a sponge or rag and then allowed to dry. If one coat is not sufficient a second may be applied, and even a third if necessary to produce the dark color wanted. When dry the

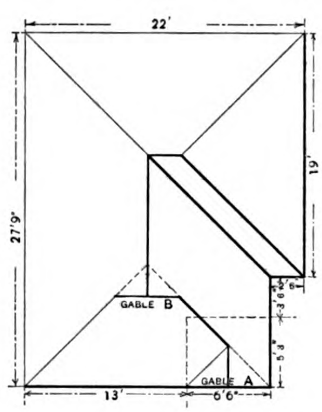


Diagram Showing Method of Framing Roof Suggested by "S. O. C."

surface may be washed with water, allowed to dry again and then polished with boiled linseed oil. In this connection it may be well to remark that the antimony chloride must be as nearly neutral as possible.

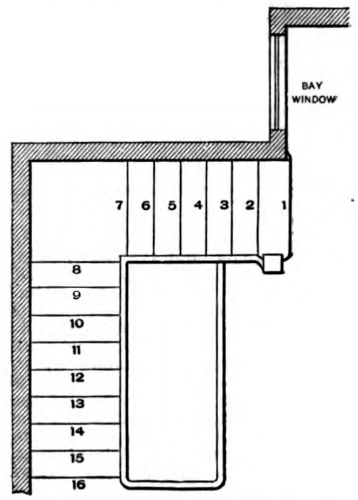
Bright steel articles kept together in a drawer may be prevented from rusting by placing with them a lump of freshly burnt lime. Articles in use can be placed in a box nearly filled with thoroughly slaked lime, and then, before using the tools, rub well with a woolen cloth.

Problem in Roof Construction.

From S. O. C., *Fredonia, N. Y.*—In reply to "J. C. B." of Hamilton, Ont., whose inquiry appears in the July issue of the paper, I send a roof plan which I think will meet his requirements. The correspondent can have two gables on the front if he so desires, one being located at A and the other at B. It strikes me he must have had something of a struggle to work out so complicated a roof as he shows after so simple a design.

Design for Open Stairway.

From G. H. B., *Scranton, Pa.*—The correspondent "D. A. B.," who inquires regarding open stairway, &c., will find the dimensions which I present below, using the arrangement that he employs, about what is required. The step should be 3 feet 3 inches long, the tread 9½ inches and the rise 7½ inches. The stairs should close under the landing, and the hight to the top of the handrail at the second floor



Design for an Open Stairway.—Fig. 1.—Plan View.

should be 2 feet 8½ inches. A newel post may be placed at the landing and another at the head of the stairs. A fancy window would make a very nice appearance over the landing. The rail returning at the head of the stairs would make an opening on the second floor of about 2 feet 8 inches. The sketches, Figs. 1 and 2, will make my meaning clear.

Contents of a Water Tank.

In giving the rule for finding the contents of a water tank in our issue for January the figures of the equation were "pied," as the printer would say, rendering them unintelligible. We therefore repeat the rule for the benefit of the correspondent who made the inquiry and for those of our readers who may be interested. The question was to find the contents of a tank the inside diameter of which was 23 feet 6 inches, and whose hight was 17 feet 4 inches. The rule for computing this into United States stand-

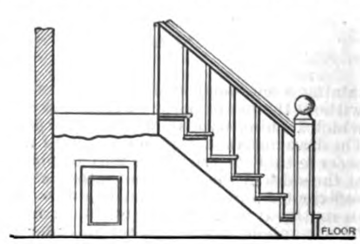


Fig. 2.—Side Elevation.

ard gallons is to multiply the area of the base by the hight of the tank, which gives the contents in cubic feet. Then reduce the cubic feet to cubic inches and divide by the number of cubic inches in a United States gallon. As the area of a circle, which may be considered the circumference of the tank, is obtained by multiplying the square of the radius by 3.1416, we have the following equation:

$$11.75^2 \times 3.1416 \times 17.833 \times 1728 \div 231 = 56234.52 \text{ gallons.}$$

Lengths of Tank Hoops.

From H. J. M., *Little Chute, Wis.*—I notice in a late issue of *Carpentry and Building* an inquiry from "E. G. B.," Ripley, N. Y., asking how to obtain the length of hoops for water tanks. I send sketches showing how to obtain the circumference of a circle of any given diameter, and as the correspondent knows the circumference of the tank or tub, I think he will have no trouble in ascertaining the correct length of any hoop he may desire. Take a pair of dividers and strike a circle to a scale of say ⅜ or ½-inch to the foot; then place the outside corner of a steel square to the center of the circle, as at A, Fig. 1. Referring now to the sketch, Fig. 2, scribe along the outside of the square from B to A, and from A to C, then draw a line from B to C, intersecting at the points where the lines previously drawn cut the circumference of the circle. Now obtain the center on the line B C, as at D. Take the square and place it with one edge at the center of the circle, cutting the line B C at D, and draw the line D E. Multiply the diameter of the circle by 3 and add the distance from D to E. For example, suppose the tank is 24 feet in diameter. The circumference would be 75 feet 6 inches: thus $3 \times 24 = 72$ plus the distance from D to E, which is 3 feet 6 inches, making 75 feet 6 inches. The sketches which I send so clearly show my method that further explanation would appear to be unnecessary.

From J. C. M., *Oregon, Ill.*—A correspondent desires to know how to obtain the length of the hoops for a round tank without the use of staging. The first thing to do is to make a draft of what is wanted to a certain scale and work from that. I send a sketch, Fig. 3, of a portion of a tank, which I think the correspondent will fully understand. He does not give the diameter of the tank at the top, but I will call it 22 feet. The width of the hoops are not given, so I will leave that to the correspondent. I would take my length from where the top of the hoop is supposed to come. It needs to be a little less than shown in the drawing for the bottom hoop, according to the width of it. Space off for the rest of the hoops on the line marked A. When the position of the hoops is known draw a line from side to side at right angles with this one from each point, and the result is the diameter of the tank at each hoop position. Now, multiplying each diameter by 3.1416 will give the length of each hoop. In order to do the work in this way the construction must be exact in every particular. Whether there would be any saving of time and labor, as compared with the erection of staging, depends, in a great measure, upon the accuracy of the work.

From W. H. L., *East Pepperell, Mass.*—I notice in a recent issue the inquiry of "E. B. G.," Ripley, N. Y., as to the manner of finding the lengths of hoops for a tank without employing a traveler wheel. My method is to first find the diameter of the tank and then multiply the diameter by $3\frac{1}{7}$. For example, suppose the tank is 18 feet in diameter, then this number multiplied by $3\frac{1}{7}$ equals 57 feet, which is the distance around the tank.

From H. M. N., *Sandwich, Ill.*—In reply to the inquiry of "E. B. G.," Ripley, N. Y., who desires to learn of a method for obtaining the length of hoops for tanks, I would suggest that he make a scale drawing showing the hight and diameter, then ascertain the diameter of the tank at the desired point, multiplying by 3.1416. For example, let 24 feet represent the diameter. Multiply this by 3.1416, which gives 72 feet 4.7808 inches, which, for the sake of convenience, may be called 4¾ inches.

From T. H., *Brainerd, Minn.*—I notice that "E. G. B.," of Ripley, N. Y., asks how to obtain the length of hoops for water tanks. I have as yet seen no answer to this question published, so I give my method of doing the work. Take the diameter of the tank and multiply it by 3.1416. If the diameter of the tank is 24 feet, for example, the equation is as follows: $24 \times 3.1416 = 75.3984$; or multiply the diameter by 22 and divide by 7. Thus: $24 \times 22 \div 7 = 75\frac{3}{7}$.

By the following method I produce a circle to any desired scale, say 1 inch to the foot, and this on 24 feet would be 24 inches. I place the steel square on the circle with the heel exactly at the center, as indicated in Fig. 2 of the sketches; then scribe closely to the square, cutting the circumference of the circle, as indicated by B C. Then draw the chord intersecting the points B C already referred to. The next step is to divide the segment equally, which is done by the line D E. Now three times the diameter plus the distance D E will give the required measurement or circumference.

From F. S. C., *New York City.*—Replying to "E. B. G.," Ripley, N. Y., I submit a method for obtaining the lengths of tank hoops. Referring to the sketch, Fig. 4, the correspondent should have given the bottom diameter A B, the top diameter C D and the length of the staves. The first step is to locate the position of each stave, and determine the exact distance from the bottom of the stave to the center of each hoop. Calculate the circumference of the bottom and top of the tank by multiplying the diameter by $3\frac{1}{7}$, or more exactly 3.14159. Divide the difference between bottom and top circumference by the length of the stave to obtain the rate of decrease in the circumference. Multiply the rate of decrease by each hoop distance separately in order to obtain the amount of decrease, which deducted from the bottom circumference gives the length of hoop required. For example: A B = 24 feet; C D = 22 feet; Staves = 16 feet, the first stave being 6 inches above the bottom.

Now, 24 feet x $3\frac{1}{7}$ = 75 feet $5\frac{1}{7}$ inches;
and 22 feet x $3\frac{1}{7}$ = 69 feet $1\frac{5}{7}$ inches.
Subtracting one from the other leaves... 6 feet, $3\frac{3}{7}$ inches; which divided by 16 = $4\frac{5}{7}$ inches. This is the rate of decrease in the circumference per foot in hight; $4\frac{5}{7} \div 6$ inches (½ foot) = $2\frac{5}{14}$ inches; 75 feet, $5\frac{1}{7}$ inches − $2\frac{5}{14}$ inches = 75 feet $2\frac{11}{14}$ inches, which is the length of the first hoop required.

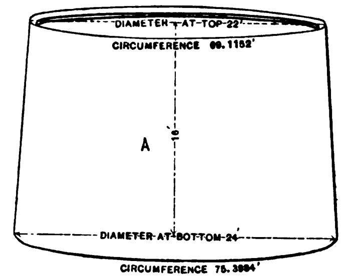


Fig. 3.—Portion of a Tank Showing Plan Pursued by "J. C. M."

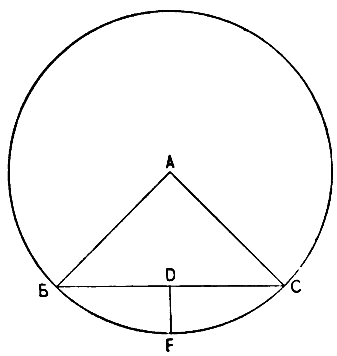


Fig. 1.—Showing "H. J. M.'s" Method.

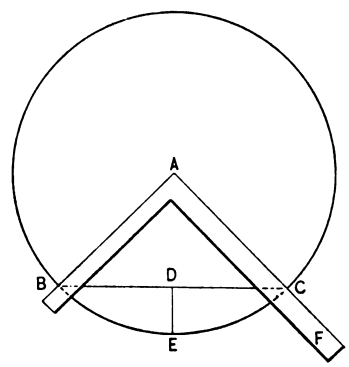


Fig. 2.—Manner of Using the Steel Square.

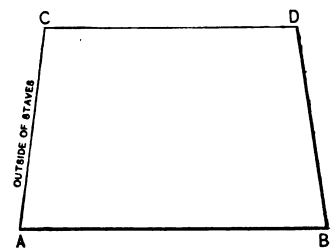


Fig. 4.—Sketch Submitted by "F. S. C."

Lengths of Tank Hoops.—Diagrams Illustrating Methods of Various Correspondents.

Pitch of Roofs.

From L. H., *New Haven, Conn.*—In *Carpentry and Building* for December I notice an item from "G. A. L.," South Hanson, Mass., asking for an explanation of the designation half pitch, quarter pitch, third pitch, &c., in roof framing. As a practical mechanic of 20 years' experience I would say that I have always termed 90° a square, and 45° half a square, or in roof framing one-half pitch. By the same token 60° would be two-thirds pitch, and so on, the fractional part of 90° designating the pitch. I believe the above to be the only true solution, but shall be glad to hear what others have to say on the subject.

Length of Jack Rafters.

From D. H. M., *Waterbury, Conn.*—Referring to the letters of "F. C. P.," Petoskey, Mich., and "C. W. B.," of South Denver, Col., in the December number of *Carpentry and Building*, I would say that both correspondents are correct, but they give no rule by which the lengths of the rafters are obtained. The result is that if "H. A. B.," of Moreno, Cal., or any one else desires to know the difference in the length of jack rafters for any other pitch, and more or less distance apart, it will be necessary for him to inquire again.

Blue Prints Direct from Original Drawings.

From JAMES F. HOBART.—In reply to "D. H." of Chicago, Ill., who asked in a recent issue how to take a blue print from an original drawing and thus save time and trouble of tracing, I would offer a method which, though somewhat expensive and troublesome to successfully carry out, will be found to give good results.

Before describing the method I wish to call attention to the fact that the idea of saving anything by working from the original drawing, instead of from a tracing, is entirely wrong. In order to make an acceptable print at all the drawing must be done in good black ink, either India ground from the cake, or in Higgin's liquid India ink, which is sufficiently good for all purposes. It is no more work to make the ink drawing on a piece of tracing cloth laid over the pencil drawing than it is to put the ink on the paper direct. It is for other reasons much better to use the tracing cloth for the ink and keep the original drawing in pencil, for, as almost every drawing has to be changed, the desired removals can easily be made on the pencil drawing with rubber and a hard pencil, whereas if the lines were inked in the task would be a tedious one.

In case of extensive changes, a new tracing can be made, and the changes incorporated therein. By this method the original drawing is not subject to wear or the risk of being soiled, and may be kept as choice as one pleases in fire-proof safes or vaults. Should, however, a man get hold of an inked-in drawing, or should he wish to copy some engraving, he can make the paper temporarily transparent by wetting it with benzine, naphtha or turpentine. This substance evaporates very quickly, but is prevented from escaping by the plate of glass which is laid over the drawing during the printing process. The great trouble with this and similar processes is that it takes too much time to print, owing to so much of the sunlight being stopped by the thick paper on which the drawing is made. Were it not for this, the problem would be a very simple one.

PRINTING SOLUTION.

The best way out of the difficulty is to use some liquid which is more sensitive than the ordinary blue printing solution, and which will therefore require less time for sufficient action of the sunlight. A solution which will print through ordinary paper in 30 minutes consists of 10 grains of bichromate of potash and 20 grains of sulphate of copper dissolved in 1 ounce of water. This mixture is spread as evenly as possible over the paper with a brush or a sponge, and then dried. The paper is then exposed under the drawing in the same manner that blue prints are made and shows a faint copy of the drawing in yellow. The print then must be washed over with a solution of 20 grains of nitrate of silver in 1 ounce of pure rain or distilled water. The print will then change to a brilliant red color, and is finished like an ordinary blue print by washing in pure water until all the chemicals have been removed. The above method does not give a blue print, but it may be changed to a greenish blue color by soaking in salt and water. In a few moments the picture will entirely disappear, but if the paper be held in the sunlight the picture or print will appear again of a greenish blue color.

When it is necessary that the time of exposure to sunlight must be reduced to a few seconds instead of minutes resource must be had to the salts of silver for the sensitizing solution, instead of the salts of iron or potash as used thus far. Silver paper, technically known as "bromide," cannot well be prepared by the printer, but should be purchased ready for use of a dealer in photographic materials. This paper is very sensitive to light, and a dark room lighted by red or orange colored light is an absolute necessity. There are three kinds of paper in the market, and the thin, smooth kind should be chosen, especially if it is to be used as a negative from which to again make a print of the ordinary kind.

The sensitive bromide paper is sold in three kinds, and marked respectively "A," "B" and "C." The kind marked "A" is the variety required for the work in hand, the other kinds being either on thick paper or with rough surface for finishing with crayon. The bromide paper will be found to be very expensive; a dozen sheets 8 x 10 inches cost over $1. But where one sheet only is used to a drawing the actual expense is not as great as appears at first sight. But using one sheet of bromide to a drawing it is assumed that ordinary blue prints will be made from the bromide print, which really is made to take the place of a tracing.

THE BROMIDE PROCESS.

There is one point in favor of the bromide process, and that is prints can be made by it in the night, although, of course, the printing process is much slower than when sunlight is used. The drawing is prepared for printing in the same manner as for an ordinary blue-print, only a dark room must be used for handling the paper between the original package and the printing frame, and again during the removal therefrom and the developing process which the exposed prints must be carried through. There is no outwardly visible change to indicate when the exposure has been completed, therefore it is well to experiment a bit with a small piece of paper placed under the drawing. Let the part of the drawing under which the test piece is placed be covered with a thick piece of dark cloth when exposed to the sun, then, watch in hand, slide back the cloth, exposing a strip of the bromide paper. After, say 5 seconds, slide the cloth back again, exposing another strip. Then another and another, until half a dozen have been exposed, the last for 5 seconds, the first for 30. Then, when the test strip is removed to the dark room and developed, the part which received the correct time of exposure will give a perfect print. The rest of the slip will be either too light or too dark. Once the proper time of exposure and kind of paper is determined, all drawings on that kind can be exposed with confidence, the only allowance necessary being for the strength of the light at the time the exposure is made.

THE DEVELOPER.

A developer is required for this kind of paper, which from the very beginning to the end must be handled with great care and cleanliness, both as regards the developer and the paper. The former is made up in three separate solutions, and mixed together only when used, as it does not keep well when mixed. A fourth solution called a "restrainer" is also used, but in such small quantity that a little of it goes a good ways. For making up the solutions two bottles will be required with a capacity of 32 ounces (2 quarts), one which will hold 8 ounces (½ pint), and one of almost any size, say 1 to 4 ounces.

Into the smaller bottle put one part bromide of potash and 9 parts of water. This makes a 10 per cent. solution, as it is called. Into the 8-ounce bottle make a citrate of ammonia solution by dissolving ½ ounce of citric acid in 2¼ ounces of rain water. Then add ammonia (stronger) till a slip of red litmus paper immersed in the solution will just lose its color, then add rain water to make up the whole volume to 4 ounces. Mark this bottle "C." Procure 4 ounces of oxalate of potash and dissolve in 15 ounces of clean rain water. Then add 30 grains of citric acid and 1 ounce of the "C" solution. Place in one of the large bottles, and mark "A." In the remaining bottle dissolve 2 ounces of sulphate of iron in 16 ounces of pure water, then add 8 drops of sulphuric acid, and mark the bottle "B."

When ready to develop arrange the dark room and its red or orange light, then remove the exposed pieces of paper from the tight box in which they were placed after being exposed, and put them in a tray or other flat dish containing clean, pure water. It will be better to begin with one piece of paper, then, after a little of the "know-how" is acquired, as many as seven or eight pieces can be handled at one time, both in the preliminary bath and in the developer. While the prints are soaking in the clean water (this is only to prevent staining by the developer, which might flow unevenly over the paper were it put on dry) mix the developer, which is formed of 1 ounce of the "B" solution, 2 ounces of "A," ½ ounce of water, and 3 to 6 drops of the potash solution.

Turn the water off the paper, being careful from the time the paper is first taken out of the original package till the picture is finished and dry to keep the fingers off the face side of it. They will leave a stain every time, and it is best to make use of paper large enough so that it can be handled by the margin, which can be cut off after the picture has been finished. If small paper, the exact required size, must be used, keep the fingers off, and handle by means of a glass rod or some other means. After the water is turned off pour on the developer with a flowing motion which will cause it to cover the entire surface of the paper with one sweep. Keep the tray in motion so the developer will not stand still, or it may spot the print. In a few seconds the lines will begin to appear. When they are dark enough, or rather when the ground between the lines is well blackened, pour off the developer, or if other pieces are to be developed, remove the print to another tray and flow with water; then place in a solution of hyposulphite of soda, 1 ounce to the quart of water. Allow the print to remain therein at least ten minutes, then soak in several changes of water for at least one hour, after which the print may be dried and pronounced finished.

If the thin bromide paper A is used for this purpose, a blue print may be made from the bromide on a bright day by an exposure of ten minutes, or even less. The blue print will possess the advantage of being a "blue positive," which presents a much finer effect than the ordinary blue print, as the lines are blue on a white ground. It would be well to experiment on a few small prints at first, say not more than 4 x 5 inches, and when the "trade is learned" on these begin with larger prints. It is a troublesome process at the best, and unless great care, cleanliness and exactness are observed at all times the whole business will surely be a miserable failure. When, however, success is obtained, the results will well repay for the time and trouble spent.

From J. P. A., *Newport News, Va.*—Replying to the inquiry of "D. H.," Chicago, Ill., I would say that drawings made on cardboard are rendered temporarily translucent by flooding the drawing paper with purified benzine of the best quality. This liquid soon evaporates without injuring the drawing. While in the translucent state the blue print may be taken.

Interior Finish.

From N. D. C., *Dixon, Ill.*—I notice a request for suggestions which will add to the usefulness of *Carpentry and Building*, and I can only say that I know of nothing except, perhaps, some new styles of interior finish for dwellings. I have just completed a house and have gotten up something entirely different from anything I have ever seen. Every one around here likes it very much. I have another house which I am building for myself and I would like to have something different. I want something without corner blocks. If any of the readers of *Carpentry and Building* can help me out I wish they would do so.

THE BUILDERS' GUIDE.*

By I. P. HICKS.

Roof Framing Without Drawings.

(Continued.)

IF THE RAFTERS are placed 16 inches from centers the run of the first jack will be 16 inches. Taking the same figures in the table as those to find the common rafter and multiplying by 16 inches, we have as follows:

$$1.16 \times 16 = 18.56$$

The decimal 0.56 may be called ½ inch. Thus the length of the first jack would be 18½ inches, the second twice that, the third three times, and so on till the required number is found. In complicated roofs the table may be used to great advantage in connection with the plan. When used in this way only one diagram showing the runs of the rafters is needed, as the lengths of all the rafters may be very quickly figured and set down on the plan and the required bevels may be taken from the table. Fig. 104 shows the plan of a roof 16 x 24 feet, with wing 12 x 8 feet. Roof to be 8 inches to the foot pitch and rafters placed 2 feet from centers. The lengths of rafters in this plan figured by the table are as follows:

For the common rafter, main part,

$1.20 \times 8 = 9.60$ feet. $0.60 \times 12 = 7.20$ inches.

Length of common rafter is therefore 9 feet 7 inches.

For the hip rafter, main part,

$1.56 \times 8 = 12.48$ feet. $0.48 \times 12 = 5.76$ inches.

The length of hip rafter is therefore 12 feet 5¾ inches.

For the first jack, main part,

$1.20 \times 2 = 2.40$ feet. $0.40 \times 12 = 4.80$ inches.

The length of first jack is 2 feet 4¾ inches; the length of the second jack is 4 feet 9½ inches, and the length of the third jack is 7 feet 2¼ inches.

For the hip rafter on the wing:

$1.56 \times 6 = 9.36$ feet. $0.36 \times 12 = 4.32$ inches.

The length of hip rafter is therefore 9 feet 4¼ inches.

Thus we have computed the different lengths of all the rafters necessary to figure in the plan, as all rafters of the same run will be the same length, these being readily seen in the plan. As the latter shows the lengths of the principal different rafters it is unnecessary to represent all those which are of the same length, although it is a good plan in actual practice. By this method one can see at a glance just where every rafter belongs, as well as noting instantly all of the same length. It is usually necessary to figure the lengths of only a few, as will be seen by referring to the plan. The valley rafter on the left side of the wing should be the same length as the main hip; then it will reach to the main ridge, the only place of support in a self-supporting roof. The jacks which cut from hip to valley on this side will each be the same length, which is 4 feet 9½ inches, the length of the second jack, as shown in the plan. The valley on the right side of the wing will be the same length as the hip on the end of the wing. The common rafter on the wing will be the same length as the third jack on the main part. It is easy to see that the length of any rafter on roofs of equal pitch may be readily found by this method.

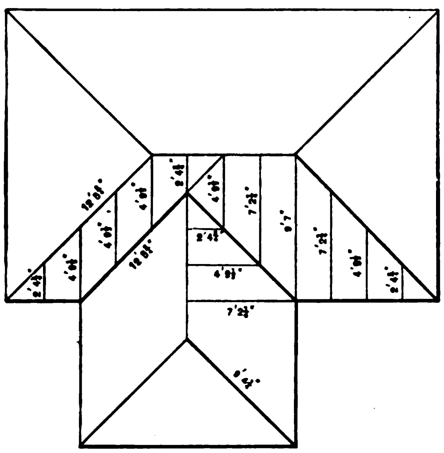


Fig. 104.—Showing how a Plan of a Roof can be used in Connection with Rafter Table.

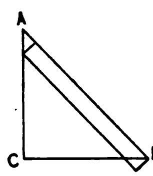


Fig. 108.—Diagram for Finding Width of Gable Planceer.

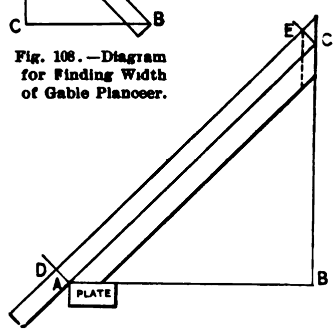


Fig. 105.—Diagram Showing Importance of Line Work in Laying out Rafters.

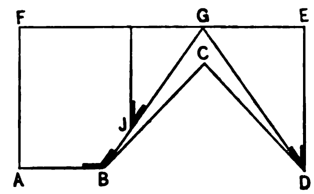


Fig. 107.—Elevation of Roof Having Three Gables.

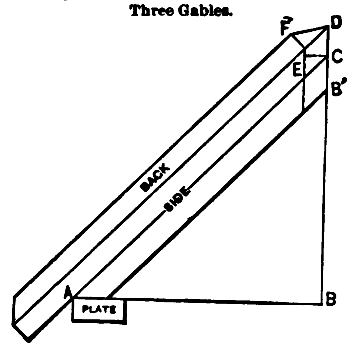


Fig. 106.—Diagram Showing Work Line in a Jack Rafter.

The Builders' Guide—The Art of Roof Framing.

LAYING OUT RAFTERS.

In laying out rafters, it is very important to set off the length on the work line, as deviations from this rule will often lead to mistakes. The lines indicating the run and rise of a rafter are easily traced, but the work line for the length of a rafter is sometimes lost to sight, particularly in cutting jack rafters. The framer must never lose the work line in cutting a rafter; if he does, he is like a mariner at sea without a compass or a ship without a rudder. The work line is an important part in obtaining the lengths of rafters, as will be shown.

In roofs which have a projection of the rafter for the cornice, the back of the rafter rises above the level of the plate whatever thickness may be allowed on the rafter for the support of the cornice. Referring to Fig. 105, A B represents the run of a common rafter, B C the rise, and A C the length and work line. Projections for the cornice must be added from the corner of the plate at A. Now suppose we square up from the corner of the plate at A to D, the back of the rafter, and measure the length to E the same as on the line A C. Now if we make the plumb cut at E, as shown by the dotted line, we find our rafter too short, as is plainly shown in the diagram. Thus it will be seen that the work line is an essential point in laying out rafters.

We will now trace the work line in a jack rafter from the plate to the top bevel, as this is the place many mechanics are at a loss as to the proper point to which to measure.

Referring to Fig. 106, we can easily trace the work ine and the lines forming the cut of the jack rafter. The work line is represented by A C, the plumb line or down bevel by D B′, and is always the same as the down bevel of the common rafter. To find the bevel across the back of the rafter draw another plumb line the thickness of the rafter from the cutting line and measured square from it, as C E. Square across the back of the rafter to F; connect F with D, and the lines to which to cut are F D B′. The proper point to which to measure on the line A C is from A to the scratch mark half way between the two plumb lines, this being the center of the rafter in thickness. In actual practice this little point need not be considered, and for convenience in measuring the length may be taken from A to C. So slight a deviation in the true length of a jack rafter does not cut any figure in framing or ever appear noticeable, from the fact that jack rafters can be moved forward or backward a little on the plate and hip and if they are all framed by the same rule will be of uniform distance apart.

We are instructed by some to deduct half the thickness of the hip or valley rafter in setting off the length of jacks. This is a point which may be disregarded, especially when hip and valley rafters are only 2 inches thick. It is evident that if we lay out a jack rafter setting off the length on the side which has the long corner of the bevel, it will be a little more than half the thickness of the rafter short when the bevel is cut.

Therefore, if jacks are cut according to the work line in Fig. 106, they will be near enough for all practical purposes in the usual order of building and without making any deduction in length for the thickness of hip and valley rafters. When roofs have a ridge pole deduct half its thickness from the length of the common rafter. Aside from this, it is seldom necessary to make any reduction in the lengths of rafters, as shown on the work lines in the plans.

RAISING RAFTERS.

It is as important to know how to properly put up the frame work of a roof as it is to know how to lay it off correctly. First see that the plates are straight and the angles true, then set up the deck or ridge on stanchions the proper hight; next put up all the common rafters which will not interfere with hips and valleys. Many mechanics advocate raising the hips and valleys first, but practical experience will prove that this is a great mistake. Put up first all the common rafters that can be raised conveniently. There is always a ready way to plumb a pair of common rafters, and if the common rafters are plumb they will square up the roof ready for hips and valleys, which, being on an angle with the plates, are often very bothersome to set to the required angle. They are also troublesome to plumb up, especially when they are the first rafters raised. By raising the common rafters first the deck or ridge is brought into the proper position for the hips and valleys and the trouble of squaring and plumbing the hips and valleys is much less. After raising the hips and valleys stay them straight and finally put in the jacks, being careful not to spring the hips and valleys when nailing the jacks.

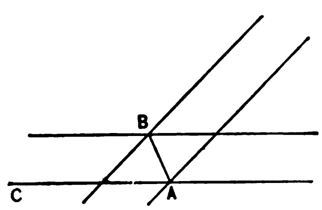


Fig. 109.—Method of Obtaining Miter Line for Fascia and Crown Molding.

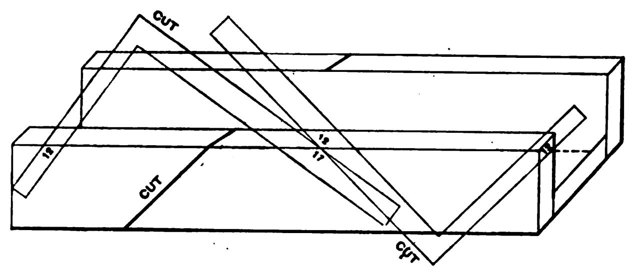


Fig 110.—Manner of Applying the Square to the Miter Box for Laying Off the Cuts.

The Builders' Guide.—Mitering Planceers, Moldings, &c.

Mitering Planceers, Moldings, &c.

As the art of making a common miter joint is universally understood by all mechanics, an explanation of the common miter is unnecessary. We will, therefore, explain the methods of making some of the most complicated and difficult miters which frequently come up in the actual practice of carpentry. Fig. 107 shows the elevation of a roof having three gables, and it is required to miter the level planceer A B with the gable planceer B C. To many this seems like a difficult problem; yet if one will consider the roof plan for a moment, he will see that the proper figures on the square to make the required miter may be taken directly from the roof plan, which gives the bevels for cutting the rafters.

To cut the bevel on the planceer A B use the same figures on the square that make the bevel across the top of jacks, but reverse the cut. Thus, if 17 on blade and 12 on tongue cuts the jack rafters, the blade gives the cut of the jack and the tongue the miter line for the planceer. The reason for reversing the cut is because the planceer A B runs in a direction exactly opposite the rafters.

The same figures will also miter the sheeting in the valley. Now, the planceer B C which goes up the gable runs parallel with the rafters, hence the same figures which give the cut for the jacks will give the cut for this, which, in the present case, are 17 on the blade and 12 on the tongue, the blade giving the cut. Or, referring to Fig. 107, B G and D G show the position and length of valley rafters, and the bevel at B is the bevel for cutting the planceer A B, while that at J, which is the bevel for jack rafter, is the bevel for cutting the planceer B C, which goes up the gable. The junction of the two gable planceers C D and E D at D forms another kind of miter joint. In this the planceer on both gables cuts the same, and the cut is the same as the bevel which cuts the jacks, shown at D. This bevel is also the same as the one shown at J.

The planceers A B and B C must necessarily be of different widths, the gable planceer being the narrower. To find the width the gable planceer must be to match the level planceer, draw the width of level planceer A B, representing the pitch of roof, as shown in Fig. 108. Square down from A to C, the rise of planceer, and B C will be the width of gable planceer corresponding to A B. To obtain the miter line for mitering the fascia and crown molding at B, draw two parallel level lines and two parallel pitch lines of the common rafter, keeping both sets of lines the same distance apart, as shown in Fig. 109. Connect the opposite angles where the lines cross each other, as shown by A B, and this will give the required miter. The figures for this may be found by placing the blade of the square on the line A C and tongue on A B. The tongue gives the cut. If the fascia stands square with the rafters on the line A B, Fig. 107, then a square miter will make the joint which connects the level fascia A B with the gable fascia A F. But now suppose the fascia on line A B stands plumb, as it frequently does, and should on a roof of this kind, then a different cut is required. In this case cut the level fascia on a square miter, but for the gable fascia cut across the edge of the board on the same bevel as for a jack, and cut the plumb line the same as that of the common rafter.

Having shown how to properly miter the planceer and fascia, we will next take the crown molding. The miter for moldings cannot be accurately laid off from the square because it cannot be properly applied to them; hence the best way to miter moldings is by means of the miter box. As almost every one knows how to make the common miter box I will not go into the details of manufacturing it, but explain the methods of making cuts in it for the purpose of mitering moldings for some of the difficult joints which frequently come up in actual practice.

To miter the molding in the valley at D, Fig. 107, which is the junction of two gables, take for the cut down the sides of the box the plumb cut of the common rafter, which in this case I will suppose to be one-half pitch, which is in accordance with the diagrams. For the cut across the top of box use the same bevel as for cutting the jacks, which is shown at J. Fig. 110 shows the manner of applying the square to the box for laying off the cuts. It will be necessary to put two cuts in the box, right and left, as shown. In connection with this kind of a box it is more convenient to make it with only one side, as shown in Fig. 111. The side, however, should be made of a thick piece of lumber, so that it will form a good guide for the saw. As these miter boxes are used only for a special purpose no one wants to spend very much time making them, therefore the box with one side is recommended to answer the purpose, and it is the easiest to make. The secret of a good miter box lies in having the sides stand square with the bottom and of the same hight from end to end. If these two points are carefully observed and the cuts made true, good results will follow, no matter how rough the box may be in appearance.

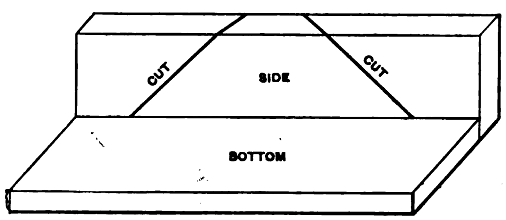


Fig. 111.—Miter Box with One Side.

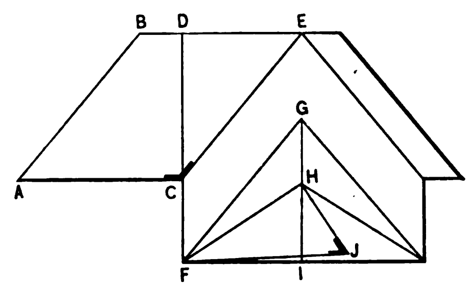


Fig. 112.—Hip and Valley Roof of One-third Pitch.

The Builders' Guide.—Mitering Planceers, Moldings, Etc.

To miter the level molding at A, in Fig. 107, with the gable molding A F, cut the level molding A B in a common miter box, using the square miter, and cut the gable molding A F in the box as described in connection with Fig. 110. By this method a fair job can be done, but the moldings will not member exactly. To make a perfect joint the gable molding requires a slightly different profile.

Fig. 112 shows the elevation plan of a hip and valley roof drawn to the scale of a third pitch, in which is shown another form of miter joints. A B is the length and position of left end hip rafter, C D the length of common rafter, C E the length and position of left valley rafter, F G the length and position of left hip on front end, and F H the length of common rafter. A B, C E and F G show the miter lines of hips and valleys. There is nothing peculiar or difficult about the joints at A, C and E except the mitering of the fascia and crown molding on a square cornice, which means that the ends of the rafters are cut square and that the fascia and crown molding stand square with the roof instead of plumb. To miter the sheeting or the planceer on the hips or in the valley, take the length of common rafter C D on the blade and the run of common rafter D E on the tongue. The figures for a third pitch are 14½ inches on blade and 12 inches on tongue, the tongue giving the cut, or the bevel may be taken at C, as shown in the diagram. There is also a bevel across the edge of the board, which may be found in the following manner: Take the length of common rafter F H on the blade and the rise of common rafter I H on the tongue. The figures for a third pitch are 14½ inches on blade and 8 inches on tongue, the tongue giving the cut, or the bevel may be found as follows: Square down on the line F H the rise of common rafter H J and connect J F. The bevel at J will be the bevel for the edge of the board.

There is practically no difference between a hip and valley cut. The bevel on the edge of board in the valley and on the hip is the same, it being only necessary to reverse the bevel, as the long point of bevel on hip will be on the face side of board and in the valley it will be on the back side.

To miter the fascia at A, C or F when it stands square with the roof proceed as follows: For the bevel across the edge of board take the length of the common rafter on the blade and the run on the tongue, when the tongue will give the cut. Figures on the square are the same as for cutting the face side of sheeting or planceer, or the bevel may be taken, as shown at C. For the cut down the side of fascia take the length of the common rafter on the blade and the rise of common rafter on tongue, and the tongue will give the cut, or take the bevel shown at J.

To make the cut on a miter box for mitering the molding on the hips and valleys take the bevel at C for the cut across the top of box, which is 14½ inches on blade and 12 inches on tongue. The tongue gives the cut. For the cut down the side of box take the bevel at J, which is 14½ inches on the blade and 8 inches on the tongue. The tongue gives the cut. The facts when condensed are as follows:

Length of common rafter, 14½ inches on blade, and run of common rafter, 12 inches on tongue, gives cut for face of planceer or sheeting. The tongue gives the cut.

Length of common rafter, 14½ inches on blade, and rise of common rafter, 8 inches on tongue, gives cut for edge of planceer or sheeting. The tongue gives the cut.

Length of common rafter, 14½ inches on blade, and run of common rafter, 12 inches on tongue, gives cut for edge of fascia. The tongue gives the cut.

Length of common rafter, 14½ inches on blade, and rise of common rafter, 8 inches on tongue, gives cut for side of fascia. The tongue gives the cut.

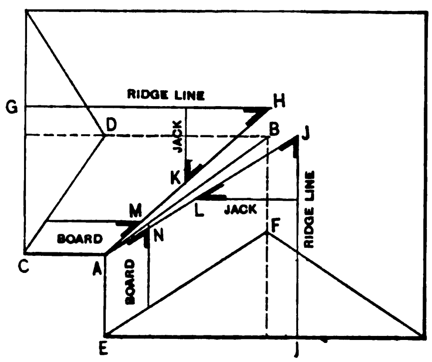


Fig. 113.—Plan of Valley in a Roof of Two Pitches.

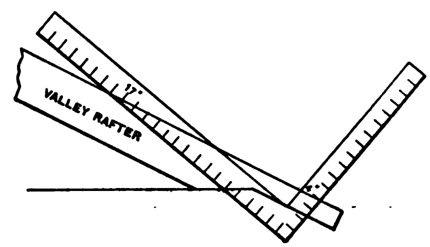


Fig. 114.—Manner of Applying the Steel Square to Obtain Bevel for Hip or Valley Rafter.

The Builders' Guide.—Mitering Planceers, Moldings, Etc.

MITERING ROOF BOARDS AND PLANCEERS.

To miter planceers and roof boards in valleys of two pitches it is only necessary to take the figures on the square which cut the bevels across the top of the jacks on the two pitches and reverse the cut, as the roof boards and planceers run in an opposite direction to the jacks.

The bevels may be taken from any plan showing the two pitches and cuts of jacks. Fig. 113 represents the plan of a valley in a roof of two pitches. The dotted lines D B and B F are the lines plumb under the ridge. A B shows the run of the valley C D the length of common rafter on left gable, and E F the length of common rafter on front gable. Transfer the length of common rafter C D to C G and draw the ridge line G H, which extends to the center of front gable. Transfer the length of common rafter E F to E I and draw the ridge line I J, which extends to the center of left gable. Connect A H and A J, which shows the position of valley for finding the bevels of the jacks, roof boards and planceers on both sides of the hip. The bevels at K and L are the jack rafter bevels. The bevels at M and N are the bevels for mitering the roof boards or planceers. The bevels at H and J are also the same as M and N, and show very plainly that they are the reverse of the jack rafter bevels. It is only necessary to have the planceers of a different width in order to have them member exactly, as will be seen by the boards in the diagram. If this plan is followed there will be no twisting of planceers in cornicing when joining roofs of different pitches.

BEVEL FOR HIP OR VALLEY.

A question in roof framing which sometimes comes up in actual practice is how to cut the bevel on the lower end of a hip or valley corresponding to a square cut of the common rafter. This is only used in cutting the ends of hip and valley rafters preparatory to nailing on the fascia and crown molding. Every carpenter knows that a square cut on a hip or valley will not correspond with a square cut on the common rafter.

This cut may be obtained in the following manner: Take 17 inches on the blade of a square and one-half the rise of the common rafter to a foot run on the tongue, and the tongue gives the cut.

For example, suppose I have a roof of one-third pitch. This being a rise of 8 inches to the foot run, 8 and 12 will make the common rafter cuts and 17 and 4 the cut on the end of the hip or valley corresponding to a square cut of the common rafter. Fig. 114 shows the manner of applying the square for the purpose of obtaining the bevel on the lower end of a hip or valley rafter.

WARMING AND VENTILATING DWELLINGS.

AN EXCEEDINGLY interesting experiment in the warming and ventilating of a dwelling under somewhat adverse conditions has lately been made by M. Somesco, in connection with a house erected for himself at Creil, Oise, France. The account of the dwelling and the methods employed which follows is taken from the report of the London *Lancet* Sanitary Commission, which visited the house and declares it to be undoubtedly "the best practical application of the principle of warm walls and cold air." In the description we have substituted the English for the French system of measurement. The commission visited M. Somesco on a day when a strong wind was blowing from the northeast and when the atmosphere was at a low temperature.

"It is important to note," says the report, "that M. Somesco's house is built on marsh land. On both sides of the house there is a river, and but for the construction of embankments flood would occur in this spot. It was necessary to dig six tween the outer and inner wall. The arrows C C C show the hot-air space between the walls. The door from the garden into the basement is represented by C D, the back door by B D, the front door by F D, and the door from the entrance hall to the drawing room by D R D. The lighted furnace in the garden outside the house is indicated by F. The arrows from the furnace show how the smoke and hot air pass horizontally round the house till they reach the point C H, where a chimney carries the smoke vertically up to the roof. The position of the windows is shown by W W W W, while P P P P are openings through which brushes may be passed from the garden into the smoke flue to clean away the soot.

HEATING ARRANGEMENT.

"Outside, at the back of the house, there is an ordinary coal furnace. The smoke and heat from this furnace pass into a chamber built in the cellar of the wind is very violent a coarse canvas may be hung in front of these air inlets on the windward side of the house. There are ten such inlets, the fresh air being delivered, as will be seen in the sectional drawing, Fig. 1, below the hot-air flue. The pipe or flue rests on iron bars and on a socket that permits the easy dilatation and contraction of the iron with which it is made. The drawing, Fig. 2, shows how the air warmed in this passage ascends into the space between the two walls of the house. There are a number of these openings into the hollow of the wall all round the house."

Referring to Fig. 2, G L represents the ground level of the garden; C L the level of the basement; G R F the parlor or first floor of the house. The inlet of air, as indicated by the arrows, is below the smoke flue, which is suspended in the center of the passage so as to warm the air in this passage. In Fig. 3 of the engravings is shown the outlet of the air above the smoke flue. The air warmed

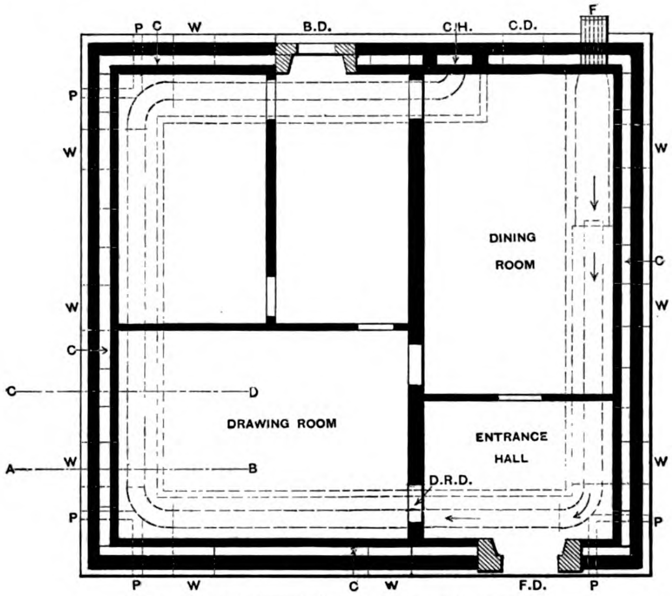


Fig. 1.—Plan of Ground Floor of House of M. Somesco.

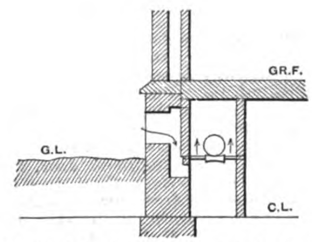


Fig. 2.—Section Through Wall at A B of Fig. 1.

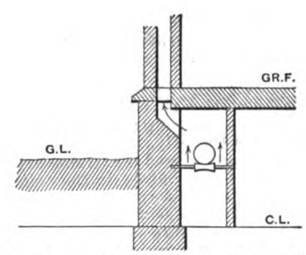


Fig. 3.—Section Through Wall at C D of Fig. 1

Warming and Ventilating Dwellings.

feet below the level of the cellar floor to find a foundation. As much masonry had to be placed under the house to form a foundation as would have sufficed to build it. The garden, in the midst of which the house stands, was also artificial. Nor is there any shelter from the winds. The house stands alone in the midst of what is now a garden, but which used to be a dismal swamp. The system of warming and of ventilation has therefore been tested under the most trying circumstances. In shape M. Somesco's house is square, measuring 39.37 feet. It has cellars, two floors, and above these under the roof a large sort of hall which serves as a billiard room. The hollowed walls are 21.65 inches thick. The external wall is 8.66 inches and the inner wall 4.33 inches, so that there is an intervening space between the walls of 7.87 inches to 8.66 inches. These walls are made with porous bricks, but in the basement the walls are massive. The house is like one box inside another box, with a space of 4 to 5 inches between the two boxes."

In Fig. 1, which represents a plan view of the ground floor of the house, the dotted lines indicate a warming flue passing down the center of the hot-air passage in the basement of the house. The plan gives the walls underneath the windows and indicates the space for hot air be- house, measuring about 6 feet in length and not quite 2 feet square. From this heat chamber and going all round the outer walls of the cellar there is an inclosed passage. Suspended in the center of this passage, and also going the whole way round the house, is a metallic flue of more than a foot in diameter (13.78 inches internal and 14.57 inches external diameter). This serves as a chimney and draws off the smoke and the heat from the furnace and heat chamber, traveling horizontally round the four sides of the house, and then when it is nearly back to the furnace the flue opens into a chimney; the smoke and what heat remains go up vertically to the roof. In other words, the basement of the house is surrounded by a narrow closed passage, in the center of which is suspended the flue or chimney from the furnace, and this flue serves to warm the air in this passage. To keep the cellar cool and to retain the heat that goes round the cellar, the wall of this passage is covered over with 'sluck wool' or 'silicate cotton,' as it is sometimes called, which is considered a better non-conductor than asbestos. All round the house communicating with this hot-air passage there are inlets of fresh air from the garden which measure 31.5 inches by 19.68 inches and are protected by metallic gauze or webbing. If the by contact with this flue passes upward in the intervening space between the inner and outer walls of the house so as to warm the entire substance of the walls.

TEMPERATURE.

"The temperature in the hot-air passage varies from 114° to 122° F. This suffices to bring up the temperature of the inner wall on the ground floor from 86° to 92° F. The temperature of the inner wall decreases by about 1° C. every 3.3 feet of hight. Thus, if the wall on the ground-floor level is at 35°, it will be 32° C. on the level of the first floor, which is 9.84 feet higher up. The hot air that travels up the hollow of the walls comes out in the large attic under the roof of the house. If this air is warmed to from 114° to 122° F. when it enters the space between the walls it will have fallen to about 104° F. as it emerges from the wall into the attic. From this attic the hot air filters into the open through the porosity of the roof and by the various openings, chinks, &c.

POROSITY OF WALLS.

"Much of the success of this experiment depends upon the porosity of the walls. Every precaution is taken not to interfere with this porosity. There is no plaster work put on the walls, and there is no paint or paper. A light wooden frame is nailed on to the walls, and from this tapestry—that is, a tissue, as far as possible a woolen tissue—is suspended and replaces paper. Some hangings of this description can be obtained that are hardly any dearer than good paper, and though for artistic purposes expensive woolens are employed, the expense in the long run is not great, for the cloth lasts an indefinite time, and, unlike paper, can be taken down and cleaned. It also contributes very materially to maintain the warmth of the walls. M. Somesco has now lived in this house for some years. Without the aid of fires, when the windows were shut, he has never known the temperature of the rooms fall below 54° F., and this during the hardest frost. If the windows were thrown wide open the temperature indoors would not fall below 39° F. in spite of the frost. The air coming through the windows is absolutely cold and frosty, but the theromometer rises under the influence of the heat radiated from the walls. There is a fire place in each room, though fires are very rarely lighted. When, however, it is very cold weather and the windows have been open for a long time, then it is expedient to light a fire for an hour or so. As there is no loss of heat through the coldness of the walls, the room is warmed in a very short time. On the day of our visit the drawing room windows had been open for two hours, and as the weather was very cold a fire was lighted, but soon the fire was let out, the room was too warm, the thermometer marking 78° F. We left the drawing room for some time. We opened the front door leading to the garden, and the drawing room door, which was from 4 to 5 feet from the front door. Thus the fresh air from the garden blew freely into the drawing room. Yet, and though there was now no fire, the radiation of heat from the walls was such that the thermometer marked 66° F. In the garden the temperature was below 50° F., and a strong northeasterly gale was blowing. Thus we were, while indoors, breathing cold, pure air from the garden.

ABSENCE OF DAMPNESS.

"We have seen that M. Somesco's house was built on a swamp; and yet the principal, if not the only, inconvenience from which he has suffered is extreme dryness. We visited other houses in the neighborhood and found the walls stained by the damp to a hight of 6 or 7 feet; some of M. Somesco's furniture and other objects were spoiled because the wood had split in consequence of its extreme dryness. To counteract this inconvenience, M. Somesco has been obliged to place a large number of plants in different parts of the house, a measure which, however, adds considerably to the charm and beauty of the place.

"The heat and dryness thus secured cost M. Somesco 10 tons of English household coals per annum. His house has 14 rooms, and ten persons could live comfortably in it. The cost would then be 1 ton of coal per head per annum. But then it must be noticed that the furnace and the system of warming the passage round the basement of the house are somewhat roughly contrived, and that more economical methods of obtaining the necessary heat could be easily devised. Then it must also be noted that it is not a question of warming one room or a portion of a room, but that the entire house is equally warmed, and warmed to such an extent that doors and windows are constantly opened, and this in spite of the exceptionally cold and damp nature of the surrounding soil and the exposed position the house occupies.

THE IDEAL DWELLING.

"Over and above all these considerations M. Somesco maintains he has realized the ideal that a dwelling should be like our clothes, only not portable, but permeable. It should be warm, because it should be made of materials that are bad conductors of heat. Indoors we should possess means of counteracting the chilling effect of the outer air. We ought to live indoors as we live out of doors, and we should consider our house merely as if it were an extra greatcoat. The coat, if porous, will be warm and healthy. One of the reasons, he says, why we are apt to feel uncomfortable when it rains is that the rain blocks up the porosity of the walls, and that, too, on the windward side. As for microbes, M. Somesco proudly pointed to the artistic drapery which covered the bare bricks of his porous walls. 'These are,' he exclaimed, 'my microbe traps. If I have any reason to believe that injurious microbes have been introduced into my house, I know pretty well where to find them. It would take but little time or trouble to unhook all this drapery, to put it into the disinfecting stove, and there superheated steam under pressure, without injuring the cloth, would assuredly kill the microbes. Even without these artificial methods of purification, if the walls were porous, oxygen would go wherever the microbe went, and Nature would effect its own cure.' How far a porous wall can filter and purify air, as earth filters and purifies sewage, is a matter which has not yet been investigated. He is of opinion that if we leave our walls alone, and do not block them up with paint and paper, we have for ordinary house walls in ordinary weather two cubic feet of air going through every square foot of wall in the course of an hour, and this is probably enough to insure the sufficient oxidation, if it goes on at all, of the materials of which the wall is made. Further, the porosity of the walls must also materially assist in the ventilation of the room which they surround. It was M. Somesco's delight to think that even when the doors and windows of his house were shut the pure air of his garden was blown upon him through the porous walls.

THE PRINCIPLES INVOLVED.

"M. Somesco's house can, of course, only be taken as an experiment. The principles of which it is a practical application have not yet been adopted by the public. Already a private house is in the course of construction at Beauvais built on the same principles, and they are also to be applied to the military hospital at Madrid. To sum up these new theories and methods, the teachings of M. Trélat, the practical experiments of M. Somesco, suggest that the natural porosity of our walls, especially the outer walls, should not be destroyed. These walls should be decorated, not with paper and paint, but with porous, non-conducting substances, such as woolen drapery. The outer walls on the side nearest to the inner surface should be hollowed throughout, thus constituting a double wall, with a space of about 4 inches between the two walls. A heating contrivance, of whatever description may be found most expedient or economical, should be placed in the basement of the house. A warm-air chamber or shaft traveling round the base of the outer walls should supply to the hollow in the walls air taken from the outside and warmed at the point of admission into the wall to a temperature of from 100° to 120° F. This should maintain the temperature of the inner wall at from 80° to 90° F. Then, he considers, the walls will radiate sufficient heat through the rooms to enable the inhabitants to constantly open the doors and windows, and to breathe cold, fresh, outer air without inconvenience. As a rule, fires will be unnecessary, dampness will be completely banished from the house, and to maintain some moisture in the air it would, he thinks, be expedient to decorate the house with numerous evergreen plants. The inhabitants should then be able to benefit by unlimited ventilation, and could breathe pure, cold and fresh air coming upon them directly from the outside."

THE VANDAL WOODCUTTERS in the California sequoia forests used to cut trees at a distance of from 12 to 20 feet above the ground in order to avoid the gnarled and knotted base. But it has lately been found that these stumps are as valuable as the straight wood. The gnarls present most beautiful figurings, and the wood is sawn into thin sheets and used for interior decorations. Now these stumps are being dug out, and soon not even a vestige will remain to show what was the appearance of some of the most majestic natural monuments of this wonderful continent.

A Veneer Warehouse.

A mahogany veneer warehouse which is probably among the largest and best equipped of its character, and which possesses many features of interest to the investigating builder, has just been completed in this city. It is a seven-story structure with massive brick walls and covers an area 40 x 100 feet. The first floor is arranged as a store and delivery room with a wagon way in front, through which trucks can back up to a platform adjoining the freight elevator. The latter runs to the roof, where in bright weather new veneers are exposed to be sun dried. On the second floor are the offices, and from the standpoint of the cabinetmaker are among the finest in the city. We understand it is the purposes of the proprietors of the warehouse to illustrate in the work done upon them the special attractions of every variety of mahogany. The main office, inclosed with a handsome grill, is finished in Cuban mahogany in the finest style of cabinet work. A reception room adjoining the office is finished in selected specimens of Frontera mahogany, while San Jago and Mexican mahogany is used in adjoining private offices, toilet rooms, lavatories, wardrobe, lockers, &c. All the cabinet finish is of special design to show the decorative possibilities of the wood. The floors are comb-grained, bound with borders of oak and mahogany. From the second floor there are entrances to the veneer mill adjoining. On the fourth floor is a special drying room for Spanish cedar cigar box material, while the remaining floors are devoted to the storage and display of veneer stuff. The new building has been put up by William E. Uptegrove & Brother of 457 East Tenth street, in order to provide facilities for their rapidly growing business.

A NEW CHURCH has just been dedicated at Stoneham, Mass., which was erected at a cost of something like $25,000. It is constructed of brick laid with dark brown mortar and trimmed with sandstone. The main roof is slated and the projecting gables are protected by stone shingles. The roof is surmounted by an ornamental ventilating cupola, and at the top of the tower is an open belfry in which is suspended a bell weighing 1500 pounds. The windows are fashioned from cathedral and opalescent glass, and are so situated that there are no dark corners in the finished interior of the structure. The audience room is 54 feet square and has a seating capacity for 500 people. The pulpit platform occupies one corner, while in the rear and above is a choir gallery and organ loft. The baptistery is in front of the pulpit and fitted with a rolling cover which, when in position, serves as solid floor to the platform. The ceiling consists of a series of groined arches suspended from the roof lined with sheet steel stamped in relief and decorated. The hips and angles are of wood. The Sunday school room is at the left of the pulpit and may be separated from the auditorium by high and wide sliding doors. There are also two attractively furnished parlors supplied with convenient alcoves and sliding doors. There are also three classrooms in addition to the main school room and library room. The edifice was erected from drawings furnished by L. B. Valk & Son of Brooklyn, N. Y.

The Builders' Exchange

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Programme Seventh Annual Convention at St. Louis, Mo.

Place of Meeting: Odd Fellows' Hall, (Ninth and Olive streets). General Headquarters: Lindell Hotel (Washington Avenue between Sixth and Seventh streets).

SESSIONS.

The opening session will be called to order at 10 o'clock a.m., Tuesday, February 14; the following sessions will be as voted by the convention.

RESOLUTIONS.

Resolutions must be presented in writing and in duplicate, both copies being signed by the parties presenting the same.

VOTING.

All votes, unless otherwise ordered, must be announced by the chairman of delegations.

TUESDAY, FEBRUARY 14, 1893.

Opening exercises.
Annual address by the president.
Appointment of Committee on Credentials.
Presentation of credentials.

AFTERNOON SESSION.

Report of Committee on Credentials.
Roll call.
Appointment of committee to report time and place of next convention, and to nominate officers for 1893.
Annual report of secretary.
Annual report of treasurer.
Reports of standing committees:
Uniform Contract.
Legislation.
Statistics.
Building Law.
Lien Law.

WEDNESDAY, FEBRUARY 15, 1893.

Roll call.
Offering of resolutions.
Reports from filial bodies.

AFTERNOON SESSION.

Reports from filial bodies (continued).
Discussion of questions suggested by reports from filial bodies.

THURSDAY, FEBRUARY 16, 1893.

Roll call.
Action on proposed amendments to constitution.
Report of committee on resolutions.

AFTERNOON SESSION.

Report of committee on time and place of next convention, and nomination of officers.
Election of officers.
Naming and election of directors for 1893.
Unfinished business.
Miscellaneous.
Adjournment.

BADGES.

Delegates should wear distinguishing badges, and the suggestion is made that they be as simple as possible; for instance, a button with name of city thereon.

TRANSPORTATION.

All efforts by the National Secretary to secure the concession of a reduced rate of fare from the Western Passenger Association in favor of delegates to the coming convention who will start at four points within the control of that association have proved fruitless. It will be necessary for delegates from San Francisco, Omaha, Denver, Pueblo, Butte City, Kansas City, St. Joseph, St. Paul, Minneapolis and Milwaukee to make such arrangement as may be possible with the local railroad authorities in these various cities. Delegates from St. Paul, Minneapolis and Milwaukee can obtain the usual reduction by entering the territory controlled by the Central Traffic Association and then buying fresh tickets and securing certificates therefor which will entitle the holder to a return fare to the point of purchase at one-third of the regular rate. The boundary between the territories controlled by the Western Passenger Association and the Central Traffic Association lies from a point just north of Chicago, west to the Illinois River, thence west to Burlington, Iowa, thence south following the Mississippi River. Points north and west of this line are in the Western Association and cities south and east are in the Central Traffic Association territory. It is anticipated that the Eastern Railroad Associations will follow the example of the Central Traffic Association, which has granted a rate of a fare and one-third for the round trip on the certificate plan.

A circular giving full particulars in regard to transportation will be issued as soon as action is taken by all the various traffic associations.

CERTIFICATES.

Certificates entitling delegates to reduced return fare should be presented to the secretary as soon as possible for his signature, and to be *viséd* by the representative of the railroad companies.

TO SECRETARIES.

Secretaries of filial bodies should pay particular attention to the request which appeared in this column last month that a full report be prepared for presentation at the convention. It is proposed to make these reports and the discussion of suggestions which they may contain a prominent feature of the meeting.

Transportation.

CONVENTION CIRCULAR NO. 2.

A concession of one and one-third fare for the round trip on the "certificate plan" has been granted to delegates attending the seventh convention by the following passenger associations: Central Traffic Association, Trunk Line Association, New York and Boston lines, New England Passenger Agents' Association, and the Chicago & Alton Railroad, subject to the following conditions: Each person attending the convention must purchase a first-class ticket at the regular rate from point of departure to St. Louis, obtaining therewith a certificate of such purchase from the local ticket agent. This certificate, upon being signed by the secretary and indorsed by the representative of the Passenger Associations at the convention, will entitle the holder to a return fare over the same route by which he came at one-third of the regular rate.

Tickets for return journey will be furnished only on certificates procured not more than three days before the meeting assembles nor later than three days after the commencement of the meeting, and will be available for continuous passage only, no stop-over privileges being allowed on tickets sold at less than full fares. Certificates will not be honored unless presented within three days after the date of the adjournment of the convention. It is understood that Sunday will not be reckoned as a day. In no case will the reduced rate for return ticket be granted without a certificate properly signed and indorsed as above, and no refund of fare can be obtained because of failure to secure certificate at point of departure.

Delegates from all filial bodies of the National Association are entitled to the reduction *except* those in cities located north of Chicago and west of the Mississippi River. The Western Passenger Association, which controls the territory mentioned (Wisconsin and Minnesota and States west of the Mississippi River) having declined to concede the reduction, delegates from this section should at once make such arrangement with their local railroad officials as may be possible.

Delegates are cautioned that certificates by which reduced return fare is obtained must be used only by original purchaser, as the National Association will be obliged to refund an amount equal to full return fare for every ticket found in the hands of any person other than the one entitled thereto. Should the National Association be compelled to refund any sums of money for tickets improperly used, the local exchange whose delegate has broken these conditions will be expected to reimburse the National Association. Issued by order of the

EXECUTIVE COMMITTEE.

W. H. Sayward, Secretary.

N.B.—Delegates in securing tickets and certificates are requested to present themselves at the local ticket office not less than 30 minutes prior to the departure of their trains.

COMPOSITION OF ANCIENT MORTAR.

THE chemical composition of the mortar employed in the construction of our old castles, abbeys and churches, says John Hughes in the *Builder*, has hitherto not received that attention which the subject certainly deserves, and which, moreover, in these days of scientific investigation it might reasonably have expected.

To the antiquarian and the admirer of old buildings it must be interesting to know how far the permanence of a structure is due to the massive character of its proportions and how far to the superior quality of the mortar employed, while to the architect and the builder the subject must be of the greatest importance and of practical use.

In this communication the writer desires to add the results of eight complete analyses of average specimens of the mortar authentically obtained from the buildings named in the table at the close of this article; also some illustrations showing the character and appearance of the sand employed in the mortar. The original photos were taken from microscopic slides by Albert Ashe, and in each case the sand was separated from the mortar by the removal of the lime and other salts with the aid of hydrochloric acid.

It should be mentioned that the analyses in the table represent, as far as possible, the average composition of the mortar, and not that of isolated pieces—the samples analyzed being prepared from the ground up portion of a great number of small particles taken from different parts of the ruins, except in Nos. 2 and 4. In arranging the results the total amount of lime is first stated separately, and then, for convenience of reference, the proportions assumed to be present as carbonate, caustic, sulphate, and otherwise combined are added at the bottom of the table.

PROPORTIONS OF LIME.

The largest quantity of lime (34.46 per cent.) occurs in specimen No. 6 from Glastonbury Abbey, and the smallest quantity (10.59) in No. 7 from Glendalough Church (in ruins), County Wicklow. A large proportion of lime, however, does not necessarily imply that the mortar is of the highest quality, for instance, in specimen No. 2, from the leaning tower of Caerphilly Castle, Mon., there is only 13.39, yet the splendid character of the mortar is amply proved by the fact that it withstood the attempted destruction in the time of Charles II., and still remains in its leaning position.

Again, No. 4, representing the mortar used in the construction of the anicut of the Giant's Tank in Ceylon, more than 600 years ago, contains only 16.24 of lime; while in No. 1, from Tintern Abbey, on the banks of the Wye, the proportions of lime are 18.84. Both these specimens are certainly very superior in quality. Those who are acquainted with the beautiful ruins of the abbey are aware that the four gable ends remain intact to the present day, and that this stability is not by any means due to the massive character of the walls; indeed, quite the contrary, for each gable carries a large window, so that the permanence of the gable is due to the tenacity of the mortar in holding the fragile structure together, thus withstanding the force and action of the combined effects of wind and water for so many centuries.

On the other hand, No. 5, from Rochester Castle, represents, on the whole, an inferior mortar, though the lime amounts to as much as 28.67 per cent., while that from Corfe Castle, No. 8, with 31.05 of lime, is, on the whole, a decidedly superior mortar.

Indeed, the present appearance of these two old castles is a good indication of the quality of the mortar used in their construction.

Of Rochester Castle, practically only the keep remains, and that still stands by virtue of its massiveness rather than by an excellence of its mortar.

Of Corfe Castle, the late George Godwin, in his prize essay "On the Nature and Properties of Concrete," tells us that Smeaton visited it and found that its solidity did not consist in having been built with large hewn stones throughout, for the filling in of the walls consisted of rough rubble and fragments from the quarries, the interstices being entirely filled up with mortar poured in a fluid state, and the whole mass had in time become thoroughly cemented together. As a consequence, when the castle was destroyed in 1646, the walls when blown up did not fall into small pieces, but were split up into huge masses which rolled bodily down into the moat below, where they remain still intact the native builders finding it easier to obtain fresh stones from the nearest quarry than from these masses of cemented masonry.

Analyses of Ancient Mortar.

	No. 1. Tintern Abbey	No 2. Caerphilly Castle.	No. 3. Raglan Castle.	No. 4 Giant's Tank, Ceylon	No. 5. Rochester Castle.	No. 6. Glastonbury Abbey.	No. 7. Glendalough Church, Ireland.	No. 8. Corfe Castle.
Probable date of erection, about A. D.	1259.	1200.	1200.	1250.	1088.	1246.	Not known	1000.
Water (lost at 212° F.)	1.72	2.60	1.36	1.18	.36	4.96	.55	2.42
Combined water	3.98	7.73	4.06	2 66	1.48	4.94	2 92	4.02
Lime**	18.84	13.49	30.68	16.24	28.67	36.46	10.59	31.05
Magnesia	.32	1.87	.25	.36	.18	.45	.43	.28
Potash	.02	.22	15	.30	.16	.33	.25	.20
Soda	.27	.29	.45	.17	.24	1.18	.13	.15
Oxide of iron	1.99	3 61	1.35	2.20	.40	3.60	1.58	.95
Alumina	1.36	1.34	.80	2.65	.30	1.45	.71	.15
Sulphuric acid	1.37	.34	.86	.58	.29	.89	.32	.26
Carbonic acid*	12.13	9 53	21.01	11.11	20 60	25.06	6 40	22.86
Chlorine	.13	.01	.15	trace	.10	.88	.14	.65
Gelatinous silica, soluble in alkali	6.20	9.85	4.10	7.10	1.60	6.10	3.90	7.50
Insoluble matters (sand)	51.67	49.12	34.78	55.45	45.62	13.70	72.08	29.51
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Equal to carbonate of lime	27 56	21.66	47.75	25 25	46.81	56.95	14.54	51.95
** Lime present as carbonate	15.43	12.13	26.74	14.14	26.21	31.89	8 14	29.09
** Lime present as caustic	.28	.56	.84	.56	.56	.56	.84	.28
** Lime present as sulphate	.95	.23	.60	.40	.20	.62	.22	.18
** Lime present as silicate and otherwise combined	2.18	.57	2.50	1.14	1.70	3.39	1.39	1.50
	18.84	13.49	30.68	16.24	28.67	36.46	10.59	31.05

REQUIREMENTS OF GOOD MORTAR.

As regards the actual proportions of lime, therefore, the requirements of good mortar would suggest that much more depends on the quality than on the quantity of the lime employed. Before passing on to other points, it may be remarked that, in all these analyses, the proportion of caustic lime is practically unappreciable, and that most of the lime exists now as carbonate; also, that after allowing for the lime as sulphate, there still remains an excess of lime which is probably present in combination with gelatinous silica and alumina—as existing in Portland cement.

The proportion of magnesia is very small in all these eight specimens, the amount being less than ½ per cent., except in that from Caerphilly Castle, where we find 1.87. It is interesting to bear this in mind after what has been written in reference to the presence of magnesia in some Portland cement used in the Aberdeen harbor works.

The proportions of oxide of iron and alumina are higher in the specimens of good mortar, such as Nos. 2, 6, 4, 1 and 8, than in Nos. 5 and 7, which represent the inferior quality, while No. 3 may be regarded as of medium quality, and has 1.35 oxide of iron and 0.80 alumina.

Sulphuric acid is 1.37 in No. 1 and 0.26 in No. 8, both specimens being regarded as of superior quality.

Chlorine varies considerably, the higher quantities being, doubtless, due to local circumstances, such as proximity to the sea or tidal rivers, but the variations are of no consequence in this particular inquiry.

AMOUNT OF SILICA.

The relative amount, however, of gelatinous silica soluble in a 10 per cent. solution of caustic soda is a point of considerable importance in determining the quality of a mortar. For the information of other investigators, it may be here stated that 2 grams of the finely ground mortar were first evaporated with HCl. acid to complete dryness in a water bath; the insoluble residue was then treated with dilute hydrochloric acid, and the total insoluble matters filtered off, burned and weighed. This was then boiled for half an hour with 100 c.cm. of a 10 per cent. solution of caustic soda, which dissolves all the gelatinous or amorphous silica, leaving the crystalline and coarser sand unaffected, and if this latter be weighed the difference between the original weight gives the amount of so-called soluble silica. It is in this form that most of the silica exists in Portland cement, the actual figures being from 20 to 22 per cent.

It will be noticed that this gelatinous silica is highest in specimen No. 2, namely, 9.85, which is very nearly half as much as occurs in the best Portland cement.

No. 8 comes next, with 7.50; then No. 4, with 7.10; and No. 1, with 6.20; also No. 6, with 6.10; afterward No. 3, with 4.10; No. 7, with 3.90; and last, No. 5, with only 1.60 per cent.

In the analysis of limestone intended for making lime for building purposes, it would be desirable to specially determine the amount of gelatinous silica present—inasmuch as the best building limes no doubt possess to a considerable extent the properties of a cement.

We now come to the proportions of sand, which form the subject of the illustrations, and it will be noticed how very much they vary in quantity, in size and general character, as observed through a microscope. No. 7 specimen contains 72.08, while No. 6 contains only 13.70.

Specimens 1 and 2 contain respectively

51.67 and 49.12; No. 4 has a little more, 55.45; while No. 5 has a little less, 45.62; then comes No. 3, with 34.78; and No. 8, with 29.51 per cent.

When we examine the size and character of the sand, the illustrations are particularly useful.

Fig. 5 is specially interesting, showing the smooth, rounded nature of the sand in the mortar from Rochester Castle, while in Figs. 2 and 4 the variation in size of the particles, as well as the much sharper edges, are easily seen. In Raglan Castle, Fig. 3, the granules are very small, while in Glastonbury Abbey, Fig. 6, and Glendalough Church, Fig. 7, the particles are much larger and present a more rounded appearance. The same power of magnifying was observed in all the specimens, and the sand was specially removed from the mortar without any grinding-up of the sample in order to preserve the original appearance as far as possible.

PRACTICAL CONCLUSIONS.

Having now briefly reviewed the characteristics of the eight specimens, what are the practical conclusions to be drawn from these analyses?

1. That the actual amount of lime present in a mortar may vary very considerably, but that within certain limits the quality of the lime is of as great importance as the quantity—indeed, a smaller quantity of well-prepared good lime is much more effectual than a larger quantity of a badly prepared or naturally inferior lime.

2. That the proportions of sand may also vary considerably, even in really good mortar, and that while it is always desirable that it should be rough, irregular in size, and with sharp edges rather than be smooth and round, still that, the quality of the sand is not of so much importance as the quality of the lime.

3. That the presence of oxide of iron and alumina in a form readily combined with silica is not to be objected to in good building lime; indeed, that the purest limestones are by no means the best for making superior lime for building purposes.

4. That the higher the proportion of amorphous or gelatinous silica soluble in alkali, the better the quality of the mortar, and, as this kind of silica is

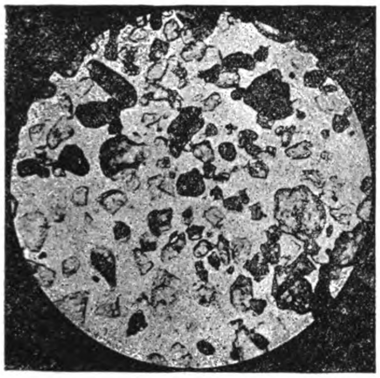


Fig. 1.—Lintern Abbey.

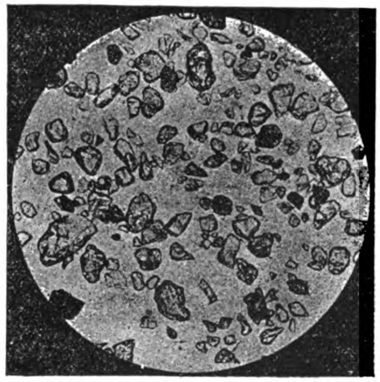


Fig. 2.—Caerphilly Castle.

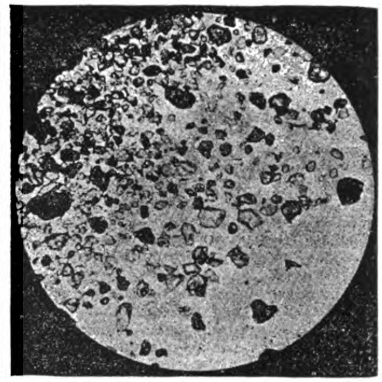


Fig. 3.—Raglan Castle.

Fig. 4.—Giant's Tank, Ceylon.

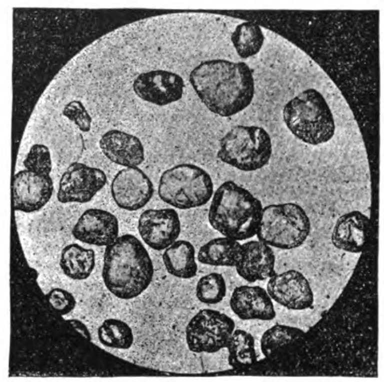


Fig. 5.—Rochester Castle.

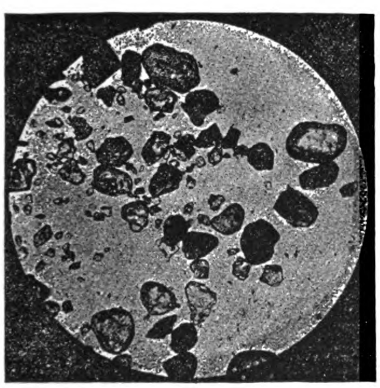


Fig. 6.—Glastonbury Abbey.

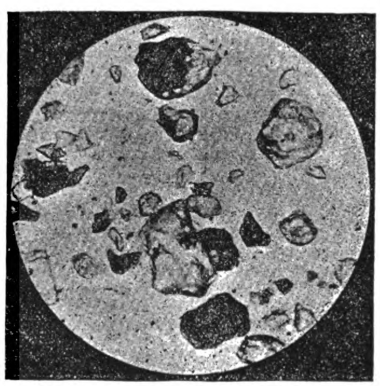


Fig. 7.—Glendalough Church, Ireland.

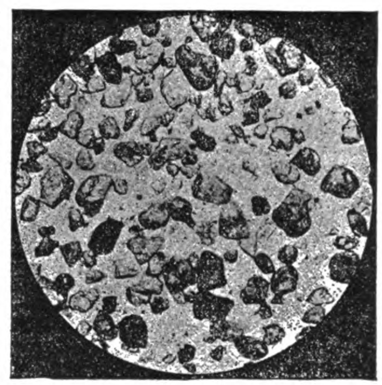


Fig. 8.—Corfe Castle.

Composition of Ancient Mortar.—Diagrams Illustrating Sand Used in Ancient Mortar.

associated originally with the lime rather than with the sand, it becomes of the greatest importance that the character and composition of the lime intended to be used should be fully inquired into, and the best possible quality in the neighborhood always selected by the architect and used by the builder.

Bay Windows and Oriels

The distinction between a bay and an oriel window, according to the London *Builder*, is as follows: By the former is understood a projecting window, or rather a projection pierced with window openings in its entire width and rising immediately from the ground, whether it be confined to the lower part of the building or carried up through one or more stories above the ground floor; by the latter, a bay which does not descend to the ground, but is suspended over the face of the wall beneath it. Oriel accordingly corresponds with the German terms *Erker-Fenster* and *Chor-Fenster*, which are almost the only ones of similar import in any foreign language. This absence for a name for it is accounted for by the thing itself being scarcely known in the architecture of other countries, and in our own it occurs only in our domestic, Gothic or Tudor, such form of window being very rare indeed in ecclesiastical structures. In our domestic, which also comprises collegiate architecture, it is a beautiful and valuable feature, and one which admits of very great diversity of design and also imparts much variety and liveliness of effect to a building, more especially if there be ground bays likewise, the two kinds of projection both harmonizing and contrasting with each other. Internally there is no distinction between bays and oriels, inasmuch as both the one and the other form a recess whose sides are filled with windows. But greater variety of plan occurs in oriels than in bays, which are usually more spacious as to breadth and of shallower proportions as to depth; they are also either rectangular in plan or form three sides of an octagon, whether a regular one or not, whereas curved forms are of frequent occurrence in the plans of oriels and are occasionally combined with straight ones. Yet as similar plans do occur in bays no real distinction can be founded upon such accidents of design.

A Remarkable Stone.

On the outskirts of the modern village of Baalbek, attention is arrested by the quarries whence the stones of Baalbek were hewn, and which lie on the right hand of the road from Shtaura. In the midst of these quarries, says a writer in *Macmillan's Magazine*, there lies one stone, hewn and fashioned with exquisite accuracy, almost severed from the solid rock, and apparently waiting to be carried away to its destined place in the walls of the great Phœnician Temple of Baal. There it has remained in silent grandeur for upward probably of 3000 years, suggesting to the thoughtful observer many interesting and curious reflections. How long was that stone in process of excavation and fashioning? How many human hands were employed upon the work? What implements were used for the gigantic toil? How was it to have been removed from the quarry to its appointed place? How raised to its position when once carried there? Why, after all the labor which had been bestowed upon it, was it left at last in the quarries? Could we discover the answer to this last question, we should probably learn of some great crisis in the world's history, some mighty incursion, some decisive battle, some irrevocable overthrow of a powerful nation. For it is evident that the work was abandoned suddenly, while yet remaining in an incomplete condition; and there is no explanation so feasible or probable as that of conquest by a foreign foe. But how shall we exhibit to the ordinary reader the marvelous proportions of this colossal stone? Roughly speaking, and in round figures, we may say that it is 70 feet long, 14 feet broad, and 14 feet high. Now what does this mean? Imagine a room 14 feet square and 7 feet high—a very fair-sized cottage room. Imagine a house with ten such rooms in it, five on the ground floor in a row, and five on the first floor above. Imagine this house to be one solid block of stone, and we have the stone in the Baalbek quarry. It has been computed to weigh at least 1500 tons, and a further calculation has been made that it would require 40,000 strong men, pulling their hardest in the same direction, to move that stone a quarter of an inch in an hour.

New Publications.

ART OF MITERING. By Owen B. Maginnis; 73 pages of letter press; illustrated with 45 engravings. Bound in stiff board covers. Published by William T. Comstock. Price, $1, postpaid.

This little work by an author who is more or less well known to the readers of *Carpentry and Building*, tells how to join miterings of various kinds. It is a book calculated to interest carpenters, joiners, cabinet makers, and, in fact, all having to do with wood work. It is composed of nine chapters, the first of which is devoted to an explanation of what constitutes a miter. The next chapter is entitled "Sawing the Miter," and tells how to miter simple moldings and prove the cuts in the miter box. The succeeding chapters give attention to mitering bevel and raised moldings, mitering octagon and polygonal figures, mitering crown or sprung moldings, mitering chair rails, picture moldings, column bases, &c.; varying miters in both straight and circular moldings and the art of coping moldings.

PRACTICAL PAPER HANGING. By A. S. Jennings. Consists of 116 pages of letterpress, illustrated with numerous engravings. Bound in stiff covers. Published by William T. Comstock. Price, $2.

This volume is designed for practical men, giving as it does a full description of the tools used and the method of hanging all kinds of wall decorations. It is composed of nine chapters, the first of which is devoted entirely to tools, many of which are illustrated. The second chapter treats especially of materials and colors, not only papers, but other materials used for wall covering and decoration. The third chapter treats on hanging paper to side walls, while giving much valuable information to the mechanic, superintendent and decorator. In the following chapters dados, friezes, borders, ceiling decorations, miscellaneous decorations, &c., are touched upon in an interesting style. A feature of the volume is the style of binding, which is in cartridge paper with frieze and dado, making it in keeping with the subject to which it relates.

THE AMERICAN GLOSSARY OF ARCHITECTURAL TERMS. Third Edition. By G. O. Garnsey. Illustrated with 500 engravings. Bound in stiff board covers. Published by the National Builder Publishing Company. Price, $2.

Within the covers of this work are to be found definitions of over 3000 terms employed in the practice of architecture and the building trades. The volume embraces historical sketches of various styles and periods of architecture and data useful in the arts and sciences. It is printed on special paper and considered as a whole is calculated to prove a useful member of the mechanic's library of trade literature.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

MARCH, 1893.

Builders' Convention.

We devote a considerable portion of this issue of the paper to a report of the seventh annual convention of the National Association of Builders, held in St. Louis, during the third week of February. The deliberations of that body were of an instructive character and indicate that the builders of the country, as represented by local exchanges, are waking up and doing more thinking than in the past. The subjects presented were discussed in a broad and practical manner by those who showed a thorough understanding of the questions involved. The reports of the filial exchanges were full of interest, affording as they did an opportunity for comparing methods in vogue and showing the plan of dealing with customs and practices variously employed for the accomplishment of the same end. These reports showed that the principles which underlie and control the conditions obtaining in the building business are beginning to be better understood, and the suggestions that were made for the improvement of unsatisfactory conditions were indicative of much more thorough consideration of the reasons for action than has been shown at any previous convention.

Architect and Builder.

The consideration of the relationship between the architect and builder was entirely free from evidence of personal bias, being treated in an abstract sense and from the standpoint of equity. The apprenticeship question excited lively discussion, and being one of the stumbling blocks in the path of employers as well as workmen, the views of delegates were freely expressed, yet at no time was the fact lost sight of that the welfare of the apprentice was the end to be attained. The utmost harmony prevailed throughout the meeting and the delegates left St. Louis with a feeling that they had profited by their meeting with fellow builders from the sister cities of the country. The hospitality of the West was fully sustained by the St. Louis builders and no effort was spared to make the meeting a success.

"Children's Home" at the World's Fair.

Not the least interesting of the many excellent things to be seen by visiting members of the building trades at the World's Columbian Exposition will be a tastefully designed structure known as the "Children's Home." It will be two stories in hight, have a roof garden 150 x 90 feet, and be erected about an open court 42 x 30 feet. There will be glass partition walls, and something like 100 windows on the four outer sides. Visitors will make their entrance and exit through two large doorways, while a third will be used exclusively by children. The Home will be constructed of staff, and this, when painted and decorated, will have, it is said, the appearance of white stone half a century old. The plans have been prepared by M. Sandier and call for a style of architecture which is of a rather pleasing character.

Industrial Education.

The sixth annual report of the Department of Labor on the subject of Industrial Education is full of interest and contains much that is of value to the careful student. The report embodies the results of a special inquiry in which Colonel Wright has taken no little interest, while being of a character which has not been previously made. Agents of the department were sent abroad and throughout this country to consult with the heads of manual training schools and obtain through them the history of their graduates and the positions they now occupy. It is stated that the results of the investigation have been satisfactory and throw much light upon the advantages of manual training. The report gives a careful statement of the various systems in vogue, explaining the difference between manual training schools and technical colleges and institutes of technology. The Sloyd and the Russian systems of training are fully explained as preliminary to the detailed review of the progress of industrial education in the United States and Europe. One of the five parts of the report is devoted to the progress of industrial education in this country traced in the public schools and colleges, as well as in the trade schools and institutes of technology. Similar facts are given in another part of the volume of the various European countries from which special reports have been secured. Another part of the report is devoted to manual training in conjunction with book work, showing how the two elements can be combined to produce a thoroughly trained workman and intelligent student. We understand that there has been a great deal of correspondence with practical business men as to the difference in aptness and efficiency between young men taken from training schools and those without special education for their work. These results have been favorable to the training schools and make altogether an interesting presentation.

The "Old Colony" Building.

One of the latest additions to the already large number of sky-soaring edifices which contribute in no small degree to the architecture of Chicago, is known as the "Old Colony." It is located on the south side of Van Buren street and covers an area 68 x 150 feet. The structure, which is now above the third story, will, when completed, stand 16 stories in hight, or 205 feet from the sidewalk. While it is a typical Chicago steel structure, it embodies two important improvements, one of which is the system of bracing to resist wind pressure. The steel work is hot riveted in all its connections and so braced and tied together as to withstand an exceedingly high wind velocity. Another interesting feature is, that though the walls will consist in part of 16-inch brick work, there will be interposed between the brick and steel a seam of hollow tile, which is said to more than double the security against intense heat. The building is divided architecturally into three stages, the first consisting of the lower three stories, the second being the next 11, and the third consists of the 15th and 16th stories, with the attic. The whole is surmounted with a heavily-molded and bracketed cornice. Each of the north corners is treated with a circular bay with an interior diameter of 13 feet extending from the third story, inclusive, to the cornice. The first stage of three stories is constructed of dressed blue Bedford stone, while the remaining stories are of white brick, with semi-glazed white terra-cotta trimmings. The brick employed are long and thin, and are what are known as the Roman brick, the texture being hard and close. The building will be divided so as to make from 300 to 500 offices, the first two stories being designed for banks. The floors, designed by Tiffany, will be mosaic, the wainscoting of white marble and the wood work of oak. The plans were prepared by Architects Hallibird & Roche.

Arbitration.

The principle of arbitration as an equally fair basis upon which to adjust the mutual concerns of employers and workmen has been again demonstrated by the action of the Joint Committee of Arbitration of the Mason Builders' Association and the Bricklayers' Union of Boston. The form under which the committee exists is that advocated by the National Association of Builders, and presents probably the fairest and most equitable plan yet devised for the adjustment of differences between employer and workmen. It is not only a court o final appeal for both sides, but by its nature no difference between the two is allowed to reach such proportions as to produce resentment or animosity. It also is, in the nature of things, the best possible preventive of misunderstandings which must inevitably lead to dissension and strife. Differences are immediately submitted to the joint committee for the purpose of adjustment before any action prejudicial to the case has been taken by either side, and while the motive of both is only an earnest desire to arrange for the more equitable continuance of harmonious relationship. Wherever this form of arbitration has been adopted and comprehended none but the most favorable results have ensued, and its use is adapted to every community of employers and workmen in the country.

New Bank Building.

An imposing structure which will tower aloft thirteen stories is about to be commenced at the corner of Broadway and Chambers street, in this city, on the site now occupied by the National Shoe & Leather Bank. The present building was erected something like 40 or 50 years ago, and is therefore now far behind the times. The old structure is to be torn down as soon as the leases of the tenants expire, and an edifice of modern construction and design, having a frontage of 25 feet and a depth of 91$\frac{7}{10}$ feet, will take its place. The new building, which will be occupied by the banking institution named, will be about three times as large as the present one, and will cost, it is estimated, about $250,000. The general style of architecture will be Spanish renaissance, and the building will tower to an elevation something like 170 feet. The first two stories will be in Lake Superior stone of a warm reddish color, while the walls will be in specially pressed brick of a buff tone and cream colored terra cotta. Every apartment in the building will be well lighted and ventilated, the electrical plant being under the Chambers street side walk. The plans have been prepared by J. C. Cady & Co., architects, and it is expected that the structure will be ready for occupancy early next year.

Pipes in Buildings.

In a building recently inspected, every pipe, whether for steam, water or gas, was entirely uncovered, and every part of every pipe was accessible for examination or repair without disturbing a wall, floor or ceiling. The pipes did not look badly either; nor were they apparently at all in the way of furnishing, or calculated to interfere with any of the purposes for which the building was erected—namely, for stores in basement and in first floor and offices in the stories above. The treatment of these pipes in finishing them had entered into the general design of decoration, and the effect, though perhaps a little odd at first, like that of a new style of hat, was really quite good when one got a little used to it. There appears to be a growing tendency, at least in buildings erected for business purposes, to render pipes more accessible from the interior of the structure than was formerly the practice, and there are several very good reasons for adopting this method. A pipe may spring a leak. If in plain view the leak is likely to be discovered before any very serious damage results, whereas, if concealed, water may be discharged in quantity sufficient to do considerable mischief before it is known that a leak has occurred. Long channels formed in brick work in which riser pipes are placed and then covered over, form flues through which foul gases, if any escape in the cellar, rise at once to permeate all parts of the building. If the pipes be cold, as for conveying water or gas, this action may be slow, being effected by diffusion only, but if steam pipes are placed in such channels an immediate circulation upward is set up, the heated air rising and escaping through spaces around radiator connections, &c., and this action constantly carries up any escaping gases from the cellar with the utmost neatness and dispatch. Pipes have hitherto been hidden, for the most part, because they are unsightly things, but if it be really better from a sanitary or an economic point of view that they should be exposed, architects must grapple with the prob em of making them tolerable to refined taste, as has been done with gas fixtures and electric lighting appliances.

Heating Greenhouses.

No observing person who has traveled much in this country during the past 10 or 15 years can have failed to note the rapid increase in the number of greenhouses. He might very naturally attribute this to improvement of the general financial condition of the country and the accumulation of wealth that enables more people to gratify their individual tastes than was possible in the earlier history of our country, and, doubtless, this is one cause. But another more potent influence upon the erection of such structures is that they have been found very profitable when applied to the cultivation of plants, fruits and vegetables for market. The old saying that "money makes the mare go" applies to the business of building and heating greenhouses, the large majority of which are wealth accumulators, instead of simply means for spending surplus funds. It has been well recognized by those who build and heat greenhouses, as well as those who carry them on for business purposes, that their profits have been rendered possible by improved systems of heating, wherein portable, automatically regulating heaters, carrying sufficient fuel to maintain their action during any interval of time likely to be required, maintain a uniform temperature; and also by improvements in the construction of buildings themselves, notably consisting in the use of lighter framing, larger glass, and lower, flatter roofs than were formerly in vogue. Specialists have given the subject great attention, and there are now architects who confine themselves almost wholly to this branch of building. The more extended employment of steam for heating greenhouses, due to the supply of boilers with ample fuel-carrying capacity and automatic regulation, has possibilities now that did not exist 20 years ago; and the use of small wrought-iron piping has much cheapened the cost of heating apparatus for this use.

Polishing Fret and Carved Work.

A writer in one of our exchanges says great care is required to put a bright level body of polish on fine fretwork, owing to the liability of the rubber catching some delicate piece and breaking it off. Great care is required in making a flat rubber, and many place a penny piece inside to help to keep a flat face. If the fretwork is open, and the edges much seen, varnish the edges, using a small camel's-hair pencil, taking care not to smother the back or face with varnish. To prevent the fretwork from warping or curling up, it is a good plan to give the back a good wet rubber of polish, which fills up the pores of the wood. Lay the fret down on a board and fasten it down with pins. No filling is required; in place of this add a little varnish in the polish rubber. Polish in the ordinary way, and do not have the rubber too wet or you will be liable to get fat edges, and spirit off as in ordinary polishing.

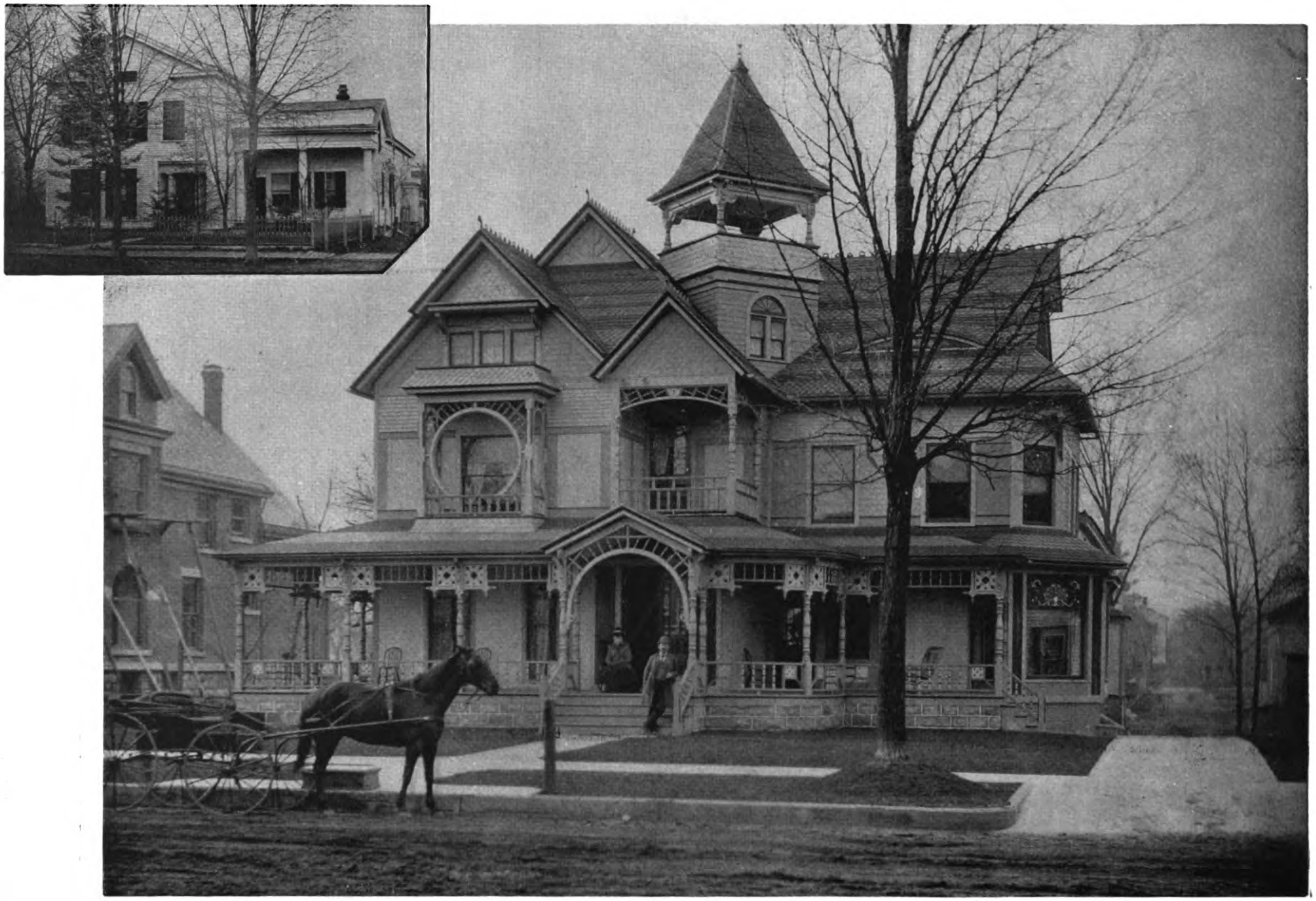
Plaster of Paris Floors.

The French, who have carried the art of hardening plaster to where it is utilized for flooring, either in place of wood or tile, use six parts of good quality of plaster intimately mixed with one part of freshly slaked white lime finely sifted. The mixture is then laid down as quickly as possible, care being taken that the trowel is not used on it for too long a time. The floor should then be allowed to become very dry, and afterward be thoroughly saturated with sulphate of iron or zinc, the iron giving the strongest surface, the resistance to breaking being 20 times the strength of ordinary plaster. With sulphate of zinc the floor remains white, but when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of a beautiful mahogany color. Especially is this the case if a coat of copal varnish is added.

Tarred Felt and Sheet-Lead Roofing.

A new sort of roofing has been patented in Germany and in several other countries which seems to have good qualities. The history of the invention, as related by the *American Architect*, is rather interesting. Herr Siebel of Dusseldorf remembering, what all architects know, that the best protection against damp arising from the ground into walls is a sheet of lead, and remembering also that, on account of the great expense of a lead damp course of sufficient thickness to support the weight of the superstructure without tearing, it is quite common in these days to use as a substitute a sheet of tarred felt, conceived the idea that the advantages of both materials might be united by inclosing a thin sheet of lead between two thicknesses of tarred felt. In this way, while the inclosing felt protects the lead from being torn by the irregularities of the masonry and from corrosion by the lime of the mortar, the metal, although thin, interposes an impenetrable barrier against dampness, which is not liable, like the felt alone, to gradual decay. Moreover, the combined felt and lead is much cheaper than lead alone, of the thickness that it would be necessary to use, and, although patented, it is available, so far as cost is concerned, for buildings of very moderate pretension.

While engaged in perfecting this invention, it occurred to Herr Siebel that the felted lead would make a very impervious roof covering, and perhaps a durable one, and thorough tests seem to confirm this idea. The felted lead is sold in the same form as ordinary roofing felt, and applied in the same manner, receiving the usual protecting coating of tar and gravel on top; but the metal protects the felt under it so completely from the evaporation of the volatile portions of the tar, which is the principal cause of the deterioration of composition roofs, that it is said to remain tight for an indefinite period; and, even when the lead is exposed, from the decay of the felt over it, nothing is necessary but to lay over it new felt, with tar and gravel finish, to make the roof as good as ever, while an ordinary felt roof, which has once begun to rot, is not usually worth repairing. The practical man will think of other details, such as the facility with which flashings, gutters and zinc or copper edgings can be soldered to the lead of the roofing, which seem very much in favor of the new material, and it is to be hoped that it may come into use here. It is, however, difficult to roll very thin lead, and it is hard to understand how sheets, inclosed in felt, could be sold for roofing at a price to compete with a tin roof, which would be better in most respects.

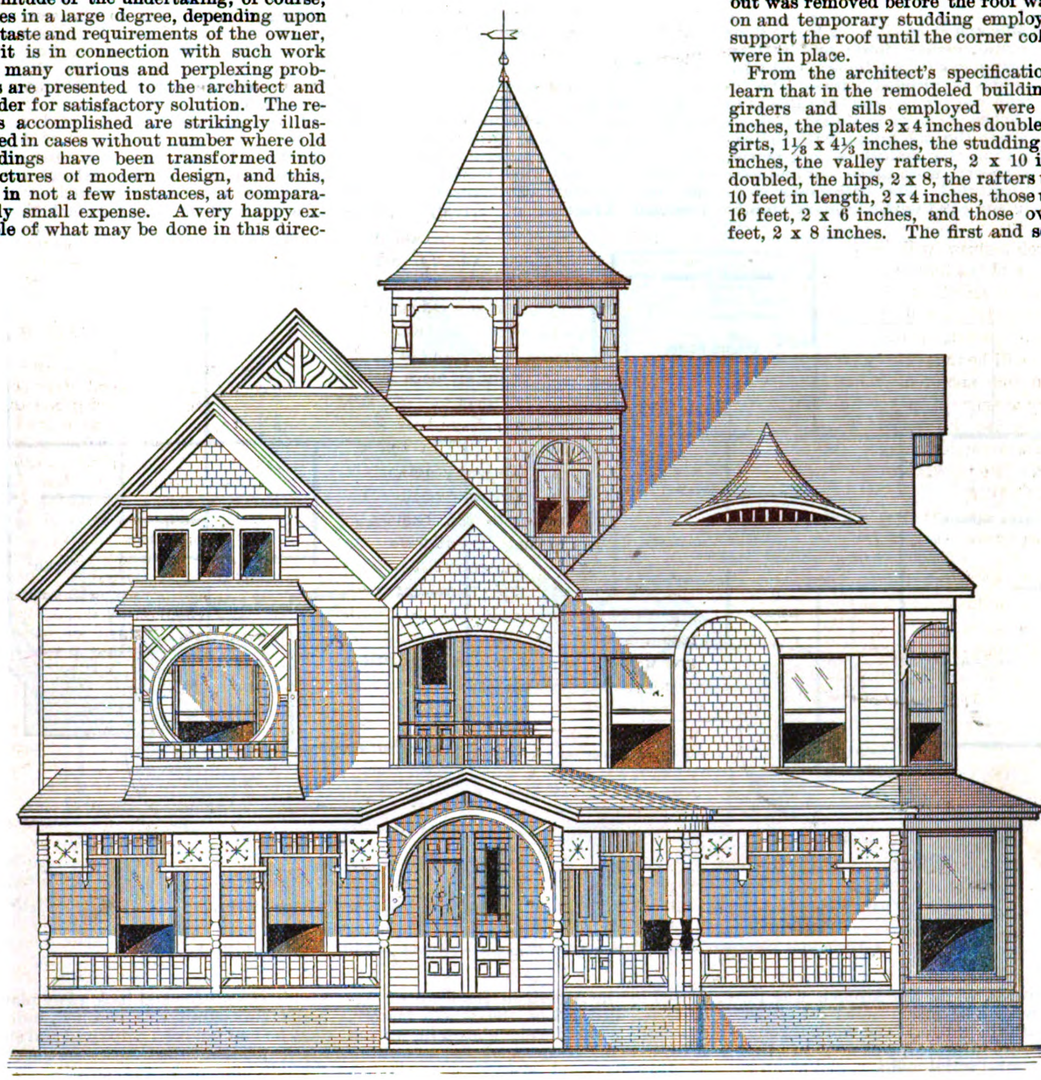


REMODELED RESIDENCE FOR MARTIN BEIGER, AT MISHAWAKA, IND.

C. A. BREHMER, Architect.

A REMODELED RESIDENCE.

IT VERY frequently happens that some of the most interesting pieces of work which those engaged in building operations are called upon to execute are found in the alteration and remodeling of old structures, for whatever purpose employed. The magnitude of the undertaking, of course, varies in a large degree, depending upon the taste and requirements of the owner, but it is in connection with such work that many curious and perplexing problems are presented to the architect and builder for satisfactory solution. The results accomplished are strikingly illustrated in cases without number where old buildings have been transformed into structures of modern design, and this, too, in not a few instances, at comparatively small expense. A very happy example of what may be done in this direction is shown by means of our supplement plate and the floor plans and elevations presented this month. The small picture in the upper left-hand corner of the plate represents an old mansion which was transformed into the modernized dwelling, shown by the larger picture. The remodeled building has a new exterior, roof, porches and bay windows, enlarged sleeping and dining rooms, two new bathrooms, fully equipped with closets, tub, bowls and instantaneous heaters, as well as plate and art glass windows. The transformation from the old to the new was recently made for Martin Beiger of Mishawaka, Ind., from drawings prepared by C. A. Brehmer, architect, of South Bend, Ind., who also supervised the execution of the work. The plans here presented show the arrangement of rooms on the two floors of the remodeled dwelling, while the dotted lines marked "taken out" indicate in some measure the outlines of the old structure. The elevations give an idea of the appearance of the house when the alterations had been completed. The old mansion was originally erected by a venerable resident of the city named, and was constructed of timbers hewn square, mortised and tenoned, and put together with pins, as was the custom in years gone by.



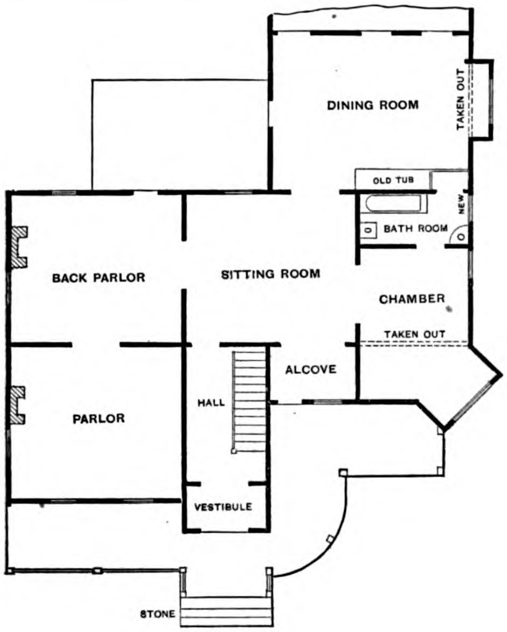
Front Elevation.—Scale, ⅛ Inch to the Foot.

A Remodeled Residence.—C. A. Brehmer, Architect, South Bend, Ind.

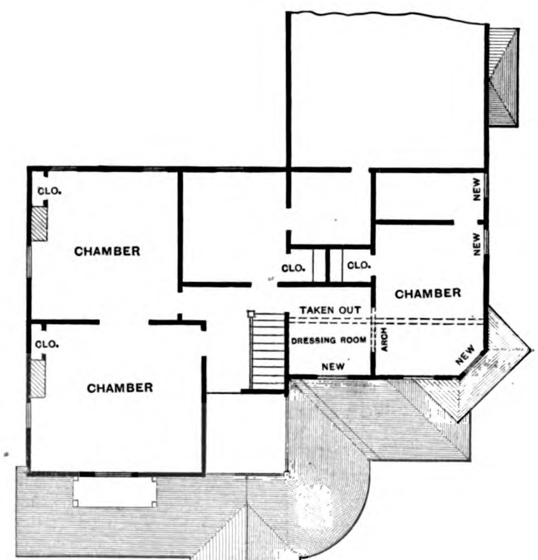
In executing a piece of work of this character there are a number of interesting problems to be solved. One of the requirements of the reconstruction was the putting on of the new roof before taking off the old, the object being to save the plaster and interior decorations from damage and injury from the elements while the work was in progress. The first thing done was the erection of the second story over the lower portion of the old building. Holes were cut through the roof over the plates, and posts and studding inserted through them, the second story being built up over that portion and sheeted in. Then the main portion of the house was taken in hand and put through a similar course of treatment. The cornice was taken off, the roof being supported from the inside, and a new roof constructed over the entire building. While this was being done and the sheeting and shingles put on, care was taken to keep all holes cut in the old roof covered so that in case of rain no damage or injury would result to the ceiling. The timber which had to be cut out was removed before the roof was put on and temporary studding employed to support the roof until the corner columns were in place.

From the architect's specification we learn that in the remodeled building the girders and sills employed were 8 x 8 inches, the plates 2 x 4 inches doubled, the girts, 1⅛ x 4½ inches, the studding, 2 x 4 inches, the valley rafters, 2 x 10 inches doubled, the hips, 2 x 8, the rafters under 10 feet in length, 2 x 4 inches, those under 16 feet, 2 x 6 inches, and those over 16 feet, 2 x 8 inches. The first and second floor joists were the same as in the old house. The third floor joists were 2 x 8 inches, the collar boards, 2 x 6 inches, and the ridgetrees, 2 x 8 inches. All floor joists and studding were placed 16 inches on centers, while the rafters and collar beams were 20 inches on centers. The entire frame of the front of the building was covered with No. 3 D. & M. pine, over which was laid building paper, and this in turn covered with poplar siding, where shown on the elevations. The roof of the building and tower was covered with No. 1 pine shingles, while the side walls, where indicated, were treated with redwood dimension shingles, cut to shape, and laid not over 6 inches to the weather.

The base of the tower was formed on top of the ceiling joists by trimming out the joists and planting on top of them, four thick, 2 x 6, well spiked together, and lapped at the corners. The posts and studding were 4 x 4. The upper joists were put in at an incline to form sides to throw the water out at the bottom of the balcony rail. The sides of the tower were inclosed in the same manner as the main building, and has seven rows of cut shingles on the roof about 3 feet from the cornice line. All the shingles were dipped in linseed oil and mineral paint before laying. The front gable is shingled, the projecting gable at the top being supported by brackets, as shown. For the veranda were used 4 x 8 inch sills and cross sills, 2 x 8 inch floor joists, plates, ceiling joists and rafters. The flooring was $1\frac{1}{8}$ x 4 inches, laid with square edges and leaded joints. The interior trim was poplar, and the same as in the old house. The main stairs remain as they were in the old house, with the exception that the balusters and newel, made of cherry, were taken out and new ones substituted. The bathrooms were properly equipped with necessary plumbing fixtures, while the kitchen was provided with a 30-gallon boiler for connection with the range. The work throughout, we are informed, was done in a thoroughly substantial manner, and at an expense of about $2000, to which sum the cost was limited by the owner.



First Floor.



Second Floor.

A Remodeled Residence.—Floor Plans after Changes were made.—Scale, 1-16 *Inch to the Foot.*

The Ownership of Plans.

The question as to the ownership of plans drawn by an architect, for use in superintending and guiding the construction of a building, says an authority, is by no means settled as a matter of law. It sometimes becomes a question of grave importance to the architect and to the owner as well by reason of the large interests involved.

Of course those cases are to be excluded from this discussion where contracts are made with architects to prepare and furnish plans and specifications, for the established law of contracts will cover them. The difference between these cases, where the making and furnishing of plans is the object of the contract, and cases where architects are formally employed only to prepare plans for and superintend the construction of a particular building, the plans being regarded only as means to another end, will readily be seen. These last suggest the question now considered. Perhaps it will be intimated that in England, that older country from which we have derived so much of our law by inheritance, a precedent will certainly be found. But up to a recent date there were no decisions in the regular reports in that country upon this question. Returning to our own land and taking up the latest, best, and practically the only treatise that we have on the law of building and buildings, especially referring to building contracts, &c., namely, that of A. Parlett Lloyd, issued in 1888, there will not be found the least assistance in the solution of this question.

Many architects would present the suggestion that the schedule sanctioned by the Royal Institute of British Architects, and confirmed at a general conference of architects of the United Kingdom in 1872, and the Schedule of Charges and Professional Practice of Architects, indorsed by the American Institute of Architects, disposed of the whole matter, especially as the former states, in section XVI, that in "respect of the ownership of drawings and specifications, it has hitherto been the general custom for the architect to be paid for their use only, those documents remaining his property, and the latter declares "that drawings and specifications, as instruments of service, are the property of the architect." But in 1870 the English Court of the Exchequer declared that the provisions of the code of the Professional Institution of Architects, issued in 1862, were not binding, as their charges were unreasonable, and, it was held, "contrary to good sense and justice," and not a legal standard. "Supposing the custom to exist," said the court, "that an architect, in the event of his employment being put an end to, is entitled to be paid for the plans and retain them, such a usage is not a reasonable one." (Ebdy *vs.* McGowan, reported in the *Times*.) The Supreme Court of the State of Illinois (Wilson *vs.* Bauman, 80 Ill., 493) has also decided that where it was attempted to prove a certain custom, in the case of the employment of an architect, the other side might show, if it could, "that there was no such custom, except by architects," and that in order to be available to the architect, "such custom must be as well known to builders and contractors as to architects, and it does not require special skill or science to know of its existence." Moreover, what will be of special significance after the declaration of the English Court of the Exchequer above, "A custom or usage, to affect a given contract, must not be in opposition to any principle of general policy . . . or against the established principles of the law. Besides this, it must be generally acted upon as known and established, and so well settled and so uniformly acted upon as to raise a fair presumption that it was known to both contracting parties, and that they contracted in reference to it and in conformity with it."

In the old case of Nourry *vs.* Lord, decided by the New York Court of Appeals in 1866 (3 Abbott, 392), where the general question litigated at the trial was whether an architect was employed to draw a plan of a building or not, the fact that the architect sent for and took away plans he had submitted, it was claimed, indicated that he had not been employed and should not be paid, but the Court held that while the circumstance was entitled to consideration, it was not conclusive that the services were wholly voluntary, or should not be paid for, the architect being allowed compensation in that case for his labor.

The well-settled doctrine, as stated by the United States Supreme Court (Chicago *vs.* Tilley, 103 U. S. Rep., 146), should also be considered in this connection, that "a party to a contract, who has performed part of it according to its terms, and is prevented from completing it by the failure of the other party, is entitled to compensation for the work performed." This, however, does not settle, as a little reflection will show, the question of the ownership of the plans.

So far in this article, architects have been treated as all being of one mind, and following the old English and present American rules intended to govern their profession. This, however, is not true, for enough, if not a large percentage of architects, and good ones too, can be found who in case work is abandoned after preparation of plans and specifications, will give up these on payment of their charges for preparing them. This will make it extremely difficult to do-anything toward proving such a custom as would have the effect of law.

The only wise and safe thing for architects to do is to make a contract in writing in all cases before entering upon an employment, and provide in the contract who shall own the plans if work is abandoned, as well as when the building is completed.

Boston Bricklayers and the Eight-Hour Question.

The following is the report of the proceedings of the joint committee of arbitration between the Mason Builders' Association and the Bricklayers' Union of Boston as it appeared in the *Globe* of February 10:

The eight-hour day has been won by the bricklayers of this city. By peaceful arbitration it was secured instead of by costly strikes, breeding hard feelings between employers and employees. The result was reached through conferences between committees representing the Mason Builders' Association and Bricklayers' Union No. 3. The committee met a week ago and adjourned until yesterday. At each meeting the whole matter was carefully and patiently gone over.

The committees were composed on the part of the Mason Builders' Association of Messrs. I. F. Woodbury, C. A. Dodge, J. Smith, M. N. Stearns and Capt. S. Sampson, and on the part of the bricklayers of Messrs. Jeremiah Harrington, Thomas Garrity, Thomas Kyne, Augustine Devine and John T. Healy.

On meeting, these committees organized themselves into a joint board, of which J. F. Woodbury of Woodbury & Leighton, was made chairman, and John T. Healy of the bricklayers was made clerk. These two sessions not only resulted in the bricklayers securing the eight-hour day peacefully, but the idea of arbitration and conciliation was recognized by the creation of a permanent board of arbitrators, which will meet every month on the last Thursday.

These meetings will be devoted to hearing and adjusting matters and disputes which may arise between the union and members of the Mason Builders' Association.

The eight-hour system, which has been in vogue during the winter months, will now be a permanent thing the year round.

The same rate of wages per hour will prevail. This means that the men take so much out of their pockets in order to establish the eight-hour day, since the rate per hour is not increased, and where the men worked nine hours before they will lose one hour's pay.

They expect some time later, probably next year, that the rate of wages per hour will be increased, but at present they are only thinking of eight hours. This will affect in the neighborhood of 1500 bricklayers and possibly as many more laborers.

One of the members of the committee from the bricklayers' union, in speaking of the result of the meeting, said:

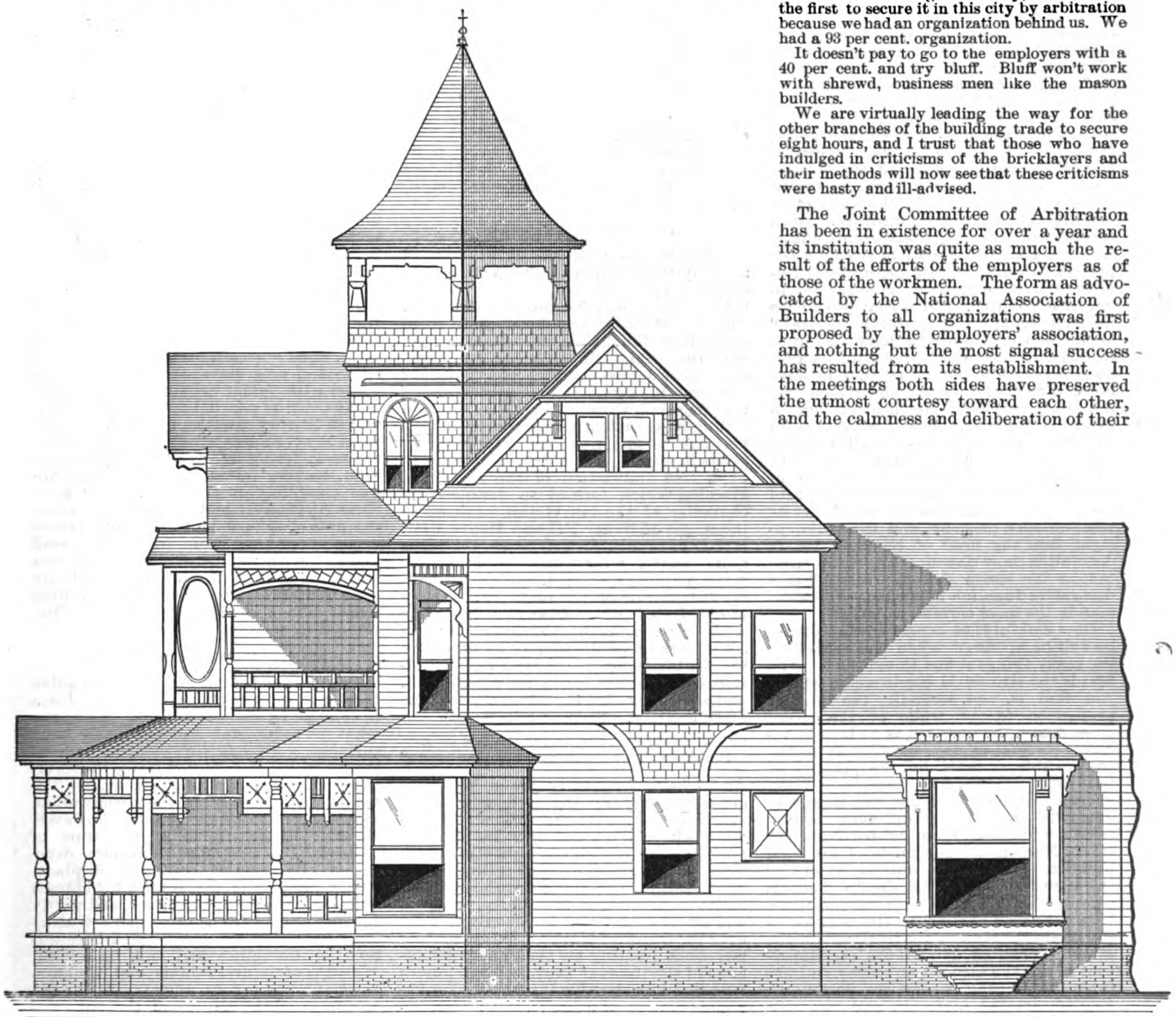
Don't put this out as a great victory for the bricklayers, or make any great blow about it. We met the employers fairly and they met us in the same spirit. They treated us like gentlemen and we tried to behave in a like manner to them.

We secured the eight-hour day, and we were the first to secure it in this city by arbitration because we had an organization behind us. We had a 93 per cent. organization.

It doesn't pay to go to the employers with a 40 per cent. and try bluff. Bluff won't work with shrewd, business men like the mason builders.

We are virtually leading the way for the other branches of the building trade to secure eight hours, and I trust that those who have indulged in criticisms of the bricklayers and their methods will now see that these criticisms were hasty and ill-advised.

The Joint Committee of Arbitration has been in existence for over a year and its institution was quite as much the result of the efforts of the employers as of those of the workmen. The form as advocated by the National Association of Builders to all organizations was first proposed by the employers' association, and nothing but the most signal success has resulted from its establishment. In the meetings both sides have preserved the utmost courtesy toward each other, and the calmness and deliberation of their action is a model for any organization. The spirit of enmity and antagonism has entirely vanished and the utmost harmony and manifest desire to secure the best results for all concerned prevail. The result obtained in this case presents an example worthy of the consideration of every organization of employers and union of workmen in the country.



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

THE Broadway Improvement Company will put up a fire-proof sky scraper near Fourteenth street for $600,000. The walls will have an iron and steel frame, which may be said to be the fashion in buildings of this description.

DECORATION OF CEILINGS.

WHAT shall we do with our ceilings? asks G. S. Robinson in the *Magazine of Art*. That, indeed, is a serious question; in fact, the difficulty of answering has too frequently crushed its consideration, and so nothing is done, and they are left in gaunt nakedness to dominate over luxurious walls and gaily clad floors. Yet when you consider that the ceiling of a room is the largest unbroken area it possesses, it is evident that its tasteful treatment is one which ought to be well considered and accomplished. And in periods of good art, by which I mean when art was felt to be a necessary adjunct to life, this has always been done. Go back as far as you will, you will always find that until the commencement of the nineteenth century, or rather until early in that century's career, the ceiling secured at least as much, and frequently more, artistic consideration than either the walls or the floor. Egyptian, Greek, Persian, Roman, Byzantine, Mediæval and all the varied phases of the Renaissance styles show us how the artists of those periods reveled in the adornment of their ceilings; nor, until the stern severity of the pseudo-Grecian phase, which, darkening the early years of the present century, cast its gloom over English art, were these ever neglected in our own country. From that gloom we have emerged. "The Gothic Revival," albeit some of those who have not lived through it now scoff at it, did us that good service—it taught us that to have our ceilings bald, barren and naked was not only uncharitable neglect, but a grievous blunder. The first essays in the Anglo-Dutch style—miscalled Queen Anne—did not do much to help, but the feebleness of that scrap-book eclecticism by which this strange hybrid was begotten manifested itself in its weak-minded progeny, and the truer insight into the need of homogeneity in decoration now dawning has more fully taught the lesson that the ceiling has a decorative function to perform which demands the most careful attention.

How careful that consideration should be will be apparent when you reflect on the many things it has to embrace. The first is the structural condition in which you find it, and, secondly, the relative proportion to the walls of the room. Then comes the question as to how it receives its light by day, whether from the ends or side, or both, and the quantity of that light. Thus, for example, a long, low room lighted from one end naturally demands an entirely different ceiling from a wide, high room lighted from the side. Nor should the mode of artificial lightning by night be unthought of, for the true value of your design depends equally on each of these considerations. You have then to consider the purpose of the room, the style of the treatment of the other decorations, and not the least important of all, the amount of money you are intending to expend upon it. Herein we English are sad niggards, and the ceilings of foreign houses are much more generously treated than with us. Floors and walls we treat lavishly, but the poor ceiling is too often left with the scantiest of covering. Two causes have no doubt combined to reduce our ceilings to this state of destitution, the one being an unsettled state of tenancy and the other the dirt generated by impure gas, or ill-trimmed oil lamps; but the advent of electric lighting bids fair to remove this latter, which has certainly been a just reason for not placing our best work there; indeed, the dreariest period of ceiling denudation dates from the introduction of gas, about 1814, so that now it is about to disappear from the principal apartments of our dwellings, we may reasonably hope for the resuscitation of this important branch of decorative art.

METHODS TO BE EMPLOYED.

Having thus noted some of the primary considerations as to any decoration of the ceiling, our first question reiterates itself with a slight difference. It is now, How shall we decorate our ceilings? There are two principal methods of doing so. 1. The formative; 2, the colored; and these can be combined—indeed, are better so. If you are constructing a new ceiling, decidedly the best plan is to have it modeled in stucco or gesso *in situ*, by which means it can be suited to the form, hight and the quality of light, and be an individual and appropriate work of art.

It was by this means that the best ceilings were constructed; both the more elaborate ones of Italy and France, and the simpler ones of our own country from the time of Henry VIII, when the art was first introduced into England, until the middle of the eighteenth century. I mention this long career of about 300 years to show how modeled stucco work suited itself to every change of fashion which occurred during that long and changeful time, and to demonstrate how plastic, in both senses of the word, it is, so that anything, from the richest figure work to the simplest ornamental detail, can be done in it.

INTERESTING EXAMPLES.

There is a very interesting example of an early Elizabethan ceiling in the replica of one recently added to that treasure house, the South Kensington Museum. This is taken from a moderate-sized room in Sizergh Hall, in Westmoreland, where, with the original inlaid wainscot, it presents to us a good example of a parlor, or withdrawing room, of the early years of the reign of Queen Elizabeth. It is a ceiling of a pendentive character, a type peculiar to England and which hardly exists in any other country, and seems to be a free translation of the stone fan groining which formed so distinctive a character of the late Gothic vaulting in the reigns of Henry VII and Henry VIII. If you have not already seen this it is quite worth your while to do so, as it is a genuine specimen, and the geometric distribution of the small ribs is very suggestive of other arrangements either with or without the pendants. As you see it in the reproduction it is simply in the white plaster, but these English ceilings were resplendent in color and gold, and always excited the admiration of our foreign critics. Spencer tells us that

> "Gold was the parges, and the ceiling bright
> Did shine all scaly with great plates of gold."

And I have frequently found traces of gorgeous coloring and rich gilding beneath the successive generations of whitewash which blunt and blur the delicate modeling our forefathers bequeathed to us. This ribbed division of the ceiling developed itself into an infinite variety of geometric combinations of squares, octagons and circlets, and you have only to turn over the pages of Nash's "Mansions," or any work treating on the domestic interiors of the times of Elizabeth and James I, to find innumerable suggestions for the recombination of a few simple figures arranged in almost infinite variety. The "square quatrefoil" dates from the time of James I, in whose reign these formative stucco ceilings were introduced into that kingdom, and where this particular figure of the square quatrefoil became pre-eminently popular, though it is by no means rare in English work. At first sight it is somewhat difficult to recognize that the basis of each of these combinations is precisely the same. In one, taken from Binu's Castle, Linlithgow, the quatrefoil is complete, the cusps abutting upon a square. In another, which comes from Winton House, the quatrefoil is simply severed at the points of the cusps and elongated by the addition of a straight bar, which is again connected with the central square by rectangular ribs. There were many other combinations of this quatrefoil arrangement, a favorite one allowing the square angles of it to overlap each other in a greater or less degree, or by simply touching at their angles. The ribs which formed these figures were at first simply molded, the modeled ornament being placed on the field of the ceiling, where the octagon is the principal form, as in a ceiling taken from Burton Kirk. Here the spaces between the reticulation of the ribs are somewhat small, so the ornament with which the field of the ceiling is charged is simple, but where the canon was larger important pieces of *basso-relievo* were attempted, such as achievements of arms, rebuses of quaint allusiveness, scenes from classic or Biblical history, the initials of the husband and wife twined with a true lover's knot, and many a pretty fancy. This surcharging of the field caused the merely molded ribs to appear too meager, and this reiteration of the same shaped space was then found to be too restrictive. Moreover, the disadvantage that the geometric pattern did not work equally to the edges of the ceiling unless that area could be divided into equal squares made itself more manifest as the size and shape of the rooms developed themselves; so the ceiling then came to be divided into four equal parts, each part filled with some convoluted figure meeting in the common center, which was usually emphasized by some molded or floriated pendant. Nor did the large size of some of our old stately rooms deter the bold attempt; for I know rooms in which the drawing of the pattern for one of these quarters is 11 yards long and 5 yards wide, filled with admirably drawn curves or meandering lines, involved and contorted with quaint unexpected quips and cranks, a true parallel to the quaintly involved literary diction of the time. In Lord Braybrooke's study at Audley End the meandering line is admirably distributed, leaving no empty spaces nor undue crowding in any part. Nor were these ribs merely molded as in the earlier example of the pendentive ceiling before referred to; they were frequently broad and flat, with molded edges, and on this surface was impressed a fine and delicate ornamentation, produced from a rolling wheel like a bookbinder's tool, or impressed by wooden molds.

WHERE SOME MAY BE FOUND.

The severe feeling of the Palladian architecture, introduced by Inigo Jones in Charles I's time, restrained this somewhat too redundant ornament, and large surfaces were left for painting, severe architectural distribution being the formative character of the plaster work. The troubles which during the Cromwellian interregnum beset the country, however, checked all this; and in the time of Charles II a reversion to a more decorative character of ceiling took place, partly because of the enforced baldness and severity of Puritan times, and partly because so many of the once more wealthy class had been living abroad, where this Spartan discipline had not been felt. Wreaths of natural flowers and combinations of circular form now prevailed, and in almost all the ceilings of this time you will find rectangular distribution absent. Of this class of work, more restricted and better composed, you will find good specimens in the Church of King Charles the Martyr, at Tunbridge Wells. With the formal Dutch feeling, introduced so largely during the reigns of William III and Queen Anne, the prevalence of rectangular forms again returned, the ceilings then having generally rectangular panels round the outsides, with a circular panel in the center, this being filled with well-modeled and often very interesting *bassi-relievi*, while the rectangular ones were filled with conventional ornament. Of this date a very charming ceiling, designed by Sir Christopher Wren, in which painting and modeling are combined, exists in the Board Room of the New River Water Company. A little later on the influence of the French taste became generally manifest and the imitative translation of the Louis XV style popularized in this country by the designs of Chippendale, Lock, and others.

WIND BRACING IN HIGH BUILDINGS.

IN THE DISCUSSION which followed the reading of the paper of Mr. Quimby on the subject indicated by the above title, and published in our last issue, a number of valuable points were brought out by well-known civil engineers who took part. As their remarks are likely to prove not only interesting but instructive to many of our readers, we present herewith portions of the discussion with accompanying diagrams. The first speaker was J. P. Snow, who expressed the opinion that if architects and architectural engineers would use built sections seriously interfere with the necessary openings in the partitions.

A feature that I once used in a design for a high building may be worth describing, he said. The building was 48 feet wide, and eight floors, each figured for 150 pounds per square foot, together with the roof, were to be carried by the frame so as to leave the floors below clear for halls. I used two main columns of Z-bars footing on the walls and inclined inward so as to be 10½ feet apart at the roof. The main floor girders were channel shape, in pairs, and riveted across the sides of the posts. objection to this style of post is the thickness of partitions required to cover it. In defense I submit that a structure must have a skeleton somewhere to sustain it, either on the outside like a crustacean, or inside like a vertebrate, and if the outside walls are reduced to "mere curtains," as quoted by the author, we must be allowed space for a proper skeleton within.

CONNECTIONS OF COLUMNS AT FLOOR LEVELS.

Foster Milliken spoke particularly of the connections of columns at floor levels, be-

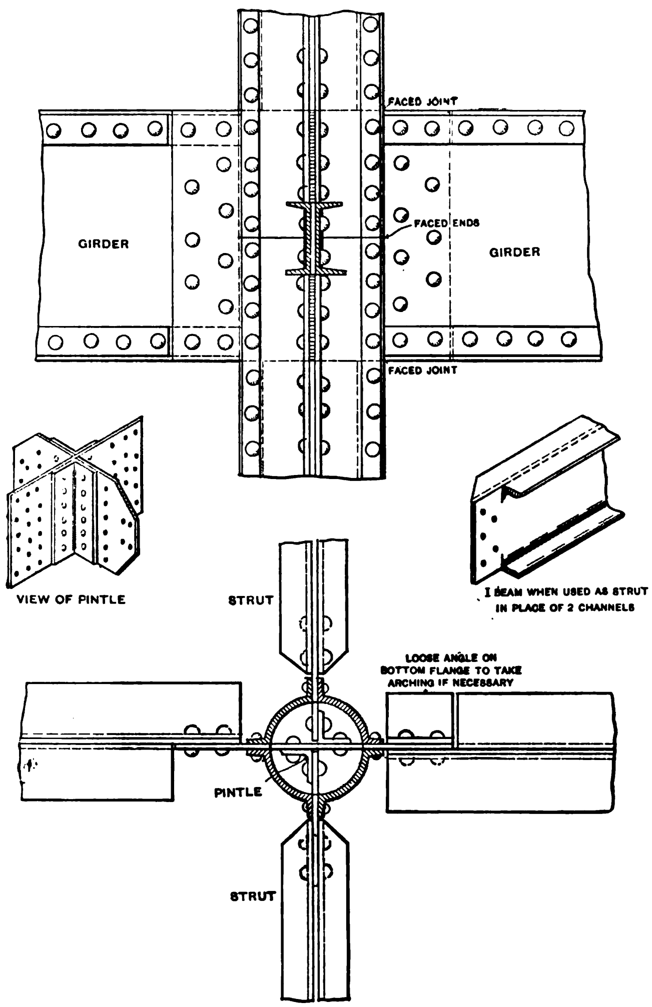


Fig. 4.—Cross Pintle Connection, Showing Method of Joining Girders and Struts.

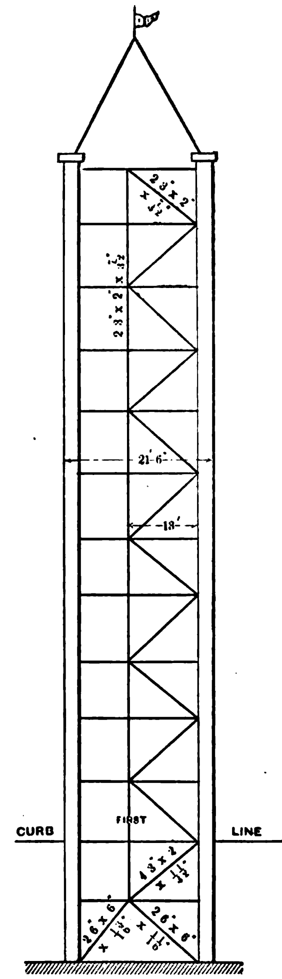


Fig. 5.—Method of Trussing the Tower Building in New York City.

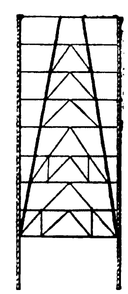


Fig. 3.—One Style of Framing employed in Tall Buildings.

Wind Bracing in High Buildings.

of plates and angle irons for their large girders instead of the conventional rolled beams, they could make much more efficient connections with their columns than is usual in ordinary building construction. The use of cast-iron columns with metal floor beams cannot be called good engineering, unless the columns must be exposed as in halls. If we have friendly partitions in which to hide the posts, wrought iron is cheaper and gives us much better facilities for making good connections with the floor girders. With built girders and wrought-iron posts such joints may be readily designed as will give a fair amount of rigidity in those cases where regular transverse bracing would The floor stringers were rolled beams headed into the girders. The walls in this case were sufficiently heavy to carry the floor beam weight delivered to them by the ends of the beams. The sketch, Fig. 3, shows the style of framing adopted. The inclined posts act to resist an overturning tendency like the legs of an ordinary trestle. The floor girders, being riveted or bolted across the posts, make a very rigid and convenient joint. The diagonal members are inside the girders and are quite light; they were arranged in strut form to clear a wide circular-topped central corridor. If doors could be otherwise arranged, a tie system would probably work up lighter. A possible cause these are their weak points when considering wind strains. He said that when cast-iron columns with wooden girders were first used for buildings, the round or oval cast pintle was adopted. This was not connected in any way by bolts or rivets to either column, and its equilibrium depended on the wooden girders holding it in line, much the same as a child would pile blocks up and steady the pile with its hands. After numerous accidents during and after erection, the pintle was cast as part of the upper column. This was like taking one of the "blocks" out of the pile at each level, but still accidents occurred. Subsequently, the line of joint was made above the floor, and the pintle cast on the lower column, the connection to the upper column being made by flange bolts. This connection answered for a great many years, and is still largely used, but the days of cast-iron columns for all but buildings of a few stories with short shafts are numbered. Owing to the many faults of cast-iron columns many engineers and architects refuse to use them for important high structures, and wrought-iron and, more recently, steel columns have come into very general use. The question naturally comes up as to the connections of columns at the floor level. Iron workers followed at first the practice for cast-iron columns, using a bracket near the head of the column for the support of the beams or girders and making the joint in the column above the tops of the beams, or just below the floor lever. In some cases the joint was made at the under side of the beams; but this, except in certain cases, necessitated putting up two tiers of columns before the beams of the floor below could be put in place. Either of these forms is open to radical improvement, as can be clearly shown by reference to an entirely new and different form of connection. That illustrated in the various sketches shown in Fig. 4 is adapted for use with the Phœnix column and is called a cross pintle. Similar forms may be designed for other styles of columns.

The main points constituting the perfect joint can be classified under the following headings:

1. Continuity of columns from cellar to roof.
2. Proper connections for load and distribution of loading on the column.
3. Facility of connection for wind bracing.
4. Ready alignment of column.
5. Simplicity of design, thus facilitating erection and minimizing error.
6. Cost.

CONTINUITY OF COLUMNS.

An ideal column would be one that had a uniform taper and whose section varied from floor to floor as the loads increased. In the design presented we have a column that meets these requirements, for as soon as the connection is made and riveted the pintle forms a splice or fish joint of the very best kind, in which the joint is stronger laterally and vertically than any other part of the shaft. Opportunity for change in sectional area is provided at each tier. There is no leverage to tear the joint asunder, such as there is in any flange joint. All that is necessary to separate a flange connection is to strip the bolts or pull the rivet heads off, especially where the joint is above the floor, in which case the floor beams offer no brace to the foot of the column. The effective length of a column with the cross pintle connection is the distance from the floor level to the ceiling only, thus reducing the effective length. The ends are in every sense of the word fixed.

As to the second point, the bearing of beams and girders on columns. In the type of connection here presented the cross pintle is simply a continuation of the webs of the girders clear through the column, distributing the load to all parts of the column and overcoming to a large extent the tendency of eccentric loads to bear only on a part of the column and thus tend to bend it. The connection of a girder to a column is much more satisfactory when made through the web than through a bracket under the girder flange. Brackets are undesirable, as they interfere with the floor and ceiling finish of a room. The cross pintle itself transmits its load directly—that is, by actual contact with the filler bars below it, in addition to which the rivets in the column flanges act in double shear.

As to the third point, the arrangement for wind bracing. While this connection would not do away with wind bracing altogether in a narrow and very high building, yet it can be seen at a glance that where columns of the old style would need wind bracing, this form would in many cases answer without it, owing to the very rigid connection of the column to the girder and because the column is continuous from cellar to roof. Where wind bracing is found necessary I would recommend that the cross pintle be made deeper than the girder, and the diagonal rods be connected by pins directly to the pintle plate. This connection would also offer greater resistance in the case of uneven settlement of columns.

ALIGNMENT OF COLUMNS.

As to the fourth point, the alignment of columns. Every one who is familiar with construction knows how much time it requires to "true" columns and align them, and what a great saving it is to have a column that aligns itself. The upper column fitting over a pintle must necessarily align itself whether the workman is careless or not. This brings us to the fifth point, simplicity of design, so that ignorant workmen cannot go astray. I have often seen columns designed with the utmost care, with ends all carefully faced, set up on nails, bits of slate, sheet iron or anything convenient, so as to correct the error made in the column already set up. It is quite evident that such a column will not safely bear the load it was designed to carry. The connection here shown cannot be tampered with, as the columns will not then fit together. I have always had more or less trouble with columns with brackets; the brackets are often bent, and in some cases entirely broken off either in transit or in handling them while in process of erection. The columns fitted for cross pintles are, when shipped, simply a shaft free from all brackets or projecting plates.

As to the sixth point, the cost of columns is certainly reduced by this system. The greatest expense in shop work is work that requires forging. This plan of connection is absolutely free from bent plates of any kind. Further, the plates are always of such size that they are easily procurable. The work is of the very simplest kind, while the weight of the connections themselves is from one-half to two-thirds that of the ordinary cap and base-plate connection.

A BOLD EXAMPLE.

J. Foster Crowell referred to the 11-story office building in course of erection at the corner of Broad and Beaver streets, in this city, and stated that if the criticisms here presented were well founded, it exhibited great boldness on the part of the designer. It stands on a pile foundation and is carried on cast-iron columns from base to roof throughout. The exterior walls are of masonry, serving as curtains merely, and do not extend below the street level, so that the first tier of columns is without vertical plane bracing. The arrangement of columns and floor connections is different from the types just described. The floor girders are secured to the tops of the columns, which pass between them to the upper flange, resting on brackets or lugs cast on to the columns. Each tier of columns rests directly on the tops of the tier below and is held in place, laterally, by flange bolts, which evidently have no adequate relation to diagonal bracing. The several stories are simply a succession of "tables" piled one on top of the other. There can be little or no rigidity in the connection between the feet of the columns and the girders, and the architect probably relies on the table construction, in addition to the masonry filling in the exterior walls and partitions, for bracing against overturning. In case of unequal settlement of column foundation, it would seem as if there might be serious trouble in this type of building, due more particularly to the use of cast-iron for columns.

George A. Just thought it hardly necessary to calculate buildings to resist a wind pressure of 40 pounds per square foot of exposed area, as danger from wind exists mainly during construction, while walls are still "green" and the building remains to be "topped out."

Buildings have been erected in this city—and, no doubt, elsewhere—he said, with such a disregard to resistance of wind that the conclusion seems inevitable that they remained intact only by the operation of forces that are ordinarily ignored by engineers in their calculations. However, the architect and builder rely upon these forces, and in the end they seem sufficient. I admit this is not good practice or good theory.

The detail shown by Mr. Quimby in Fig. 1 of his paper, and one that is generally used since the introduction of wrought columns in buildings, is a poor one. It prevents good splicing and girder connections, and makes the erection of the next higher tier more difficult for the "setter." On this point the "rolling-mill engineer" could well follow the less professional "iron man," who always attaches his girders and beams to the head of the lower column and makes his joint at or above the floor line. I happened to be connected with the erection of the first and some of the subsequent buildings of this class in New York. The first, known as the "Tower Building," I declared unstable as it was being "topped out."

This building of eleven stories, with basement and cellar, reaching about 116 feet above the curb, with a wing or frontage of only 21 feet 6 inches on Broadway, was constructed with the usual cast columns spaced 13 to 19 feet on centers, with longitudinal and cross beams in the floors. The connections of the latter to the columns were made in the careless manner usual to buildings, so that for purposes of calculation it was deemed wise to consider the side or gable walls as virtually independent of each other. As a result five trusses (Fig. 1) were introduced into the narrow part, or Broadway wing, of the building, transversely, and extending from the cellar to the roof, as shown in Fig 5. The columns of the south wall were utilized as a chord. The other chord consisted of double L-irons placed 13 feet away at the line of the hallways, which of course could not be closed up. This new chord was attached to the intersecting floor beams at each story, the web members by panel plates to the angle-chord, and by tap bolts and bent plates to the cast columns. While the value of the latter connections depended mainly on the skill and care exercised by the workmen, it seemed at the time the only means to an end. In the worst case the loads assumed induced strains that required chord sections at the bottom of two 6 x 6 x $\frac{11}{16}$ inch angles, and end webs each of four 3 x 2 x $\frac{11}{32}$ inch angles. These small-legged angles were used so as to confine the iron within the partitions, none of this trussing being visible in the completed building. The trusses were spaced 18 to 25 feet center to center, to meet the position of the wall columns already in place.

(To be continued.)

As a telling testimonial of the durability of its woods and an advertisement of its lumbering industries, Oregon will send to the World's Fair a number of shingles that have been doing service on a roof in Whatcom for over 25 years. They are of cedar, and were laid with 5 inches exposed to the weather. All that Oregon weather has done is to wear down the surface about ⅛ inch; the remainder of the wood is sound, and is said to be far harder than it was on the day the shingles were laid.

The Pittsburgh Building Inspector's annual report for the fiscal year, which closed on January 31, is now about ready, and shows that the building operations for 1892 in Pittsburgh surpassed all previous years. The actual number of buildings erected during the year foots up about 3470, an increase of over 200 over all former years. In 1889, which was the banner year until the present, the number of buildings erected was 3254, and this was then considered extraordinarily high, as it exceeded by far all previous records. The value of the improvements is greatly increased, and will foot up in round numbers nearly $9,000,000.

WHAT BUILDERS ARE DOING.

FROM CORRESPONDENCE previous to the date of the convention of the National Association of Builders at St. Louis, and from the opinions of the delegates to that meeting, builders generally are looking forward to an active and profitable business in the season now approaching. It is expected that there will be less friction with the workmen than ever before; both sides are growing into greater and wiser knowledge as to the best means for securing and maintaining equitable conditions, and both are less inclined to arbitrary action than formerly, notwithstanding that individual cases seem at times to contradict the fact. The recommendation of arbitration by the National Association of Builders, combined with a clearly defined and honorable form, dealing equal justice and power to both sides, has done more to set employers in the building trades thinking than any other specific movement ever undertaken in this country. One of the most valuable features of this form of arbitration is the fact that it provides a perpetual means for the prevention of labor troubles, giving to both sides equal representation and voice in the settlement of details and conditions. New organizations of employers are forming at a more rapid rate than ever before and all such have the benefit of the experience of the older bodies, and the National Association gives with scrupulous impartiality, alike to all, the recommendations that have proved so beneficial to its own filial bodies. The prospect for 1893, so far as it relates particularly to the relationship between employers and workmen in the building trades, seems unusually bright, and indications as to the pecuniary result of the year's work are equally promising at present.

Baltimore, Md.

The Baltimore builders are beginning to get thawed out for the season's work. Operations have been resumed on jobs that have been idle during the winter weather, and new work commenced. The members of the Builders' Exchange are happy in the prospect of breaking ground this season for their new home. It is confidently expected, at present, that another winter will see a fine building owned by the exchange, under cover and well along toward occupancy. The strike of carpenters, which proved a considerable set-back to building operations last season, and which was abandoned after a fruitless effort to gain concessions from the employers, seems to have become a thing of the past only, and no trouble of a similar nature is expected in this branch of the business this year.

Boston, Mass.

Present indications for the coming season in Boston point to about the usual amount of work, and there are no special signs of any unusual activity or dullness. The action of the Master Builders' Association on the question of eight hours which was referred to in this department last month, was brought up for action at a special meeting on a motion to reconsider the vote which killed the resolution in favor of advocating the adoption of eight hours on November 1, 1893. By a small majority of those voting it was decided not to open the subject for discussion. The joint committee of arbitration of the Mason Builders' Association and the Bricklayers' Union are at present engaged in adjusting their mutual concerns for the coming year, and at the time this is written an adjourned meeting is pending at which the question of hours of labor is to be considered. At a meeting of the Mason Builders' Association held February 7, for the purpose of securing the opinion of the members on the question of eight hours, it was decided to be the sense of the meeting that it would be unwise to establish eight hours this year.

The following resolution was unanimously adopted at a special meeting of the Master Builders' Association, February 3, 1893:

Resolved, That our delegates to the seventh annual convention of the National Association of Builders, to be held in St. Louis on the 14th inst., be instructed to convey to the National Association the hearty and cordial invitation of this body to hold its eighth convention in the commercial metropolis of the Old Bay State.

In conveying this invitation, the delegates are further instructed to say that inasmuch as Boston was the birthplace of the National Association, it seems appropriate that the Master Builders' Association should extend a special welcome to the central body, and sincerely hoping that the eighth convention may be fully attended, we beg every filial body to remember that in coming to the Hub they are returning home for the first time since their departure seven years ago, and that the best hospitality which New England can offer awaits them.

The Master Builders' Association of Boston assures the National Association that its doors will be wide open to each and every one who may have an interest in the National Association affairs, and that, if we have anything good to offer as illustrative of what an organization of builders can and ought to do, it will be our especial pride and satisfaction to offer it on the occasion of the eighth convention.

In the meantime the Master Builders' Association of Boston desires to say to each and every individual member of the filial bodies of the National Association that the latch string of our exchange rooms is out from the first day of January to the last day of December, every year, and we shall be only too happy to receive visits at any time, either for purposes of business or for special visitations. If individuals desire to compete for work in our vicinity, we will afford them every opportunity to gain needed information, and will take our chances of winning the game. If they are on pleasure bent, we will devote ourselves to their entertainment and will not let them leave our limits without an acknowledgment that a friendly hand was ready to greet them in the Boston Exchange.

The hope is expressed that in fixing the date for the eighth convention it may seem possible to have the meeting occur in the early fall, so that advantage may be taken of the natural beauties of the New England coast in entertaining our visitors, but if this does not seem wise to the National convention its verdict will be gracefully received by the Boston Association, and the warmest kind of a welcome will be extended by us at whatever date the convention may be fixed upon. So

"Come in the evening, or come in the morning;
Come when you're looked for, or come without warning;
Come when the cold winds of winter are blowing;
Come when the furnace of summer is glowing;
Come in the springtime, or come in the fall;
You'll only offend if you don't come at all."

A true copy.
Attest: WM. H. SAYWARD,
Secretary M. B. A.

The following gentlemen selected to attend the St. Louis convention were accompanied in several instances by their ladies: E. Noyes Whitcomb, C. Everett Clark, Wm. N. Young, James Fagan, Cyrus T. Clark, Walter J. Connery, Franklin Smith, Walter S. Lyons, Charles W. Parker, John Y. Mainland, George E. Leighton, Isaac N. Tucker, David McIntosh. Ira G. Hersey, first vice-president, and Wm. H. Sayward, secretary of the National Association, were delegates by virtue of their office.

Buffalo, N. Y.

The following gentlemen were in attendance at the St. Louis convention from the Buffalo Exchange: John Feist, A. A. Berrick, James Boland, Charles A. Rupp, W. D. Collingwood, G. S. Donaldson, William Schumacher, George W. Carter, George Duscherer, John O'Connor, J. J. Churchyard and C. M. Cook.

The sash and blind manufacturers held a big general meeting at the Builders' Exchange, February 8. They are trying to form an organization which shall include all who sell in markets east of the Ohio River. The president is A. S. Bartlett of Binghamton.

Cincinnati, Ohio.

The builders of Cincinnati, as represented by the Builders' Exchange, have combined with the real estate men for the purpose of forwarding a project to build an ice harbor. The two organizations are actively considering the subject, it being considered a very important one for the welfare of the city. One of the members of the Builders' Exchange, B. W. Blair, was elected vice-president of the National Brickmakers' Association at the recent convention at Louisville.

Detroit, Mich.

The Builders' and Traders' Exchange of Detroit has settled in its new quarters at 92 Fort street, West, and celebrated the occasion with an informal house warming on February 1. The new location is a very favorable one, and the building peculiarly adapted to the wants of the exchange. It was until recently occupied by the Michigan Club, is three stories high, and will be entirely devoted to the use of builders and those connected with the building business. This move on the part of the exchange will do much toward localizing and centralizing the building interests of the city, a condition that has proved beneficial in every city where it has been accomplished. The informal opening was a delightful affair, and a large number were present. From the reports of Superintendent Guiney of the exchange as to the number of contracts let to members during the past month business seems to be very fair for this season of the year.

Grand Rapids, Mich.

The Builders' and Traders' Exchange of Grand Rapids, at its annual election, selected the following officers to serve during the ensuing year: President, P. C. Campbell, vice-president, A. A. Stearns; secretary, John H. Hoskens; treasurer, W. C. Weatherly. Directors: Geo. N. Miller, Jas. Curtis, W. T. McGurrin, N. Rosema, W. C. Hopson. Delegates to the convention of the National Association at Cleveland: P. C. Campbell (director and delegate at large), James Curtis, W. T. McGurrin. Alternates: W. C. Hopson, Chas. Hoertz, N. Rosema.

Business is reported as being good.

Lynn, Mass.

The Master Builders' Association of Lynn held its regular meeting at its rooms, 18 Andrew street, on Tuesday evening, February 7, at 8 p.m. In the absence of President Frank G. Kelly, A. J. Dearborn was elected president *pro tem.* After a large amount of routine business had been transacted, the application of new members came up; the Executive Committee reported the name of E. E. Strout, mason and builder, and he was elected a member of the association.

A. J. Dearborn and L. A. May were elected delegates to the National Convention of Builders to be held at St. Louis, February 14, 15, 16, 1893.

The Executive Board will meet on the first and third Tuesdays of each month to consider new applications, as it is expected that all the contractors and builders of Lynn will become members of the association in the near future.

Milwaukee, Wis.

The Carpenters' Union of Milwaukee has decided to make an attempt to have the wage scale and other matters in dispute between its members and their employers settled before the season opens by a joint committee, in which both the bosses and their employees will be represented. The union has sent a request to the various boss carpenters' associations of the city asking them each to appoint a committee to represent them at the conference, at which delegates from all the unions are expected to be present. At the meeting the wage question will be discussed, and if a satisfactory agreement can be reached it will be settled.

If their plan for calling a conference succeeds the carpenters are certain that the move will prove a satisfactory one. They claim that at the meeting the delegates from the union and the Carpenters' Association will come together upon an equal footing, and that it will not only be a move which, if adopted as a permanent thing, will prevent future strikes, but that it will tend to produce harmony of action between the bosses and the men.

The demand made by the union has not yet been made public, but it is understood that the workmen expect to demand that none but union hands be employed, also that a slight advance in wages be granted.

The employing carpenters say that such a demand will be met with refusal. At present they pay 27½ and 30 cents an hour, with eight hours' labor, but employ such men as they deem competent to do their work. They are willing to meet any and all reasonable demands, but they are all agreed that they will not advance the present scale.

The master masons have also agreed to a conference, to be held at the same time. The men, according to one of their number, are organizing, and, should a demand for more wages be refused, it is probable that a general strike will result. Another thing they expect to enforce is that none but union men be employed in any department of a building on which they are employed.

The masons will also doubtless come forward with their yearly demand for increased pay, and the outlook of Milwaukee's building prospects being unhindered by labor trouble in '93 are not bright.

At the annual meeting of the Builders' and Traders' Exchange, which occurred recently, the subject of trade schools, as advocated by the National Association, was brought up for consideration. The builders of Milwaukee have long recognized the need of an effective trade school and have frequently attempted to set a movement on foot that would result in the establishment of such an institution in the city.

Minneapolis, Minn.

The Builders' Exchange at the last regular meeting elected E. F. Dodson a delegate to the national convention held at St. Louis February 14, 15 and 16, and as alternates Capt. Charles W. Brown and C. E. Richardson. Geo. W. Libby was the delegate at large, by virtue of his office as a director of the National Association.

After the election the secretary read a letter from Mrs. A. A. Pond, expressing thanks for their kind attention during her bereavement.

A joint meeting of a committee each from St. Paul and Minneapolis took place at the rooms of the exchange January 23. This committee is known as the Committee on Legislation, its members being as follows:

From Minneapolis—Herbert Chalker, George Cook, George W. Libby, B. Cooper.

From St. Paul—Wm. Porter, O. L. Rhaume, William Rhodes Peter Long, William H. Ulmer, George M. Morton and Herman Hardt.

New York City.

The Mechanics and Traders' Exchange of New York, at the annual meeting, January 31, elected the following officers for 1893:

President, George Moore Smith; vice-president, Isaac A. Hopper; treasurer, Edmond A. Vaughan; secretary, Stephen M. Wright; trustees: John J. Tucker, John J. Roberts, Thomas Dimond, James B. Mulry, John C. Doremus, Matthew C. Henry, John J. Donovan; examiners (Department of Buildings), Warren A. Conover, Edwin Dobbs; inspectors of election: Lawrence Curnen, Isaac E. Hoagland, Robert L. Pirsson.

The following, from one of the New York dailies of January 27, shows the result of arbitrary action by leaders of a trade union, which is evidently as ill advised as it is unjust:

Charles W. Hewitt and 30 others, representing one faction of the Journeymen Stonecutters' Association, have begun suit to compel John Morris, president of the union, to remit about $1000 in fines which have been imposed on them. They also demand to be reinstated in the union, by which they were suspended for non-payment of the fines.

The trouble dates back to November, when the union split into two factions, and each side tried to elect officers. Hewitt was the leader of one faction and Morris of the other. At a meeting in Brevoort Hall on November 16 John Kelly, the treasurer, was accused of not accounting for $10,000. The meeting broke up in a riot. Morris was elected president during a lull in the fight. Then Hewitt and the others were fined for the part they took in the row. They refused to pay the fines, and were suspended from the union.

Philadelphia, Pa.

The sixth annual meeting of the Master Builders' Exchange was held January 24, afternoon and evening, in the Exchange Building.

The organization put itself on record regarding two questions which are at present agitating the public mind—the Public Buildings Commission and the adoption of stringent measures looking to the rigid inspection of buildings used for business purposes, particularly for the storage of heavy merchandise, in order to prevent the repetition of the accident and loss of human life which occurred on January 16, when the Nixon paper warehouse collapsed and killed three men.

The attitude of the exchange toward the Public Buildings Commission was clearly defined in the following resolutions, drawn by John S. Stevens, and presented, after adoption, through the Board of Directors. They were passed by a vote of 36 to 4, after lengthy arguments for both sides. They are as follows:

Your Board of Directors has recently received communications asking them to take part in the demand upon the State Legislature for the abolishment of the Building Commission.

Deeming this a very important subject, they consider it best to refer the matter to the corporation meeting for their action, with the following comments:

While there seems to be a widespread demand for the abolishment of the commission by the public at large, the City Councils and the public press, yet your Board of Directors think it well to pause and consider the subject calmly before taking action.

That the Building Commission is clothed with autocratic powers, which they have exercised in such a way as to cause general dis-satisfaction, is not to be denied, yet it is questionable whether at this late day it would be wise to take the work out of their hands and place it in charge of a city department.

We all know that the work thus far done on the public buildings is of the very best of its kind, both as regards the material and the workmanship, and is a credit to the city of Philadelphia, to which all her citizens can point with pride. We grant that some, perhaps many, mistakes have been made, notably the tower contract, and possibly the work might have cost less money if done by the city authorities, but, judging from the general character of "city work," we seriously doubt it it would have been as well done as it has been under the careful supervision of the able architect, superintendent and their assistants.

Would it not be better to have the law amended, making the commission amenable to our City Councils, requiring them to send to the Finance Committee of Councils an itemized statement of their requirements, as is done by all the departments, and compelling them to limit their contracts and disbursements for the year to the amount so appropriated? It does seem but just that the city authorities, who have to furnish the money, should know how and for what it is to be expended.

Also, instead of having the commission to continue itself indefinitely by filling vacancies as they occur, have the terms of a certain number of the board (not more than one-third) expire at the end of each year, and the vacancies filled by appointments by the board of judges of our courts.

It is the judgment of your board that the exchange should advocate calm and deliberate action in the premises and ask the Legislature to amend the act as suggested, instead of abolishing the commission.

Resolved, That this corporation approves of the recommendations contained in the communication received from the Board of Directors and, further,

Resolved, That a committee of five be appointed to go to Harrisburg and present the same to the Legislature.

A lengthy discussion followed the presentation of the resolutions, which resulted in their adoption by the vote above mentioned.

The election for seven new directors in the board of 21 resulted as follows: Samuel Hart, Frank F. Black, Peter Gray, Charles Gillingham, Jacob Myers, Charles H. Reeves and William Harkness.

The annual report of the board was then read. It was a lengthy and interesting document to the exchange. Included in it were the following facts: The average daily attendance at the exchange was 65, an increase of 10 per cent. over 1891. There were 90,000 visitors to the Exhibitors' Department.

The Trades School Department had been very successful in securing good pupils and graduating competent workmen. The Real Estate Department is in good condition. The board tendered their obligations to the press of the city for their influence in behalf of the organization.

The total membership is now 280, including 124 corporate and 156 non-corporate members; a net decrease of 14 since 1891. The financial statement sets forth: Receipts, $9883 04; expenditures, $7391.48; balance, $2491.56. The board recommended that an endowment fund, for the perpetuation and support of the Trade School, be created, and also the starting of day classes when there was a demand for the same. The reports of various committees were included in the general report.

The Joint Special Committee of City Councils on the revision of the building laws met on February 3 in the office of the Clerks of Councils to consider the draft of the proposed law which Mr. Haddock has prepared. The subject has been receiving the attention of builders and real estate operators for some time past, and a number of representative men in the trade were present at the meeting, among the number being Director of Public Safety Beitler, who is at the head of the Bureau of Building Inspectors; William Harkness, Jr., Secretary of the Master Builders' Exchange; Stacy Reeves, William T. B. Roberts, Michael Andress, A. B. Hutton, J. S. Stevens, J. B. Howell, W. S. P. Shields, W. C. Merritt, Peter Carrigan, C. C. Moore, Thomas H. Marshall and James Hastings.

The committeemen and the builders discussed the subject in an informal manner for nearly two hours, the builders proposing many minor changes which their experience suggested.

The one hundred and third anniversary of the Bricklayers' Company was celebrated at the Builders' Exchange. The annual business meeting preceded the banquet and celebration.

The following officers were elected to serve for the year 1893: Joseph B. Hancock, president; R. C. Ballinger and John Atkinson, vice-presidents; John W. Miller, treasurer, and William J. Gillingham, secretary.

Providence, R. I.

Pursuant to a call issued by Secretary Cady of the Builders' and Traders' Exchange of Providence, a meeting of the contractors and builders of the city was held in the rooms of that body, February 1. T. B. Ross presided, and W. F. Cady acted as secretary. The question brought up, in the form of a motion by T. B. Murphy, was that "on and after May 1, 1893, we grant our men nine hours a day." The motion was fully discussed by Messrs. Hayward, Murphy, O'Reilly, and Spencer B. Hopkins presented a paper upon the subject. The question was finally divided. It was voted unanimously that nine hours should constitute a day's work, but that the time fixed should be March 1, 1893. It was further voted that overtime should be charged time and one-half, and holidays be charged double time. The object of the contractors and builders in this move is to anticipate the masons and carpenters, who have announced their intention of demanding a nine-hour day after May 1, and thus create harmony. The question as to whether ten hours' pay will be given or required for nine hours' work was not discussed. This will be regulated largely by the supply and demand, although both employers and employees look to but one ultimate result, viz., no reduction in wages.

Rochester, N. Y.

At a meeting of the Builders' Exchange February 7, the following named officers were elected: President, H. H. Edgerton; first vice-president, T. W. Finucane; second vice-president, F. C Seitz; third vice-president, J. J. L. Friederich; secretary, J. E. Summerbay; superintendent, H. M. Parish.

St. Louis, Mo.

The annual meeting and election of officers of the St. Louis Builders' Exchange took place January 17. The offices to be filled were those of president, vice-presidents, six directors, Committee of Arbitration and Appeals Committee. The race for presidential honors was an especially exciting one. The two candidates, William J. Baker and Jeremiah Sheehan, each had a large following. Mr. Baker was elected by a vote of 88 to 70. P. J. Moynihan and Patrick Rowan were elected vice-presidents. Out of the twelve candidates for directors, the required six were made up of William M. Anderson, Charles B. McCormick, Thomas J. Kelly, William A. Rutter, Joseph L. Guerdry and Patrick Mulcahey. The Committee of Arbitration selected was: Adam Bauer, David Roden, William Daman, A. J. Judge, John J. Ganahl, Charles Fathman, Jr., August Fick, W J. Fletcher and Joseph P Kelly The candidates for Appeals Committee selected were: George Ittner, Thomas F. Hayden, George F. Bruce, Augustus Bullis, Mark Hudson, Seneca N. Taylor, C. C. Weaver, Patrick Kirby and C. Kellerman.

The Builders' Exchange got out a very attractive volume in connection with the seventh annual convention of the National Association, held in their city February 14, 15 and 16. In addition to containing a directory of the National Association of Builders, it presented a programme of the convention, a brief sketch of the St. Louis Exchange, together with likenesses of some of the gentlemen prominently identified with the local and national bodies. There was also given illustrations of many of the prominent buildings in St. Louis, with general information likely to interest those attending the convention. The volume was substantially bound in board covers, and carried a gilt side title. Numerous advertisements of interest to the building trades were scattered through the pages.

Wilmington, Del.

The annual meeting of the members of the Builders' Exchange of Wilmington was held January 24, at the exchange, 605 Market street.

President Archibald S. Reed in his annual report said that the exchange was in an excellent condition. He recommended the securing of property for the erection of a new building for the exchange.

Secretary Foulk reported a membership of 64 in good standing, an increase of 14 in the year.

Treasurer Henry Evans reported a balance of between $1100 and $1200.

The following directors were elected for three years: William H. Foulk, Philemma Chandler, Richard Kelly, H. A. Miller, Jesse K. Baylis, Frank A. Mitchell and J. R. D. Seeds.

A. S. Reed, John P. Allmond and William H. Foulk were elected delegates to the convention of the National Master Builders' Association.

A proposition to reduce the dues was defeated. It was decided instead to give a dinner, and George H. McCall, Frank A. Mitchell, Richard Kelly, Jesse Simmons and Lundy Kent were appointed a committee on the dinner.

The exchange is endeavoring to secure the establishment of uniform measurements for masonry.

Worcester, Mass.

The builders of Worcester have been much interested during the past month over a public discussion of the labor question in the rooms of the Board of Trade between O. W. Norcross and Geo. E. McNeil, of Boston. Mr. Norcross, who spoke from the standpoint of the employer, is well known throughout the country as the largest employer in the building trades, perhaps in the country. Mr. McNeil, who treated the opposite side of the question, is well known in Boston and vicinity as an energetic worker in the cause of trade unionism. The aspects of the questions to which the speakers confined themselves were those relating particularly to the functions of a trade union and the character of the leaders. The result of the debate seemed to leave the honors about evenly divided. No new methods were used by either of the gentlemen, but the old stock arguments were well handled.

Notes.

The following officers have been elected for the ensuing year by the Building Trades Club of New York City: President, John J. Tucker; vice-presidents, Andrew J. Campbell, Charles A. Cowen; secretary and treasurer, Stephen M Wright; managers for three years, William T. Ritch, Edwin Outwater, William H. McCord, Edwin B. Tompkins, William K. Hammond.

The builders of Lima, Ohio, are at work endeavoring to establish a Builders' Exchange upon the lines advocated by the National Association. F. M. Leech is one of the prime movers in the undertaking, which, it is expected, will be carried to success in the near future.

Dankmar Adler of Chicago has resigned his office as secretary of the American Institute of Architects, and Alfred Stone of Providence has been appointed in his stead. Mr. Adler alleges as a reason for his resignation that press of business prevents his devoting the requisite amount of time to the affairs of the Institute.

The officers of the newly-established Master Builders' Association of Fitchburg are: J. D. Littlehale president, W. H. Keyes vice-president, J. S. Starr secretary and treasurer; directors, Frank McCauliff, A. Dunkason, H. B. Dyer, A. Wellington, H. E. Jennison and Geo. Buckley. The association is pleasantly located in the Safety Fund Bank Building, and is progressing favorably.

The builders of Tampa, Fla., are endeavoring to establish an exchange, and have applied to the Secretary of the National Association for the necessary information to insure a correct start.

The builders of Salt Lake City are again at work trying to perfect the organization of an exchange. They want the secretary of the National Association to pay them a visit, and start them on the right road to success. An attempt in this direction has been made by the Salt Lakers before, and it is expected that this effort will be successful.

Early History of the Hamburg Carpenters' Union.

In view of the labor disturbances which are occurring from time to time in the building trades in this country, and the methods employed for reaching satisfactory adjustment of these differences, it is interesting to note some curious details of the Hamburg Carpenters' Union during the early part of the present century. The particulars which follow are gleaned from a paper published by the Hamburg Historical Society and contained in a recent issue of the *Bautechnische Zeitschrift*. At the period mentioned the carpenters' union, like all others, was divided into two parts, namely, the division of the masters and that of the journeymen. The masters had their own place of meeting, known as the Masters' Hall, while the men met in what may be designated as the Refuge. Two of the masters were appointed by their fellows to supervise the meetings of the journeymen and, if necessary, present their complaints or requests, but otherwise the two bodies had not much official connection with each other. Occasionally, indeed, they came in conflict. There were two classes of journeymen; the "natives," including both those born in Hamburg and those adopted by the union, and the strangers, who were permitted to work only under certain restrictions. As the natives, or *einheimisch*, were mostly married and often rather advanced in years, as compared with the strangers, the masters were disposed to prefer the latter, and the native journeymen, who were in a great majority in the union, interfered repeatedly to prevent them from doing so. About 1809 trade was dull, so that the natives could not all get work, while several of the masters kept strangers in their employ. The native journeymen conspired to prevent this, and served notice on the masters that if any more strangers were admitted to work in the Hamburg shops for two years they would desert all the shops in which any stranger was employed. This threat proved effectual and the strangers in the shops were dismissed.

QUALIFICATIONS.

It was necessary, also, for any strange carpenter, before he could work at his trade in the city, to obtain authorizations from the chiefs of the union. This rule was strictly enforced. Even one of the native Hamburgers, if he had been away from the city for a time, was obliged to go at once to the altgesell, or old companion, the chief magnate of the journeymen's part of the union, and get leave to work before proceeding to his own home; and, if he was found working without this license, he was put out of the city by force, and not allowed to return until he had paid a fine and complied with the regulation. Even when armed with their permit to work, for which they had to pay a round price, the strangers did not always enjoy equal rights with others. In the autumn of 1809, when business was nearly paralyzed by the Napoleonic commotions, the natives, who had a large majority in the union, procured the adoption of a rule by which every master was obliged to employ at least three married native journeymen before he could hire any stranger. The "Herberge," or journeymen's quarters, had two rooms, the trade hall and the beer counter. In the former of these the meetings of the journeymen were held monthly and quarterly and here strangers, on arrival, were obliged to pay their respects to the old companion, show him their credentials, pay their dues, and get a license to work in the city. As soon as a newcomer found an engagement he was obliged to take his papers to the chief of the master's division for approval, and was then an accepted member of the union. If any member desired to leave the city, it was necessary for him, in order to get employment elsewhere, to have proper papers of dismissal to show to the union officials of the next place he might settle in. These papers were not always easy to get. They were absolutely refused to any man who had unpaid bills in the town, and if an aspirant wished for proper credentials it was necessary for him to pay all his debts first. If he failed to do so, and departed without a settlement, he was warned three times, at intervals of about a month, and if he was still unrepentant his name was put on the black tablet, with a list of his debts and other information of a personal character. Before any journeyman could be inscribed on the union lists he must prove that he had been taught his trade by union rules, in a union town and by a union master. Without these qualifications he could not be received, and in 1815 a journeyman carpenter who had been trained in a distant place was expelled from the Hamburg Union because a fellow-townsman betrayed that he had not been taught his trade in the prescribed manner.

The Rights of Labor.

The labor troubles of the past year have probably excited more discussion of the relations between capital and labor than any previous occurrences of the kind. So much has been printed upon this subject that one would imagine the public thoroughly wearied and ready to say to employers and wage earners "a plague o' both your houses." But this is not the case. The matter is of too important a nature to be dismissed. Until some effective plan is evolved for settling labor disputes men will continue to discuss the relations of capital and labor and to propound their theories upon the question of the rights of both parties. It is interesting to note that a change has taken place in the manner in which the rights of workingmen are regarded. The Homestead trouble was the occasion of a sudden outburst of rampant socialism from unexpected sources. For a time it seemed that the weight of public opinion was being exerted more and more strongly against individual property interests and in favor of the recognition of some sort of a right in mankind to other people's property. This doctrine was so manifestly absurd that public opinion soon corrected itself, and of late there has been a decided tendency among public speakers and writers to take the anti-socialistic side of the discussion.

One of the most forcible, logical and thoroughly sensible contributions to this discussion is an address recently made before the Sunset Club by Z. S. Holbrook of Chicago and now issued in pamphlet form. Mr. Holbrook sets forth the circumstances surrounding the outbreak at Homestead in a calm, dispassionate manner, perfectly free from prejudice and then proceeds to define the rights of the company and their workmen without regard to any other considerations than those of natural rights as laid down by accepted authorities. He denounces demagogism as the underlying cause of the latter day mystification of the true relations of employers and employed. With caustic irony he thus sets forth the demagogic view:

> Capital is denounced as a criminal acquisition. The successful merchant or manufacturer is the real criminal of to-day. The way to heaven is by the poorhouse. The hero is the tramp. Poverty has become a virtue. Muscular labor and not brain labor is the highest goal of manhood, and all such talk because the men who use their muscles cast a larger number of votes than those who use their brains.

He says wealth is not created by labor alone, and with almost brutal frankness adds that the province of labor is simply to change the form of matter; it is the province of capital to pay labor its wages for so doing, and then assume the risk and responsibility of changing the place and time of matter. "When wages have been paid all obligations of capital cease, except such as pertain to the domain of private conscience." Following up his course of reasoning to its logical result, it would be difficult to find a stronger presentation of the whole question of labor's rights than the following concise summary, with which he concludes:

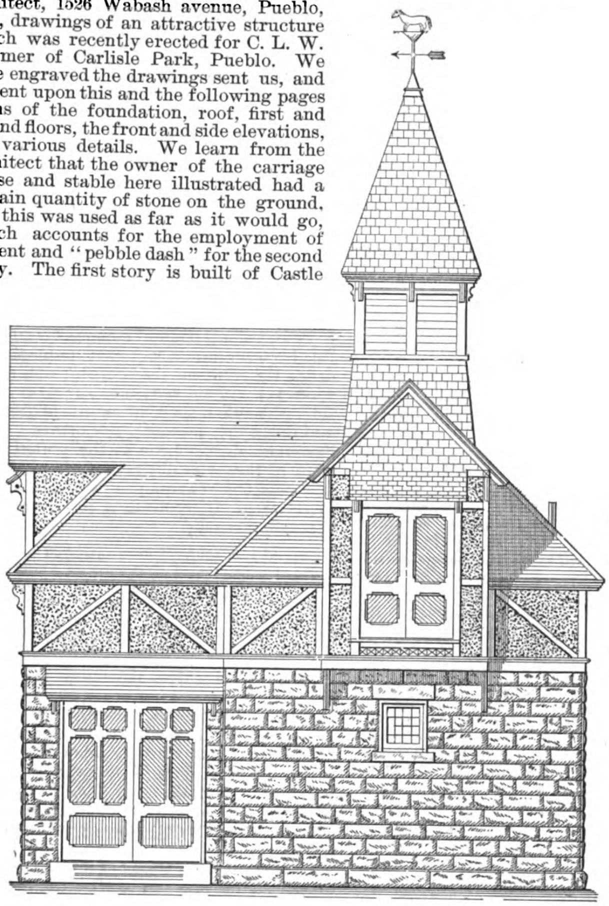
1. Work is a blessing, not a curse.
2. The greatest philanthropist is he who furnishes employment to others.
3. Aggregations of capital are beneficial to society, as they reduce the cost of production.
4. Capital and labor are partners, but capitalists and laborers are not.
5. Labor must choose between the certainty of wages and the vicissitudes and risks of profit and loss.
6. Having chosen wages as its part, when wages are paid the obligations of capital cease, except such as pertain to the domain of private conscience.
7. The obligations of capital to share profits with labor are no greater than those of others to share their surplus with the needy.
8. No man can show authority for dictating to capital its duty to labor when agreed wages have been paid.
9. Honesty, industry and thrift are the basic elements of wealth.
10. The capitalists of to-day were the wage-earners of yesterday, and the laborer of to-day can become the capitalist of to-morrow.
11. The mounds of property are dissipated by the sure laws of nature; hence the State does not need to assist in the work.
12. It is not a crime to acquire and to own. It may be a crime not to do so if one has the ability. Acquiring must not be confounded with avarice.

Finally, man has an inherent and inalienable right to labor, and this right must not be interfered with by unions or strikers. It is not the business of government to aid in the acquisition of money or to make property, but to protect every man, the humblest and the wealthiest, in his lawful efforts to acquire and enjoy the fruits of his labor.

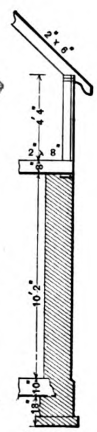
CARRIAGE HOUSE AND STABLE.

IN REPLY to the correspondent who inquired in the November issue of the paper for plans of a stable and carriage house, we have received from M. Marble, architect, 1526 Wabash avenue, Pueblo, Col., drawings of an attractive structure which was recently erected for C. L. W. Dittmer of Carlisle Park, Pueblo. We have engraved the drawings sent us, and present upon this and the following pages plans of the foundation, roof, first and second floors, the front and side elevations, and various details. We learn from the architect that the owner of the carriage house and stable here illustrated had a certain quantity of stone on the ground, and this was used as far as it would go, which accounts for the employment of cement and "pebble dash" for the second story. The first story is built of Castle Rock pink lava stone in 9-inch courses, rock face, with bead joints. The second story, as already stated, is of cement "pebble dashed." The roof is covered with Oregon cedar shingles.

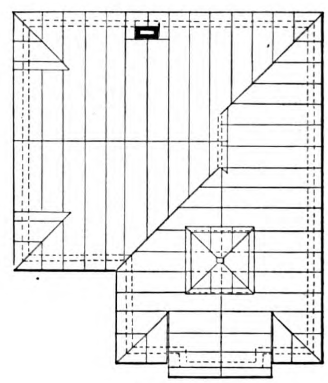
From an inspection of the drawings it will be seen that on the first floor provision is made for a carriage room, two stalls, one of which is a box, and a harness room conveniently located with regard to the carriage space, in which the harnessing and unharnessing is naturally supposed to be done. On the second floor is a hay loft, feed bins and storeroom, the latter measuring 14 x 14½ feet, and a bedroom 12 x 14 feet. The stable is provided with water and sewer connections. The engravings so clearly indicate the arrangement and construction of the building that our practical readers will be able to thoroughly understand them without further particulars.



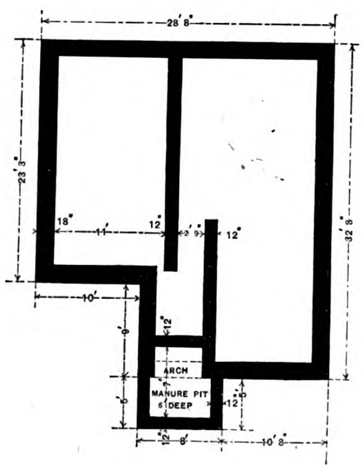
Front Elevation



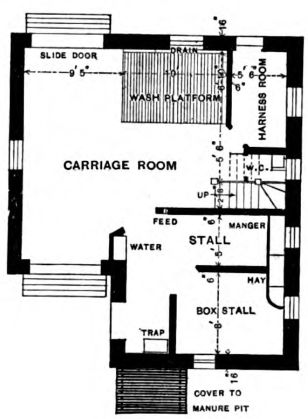
Section.



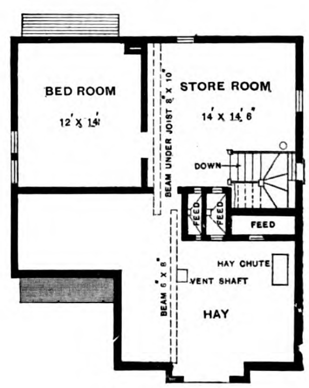
Roof Plan.



Foundation Plan.



First Floor.

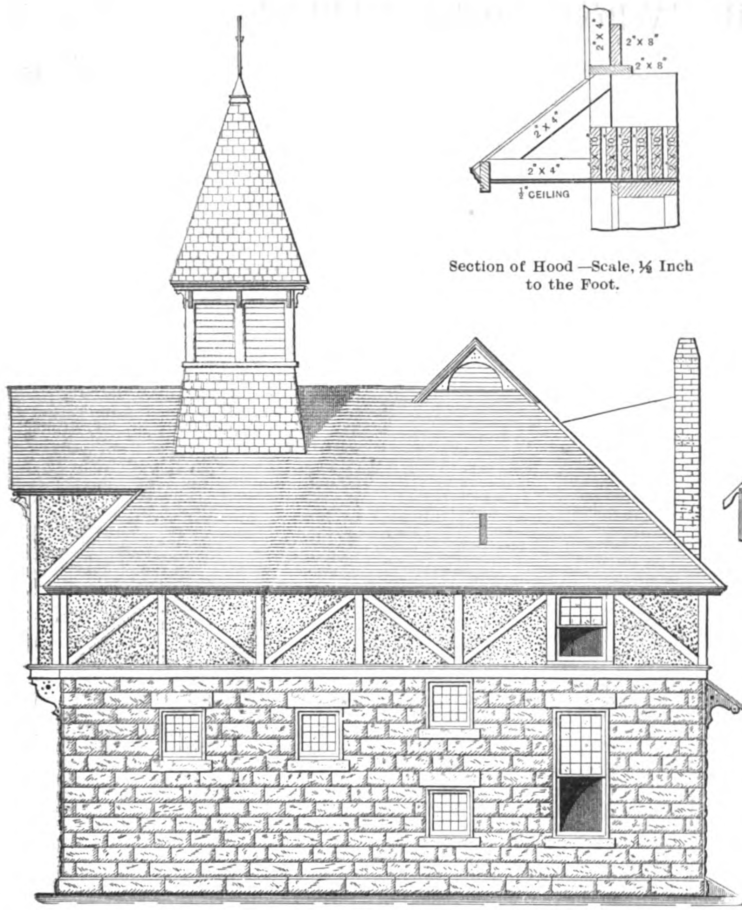


Second Floor.

Carriage House and Stable.—M. Marble, Architect, Pueblo, Colorado.—Elevation—Scale, ⅛ Inch to the Foot.—Plans—Scale, 1-16 *Inch to the Foot.*

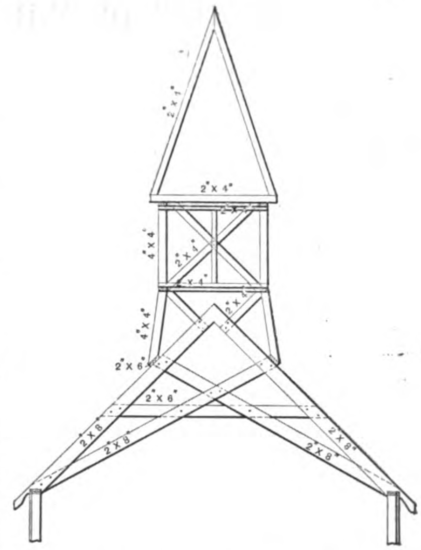
AN INTERESTING little device has been used at the World's Fair grounds during the past few weeks which is not strictly electrical in its own mechanism, though its efficiency is dependent upon the electric motor. It consists of a small air compressor in which no springs are used, but which is remarkably efficient because of the arrangement of an eccentric. This compressor is operated by a small electric motor and requires only about 2 horse-power. It makes from 250 to 300 revolutions a minute. Twelve parts of air to one part of liquid paint are drawn into the motor and discharged at a pressure of about 12 pounds in a steady stream. The paint is put on with hose and is spread much more evenly and economically than could possibly be done by hand.

PROFESSOR MORSE of Salem, Mass., is said to have solved the problem of house heating in a curious fashion. He has built a house with all its rooms fronting southward, and only a passage on the north. Almost the whole southern front of the house is made of glass, and by means of reflectors Professor Morse is enabled on sunny days to heat his whole house with sunshine alone. At night and on cloudy days he has hearth fires going. He believes that by this contrivance he has the most wholesome heat that is attainable.

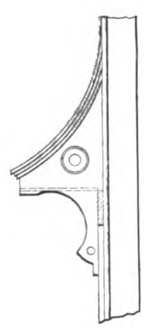


Section of Hood.—Scale, 1/8 Inch to the Foot.

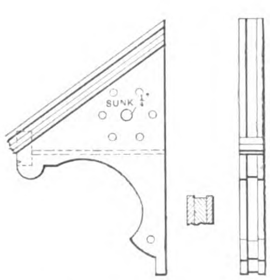
North Side (Right) Elevation.—Scale, 1/8 Inch to the Foot



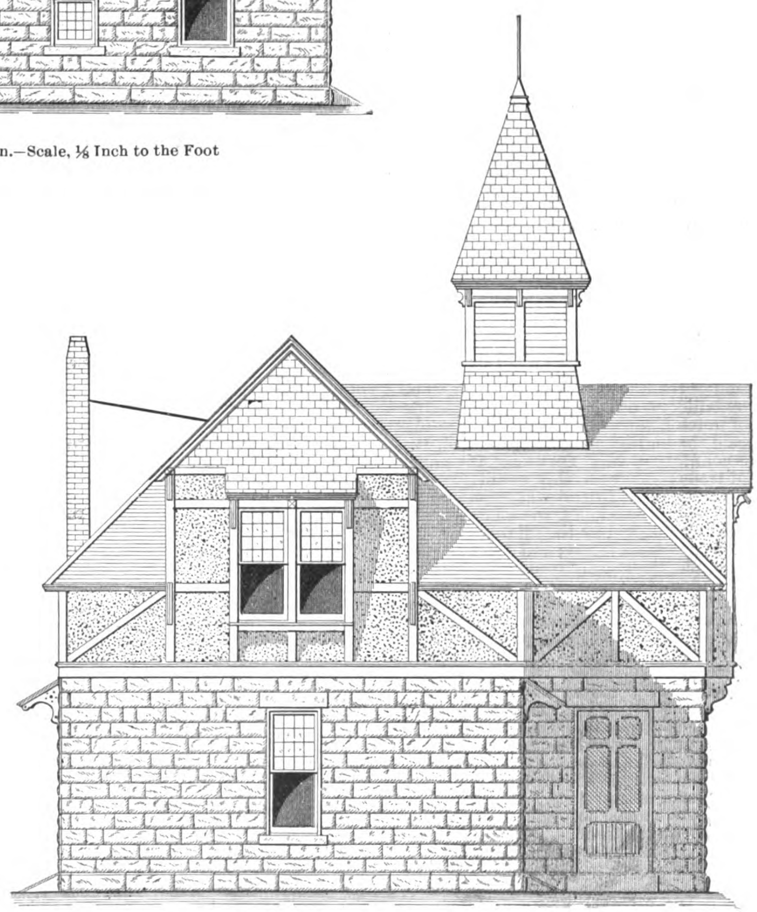
Section Through Ventilator.—Scale, 1/8 Inch to the Foot.



Hood over Gable Window.—Scale, 1/2 Inch to the Foot.



Detail of Bracket under Hood.—Scale, 1/4 Inch to the Foot.



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

Carriage House and Stable.—Elevations and Miscellaneous Details.

CONVENTION OF THE NATIONAL ASSOCIATION OF BUILDERS.

THE seventh annual convention of the National Association of Builders was called to order by President Anthony Ittner at 10 o'clock a.m., on February 14, in the city of St. Louis. The presentation of credentials and the usual opening exercises were all the business transacted on the first day. The president's address was warmly received and was accorded close attention from beginning to end. A summary of his remarks reads as follows:

President's Address.

After extending a cordial and hearty welcome to all the visiting builders on behalf of the St. Louis Exchange, the president proceeded to emphasize the value of organization in the abstract, and cited the National Association as a concrete example of the benefits of united and harmonious action taken upon proper lines for the benefit of a class and, incidentally, of the community. The form of organization of the National Association was such as to produce the very best results, he said, inasmuch as all its deliberations were frank and open and always subject to the inspection and criticism of all; its conclusions, after being arrived at in a most thorough manner, are recommended to its constituent bodies, never being mandatory in any way. The result of its councils, obtained after the most careful consideration by the best possible form of representation of the varied interests involved, are given to the affiliated exchanges in the shape of advice and the application left to the local body, unbiased by compulsion or restraint. The president complimented the National Association upon the *personnel* of the meetings, past and present, and referred to the fact that the high character of the delegates sent by the filial bodies spoke well for the quality of the legislation enacted by the conventions. He considered the Declaration of Principles and Article II of the Constitution as worthy of the most careful consideration of all builders as recommending true principles, and introduced both in full into his address. The National Association should be proud of such a platform. (The Declaration of Principles and Constitution are always printed in the appendix to the annual reports of the association.)

TRADE SCHOOLS.

In recapitulating the principles enunciated and resolutions passed at the first convention in Chicago, the recommendation of the establishment of trade schools by builders' associations was the subject of much commendation and the president paid the highest compliment to Col. R. T. Auchmuty of New York City, the pioneer of trade schools in this country, for his philanthropy. Regret was expressed that a greater number of trade schools had not been established by the filial bodies of the National Association; but the successful example offered by the action of the Philadelphia Exchange in setting up and maintaining an excellent school was the subject for congratulation. The president stated that it was with pleasure that he would present later in the course of the convention a system of apprenticeship now existing among the iron founders and hollow ware workers that was based upon much the same lines as guided the instruction of pupils in the trade schools. He also spoke at some length on the deplorable lack of skilled workmen among the young Americans. The cause was attributed to a too rigid discrimination against apprentices and arbitrary and restrictive rules adopted in this respect by the workmen themselves.

THE ARCHITECT AND BUILDER.

Profit sharing next came in for consideration and the president expressed a hope that the convention would take up the subject and give it attention. In referring to the relationship between the architect and the builder he said that there was no reason why they should not be more generally friendly toward each other than seems to be the case at present. The architect can do full justice to his client without being unjust to the builder and work would progress with much greater mutual satisfaction if there were more friendliness between the two. On this subject he said:

It affords me pleasure to bear witness to the fact that there are many architects in this and other large cities who are entirely just and fair in their dealings with the builder, as between the builder and the owner. In fact, I have knowledge of an instance in the case of one of the leading architectural firms in this city, where, if it had not been for the architect's pointing out certain extra work in the interest of the builder, it would have been lost to him entirely, as he would not have been aware that he was entitled to an extra for the same. Some might hold that the architect was not required to go so far in the interest of the contractor, and some owners that I have known, in my experience, would dispense with the services of such an architect if they came into possession of the knowledge of such an action on his part; and I have also known architects who seemed to imagine that their mission on earth was to rob the builder in the interest of the owner, and it has also been the case where architect and builder, both being dishonest, would mutually agree to rob the owner in their own interest and divide the spoils, but I am glad to say that these are extreme and rare cases, and not of recent date. There may be cases of this kind at present, but if so, they are surely few and far between.

UNIFORM CONTRACT.

The Uniform Contract was referred to as a most valuable and important document, calculated to protect and facilitate the builder's business and interests, and was urgently recommended for even more general use than it has yet attained. The wonderful progress made in the United States in the past decade, said the president, presented a most marvelous record to the world. Such magnificent exhibitions of design, speed and thoroughness of construction the world has never seen before, and few comprehend even now the tremendous strides that are being made in the building arts. The World's Fair buildings at Chicago were cited as one example of the wonderful speed with which the American builder can accomplish his work. The president thought that every patriotic American owed it to himself and his country to attend the fair and learn what is being done in art and mechanics in our own and other countries to-day.

A touching tribute was paid to the memory of Marc Eidlitz of New York City, whose death, since the last convention, had deprived the National Association of one of its most honored and valued directors.

OUTLOOK IN THE BUILDING TRADES.

Referring to the condition and prospects in the building world, he said that, barring several ill-advised and unfortunate labor strikes, business generally throughout the country has been as prosperous during the past year as in any previous year of our history, and we are justified in the belief that the coming season will be still more prosperous. The president closed his remarks by asking the aid of every delegate present in making the convention one of profit to all present, and to the builders of the country.

Following the president's address were announcements of many cordial invitations from many sources to the delegates to various points of interest in the city. The following gentlemen were appointed as a Committee on Credentials: M. B. Madden of Chicago, chairman; James McGauley, Indianapolis; E. Noyes Whitcomb, Boston; Jeremiah Sheehan, St. Louis, and W. J. Hill of Denver. Upon the presentation of the credentials the convention adjourned to 9 o'clock Wednesday morning.

During the afternoon the first distinct event in the hospitality offered by the builders of St. Louis was presented in the form of a carriage ride. The majority of the delegates took advantage of the opportunity to see the building features of the city under the guidance of their hosts.

WEDNESDAY MORNING.

The first business of the morning session on Wednesday was the report of the Committee on Credentials, which showed that there were present 97 delegates representing 24 cities. Besides this number, the lists of the Committee on Entertainment showed that, including alternates and visitors, the total number of builders gathered in St. Louis as the result of the convention was in the vicinity of 250. The Committee on Time and Place of next convention, and for the nomination of officers for the ensuing year, was appointed as follows: Chas. W. Gindele of Chicago; J. Milton Blair, Cincinnati; John S. Stevens, Philadelphia; Stephen M. Wright, New York City; Arthur McAllister of Cleveland. The selection of these gentlemen was governed by the fact that one member was drawn from each city which has entertained the conventions of the National Association in the past. The increasing desire of the various cities to secure the next annual convention makes the duties of this committee more and more arduous.

Following the appointment of the Committee on Time and Place was the secretary's report. This covered very thoroughly the ground gone over by the association in the past year.

Secretary's Report.

The secretary opened his report with a statement of the present condition of the association, noting the accession of exchanges in Butte City and Scranton. In speaking of the benefits of affiliation he said:

While it is not essential to the life of the National Association that it comprehend in its membership each and all of these organizations in the smaller cities and towns of the country, it is important to these bodies themselves that they be placed in position to receive the education and benefit which comes by virtue of the measures adopted by the National Association to obtain a wide comparison of experiences, discuss practices, and recommend methods by and through which improvements may be uniformly secured, and the best interests of builders systematically and intelligently advanced.

Before leaving the subject of membership I desire to emphasize the fact that the value and strength of the National Association depend upon the observance of exactly the same principles as those which we recommend for the guidance of local bodies—namely, that a large membership does not necessarily indicate greatness, that the true aim of all associations should be quality rather than quantity, and that selection based upon intrinsic merit of the individual is the surest safeguard and defense against disintegration and decay.

The statistics gathered during the year at the suggestion of the committee created for the purpose were confined to the search for kindred organizations in both this country and abroad. The report showed a net increase of 20, being a gross increase of 42 and a gross decrease of 20 organizations connected with the building trades. The increase in builders' exchanges, as advocated and assisted by the National Association, was shown to be 24.

FILIAL BODIES.

In referring to the condition of filial bodies, as seen from the secretary's standpoint, he said:

The officials of local bodies may be unduly elated or depressed by conditions existent in their environment, and are likely to color their conclusions as to general conditions by their local ones. The advantage of a central organization is here manifested in the opportunity offered for a wider and more comprehensive outlook, which results in a truer judgment as to the prevailing condition throughout the whole body. Just as in any one of the organizations which form the National, it would be delusive to base a judgment of the condition of that body upon the attitude or sentiment of particular individuals, so in the National Association itself conclusions as to improvement or lack thereof upon the lines and policies laid down by it are not to be reached or based upon the conditions prevailing in one or another of its constituent parts, but upon the average condition manifested in the body as a whole. It is with great satisfaction, therefore, that I declare that at no time since the National Association was established has there been such general evidence of improvement in condition of local bodies as during the past year; never has there been such promise for the future. In some cases, it is true, there are facts existent which we cannot but deplore, but those very facts are no doubt a part of the evolution necessary to final and permanently better life.

The mid-year meeting was summarized, much as it was reported in *Carpentry and Building* at the time, for the benefit of the full association. An extended reference was made to the great variety of subjects treated from the secretary's department in the columns of the journal named and the benefit, as indicated by returns received, commented upon.

EXCHANGE BUILDINGS.

Under the head of exchange buildings the secretary pointed out the beneficial results that such a possession assures a builders' exchange. After referring to the energetic work of the builders, particularly in Buffalo and Milwaukee, he said:

In almost every exchange the feeling is manifestly gaining foothold that the ownership of a building which shall be a home for the exchange is one of the most essential elements to success in permanent and effective establishment of the local bodies. Not a year has gone by since the establishment of the National Association and its announcement of belief that such undertakings are not only legitimate, but full of promise for the best life and opportunity of builders' exchanges, that great steps have not been taken in support of this theory by one and another of the filial bodies. While at the birth of the National seven years ago no one of the builders' exchanges had a vestige of ownership rights in the buildings they occupied, to day finds us with six exchanges in full possession of completed buildings, one exchange with land purchased and plans made and two exchanges with the project well under way. The value of property thus far obtained and held by our filial bodies under the stimulative advice of the National Association falls but little short of $2,000,000. Is not this a remarkable showing, and one that promises much for the future influence and importance of builders in this country? No other country in the world can show like enterprise by the organizations of the building fraternity.

THE UNIFORM CONTRACT.

In touching upon the question of the Uniform Contract, the secretary said:

During the past year that valuable work of the National Association, the Uniform Contract, has received an unusual amount of attention in several directions. It has been noticeable that, for some reason or other, probably because of the continued agitation of the subject from this department, assisted by the efforts of individual members of the local bodies, a new and widely scattered demand for the document has developed, not in large quantities, but for single copies as specimens, and from all parts of the country, particularly in places not within the affiliation of the National, even as far away as Salt Lake City in Utah. Interest in this form manifests itself also in renewed criticism, which is most welcome, for such examination denotes a consideration of the method proposed, which in itself acts as an advertisement, and if intelligently applied will be productive of a clearer apprehension of its purpose and larger use. There has, however, been one attempt to supplant or at least weaken the authority of the form which calls for special comment, inasmuch as it emanated from a constituent body of the American Institute of Architects, the association which has joined with us in preparing and recommending this document for general use.

The Boston Society of Architects, ignoring the fact that it is a chapter of the American Institute, and also that at the annual convention of that body, held in Boston in the fall of 1891, in which it participated, the acts of the Joint Committee on Uniform Contract were approved and the committee continued, proceeded, very soon after the said convention, to prepare, in consultation with legal advisers, a close but most inconsequent criticism of the standard form, distributing the same with a certain "Suggestive Form of Contract" to its members, advising them to still follow their individual preferences in the matter of contract forms, rather than use the form regularly and properly approved by the National Association representing their profession. Now, there can be no possible objection to fair criticism of the Uniform Contract, but in this case the criticism was not properly applied, and an effort was illegitimately made, the result of which, if successful, would be productive of the very evil which the bodies who framed the standard form aimed to eradicate or prevent—namely, diversity of forms of building contracts. The National Association of Builders has a right to expect from all its constituent bodies loyalty to the method which it has united in establishing to produce equity and uniformity in this one of the most important relations which the builder is called upon to assume in carrying on the business of building; and the National Association of Builders has also a right to expect loyalty on the part of constituent bodies of that National Association of Architects with whom it has joined in this important work. If constituent bodies of either of these National Associations desire to suggest amendments or changes in the standard form, there is a proper way to do it, and but one proper way, and that is by referring their suggestions to the Joint Standing Committee on Uniform Contract. No constituent body of either party has the right to undermine the great work undertaken, by independently proceeding to supplant the form with some other, or by advising its members to ignore altogether the Uniform Contract and continue on perpetrating diversity and confusion in contract forms.

Builders will gradually learn by such examples as this that in the matter of their rights as to forms of contract which they are to sign, as well as in other directions, it is only by united and persistent endeavor that proper relations can be secured and maintained. You may never hope for some one else to be considerate enough to deal justly by you; you must rely upon yourselves for every advance out of the slough into which you have fallen.

REVISION OF THE STANDARD FORM OF CONTRACT.

In pleasant contrast to the condition of things above described was the meeting of the joint committee on uniform contract to consider, for the first time since its establishment, a revision of the standard form.

The report of your delegates to that committee will give you in concise form the result of that meeting, in connection with the views of the committee in relation to more universal use of the document. I can only supplement their report by saying that the meeting in which I participated in an advisory capacity as well as scribe was most harmonious, and it was particularly gratifying to note that many of the points, the importance of which your original committee found very hard to impress upon the architects who first sat in council with them five years ago, are now considered by the architects themselves as most essential features. I feel assured that the simplification of the form which resulted from this meeting will aid very much in its increased use. The shortening by some five or six hundred words will in itself prove a great card in its favor, for it is now, without exception, the shortest building contract in general use. I note in the Underwriters' National Convention that our contract was very favorably mentioned. The insurance men have, to use a common phrase, "caught on" to the advantage of uniformity in matters of insurance.

FORM OF ARBITRATION.

In referring to the form of arbitration advocated by the National Association he said:

In regard to the method itself, it is within my province and function to state that the experience of the past year has not developed a single flaw in the plan we have recommended. It seems to be as near a just method as can possibly be devised, and while many, too many, feel as if they do not wish to adopt any preventive measures, I feel confident that when they do reach this point they will find that this plan of ours offers absolute equity of method. So much for the plan itself. I regret that I cannot report a swifter growth of sentiment in favor of taking some trouble, some time for the study of this greatest of social problems, the labor problem. It would seem as if the very fact of being a part of it would spur every builder at all events to make himself familiar with its bearings, but I suppose the truth of the matter is that most employers fail as yet to realize that they are a part of the problem. They seem to consider that it is a subject that will either be settled for them or will settle itself. This to me seems not only a "vain and impotent conclusion," but a most unbusiness-like and heedless conclusion. It also seems like confession of weakness to be willing to let matters drift without an effort to direct, divert or guide into proper and safer channels those affairs which will not vanish simply because their presence may be ignored. It is within the power of employers more than others to secure peaceful and equitable solution of the problems which confront labor and capital, and it is almost *prima facie* evidence of business obtuseness, mental ignorance and moral cowardice, to permit others to mangle and distort these problems by one-sided attempts at forceful solution, when by an insistence that they shall not be so handled, when by a steady, intelligent, painstaking course, when by a devotion of time to its consideration as much as would be readily, unhesitatingly devoted to any other branch of one's business, that security could be obtained which is the most essential element to successful business undertakings. Sooner or later this matter will be approached on true lines, and I sincerely believe that when that time shall come, however much the process may have become elaborated, the fundamental principles will still be those which we have discovered and are now slowly pushing forward year after year, as the true basis. I am not discouraged, I am simply disappointed that the principle has not yet been made plain enough for all our great constituency to appropriate it for their own use and benefit.

CORRESPONDENCE.

The report of correspondence, as indicative of the routine work of the secretary's office, covered a wide range of subjects and involved the receipt of over 3000 letters, many of which demanded, in a sentence, pages of reply.

Not a few letters speak of the difficulty of getting architects to co-operate with builders in seeing better practice and methods in estimating and contracting. This brief reference to the character of correspondence received will give a faint idea of the tone and extent of correspodence which must go out in response. The increasing consciousness among individual builders and organized bodies of builders of need for reform in practices that have slowly obtained foothold, and need for careful and intelligent formulation of methods and system where none have previously existed, as shown in the communications received in my department, make me painfully aware of the inadequacy of my ability and efforts in attempting to properly and satisfactorily meet the demand. Much that is done gives little token of its value in net result obtained, but I realize that all progress in such affairs must be slow, and must necessarily be accompanied by a feeling of disproportion in the immediate return to the outlay of time, thought and vitality, and so I am comforted by the conclusion that the work that is being done year by year is not for those years alone, but for the years to come as well, and the little gained here and the little gained there is the usual process in life as well as nature, and must be so accepted as the true and best way.

RECOMMENDATIONS.

After the foregoing *resume* of the year, which presented what has been touched upon from time to time in these columns, his report closed as follows:

It seems to me that there is possibility for action by the National Association in the direction of securing more effective committee work than by our present system. I notice that some national organizations have adopted the plan of naming the members of a given committee all from one city, with the purpose of making it practicable to hold many committee meetings during the year, which is almost impossible with a committee composed of widely separated members. This matter, it seems to me, should be discussed in this convention, and if deemed wise put in operation for the coming year. In this connection it seems to me desirable to give the Executive Committee power to create special committees for special investigation during the year. It is possible that some minimum membership should be fixed by the National for local exchanges as a basis and prerequisite for affiliation with the National. At present there are two cases at least where the total membership of the local body is five, hardly enough to fill the offices, and while organization which is so short of adequate representatives as this is better than no organization whatever, there is room for doubt whether so slim an organization is entitled to representation in the national body.

COMMITTEE ON BUILDING LAW.

The Joint Committee on Building Law which we have taken part in forming has not made any effective move during the year and it occurs to me that it is incumbent upon us as one of the most active organizations forming this committee to suggest a division of the labors of that committee, so that each set of delegates shall have a distinct and positive duty to perform, for at the rate of progress in investigation thus far, the ethics of building laws will not be speedily reached by the committee at large. This committee is called to meet here in this city during this convention, but, while I appreciate the implied compliment of meeting in quasi-conjunction with us, I feel assured that but little can be accomplished by our delegates, at least on the limited opportunity which proper attention to the affairs of our meeting will give them, and I therefore suggest that our delegates be instructed to suggest to the joint committee the advisability of meeting at some other time during the year, with the work divided up as I have previously suggested. I believe much good can be done by this committee in the direction, at all events, of showing how difficult it is to frame building laws which shall not be unduly burdensome and ineffective on the present basis, which attempts to make a specification rather than a law.

SECRETARIES OF LOCAL EXCHANGES.

I refer again with renewed emphasis to the necessity in large cities at least, for the local exchange to employ, at a proper salary, a secretary whose time and talents shall be wholly devoted to the interests of the body. I am more and more convinced as years go on that this is the only sure way in which the best and fullest good can be attained. It is folly, as I have said in almost every annual report, to expect of some one of the members of the exchange that service which he can only give by stealing it from his own business. The secretary of a local body cannot be all that he ought to be, cannot even approximately do all that ought to be done for the body unless he is on deck all the time and armed with a reasonable amount of authority.

Perfection cannot be expected, but surely there is little hope that any advance can be made for the whole interest if you are going to depend upon what some busy man is going to give you out of his life, animated by his sense of what ought to prevail.

Able men—men of fertility of thought, readiness of application and power of study and analysis—can be had, and they will be worth your money whatever they cost. It should be an axiom of the National Association that the local exchange, to properly work for the good foreshadowed in our recommendations, must have a secretary competent, and with permanency of employment assured, so that he may have a chance to develop and advance the interests which we all admit are worthy of great endeavor. With such secretaries the work of the National can be done with greater certainty and success than the national secretary can ask, with the certainty that he is not imposing on some busy man for the information which now it is practically useless to attempt to obtain, and can make suggestions for service with the feeling that he may do so freely. My past experience shows me that I cannot expect to get reports and information from unpaid and non-permanent secretaries, and we ought not to expect it, but the service suffers because of this condition. Then, too, secretaries of local bodies should feel that it is incumbent on them to make suggestions to the national secretary and help him by showing some new need, tell him of each new difficulty that presents itself. With a good corps of local secretaries the national secretary would eventually amount to something. It has been suggested by some one that a secretaries' organization would be a good thing under the auspices of this body, and that regular meetings for the exchange of views, information and experiences would result in much good. So it would; but first we must have our secretaries men devoted to the work. I repeat, spend some money for your secretaries, and they will more than pay you in the returns secured.

ESTIMATING.

Something in the way of a more systematic method of estimating has been anxiously asked for almost ever since the National Association was formed, and from many quarters the inquiries come in. I would suggest that a committee be created to look into this matter and make report of their findings to the national secretary with power to instruct him to communicate their views to all the local bodies and members thereof. A more complete directory of all exchanges is needed and local bodies should file full lists of their members with their callings and addresses, corrected at least twice in each year; here again the services of a permanent paid secretary are essential. Such a list would be very valuable and would enable the central office, when necessary, to reach all individuals without the necessity of troubling the local secretary and sometimes the appeals of such a central official are more effective than those of one near at hand.

There is possibility that we ought to make a way for the affiliation of Canadian associations of builders; there are several cases already where they have organized under advice and counsel from us.

"CARPENTRY AND BUILDING."

I would again suggest that local exchanges urge a more liberal subscription by their members to *Carpentry and Building* in order that our work done in that paper may receive the attention which I believe it deserves.

Especial effort should be made by all local bodies to act in earnest in the recommendations of the National body. I hear too frequently either that nothing has been done, or, simply that "the recommendations of the National Association are well thought of." This latter is much worse than adverse action. "It damns with faint praise."

The establishment of separate trade organizations should be urgently pressed by all local bodies. They are essential to the perfect working of the system of arbitration as well as to carrying out many other recommendations of the National.

COLLECTION BUREAUS.

The possibilities for establishment of collection bureaus under the direction of local bodies is one worthy of consideration by a special committee, and I suggest that such a committee be appointed to report to the Executive Committee all that they find in favor or against such bureaus. Some plan ought to be devised to secure in each local exchange a Board of Reference composed of an equal number each of architects and builders, to whom should be referred all disputes and disagreements between individuals in either branch. This would be equally valuable to architects as to builders. A special committee on this point would have a large field of inquiry.

There is a loud call for uniform preliminary clauses of specifications. This should be brought to the attention of the Committee on Uniform Contract.

Finally, I suggest that all suggestions contained in the president's address and in this report be referred to the Committee on Resolutions and the Legislative Committee, and that the combined committee be instructed to report thereon at the proper time in this convention.

REPORTS OF DELEGATES.

In closing I beg to say one word to the individual delegates present in their function as representatives of local bodies. I am frequently in receipt of letters from interested members of your exchanges, in which they complain that on the return of their delegates from conventions they are full of enthusiasm as to the bountiful and delightful entertainment which has been extended to them by the exchange in the convention city, but have nothing comparatively to report as to the business part of the meeting. This, it is claimed, and truly, tends to throw discredit upon the National Association and leads local bodies to question the value of our work.

This condition ought not to confront us, and I recommend most forcibly that each delegate here present arm himself with note book and pencil, follow every report, every address, every suggestion or bit of information coming in the reports from filial bodies, be prepared to inquire, discuss and follow up every item, and then, on his return home, submit individually and in full delegative report a statement of what you have learned, and I will guarantee that if this is fully and properly done your exchanges will no longer question the value of your service or the value of the National Association.

The secretary's report was very warmly received and a motion was immediately made bringing into operation the methods of consideration of matters of a legislative nature suggested by him.

TREASURER'S REPORT.

The report of the treasurer, Geo. Tapper of Chicago, was next in order and showed that the balance of $1,800 on hand at the end of the preceding year had been reduced to $675, from which the National Association's expenses for the meeting were still to be paid.

The reports from committees were next presented.

COMMITTEE ON UNIFORM CONTRACT.

The Committee on Uniform Contract submitted its report as follows:

For five years the Uniform Contract, adopted in 1888 by the Joint Committee of the American Institute of Architects and the National Association of Builders, has been before the public.

The fundamental principles therein expressed have been tested and approved by time, but, while the instrument has added to the number of its friends among architects from year to year, and owners have acknowledged its even-handed fairness to both parties and executed it readily, there still are many architects who do not use this form of contract.

A large number of those who still cling to old forms are doubtless those whose conservatism impels them to doubt new, though better methods, while others have failed to employ the standard form for the reason, which they frankly admit, that the older forms give to them and to their clients, the owners, a greater advantage over the builders. This is an entirely improper position, for a contract of this nature should in no way give more advantage to one than to the other party to it, and it has been the purpose from the first to provide in the Uniform Contract an instrument which should give even-handed justice to all concerned in it.

It is very evident that many architects will not voluntarily adopt this form, either because of their conservatism or from unwillingness to give up an unfair advantage or from ignorance of the terms of the document, and it is, therefore, important that the builders themselves should decline to sign other forms.

The more general use of the Uniform Contract may be said to depend to a very great extent upon the insistence of builders that this form and no other is acceptable to them. This attitude is strongly urged by your committee.

During the last year meetings of the Joint Committee have been held and we now present to you a revised form which, in our judgment, covers the same ground in more direct language and adapts it better for use of sub-contractors for their particular portions of a building.

No changes were made without careful consideration and full discussion, and without entering here upon a discussion of the merit of each change, we express the belief that experience will indorse our action. In this action your committee has gone to the length of its authority.

The Uniform Contract is "adopted and recommended for general use by the American Institute of Architects and the National Association of Builders." Upon your individual effort depends its general use.

GEORGE C. PRUSSING,
H. H. EDGERTON,
JAMES I. WINGATE.
Committee on Uniform Contract.

N. B.—A copy of the Uniform Contract, as revised, is attached hereto.

COMMITTEE ON LIEN LAW.

The next report presented for consideration was that of the Committee on Lien Law. This was presented by John S. Stevens, chairman, and reads as follows:

Your Committee on Lien Law would respectfully report that after a number of sessions and much correspondence they have reached the following conclusions: Inasmuch as the present lien laws in the various States differ so materially, and the conditions existing are so much at variance, we deem it inexpedient for the National Association to attempt at this time to frame any general law, but to ask the affiliated exchanges to examine carefully the lien laws now existing in their respective States, and where they are not satisfactory to suggest such changes as may, in the judgment of the local exchanges, meet their requirements, and report the same from time to time to the Committee on Lien Law.

JOHN S. STEVENS,
EDWARD E. SCRIBNER,
CHAS. W. GINDELE,
J. MILTON BLAIR,
C. D. MORSE,
Committee.

Resolutions were next offered and referred to the proper committee, and appear, together with action thereon, in the latter part of this report.

REPORTS FROM FILIAL BODIES.

The reports from filial bodies, the presentation of which occupied the balance of the morning and the entire afternoon sessions, were prolific of the greatest interest and were listened to with closest attention from beginning to end. The various phases of the conditions which exist in the building trades were of great interest to every delegate in attendance, and presented methods of treating common conditions that could be brought out by almost no other means.

BALTIMORE, MD.

The reports were presented without discussion from the cities in alphabetical order, beginning with Baltimore. The report from the exchange in Baltimore showed that the building interests of the city, as seen from the standpoint of the builder, were excellent at present, and that a profitable season for 1893 is expected. The membership in the exchange has increased about 15 per cent. in the past year, and the increase represents the results of careful selection in the quality of the new members. The relations between architect and builder are rapidly assuming a more harmonious and fraternal aspect as a result of the effort of the builders to establish the validity of their claims for equality upon the other half of the building fraternity. The finances of the exchange are in excellent condition, and represent a sufficient capital to insure the erection of a building of their own in the coming year. One of the most important acts, and one that best demonstrates the inherent power of builders' exchanges, was the preparation of a building ordinance and the securing of its enactment for the benefit of the city. The effect of the new law, the entire credit for which should be given to the Builders' Exchange, is already apparent in the improved class of buildings which are being erected in Baltimore. A strenuous effort is being made to secure the adoption of a code of practice which shall secure to the builder absolute fairness in the treatment of his bid after it has left his hands. The 'change hour has not been as fully successful as might have been desired, but it is hoped that the new building which is to be erected by the exchange will supply the motive, which is at present lacking, for better attendance at the exchange during the hour mentioned. In referring to the unquestioned benefits of the National Association, the report stated that the exchange was loyal to the National Association, and believed that it has been a direct advantage to the members in many ways.

BOSTON, MASS.

The character of the report from the Master Builders' Association was somewhat different from that of the other filial bodies, as indicated by the following portions of the opening paragraphs: "It also begs the counsel and advice of the National Association in certain matters of administration, and offers certain suggestions as to the character of membership in filial bodies and the advisability of requiring a fixed standard of excellence as a basis of eligibility to membership in the National body. It is not expected that the National Association desires that the filial bodies should particularly present the state of business, relative prices obtained for work, &c., as these matters, while interesting, are not of such great concern as matters of administration, difficulties of management, success or failure in carrying out the recommendations of the National Association, defects and suggestions for improvement in such recommendations, and other matters of the same kind. The report treats carefully and thoroughly of many important phases of the builders' interests.

BUFFALO, N. Y.

The report of the Builders' Exchange of Buffalo showed a membership of 172, a net gain of 28 in the past year. The attendance of members at the exchange during the 'change hour has increased until it now represents an average of nearly 50 per cent. The financial condition was excellent, with a balance in the treasury. In addition to this the stock company owning the new exchange building had, up to the date of the report, received $178,024 and disbursed $177,543. The value of the property is $200,000; the indebtedness is a mortgage of $90,000 at 4½ per cent. and $75,000 stock, all other debts being paid. The building trades have experienced the best year's business in the history of the city and the outlook for 1893 is better still. The class of buildings now under construction and proposed are much more substantial than those erected in the past. Free access to the exchange has been extended to the architects. Five members have been paid liquidated damages where the lowest bidder did not receive the contract. The subjects considered and acted upon by the exchange, both within itself and in conjunction with other public bodies, were presented in the last preceding issue of this journal. The Uniform Contract is in general use by the members of the exchange. A membership in a commercial agency has been secured by the exchange for the benefit of its members. The new building erected by the exchange, the dedication of which has been previously noted in these columns, is fully occupied by builders and has so centralized the building interests of the city that the benefit of the move has already demonstrated itself beyond question.

CHICAGO, ILL.

The Chicago Builders' and Traders' Exchange reported a total membership of 589 and the prospect of an early change in its quarters. The adoption of a code of practice and system of discounts to contractors on building materials are progressing slowly and favorably. The members extend a most hearty welcome to all builders attending the World's Fair to visit the exchange, assuring them a hearty welcome.

CINCINNATI, OHIO.

The report from Cincinnati showed that the volume of business for 1892 fell off from the average of the past few years—a fact which is attributed to the unsettled condition of the building trades early in the season. The members of the exchange secured approximately 75 per cent. of the work done in the city. The membership shows a net gain of 24 and the attendance at the 'change hour, which is beginning to be considered a necessity, is steadily increasing. The Uniform Contract is but little used, but the form of arbitration has been used to some extent in the last year, during the strikes alluded to. Most of the settlements were made with the workmen through its means, and the Bricklayers' Association have just lately settled the demands made upon them by their workmen without the intervention of an umpire.

The hours of work are not entirely uniform in Cincinnati. Bricklayers have been working nine hours at 50 cents per hour, but have been granted eight hours at 50 cents per hour from March 1, 1893.

Carpenter outside hands, nine hours, paid by the hour, 33½ cents.

Cornice makers and tinners, nine hours, paid by the hour, 20 cents.

Iron workers, nine hours, paid by the hour, not uniform.

Painters, nine hours, paid by the hour, 29 cents.

Planing mill, nine hours, paid by the hour, not uniform.

Plumbers, nine hours, paid by the day, $3 and $3.50.

Stair builders, nine hours, paid by the day, $3 and $3.25.

Plasterers, nine hours, paid by the hour, 40 cents.

Stone cutters, nine hours, paid by the hour, 45 cents.

Stone masons, nine hours, paid by the hour, 40 cents.

The members feel that the exchange is steadily improving and is hoping by the aid of the helps and suggestions received from the National Association to keep on improving until the Cincinnati Exchange shall be second to none.

CLEVELAND, OHIO.

A brief verbal report from the Cleveland Builders' Exchange showed that that organization was steadily progressing both in membership and usefulness. The membership has nearly doubled twice in the past year, and has enlarged its rooms and facilities for transacting business. The rapid increase of the past year is directly attributed to the effect of the presence of the sixth convention of the National Association.

DETROIT, MICH.

The report from the Detroit Exchange showed that a very profitable year had been experienced in matters relating to the organization, and also in a business sense. The season has passed without labor complications of any kind; the men work nine hours and are apparently satisfied with the scale of wages which prevails. The exchange has nearly doubled its membership in the past year, and the greatest care has been used in admitting new members, quality being preferred to quantity. The exchange finds much benefit in the fostering of special trades' associations within the organization, it being better able to act comprehensively upon special questions affecting a given trade, if the association of that trade has already discussed the matter among its members. By this means the exchange is enabled to act intelligently upon subjects that particularly affect any special trade without the danger of hampering that trade, such as general action by the whole exchange upon questions affecting only one trade, without a specific request from the members of that trade, would be likely to do. The exchange furnishes meeting rooms for these special organizations and encourages their existence. The employment of a paid and competent superintendent by the exchange has been prolific in good results. The leasing of an entire building for the use of the exchange and its members has been the most important step taken by the organization during the past year, and a cordial welcome is extended to the builders of the country to visit the members in their new quarters at any and all times.

GRAND RAPIDS, MICH.

The exchange in Grand Rapids reported that a strong effort was being made to bring the standard of membership up to a more desirable point. The result of the effort appears in a decrease of 17 in the total membership, but a very great increase in the proportion of working material in the exchange. Business was reported as being good, with an excellent prospect for the coming season. No labor troubles of any magnitude have been felt during 1892, and none appear to threaten for 1893. A banquet, the first social function in the history of the exchange, was to have been held on February 22.

INDIANAPOLIS, IND.

The Indianapolis report stated that the exchange had been steadily growing in appreciation of the benefits of organization, and particularly under the form advocated by the National Association. The total of membership is 103, a gain of 12 since the last convention.

The effect of the presence of the directors of the National Association at the mid-year meeting has been most beneficial in reawakening the interest of the builders to the benefits to be obtained by careful organization. No labor troubles have complicated the building business, and none are expected in the coming year. The prospect for 1893 promises profitable activity among the builders of Indianapolis.

LOWELL, MASS.

Business in Lowell, as indicated by the report of the Builders' Exchange, has been excellent throughout the past year. Plans are under way which promise, for the exchange, very great improvement during the coming year.

LYNN, MASS.

The report from Lynn showed that the builders had enjoyed an exceptionally good year and that the members of the exchange secured all the desirable work in the market. The Lynn builders seem to feel the need for the establishment of some fixed and equitable relationship between the architects and contractors. Nine hours are worked generally in the building trades throughout the city and the best of feeling exists between the employers and workmen.

MILWAUKEE, WIS.

The report from the Builders' and Traders' Exchange of Milwaukee stated that business was in a fair condition and that $15,000,000 worth of work had been done during the past year. The exchange has 125 members in good standing and the appreciation of the better conditions which are being brought about by the exchange grows greater every day. The principal event of the year for the exchange is the completion of its building, which is to be formally dedicated with appropriate ceremonies in the near future. The exchange has made another long step in advance by securing the services of a paid and permanent secretary. A standing committee has been appointed to watch the action of the State Legislature in the interest of the builders. The building laws of the city are now being revised by a commission composed of three members of the exchange, three architects and the building inspector.

MINNEAPOLIS, MINN.

The report made by the Builders' Exchange of Minneapolis contained a succinct history of the organization from the time of the establishment of the Hennipin Club, from which it sprung, to the present date. A steady increase in influence and numbers was clearly shown. A dividend was declared on the stock of the exchange early in 1892, and the organization is in excellent condition. The exchange has placed itself on record as being opposed to lien law except for the protection of the laborer. A warm welcome was extended to every builder in the National Association to visit the exchange when in Minneapolis or vicinity.

NEW YORK CITY, N. Y.

The Mechanics' and Traders' Exchange of New York City reported that it commenced the thirtieth year of its existence under a charter of incorporation, although for many years previous to that time it had existed as a mutual body, and is therefore entitled to the claim of being one of the pioneers in the custom of daily meetings of those identified with the construction of buildings for conference and information. In New York City during the past year "there has been erected 2967 separate buildings devoted to various purposes, at an aggregate cost of $59,106,618, and of these at least 125 cost upward of $100,000 each to erect. While this may seem to be a large volume of business, still it is far below the annual average of the several preceding years. One reason for this decrease was the disturbing influences of labor organizations which arose early in the season. No trade seemed free from their influences and strikes were consequent in nearly all. Where these strikes were unreasonable or unjust or without sufficient and apparent cause, they were resolutely, and in most cases successfully, resisted by the employers. Successful resistance was due almost entirely to the thorough organization of the employers in the several trades affected.

"To-day we have." says the report, "16 associations of employers in the building trades, comprehending all of the principal branches, each with its officers and all the machinery of perfect organization.

Building Trades Club.

"In this connection we cannot refrain from alluding to the Building Trades Club as an important factor in the movement to bring about unity of action among employers. Its club house furnishes every facility for the meetings of such associations, and at the same time it affords the members of these associations the advantages of socially meeting with those of other building trades.

"With the facilities afforded for business during the day time, it does not neglect the social element of club life, and the evenings are made enjoyable by social entertainment and friendly intercourse. Builders and others comprising the building trades are to-day, through the efforts of this club, better acquainted with each other than in the days when they met only as competitors for contracts or for business. The result of such intercourse is a bond of friendship in the craft, which is not only delightful, but novel. We earnestly commend to our friends in other cities the benefits to be derived from such a club.

Building Law.

"The exchange was instrumental in securing the passage in the early part of last year of a new building law for the city of New York, in which is provided for a Building Department, which heretofore was but a bureau in the Fire Department. This change is particularly important as giving increased distinction to the building interest, making it worthy of a separate department under the city government. Under this law the erection and alteration of all buildings is under control of the department named, and all questions regarding proposed construction not within the law are presented to a board of examiners, which is empowered to modify the law in its discretion. This board consists of nine members, of which the exchange is entitled to two.

Plumbers' Certificates.

"Another law passed provides for the appointment by the Mayor of an Examining and Supervising Board of Plumbers and Plumbing to examine and issue certificates to master plumbers and inspectors of plumbing. This board consists of two master plumbers, one journeyman plumber, the chief inspector of plumbing and drainage in the Building Department and the engineer in charge of sewers in the Public Works Department.

"Master plumbers and plumbing inspectors examined by this board must pay a fee of $5, which goes into the city treasury. The law requires that all master plumbers shall be examined as to fitness for their business, and be registered in the Health Department before March 1, 1893.

Arbitration.

The question of arbitration is one that appeals to the good judgment of the members of the exchange and is receiving the attention it commands, but with two exceptions has not been put in practice in New York City. These exceptions are the associations of masons, builders and plasterers, which have an arbitration board composed of an equal number of employers and workmen, resulting in the absence of difficulties or strikes since their establishment. On April 1 the exchange will remove from its present location to one more eligible in the center of activity in the building line. This change is accepted by the progressive element in the membership as indicative of increased interest in the project for a suitable and exclusive exchange building. The New York Exchange is confident of the ultimate success of the measures advocated by the National Association for the general improvement of the building trade, and it closes its report with an expression of a desire to promote such measures to the best of its ability.

OMAHA, NEB.

The report from Omaha was practically the same as the *résumé* of the interesting reports of the president and secretary of the Builders' and Traders' Exchange which appeared in the last issue of *Carpentry and Building*. The wonderful progress made by the exchange in the past year excited much favorable comment and applause.

PHILADELPHIA, PA.

The report from the Philadelphia exchange was particularly interesting, and was received with marked attention. The report includes a financial statement of the exchange, the exhibit department and the trade schools.

PROVIDENCE, R. I.

The past year in Providence, as shown by the report from the Builders' and Traders' Exchange, has been one of unusual activity in the building business. The amount of money invested in new buildings was nearly 25 per cent. greater than that of the preceding year. The exchange is urging the attendance of the members during the 'change hour, and is striving to bring into effect the measures advocated by the National Association. The work of preparing for the erection of a building is being steadily pushed and is expected to assume definite shape before long. The exchange decided at a recent meeting to secure the establishment of uniform hours of labor and after March 1 all trades will work nine hours.

ROCHESTER, N. Y.

The Rochester Exchange presented an interesting report, stating that the organization was in good condition, the 'change hour well observed, the uniform contract in general use, arbitration well established as a means of settling differences between employers and workmen, and the first steps toward securing a building have been taken. The city of Rochester has invited the exchange to appoint a committee to meet with a like committee from the City Council to revise the building law now in operation.

"If it should be asked, What does your exchange need most to make it a better and more efficient organization for accomplishing the purpose set down in your constitution? we should answer—something that shall make its members think more of, and take more interest in, those questions that require united action. Individual effort is good, but concerted and organized action is better, and little real progress can be made by our exchange, or any other, until a working majority first believe that there is something to do, and then together set about doing it. In short, we need to eat and digest the food prepared for us by the National Association. In our city, most of the large buildings are taken by one firm to build, this firm becoming responsible for the full completion of the work in all its details, under the supervision of the architect and according to plans and specifications. Too often the builder who thus contracts to do all this allows the architect to direct the sub-contractors directly, instead of through him, often making changes of which the first notice the builder gets is to see something placed in his building very different from that for which he has agreed to pay a stipulated price.

This leads to complications in the settlement of accounts, and confusion in the execution of the work. The builder is often asked by the architect to name his sub-contractors, something it seems to us that does not concern any one but the builder himself, since he and he only is responsible directly to the architect as owner's agent.

Now, we believe if a builder is responsible for work he should select whom he chooses to execute it, and if changes are made they should be made by or through him, and, in short, all directions from the architect should be made to the builder direct and not to the sub-contractor.

We believe this state of affairs is not peculiar to our city.

We recognize the fact that reform must be brought about by the effort of the separate exchanges, but we hope to have some exchange that has recognized these wrong relations and has corrected them tell us just how they did it, so we may set about correcting ours with more intelligently directed efforts."

ST. PAUL, MINN.

The St. Paul Exchange reported a change in its character of organization which makes it different from any other filial body in its nature. The membership is composed of trade associations, as follows: carpenters', brick and stone masons', plasterers', cornice makers', stone cutters', steam and hot-water fitters' and painters' associations. The Master Plumbers' Association withdrew early in the year, alleging as reason for so doing that it failed to see the benefit of its membership. The defection did not seriously affect the exchange. The action taken by Minneapolis on the lien law was in connection with the St. Paul Exchange, both being opposed to its existence save as a protection to the laborer.

ST. LOUIS, MO.

The report of the St. Louis Exchange showed that business had been good during the past year, that no strikes or labor troubles of any magnitude had occurred, and that the financial and numerical strength of the exchange is excellent. The opening of the new rooms has worked a benefit to the exchange and offers much more attractive quarters than those formerly occupied.

WORCESTER, MASS.

The year in Worcester passed without unusual action among the builders, and with no disturbance in the harmonious relations between employers and workmen. The exchange is steadily demonstrating to its members the value of its existence, and it has assumed a position of influence and importance. A hearty welcome was extended to all members of filial bodies who might visit Worcester.

SAN FRANCISCO, CAL.

A very interesting letter was read from the president, Chas. C. Terrill, of the Builders' Exchange of San Francisco, which, while it foretold a possible withdrawal from the National Association of this exchange, was couched in such friendly language that it was received with great attention. The isolation of the city from the great majority of the filial bodies and the difficulty of finding a delegation willing to bear the expense of attending the conventions were the principal reasons for the possible withdrawal. However, Mr. Terrill inclosed a check in payment of the *per capita* tax for the coming year.

CODE OF PRACTICE.

The reading of the reports occupied the balance of Wednesday, and on Thursday morning the business of the session was taken up and the discussion of subjects presented in the reports was abandoned for lack of time.

Immediately following the reading of the last report from filial bodies, one of the questions contained in the report from the Boston Exchange, based upon conditions which exist in that city, was presented to the delegates for discussion. All effort on the part of the builders in Boston to secure either aid or co-operation from the architects in matters of mutual concern have proved entirely useless, and the question asked in the Boston report was: "Would the National Association recommend one of its filial bodies to formulate a code of practice without consulting the architects, and insist upon the observance of such a code to the extent of refusing to conform to any other rule?" The discussion was earnest and extensive, many of the delegates urging that, in the event of the architects refusing to assist at the correction of unjust conditions, the contractors should stand together and compel the acceptance of the code agreed upon. On the other hand, the more conservative argued that such a proceeding would virtually be a boycott and just the method of procedure so strongly condemned in the workmen. The result of the consideration, which was broad and careful throughout, was embodied in the adoption of the following resolution:

Whereas, Mary filial bodies have found, in attempting to establish the Code of Practice recommended by this association, as one which should prevail in the relations between architect and builder, that the architects, as a class, decline to co-operate in such establishment, it is therefore

Recommended. That filial bodies should not, because of this discouragement, abandon this just cause, but, while refraining from coercive measures which partake of the objectionable features of the boycott, should repeatedly and persistently press for the recognition of some such codes until they are adopted in the way and manner comprehended in the original recommendation.

THURSDAY MORNING.

The first thing taken up was the apprenticeship question and the advantage of trade schools. The trade schools, under the patronage of the Master Builders' Exchange of Philadelphia, were shown to be in a most excellent condition and doing a most beneficial work. George Watson of Philadelphia made a very strong plea in favor of increasing the number of trade schools under the direction of the filial bodies of the National Association. A resolution was passed expressive of the profound thanks of the National Association to J. Pierrepont Morgan for his magnificent gift of $500,000 to the New York Trade Schools. The question upon the subject of apprenticeship was divided into several separate heads: Whether the workmen have any right to restrict the number of apprentices which shall be taken by an employer? Whether the employers and workmen in joint action have any right to control the number of apprentices which any employer shall be permitted to employ, and whether any one, employer or workman, has any right to interfere with a boy's desire to learn a trade? The prevailing opinion seemed to be that proper boards of arbitration, composed of equal numbers of employers and workmen, were best qualified to make such rules as should govern the number of apprentices which an employer should be permitted to employ. The discussions occupied the morning and were exceptionally thorough in the treatment of the subjects.

VISIT TO THE MERCHANTS' EXCHANGE.

During the noon recess the delegates attended the Merchants' Exchange in a body and were cordially received by the president, W. T. Anderson, and the members of the exchange. President Ittner of the National Association, George C. Prussing of Chicago, J. Milton Blair of Cincinnati, Governor E. R. Stanard and others made short addresses.

THURSDAY AFTERNOON.

President Ittner called the meeting to order at 2 o'clock. After the roll-call action on proposed amendments to the constitution came up in the regular order. The first amendment proposed was to Article 4 on the officers and directors, and the amendment adds to the clause, "They shall enter upon their duties immediately upon the adjournment of the convention at which they were elected," the following: "And serve until the election of their successors." The amendment was adopted.

The second amendment was to Article 8, entitled, "representations at conventions."

The article reads that each exchange affiliated with the association shall at annual or other conventions be entitled to representation as follows: One delgate at large—who shall be the director chosen at the preceding convention—and one delegate in addition for each 50 members or fractional part thereof. Each delegate shall have one vote and may be represented by alternate or proxy. No delegate shall hold more than one proxy. The amendment adds to the second clause: "Upon which membership *per capita* tax has been paid 30 days prior to the election of delegates to the annual convention," and to the third clause: "The presidents of local bodies should be delegates by virtue of their office, and ex-presidents of the National Association should be delegates to all conventions by virtue of having held office."

After considerable discussion the amendments were lost.

The last amendment offered proposed an addition to Article 9, regarding the annual dues, making it read, "the annual dues for the ensuing year shall be assessed by each convention upon the recommendation of the Board of Directors. It shall be assessed *per capita* of membership in exchanges or organizations that have gained membership in this association, and be payable through the officers of the exchanges. This assessment will be due immediately upon the adjournment of the annual convention and must be paid 30 days prior to the election of delegates to the next annual convention. Default in paying this assessment shall forfeit membership and representation. Payments may be made on account of the *per capita* tax during the year." The amendment was unanimously carried.

MARC EIDLITZ.

C. W. Gindele of Chicago presented the following resolution:

Resolved, That the proceedings of the mid-year meeting regarding the death of Marc Eidlitz of New York be made a part of the proceedings of this convention, and that the secretary be instructed to reserve a page in the minutes of this convention to be used as a memorial page to him.

The resolution was adopted.

COMMITTEE ON RESOLUTIONS.

The report of the Committee on Resolutions was next in order, the various resolutions having been referred to the committee on the first day of the meeting.

A preamble and resolution, submitted by the Builders' Exchange of San Francisco, favoring the enactment of legal measures for providing compulsory arbitration throughout the United States for the settlement of differences between employers and workmen, the committee recommended be laid upon the table. The recommendation of the committee was adopted. A resolution from the Baltimore Exchange recommending that the secretary make at least annual visits to all filial bodies was indorsed by the committee, but after considerable discussion was lost.

A resolution offered by J. Milton Blair of Cincinnati, asking the National Association to approve the construction of the Nicaragua Canal, was reported favorably by the committee, but lost when put to vote in the convention.

The request presented by the president in his opening address, that profit-sharing be made the subject of consideration during the convention, was referred to the Committee on Resolutions, which reported that the matter was considered of sufficient importance to be referred to a special committee with instructions to report at the next convention. It was so ordered.

The recommendations in the secretary's report were next presented by the committee; the first, suggesting the appointment of committees from some one locality, in order that meetings of the committees might be held during the year, was favorably reported upon and was adopted.

MINIMUM MEMBERSHIP.

The suggestion that a minimum of membership be fixed for membership in exchanges desiring affiliation with the National Association was returned by the Committee on Resolutions with the recommendation that it be referred to a special committee on revision of the constitution to be appointed. The secretary's suggestion that each of the committees from the various bodies which together form the Joint Committee on Building Law be assigned some particular and special duty, in order that more definite action may be secured, was favorably reported, and the committee recommended that the committee from the National Association be so instructed.

The suggestion that a committee be appointed to prepare some systematic method of estimating was considered by the committee as being a purely local question and recommended back to the local exchanges.

The suggestion that it might be well to make some way for the admission of the Canadian exchanges was lost, the committee recommending that action be deferred until after annexation.

The secretary's suggestion that collection bureaus might be established in connection with local exchanges, and that a committee be appointed to investigate the possibilities of the subject, was reported unfavorably by the committee, it being deemed inadvisable to take action on the subject at present.

BOARD OF REFERENCE.

The suggestion that some plan ought to be devised to secure in each local exchange a board of reference, composed of equal numbers of architects and builders, to which should be referred all disputes and disagreements between individuals in either branch, the committee reported unfavorably, believing that the question was one that should be treated locally.

The urgent need of uniformity in the preliminary clauses of specifications, the secretary suggested, be referred to the Committee on Uniform Contract. The Committee on Resolutions recommended the adoption of the secretary's suggestions.

A resolution presented by John E. Carpenter of Louisville, seeking to prevent dealings by the members of any filial body with any architect who has refused to conform to the code of practice adopted by any other filial body, was reported unfavorably by the committee, which recommended that the same be laid upon the table. The resolution excited considerable discussion, but was finally lost.

TIME AND PLACE OF NEXT CONVENTION.

The report of the Committee on Time and Place of Next Convention and for the Nomination of Officers was next in order, and was presented as follows:

To the National Association of Builders:—Your Committee on Time and Place beg leave to respectfully report that they have carefully considered the subject and would recommend that the eighth annual convention be held in Boston, Mass., commencing on the second Tuesday in February, 1894.

OFFICERS FOR 1893.

The committee have nominated for president, Ira G. Hersey of Boston; vice-president, Hugh Sisson of Baltimore; second vice-president, Charles A. Rupp of Buffalo; secretary, William H. Sayward of Boston; treasurer, George Tapper of Chicago.

Respectfully submitted:

CHAS. W. GINDELE,
JOHN S. STEVENS,
A. MCALLISTER,
J. MILTON BLAIR,
STEPHEN M. WRIGHT,
Committee.

The report of the committee was received and adopted, and on motion the president was instructed to cast one ballot for the officers named in the report, whereupon the officers as mentioned were declared elected.

SPEECHES OF NEW OFFICERS.

Mr. Hersey responded in a happy speech of acceptance, and promised to all the delegates a hearty welcome on the occasion of the eighth convention, when the National Association should return to Boston, its birthplace and home. Mr. Sisson being absent, Mr. Miller of Baltimore responded to the call for the new vice-president, and assured the delegates that Mr. Sisson held the welfare and purposes of the National Association in the highest esteem, and only a very recent family bereavement prevented his attendance at the meeting. Chas. A. Rupp, the new member of the executive officers, the second vice-president, laid himself open to suspicion by stating that he could not make a speech and then immediately proceeding to make a very pretty one. Mr. Rupp's remarks were received with a warm welcome and attention. He promised his earnest efforts to the association, and forecast a pleasant time for the delegates when the time for the meeting in Buffalo shall have arrived. Mr. Sayward and Mr. Tapper both responded briefly to calls for a speech, and the convention proceeded to the election of directors, with the following result:

DIRECTORS FOR 1893.

Noble H. Creager	Baltimore.
James I. Wingate	Boston.
H. C. Harrower	Buffalo.
John Rawle	Chicago.
L. B. Hancock	Cincinnati.
Arthur McAllister	Cleveland.
J. D. McGilvray	Denver.
Jos. Miles	Detroit.
W. T. McGurrin	Grand Rapids.
W. P. Jungclaus	Indianapolis.
George L. Smith	Louisville.
Moody D. Prescott	Lowell.
Henry Ferge	Milwaukee.
Emery F. Dodson	Minneapolis.
Stephen M. Wright	New York.
N. B. Hussey	Omaha.
Stacy Reeves	Philadelphia.
W. W. Batchelder	Providence.
H. H. Edgerton	Rochester.
Charles B. McCormack	St. Louis.
J. W. Makinson	St. Paul.
John H. Quallman	Saginaw.
A. S. Reed	Wilmington.
O. S. Kendall	Worcester.

Cities not represented will appoint directors by letter.

MISCELLANEOUS.

Under the head of miscellaneous business a petition was presented by the Lucas Ship Enterprise and referred to the incoming board for action.

A. J. Campbell of New York took the opportunity of presenting to the National Association an exceedingly valuable document in the form of a pamphlet containing the different forms of building law for cities of different sizes, which have been prepared by a commission appointed for the purpose by Governor Flower of New York. The bill under which the action took place provided for three grades of laws: 1, for all cities in the State of New York (except New York and Brooklyn) having a population of over 75,000; 2, for all cities having a population over 30,000, but not exceeding 75,000; 3, for all cities having less than 30,000. These laws apply only to incorporated cities, and not to towns or villages. The form for the administration of the different grades of these laws is also elaborated, and the pamphlet will be of much value as containing suggestions for future work upon the subject either by the National Association or its filial bodies. A vote of thanks was tendered to the giver.

A resolution expressing earnest appreciation of the efforts of President Ittner in behalf of the National Association, and the manner in which he conducted the deliberation of the seventh convention, was passed by a rising vote and hearty applause. A vote of thanks was also extended to the St. Louis Builders' Exchange, the citizens and officials of the city, the officers and members of the Chamber of Commerce and the press of the city for their uniform courtesy and unbounded hospitality. The convention adjourned to meet in Boston in 1894.

ENTERTAINMENT.

The entertainment offered by the St. Louis Builders was of the most lavish kind; on the evening of the second day a theater party at the Olympic was tendered the visitors, and a most enjoyable time was had by all. Every seat in the house was occupied by the builders and their friends, and the play, "The Ensign," was enjoyable to the end.

The climax of the entertainment, however, was reached when the flood of light burst from the open doors of the beautiful banquet room in the Lindell Hotel. About 600 guests sat down and partook of the feast, and there is no doubt whatever about the enjoyment and pleasure of the occasion. The various toasts were appropriately responded to by Messrs. Hersey, Stevens, Eames and Dyer, and an impromptu programme was made up, after the guests were seated, which lasted until a late hour in the morning. George Moore Smith and A. J. Campbell of New York were among the latter number.

ATTENDED THE CONVENTION.

The credentials showed the following to have been present:

From Baltimore.

Noble H. Creager, P. M. Womble, Jr.,
E. D. Miller, S. B. Sexton, Jr.,
Geo. Mann, I. S. Filbert.

From Boston.

E. Noyes Whitcomb, John Y. Mainland,
Wm. N. Young, John Emery,
Chas. W. Parker, L. D. Willcutt,
C. Everett Clark, F. N. Tucker,
David McIntosh, Ira G. Hersey,
W. J. Connery, W. H. Sayward,
Geo. E. Leighton.

From Buffalo.

A. A. Berrick, J. J. Churchyard,
Chas. A. Rupp, Geo. E. Donaldson,
John Feist, Geo. Duchscherer,
James Boland.

From Chicago.

C. W. Gindele, Francisco Blair,
W. H. Alsip, Geo. C. Prussing,
George Tapper, Wm. Henry,
M. B. Madden, John Rawle,
Frank I. Wright, John Griffiths,
D. V. Purington, James John,
Jas. A. Hogan.

From Cincinnati.

Samuel D. Tippett, J. Milton Blair,
L. B. Hancock, B. W. Blair.

From Cleveland.

Arthur McAllister, G. G. Griese,
J. W. Conger, Thomas Simmons,
J. A. Reaugh, R. H. Jenks.

From Denver.

Chas. W. Fair, W. J. Hill.

From Detroit.

Alex. Chapoton, Jr., John Finn,
Robert Hutton, Martin Scholl,
G. J. Vinton.

From Grand Rapids

P. C. Campbell, W. C. Hopson,
James Curtis, Chas. Hoertz,
W. T. McGurrin, N. Rosema.

From Indianapolis.

James McGauley, Wm. Kass,
Chas. Nuerge.

From Louisville

Jas. H. Murphy, W. P. Hampton,
Geo. L. Smith, John E. Carpenter,
Wm. Muster.

From Lowell.

L. F. Kittredge.

From Milwaukee.

Paul Reisen, G. F. Stuewe,
Henry Ferge, G. M. Reynolds,
T. R. Bentley, H. J. Sullivan,
C. G. Forster.

From Minneapolis.

Geo. W. Libby, Chas. E. Richardson,
Emory F. Dodson, Chas. W. Brown.

From New York City.

Geo. Moore Smith, J. J. Roberts,
A. J. Campbell, Chas. A. Conover,
S. M. Wright, Augustus Myers,
W. A. Conover, John McGlensey.

From Omaha.

W. S. Wedge, Geo. Bassett.

From Philadelphia.

Stacy Reeves, F. M. Harris,
Wm. H. Albertson, John S. Stevens,
W. S. P. Shields, Wm. Harkness,
Geo. Watson, Wm. Carlile.

From Providence.

W. W. Bachelder, A. C. J. Learned,
Jas. S. Hudson, Henry Mason,
Richard Hayward, Jas. Sheridan.

From Rochester

H. H. Edgerton, J. J. L. Friederich,
J. H. Grant.

From St. Paul.

J. W. Makinson, Wm. H. Ulmer,
Wm. Rhodes, G. M. Brack,
J. D. Moren.

From Saginaw.

Michael Winkler, John H. Quallman,

From Wilmington.

A. S. Reed, John P. Almand,
Wm. H. Foulk.

From Worcester.

C. D. Morse, F. B. White,
O. S. Kendall, C. W. Walls,
Geo. W. Carr.

There were many visiting builders present whose names did not appear on the credentials.

SAFE SCAFFOLDING.

THE fact that many tall buildings, in the construction of which vast quantities of brick and heavy stone are required, are put up in comparatively narrow streets or in those through which a continuous traffic is maintained, forces the builder or contractor to resort to forms of scaffolding which under other circumstances might be regarded as unnecessary. Not only has the art of building been more or less revolutionized by the use of iron work, but also the appliances and scaffolding employed in connection with it. In a street having a very narrow sidewalk, where there is a rapid and incessant passing to and fro of pedestrians and venicles, as is always the case in the larger cities of the country, it is evident that the ordinary form of pole and putlog scaffold would be inadequate for the purpose. This being the case, the contractor at once adopts a form which, while causing no inconvenience to traffic, will fully serve his purpose. In the illustrations given herewith is represented a form of scaffold which meets the requirements of a crowded thoroughfare, as it offers very little, if any, interference with the free passage of people to and fro upon the sidewalk. Fig. 1 represents a section through the front wall of a building, and gives a very clear idea of the form of scaffold to be employed. The writer has never heard any name for it except that of "Plank Scaffold," but it is really more than that. It is, of course, constructed of planks, but it is also a "cantilever" scaffold, for the reason that it consists of a series of timber levers projecting about one-third of their length from the first or second story windows, while the other two-thirds remains within the building. There is usually a lever at each window, and, as windows are rarely very far apart, the levers are spaced so as to support a mason's plank in three places—namely, at each end and in the center. As a rule the bearing planks are necessarily of sound and reliable timber, generally of spruce, and of proportions sufficiently adequate to sustain the weight of men and material to be placed upon them. The best section of timber to use is that which has a proportion of at least three to one, though it would be better and safer to use four to one. What is meant by this is that the cantilever beams should in all cases be 4 inches thick and 12 inches deep, and where much brick, stone and mortar are to be laid upon the scaffold, 4 inches thick and 14 inches deep would be preferable.

It must be remembered that in most scaffolds of this class entire reliance is placed upon the ability of the supporting timbers to sustain their transverse strain, and should the proportions be inadequate great danger results. It will occur to the practical builder to ask: "How can I obtain the exact proportion of timbers necessary to bear a certain weight of material? I am going to erect this heavy building, and may, perhaps, have several tons of stuff on the scaffold at a time, but I don't see how I can approximate the dimensions of the timbers." In answer to this, the writer would say: "Figure it out, and allow a safe margin for emergencies. If, for the sake of economy, the scaffold sills are to be of wood, consult an engineer's pocket book, and by formulæ laid down by reliable authorities notice the conditions under which each individual stick will be placed and calculate correctly its dimensions." It is found that in a scaffold of this description, the supporting beam being fixed at one end and having its load uniformly distributed, the form of equal strength is a triangle. It follows, therefore, as a natural consequence, that the deeper the timber the larger the hypotenuse of the triangle and the greater the strength or resistance. It will, of course, be understood that in every case where constructive works are concerned, more than equal strength is necessary to resist the strain and obviate fracture. Depth, therefore, is essential to accomplish this, and the greater the depth the stronger and more suitable the beam for the purpose.

Referring to Fig. 1 of the illustrations, and carefully noting there the different

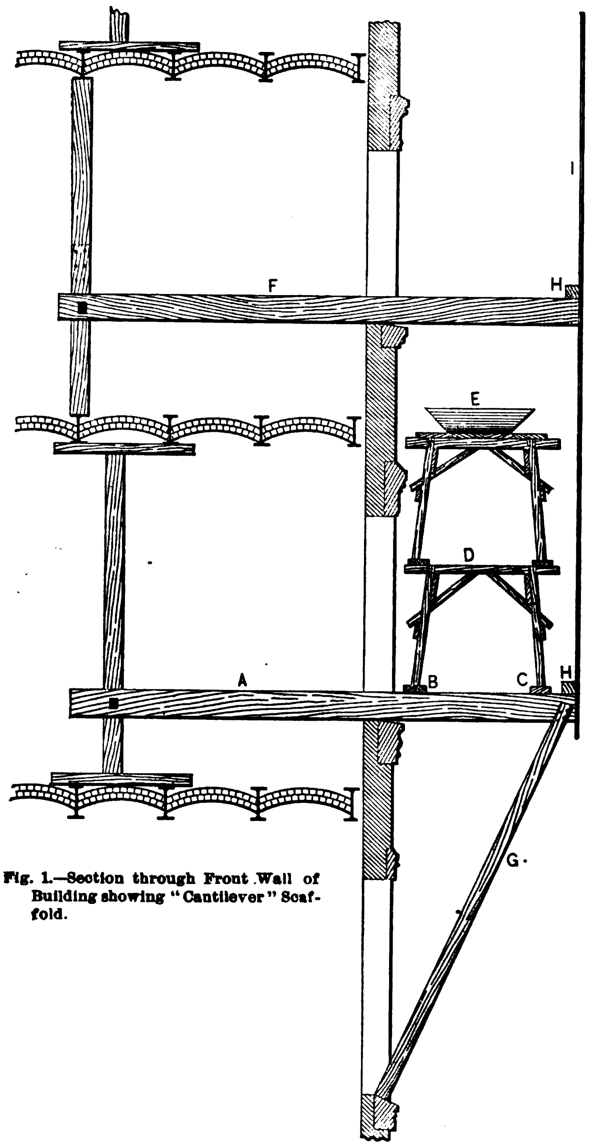


Fig. 1.—Section through Front Wall of Building showing "Cantilever" Scaffold.

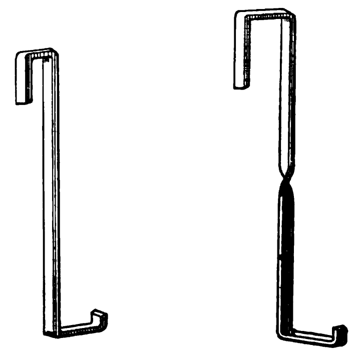


Fig. 2.—Hanger Irons for Beams.

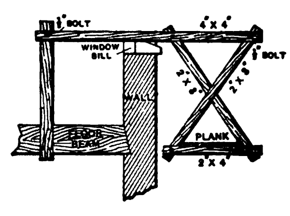


Fig. 3.—Hanging Scaffold.

Safe Scaffolding.—Illustrations of Various Forms.

parts shown, the form of scaffold will be clearly understood. The first or lower cantilever beam or putlog A is placed in the middle opening and projects from the face of the wall 5 feet 6 inches, or a little more than the length of a mason's horse. The lower edge of the timber, it will be noticed, rests on the edge of the stone sill. The dimensions of this beam are 4 x 12 inches, and it is prevented from canting upward by being bolted to an upright shore or post driven in tightly between the rolled iron or steel T-beams forming the fire-proof floors. On this floor upper and lower timber horses are placed beneath the shore, for the reason that it comes in the center of the brick arches. On the projecting ends of this series of beams the necessary scaffolding planks are laid, and when the wall has been built as high as the masons can reach two planks, B and C, are left on which to place the horses D. Similarly, when the hight gained by standing on one horse is reached in the construction of the wall another horse is added, and by this means the wall is carried up to the story above. Often three and even four hights of horses are required in reaching from story to story. In the engraving E is a mortar box, indicating the manner in which mortar and other materials are placed upon the scaffold platform. The next cantilever beam is represented by F, and this is of the same description as A, with the slight difference that the shore is driven in between the T-beams of the two floors. Should this upright be of shaky or any way doubtful timber it should be solidly nailed on to obviate all danger of the weight splitting it out and the end of the beam springing up. By following this method a very reliable scaffold, capable of sustaining any ordinary weight of material, can be cheaply employed in connection with any hight of wall in modern fire-proof or ordinary construction. Should the scaffold, however, be called upon to bear an extraordinary weight it could be made doubly strong by the addition of the brace G, which supports the end of the beam, and thereby reduces the transverse strain to a minimum.

In crowded streets, where there is a possibility of pieces of brick, stone or other material falling upon people passing below, it is advisable to sheet, or box in, the scaffold. This can be done by spiking string pieces of 3 by 3-inch stuff on each beam, as indicated by HH, and nailing boards to them in a vertical position, as indicated by I. If the lower beams are then planked over, any chipping, carving or other work may be safely conducted.

In Fig. 2 of the illustrations are shown views of hooks useful for holding the beams to the T's of the floor when the latter must be left clear. Some builders prefer these, as being safer and cheaper than the shore, but they are not adapted to every building on account of the difference in window sills. Fig. 3 shows a form of scaffold which is very secure and convenient in making repairs or executing other work at the exterior wall of a building. If the timbers be sound, the dimensions given will carry two men and sufficient material for the work. Where it is possible, iron cantilevers may be substituted for the wood in heavy work, on account of the greater resistance to transverse strain as well as increased reliability.

Echo in Buildings.

In buildings of oblong form reflection or echo is often found, due to the end wall and ceiling and the angles formed by the walls and ceiling. Direct echo from the end walls, says H. C. Kent, in a paper read before the Sydney Architectural Association, "can be obviated by making the end wall elliptic, and by breaking it with recesses or with a deep-stepped gallery, or by using absorbent materials, such as draperies; while secondary echoes can be greatly obviated by cutting off the angles with a curve, as well as by slight breaks in the side walls, which will prevent the conduction of the waves along their surface." Deep square recesses in the walls, except in the end opposite the speaker, and deep square openings in the ceilings, such as lanterns, should be avoided, as these breaks serve to set up vibrations of a conflicting kind. Wood lining is recommended for the walls and ceiling by most writers; but Mr. Kent thinks it increases resonance and detracts from clear definition of speaking. The author thinks simple harmonic proportions desirable in buildings intended for music, such as the ratio 2 to 3 to 5, or 2 to 2 to 5, the first of these being that of the Free-Trade Hall, Manchester, the second that of the old Surrey Music Hall. The Sydney University Hall has the dimensions 135 x 45 x 68 feet high, and these are found to give satisfactory results.

Brick Work.

In some of the ruder kinds of early masonry bricks were often employed as mere lacing or string courses, to bind together at varying vertical hights the whole of the underlying constituent parts of the masonry, and when so used in the construction of arches in combination with stone, the object of their use with the builders seems to have been to obtain even and equal bedding planes here and there throughout the arch by the insertion, as it were, of bricks or brick courses, irregularly alternating with the rough, unworked, or rudely "scraped" stones of uneven beds, chiefly composing the body of the arch. Bricks are still sometimes so employed, not as inclosures to flint diaper work, but more in the capacity of ornamentation, and as units or scales of a known dimension to aid the eye in the realization of the extent and effect of the composition as a whole, than as parts of constructive necessity. In modern work some of the greatest achievements of engineering skill have been carried out chiefly in brick work, and in some instances almost to the entire exclusion of the aid of stone.

This being so, it will not be out of place, says one of our contemporaries, to consider the essential conditions of what is now universally accepted as being worthy the name of good brick work. In the first place, brick work has made rapid and well-marked strides in the last quarter of a century, or since the decadence of the stuccoed front, and the revival and use of red bricks and terra cotta under the sympathetic and able advocacy of our architects and masters of modern refined thought as applied to architecture. Prior to the time mentioned, the shuff, the grizzle and the rough stock were mostly in demand, but they are now happily supplanted by bricks of a better class and quality, except in the erection of suburban villas and other jerry-built structures. One of the recommending advantages of the use of bricks over stones is the thorough and perfect bonding which may be obtained throughout the mass of the work; the ease and certainty of obtaining solid and homogeneous bedding of the bricks when laid by skilled bricklayers working under the recognized conditions essential to the production of good work; also, the imperishable nature of the material as compared with most of the building stones in use—even the granites; the ease with which they lend themselves to the construction and production of complex forms and outlines under a skilled treatment, as compared with the vastly greater expenditure of labor and material required to bring about similar results in stone. Of the importance and necessity of solidly bedding the bricks and effectually flushing up the interior joints (known as cross joints and wall joints), no one is so fully alive as the civil or municipal engineer long experienced in the construction or personal superintendence of sewers, water works and hydraulic work generally. The sewers recently built in a Western suburb afford a good instance—a case in which the brick work is so badly executed, that to connect the house drains to the sewers "would be," said the reporting engineers, "nothing less than converting the whole of the inhabited area into a hotbed of typhoid fever." The question of flushing-up, as applied to a building, differs in degree of importance as applied to a sewer or similar work. Apart from flushing-up the brick work, as a means of obtaining the maximum amount of tensile strength, in addition to that obtained by good transverse and longitudinal bonding, to carry the loads to which most walls are subjected, and to provide against the possible lateral movement of any of the constituent parts when the whole is under strain, the question has its sanitary aspect also, and by reference to most of the published engineers' pocket books will be found formulæ to find the amount of air in cubic feet which will in a given time, under certain conditions stated, pass through walls of varied thickness built of different kinds of material. The walls of dwelling houses defectively flushed up are therefore admittedly air filters on a very large scale. They are also liable to be receptacles of damp driven in by storms, and induced by the hollow, or partially hollow, state of the brick work, leading up to disease, and in some cases probably to fatal consequences.

Sugared Mortar.

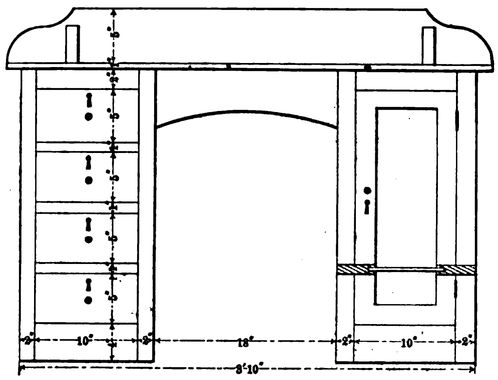
The recent references in the building and engineering journals to the supposed benefits to be derived from adding sugar to lime mortar have induced *Indian Engineering* to refer to tests made in 1817, in connection with the building of a bridge across the River Cooum, at Madras, to ascertain whether there is any advantage in the process, which is admittedly an ancient Indian practice. Small pillars were, at the time referred to, built up with great care, some with sugared, and others with unsugared lime, and allowed to set for nearly a month, when it was found, by testing, that the tenacity of the former was about 74 pounds while that of the latter was about 81 pounds per square foot. Several similar experiments had been made before, and have since been repeated to the same effect; and it is concluded that "there is no reason to believe that in the end any advantage is derived to the mortar by the use of saccharine matter." The mortar is made more plastic by it, and works more easily. But, in reality, the sugar is a useless expense in the first instance, and is probably prejudicial to the final duration of the cement—first, because there is a considerable quantity of impurity in cheap sugary matter which may not combine so well as clean water, and, secondly, because quicklime is not easily slaked in sugared water. When this is used, many particles of lime may remain unslaked, or may be slaked so late as to disturb the crystallization of the mortar after it has commenced. The employment of saccharine matter was therefore discontinued at the Cooum Bridge Works, and its disuse has since been generally recommended for large and heavy works. It occurs to a reader of this record, however, that if there is in Madras a bridge which was known in 1817 to have been built partly with sugared and partly with unsugared lime mortar, the condition of different portions of the structure to-day might supply an indication of the real value of the process in question.

GERMANY'S BUILDING at the World's Fair was dedicated with appropriate exercises on January 27, the anniversary of Emperor William's birth. The building is a handsome structure, costing $150,000, and is nearly completed.

CORRESPONDENCE.

Design for a Secretary.

From C. A. G., *Rankin, Ill.*—"W. C. R." of Chicago asks in a recent issue for a design for a secretary without a book case. I send sketches of one, of which I am both designer and maker, and I would say in this connection that it suits me very well. Good effects will be produced by using maple for the main portion with cherry panels, drawer fronts and an oak top, or it may be finished in natural wood. From an inspection of Figs. 1 and 2 of the sketches, which represent front elevation and plan views, it will be seen that there



Design for a Secretary.—Fig. 1.—Front Elevation.

is room at the top and bottom for a frame 1¾ inches thick to which to seal the back and feet. I send a good formula for finishing. After a good scraping and sand-papering fill with the following: Boiled oil, 1 pint; benzine, ½ pint; turpentine, ½ pint; japan, ¼ pint; silver white, 1 part; corn starch, 3 parts. Apply thoroughly, letting it stand 20 minutes, after which rub off the surplus and allow it to stand two days. At the expiration of this time follow with a hard

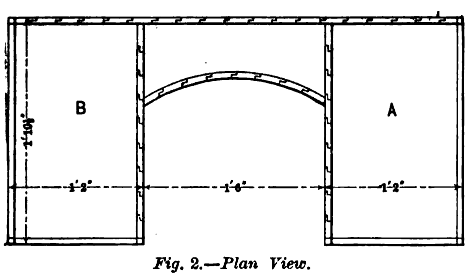


Fig. 2.—Plan View.

oil finish or a good coach varnish. If a dead polish is wanted, cut down the latter with pumice and sperm oil and finish by rubbing with the open hand. Referring to the plan, Fig. 2, A is a space closed by a door, while B is occupied by four drawers, all of which are indicated in Fig. 1 of the illustrations. Fig. 3 represents an end elevation.

Striking an Ellipse with the Dividers.

From "A. D. E.," *Branchville, S. C.*—I notice in the July number of *Carpentry and Building* that "L. S. F.," Beatrice, Neb., furnishes a method of striking an ellipse by means of only a portion of two arcs of circles. Now, I do not want to discourage "L. S. F.," but I think he is slightly mistaken, as he cannot strike a true ellipse by employing a portion of only two circles. In the first place, there is in the upper part of the drawing a sag where the arc 5, 6 and 7 intersects and in the lower part where 5, 6 and 8 intersects. According to my idea, the width is too greath for the length. If one was to employ this rule and wanted to put an arch between two rooms 8 or 10 feet wide between jambs, which is very often the case, the ceilings would have to be 15 feet high in order to get the frame in, unless the spring line was about 6 feet from the floor. Altogether "L. S. F.'s" method is a little out of proportion. For the purpose of showing this correspondent and others a correct method of striking an ellipse with the dividers I send the enclosed sketch, with explanation, which I trust may prove of interest. To form an ellipse by means of segments of circles, as represented in the sketch, let $a\,b$ represent the tranverse and $c\,d$ the conjugate axis. With d as a center and $d\,c$ and $d\,h$ as radii, describe the quadrant $c\,h$. Then from the center d draw the radius $d\,g$ at an acute angle of 69° from $d\,h$, the base. Divide the conjugate axis $c\,d$ into five equal parts; then through the point 1 draw $e\,f$ parallel to the transverse axis $a\,b$. When this has been done form the equilateral triangle as $d\,e\,f$. With f as a center, and $f\,g$ and $f\,v$ as radii, describe the quadrant $g\,b$. From the center f draw $f\,j$ at an angle of 53° from $d\,h$, the base. Take the distance $d\,l$ and apply it from f to j upon the line, as shown; then having j as center, with j 53 and $j\,x$ as radii, describe the quadrant 53 x. From the center j draw $j\,u$ at an angle of 30° from $d\,h$, the base. Then at the point of intersection with $j\,u$ to the transverse axis $a\,b$ will be the center n. Now, with n as center, and $n\,u$ and $n\,w$ as radii, describe the quadrant $u\,w$. The segment $c\,g$ of the quadrant $d\,c\,h$ and the segment g 53 of the quadrant $f\,g\,v$ and the segment 53 u of the quadrant 53 x, together with the segment $u\,b$ of the quadrant $n\,u\,w$, form one-quarter part of the ellipse from c to b. The parts $b\,d$, $d\,a$ and $a\,c$ are formed and the centers obtained in the same manner as described.

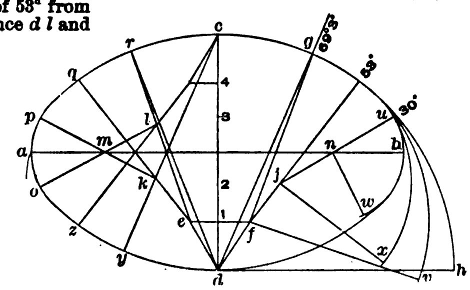


Diagram Showing "A.D. E.'s" Method of Striking an Ellipse with the Dividers.

Pitch of Roofs.

From D. H. M., *Waterbury, Conn.*—In the December issue of *Carpentry and Building* "G. A. L." of South Hanson, Mass., makes inquiry concerning the pitch of roofs. I would say that the terms quarter, third and half pitch for roofs are old and have long been dropped, owing to the fact that modern roofs are varied to such an extent in form and pitch. The latter is usually given by inches, as for example 7 inches in 12, 8½ inches in 12, 10½ inches or 12 inches in 12, and so on as the case may require.

Easy Running Tool-Chest Tills.

From A. R., *La Crosse, Wis.*—For the benefit of the correspondents who have

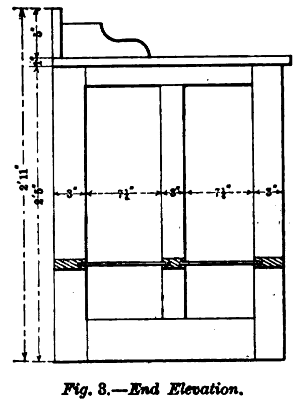


Fig. 3.—End Elevation.

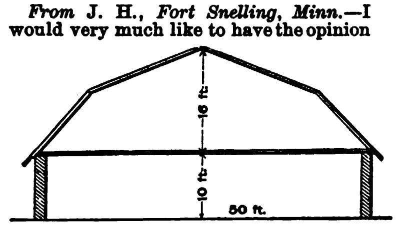
presented interesting letters relating to tool-chest construction, I would say that in order to make the tills of the chest slide easily, it is only necessary to apply a little stove polish to the skidways.

Pattern Making.

From S. G., *Salt Lake City, Utah.*—I am a reader of *Carpentry and Building* and always recommend it whenever opportunity offers. The only suggestion I can make just now is for some of the practical men in the trade to give us an article, now and then, on the subject of pattern making. I follow that occupation here, and while I should be very glad to see the subject discussed, I think there are other readers who are in the same position as myself.

Construction of Self-Supporting Roof.

From J. H., *Fort Snelling, Minn.*—I would very much like to have the opinion



Construction of Self-Supporting Roof.—Sketch Accompanying Letter from "J. H."

of some of the practical readers of the paper regarding the best method of constructing a self-supporting roof for a building 50 x 150 feet in size. The walls are 10 feet high and 17 inches thick. I inclose a rough sketch showing a section through the building.

Framing a Church Spire.

From H. H., *Johnsonburg, Pa.*—I have been a reader of *Carpentry and Building* for a number of years, and find it very helpful, especially the Correspondence department. The various articles on roof framing have already been of more value to me than ten times the price of the subscription. I submit for the consideration of the readers of the paper plans of a church spire which I erected last summer in this place. Referring to the sketches, Fig. 1 represents a plan view of base of the spire as it appears when viewed from the top. The braces are omitted in this sketch in order to show more clearly the position of the rafters. The size of the tower at the base is 10 feet 1½ inches. The plate is formed of three thicknesses of 3 x 12 stuff spiked together and secured by ⅞-inch bolts extending downward 4 feet into the brick work and fastened at the bottom to iron anchors 1½ x ½ inches and 3 feet in length. The triple plate is also bolted to a 6 x 6 post in each

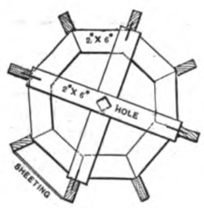


Fig. 5.—Section at B.

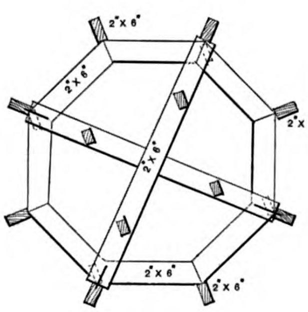


Fig. 4.—Section of Spire at A.

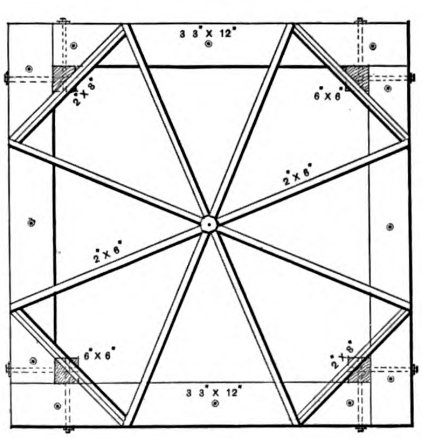


Fig. 1.—Plan View of Base of Spire, the Braces being Omitted to more clearly Show the Rafters.

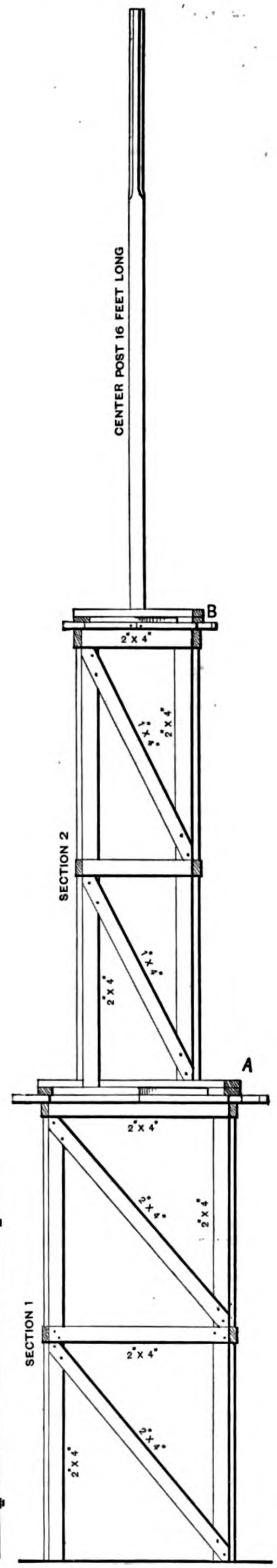


Fig. 2.—Frame Work, Showing Method of Raising the Rafters.

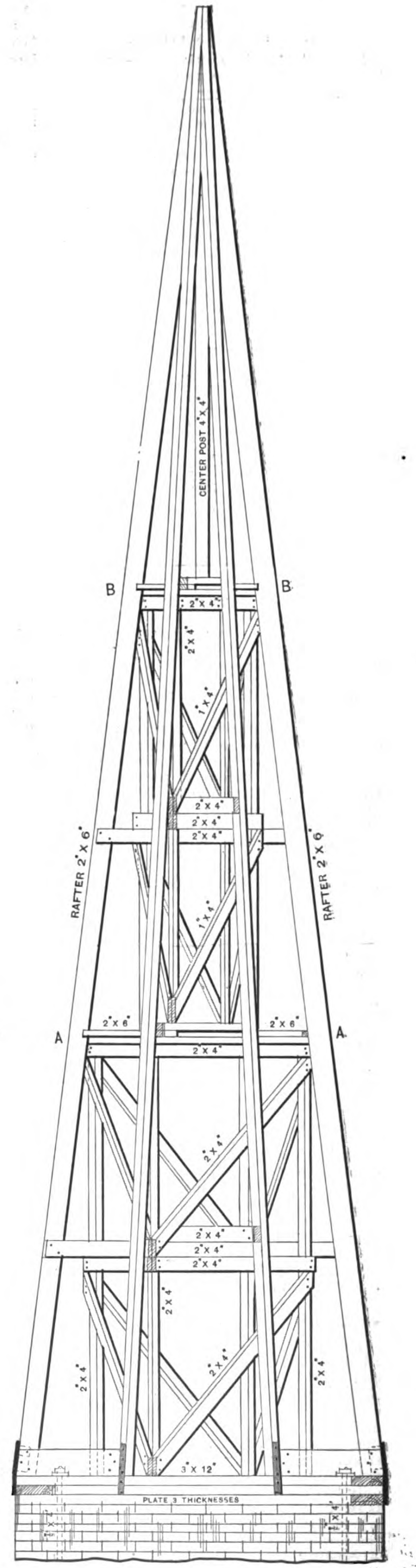
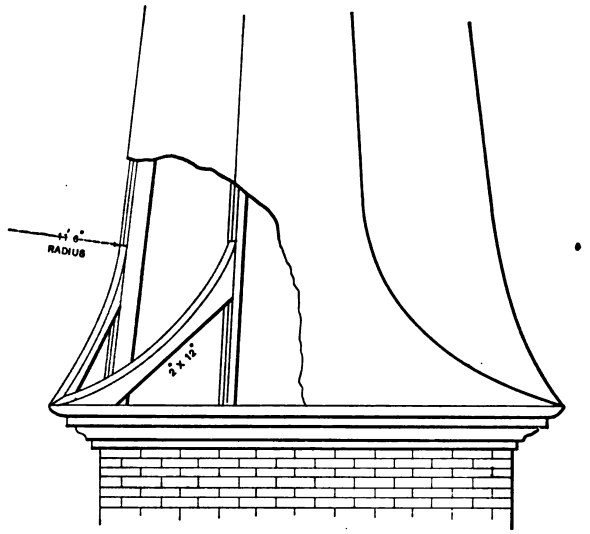


Fig. 3.—Showing Rafters and Bracing as Completed.

Framing a Church Spire.—Method Pursued by "H. H." of Johnsonburg, Pa.

corner of the brick work. These posts are mortised into timbers built into the brick work 30 feet down from the top of it. Fig. 2 of the sketches represents the method of raising the rafters. We first set up section one, which is built of four pieces of 2 x 4 stuff 11 feet 10 inches long and braced in two sections, as shown. We then placed the form shown in Fig. 4



Framing a Church Spire.—Fig. 6.—Showing how the Octagon Roof was Brought Out to the Brick Work at the base of the Spire.—Scale, ⅛ Inch to the foot.

on top of these posts, as indicated at A of Figs. 2 and 3. Using this platform as a scaffold, we then put up section two of Fig. 2, which is composed of four pieces of 2 x 4 stuff, the same length as used in section one. We braced them as indicated in the drawing, and on top of these at B we placed the form shown in Fig. 5. Now, using this second platform as a scaffold, we raised four of the rafters into position, after which we placed the center pole in the square opening in the center of the section represented in Fig. 5. I then climbed to the top of the center pole, which was held steady by another workman, and fastened the rafters to it. We then braced the rafters to the four in the center of each section and also to the center pole from section B to the top. In Fig. 3 of the sketches is shown the rafters and bracing as completed, as well as the iron shoes at the bottom of the rafters. The details in Figs. 6, 7 and 8 show the manner in which we brought the octagon roof out to the square brick work at the base of the spire. The hight of the brick

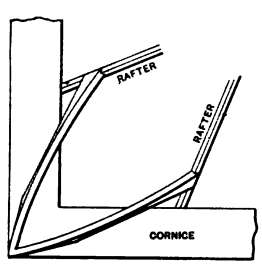


Fig. 7.—Plan View at One of the Corners.—Scale, ⅛ Inch to the foot.

work is 43 feet, that of the stone work from the grade line 7 feet, and that of the wood work on the spire 40 feet. The weather vane on top is about 8 feet, making the total hight of the spire 98 feet. With a crew of seven men we raised all the stuff from the ground and framed the spire complete in four hours.

Jack Rafters on the California Plan.

From I. P. H., *Omaha, Neb.*—In reply to "H. A. B.," Moreno, Cal., will say that for a third-pitch roof each succeeding jack rafter, working toward the foot of the hip, if placed 2 feet from center to center, will be 28⅞ inches shorter. On a half-pitch roof each jack will be 34 inches shorter. These figures are mathematically correct to within two or three hundredths of an inch and as close as any steel square problem solver will ever get. Men will make mistakes, but figures won't lie, therefore I will first take figures to solve

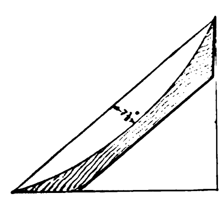


Fig. 8.—Detail of Cripple Rafter.

the problem. If the jacks are placed 2 feet apart from center to center it is evident that each jack toward the foot of the hip has 2 feet, or 24 inches, less run. Now take the pitch of the roof into consideration. A third-pitch roof rises 8 inches to the foot run of common rafter. As the rafters are 2 feet apart there will be 16 inches rise to take into consideration on each rafter to be cut. The solution is as follows: $24 \times 24 = 576$; $16 \times 16 = 256$; $576 + 256 = 832$, and the square root of $832 = 28.84$, which, reduced to reasonable measuring figures, is 28⅞ inches. Again if a half-pitch roof is taken there are 24 inches rise in 2 feet run instead of 16 inches, as before. Hence $24 \times 24 = 576$, the square of the run, and $24 \times 24 = 576$, the square of the rise; adding the two squares together we have $576 + 576 = 1152$, the square root of which is very nearly 34; therefore each jack on a half pitch roof will be 34 inches shorter. Some California carpenters have a way of their own, and are generally right in their way, but sometimes their ways are mixed, and they do not make them plain. Only a short time ago the same problem in jack rafter lengths came up for consideration and a fellow-workman fresh from the Golden Gate made a strenuous effort to show the California jack rafter plan, insisting that if the rafters were 2 feet apart each jack would be 24 inches shorter, no matter whether it was a third or half pitch roof, or any other pitch. An accurately scaled drawing showed conclusively that a jack rafter was a jack rafter the world over and that California jacks were no exception to the general rule. The drawing scaled exactly the same figures as the solution given in figures by square root.

I will make an effort to explain the system to which, undoubtedly, "H. A. B." has reference. By this method the hip rafter is not drawn. Referring to the sketch, A D is the run of common rafter, D E the rise for third pitch and A E the length of the common rafter; A C is the run of second jack from the hip, C F is the rise and A F the length; A B is the run of first jack, B G the rise and A G the length. Notice, particularly, that the lengths of jacks are taken directly on the line of the common rafter and are found by squaring up the run and rise of each jack as described. A D is the run, D H the rise and A H the length of the half-pitch common rafter; A J and A I are the lengths of jacks. Now we will suppose the jacks to be 2 feet, or 24 inches, from center to center. Take the third-pitch roof first, and in 24 inches run there are 16 inches rise, so measure down 16 inches from E to K and square across 24 inches to F, and from F to E will be found to equal 28¾ inches, which is the amount each jack toward the hip must be cut shorter on the third-pitch roof. We will now take the half-pitch roof: In 24 inches run there are 24 inches rise, hence measure down from H to E 24 inches and square across 24 inches to I, and from I to H will be found to equal 34 inches, the amount each jack must be cut shorter for the half-pitch roof. The point A is supposed to be toward the foot of hip, so do not take the lines A E and A H for the lengths of hips on the third and half pitch roofs, for they are the common rafters. This method, to say the least, is, in my opinion, a backward and awkward way of working. I have shown the method in its best light and yet it will undoubtedly appear in the dark to many. They will have to imagine what they can't see, but I hope they will see the folly of trying to pursue the dark method of some jack-rafter crank. Their method is inclined to mislead, so that it can hardly be worked and the operator know what he is doing. I have known people to measure down from H to E 24 inches, square across 24 inches to I and then declare that each jack would be 24 inches shorter on the

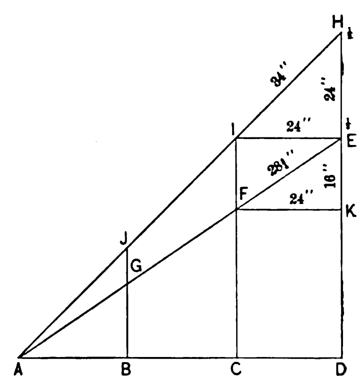
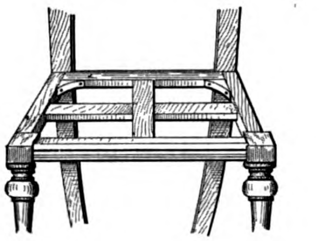


Diagram Illustrating Jack Rafters on the California Plan.

half pitch and would be the same on any pitch; also that the jacks would be just as many inches shorter as they were placed inches apart. Those who believe this are following a delusion. The plan will work only as I have explained it, and even then it is a good deal like pulling a saw by the pointed end, rather than pushing it in the proper way—by the handle.

Wooden Bottoms for Stuffed Chairs.

From CABINETMAKER, *London.*—I notice in recent issues of the paper that more or less attention has been given to the subject of furniture and cabinet making, and thinking that the readers might possibly be interested in a wrinkle to which my attention has been called, I send sketches illustrating it. One of the sources of no little annoyance in connection with stuffed furniture is the giving out of



Wooden Bottoms for Stuffed Chairs.—Fig. 1.—Showing Construction.

the bottom after comparatively short usage. This trouble may be overcome by the adoption of some such construction as that indicated in Fig. 1 of the sketches. The inner face of the four seat rails is notched horizontally, as represented in Fig. 2, while a pair of stout halved rails have their ends combined, as in Fig. 3,

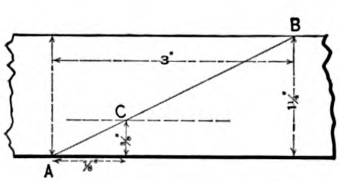
Fig. 2.—Inner Face of Seat Rail, showing Horizontal Notch.

Fig. 3.—End of Halved Rail.

which shows a side view. When the stuffing of the chair is completed it is a very simple matter to place the four ends of the cross rails against the narrow extremities of the notches, and then turn them bodily as upon an imaginary pivot until their ends are disposed of in the wider part of the notches, assuming the position represented in Fig. 1. As the under part of the seat is not exposed to contact with any other articles, there is no fear that the rails will be shifted from their proper position, although if they were, no harm could possibly result.

Laying Out an Octagon.

From J. J., *Oriskany Falls, N. Y.*—In laying out an octagon my plan is to space off 3 inches from the angle marked A in Fig. 1 and then measure off $\frac{7}{8}$ inch. Square the 3-inch mark over to the other side, marked B, and connect A and B. Square over from the $\frac{7}{8}$-inch mark to C,



Laying Out an Octagon.—Fig. 1.—Method Practiced by "J. J."

and laying off this distance from each angle of the square gives an octagon as the result. The sketch, Fig. 2, is supposed to be the edge of a $\frac{1}{4}$-inch board. Measure off 3 inches and also $\frac{7}{8}$ inch and from any point square over the 3-inch mark, connecting A and B. Square from the $\frac{7}{8}$-inch mark to C, which gives a $\frac{3}{8}$-inch base. Draw lines this distance from each angle of the board edge, and the

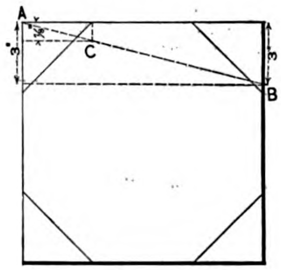
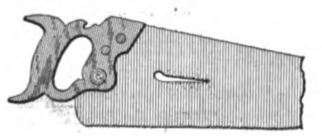


Fig. 2.—Showing Plan of Obtaining Lines for Cutting the Edges of the Board.

result will give the lines by which to round the edge of the board.

Combination Screw Gauge and Saw.

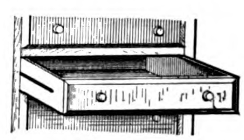
From S. R. K., *Asbury Park, N. J.*—I have looked for a long time for a combination screw gauge and saw, but have yet failed to find anything on the subject. I doubt if there is one carpenter in a hundred who knows the size in inches of screws by their numbers, while if he had a screw gauge it would not always be where he could find it, especially if he wanted it in a hurry. Now, if the gauge was cut in the saw blade, it would always be in sight and where it could be used when wanted. The sketch which I send is a suggestion of what would probably answer the purpose.



Screw Gauge Cut in Saw Blade as suggested by "S. R. K."

True Running Drawers and Sliding Doors.

From ENGLISH.—As being of possible interest to the readers of *Carpentry and Building*, I submit, with a brief description, sketches showing one way of making drawers and sliding doors run true. The



True Running Drawers and Sliding Doors.—Fig. 1.—Showing Groove in Side of Drawer.

idea is not original, but was suggested by some exhibits in the Natural History Museum at South Kensington. The cabinets containing the rare and beautiful butterflies are fitted with drawer cases, and in the side of each drawer is a groove running parallel with the top and bottom edges, as indicated in Fig. 1 of my sketches. These grooves engage with beads along the sides of the interior of the cabinet, so that when a drawer is pulled out it runs perfectly true. In order to fit a drawer in this manner a groove is made in each side its entire length, excepting the edge of the front piece, and a flush piece corresponding in length dropped into it. When the drawer is placed in position the beads are secured by means of screws inserted from the outside of the cabinet. The particular drawers to which reference is here made were so constructed as to stop when withdrawn a certain distance, although for ordinary purposes the adoption of such construction would be unnecessary. In Fig. 2 of the engravings is represented a section of the front, showing the bead along the side of the interior of the cabinet. Very much the same principle

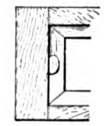


Fig. 2.—Section of Front, showing Bead along the side of Interior of Cabinet.

may be applied in connection with sliding doors, in order to make them run true and prevent jamming, either at the top or at the bottom. The idea is to fit one or more beads on each face the entire length of the guides within the channels

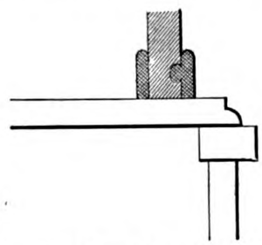


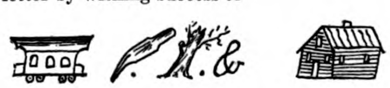
Fig. 3.—Showing Construction for making Sliding Doors run true.

in which the doors move, the bead closely uniting and being firmly confined to a corresponding groove in the door, as indicated in the sketch marked Fig. 3. The upper guides employed at the top of the doors may be treated in a similar manner, so that when the door is drawn in the desired direction it is impossible for any of the ends or corners to become jammed and cause untold annoyance.

Attaching Letters and Figures to Iron Patterns.

From W. H. H., *Seelyville, Pa.*—I would like to ask through the Correspondence department of the paper the method of affixing lead letters and figures to iron patterns. I am a beginner in this particular branch of wood working and am desirous of seeing published correspondence relating to the art of pattern making. Much of this work is difficult as well as perplexing, and I feel certain that some well-directed lessons from masters of the art would prove a boon to many a puzzled mind, especially to beginners or apprentices.

Note.—This correspondent in renewing his subscription to the paper refers to its value to him as an instructor, adding that he has carefully preserved and bound many numbers and never tires of studying the matter contained in the Correspondence department. He concludes his letter by wishing success to



Question in Roof Framing.

From E. G. W., *Elgin, Ill.*—I would like to have some roof-framing reader of the paper tell me how deep to cut the notch in a hip or valley rafter at the foot in order to bring it in line with the common rafters for the roof boards. I have seen a great many articles on roof framing, but have never seen this point explained.

DESIGNS IN SLATE ROOFING.

The variety of forms into which the slate of commerce may be cut for the purpose of producing pleasing designs in the covering of a building afford ample opportunity for the display of artistic talent on the part of the practical roofer. That this ability is possessed to a greater or lesser degree by many engaged in the building trades is evidenced by the large number of roofs which may be seen at the present day composed of slate, the patterns of which are combined in a highly ornamental manner. Those of our readers who are called upon to execute work of this character are likely to find both interest and value in the suggestive combinations of slate presented in the accompanying illustrations, even though they do represent designs of roofs covering buildings in England. The descriptive particulars which follow are from the pen of Whynn Steyne, and appeared with the engravings in recent issues of the *Illustrated Carpenter and Builder*.

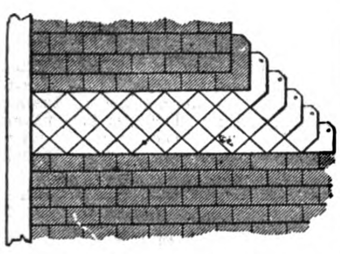


Fig. 1.—Horizontal Band of Slate with Lower Ends Pointed.

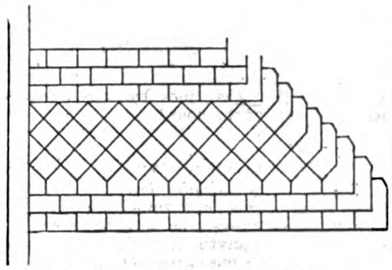


Fig. 3.—Results Obtained When Ordinary Courses of Slate are Used.

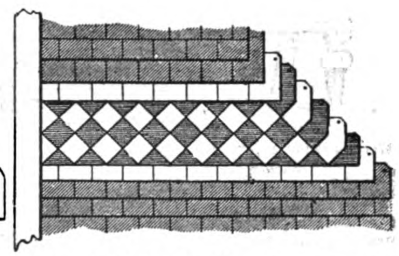


Fig. 4.—Another Combination of Same Form of Slate.

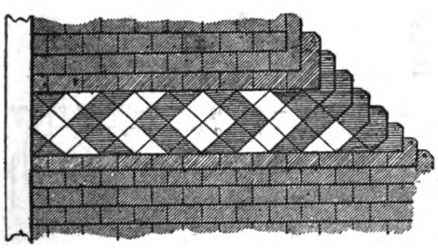


Fig. 5.—A Third Combination.

Fig. 2.—An Enlarged View of Slate Used in Fig. 1.

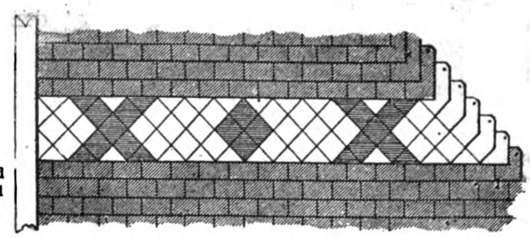


Fig. 6.—A Fourth Combination.

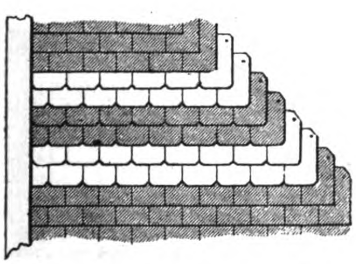


Fig. 8.—Design Obtained from Using Slate Cut, as Shown in Fig. 7.

Fig. 7.—One Form of Slate Employed.

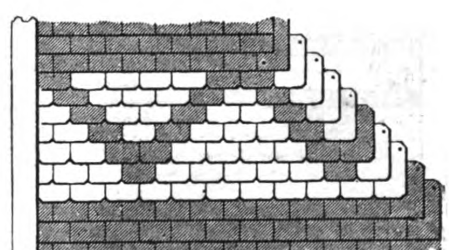


Fig. 9.—Another Design Resulting from the Use of Fig. 7.

Designs in Slate Roofing.

Walking along a quiet country road some half a dozen miles from one of our largest provincial cities, the writer noticed a highly ornamental design worked out in the roof of a little roadside cottage. It was formed with light gray or greenish slates among the usual dark blue slates so commonly used. The center slates were light; some dark ones completely surrounded those, then light ones were placed outside the dark, and the main body of slates were dark also. Both colors were also shaped at certain parts. This shaping simply consisted of cutting off a corner of the slate here and there as the design required it; and, while interfering a little with the keeping out of the weather, the extent of interference is so very little that the appearance gained more than counterbalances the disadvantage. This example set the writer thinking how seldom it was that roofs, usually so dismal, dingy and monotonous, are not brightened with a little ornament. When one considers the miles of slated roofs seen when traveling by rail, car or omnibus, what an extensive field for decoration there lies dormant! Perhaps it may be urged there is not much scope for ornamenting roofs. Well, that may be so. But has the most been made of this matter that can be made? The example already mentioned emphatically answers no; and the reader, it is hoped, ere the article is finished will be able to completely and fully substantiate this answer.

Since seeing the above example of ornamental slating, more than a year has elapsed before an opportunity has arisen for putting it on paper; and while nothing of the same kind has been observed anywhere in the course of the writer's wanderings here, there, and everywhere, other forms of ornament have been observed, and are now put on show in this article for the benefit of all whom it may concern.

The simplest and commonest deviation from an entirely plain slated roof is to have three or four courses of a different colored slate from that principally used. These form a long horizontal band, either light or dark, as the case may be, the whole length of the roof. In large roofs there may be two or three such bands, as in high-pitched church roofs.

The next most common variation is to have a horizontal band of slates shaped at the lower end, but of same color and size as the rest of the slates used. In Fig. 1 is given a general view of such a band, with the additional advantage of having all the shaped slates of a lighter color than the others. In Fig. 2 is given an enlarged sketch of one slate to show how each must be shaped. A shape or template should be prepared of tin, zinc, wood or any suitable material, and the slate cut away to that shape by means of the slate knife. This is not a difficult matter. The size of slate used is immaterial in this as well as the other illustrations to be given, although, be it understood, it will be necessary sometimes to use narrower slates at certain places than the standard width. In this case of Fig. 1 all the shaped slates must be of one uniform width. Regarding length the size varies, as an extra course of slates has to be got into the space of four, so that a straight line of color may be obtained at top and bottom. If the ordinary courses be used the result will be as shown in Fig. 3. This is not objectionable at all, and as it is the easier way, it is more often executed both in one and in two colors of slates.

Other variations of color, with the same form of cutting for the slates, are given in Figs. 4, 5 and 6. The first of these three is most easily executed, but the other two will be more effective on the building. Care must be taken to mark off the centers of the design, and then the slates, being all the one width and laid from these marked centers, the design will work itself out all right.

Another form of cutting for the lower edge of the slate is shown in Fig. 7. In this case only the two corners are cut off and the appearance of the roof laid with uch slates may be seen in sketch, Fig. 8, where two courses of dark slates are laid between two courses of light ones, all treated as in Fig. 7 and laid between courses of ordinary dark slates. The three following Figs., 9, 10 and 11, are variations with the same shaped slate. In Fig. 12 is shown a curved edge on the lower end of the slate, and in Fig. 13 is given a sketch of its general appearance.

Figs. 14, 15 and 16 are all very bold treatments of colored slates, and to be effective should only be used in large roofs. The pattern, it need hardly be said, shown in Fig. 15, should be reversed at the opposite end of the roof.

A common and yet effective shape to cut the slate to is shown in our next illustration, Fig. 17, and its general appearance, Fig. 18, is, on the whole, very effective and highly ornamental, more so perhaps than any of the preceding shapes. Two additional methods of applying this shape are indicated in Figs. 19 and 20 the latter being, perhaps, the more pleasing. In it the reader may notice that the shaped slates are a considerable piece longer than the other slates used, and that there will be a stronger shadow cast down the side of the triangular portions.

A very slight variation of shape is observable in Fig. 21, which, however, is very like the preceding examples; but in Fig. 22 is shown the most elaborate of these cut slates, and one that gives a very ornamental effect, as may be seen in Fig. 23. Such a slated roof looks exceedingly well, as the writer can personally testify. A few ordinary square slates inserted among these, as in Fig. 24, may be used to add variety.

At first sight Fig. 25 may seem rather a curious example of slating. It is, however, quite simple when it is analyzed. It consists of alternate courses of two of the shapes previously described, being Figs. 2 and 7. About as curious is the effect of Fig. 26, produced with exactly the same shapes, but with one shape cut out of

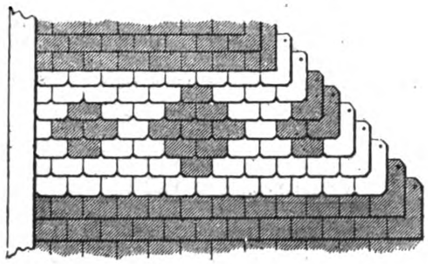


Fig. 10.—Variation of the Design.

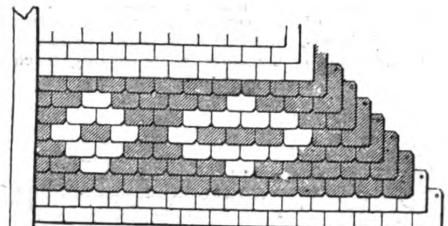


Fig. 11.—Another Combination of Slate Cut as in Fig. 7.

Fig. 12.—Slate Cut with Curved End.

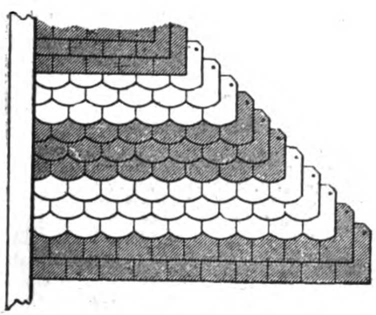


Fig. 13.—Design Obtained from Using Fig. 12.

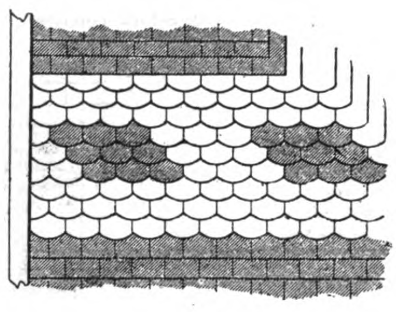


Fig. 14. A Bold Treatment of Colored Slate.

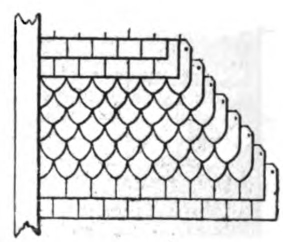


Fig. 18.—Effects Produced with Slate Cut as Shown in Fig. 7.

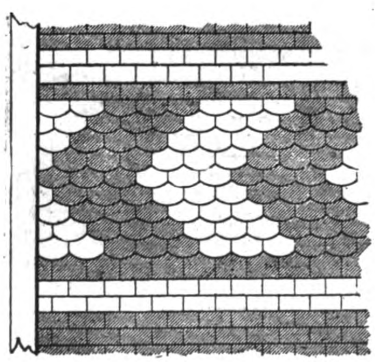


Fig. 15.—A Design Which Should be Reversed at the Opposite End of the Roof.

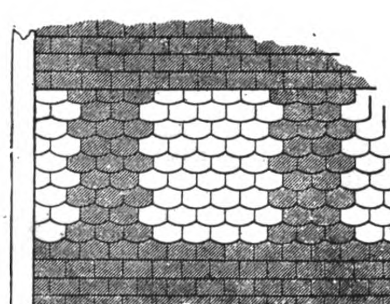


Fig. 16.—Another Combination of Slate Cut as Shown in Fig. 12.

Fig. 17.—Slate Cut with Pointed End.

Designs in Slate Roofing.

larger slates than the other, and two courses of the larger slate to four courses of the smaller one. Another combination of shapes is shown in Fig. 27, formed with slates as in Figs. 2 and 12, while in Figs. 28 and 29 are given particulars of yet another. A more ornamental arrangement is that shown in Fig. 30, with the corresponding diagrams in Figs. 7 and 22, and in Fig. 31, with its diagrams in Figs. 17 and 22. To finish up this section properly, as it were, in Fig. 32 is given a conglomeration of all these shapes together—one course of each.

This is more by way of experiment than otherwise, and it would scarcely be wise to carry out such a scheme, unless on some little odd house where quaintness and oddity prevailed throughout. In such a structure the style of slating would then be quite in keeping.

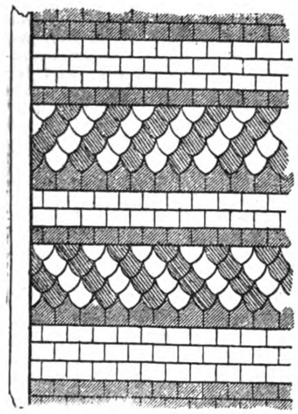


Fig 19.—Another Design Using Fig. 17.

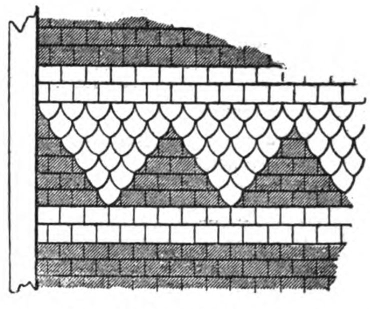


Fig. 20.—Still Another Combination.

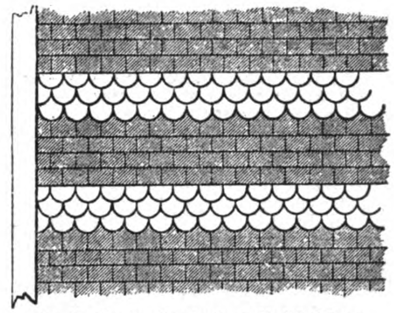


Fig. 21.—Design Employing a Modified Form of Slate.

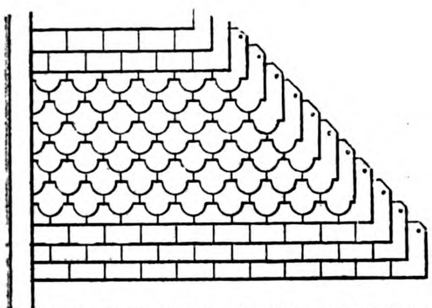


Fig. 23.—Design Worked with Slate as Cut in Fig. 22.

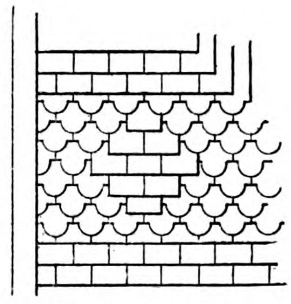


Fig. 24.—Design Varied From Fig. 23.

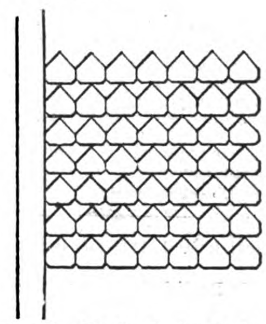


Fig. 25.—A Rather Curious Design.

Fig. 29.—Slate Cut with Half Round End.

Fig. 22.—A More Elaborately Cut Slate.

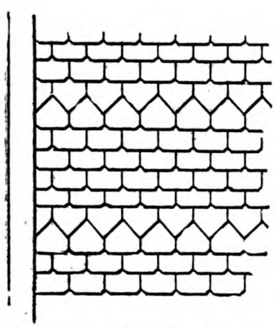


Fig. 26.—A Combination of Slate Cut as Shown in Figs. 2 and 7.

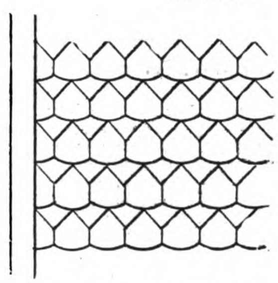


Fig. 27.—Design Formed of Slate Cut as Shown in Figs. 2 and 12.

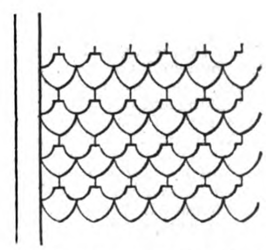


Fig. 31.—Design Composed of Forms Shown in Figs. 17 and 22.

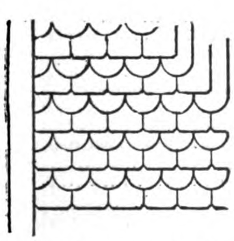


Fig. 28 —Design Formed of Slate Shown in Figs. 7 and 29.

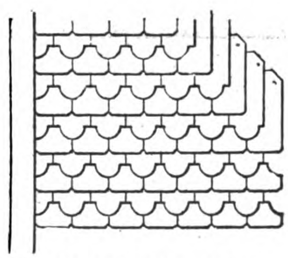


Fig. 30.—Combination of Forms Shown in Figs. 7 and 22.

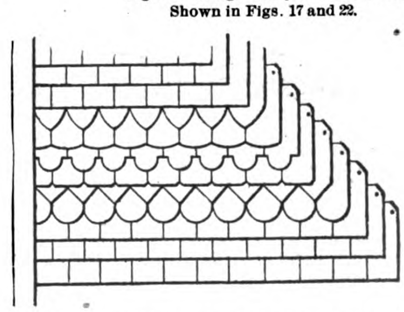


Fig. 32.—Composite Design Made Up of All the Various Forms Here Shown.

Designs in Slate Roofing.

Antiquity of the Saw.

The saw is an instrument of high antiquity, says one of our foreign contemporaries, its invention being attributed either to Dædalus or to his nephew Perdix, also called Talos, who, having found the jaw of a serpent and divided a piece of wood with it, was led to imitate the teeth in iron. In a bas-relief, published by Winckelmann, Dædalus is represented holding a saw, approaching very closely in form to the Egyptian saw. St. Jerome seems clearly to allude to the circular saw, which was probably used, as at present, in cutting veneers. There are also imitations of the use of the center bit, and even in the time of Cicero it was employed by thieves. Pliny mentions the use of the saw in ancient Belgium for cutting white building stone; some of the oolitic and cretaceous rocks are still treated in the same manner both in that part of the continent and in the South of England. In this case Pliny must be understood to speak of a proper or toothed saw. The saw without teeth was then used, just as it is now by the workers in marble, and the place of teeth was supplied, according to the hardness of the stone, either by emery or by various kinds of sand of inferior hardness. In this manner the ancient artificers were able to cut slabs of the hardest rocks, which consequently were adapted to receive the highest polish, such as granite, porphyry, lapis-lazuli and amethyst.

English and Italian Brick Work.

Early English brick work is now rare, remarks one of our exchanges. Little Wenham Hall, Suffolk, of the latter part of the 13th century, shows different sizes of brick; these are mixed with stone and flint in parts. The brick are of Flemish shape, though some resemble Roman brick or tiles, and the color varies. We must turn to the Eastern counties for examples of English brick work. In many of these flint is introduced in the form of panels, and this kind of walling is known as "flush work." Nearly every important church is of this mixture of brick or stone and flint. Layer Marney Hall, Essex, is a noted example of brick work. The great gate house of three stories, flanked by octagonal turrets, with battlements and parapets, and window mullions, exhibits an advanced stage of brick making and workmanship. Respecting the size of English bricks, those at Little Wenham Hall measure 9¾ inches in length by 4¾ inches wide, and 2¼ inches thick. Those made in Edward II's time measured 10 and 12 inches long by 5 and 6 inches wide. The "great brick," of 1734, measured 12 inches long, 6 inches wide, and 3 inches thick. Portions of Hampton Court Palace show some beautiful examples of English brick work, to which the attention of the student may be directed.

The late Mr. Street, a great authority upon Italian brick work, points out in his work on "Brick and Marble Architecture" to what a large extent red brick is used with stone. Italian brick are rather larger than ours, but not of better quality; the joints are wide, generally not less than ½ inch. The brick used for windows, doorways and other ornamental features are of finer quality and molding.

Those who know Italian examples of brick arches and tracery are aware that the cusping of arches is of brick, set in the same radiating lines as the arch and cut and rubbed to the outline required. He says: "In nearly all cases where brick is used for tracery, it is in the shape of plate tracery. The tympanum of the arch is filled in with a mass of brick work, through which are pierced the arches over the several lights of the window, and these are supported on marble or stone shafts, with carved capitals instead of monials; and above these sometimes, as in the windows of St. Andrea, Mantua, are three cusped circles, sometimes only one; or else, as in the cathedral of Cremona, the plain brick tympanum is relieved by the introduction of a panel of terra cotta bearing the cross on a shield, while round its outer circumference delicately treated though large cusping defines the outline of the arch." Outside the arch sometimes a red brick label, 2¼ inches wide, is introduced. In Mantua and Asti these narrow bricks are set between rings of brick and stone voussoirs.

Soft vs. Hard Steel for Building Construction.

According to the report of a committee appointed by the *Bezirksvereines Deutscher Ingenieure*, soft steel is to be preferred to hard for building purposes. For ordinary purposes the tensile strength should be between 23.45 and 28.60 tons per square inch, with a minimum elongation of 20 per cent. in test bars 8 inches long. For bridge work the tensile strength should be between 23.45 and 27.30 tons. It was not considered advisable to specify any chemical analysis, as the physical properties afford a sufficient index to the quality of the metal, this quality being dependent not only upon the composition of the metal, but also upon the mechanical combination of the different constituents. In considering if it be necessary to specify not only the class of material, but also the manner of its manufacture, the committee decided that the specification should be limited to such normal conditions as could be certainly complied with, and that any minute limitations were technically impracticable and commercially injurious. The committee states, however, that except when unavoidable the material should not be worked at a blue heat. In regard to the increase of working load the committee states that it can profitably be increased to 6.35 tons for live loads and 7.62 tons for dead loads. As to the meaning of the term "Flusseisen" (ingot iron) it may be said that, strictly speaking, it is limited to the product of the basic open-hearth furnace and the Thomas or Basic Bessemer converter. Acid open-hearth metal cannot always be included.

Measurement of Roofs.

A new idea has occurred to a New Westminster, B. C., roofer, for measuring roofs of buildings, says an exchange, which he thinks of importance to those who estimate quantities, and which may prove of interest to many others engaged in the same line. It is this: Find the whole horizontal area of the roof by dividing it into quantities or sections. To these quantities add the fractions thereof necessary to raise them to the required quantity, which is in a roof of square pitch, 5.12; in a roof of 9 inches rise to the foot, one-fourth, and so on, according to the varying pitches. This is equal to raising the quantity representing one of the sides from 12 to 17, or 12 to 15, as in the pitches mentioned respectively. This will apply only to a roof in which all the pitches are equal, but can be made approximately correct by taking a mean between, or it may be made correct by considering the portions separately.

A WRITER in the London *Spectator* says of English country houses that they fail not in want of space, but in lack of warmth. It is astonishing that a sojourn of nearly 800 years in a sub-arctic region has not taught the Anglo-Norman race that a six months' winter demands some greater provision for the change of temperature than the mere lighting of fires in a few sitting rooms. The warming of the hall is the key to the position. In country houses the hall is nearly always of ample dimensions, and not one but all the sitting rooms are on the ground floor, deriving their supply of fresh air from the hall, which, as in the London house, gets its stock in turn from under the main door. But the greater space leaves ample room for a thorough warming of the central air chamber. Yet in how few country houses is the hall properly warmed by stoves! With that provision omitted, the size of the hall and staircase merely prevents the air from ever becoming properly warmed at all; and for weeks the passages and bedrooms remain at a temperature in which it would be unsafe to allow even cattle to sleep. A further capital defect in most country houses is the absence of bathrooms, either of hot water or hot air, and the impossibility of obtaining any sudden increase of temperature in case of chill or illness. There are many large and costly country mansions less well provided in this respect than a fifth-rate London house.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

APRIL, 1893.

Building Operations in New York.

The statistics of building operations in New York City during the past year, as found in the records of the Bureau of Buildings, present a very interesting study. They indicate not only all the structures that have been planned or built during the period named, but the kind of houses erected, as well as their details of construction. A careful examination of the records also shows that within a comparatively brief period many important changes have taken place in the character of the buildings erected in various sections of the city. Portions formerly occupied almost wholly by the poorer class of buildings are now built up with substantial business structures, which bring to their owners a good return on the investments, where before they were hardly more than paying taxes. Other sections devoted to dwelling houses and churches, with here and there a store, have undergone a marked change, and in many places throughout the city the onward march of the office building and the business block is manifest in a striking degree.

Permits Granted.

The figures contained in the records of the building department show that for the year ending February 28 there were filed 2929 plans, calling for an expenditure of over $60,000,000, as compared with 3037 plans, involving an outlay of over $55,600,000 for the corresponding period of 1891–92. The plans filed cover buildings of all descriptions, both public and private. Prominent among those planned or completed in the last year may be mentioned the Hotel Waldorf, costing upward of $3,000,000; the Manhattan Life Insurance Company's building, costing $950,000; the Corn Exchange Bank, $500,000; the office building at Broadway and Duane street, $780,000; the hotel at Eighth avenue and Seventy-first street, $1,000,000; the Edison Building at Elm and Pearl streets, $800,000; the Metropolitan Club, $750,000; Hotel Savoy, $800,000, and the Postal Telegraph Building, $750,000.

Class of Buildings Erected.

The records show that there has been, during the period named, as compared with the year before, a large increase in the number and estimated cost of private houses, and that while the number of flats costing more than $15,000 each has materially decreased, the total cost has not diminished in the same proportion. The number of dwelling houses costing over $50,000 each and erected between March, 1892, and March, 1893, was 13, as compared with 4 the previous year. The number erected costing between $20,000 and $50,000 each was 246, as against 255 the year before, while those put up for less than $20,000 each numbered 509, as compared with 232 erected between March, 1891, and the same month of 1892. There were also 7 hotels erected, 170 manufactories and workshops, besides 17 schoolhouses, 17 municipal buildings, 64 stores costing over $30,000 each; 51 ranging in price from $15,000 to $30,000 each, and 61 stores costing less than $15,000 each. There were also put up 95 tenements, each costing less than $15,000 and 803 flats involving an outlay of over $15,000 each. Comparing these figures with those for the period from March, 1891, to March, 1892, shows that while more houses were planned, there was a falling off in the number of hotels and flats. On the other hand, there was a large increase in the number and cost of public buildings and those used for industrial purposes.

Builders' Associations.

The needs and benefits of organization among builders in this country have never been so well understood as they are to-day. The advantages which accrue to a class from united action have been proved over and over again in the building trades during the past few years by the benefits which properly organized builders' exchanges have conferred upon the trade generally and upon the contractor individually. Builders are better capable of dealing with the problems of the business as a class than they are individually, and a carefully conducted association offers opportunities for effective action that the individual does not possess, no matter how strong his position may be or how great his influence. The example set by the workmen in this particular has been of great benefit to the employers and they have by these means been enabled to see the strength of united action. In many cases employers have organized solely for the purpose of securing an equal footing with the workmen; but it has generally been the case that where the motive of formation was only combativeness the organization has been short lived.

New Associations of Builders.

The present increase in the number of new associations of builders is clearly indicative of the fact that the builders themselves are becoming more fully aware that there are conditions existing in the methods of transacting business, in the relationship to their workmen, as well as to the architect and owner, which need correction, and are beginning to recognize the fact that these corrections cannot be made by individuals without unity of purpose and action. It is safe to assume that the present situation portends a better condition of affairs in the next and succeeding years than ever before existed in this country. Thinking men cannot repeatedly come together for the purpose of improving the conditions under which their business is mutually conducted without some good being accomplished.

Novel Construction of Foundations.

One of the tallest buildings of which this city will soon be able to boast, is that of the Manhattan Life Insurance Company, in process of erection in lower Broadway. It will have a steel skeleton frame, and will tower aloft to an elevation of 300 feet above the curb line. One of the novel features of its construction is to be found in the method of putting down the foundations. The supporting piers of the building are to be sunk to bedrock by what is known as the pneumatic process. The reason for the employment of this plan is that the soil is a fine sand for a depth of about 50 feet overlying the rock. It would be a great risk to build so heavy a structure on the sand, and to excavate to such a depth would very likely result in undermining neighboring buildings, especially as the soil is very wet. The difficulty is to be overcome by sinking pneumatic steel caissons, 15 in number, by the same means that are often employed in laying the foundations for bridges, and which was used in connection with both towers of the Brooklyn Bridge. When the caissons reach bedrock the workmen inside level the rock so as to give a firm bearing, and then fill in with concrete so that the space from the top to the bottom of the caissons is solidly filled. Stone piers will be built over these caissons, and upon these piers in turn will be placed huge cantilevers, from which will be built up the skeleton steel structure of the building.

Britain Honors an American Architect.

From accounts now current, the gold medal which is given every year by Queen Victoria on the recommendation of the Royal Institute of Architects to some person who has achieved distinction in architecture or archæology will find a recipient in the person of architect Richard M. Hunt of this city. In accordance with the general custom, the Council of the Institute selects the architect who is to be honored, the name of the individual is posted in the rooms of the society and the members vote upon the name so chosen. The selection of the architect by the Council is considered as practically an award by the Institute. We understand that Mr. Hunt was notified by the president of the Institute of British Architects, after a meeting of the council held February 13, asking him if he would accept the honor. As Mr. Hunt has signified his acceptance, there seems to be no reasonable doubt as to the result. This, we believe, is the first time in the history of the Institute that an American has been proposed for such an honor. Mr.

Hunt is a member of the Royal Institute and his work upon the Administration Building at the World's Fair, of which he is the architect, has no doubt had much to do with his selection as the one to whom this honor should be awarded. Mr. Hunt is a member of the French Institute as well as the Legion of Honor and is, we believe, the only American member of the Order of St. Lukes, one of the oldest societies of architects in England. Mr. Hunt is said to regard the action of the British Institute as the greatest recommendation of his work he has ever received.

Novel House Moving.

A good example of house moving at comparatively small expense and without injury to the walls of the building, is found in the case of the removal of the brick ferry-house 50 x 110 feet, from the foot of Thirty-ninth street, Brooklyn, to a site some hundred or more feet to the west and north. One of the features of the work was that when the job was completed the building was to stand 17 inches lower than it did on the old site. In carrying out the work of removal, the building was put on a rigid frame work and its walls shored and braced by tie rods and cross timbers. It was moved on ways consisting of a frame work of heavy timbers provided with diagonal guides, which caused the structure to move sidewise as well as endwise. The frame upon which the building rested was provided with shoes sliding upon the diagonal guides. The abutments against which the moving screws rested were heavy timber, secured to the ways by means of chains. After the screws which abutted upon the timbers had been run out their full length, they were returned to their original positions, the timbers moved forward and again made fast in the manner indicated when the operation was repeated. This was continued until the desired site, which was 140 feet to the west and 25 feet to the north of the old location, was reached. The work occupied about a month, and was executed by the same concern that moved the Brighton Beach Hotel after the damaging encroachment of the sea on the beach in 1888. In this case the building was 465 feet long and 150 feet deep, three stories in hight and weighed 5000 tons.

Lessons from the Boston Fire.

The serious conflagration which recently visited the city of Boston, involving not only a loss of property valued at several millions of dollars, but also a number of human lives, has served to direct attention anew to the necessity of building reforms which shall reduce, so far as possible, the chance of occurrences of this kind. The Boston papers have taken up the subject and present a number of suggestions looking to the accomplishment of reforms in the direction needed. One recommends that the fire traps existing in the section of the city where the fire originated be completely wiped out, regardless of expense to those who are called upon to bear the burden of taxes. Another paper, the *Herald*, is of the opinion that building areas should be limited to 6000 square feet. One of the buildings burned had an area of nearly 28,000, and though divided by a brick wall, this was pierced by so many openings as to make it insufficient as a means for preventing the spread of the fire. The finish, we are informed, was in shellacked Georgia pine, which, naturally, burned like tinder. The building was provided with at least two stairways, inclosed with brick walls on every floor, but by reason of the custom of taking employees up in the elevators, the existence of the stairways was little known. Another defect pointed out in the burned structure was the size of the windows which permitted great sheets of flame to pass from one building to another. This defect, it is claimed, should be remedied in the statutes at once. Great praise is bestowed upon the work of the automatic sprinklers with which some of the buildings were fitted, the claim being made that their operation greatly retarded the progress of the flames and prevented the extension of the conflagration across Kingston street and onward up into the city.

Builders and Building Laws.

A specific benefit to the general public, that has been the outgrowth of the establishment of associations of builders throughout the country, is found in better building laws. As the result of the bringing together of the builders in harmonious relationship, the conditions affecting their business which have needed correction have generally been the first to receive consideration, and in many instances defective building laws have commanded immediate attention. Builders, by their occupation being peculiarly fitted to comprehend the need and importance of sound building laws, have been able, more comprehensively and intelligently, to undertake the revision of imperfect laws with unusually satisfactory results. Several of the more prominent cities have the builders to thank for the efficacy of their present ordinances, and the builders in cities where bad building laws exist should take the matter in hand and secure the honor of providing for at least one of the urgent needs of the community in which they live. No class of men are better qualified to undertake such a work, and no class of work confers more lasting benefit upon the city for which it is undertaken. Through their associations builders are provided with the means for securing united action on any subject, and in addition there is the influential weight of the approval of the fraternity most directly interested in good building laws.

Corn Exchange Bank Building.

A structure which will constitute a striking example of the architecture of the lower portion of the city, is the edifice now in course of erection at Beaver and William streets, for the Corn Exchange Bank. It has a frontage on Beaver street of 86 feet 8 inches, and on William street 44 feet 4 inches, the shape of the site being an irregular L with the longest arm 110 feet. The front of the lower stories will be in Stony Creek granite, while those above will be treated with yellow limestone. The hight of the structure will be eleven stories and the cost half a million dollars. The halls will be wainscoted, the corridors tiled in mosaic and the stairs fitted with marble steps. The general character of the completed design, as called for by the plans of architect R. H. Robertson, is Romanesque.

Domestic Ventilation.

Although proper ventilation is receiving more of its due meed of attention in our public buildings and in the large new structures now being put up for office and other purposes, the public still remain, in large measure, callous and apathetic in this connection, when it comes to a question of the houses in which they and their families dwell and pass the greater part of their time. Why this should be so it is hard to say; but it is nevertheless a fact that even men who are particular about the due supply of fresh air in the places where they work during the day, are content to go home and pass their sleeping hours under conditions which are most unsanitary. Houses go up by hundreds in the cities in which no provision whatever is made for the proper circulation of air and the purity of its supply. In the majority of rooms in city and suburban dwellings, during the winter at least, the only source of air supply of any kind is the register, and the air has to escape as it best can through an occasional open door or window, or through any cracks and crannies it may find. The only method of insuring ventilation is the primitive one of opening the windows, and that is not always comfortable or desirable during such severe weather as this winter has brought with it. Especially is this felt at night, where, in a small room, the choice has to be made between inhaling the atmosphere laden with impurities, or sleeping near an open window, with the chance of being snowed under or blown out of bed by a sudden change of weather. Now, it is perfectly feasible to so build a house as to insure this desirable feature of adequate ventilation. Every dwelling should be provided with a proper air shaft, with connections from each room, or flue to carry off the heated and vitiated air which accumulates there.

The Diamond Exchange.

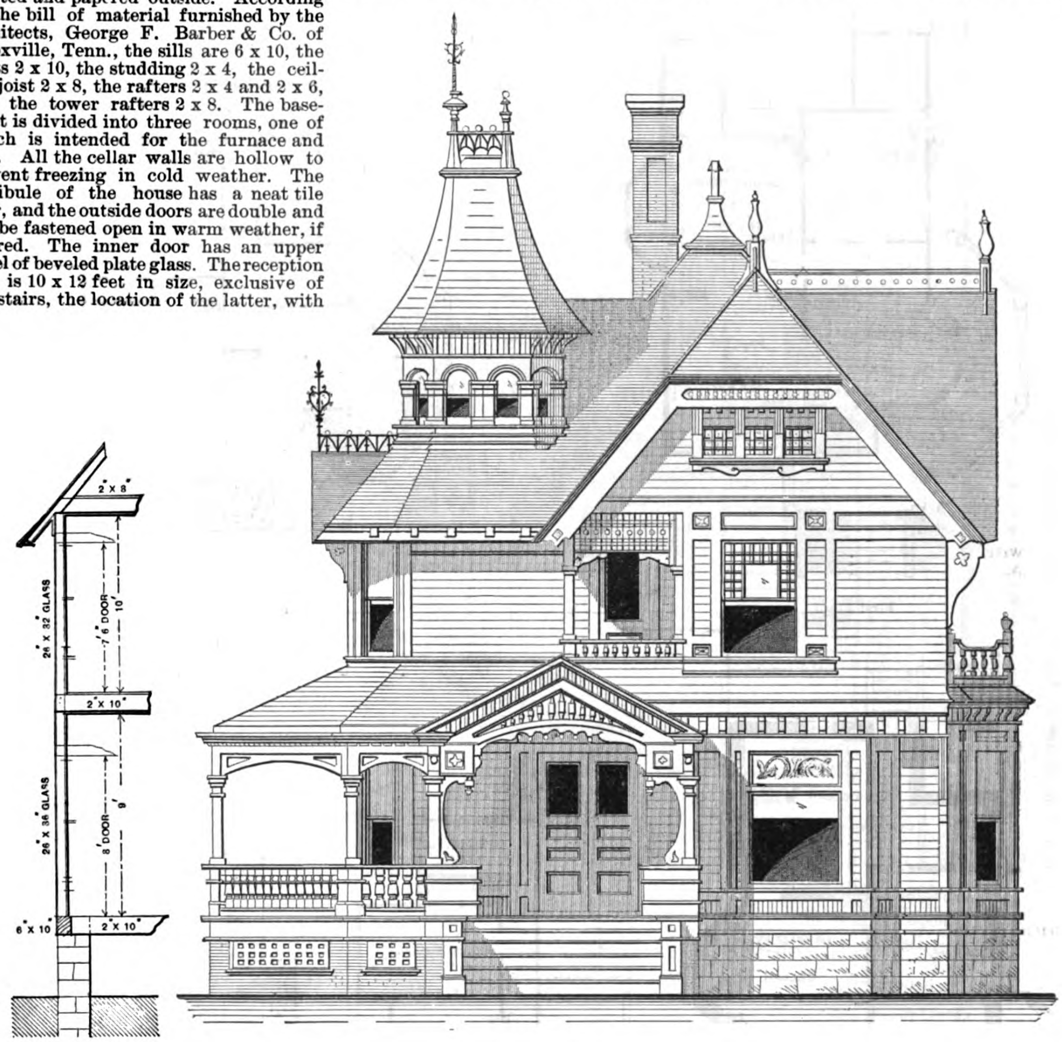
Within a very short time ground is to be broken for a structure which in its composition and make-up will be decidedly unique. The design calls for an edifice in the shape of a tower of iron and glass, 11 stories in hight, surmounted by a pinnacle and a gold figure of Mercury. The building is to be erected on the site of 14 Maiden Lane, in this city, and is designed for the Diamond Exchange. The front of the building will be only 25 feet in width, while the depth will be 70 feet. The first story is to be of polished granite, the second of limestone, and the upper stories of iron, brick and terra-cotta. The front of each story will contain two bay windows, extending nearly the width of the structure, while the partitions between the offices on different floors will be of plate glass, thus giving an abundance of light. The architect of this unique building is G. A. Schillinger, and the estimated cost is placed at $275,000.

STUDY IN HOUSE DESIGN.

THE DWELLING which we illustrate in one of our supplement plates and by means of the elevations, floor plans and details presented upon this and the following pages has been designed with a view to convenient arrangement of rooms and the utilization to the best advantage of the space occupied.

The foundation is of stone, brick lined, the first story is weather boarded and the second story and roof shingled, all being sheeted and papered outside. According to the bill of material furnished by the architects, George F. Barber & Co. of Knoxville, Tenn., the sills are 6 x 10, the joists 2 x 10, the studding 2 x 4, the ceiling joist 2 x 8, the rafters 2 x 4 and 2 x 6, and the tower rafters 2 x 8. The basement is divided into three rooms, one of which is intended for the furnace and fuel. All the cellar walls are hollow to prevent freezing in cold weather. The vestibule of the house has a neat tile floor, and the outside doors are double and can be fastened open in warm weather, if desired. The inner door has an upper panel of beveled plate glass. The reception hall is 10 x 12 feet in size, exclusive of the stairs, the location of the latter, with tion. The kitchen has back and cellar stairs, dumbwaiter, cupboard near the sink, range, boiler and a wide table. These are features likely to be appreciated, as in many cases comparatively little attention is given to the arrangement of the kitchen and its fixtures, especially with a view to saving steps on the part of the one who is called upon to do the work in this department. All the rooms on the first floor, including kitchen, tends from front to rear. The observatory, 5 x 7 feet, inside measurement, is surrounded on three sides with glass, and is heated with a warm-air pipe opening into it from the furnace, the intention being to keep it filled with growing plants during the winter, and to serve as a pleasant outlook in the summer.

The house is so arranged that certain changes may be readily made if desired. The bedroom on the first floor may be



Section.

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

Study in House Design.—George F. Barber & Co., Architects, Knoxville, Tenn.

the arched grill above, giving a very attractive appearance, as viewed from the main entrance. The parlor is fitted with a neat mantel, with open fire place, and communicates with the dining room by means of sliding doors. The opening between the parlor and sitting hall may be closed by means of *portières*, which, when nicely draped, constitute an attractive feature. The dining room has a deep bay window, giving a good view to the front. The sleeping room on the first floor has a closet under the front stairs, while the bathroom, near the kitchen, is so located that the plumbing of the entire house is clustered and compact, thus reducing the expense of this feature to a minimum. A sash door opens through the bathroom to the rear porch, and with a transom above affords light and ventilation pantry, dining room, parlor, &c., are in hard pine, natural finish.

The second story, as will be seen from the plans, has two large chambers with ample wall space for the accommodation of furniture. There is also a small room opening from the hall, while in the rear, near the entrance to the attic stairs, is a cedar closet, and an earthen washbowl, with waste pipe connecting with fixtures below. There is also a well-lighted storeroom, having wide shelves, which are always found convenient in well-managed households. The hall is lighted at the front with an art glass window over the front stairs and a plain window in the rear. The finish of the entire second floor is soft wood painted.

The attic has two rooms, well lighted, and is entered from the hall, which ex-

converted into a dining room and the dining room into a sitting room, making a pantry of the bathroom, and transferring the latter to what is known as the store room on the second floor. By extending the sleeping room on the first floor 2 feet to the left, and carrying it up two stories, a room can be added to the second floor, while still another apartment can be added by carrying the kitchen up in the same way.

SOME BIG TIMBER has been prepared at the Camden lumber mills, on Ganley River, in West Virginia, for the World's Fair. One of the pieces is an ash plank, feet 3 inches wide, and another is a poplar plank exactly 5 feet wide. Another poplar tree, 11 feet in diameter, is being hewed out to be sent on to Chicago. It cannot be cut with a saw on account of its tremendous size.

Regulations Governing Pent Houses.

A scheme by which the janitors of flat houses can now transfer their place of abode from the basement, where at present are to be found the living apartments of those who take care of flats in the large cities, to the roofs of the structures, is about to be carried into effect. The Board of Examiners in the Department of Buildings in this city has yielded to the demand to construct janitors' quarters on the roofs of flat houses, and have agreed on the following rules to govern the same:

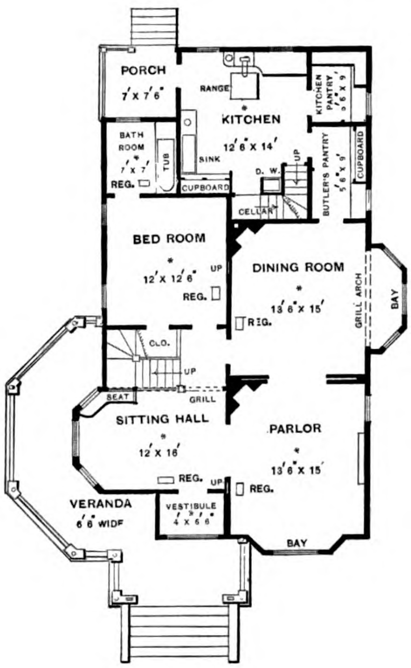
1. Pent houses on non-fire-proof buildings shall only be allowed when the hight of the main building is less than the lawful hight of 85 feet. A pent house shall not be nearer than 6 feet to a front or rear wall, or a side street wall if the building be located on a corner.

2. The area of a pent-house shall not exceed 500 superficial feet, nor the highest part exceed 12 feet.

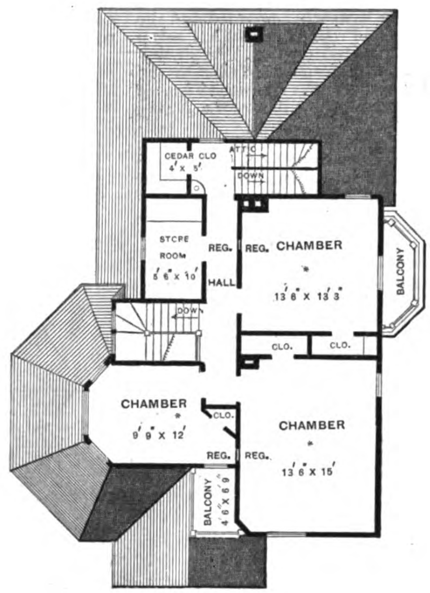
3. So much of the main wooden roof as the pent house may occupy shall be covered with cement or rock asphalt, not less than 1½ inches in thickness.

4. One side of a pent house shall be formed by a vertical extension of the brick wall of a side or party wall, and in thickness may be 8 inches. The other three sides shall be constructed of an iron frame filled in with incombustible material, and covered on the outside with galvanized corrugated sheet iron. The inside partitions may be of wooden studs, lathed and plastered. The roof of a pent house may be constructed with wooden rafters and boards covered with tin.

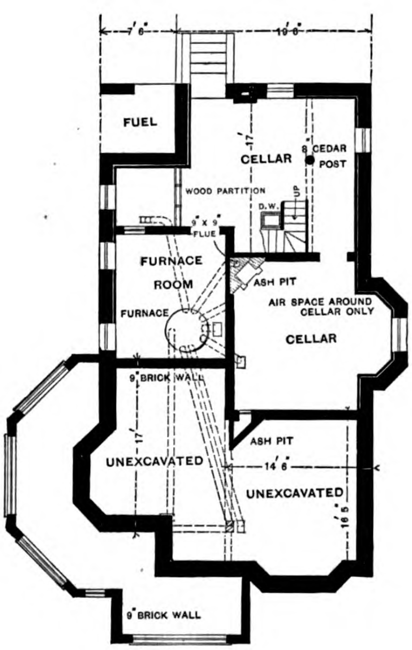
5. A pent house shall not immediately



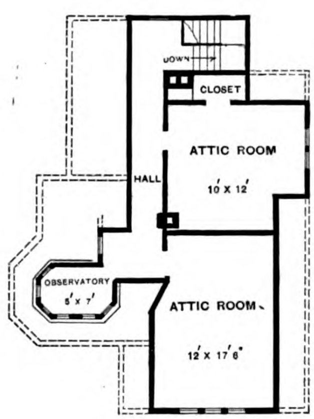
First Floor.



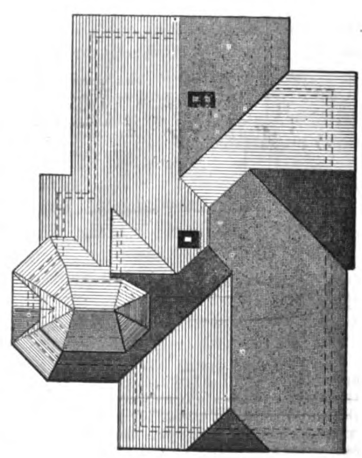
Second Floor.



Foundation.

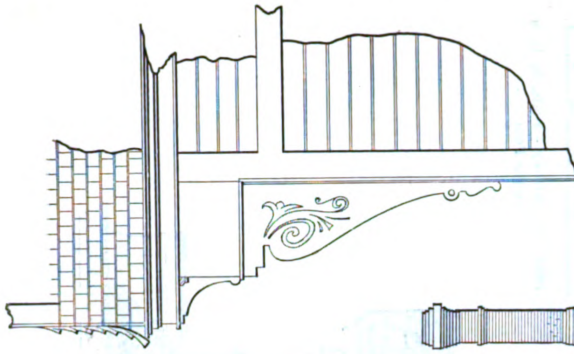


Attic.

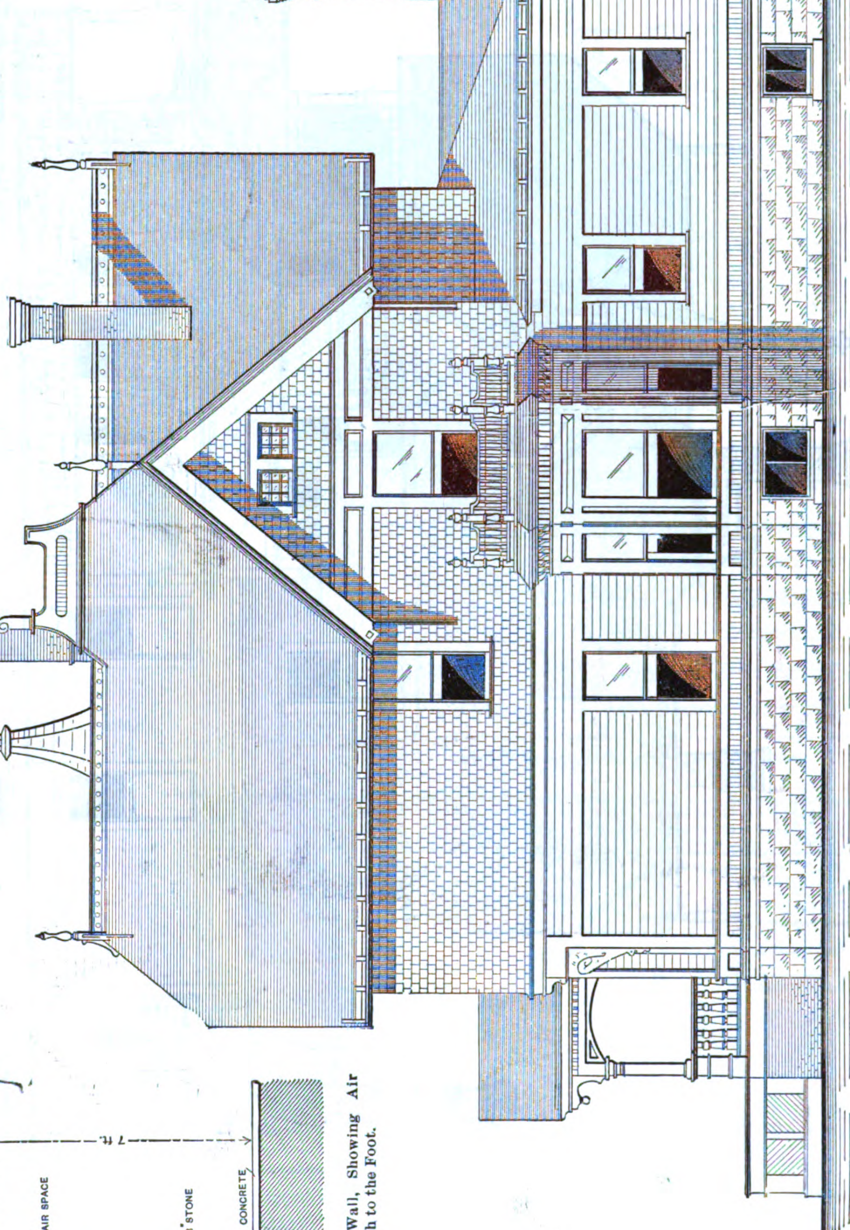


Roof Plan.

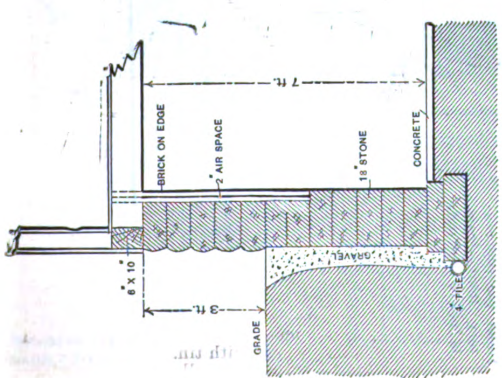
Study in House Design.—Floor and Roof Plans.—Scale, 1-16 Inch to the Foot.



Detail of Projection Over Front Bay.—Scale, ⅜ Inch to the Foot.

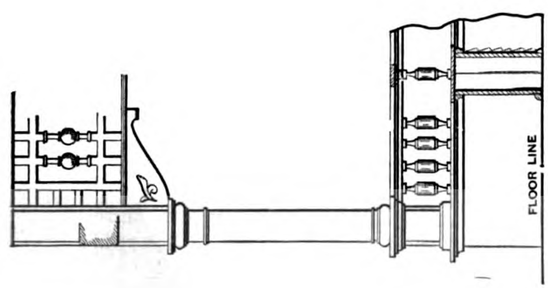


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

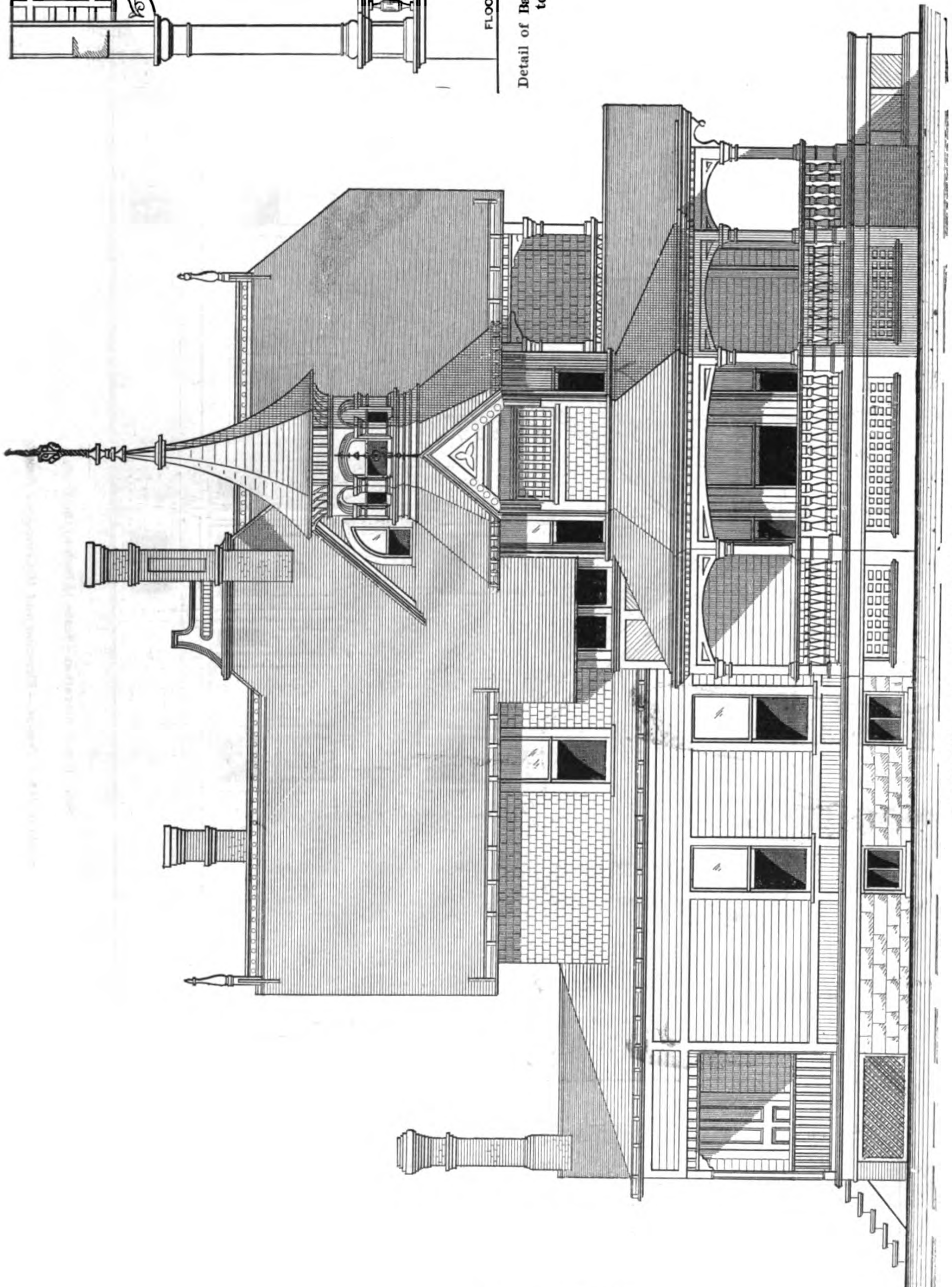


Section Through Cellar Wall, Showing Air Space.—Scale, ¼ Inch to the Foot.

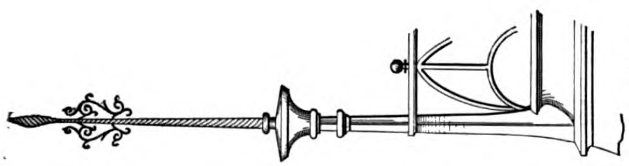
Study in House Design.—Elevation and Miscellaneous Details.



Detail of Balcony.—Scale, ¾ Inch to the Foot.

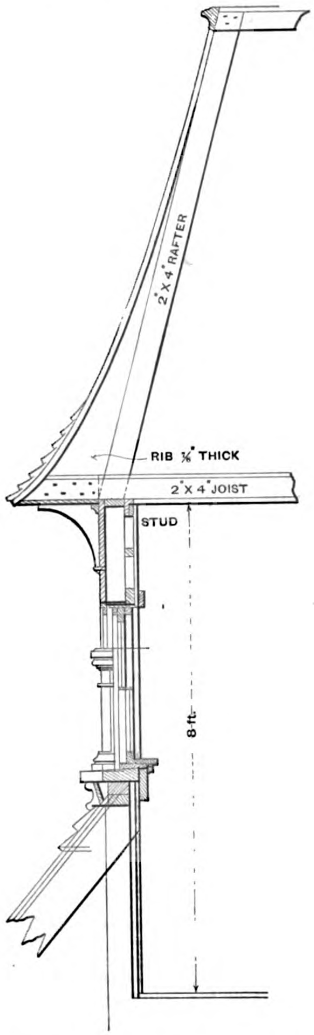


Side (Left) Elevation.—Scale, ⅛ inch to the Foot.

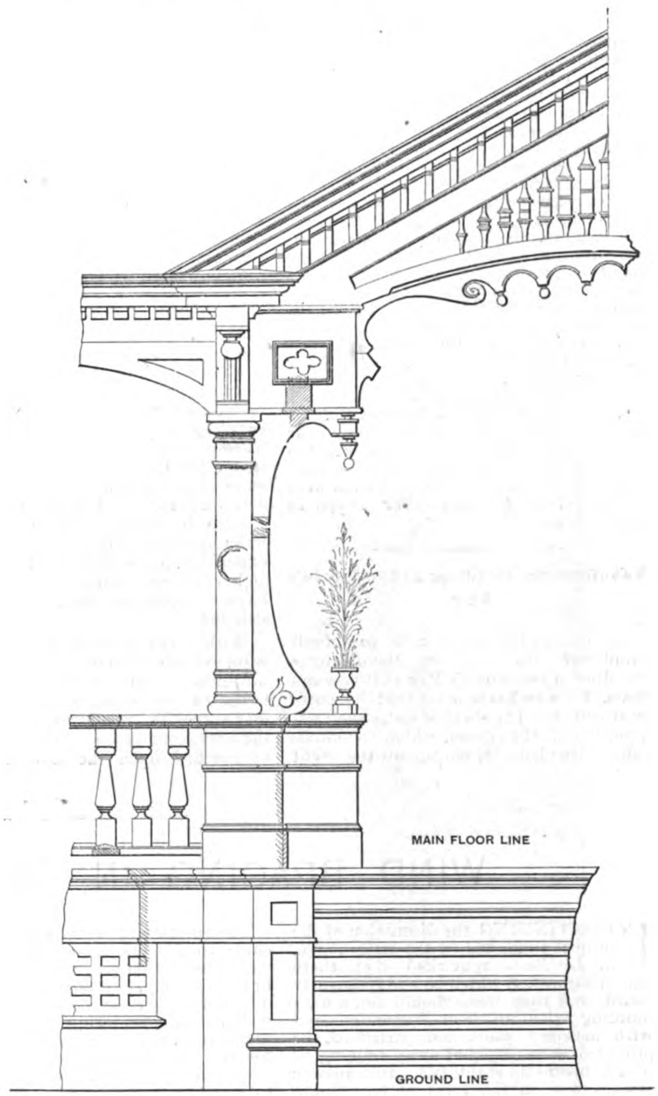


Finial for Observatory Roof.—Scale, ½ Inch to the Foot.

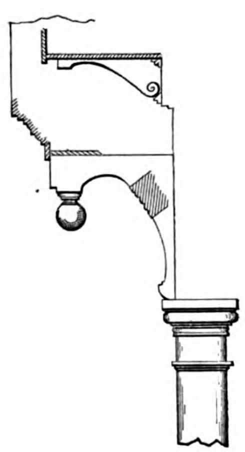
Study in House Design.—Elevation and Miscellaneous Details.



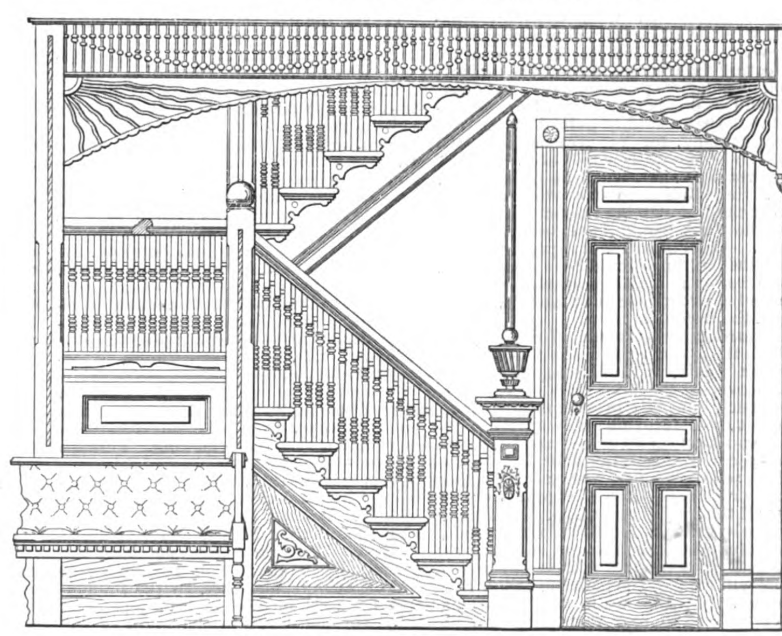
Section Through Observatory.—Scale, 3/8 Inch to the Foot.



Detail of Veranda.—Scale, 3/8 Inch to the Foot.



Details of Brackets in Veranda Gable.- Scale, 1/8 Inch to Foot.



Staircase and Arch.—Scale, 3/8 Inch to the Foot.

Study in House Design.—Miscellaneous Details.

adjoin the bulkhead of stairs to roof, but shall be so placed that free and unobstructed passage may be had from the said stairs to the main roof. The pent house shall also be separate from any dumb waiter or elevator shaft.

6. From the main roof an outside iron ladder shall extend down to the first outside fire-escape balcony below, and if there be front and rear fire-escape balconies outside ladders to each, from the roof to the first balconies of the story below, shall be provided. If a building has no outside fire escapes, no pent house shall be allowed, unless on both sides of the building the adjoining roofs are substantially on the same level with the roof of the building upon which the privilege of erecting a pent house is asked.

7. No part of a pent house shall be used for the storage of furniture, books, paper or other articles, but shall be used exclusively for living purposes.

8. This board will cordially acquiesce with the judgment of the Superintendent of Buildings in each case to secure the best location on the main roof for a pent house, the limiting of size both as to area and hight, and the means for escape in case of fire.

Manufactures Building at the World's Fair.

An illustration is given in one of our supplement plates of the Manufactures Building of the World's Fair as it now appears. The view has been taken at the southwest corner. The sheet of water shown is a portion of the lagoon, which communicates with Lake Michigan at the right and extends to the left past the Manufactures Building and thence through the grounds under a succession of ornamental bridges. This is the body of water which will be navigated during the exposition by steam and electric launches, gondolas, &c. The Manufactures Building was completed some time since, and a large force of workmen are now engaged in the erection of booths and pavilions for the numerous exhibitors. Exaggerated accounts have recently been published of damage to the roof of this building by accumulations of snow during the extraordinary winter, which has been especially severe in the Northwest. The frame work of the roof has not been injured in the least, as it is so strong that nothing short of an earthquake could affect it. Wet snow sliding from the sides of the great central span fell on the skylights at its base and crushed a few of them in, entailing some work in replacing or repairing them, which will not cost more than a few thousand dollars, and proving more of an annoyance than an expense. The illustration will enable this explanation to be intelligently grasped. This building is the mammoth structure of the exposition, measuring 1687 x 787 feet, and, covering nearly 31 acres, is the largest exposition building ever constructed.

Within the building a gallery 50 feet wide extends around all four sides, and projecting from this are 86 smaller galleries, 12 feet wide, from which visitors may survey the vast array of exhibits and the busy scene below. The galleries are approached upon the main floor by 30 great staircases, the flights of which are 12 feet wide each. Columbia avenue, 50 feet wide, extends through the mammoth building longitudinally, and an avenue of like width crosses it at right angles at the center. The main roof is of iron and glass and arches an area 385 x 1400 feet, and has its ridge 150 feet from the ground. The building, including its galleries, has about 40 acres of floor space.

The Manufactures and Liberal Arts Building is in the Corinthian style of architecture, and in point of being severely classic excels nearly all of the other edifices. The long array of columns and arches which its façades present is relieved from monotony by very elaborate ornamentation. In this ornamentation female figures, symbolical of the various arts and sciences, play a conspicuous and very attractive part.

The exterior of the building is covered with "staff," which is treated to represent marble. The huge fluted columns and the immense arches are apparently of this beautiful material.

There are four great entrances, one in the center of each façade. These are designed in the manner of triumphal arches, the central archway of each being 40 feet wide and 80 feet high. Surmounting these portals is the great attic story ornamented with sculptured eagles 18 feet high, and on each side above the side arches are great panels with inscriptions, and the spandrils are filled with sculptured figures in bas-relief. At each corner of the main building are pavilions forming great arched entrances, which are designed in harmony with the great portals.

WIND BRACING IN HIGH BUILDINGS.

IN CONTINUING the discussion of the subject indicated by the title above, L. L. Buck remarked that there was one question which he had frequently heard, and that was, should not a high building with an iron frame, covered with masonry walls and partitions, be provided with diagonal sway bracing of iron to insure its stability? His answer always was in the form of an opinion substantially as follows: "When a building with a well-constructed iron frame is covered with well-built masonry walls of a thickness sufficient to prevent sudden changes of temperature affecting the iron frame, and the proportion of window space compared with that of solid wall is not too large, I see no advantage that would be gained by the iron sway bracing, for the reason that the rigidity of the walls would exceed that of the braced frame to such an extent that, were the building to sway sufficiently to bring the iron bracing into effective service, the walls would have become damaged. Consequently, it appears to me that the building should be so constructed as to make the stability against swaying depend entirely upon the masonry, or else upon the iron alone.

A strong iron frame of columns to which the iron floor beams are secured by proper joints, with masonry walls not only covering the outer sides of the iron members, but built in between them to protect them from changes of temperature and keep the columns straight, while the spaces between the floor beams are filled with masonry arches or hollow brick or cement—would appear to possess all the stability required. The floors, themselves, are sufficient lateral bracing; the columns secured from buckling by the masonry and strut and beam connections will support the floors and their live loading. All the walls and partitions have to do is to bear their own weight and prevent swaying of the building. They should be capable of doing this effectively.

The question appears to be more applicable to the enormously high buildings which have been projected in some cities in this country, buildings so high that it does not appear possible that the masonry walls, after considering their own crushing weight, can have much efficiency left for the purpose of bracing the frame. For such buildings it would appear best to use the metallic sway bracing, and plenty of it, while the walls should be made of lighter material and merely serve to cover the iron and inclose the building.

H. B. Seaman thought the wall edgewise was undoubtedly the stiffer, and referred to an example of the flexibility of iron bracing illustrated in Philadelphia several years ago. A tall brick building which, with its wings, formed in plan a U, was seriously injured by the vibrations of an engine at the top of one of the wings. The wings were afterward most thoroughly braced by a system of rods and struts between them. When the engines were again started, however, the cracks continued to increase, as before, and the engines were finally abandoned.

Mr. Just continued the discussion by remarking that he knew of no two buildings of similar size and style, the one designed with, the other without, diagonal rods and braces. Large gussets at the intersections were generally used to secure lateral stiffness. Doors, windows and hallways, as a rule, interfere with any regular system of bracing. Perhaps the best-constructed building of this class in this city, he said, is that of the Lancashire Fire Insurance Company, built in 1889–90. It rises in ten stories 120 feet above the curb, with a frontage of about 24 feet. The side walls and floors are carried by wrought-iron Z-columns, 12 feet on centers, anchored to the foundation by rods incased in lead pipe. At three different levels in the hight of the building riveted girders are placed in all four faces of the building, well connected to the columns, and by extra large gussets in the front and rear walls. The designer also introduced at these levels over the floor beams diagonal ties of flat iron. He further recognized the force of the wind by designing his columns and girders in each wall to carry the dead loads, and an additional vertical load of 15 pounds in lieu of wind pressure over the exposed surface.

The architect of the Havemeyer building, at Cortlandt and Dey streets, introduced a partial system of sway rods. The building covers an area of about 214 x 50 x 60 feet, and rises about 172 feet above the curb. Assuming that the Dey and Cortlandt street fronts were braced by these walls and the center of the building by a semicircular wall or rotunda, built out from the rear wall, he provided, at two intermediate points about 30 feet from each end of the plot, diagonal round rods and turnbuckles between the two columns nearest the front, as also between those two nearest the rear of the building, forming half-bents. These rods, however, needed constant adjustment during construction, since the outside columns, built on the same footings as the outside walls, sank more than the next columns to which they were tied by the rods and which rested on isolated piers.

EVOLUTION OF "SKELETON" BUILDING.

While perhaps not germane to the subject, it may be interesting to note the evolution of "skeleton" building in the metropolitan district. To secure the greatest amount of light for commercial buildings, architects were first induced to reduce the size of their front piers by building into the heart of the same a line of columns which should sustain directly the loads of the floors, and then by cross girders connecting the columns, the weight of the front bays. The constantly increasing value of land next led to higher structures, and hence thicker walls. To reduce the encroachment of the latter upon the rentable floor space, columns with "curtain" walls were resorted to.

THE MANUFACTURES BUILDING OF THE WORLD'S COLUMBIAN EXPOSITION.

SUPPLEMENT CARPENTRY AND BUILDING, APRIL, 1893.

This saving led to the adoption of a skeleton construction in the case of the Tower Building in 1888. This new construction naturally gave rise immediately to discussion on related questions, such as the effect of the expansion of the metal on the permanency of the building, and the relative rate of corrosion in cast-iron columns *vs.* wrought iron and steel.

The concentrated loads transmitted by the columns to the foundations in this system, together with an inability to extend the footings upon any adjoining property, led to some ingenious devices to reduce the consequent eccentric loading, and to distribute the weight uniformly over the same.

In the case of the addition to the Western Union Building on Dey street, the architect covered his floor with rolled beams, and across the same at certain intervals placed riveted girders of a depth equal to that of the cellar story, as shown in Fig. 6. To accomplish the same end in the Hays Building in Maiden Lane a cast shoe over the pier with cantilever beams in the floors, carrying the wall columns on the short arm, was resorted to, as illustrated in Fig 7.

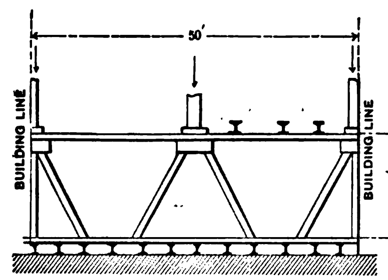


Fig. 6.—Plan Employed in Western Union Building for Distributing the Weight to the Foundations.

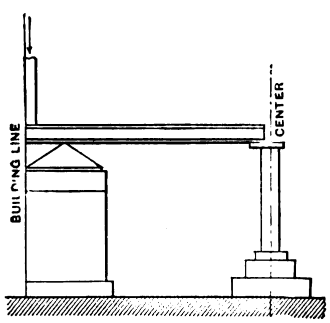
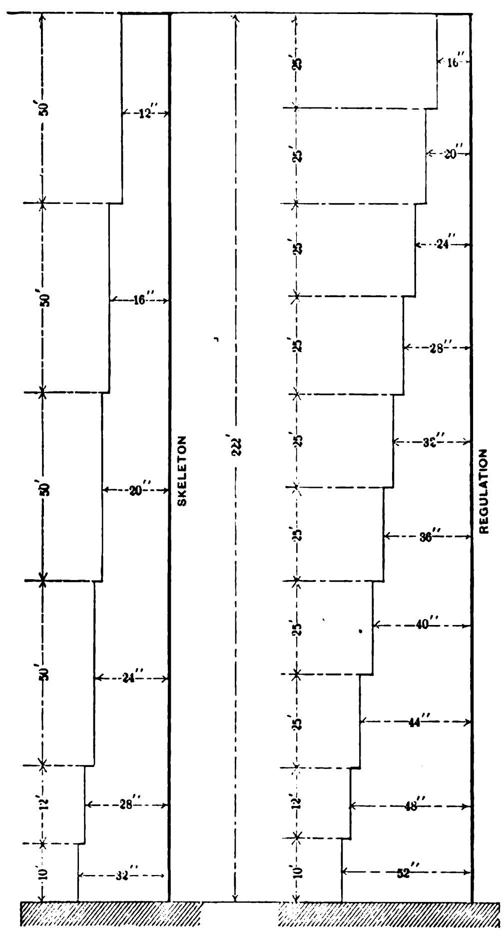


Fig. 7.—Plan Adopted in the Hays Building.

still maintains in "commercial" buildings under the new law. They show the required thickness of brick walls for a skeleton building and for one of "regulation" thickness, 200 feet high above the curb.

Let us take a typical skeleton building, 25 feet front, with 12 stories above the curb, each of 12 feet, and a basement and cellar, in which the wall columns stand opposite each other and are spaced 12 feet on centers in plan. Assuming that the length of the building affords sufficient stiffness in that direction, and that the same is to be secured only against the wall girders. With an assumed load of only 30 pounds, these forces would, of course, be reduced by 25 per cent.; and with a building 120 feet deep, requiring 11 such trusses, the lesser load would effect a considerable economy in the cost of the building.

The dead weight (consisting of iron work, brick walls, as per the New York law, floors made as usual of hollow flat arches, filling and wood flooring, together with plastered ceilings and walls) on any one foundation is about 440,000 pounds (for iron work only and walls 12 inches thick throughout this becomes 322,000



Figs. 8 and 9.—Diagrams Showing Thickness of Brick Walls for "Skeleton" and "Regulation" Buildings, 200 feet high above the curb.

Wind Bracing in High Buildings.

In the earlier skeleton buildings the frame was not carried to the roof. The only motive for adopting this style was a saving of floor space, so that when a hight was reached at which the law specified walls 12 or 16 inches in thickness, a girder was placed over the top of the columns. The walls were continued over this girder, the floor beams resting in the walls, just as in a building standing directly upon solid foundations. The Jackson Building, with 28 feet 6 inches front on Union Square, is an example. Carried on cast-iron columns placed 15 feet on centers, with cross girders of 20-inch rolled beams and 10-inch longitudinal floor beams, the frame rises to the top of the sixth story. Here a girder forms the foundation for a superstructure of brick 20 inches thick for two and 16 inches thick for three additional stories, a total of 154 feet above the curb. The wall surface here exposed is 184 x 61 feet in hight. Figs. 8 and 9 indicate the advantage that

yielding sideways, we could, apart from architectural considerations, place diagonal members through each story, as in Fig. 10, utilizing the cross-floor girders as posts (or ties) and the wall columns as chords.

If each truss so formed be now subjected to a wind pressure of 40 pounds per square foot of exposed surface, we should have panel loads of 5760 pounds, shear of, say, 38 net tons in the cellar, diagonal, a tension of about 146 net tons at the foundation of the windward side, and a compression of nearly 180 net tons on the leeward. The columns and girders in this side should then be proportioned for this additional compression, and the cross-floor girders of the lower tiers for 85 tons (the upper ones proportionally less) tension or compression, depending on the direction of the wind. All connections would have to be designed accordingly, while the floors would give the necessary "sideways" strength needed in

pounds). The tension at the bottom of the windward side is thus seen to be overcome by the dead weight, with a sufficient margin of safety, even for a building in which the floor filling, partitions and plastering remain to be done, and anchorage becomes unnecessary.

After all, it seems that in narrow, clear span buildings, especially with the heavier fire walls now demanded, rigid connections to the columns at all floor levels, with girders and columns designed to stand an additional vertical load equivalent to a given wind pressure over the exposed wall, forms a good solution of the problem. It will generally be found that the moment of the wind acting through the center of pressure is exceeded by the moment of the dead weight.

Henry H. Quinby said that the paper under discussion suggested 40 pounds per square foot of exposed surface as an assumed load to secure reasonable provision against all the destructive forces referred to—natural and artificial. Mr. Just, he continued, thinks that 30 pounds is a safe assumption. Others, who don't say anything, seem to provide for much less. Thirty pounds may be safe, and 40 pounds may be not safe; but the latter, while much more to the right side, can be objected to only in the line of economy, and the addition of one-third to a well-designed system of diagonal bracing, and one-ninth to the outer columns, will be a small percentage of the total cost of a building where doubtless large sums are spent for decoration alone.

Mr. Just's plan of a single system of stiff diagonals is good and avoids interference with passage doors; but in wider buildings it involves troublesome splices at intermediate columns, and it does not admit of convenient adjustment, which is desirable as a means of plumbing the successive tiers of columns and correcting the effect of unequal settlement. This can be best obtained with tension members, which are convenient of attachment, though not always most economical of material. The lateral stiffness of the floors makes it unnecessary to have bracing in every bent, and permits the shift of bracing to different bents in different stories if needed for architectural purposes.

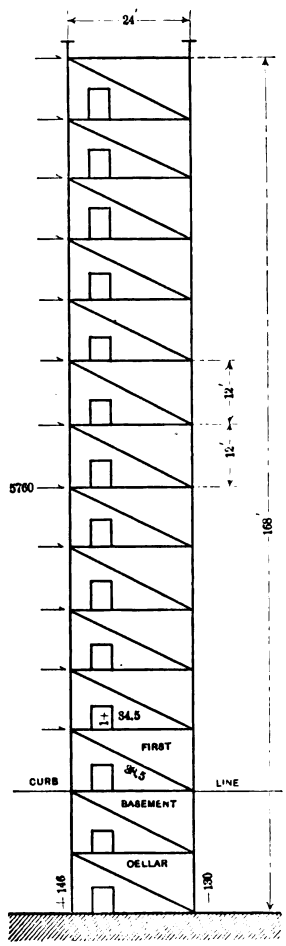
But Mr. Just, after solving this problem as it appeared in a partially completed building, by inserting an iron vertical wind truss, concludes his discussion with the opinion that the solution of the general problem is in rigid floor connections and heavier columns, presumably leaving the diagonal stresses to be cared for by the partitions. In his typical building, Fig. 10, he shows a diagonal stress in the first story of 38.5 tons produced by a wind pressure of 40 pounds. A pressure of 30 pounds, which he advocates as proper to provide for, will develop stress amounting to 29 tons. Would he concentrate such a load upon a hollow brick wall with a total net thickness of $2\frac{1}{4}$ inches or less, as modern fire-proof partitions are built? Does anybody know how much such a wall 12 feet high can safely carry?

In the 17-story building described in the paper, with 30 pounds wind pressure, the shear at the top of the adjoining six-story building (a support that may sometime be removed) is 39.5 tons per panel of 20 feet. As there are three interior rows of columns, this shear is resisted by four walls, each 15 feet wide and 12 feet high. The diagonal compression in each is therefore 13 tons, all of which is assumed to come upon the partition walls because of the flimsy character of the column connections, Fig. 1. Thirteen tons make a heavy load for such walls, even when they are not, as many of these are, weakened for diagonal resistance by doorways through them.

Rigid floor connections, if they are as good as the detail shown by Mr. Milliken, will, with the ordinary partitions, furnish sufficient stiffness for buildings having a good breadth proportionate to hight, and will materially assist the diagonal braces in a narrow, high structure. Mr. Milliken's claims of excellence in his design are well founded if the pintle has the requisite number of rivets; but it can scarcely be expected that shop work will be so accurate that the rivet holes will bring the lines of columns perfectly plumb, as his fourth point seems to claim.

It is to be regretted that the discussion has shed no light on the value of the hollow tile walls which are so much used for partitions and bracing; but it has brought out illustrations of the destructive effect of vibrations on solid walls, and strengthened the position taken in the paper, that hollow tile is not the most efficient bracing for buildings subject to continued vibration.

The steel skeleton type of building is new, and, so far as known, not one has yet been destroyed by wind; but ordinary buildings have been blown down, presumably because they were not properly braced. A few years ago a three-story factory near my home was demolished—simply pushed over without evidence of cyclonic action—in a severe storm. It had been in use three years with light machinery. The walls were of brick, 22 inches thick in the first story and 18 inches in the second and third, with 4-inch pilasters every 12 feet. More than half of the wall space was taken up with windows. The building was 260 feet long, 52 feet wide and 48 feet high, and a 7-foot lantern top crowned the roof. In the middle, at one side, was a stair tower about 12 feet square, and between it and each end were closet bays projecting $4\frac{1}{4}$ feet. These bays and the tower



Wind Bracing in High Buildings.—Fig. 10.—"Skeleton" Building with Diagonal Members Running Through Each Story.

remained standing, but the remainder of the building was leveled to the sills of the first-story windows. The second and third floors were supported by one row of wooden posts 12 feet apart, but there were no knees or partitions anywhere. Apparently, good bracing would have saved the building and prevented the loss of twenty lives.

The efficient system of bracing in an eight-story building described by Mr. Snow is interesting in comparison with the plan of the 17-story building referred to in the paper, and shows that the subject has already received advanced treatment.

In a field of so much uncertainty increased provision is in the nature of insurance, and, like fire insurance paid on a combustible structure that is never damaged by fire, should not be regarded as wasted, but as returned in the shape of protection.

Chicago Stock Exchange Building.

The new building which is about to be erected for the Chicago Stock Exchange will have a frontage of 100 feet on Washington and 180 feet on La Salle streets. It will occupy the site of the present Union Building, and will have its roof $172\frac{1}{2}$ feet above the sidewalk. The permit for the erection of this structure was obtained something like two years ago and will not, we understand, be affected by the recent ordinance passed by the City Council limiting structures to ten stories in hight. One of the peculiar features of the arrangement of the building is that each story of offices will be adapted for different kinds of occupation. It is expected that by this means tenants can be better satisfied, and that the tearing out and rebuilding of partitions and of heating, plumbing and lighting apparatus so characteristic of big office buildings will be to a large extent avoided. The top story is divided into three immense rooms, each without a column. Another distinctive feature will be the means of lighting the offices. On the south side of the building, immediately above the Stock Exchange, which will occupy a space 70 x 100 feet at the south end of the main floor and extend through two floors, all the offices, except the front tier, will recede 13 feet from the line of the alley, which bounds the building on the south. As the west line of the property abuts the court of the Herald Building, this will be utilized, and a court measuring 32 x 60 feet will be extended into the body of the Stock Exchange Building in the form of two courts each measuring 28 x 55 feet. By this means it is calculated there will be nearly 200 feet external exposure of offices, this court giving plenty of light and yet being free from the dirt and noise of the street. Still another feature of the structure will be two enormous brick stacks, which will lead from the basement to a point above the roof. Each of these will contain a large ventilating fan intended to ventilate the basement and carry all odors to the hight of 15 feet above the roof of the building. All the windows throughout the structure will be of plate glass, the stairways of marble and the halls and corridors will have marble wainscot and mosaic floors. All the rooms will have concrete and mosaic floors with a view to rendering them as fire proof as possible. A peculiar interest attaches to this building site, as upon it in 1837, it is said, P. F. W. Peck put up the first brick house erected in Chicago. The building remained until 1868 and was used in the latter part of its existence as a police station. It was then demolished to make room for the Union Building, which, after its destruction in the great fire of 1871, was replaced by the present structure. The new Stock Exchange Building will contain 400 offices, besides the various rooms necessary in connection with the business of the Stock Exchange brokers. The exterior of the building will be treated entirely in stone or terra cotta.

AN INTERESTING EXPERIMENT with shingles was tried a short time ago, says a writer in an English journal. A green 6-inch shingle, fresh from the saw, was measured and weighed, care being taken to get both exact. It was found that it weighed 7 ounces. It was then dried and again weighed and measured. It had shrunk nearly $\frac{1}{8}$ inch, while the weight had decreased from 7 ounces to 3. It was then submerged in water 24 hours, and the size had not changed a particle, while the weight had increased about 1 ounce, demonstrating the superiority of cedar shingles over others, as when once dry they will neither shrink with excessive heat nor pry one another off the roof in wet weather.

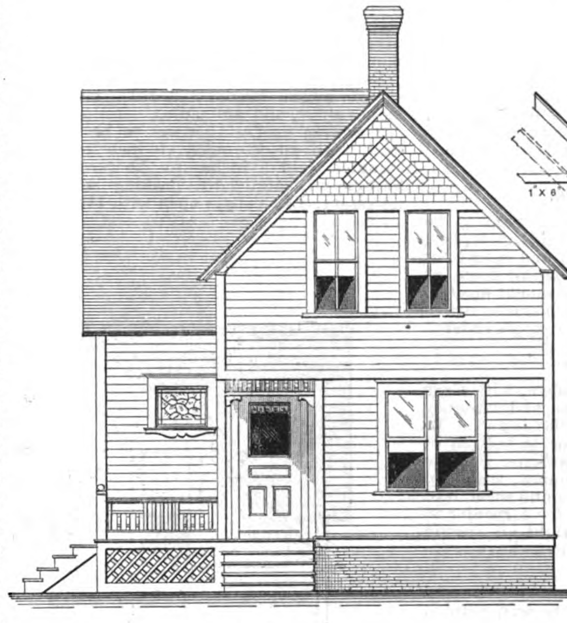
COMPETITION IN $1000 HOUSES.

THE COMMITTEE to whom was referred the drawings submitted in the competition for $1000 houses, being the twenty-first in the series conducted under the auspices of *Carpentry and Building*, has completed its labors, and having rendered its report, we now take pleasure in presenting the set of plans deemed the most worthy under the conditions of the competition, and, therefore, entitled to the first prize. The number of contestants was large, and the fact that the studies submitted came from nearly every section of the country showed widespread interest in the contest, the result being highly gratifying in the variety of the designs and the arrangement of the rooms. By referring to the conditions in the December issue, the committee found that there were several items with each which it was necessary for the drawings to comply before they could properly be considered. These requirements included a front elevation, one side elevation, a foundation or cellar plan, first and second floor plans, and a selection of details covering both exterior and interior finish. There was also required an estimate in detail under the headings of excavation, mason work, carpenter work, plastering, painting and tinner's work, showing the cost of each of these portions of the structure, as well as the aggregate cost. Each estimate was also to be accompanied by a certificate from some responsible builder, to the effect that he would be willing to erect the house indicated by the drawings and specifications at the price named in the estimate. An important point, therefore, was the matter of cost, which in this contest was a prime condition. What was called for were houses which could obviously be erected for $1000, and this without manifest deficiencies in construction and finish or omissions of important points. It was also required that the designating motto or *nom de plume* of each contestant should be placed upon a sealed envelope containing the real name and address of the competitor.

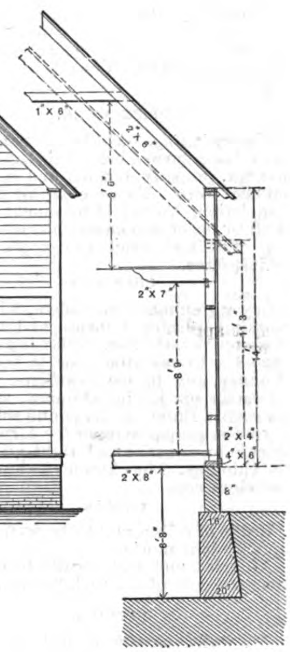
The first work, therefore, was to examine the drawings submitted for the designs submitted was their elaborate character and an evident desire on the part of their authors to include everything likely to be found in a well-planned dwelling, fitted with every modern convenience. In dealing with these the committee were compelled to throw out a large percentage on the ground of excessive cost.

conditions and wholly on the merits of the case.

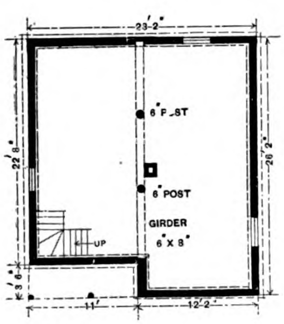
According to the finding of the committee, the first prize, of $100, is awarded to John P. Kingston of 518 Main street, Worcester, Mass.; the second prize, of $60, to C. W. Tetwiler, Poplar Bluff, Mo., and the third prize, of $40, to Thomas E. Jennings, Brasher Falls, N. Y.



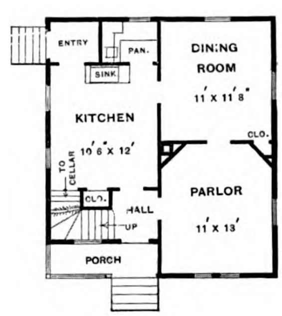
Front Elevation.



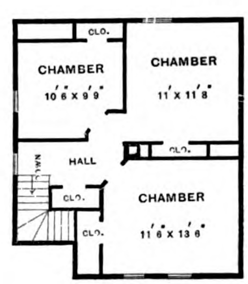
Section.



Foundation



First Floor.



Second Floor.

Competition in $1000 Houses.—First-Prize Design.—J. P. Kingston, Architect, Worcester, Mass.—Elevation and Section—Scale, 1/8 Inch to the Foot.—Plans—Scale, 1-16 Inch to the Foot.

purpose of ascertaining if all had complied with the advertised conditions, and such as did not were at once thrown out. Of these there were a number. In some cases an elevation and floor plan were omitted; in several there was no envelope containing the name and address of the author, these being written on each sheet of the drawings and specification, showing the committee at a glance whence they came and by whom they were prepared. Still others were deficient in the matter of estimate, and in one case, at least, a meritorious design failed to secure for its author one of the prizes by reason of the omission of an estimate in detail.

A noticeable feature of many of the

While there was in each of these cases a builder's certificate to the estimate, it was of comparatively little, if any, value in assisting the committee to a decision, for the reason that the certificate appeared to be largely in the nature of a favor to the architect on the part of the builder, who felt sure he would never be called upon to make his figures good. The committee, therefore, was not misled by the certificates of the builders, more especially where it was obvious to the most casual examination that the structure could not properly be erected for the sum of money to which the competition was limited. The decision in each case, we are informed, was in strict accordance with the advertised

Among the designs submitted were several deserving of special mention, but which, under the terms of the competition, were not entitled to a prize.

We give in connection herewith the specification and estimate of cost in detail accompanying the first-prize design, and will publish the others in subsequent issues, deferring them for a time in order to give greater prominence to the first prize designs of the remaining competitions.

Specification Accompanying First-Prize Design.

MASON WORK.

Excavation, Including Cesspool.—Scrape off loam and deposit on lot as directed by owner. Excavate earth from cellar to the depth shown by drawing, 1 foot larger than outside of cellar wall. Excavate for all piers and trenches shown, or necessary. All earth needed for grading to be deposited on lot as directed. All the remainder to be taken from the lot.

Foundation, Including Cesspool.—Foundation walls to be built as shown, of good field stone laid up dry in best manner, the footing courses to be large stone, the inner face to be laid true to a line, the corners made true and even, with good cap stone to start brick upon. All parts of wall to be at least 4 feet below finished grade. Put in bed stone for chimney at least 8 inches larger all around than chimney and 6 inches thick. Bed stone for piers to be 24 inches square and 6 inches thick. Piazza foundation stone to be 20 inches square and 6 inches thick, and have 3-inch iron pipe to rest piazza sill upon, and to be 4 feet below finished grade.

BRICK WORK.

Underpinning.—All brick used to be good hard-burned brick laid up in best manner, properly bonded and culled for outside work. To be cleaned down at completion. To be laid in cement mortar. Wall to be of thickness shown by drawing. Put in all brick fire stopes ordered by inspector.

CHIMNEYS.

Lay up chimney as shown, with flues smoothly plastered inside and chimney plastered outside from cellar to roof. To have 8 x 10 cast-iron door at bottom of chimney, and to have cast-iron thimble for each room joining chimney, with cap for each. Build in 2½ pound sheet lead at roof in proper manner for carpenter to shingle in, to make roof tight all around the chimney. The chimney to have artificial stone cap.

CELLAR.

Inside of cellar wall to be well pointed up with hair mortar.

All brick and stone walls in cellar to have one coat of good whitewash.

LATHING.

All walls, partitions, ceilings and all furred places to be plastered will be lathed with best spruce lath, full thickness, free from bark, knots, or anything to stain the plaster. Break joints every eighth lath, all put on horizontal. Lath behind all base and wainscoting on outside walls. All laths in corners or angles must be nailed to solid bearings.

PLASTERING.

All walls and ceilings of the entire building will have a coat of good lime, hair and sand mortar, to be well mixed together, and to be mixed at least four days before using.

The ceilings of all rooms will have a second coat of good whitewash, and to be left perfectly white and clean at completion. All plaster to be carried down to floors on outside walls. All the above work to be done in a good and thorough manner, using good materials, and the mason will fix up all places damaged, and clean up the building in a neat and proper manner.

CARPENTER WORK.

Framing timber to be of good spruce, free from imperfections to hurt the strength or durability of the timber. Frame to be of the following sizes: Girder, 6 x 8; sills, 4 x 6; first-floor joist, 2 x 8; second-floor joist, 2 x 7, set 16 inches on centers. Rafters, 2 x 5, and collar beams, 1 x 6, 24 inches on centers. Corner posts, 4 x 6; piazza sills, 4 x 6; joist, 2 x 6; wall studs, 2 x 4; main partition studs, 2 x 4; miner partition studs, 2 x 3, placed 16 inches on centers. Framing to be done in balloon-framing style, joist under partitions to be double. All corners to be made solid. All partitions to have sills and cap same size as studs.

Truss over all door openings when at right angles to joist. Main partition to foot upon girder, and cap above to form sill of partition above where they come over. Put in all wood fire stopes ordered by inspector.

Furring.—All ceilings to be furred with ⅞ x 2½ inch strips, put up 16 inches on centers, well nailed and straightened.

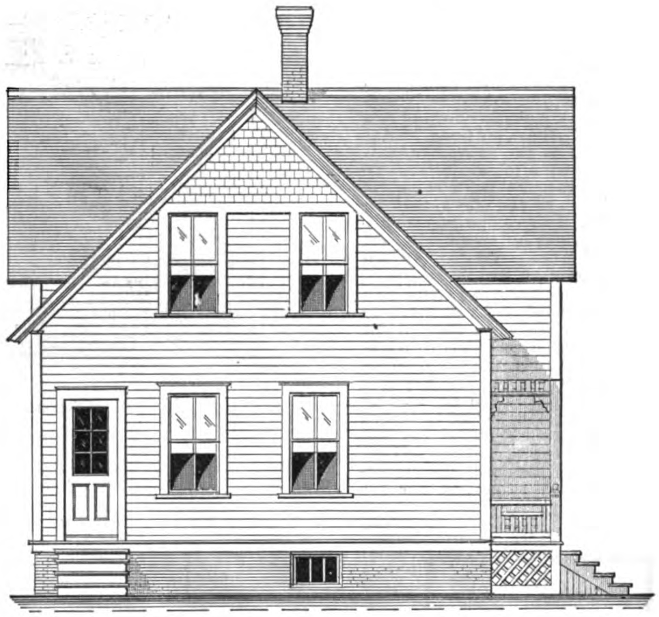
Bridging.—All joist to be bridged with 1 x 2½ inch strips, nailed with two nails at each end.

Grounds and Beads.—Put ¾-inch grounds, and corner bead where necessary to plaster against.

Inclosing Boards and Lining Floors.—To be No. 2, ⅞-inch, square-edged, planed hemlock boards, to be well nailed to each and every bearing, with all joints made on solid bearings.

Roof Boards.—To be No. 2, ⅞-inch, square-edged hemlock boards, laid 3 inches apart, and well nailed.

Shingling Roof.—All roofs to be covered with good quality 16-inch cedar shingles, laid 5 inches to the weather. Shingle in painted tin flashing where necessary. Lay valleys open with 14-inch



Competition in $1000 Houses.—First Prize Design.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

painted tin, well soldered together in each valley. Put on pine saddle boards on all ridges. Flash around chimney in best manner to make all perfectly safe.

Side Shingle. — All walls or gables shown, or marked, to be covered with cedar shingles, cut as shown.

Clapboarding.—All outside walls shown or not shingled to be covered with a good quality spruce clapboard, 6 inches wide, laid 4½ inches to the weather, with close, clean joints, well nailed on every stud and once between.

Sheathing Paper.—All outside wall surface is to be covered with a good quality of building paper, lapped at least 2 inches. Put strips under all frames and finish. Put same paper between floors on first story.

OUTSIDE FINISH.

All outside finish to be No. 2, well-seasoned pine, all made as per detail drawings. Piazza floor will be ⅞-inch tongued and grooved N. C. pine, blind nailed. Ceiling will be ¾-inch narrow spruce sheathing, with 1½-inch bed molding in angle.

Outside steps will have ⅞-inch risers of pine. Treads 1⅛ inches, of N. C. pine.

Windows.—All window frames to be made as per detail drawings. Cellar windows to have 1¾-inch plank frames, 1¼-inch glazed sash, hung at top with 2-inch wrought butts, with button, fastener, and hook and eye to hold open.

Window frames above to have 1¾-inch stool, ⅞-inch x 5-inch casings, and ⅞-inch pulley styles, with pockets cut for weights and good finish face pulley.

Sash.—All windows shown to be fitted with 1⅜-inch pine lip sash, glazed with No. 2, American glass, well leaded and puttied, all to be hung and evenly balanced with cast-iron weights and sash cord. All weighted windows to have outside blinds, hung and trimmed with good blind fasteners. Stationary sash to be as shown, with cathedral glass in border lights and plain glass in center.

Outside Doors and Frames.—Front doors to be as shown, 1¾ inches thick, of good pine, side door of pine, 1½ inches thick. Outside doors to have 1¾-inch pine frames, 1¾-inch hardwood sills, and casings same as window frames, or per details.

INSIDE WORK.

Floors.—Lay the floors in kitchen, pantry and entry with ⅞-inch kiln-dried birch flooring, not more than 3 inches wide, driven tight together, blind nailed, laid at right angles to lining floor, and joints smoothed up. The remaining rooms on first floor will have top floor of No. 2, ⅞-inch, square-edge pine flooring. The whole of second floor will have a single floor of No. 1, ⅞-inch, narrow tongued and grooved spruce flooring, all well nailed and cleaned up.

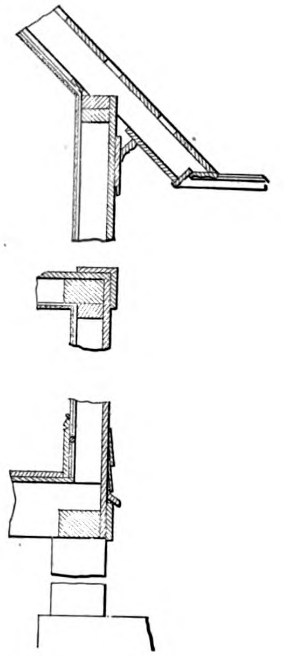
Interior finish.—All to be constructed as required by the plans and details, with sound, clear, kiln-dried white wood. All put up with neat close joints smoothed up and sandpapered. Base put down in all rooms not wainscoted. All interior finish put on after plastering is dry.

Doors.—Provide good 1⅜-inch four-panel doors 6 feet 8 inches high by 2 feet 6 inches wide, to have bevel edges, raised panels, in first story. Provide 1¼-inch four-panel doors, 6 feet 6 inches high by 2 feet 6 inches wide, with bevel edges, raised panels, for second story, all to be hung with two loose-joint butts, in good, workmanlike manner.

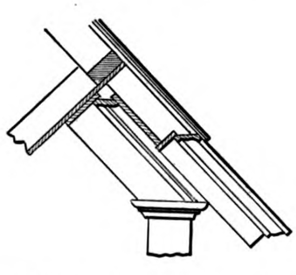
Door and Window Trimmings.—Provide and put up all door and window finish as per plans and details.

Wainscoting.—Kitchen and entry will be sheathed up 3 feet high with narrow beaded sheathing, and to have a 3 inch molded cap on top.

Closet Base.—All closets to have base



Sections through Wall of Building.—Scale, ½ Inch to the Foot.



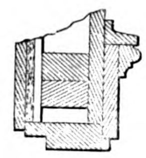
Detail of Gable Cornice.—Scale, ½ Inch to the Foot.

6 inches wide, and casings 3½ inches wide, of plain stock.

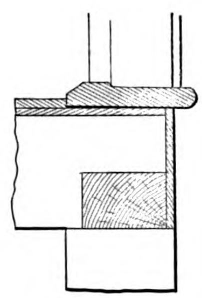
Pantry.—Fit up pantry, as shown, with counter shelf on two sides, sheathed under, and closet for flour barrel, with cleat doors and cover. Put up four shelves over 12 inches wide on rabbeted cleats.

Kitchen Closet.—Kitchen closet to have four shelves, on rabbeted cleats.

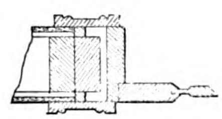
Other Closets.—All other closets to have one shelf and two rows of wardrobe cleats, with hooks 12 inches apart on each cleat.



Section through Door Head.—Scale, 1 Inch to the Foot.



Section through Door Sill.—Scale, 1 Inch to the Foot.



Section through Door Jamb and Panels.—Scale, 1 Inch to the Foot.

Sink.—Sink in kitchen to be fitted up with border casing 6 inches wide to set sink into, sheathed under with cleat door. To have drip shelf as shown sheathed back 16 inches high with shelf on top.

Clock Shelf.—Put up in kitchen and sitting room a clock shelf 1⅛ inches thick, molded edges, set on bronze brackets; to be put where directed.

Stairs.—Construct the stairs as shown, on three plank stringers each. Cellar stairs to have 1⅛-inch treads, ⅞-inch risers, of spruce. Front stairs to have 1⅛-inch treads, ⅞-inch risers and scotia molding and nosing, all of white wood properly put up.

Electric Bell.—To be electric bell in kitchen to connect with button at front door, all of good material, properly wired and put in position.

HARDWARE.

The contractor will allow $30 for hardware, which will include door trimmings, sash fasteners, drawer pulls, cupboard catches and hinges, base knobs, wardrobe hooks and screws for same, all to be fitted in place by contractor. All of the above hardware to be selected by the owner.

PAINTING.

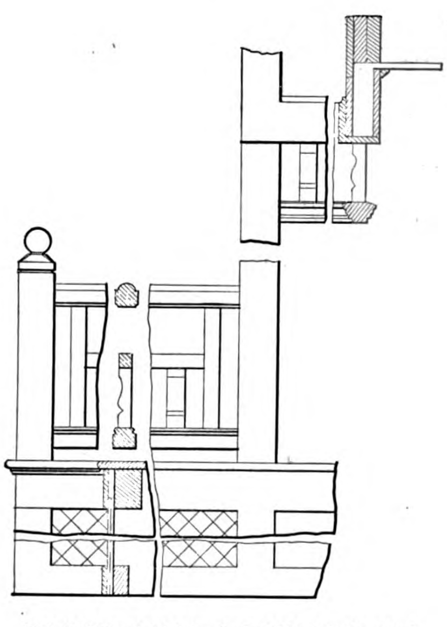
Outside.—All outside work to have two coats best lead and oil paint, in colors to be selected by the owner. Putty stop all nail holes in finish and shellac all knots and sap before painting. The roof will not be painted.

Interior.—All the inside work must be well cleaned off and puttied to match the wood as near as possible, and to have one coat of stain or liquid filler (as owner directs) and two coats of preservative; to be rubbed down between coats.

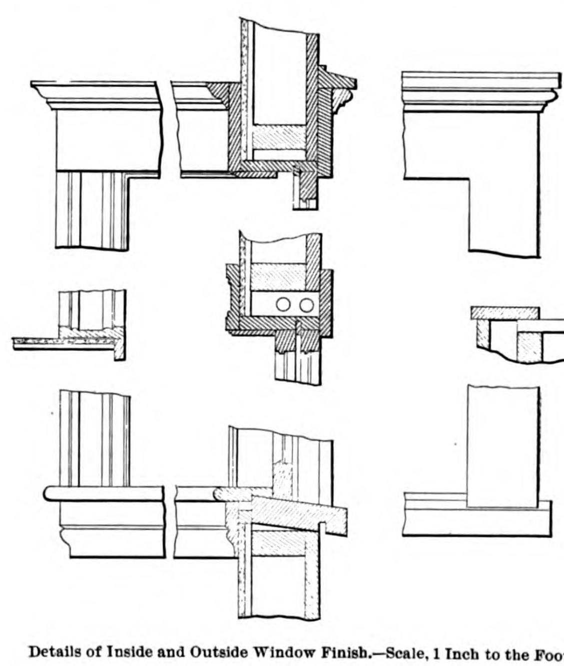
Hardwood floors to have one coat of oil. Plastered walls of kitchen and pantry to have one coat of liquid filler and two coats paint. All materials used by painter to be good stock of their several kinds, and labor done in a good manner.

PLUMBING.

Furnish and set up where shown in kitchen a 20 x 36 x 5 inch Miller cast-iron sink, with 4-inch round trap and 1¼-inch lead waste pipe to under side of floor; from there continue waste pipe to inside of cesspool wall with 2-inch cast-iron soil pipe. Supply sink with water,



Detail of Porch Finish.—Scale, ½ Inch to the Foot.



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

Competition in $1000 Houses.—First Prize Design.—Miscellaneous Details.

using a small pitcher pump and all necessary pipe for same.

Detailed Estimate of Cost.

NOTES

	Feet.
Feet around house	98
Excavation surface	560
First floor surface	560
Second floor surface	568
Net clapboarding surface	1150
Net side shingle surface	40
Net roof shingle surface	975

MASON WORK.

62 Yards excavation	$15.50	
30 Perch field stone	46.80	
3900 Brick	46.80	
1 Chimney cap	1.75	
5 Chimney thimbles	2.50	
6 M. lath	27.90	
400 Yards plaster	48.00	
Pointing cellar	2.25	
Whitewashing cellar	1.75	
		$193.25

CARPENTER WORK.

3850 Feet framing timber	59.67	
Grounds and beads	2.65	
3700 Feet square-edge hemlock boards	55.50	
8 M. cedar shingles	28.00	
525 Pieces 6 foot 6 inch spruce clapboards	28.87	
Flashings	11.20	
Sheathing paper and nails	27.00	
Outside finish	20.00	
Front piazza finish	10.00	
2 Outside steps	7.70	
14 Window frames, sash and blinds	70.00	
3 Cellar frames and sash	4.05	
2 Outside door frames	4.50	
1 Front door 1¾ in. thick	7.25	
1 Side door 1⅛ in. thick	3.50	
175 Ft. sheathing for kitchen, &c	7.00	
43 Feet 3-inch sheathing cap.	.80	
238 Feet 7-inch base; 100 feet 2-inch base molding	7.74	
16 Door jambs	5.60	
16 Doors 1⅝ inches thick	25.60	
27 Sides finish for doors	18.90	
14 Sides finish for windows	18.20	
1 Pantry	2.62	
1 Sink	1.76	
2 Dish closets	4.80	
4 Clothes closets	2.20	
1 Flight front stairs; 1 flight cellar stairs	9.34	
210 Feet birch flooring	9.45	
325 Feet pine flooring	7.15	
675 Ft. narrow spruce flooring	14.85	
2 Clock shelves	.60	
Electric bell	3.25	
Hardware	30.00	
Carpenter's labor	175.00	
Incidentals	48.38	
		$733.13
Plumbing	23.00	23.00
Painting	65.00	65.00
Total		$995.33

Builder's certificate signed by
GEORGE KINGSTON of Worcester, Mass.

Technical Education.

Some useful remarks are made in a recent report of the special committee on technical education of the London County Council by H. Llewellyn Smith, secretary of the committee, on the subject and scope of technical education. The relation of technical education to workshop training has been much debated, says an exchange, and this report tries to make the subject clear. This sort of instruction includes both the principles of science and art applicable to industry, and the application of special branches of science and art applicable to specific industries and employments. The line of demarcation between technical education and the ordinary workshop training is defined by the act. "It shall not include teaching the practice of any trade, or industry, or employment;" in point of fact the act does not propose to undertake the work done by apprenticeship. So far, so good. The division between the objects is thus expressed in the report: "Roughly speaking, the practical work of the technical school should aim at, and be limited to, the teaching and illustration of principles and methods; if we go beyond this and attempt the mechanical drilling of the pupil in the various processes, with a view not to attain insight into principles of work, but to gain mechanical skill and dexterity, it is trenching on the teaching of the practice of a trade." This appears to be a fairly comprehensible line to take by the council. In a few exceptional cases a complete teaching of a handicraft is permitted, inasmuch as principles and practice are so indissolubly united; these are crafts like clay modeling, wood carving, metal work; these are "authorized under the head of manual instruction (modeling in clay, wood or other material), without the necessity of referring to the Science and Art Department." Industrial school teaching is excluded also from the scheme.

Ventilation.

The following article, which treats of ventilation in a very simple way, was prepared by D. H. Smith, Watkins, N. Y., to present the subject to a few country school trustees and teachers, all technicalities being purposely avoided:

Ventilation may be simply defined as a process of supplying pure air to a room and getting rid of the impure air at the same time. Ventilation and warming must necessarily be considered together, as artificial ventilation, without the use of machinery, must be accomplished by means of heat. Natural ventilation may be obtained by opening windows in opposite sides of a room. Pure air will come in at one opening, and the vitiated air will go out of the other, according to the direction of the air currents outside. This form of ventilation will do in summer, but not when the outer air is too cold to be brought into the room. This fact must always be remembered—that a room always contains the same volume of air. It is full. You cannot increase the quantity, neither can you diminish the volume. Therefore, if air is taken out of a room by any device, and no special opening is provided for the ingress of pure air to replace that taken out, the air must come in as best it can through crevices in the windows and doors. On the other hand, warm air will not come into a room through furnace pipes any faster than air can escape from the same room. This is the reason it is so hard sometimes to warm a dwelling with a warm-air furnace when there is no ventilation.

It is a wise law of nature that the most impure and coldest air is at the floor of a room. The purest and warmest air is near the ceiling. House ventilation should be planned to get rid of the cold and impure air, and in this way ventilation will assist in the heating, by getting the cold air out of the way and allowing the warm air from the ceiling to descend and warm the room. A room is always warmed from the top downward, the warm air from whatever source rising at once to the ceiling and settling down as it is cooled. It is also important that the pure air which is introduced into a room to take the place of the air sent out should pass over a heated surface of some kind on its way, so as to come into the room warm.

The fact that air when heated will rise and when cooled will fall is taken advantage of to effect ventilation. Flues may be properly built and openings properly made, but the air within the flue will be as likely to descend as to rise, if it is not artifically warmed. Any flue in the wall, having an opening at the floor into a room and extending up through the roof, will make a ventilating flue, if the air within the flue is warmed in some way. A good way is to construct a chimney with two flues, one for the smoke flue of the heating apparatus, the other for ventilation. The heat from the smoke flue will warm the ventilating flue, so that the air within the flue will rise and escape, and, of course, draw the air from the room through the opening at the base. A still better way is to build a large chimney (12 x 20 inches inside is about right for a large country schoolhouse) and use a cast-iron smoke pipe 8 inches in diameter, placed inside the flue when it is built and extending to the top. The space inside the brick flue and surrounding the smoke pipe makes one of the best ventilating flues known, as the cast smoke pipe will warm the air in the flue much more than one side of a brick flue possibly can. Leaving out of consideration the large heating and ventilating apparatus, too costly for general use, the best schoolroom heater is a warm air furnace of suitable size. This heater can be set up in one corner of the room out of the way, no matter where, if smoke flue is near. It should be set a few inches above the floor with a case open at top and bottom. When in operation the air inside of the case becomes heated and rises to the ceiling and the cold air is drawn in at the bottom, and this circulation will continue as long as there is fire in the heater. This circulation is not ventilation; not a bit of it. The temperature in all parts of the room, at same hight from the floor, will be the same whether the room is warm enough or not. When the room is warm scholars close to the heater will not be too warm, and those in distant parts of the room not too cold, as is the usual way.

To complete the arrangement properly there should be a ventilating flue suitably warmed, and also a cold-air flue of the same size from the outer air brought with the opening directly under the heater. Then the air which comes into the room to take the place of the foul air sent out through the ventilating flue, will come in warm as it should, instead of coming in cold through the crevices of doors and windows.

THE NEW BUILDING which is to accommodate the Department of Mechanical Engineering of the Pennsylvania State College, in Centre County, Pa., was formally dedicated on February 22. The building, which has been erected by the Commonwealth of Pennsylvania for the purposes of industrial education, at a cost of about $100,000, is stated by the Williamsport *Times* to be a very handsome structure, of good design and well adapted for the purpose to which it will be devoted. It is of ample proportions, covering an area 266 x 208 feet square, is three stories high, and contains in all 57 rooms, with all the most improved facilities for heating, lighting and ventilation, as well as a complete equipment of tools and apparatus for the instruction and practice of the students. The educational departments include mechanical and sanitary engineering, hydraulics, machine wo k of all kinds, smiths' work in a shop with 20 forges and anvils, wood working, pattern making, pipe cutting, steam fitting, &c. A museum of mechanical devices, model rooms, laboratories, libraries, drawing rooms, and a number of classrooms, together with offices for the professors attached to the department, are provided in the building. Three hundred students can be accommodated in the different undergraduate and post graduate engineering courses, and free scholarships have been provided by the trustees, which will place the facilities of the new college department within reach of all.

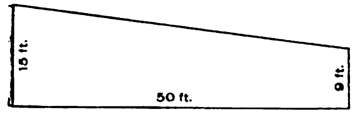
CORRESPONDENCE.

WE ARE ALWAYS GLAD to receive letters from practical readers of the paper, discussing subjects of general interest to the trade, answering requests of correspondents desiring information, or it may be criticizing methods of doing work advocated by some of those who have replied to published inquiries. By this means the interest in the paper is increased, and there is brought to the attention of all peculiarities in the trade which prevail in different sections of the country. There is one thing, however, which, in many instances, mars the pleasure otherwise resulting from a perusal of what our correspondents have to say. There is no means of identifying the writers. In many cases both the name and address are missing, and we only know the communications come from writers who call themselves "P. O. P.," "A. J. X.," "H. I. T.," or some other queer thing. It is essential that we have in all cases the name and address of the writer, not necessarily for publication, but as an evidence of good faith, and to enable the Editor to communicate with him if such a course should seem desirable. The omission of this important feature will probably explain to "W. P. K." of Ansonia, Conn.; "A Puzzled Apprentice" of Jersey City, N. J.; "G. I. B.' of Greece, N. Y., and many others, why their communications have failed to receive attention.

Dividing a Roof.

From C. A. J., *Cobden, Ill.*—As the readers of *Carpentry and Building* are anxious to solve problems, I have one which looks very easy, but is very deceiving. Two tinners agreed to cover a roof in partnership. The roof was 50 feet long, 15 feet wide at one end and 9 feet wide at the other end. As each one was willing to do his share of the work, they start laying the tin at both ends. Where will they meet and how wide is the roof at the meeting point?

Note.—We have reproduced the diagram showing the shape of the roof, with



Dividing a Roof.

the dimensions. The problem is to divide the roof into two equal parts, and will, we think, be found somewhat difficult of solution by arithmetic. By another method it is found the roof is 12.37 feet wide at the meeting point. The roofer working from the 9-foot end will have to lay 28.08 feet and the roofer working from the 15-foot end 21.92 feet, if both are to lay an equal number of square feet.

Cleaning Old Zinc.

From I. DEV., *Glen Cove.*—Will some one please inform me through *Carpentry and Building* if there is any way of cleaning old zinc to make it like new?

Note.—According to some of the works giving recipes of various kinds, zinc may be cleansed by passing it through a boiling solution of caustic lye, care being taken, however, not to allow it to remain too long, as it may be corroded or even dissolved. After rinsing it is plunged for a few minutes into water containing from one-tenth to one-twentieth of sulphuric acid; then rinsed in plenty of warm water, and when necessary brushed with a stiff brush and pumice-stone dust or scratch brush. Another method is to dip the zinc into a cold mixture composed of 100 parts sulphuric acid, 100 parts nitric acid and 1 per cent. of common salt, and quickly rinse in cold water until perfectly free from copper salt, which will blacken the zinc. If instead of quickly cleansing the zinc it is allowed to remain a little longer in the mixture it acquires a dead luster, which may be utilized for producing contrasts between various parts of the same ornament.

Rule for Finding Curve of Rafters in an Ogee Roof

From J. A. S., *Portland, Ore.*—In the October number of *Carpentry and Building* "A. J. B." of Duluth, Minn., asks for a simple and accurate rule for finding the curve of a hip rafter in an ogee roof. For his benefit I will give my method for finding such a surve. "A. J. B." does not give the length of the tower, nor the radius of the curve of the roof. I will therefore assume 10 feet for the rise of the roof and half the distance A C of Fig. 1 of the sketches for the radius of the curve of the roof. In Fig. 1 A B is the run and B C the rise of the common rafter. Connecting the points A and C gives the line A C, showing the pitch of the roof. With the assumed radius describe the reverse curve A D C, which will give the plan of the rafter. Divide the pitch line A C into any number of equal parts and draw the dividing lines parallel with B C or the down cut of the rafter. Referring to Fig. 2 of the sketches, A B is the run and B C the rise of the hip rafter, A C being the pitch line. Divide the pitch line into the same number of equal parts as in the common rafter. Draw the dividing lines parallel to B C or the down cut of the hip rafter. Make *a a*, *b b*, *c c*, *d d*, *e e*, *f f*, &c., in Fig. 2 equal to *a a*, *b b*, *c c*, *d d*, &c., in Fig. 1. Now, drawing the curved line through the points *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, *j*, *k*, *l*, *m*, *n* gives the plan of the required hip rafter. In conclusion, I would remark that this rule will work in curves of any degree.

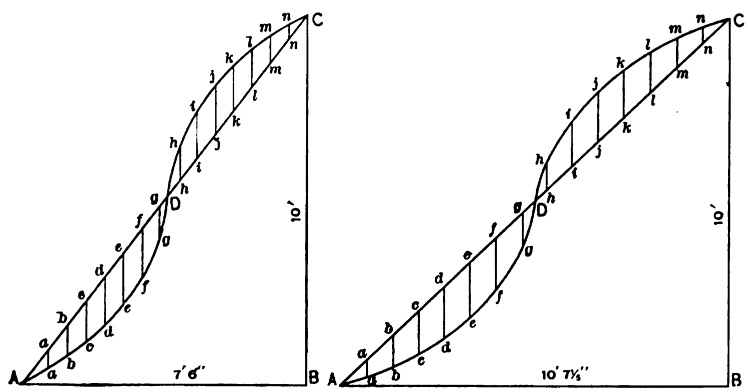


Fig. 1.—Common Rafter. Fig. 2.—Hip Rafter.

Rule for Finding Curve of Rafters in an Ogee Roof.

Hanging Double Swing Doors.

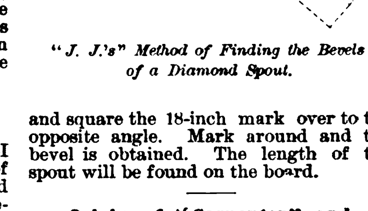
From J. F. R., *Pettisville, Ohio.*—I would like to ask through the columns of *Carpentry and Building* the best method of hanging a door with Chicago double-acting blank butts. Can the work be done in such a way that the door will not sag from the frame at the top, or must there be a double-acting spring butt at that point? I have no doubt there are many practical readers of the paper who will take pleasure in giving me information on this point.

Sideboard Designs.

From L. J. F., *Chartley, Mass.*—I want to build a sideboard for my own use and desire some of the practical readers of the paper to furnish designs of work of this kind. This matter is one in which other readers of the paper are likely to be interested, and I trust a number of designs will be forthcoming.

Bevels for a Diamond Spout.

From J. J., *Oriskany Falls, N. Y.*—I have read the articles about bevels for diamond spouts in the various issues of *Carpentry and Building* for 1888 and 1889, and I thought when I saw the inquiry in the September number I would send my method of doing the work. I would take a piece of board and lay out the hight and run to a ¾ or 1½ inch scale, if the board is wide enough. Now lay out the spout and square over where the horizontal line runs. In the sketch which I send I have it on top. Measure down to where the line cuts off the spout, giving 18 inches. Now, when the spout is made measure off 18 inches on each side. Nine inches from the end square over to each side angle



"J. J.'s" Method of Finding the Bevels of a Diamond Spout.

and square the 18-inch mark over to the opposite angle. Mark around and the bevel is obtained. The length of the spout will be found on the board.

Origin of "Carpenter" and "Plumber."

From F. D., *Union City, Tenn.*—Why is a carpenter called a "carpenter," and a plumber a "plumber?"

Answer.—Both words are of Latin

origin; "carpenter" being derived from *carpentum*, a wagon or carriage, and *carpentarius*, a maker of the same. The word has in course of time widened its meaning, so as to include all artificers in wood. "Plumber" takes its rise from the Latin word *plumbum*, lead, and literally means a worker in lead. The French equivalent, *plombier*, explains itself in that languague, *plomb* being the French for lead.

Tool-Chest Construction.

From L. L. D.. *Madison, S. D.*—I am something like "W. J.," who gives, in the September number, a plan for a handy tool chest. I have been a subscriber to the paper for a few years past, but have not as yet seen anything in the shape of a chest which I consider as handy as my own. I have used it for five years and never had reason to change my opinion concerning it; besides, a number of carpenters who owned good chests with the old-style long tills have put them aside and made new chests exactly like mine. Thinking that the subject may be of interest to the readers of the paper, I send sketches of the chest, hoping that they are sufficiently clear for my brother chips to understand them. It will be noticed by reference to the drawings that I have placed the saw till where, in my opinion, it is handiest and out of the way of everything else. The molding planes are to the front side of the chest, as will be seen from the drawings. Fig. 1 represents a perspective view of the chest with the lid partially raised; Fig. 2 a section through the end, while Fig. 3 represents a longitudinal vertical section. Instead of having long tills divided up into little spaces to hold different tools, I employ short tills placed crosswise of the chest. This arrangement prevents binding in sliding from one end to the other, and I am not obliged to lift out a single till in order to reach anything in the bottom of the chest. The lids, or covers, of the bottom space of the chest, which are hinged to the bottom of the lower till, turn up and catch at the top, as indicated in Fig 3. This permits of ready access to the bottom portion of the chest. When the lids are down the space between the tills forms a convenient receptacle for apron, overalls or any old clothes for work when the day is over. If "W. J." thinks his chest is handy, I am inclined to the opinion that he does not know what real convenience is. I think he has too many boxes to lift out and in. I have a hand box, but it does not belong in the chest. I employ as a material black walnut and use it for all parts except the bottom. The sides, bottom and top are made of full-width boards, the corners dovetailed together and bound with brass corner pieces. The cover is paneled outside and does not leak.

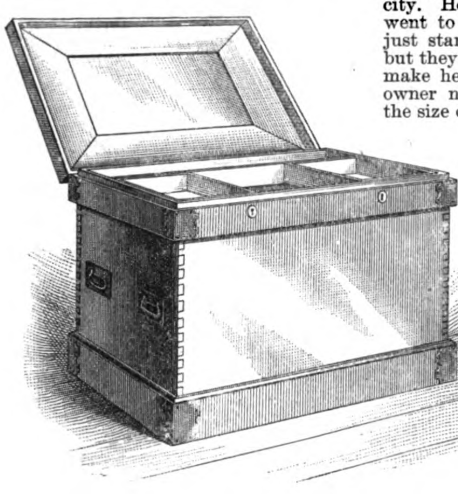


Fig. 1.—Perspective View of Chest with Lid Raised.

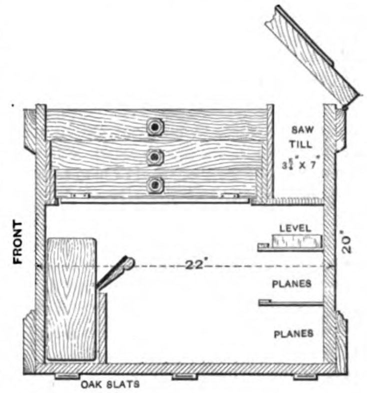


Fig. 2 —Cross Section through One End.

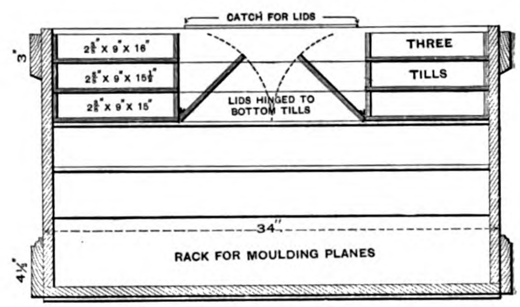


Fig. 3.—Longitudinal Vertical Section.

Tool-Chest Construction as Adopted by "L. L. D.," Madison, S. D.

Roofing Contracts.

From H. C., *Pittsburgh*.—My attention has recently been called to the subject of contracts, especially roofing contracts, and as I have been thinking about the matter, it occurred to me it might be interesting if I gave my experience with a verbal agreement.

A party whose name and business I knew and with whom I was on speaking terms (an acquaintance only, no friendship, no knowledge of his standing) came to me stating that he was building two houses out of town and was recommended to call on me in reference to putting in the heating and cooking apparatus and doing the necessary roofing, &c. Who sent you? was my first question. He gave me the name of one of my best customers, one who has given me many a pointer when I needed them in my earlier years, and who is a leading dealer of this city. He also gave him as reference. I went to see the buildings. They were just started. He showed me the plans, but they were worthless. No one could make head or tail of them, neither the owner nor the carpenters. I asked for the size of the buildings and he gave me them. The total square feet over all, allowing for all projections of cornices, &c., was 1500 square feet, with 28 feet of leader. They were to be 5-room houses.

I gave him price on heating same; specified the ranges and also set price; and he said: "That is satisfactory; we will send you word in a few days, for the roof is ready, so that you can be prepared." I then said, "I will send you specifications and estimate what I intend to furnish, and what I will do for that money, and you send me acceptance." That, he said, was not necessary; he was not afraid but I would do what was right. "Well," I said, "now if your houses are any larger than the sizes you gave me I will charge you so much per foot extra. That is what I am figuring on; and the leaders must not exceed 28 feet; and if they are smaller I will allow you the same. There must not be over five runs of pipe from each heater, or I will charge you so much per foot extra; or, if less, I will credit you with the difference." I went over the estimate item by item, and he was perfectly satisfied with my terms—payments to be made as work progressed, and 20 per cent. to remain until houses were finished, as a guarantee of good workmanship, &c.

I started. After a few days' work my foreman sent me word that there was not enough tin. Strange, I thought. I went out and saw the brother of my customer, who was part owner and the paymaster of the firm. "Oh, that will be all right," was his response. I finished the roofing, 3368 square feet, and 108 feet of leader. I measured the job, handed the measurements to the brother, and called his attention to the difference. He said, "We thought while we were about it we would give ourselves plenty of room, and altered the plans." No money yet! The partition studding was put up, and call made for pipes for heating. Out I went, ten rooms instead of five. I called the boss carpenter's attention to it. He was the father of the owners. He called in the paymaster, who said, "I suppose it is all right; the house will have to be heated, and if it is extra, of course that is all right." In went the pipes. No money yet!

I then stopped, requested some cash and got 50 per cent., and the promise that as soon as heaters were in I should be given the other 30 per cent. A heater intended for five rooms won't heat ten. Without asking any questions, I put in one large enough. Instead of six registers in each house I put in 11 and refused to put in ranges on account of so many changes, and not seeing more cash. I finished the work and presented the bill to the one I made the contract with.

Bill disputed! Would not pay. His excuse was, I had no authority to do any more than I had agreed to do. His brother or father had no authority to order it and he would not pay one cent over or above the contract.

I employed an attorney, started suit, filed lien, &c. Found out that there was $6000 of judgments ahead of me. They made their defense, filed affidavit, &c. I was not satisfied with my attorney's opinion and got another opinion. Both opinions were that he would beat me. I should have made a new contract, or have stopped. They offered 60 per cent. in settlement, and under advice of my attorney I accepted it and was glad to get it. I thus got a larger percentage of my bill than a few others. After the smoke cleared away I figured the second time. Result: net loss, $134.50. My first figuring showed a profit of $60. I have no comment to make.

Problem in Roof Framing.

From H. B., *Alfred Centre, N. Y.*—I send herewith sketches and description showing a method by which to obtain the lengths and bevels required for a conical roof covering a tower, one-half of which intersects with the roof of the main building. I am prompted to submit this by reading the letter from "L. V. V." of San Francisco, published in the July number of *Carpentry and Building*. Referring to the sketches, Fig. 1 is a plan of a conical roof intersecting with a plain roof of different pitch. In order to find the lengths and bevels of the rafters which intersect with the roof boards of the main building, let A B of Fig. 2 equal one-half the diameter of the tower. Draw the full circle with A B as a radius. Divide the half circle B C D to correspond to the number of rafters desired, as B O O O, &c. Extend D C to E. Draw G F at right angles to D E, and at any convenient hight from C. Now draw G H and FB perpendicular to G F. Let triangle E F G represent the pitch of the tower roof, and K K represent the pitch of the roof with which the tower intersects. Draw the perpendiculars shown at S S S and meeting the larger circle at O O O, which represent the center of the rafters. Draw lines from S S S to E. Now from where the lines S E intersect with K K produce the lines 3 3 3 3 parallel with G F and intersecting G E. Connect the points of intersection with K at the foot of K K. Now, measuring from E down to 2 2 2 2 and G will give the length of each rafter at B O O O and C. The side bevel for each rafter is found at 2 2 2 2, running to K.

Now, to find the bevel at the top edge of each rafter, begin with E as a center and E G as a radius, drawing the curve from G to L indefinitely. Transfer all the spaces of the half-circle D B C to the curve G L. The stretchout of the curve G L should be equal to the stretchout of D B C. Connect the points of division on G L with E. Now, with E as a center, draw the curves from 2 2 2 2, intersecting the radials from E, as shown. Trace a line through the points of intersection, as shown by L 6 G. Now, E L 6 G is the unfolding of the part of the tower roof which intersects with the main roof, the radials from E to the curve L G representing the center line of rafters. The bevel across the top edge for each rafter is found where the traced line L 6 G intersects the radials drawn from E. The curve D 4 C is the intersecting line of the tower roof with the main roof, as it should be shown on the plan. The curve D 8 C is the intersecting line as it should be drawn on the roof boards of the main roof. I think the manner of developing these curves will be easily understood by the reader by reference to the drawings.

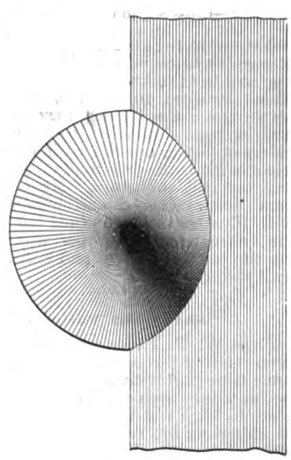


Fig. 1.—Plan of Conical Roof Intersecting a Plain Roof of Different Pitch.

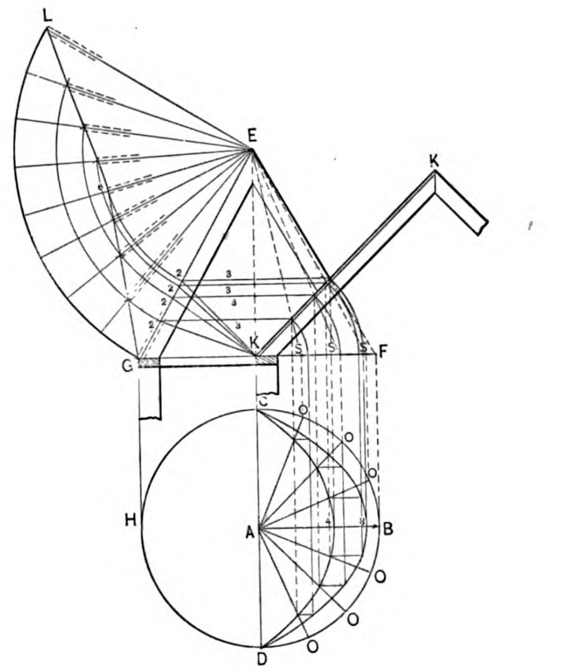
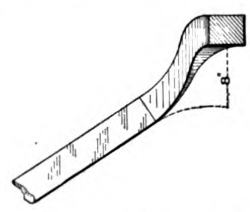


Fig. 2.—Diagram Showing Development of the Curves.

Problem in Roof Framing.—Sketches Submitted by "H. B.," Alfred Centre, N. Y.

Information Wanted on Handrailing Problem.

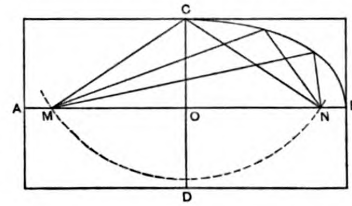
From CONSTANT READER, *Toronto, Canada.*—I am very much obliged to Morris Williams of Scranton, Pa., for his answer to my problem on handrailing, published in the June issue of *Carpentry and Building*. The answer, so far as I understand, is what I want, as the rail falls level at the newel post. The problems illustrated in Figs. 29 and 30 of Mr. Williams' series of articles would not, as I understand them, answer the purpose, as the upper tangents are on the pitch and would make the rail deeper at the newel post than the level rail on the landing. I may be wrong, but am open to correction, or perhaps I have been misunderstood. The rail should form an easing when in position, the same as the diagram. I saw a wreath like that shown in the sketch sent herewith rise 8 inches above the pitch of the rail and fall level at the newel post the same as I would like my wreath. I should be very glad indeed if Mr. Williams would give us a little more light upon the subject.



Sketch submitted by "Constant Reader."

Drawing an Ellipse.

From W. W. J., *New York City.*—In answer to the inquiry of "C. L. M." of Madera, Cal., published in the November issue, I would say that to draw an ellipse proceed as follows: Having given a rectangle, as shown in the sketch, draw the diameters A B and C D. Now, with C as a center and a radius equal to A O, which is one-half the diameter, describe an arc cutting A B at two points, as indicated by M and N. These are the focii. Now, with two pins at either end of a string, the latter being equal to A B, place them at M and N. With a pencil in the loop describe the curve as shown. This will be an ellipse inscribed in the rectangle required.



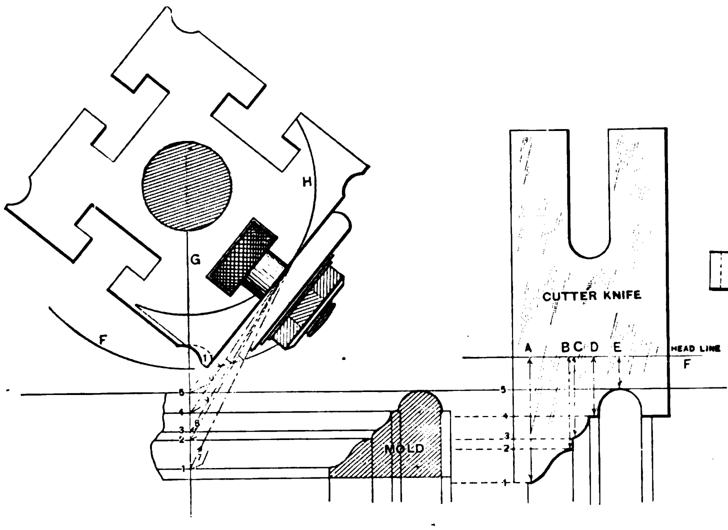
Method of Drawing an Ellipse Suggested by "W. W. J."

Obtaining Shape of Molding Cutters.

In one of our issues not many months since we presented a letter from a correspondent in which was given his method of obtaining the shape of molding cutters. This communication was reprinted in the November number of the *Woodworker* and a reader of that journal interested in the subject contributes the following remarks, illustrated with the diagram which is presented in connection herewith:

In the November number of the

WOODWORKER I notice an article from *Carpentry and Building*, which contains an illustration of how to obtain the shape of molding cutters, which in practical use would be a great thing if it were correct, but the correspondent gets his measurements all from one position of the cutters, which will not give it correctly. I furnish an illustration of that idea which I think will be more nearly correct. In the first place, long and short cutters never have the same position while making their cut: the longer the knife the more the tendency to scrape its way, unless you prevent that by bending your cutters a little, or using thick metal



Obtaining the Shape of Molding Cutters.

blocks between cutter and head, which is a good thing for deep cuts.

First, draw your head, as shown in illustration; then draw line G from center of arbor down; then draw lines 1, 2, 3, 4, 5, or whatever lines it takes to represent every member of the molding you wish to make. Then by drawing the tangent lines 7, 8, 9, 10, 11, and taking the exact distance on said line from one member line to the other, you get the exact distance to establish your cutter lines, as 1, 2, 3, 4, 5 in illustration, and of course lines A, B, C, D, E will always be the same on both molding and cutter; and by applying them as shown, in connection with lines 1, 2, 3, 4, 5, you can make an exact tracing of the cutter you want.

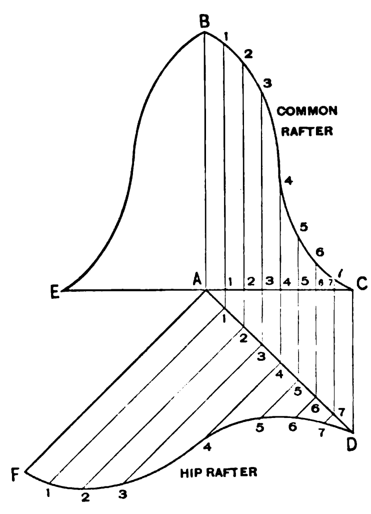
I claim that for exact work this method will never deceive you. Of course I do not use this rule in all cases, as it would take too much time, as I can shape a cutter by my eye that will come to the scratch almost every time; but when I saw that illustration from *Carpentry and Building*, I thought I could give a better one. I think the rule was established to get the shape of cutters for hand molding planes, where it would work like a charm, as such cutters stand in a fixed position. You can plainly see that the cutter shown would not make all of its members while in that position; the longest part would pass the intersection of lines F and G before the half-round portion would be near down to its cut.

Shingles in Washington.

From W. F. McQ., *Seattle, Wash.*—In the March issue reference is made to shingles coming from Whatcom, Ore. Allow me to make correction. Whatcom is in Whatcom County, Wash., about 70 miles north of Seattle. We are looking for all the credit that belongs to us for our cedar and other native woods; also our climate, which we think is unsurpassed. There are a number of cases of shingles being on for more than 25 years and not being worn more than 1/8 inch. Our output of shingles this year here will be something immense.

Finding the Curve of Hip or Angle Rafter.

From P. H. L., *Denver, Col.*—In the October issue of *Carpentry and Building* "A. J. G.," Duluth, Minn., asks for a simple and accurate rule for finding the curve of a hip or angle rafter. In reply, I submit the following remarks, covering the simplest and most accurate method of which I have knowledge. Referring to the diagram, let C E represent the width of the roof, A B its rise and A C the run of the common rafter. Now divide the line A C into as many parts as may be necessary, and at each of these points erect perpendiculars parallel to A B and cutting the curve line B C. Extend the lines also to the diagonal A D, which is

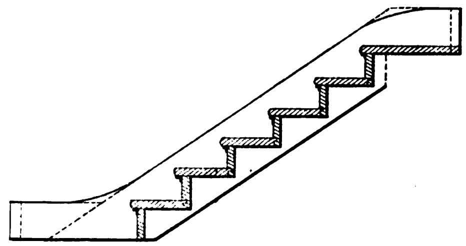


"P. H. L's" Method of Finding the Curve of a Hip or Angle Rafter.

the run of the hip rafter. Next, draw lines from each of these points on A D and at right angles to it. Now set off from A to F the distance A to B, as the rise of the hip is the same as the rise of the common rafter, also set off on the hip 1 1, 2 2, 3 3, 4 4, &c., corresponding to 1 1, 2 2, 3 3, 4 4, &c., on the common rafter. Join these points together, and the result is the correct shape of either hip or valley rafter.

Laying Out a Housed Stair String.

From R. B. G., *Warfel, Ohio.*—In reply to the inquiry of "L. V. V.," San Francisco, Cal., which appeared in the February number of *Carpentry and Building*, as to the laying out of a housed stair string, I would offer an answer which I trust will prove satisfactory. Make the upper edge of the nosing about 3½ or 4 inches from the upper edge of the stair string. The width of the latter will depend upon the hight of the riser and width of tread. Select a nice clear board of 1¾ inches thick, and taking the pitch board lay out the number of steps

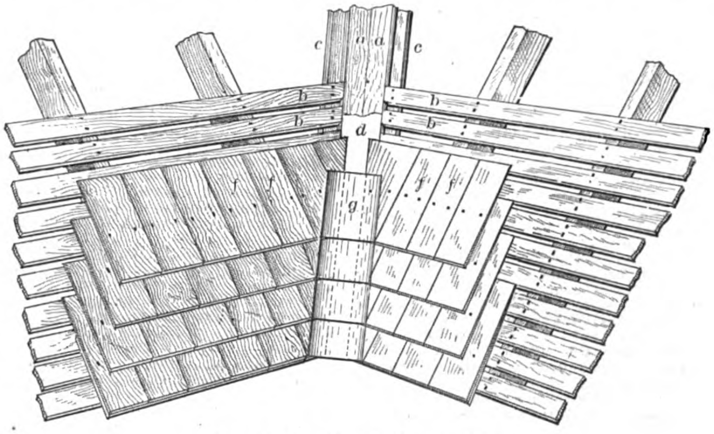


Method of Laying out a Housed Stair String Suggested by "R. B. G."

and risers in the stairs. Make a template of a width to equal the thickness of the step and the thickness to equal that of the riser. Proceed to lay out the housing above the steps already marked on the wall string. I usually employ the dividers in laying out the nosing and an expansive bit is the best tool to use in boring out the housings. Make them ⅝ inch deep. The sketch which I send will illustrate the method of making the easing and the proper way of joining the post at the top and bottom of the wall string.

Shingling Valleys.

From W. T. T., *Onaga, Kan.*—I have been reading *Carpentry and Building* for some time past with a great deal of interest, and have seen a number of good suggestions with regard to different methods of shingling hip roofs. Another subject which I consider of much interest to the carpenter is the shingling of valleys. When improperly constructed these are very hard to repair, while in the case of a hip a portion of the shingles may be removed without seriously damaging the roof. I take the liberty of sending a sketch showing the manner in which I shingle a valley. In the first place, I take two 1 x 6 sheeting boards, and, placing one on each side of the valley, nail them well to the top of the valley rafter and also to the common rafters. To the outer edge of the boards I nail a 1 x 3 inch strip on the under side to receive the ends of the sheeting boards, fitting these between the rafters. In the sketch which I send the valley boards are represented by the letters *a a*, the 3-inch strips by *c c* and the ends of the sheeting by *b b*. These boards give a solid surface on which to lay the tin. The latter is a strip 10 inches wide and runs the length of the valley. It is shown by the letter *d* in the sketch. I chalk this tin, leaving a space 2 inches wide at the top and 3 inches at the bottom. I then lay a course of shingles, letting them come to the valley and cutting them to fit the chalk line. I place them in such a way that the crown of the shingle runs with the roof. Over each course I lay a tin shingle 8 inches wide and 10 inches long, letting the butt of the tin shingle correspond with the butt of the common shingle. In the sketch the tin shingle is represented by *g* and the other shingles by *f f*. By this arrangement a space is left at the butt of each tin shingle the thickness of a common shingle. This space I close with common putty after the roof is finished. From an inspection of the sketch it will be seen that the method employed gives a double valley. Any water which may find its way through the tin shingles will be

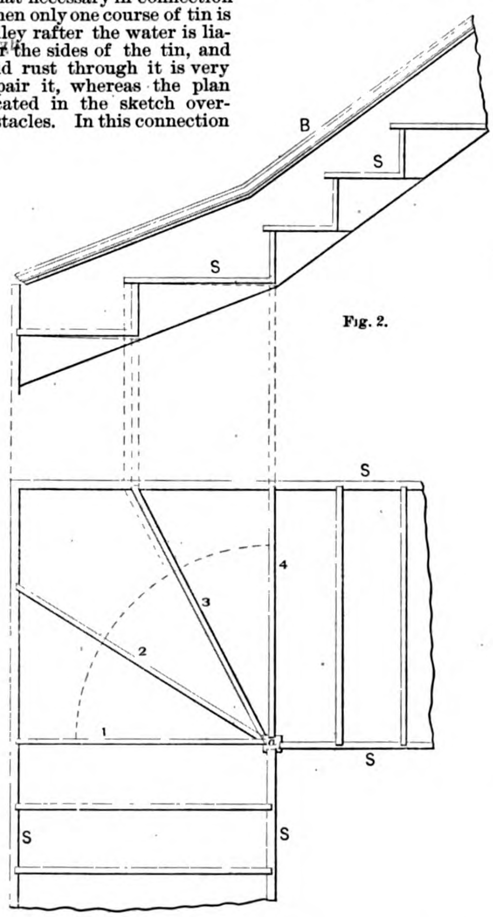


"*W. T. T.'s*" *Plan of Shingling Valleys.*

caught by the lower valley and carried down the roof. The valley must form a sort of gutter, catching the water, and therefore the work of shingling differs materially from that necessary in connection with a hip. When only one course of tin is laid on the valley rafter the water is liable to dash over the sides of the tin, and if a hole should rust through it is very difficult to repair it, whereas the plan which is indicated in the sketch overcomes these obstacles. In this connection I would remark that the lower tin should be well painted. I would like very much to hear from other readers of the paper on this subject.

Laying out Strings and Winders.

From F. J. C., *Allentown, Pa.*—In answer to the inquiry of "A. A. S.," Newark, N. J., which appeared in the August issue of *Carpentry and Building*, I send sketches of a winding stair with housed stringer, together with the method of laying them out. The winder is in the center of a flight of stairs, which, I imagine, is immaterial, as the method of laying them out is the same. Referring to the sketches, Fig. 1 represents a plan of winder; Fig. 2, the elevation of the rear stringer, while Fig. 3 is an elevation of the winding post. The width of the winding steps is the same when measured on a circle struck from the winding post *a*, Fig. 1. In the three sketches, the stringer is marked with the letter S. In Fig 3, P indicates the winding post, while B, in Fig. 2, represents the base molding. As the drawings so clearly indicate my method of construction, further explanation would appear to be unnecessary.



Laying Out Strings and Winders,—Fig. 1.—*Plan of Winder.—Fig.* 2.—*Elevation of Rear Stringer.*

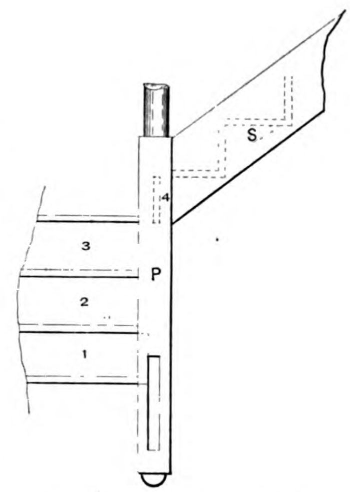


Fig. 3.—*Elevation of Winding Post.*

Framing a Tower Roof Intersecting with Main Roof.

From C. G., *New Haven, Conn.*—In the December issue of *Carpentry and Building* is an article on framing a tower roof intersecting a main roof, accompanied by a diagram, the author of which is "J. F. M.," Washington, D. C. I have been trying to work out a diagram according to the instructions given by him, but there are, it appears to me, some misstatements and also some important parts left out. It may be, however, only dullness on my part, which he can easily explain away. The subject is a good one, and I am anxious to understand it perfectly, so I will feel greatly indebted to the correspondent if he will make clear the parts I do not understand. In the first place he says, "draw plan of the tower rafters H A, H M and H N." I would like to ask why does he leave out the rafter H O? In the second place, he says, "then draw an elevation of the tower rafters O′ G, N′ G and B′ G." Again, why does he omit M′ G? In the next place, he says, "then with P′ H of the plan as a base and H′ G of the elevation as a hight, construct the triangle H P′ P." Does he not mean the triangle H P′ G′? In continuation the correspondent says, "from the point G′ set off the distance G′ T on the line G′ R." I would like to ask where he gets the distance G′ T? The correspondent then says, "repeat the operation with the hights I G and J G of the elevation over the lines P′ H and R′ H of the plan, setting off the distance G′ H in each case to obtain the foot bevel." I would like to ask how he gets the cross bevel for the foot, and also how he would obtain the bevels at the top, so that the rafters would all come together in the point? How would he ascertain the place on the main roof to set the tower rafters?

Cabinet Maker's Bench.

From A. W. S., *Shickshinny, Pa.*—Will some of the practical readers of the paper who have had experience give me a description and sketch of a convenient cabinetmaker's bench?

WHAT BUILDERS ARE DOING.

THERE IS COMPARATIVELY so little activity in the building trades throughout the country that most of the news afloat relates to the prospective amount of business for the coming year. The outlook generally seems to be good, and builders are preparing for an active season. The situation in the labor market seems to be peaceful and to promise but little disturbance. In some few of the cities there are mutterings of various kinds, but the general condition throughout the country, excepting, perhaps, one or two of the large centers, is unusually free from the element of disturbance. The work done by builders' organizations in several cities, notably Baltimore, Buffalo, Omaha and Boston, in behalf of better building laws, together with the fact that builders' exchanges are outgrowing the experimental stage, has worked much benefit to the trades and to the cities in which exchanges exist. Several other exchanges are now at work revising the building laws of their cities under the sanction of their city governments, and builders are becoming closer identified with the live interests of their cities than ever before. They are taking places among the branches of business upon which the promotion of public good formerly fell almost exclusively. The relationships with architects and owners are becoming more clearly defined, and the treatment of labor questions less personal and one-sided. Methods of competition among builders are growing better in cities where exchanges exist and where as a result of the exchange the builders come to know each other better and are enabled to take united action for the correction of improper practices. Specific cases are continually being shown in this department of *Carpentry and Building* of action taken by some organization for the benefit of its membership, and therefore for the benefit of the community in which it exists. Such examples are profitable demonstration to other builders of how much can be accomplished where all work together for the common good.

Buffalo, N. Y.

The regular quarterly meeting of the Builders' Association Exchange of Buffalo was held on February 27 with a full attendance. The report from the delegates who attended the convention of the National Association of Builders was received with approval and matters of routine were considered. The Planing Mill and Woodworkers' Association submitted a new grade for white pine lumber that had been established February 1, and asked its adoption by the exchange. It was decided to adopt the new grade. The exchange is considering the advisibility of advocating the system of estimating in vogue in England, called quantity surveying. A quantity surveyor makes the estimates for all branches of work involved in the drawings and specifications of a building, guaranteeing his figures to be correct. Upon the figures of the surveyor the contractors in each branch of the work base their bids. The adoption of this custom, it was maintained, would save the builders much time and insure perfect fairness, for all bids in a given branch of work would be based upon the quantities established by the surveyors. A committee was appointed to investigate the subject and report at the next meeting. The delegates who attended the convention were enthusiastic over the results of the meeting and the hospitality of the St. Louis builders.

Baltimore, Md.

At the meeting of the Builders' Exchange of Baltimore, held March 7, Israel Griffith, E. D. Miller and George Mann, delegates to the seventh annual convention, held at St. Louis February 14, 15 and 16, submitted their report. They stated that the National Association had an increased membership and that all branches of the trades were exhibiting increased interest in the organization.

The building season has opened up with excellent prospects for an active year, with but little indication of labor complications.

The quarterly meeting of the exchange was held March 7, with the usual accompaniment of a light lunch. All the members present expressed their confidence in an extremely busy season about to open with the return of good weather. All are making preparations for a large amount of work.

One of the large contracts to be undertaken this year is the tearing down of the building on the northeast corner of Charles and Lexington streets, to make room for the erection of the new Builders' Exchange. The building company who have this improvement in charge are a separate organization from the exchange, although composed of the same members.

It is their desire to get the work under way early this spring, so that the building will be completed and occupied by the time the National Builders' Association holds its convention in Baltimore in 1895. By that time the builders will have many handsome and costly specimens of their work to show the visitors about the city.

Boston, Mass.

The rebuilding of recently burned districts in Boston, in addition to the work already projected, will give the contractors plenty to do this season. Builders are now busily preparing for the year's work and expect that there will be greater freedom than for some years past from labor troubles of any kind. The bricklayers, stone masons and building laborers have settled the hours and wages for the season through the joint committee of employers and workmen, and there is little probability that serious disturbance will occur in other branches of the trade. The recent heavy fires in Boston have demonstrated the wisdom of the commission which framed the new building law adopted last year. When the recommendations of the commission were given to the Mayor he increased the area of floor space above 6000 square feet, which was recommended by the commission, and the law was so passed by the Legislature. The Mayor has now petitioned the Legislature to reduce floor areas in business buildings to 6000 square feet. That portion of the city which has suffered so terribly will, under the new law, be rebuilt under conditions which will be practically fire proof.

The lumber dealers are still at work trying to secure an amendment to the lien law which will permit the filing of a lien against an owner for building materials, without the necessity (which exists at present) of notifying the owner of intent to lien. A bill to this end was passed by the House of the Massachusetts Legislature in 1892, but failed to pass in the Senate. The Joint Committee of Arbitration of the Mason Builders' Association and the Bricklayers' Union on March 2 finally settled the schedule of wages and hours for 1893.

Following the example of the bricklayers, the stone masons have asked that eight hours constitute a day's work; if their request was granted they also offered to surrender one hour's pay.

This proposition was agreed to by the representatives of the Mason Builders' Association. The stone masons will work from 8 to 12 a.m., and from 1 to 5 p.m.

A further agreement was entered into by the joint committee that overtime work should be paid for at the rate of time and one-half; that Sunday and legal holiday work should be paid at the rate of double time, and that 42 cents per hour should be the rate of wages.

The representatives of the employers recommended that all journeyman stone masons join Union 1, and agreed to give union men the preference when hiring stone masons.

In view of the constant arising of issues between employer and employee entailing arbitration, it was decided that the Arbitration Committee of the Mason Builders' Association and the Stone Masons' Union shall hereafter meet once a month.

Cincinnati, Ohio.

On March 6 the Builders' Exchange of Cincinnati elected the following officers for the ensuing year: President, Henry E. Holtzinger; first vice-president, Samuel D. Tippett; second vice-president, Simon Strunk; secretary, Charles B. Stevenson; treasurer, J. Milton Blair; directors, L. B. Hancock, Lawrence Mendenhall, C. F. Bassett, John W. Robinson, A. T. Reid; Arbitration Committee, John H. Dorman, Dennis Flaherty, Amos Tooker, J. R. Hancock; Committee on Appeals, Frank S. Rohan, Edward Kress, E. W. Schroder, M. F. Collins, George Gleason, Samuel Dickson. Thos. D. Horner, the assistant secretary, was elected an honorary member, the second in the history of the organization. Treasurer Blair's report showed dues, $2920; initiations, $460; rents, $1990.80; sundries, $6780; total, $5438.30; disbursements, $4148.48; balance on hand March 1, 1893, $1289.82. The total membership is 202, and the daily average attendance has been 75.

An excellent and thoroughly enjoyed lunch was served in connection with the meeting. The very best of feeling prevailed during the election, notwithstanding that some of the votes were very close. The report from the delegates to the convention was presented at a previous meeting and was received with marked attention and interest. The city Board of Administration has set the builders all agog by the announcement that in future no street permit will be granted for storing materials entering into buildings in course of construction. A committee was appointed to investigate the matter. Reports from the real estate centers of the city indicate that there will be a steady and satisfactory amount of building done during the coming year. Considerable improvement is already projected in business property in the heart of the city, and plans are already being prepared for an unusual number of fine residences, both in the city and in the suburbs.

Chicago, Ill.

An agreement has been reached between the carpenters and contractors of Chicago, which dispels all possibility of a strike this year. It provides that all grievances on the part of employees or employers shall be referred to an arbitration committee, whose decision shall be final. It also provides for an eight-hour day, journeymen to receive 40 cents an hour, overtime and Sunday work to command extra pay. The agreement is to continue in force for a year. Sympathetic strikes for the protection of union principles are not barred, but the union carpenters agree to do all in their power to protect the property of their employers during such strike.

Double pay is to be given for Sunday work, pay days must be at least once in two weeks, and no apprentice is to be employed who is over 21 years of age. Piece work is prohibited.

Cleveland, Ohio.

The building trades of Cleveland seem to be in danger of a disturbance, as the carpenters and painters are trying to secure increased wages. The carpenters want an increase of from 5 to 8 cents per hour, in a nine-hour day. The price last year was 25 to 27½ cents per hour, and the men want 30 and 35 cents this year. It is expected that the contractors will decline to grant the increase. The carpenters' union is very strong, and although no intention to strike has been definitely stated, such an outcome is expected in the event of failure to obtain the increase by other means. The painters have asked for an increase in wages from 27½ cents per hour to 30 cents, and do not anticipate securing the advance without a struggle

Detroit, Mich.

The reports made by Superintendent Guiney of the Builders' and Traders' Exchange of work awarded to the members indicate that the Detroit builders are busy. There is nothing to indicate that the present prospect for a good year's business will not be fulfilled.

Grand Rapids, Mich.

The Builders' and Traders' Exchange of Grand Rapids held its first annual banquet on the evening of March 2. The affair was a brilliant success, and was thoroughly enjoyed by every person in attendance. The banquet room was beautifully decorated with flowers and greens, and the discussion of the *menu* was assisted by music. The toasts were happily responded to, and the utmost fraternal feeling prevailed. The Grand Rapids Exchange has been in existence, in its present condition, for about three years, and this banquet was the most pretentious affair in the way of social features that it has ever undertaken. The effect of such thoroughly enjoyable times tends to greatly strengthen the fellow-feeling among the members of any organization, and builders are no exception to the rule. The outlook for the coming building season in Grand Rapids is good.

Indianapolis, Ind.

The Indianapolis builders are looking forward to a good year in 1893, considerable work being already in sight. In order to ascertain the amount of building done in the city last year the Builders' Exchange appointed a committee to secure the information desired. The report of the committee was as follows:

Last year there were built 1644 one story residences, 63 one and one-half story residences, 584 two-story residences, 3 three-story residences (making a total of 2258 new dwellings), 939 additions, 304 business houses (from 1 to 6 stories high), 59 factories, 36 public buildings (including schoolhouses, churches and theaters), making a grand total of 3596, and costing $4,093,500; buildings requiring brick to the curb used 72,558,000 brick; brick to the business line, 322,657. There were 22,500 barrels of cement used, 3450 barrels of plaster, 133,625 feet of flue lining, 291 tons of white sand, and 498 tons of fire clay.

Lowell, Mass.

At a recent meeting of the Building Laborers' Union of Lowell it was unanimously voted to ask of the master builders doing business in Lowell an increase in wages to the amount of 3 cents per hour, to take effect on the 1st day of June. In accordance with this vote the union is sending circulars to the master builders making known its desires and soliciting an early reply.

Lynn, Mass.

It is the intention of the Master Builders' Association of Lynn to erect at an early date a building for its own use. The location has not been decided upon definitely, but it will probably be in the central part of the city. It will be a four-story granite and iron structure, with stores on the first floor, offices and exchange room for the association on the next, and office apartments on the other floors. The association has issued a building prospectus.

Louisville, Ky.

On February 21 a special meeting of the Builders' and Traders' Exchange of Louisville was held to hear James E. Gaither on the present mechanic's lien law and the necessity for an amendment looking more to the interests of the mechanic and the man who furnishes the material.

There were several objections to the present law, Mr. Gaither explained. One was that a mortgage took priority over the lien, thus causing in many cases a loss to the holders of the liens. The subsequent improvement of mortgaged property should be so regulated, he held, that the mechanic may receive remuneration for the material used and the labor employed. Mr. Gaither cited a number of such cases, showing that where a forced sale followed there was barely enough to satisfy the mortgage, completely shutting out the material man.

Mr. Gaither thought the lien holders should receive a pro rata, holding the improvements enhanced the value of the property. He thought there should be an amendment requiring the owner to pay for the material at the contract price before the contractor is paid.

After a general discussion the matter was referred back to the special committee to confer with Mr. Gaither and draw up a bill, including the amendments proposed, to report as soon as possible.

The Louisville Exchange is one of the most active in the National Association of Builders in watching and protecting the interests of its members and the fraternity at large, and is very energetic in the prosecution of any improvements that may be undertaken for the benefit of the builders. In the matter of establishing and maintaining just and honorable relationships between builders and architects and between builders themselves, this organization has been wonderfully successful.

Milwaukee, Wis.

The old quarters of the Builders' and Traders' Exchange of Milwaukee, at No. 1 Grand avenue, are vacant and the exchange is installed in its new rooms in its own handsome building at the corner of Grand avenue and Fifth street. The exchange is deserving of the greatest amount of praise for the business-like and successful manner in which it set about and carried to completion the erection of a home of its own that not only is a credit to the building fraternity, but is an ornament to the city. The building has been finished with all the modern appliances of a properly built office building; it occupies a prominent corner in the business part of the city and is peculiarly adapted to the needs of the builders. The erection and occupancy of such a building, in such a location, cannot help but bring the exchange, and the building interests generally, into a much more favorable and influential light before the public than they have ever occupied before. Nearly all the offices have been let to members and the building will be a paying investment from the start if looked at from a financial standpoint only. Arrangements have been made for a formal opening some time in April with a banquet and fitting dedicatory exercises.

New York City.

The following from the New York *Post* presents a phase of the building business in New York City which needs correction:

"The effect of strikes in the building trade during the last few years has been to cause a considerable loss to the stronger builders, while it has driven many weaker ones to the wall and added materially to the foreclosure sales of the real-estate market. At the present time the builder is practically at the mercy of the walking delegate, who is likely to order a strike on the slightest pretext. Many attempts have been made to relieve the builders from this tyranny, some of them so successfully that the trade is at the present time in better condition than for some years. The chief trouble lies in the fact that the builder, unless very wealthy, cannot enter into a combination to fight a strike.

"It may be safely said that the bulk of the building operations in this city, referring particularly to flats and dwellings, are carried on with borrowed capital. The builders, of course, have some means and have good credit, but advances are made to them as the building rises, so much at each tier of beams, until about 60 per cent. of the cost has been reached. If for any reason a strike is ordered just before a payment is due, the builder is unable to get his money, and, as his outstanding obligations are usually of a pressing kind, the only thing for him is to compromise. The loss so caused by these petty annoyances and the money needed to settle them often eat up entirely the builder's profit, and in consequence many West-side operators who have apparently been successful have withdrawn within the period mentioned until a change should be made."

The Mechanics' and Traders' Exchange is making preparations to move into its new quarters up-town early in April. It is anticipated that the change in location as well as the improvement in the facilities for transacting business will greatly benefit the exchange. Preparations are being made for a house warming upon the opening of the new rooms, an account of which will appear in the next number of this journal.

St. Louis, Mo.

The builders of St. Louis, through the Builders' Exchange, are as a class being more closely identified with the best interests of the city than ever before. Several matters affecting the welfare of the city upon which public action is necessary have been considered by the exchange recently, notably the Stone bill, which provides for the levying of taxes upon adjoining property for street improvements. The exchange is in excellent condition numerically and financially and the members covered themselves with glory by the hospitable manner in which they entertained the builders attending the recent convention of the National Association, held in their city.

Wilmington, Del.

The Builders' Exchange of Wilmington recently gave its first banquet to members and guests under the name of First Annual Dinner. The banquet room was tastefully decorated with flowers, and excellent music furnished as an aid to digestion. The toasts covered many phases of the builders' work and the speakers were most pleasing in their responses. W. H. Foulk, the secretary, in speaking to the toast "The Exchange," stated among other interesting facts in relation to its condition that the erection of a four-story building is one of the plans which the exchange will carry out in the near future. Over 100 persons were in attendance, and it was the general verdict that the first annual dinner was an unqualified success.

Worcester, Mass.

The Worcester builders who attended the National Convention at St. Louis reported a most enjoyable time. After the business of the convention was over the party returned by way of Chicago, Buffalo and Niagara Falls. At Chicago a visit was paid to the World's Fair grounds and to the prominent buildings in the city, and a day was spent at Buffalo and the Falls. The Buffalo builders had prepared an entertainment for them in the evening of the day spent in that city, but they were anxious to get home and were obliged to forego the courtesies offered.

Kansas City, Mo.

The Board of Directors of the Builders' and Traders' Exchange of Kansas City recently elected the following officers: W. W. Taylor, president; L. B. Cross, vice-president; C. L. McDonald, secretary, and A. J. McDonald, treasurer.

On March 2 an informal reception was tendered by the exchange to the architects, builders and supply dealers, and the event proved one of the pleasantest of the kind ever held in the city. The attendance was large, the speechmaking good and the supper and music thoroughly enjoyable. The builders were enthusiastic over the affair, and, although no extra solicitation has been made by the officers, 26 new applications for membership have been received since the reception. Some time ago another organization, called the Kansas City Contractors' Association, was organized by builders not connected with the Builders' and Traders' Exchange. The initiation fee was placed at $5 and the annual dues at $12. Each member will be subject to an additional assessment, not to exceed $10 per annum. The association will recognize all labor unions, with the proviso that they must be composed of practical mechanics.

Notes.

The new public building law bill introduced into the State Legislature of New York seems to have met with general approval. The law has been very carefully prepared, and is comprehensive and effective.

The building law commission appointed by the Mayor of Brooklyn has finally decided to adopt practically the same law which exists in New York City.

The Bridgeport, Conn., builders are still at work endeavoring to establish an exchange, and with increasing prospect of success. The Master Plumbers' Association has signified its willingness to help the matter along to the extent of its ability.

The Builders' Exchange of the city of Des Moines filed articles of incorporation February 25. The object of the exchange is to provide a place of meeting for its members, and for benefiting the builders, as well as promoting the general interests of the city. Charles Weitz, president; James Maine, first vice-president; S. T. Roberts, second vice-president; M. Z. Coleman, secretary; Charles M. Martin, treasurer. Headquarters of the exchange will be 509 Mulberry street.

The builders of Duluth, Minn., have formed a builders' exchange and elected B. F. Howard president and C. J. West secretary. About 30 contractors and building supply dealers have become members, and there is every indication that the new organization will be a permanent success.

A preliminary meeting looking toward the establishment of an exchange has been held by Jackson, Mich., builders. Mr. Robert Lake was chosen chairman and Mr. J. C. Riley secretary; the latter was requested to correspond with exchanges in other cities in search of information and advice. A selection of printed matter was forwarded to Mr. Riley by the secretary of the National Association of Builders, and it is expected that the new exchange is well on its feet.

The Mobile, Ala., builders organized themselves into an exchange recently, and the following officers were elected to serve the ensuing year: C. C. Griffin, president; Daniel Harrison, vice-president; N. K. Ludlow, secretary; N. Phelan, treasurer. The officers were made a committee on constitution and by-laws, which they will prepare and submit to the exchange for adoption or amendment. The committee are also charged with the selection of a suitable place for the exchange.

The employing carpenters of Madison, Wis., met about the 1st of March to consider the requests of the Carpenter's Union. The workmen desire the establishment of a minimum wage scale, a three-year term for apprentices; that they shall not be required to work with non-union men, and that any man, by reason of old age, not capable of earning the minimum wages shall be allowed to work for such wages as his employer shall deem him capable of earning. These propositions the union is willing to submit to arbitration.

The Builders' Exchange of New Haven is preparing to hold its annual banquet some time during the month of April. The following have been appointed a committee of arrangements representing the various trades: E. H. Sperry, David H. Clark, S. E. Dibble, Frank L. Stiles, James F. Goodwin, William Kaehrle, John E. Bassett, A. J. Harmount, J. Gibbs Smith.

The Builders' Exchange of New Bedford will remove from the present headquarters in Liberty Hall Building to the Sherman Building, opposite.

The Builders' and Traders' Exchange of Newark recently held its annual banquet, which was an exceedingly pleasant affair. The officers of the exchange are: President, Hugh Kinnard; vice-president, Henry J. Schradel; treasurer, George S. Clark; secretary, John J. McGrath; managers, Henry Dickson, Thomas Boyle, J. H. Van Houten, George H. Kingsland, J. C. Mundy, Edwin Ball and F. K. Pruden.

Manual training was introduced into the schools of Norristown, Pa., early in February, with full facilities for instruction in the handling of tools. For boys the training only covers wood working as yet, but all phases of this department of manual instruction are included in the course, beginning with the coarsest kind of work and ending with carving. The schools are thoroughly equipped with all necessary tools and appliances. In the girls' department instruction is given in mechanical drawing and clay modeling.

The contracting builders of Oakland, Cal., are in trouble because of a lack of some well-defined code of practice for the government of the conditions of estimating for work. The Board of Public Works called for bids on two new schoolhouses and desired that bids should be submitted in five parts. The carpenters refused to bid unless the estimates could be made up in two parts, and the other contractors want the competition to stand as it is. The establishment by the Builders' Exchange of an equitable code of practice would avoid such complications.

The Builders' Exchange of Pittsburgh is talking of erecting a building of its own to cost in the vicinity of $300,000. An exhibit of builders' supplies is also planned. The exchange is endeavoring to secure the establishment of a trade school in the Reform School at Morgauza. The managers of the Reform School have asked the Legislature for an appropriation to this end, and the exchange is seeking to aid this movement. A committee has been appointed to appear before the Legislature and advocate the necessary appropriation.

The experiment of the eight-hour day, or rather of making 48 hours a week's work, is now being tried in one of the largest iron works in England, the Salford Works, at Salford, which is a suburb of Manchester. The working hours at these works have heretofore been 53 per week, and the reduction is made on an understanding with the men that the output of the works shall not be diminished by this shortening of the hours. The men are to be punctual and energetic, and to save the owners from loss because of this shortening of the hours by greater industry. There is to be no reduction of wages, and if the end of a year finds the experiment successful, the 48-hour week will be the permanent arrangement.

The bricklayers of Springfield want eight hours and $3.75 per day, and say that employers can have but one apprentice in three years. The contractors are opposed to working eight hours, but claim that they are paying good bricklayers more than the union price now. A strike is feared, and the employers are taking steps to form an organization for mutual protection.

A builders' exchange has been established in South Bend, Ind., upon lines advocated by the National Association of Builders, with the following officers: C. Fassnacht, president; John Yants, Theo. Knoblock, vice-presidents; Ira Miller, secretary; George Knoblock, financial secretary; D. B. Creviston, treasurer; directors, George Hepler, William Downes, David H. Kiefer, Martin Roach, T. F. Berkley, J. C. Lauber, C. Fassnacht, John Yant, Theo. Knoblock; Committee of Arbitration, Isaac Fry, N. May, James Aslin, T. F. Berkley, A. Wenger, John Weaver, John Meyer, George Knoblock, A. Werst; Board of Appeals, Fred. T. Kemble, Ed. Phillips, I. A. Sibley, Jos. N. Calvert, H. Mitchell, Henry Eckler, C. Fassnacht, John Yant, Theo. Knoblock. Convenient rooms have been secured, and a permanent secretary will look after the affairs of the institution. The 'change hour is from 11 to 12 o'clock a. m.

The builders of Salt Lake City have formed an organization under the name of the Master Builders' and Traders' Association, with the following officers: S. W. Morrison, president; M. J. McDermott, vice-president; A. B. Gibson, secretary; and H. E. Redfield, treasurer. The directors elected are divided into two classes, a portion to serve one year and a portion two years. Those of the one-year term are A. C. Schumacker, W. S Simpkins, Daniel Fry. Those for two years are S. C. Sherrell, A. M. Grant and Alex McDonald. The object of the organization is general and broad, seeking to bind contractor and builder closer together in their relations, and establish uniform systems of work and harmony in action. The membership fee has been fixed at $25, and an earnest endeavor will be made to get every contractor in the city into the association. This also carries with it one share of stock (the association is to be incorporated) in addition, at an added cost of $25. At the expiration of thirty days the membership fee will be raised to $50, which, with the share of stock, will make a membership after that time represent an outlay of $75.

The Builders' Exchange of Toledo has elected the following offices for the current year: President, J. C. Romies; first vice-president, Henry Brown; second vice-president, W. J. Spear; secretary, Ed. J. Wels; assistant secretary, P. J. Kranz; treasurer, John W. Lee. The annual banquet recently given by the exchange was a brilliant success. The Toledo carpenters are asking for more pay and the contractors are divided as to granting the same. A strike may result.

The Builders' Exchange of Washington at its recent annual meeting elected the following officers: President, H. A. Jones; vice-presidents, Thomas Norwood and Alfred Stephan; secretary, Thomas J. King; treasurer, W. C. Morrison; directors, James Nolan, A. L. Phillips, Michael Shea, J. R. Galloway, T. V. Noonan, J. W. Thomas, L. A. Littlefield, Robert Clarkson, Thomas P. Stephenson, C. A. Langley, John T. Lynch, and W. O. Connor. After the balloting had concluded a banquet was enjoyed in the main hall.

Fire-Proof Buildings.

The following letter, from the pen of an observing resident of the Hub, appeared in a recent issue of the Boston *Herald:* "Why is it that in London, England, conflagrations of a like magnitude to our recent fire, accompanied by a similar distressing loss of life, never occur? The reasons are not many nor far to seek. Buildings there are not carried to an excessive hight; they have steeply pitched roofs, covered with incombustible material—tile or slate; the party walls are carried up 3 feet above the plane of the roof, and large undivided floor areas are not permitted by the 'Metropolitan Building act,' which is rigidly enforced. Large and important buildings are so built as to be actually, not nominally, fire proof.

"I have had extensive experience in the construction of fire proof buildings in London. I will instance one, a bank in Charing Cross, built for Messrs. Cox & Co., costing, without fittings, $200,000. This is a building of five stories in hight above the basement, 60 feet in frontage and 80 feet in depth, inclosed on three sides by other buildings. Of the exterior walls, that facing Charing Cross is of brick, faced with stone; the others are of brick. The floors and roof are constructed with iron beams and joists, filled in solid with fire-proof material and cased in plaster. The internal partitions, where not of brick, are fire proofed and covered with asbestos plaster. The stairs are of concrete, cased with stone. The windows have coiling steel external shutters. The surfaces of floors are laid with solid wood blocks, bedded and jointed in boiling pitch.

"The topmost story is used as a storage for the old books and papers of the firm, which has existed over two centuries. The lease of the old premises having expired before the new building was finished, it was necessary to store the old papers, etc., in the latter before the whole of the floor of the top story was laid. They were, therefore, piled on that part of the floor that was completed. In laying the remainder of the floor a pot containing boiling pitch was accidentally overturned. The pitch caught fire, ran into and ignited the papers, and the whole room was soon filled with fire, which burned furiously. When got under control it was found that, though the greater part of the contents of the room were consumed, no injury was caused to the fabric, proving the efficiency of the construction used.

"Consider the saving in life and property the adoption of similar construction would effect here! How it would benefit owners and underwriters, and lessen the work of the fire department!"

Home Versus House Building.

Home building is sometimes confused with house building, says an exchange. We sometimes see advertisements of books, "Beautiful homes, and how to build them." One involves a mechanical process, and in the other there is a great deal that is personal. Nevertheless there may be more home feeling, more home spirit, more opportunity for enjoyment in one kind of a house than another. There are those who can make a home in any kind of a building.

Sir Walter Scott was a great home builder. His first home was in an old tower. There he lived with his family, his dogs and his work. As his resources increased he built the castle at Abbotsford, and the world has found him equal to the emergency in making a home out of a castle, a large undertaking. The history of the house building of any State is about the same. In its early settlement there are cabins of one, two and three rooms; a big fire place where the wood is so abundant. Adjoining the main rooms are others, which receive their heat directly from the living room.

In the course of time, as the State becomes wealthier, they build big houses, and often everything is sacrificed to their largeness. The new, large white house in a new State, with its cold, wintry bedrooms, is barren indeed as compared with the snug, comfortable, picturesque structures of the earlier period. It is always true that people who live in a house that is too small for them afterward build, if at all, one that is too large. This is a history of individual building, and it is a history of the building of our country.

Finest Mansion in Great Britain.

The rebuilding of Mount Stuart, Lord Bute's palace, near Rothesay, Scotland, makes it the most magnificent mansion in Great Britain, says the St. Louis *Republic.* The base of the building covers a fraction more than an acre, and is built in the mediæval Gothic style of the thirteenth century. The walls, turrets and balconies are built of the beautiful variegated granites and sandstones from Kirkcudbrightshire, the floors and arches being of clouded Italian marbles. The main hall is constructed entirely of alabaster, the supports being columns of oxidized brass and bronze. The gallery and grand staircase are of marbles brought from Cicily and Carrara. The drawing rooms are paneled with alternate strips of cherry, walnut and ebony, all from America. The main dining room, which was built so as to accommodate 280 guests, is finished after the style of the drawing rooms with the exception of relief figures and mosaics of fish, game, animals, &c. The ceilings and chimney pieces of all these rooms are most artistic, and so also are the windows, mantels and doors, the work of which is extremely elaborate. There are three immense libraries and a billiard room, all with carved stone fire places of antique design. In one wing are the Turkish and swimming baths, large conservatories, aviaries, aquariums, &c. The whole palace is heated throughout with steam and hot-water pipes and lighted both by gas and by electricity. The pictures in the galleries alone are worth $500,000, and the books in the libraries as much more. The building, decorating and furnishing of this palace, which is without doubt the finest private residence on the globe, entailed an outlay of £1,000,000, nearly $5,000,000.

Finishing Wood Work.

A method of finishing doors and other wood work that appears to be coming into favor is thus described by one of our exchanges: "The doors are of hard wood and are filled with very dark filler; they are then polished in wax, when they present a semi-dull appearance that is somewhat pleasing. Ornamental beaded nails made of white metal are then driven in the doors at regular intervals, but in a way to form a somewhat elaborate design of scrolls. Each of the doors leading into the same hall is finished in different designs as far as the nails are concerned, but the prevailing color is the same throughout. The effect is very good."

FRENCH VENEERING.—III.

By HENRY DAUBE

IN PRECEDING ARTICLES on this subject in woodworking, I explained in detail the best methods now in use for veneering flat and curved work. I will now take up the veneering of cylinders and truncated cones.

Suppose we are required to veneer some columns about 3 inches in diameter, the cores to be of pine, this work will have to be treated in the same manner as the coves, and quarter rounds of the preceding articles; in so far as the making of joints, and the sponging of veneer is concerned, the ultimate success of the operation depends entirely on the manipulation of the cauls. There are two ways of doing the work, one being the old method and the other the new. The old method is mentioned here simply to show the difference between it and the new.

The diameter of the column being known, it is easy to calculate the required size of veneer to pass around the pine core. The rule is to multiply the diameter in inches by $3\frac{1}{7}$, or more correctly 3.1416. The product will be the circumference of the column. The veneer should be cut to the exact size, and must have both sides parallel, to insure their meeting in close joint. A piece of paper passed around the core will also answer very well for getting the right size of veneer.

The veneer should also be a little longer than the length of the column to allow for trimming down. Having cut the veneer to the proper size and shape, we now give attention to the cauls. The old method of veneering columns was to scoop out two pieces of pine wood to fit exactly around half of the column. They were then hinged together, as shown in Fig. 11. These cauls were heated in the usual manner in a hot box, and treated with wax. A space of about 1 inch was left at the top edge of the cauls to allow the glue to escape freely. The columns were then given a coat of glue and the veneer passed around them, and the whole was screwed in between the cauls. After the work has cooled off sufficiently the columns are then taken out of the cauls, and the two edges of the veneer, which are to form the joint, are screwed down between two special cauls, A and B, shown in Fig. 12. Only one of these cauls is heated, the other simply acting as a protection from the hand screws. The objection to this method is, that there is generally a discrepancy existing between the size of the column and the size of the caul, thereby causing an unequal pressure throughout, and resulting in blistered surfaces.

So much for the old method. The new method of veneering columns is to make the cauls of tin, and have two cleats fastened to each end, as a purchase for the hand screws, as shown in Fig. 13, which illustrates one of these improved cauls. These should be about 1 inch less on the circumference to allow the glue to escape freely.

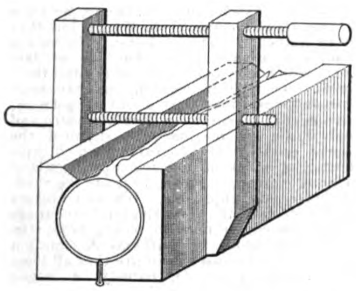


Fig. 11.—Cauls for Veneering Columns by the Old Method.

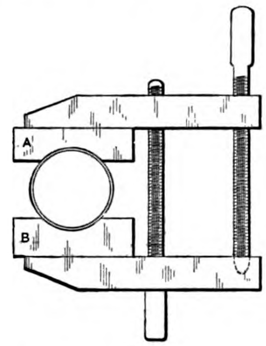


Fig. 12.—Special Cauls for Use in Forming the Joint.

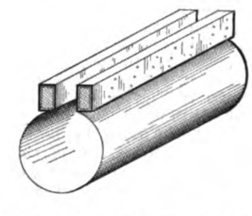


Fig. 13.—Cauls made of Tin with Wooden Cleats.

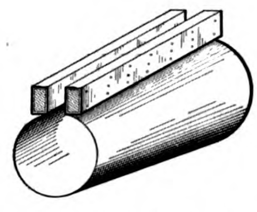


Fig. 15.—Caul for Use in Veneering Tapering Columns.

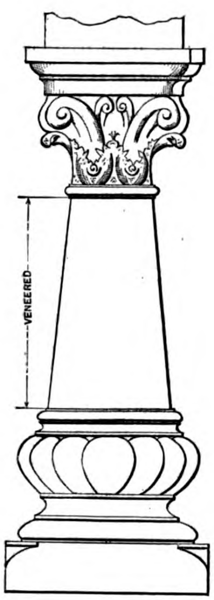


Fig. 14.—Veneered Tapering Column.

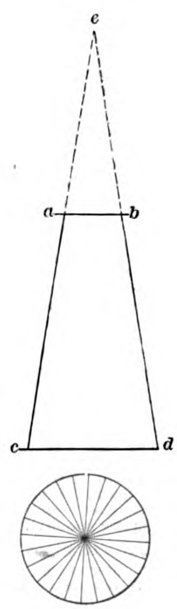


Fig. 16.—Plan and Elevation of Tapering Column.

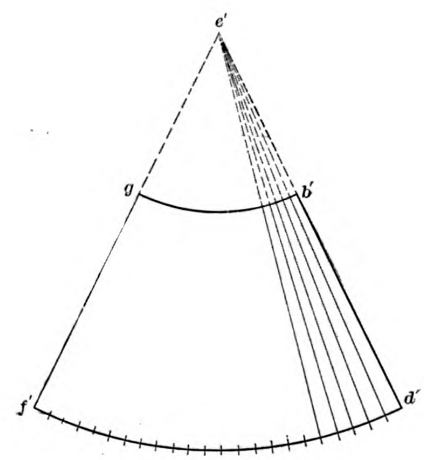


Fig. 17.—Development of the Pattern.

French Veneering.—Illustrations of Tapering Columnar Work.

To veneer with these cauls apply the glue to the column and quickly pass the veneer around, not neglecting, however, to sponge the veneer before doing so. After screwing together with hand screws put into the hot box to warm up the stiffened glue. Allow the work to remain long enough in the box to get thoroughly warm, then take it out, and giving the screws an additional turn, the work can be laid aside until the glue has cooled and set. After this we may unscrew the tin caul and bring the two ends together in a joint by means of the two pieces, A and B. The advantage of the improved caul is readily seen, for, as the screws are tightened the pressure is increased uniformly on all sides, insuring a good job. It is also obvious that the tin caul can be used for veneering various sizes of columns when these do not differ more than one-quarter to one-half inch in diameter. The tin cauls can also be used advantageously for veneering tapering columns, such as are shown in Fig. 14, the process being carried on precisely the same as before. Fig. 15 illustrates the kind of caul to be used in such cases. Any mechanic who will use these simple rules when doing any of this work will have no trouble in turning out a first-class job.

In Figs. 16 and 17 is shown the method employed in developing the surface of the tapering column. In Fig. 16 the tapering column is shown in elevation and plan. To develop the pattern prolong the sides *c*, *a* and *d*, *b*, until they meet in *e*, then with a radius equal to *e*, *d*, and *e*, *b*, respectively, and with any point as *e*′, describe the two arcs *d*′ *f*, and *b*′ *g*′ as shown in Fig. 17. Now divide the circle shown in Fig. 16, which is a plan view of the column, into as many parts as are convenient, the more the better, and, with a pair of dividers, lay off these distances on the arc *d*′ *f*, taking care to lay off the same number of spaces as those into which the circle is divided. This done, join the point *e*″ with *f* and *d*′, and the result is the pattern for the veneer which must pass around the tapering column. The same principle is employed in making the tin cone shown in Fig. 15.

Administration of Exchanges.

The following report, presented at the recent convention of the National Association of Builders by the Master Builders' Association of Boston contains so many valuable suggestions to organizations of builders, both in the work accomplished by this exchange and in the questions asked, that it is given practically in full for the benefit of organizations of builders, in and out of the National Association.

REPORT OF THE MASTER BUILDERS' ASSOCIATION OF BOSTON.

ST. LOUIS, MO., February 14, 1893.

To the Seventh Annual Convention of the National Association of Builders:

In response to the request of the Executive Committee of the National Association, the Boston Exchange offers the following statement of such of its acts and failures to act during the last year as may be interesting and instructive to the delegates to this convention.

It also begs the counsel and advice of the National Association in certain matters of administration and practice where it fails to see clearly the best and safest road to success.

It also offers for the consideration of this convention certain suggestions as to the character of membership in filial bodies, and the advisability of requiring a certain standard therein as a basis for eligibility to membership in the National.

It is not supposed by our exchange that the National Association desires in these reports from filial bodies that the state of business, the relative prices obtained for work, or other items of that nature be particularly recited—those, while interesting, are not of so much concern as matters of administration, difficulties of management, success or failure in carrying out recommendations of the National Association, defects found in such recommendations, and suggestions for better and more effective work by the National, by and through which better and more effective as well as uniform action may result in the local bodies.

REVISION OF BY-LAWS.

One of the most important accomplishments of the year in our exchange has been a very thorough revision of our by-laws, by which we feel that we have secured many valuable improvements over our old form. In the first place, our by-laws recognize the fact that a select membership is of the largest importance to the strength of the association, and we therefore announce as our first principle that skill in the trade represented, honesty in business management, and responsible standing generally must be possessions of an applicant to warrant his admission. We realize that by so doing we have defeated possibility for great numbers, but we believe we have gained infinitely more by establishing a grade of eligibility which makes those who are members value their membership, and makes those who are not members anxious to be recognized as belonging to an organization which represents so high a standard.

SOME PROVISIONS OF BY-LAWS.

Our by-laws provide for keeping the membership wholesome by several methods. One by making failure in business terminate membership. This to some may seem a hardship, but it is not more so than circumstances would seem to warrant, for, of course, the welfare of the association is of first importance, and with that view the individual's interest must be secondary. By failure the relation of the individual is so changed that his continuance in membership should depend upon the circumstances preceding, connected with and following the failure, and we have conceived that the best way is to have the by-laws work termination, and then if the party desires to again become a member he is not debarred from application, the consideration of which will enable us to make investigation as to the circumstances connected with the failure and decide whether the interests of the association would be prejudiced by his re-admission. This method avoids the embarrassment of making investigation while the failed party is in membership, with the possibility of having to discipline him by expulsion, suspension or other penalty. If the party has opportunity for application he is not injured, and if exonerated from wrong-doing by re-admission he is in practically much better relation to the public and to his fellow-builders than if he remained in possession of membership with his reputation under a cloud.

IMPROPER PRACTICES.

Another method of keeping the whole membership up to the mark is by the provision for complaint of one member against another for improper practices. Under our revision such complaints can be entered by one member (it formerly provided that five members should join)—and we now bring the complaint for hearing before the whole body, when formerly we decided such complaints before the directors only. This we discovered to be illegal. This opportunity for complaint acts as a wholesome restraint, inducing members to be circumspect as to their methods and practices. It was contemplated at one time making a further provision, so that architects or owners could have opportunity for complaint, but it was finally concluded that unless equal opportunity be granted by the architects for complaints against them, such privilege granted by us would be entirely improper.

USE OF BY-LAWS.

The next important procedure on which you may be glad to be informed was the use to which, during the year, we have put these opportunities of our by-laws. In the matter of admissions we have to report that 26 applications for membership have been considered during the year, 17 of which were accepted and 9 rejected; 25 applications for exchange privileges have been considered, 23 of which have been accepted and 2 rejected.

Three complaints have been made and tried, in two of which the parties complained of were exonerated, but in the other the member was suspended for three months. The complaint in this latter case was an improper use of a sub-bid by a general contractor.

We put the Australian system of voting in operation at our election in December, with the result of having but seven scattering votes in opposition to the regular nominations.

FINANCIAL CONDITION.

The next most interesting matter for your information is our financial condition and the state of our building enterprise. As one of the principal foundation stones of our financial prosperity, we may probably refer again, as we did last year, to our annual dues or assessment. This remains as it has for several years at the very low sum of $100, and we never mean to have it reduced below that figure. No organization which gives its members as much accommodation and opportunity as ours can afford to do it for less, and we are happy to say that none of our members complain; on the contrary, they would think it undignified to pay less, for they realize that they are getting more than their money's worth.

The possession of the fund created by our annual dues as aforesaid has made it possible for us to live well and have a good surplus which we have transferred to our Construction and Building Account. The Building account in its time has been most satisfactory, showing a handsome surplus above expenses. We have reduced our mortgage and our floating debt out of our earnings during the year and up to the 1st of January, 1893, in the total sum of $20,000. And our total surplus up to January 1, 1893, over and above our capital stock, reckoning our property at no advance over the net cost and in some particulars at 50% less than cost, is not less than $48,900, an increase over our exhibit of last year of almost $19,000.

BOARD OF APPEAL.

Our Association has during the year participated in the administration of the building laws of our city. Under the statute which revised our law governing the erection of buildings it was provided that a Board of Appeal should be set up, one member of which should be selected by the Master Builders' Association, one member by the Society of Architects and one member by the Mayor. This Board has been filled in the manner provided and has had very many references during the year. This has tended to strengthen the hands of the department, and as far as we are concerned has placed our association in a very proper and decidedly influential relation to this important branch of municipal administration.

ENTERTAINMENT.

In the line of social entertainments, we have but one special occasion to report, but that was an eminently successful one. We held a reception and smoker on the 11th of last month, which was open to members and their friends. The affair was in our exchange rooms and was attended by about 500 persons. Instrumental music by a fine orchestra and vocal music by a quartette supplied the æsthetic part of the programme which, with a bountiful collation and accompaniments of a vinous character served to make the evening thoroughly enjoyable. We had visitors from several of the New England exchanges and all present seemed to secure from the occasion that which the National Association has so often expressed a desire that all local bodies should cultivate, namely, a larger social and friendly relationship.

ARBITRATION.

The plan of arbitration by and through which the National Association hopes to see the questions pending between workmen and employers peacefully settled has only been put in operation by one branch or trade among us, namely, the mason builders. We are at fault in not making more serious effort in this direction by at least advising a consideration of the arguments of the National Association by each trade represented in our exchange.

COUNSEL SOLICITED.

As stated at the opening of our report, we beg counsel and advice on one or two subjects.

We have in times past failed most completely in our efforts to get the architects to co-operate with us. In setting up these codes of practice, is it the opinion of our fellow-builders in other localities that we had better establish them without reference to the architects, as far as consultation is concerned, and then serve them with copies and a notice that these methods must prevail?

In the matter of setting up a Board of Adjustment, to which matters in dispute between architects and builders might be referred, such as interpretation of drawings, meaning of ambiguous specifications, &c., a board might be created to consist of an equal number of architects and builders appointed by their respective organizations.

Is it wise or worth while for us to protect in the name of the exchange against such practice as the following? The United States Government asks for bids for painting in our post office. Two bidders only respond, and the amounts of their bids are published in the newspapers. Government informs the bidders that the competition is not satisfactory and without changing the work in any particular again advertises result; a man who did not estimate before is the low bidder. A bit of information here for the benefit of all, and to show the necessity of using the Uniform Contract, which definitely fixes that the architect is, for the purposes of the work in question, the agent of the owner. One of our members has recently attempted through the courts to collect from the owner money due for work done under written order from the architect in charge of the work, and each court to which he has carried it (and he has carried it as far as possible) has decided that he cannot collect.

The suggestion we have to offer for the consideration and possible action of the National Association, either in this convention or some future one, is this:

Would it not be proper and wise for the National Association to require of its filial bodies, or those who desire to be affiliated, that they maintain a high standard in their membership, by strict examination by proper committees into the skill, honesty and responsibility of applicants—that they must not if they desire to be associated in this National body, allow themselves to admit freely all who may desire admission, irrespective of merit, thus hazarding the interests of the National Association as well as their own. Would it not also be proper for the National to fix a minimum of yearly dues as well as a membership for local bodies to be below, which would be unsafe for permanency of the body and therefore work ineligibility to National affiliation?

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers.

President, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.
First Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Second Vice-President, CHARLES A. RUPP, Builders' Association Exchange, Buffalo, N. Y.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago, Ill.

DIRECTORS.

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Boston, Mass.........JAMES I. WINGATE.
Buffalo, N. Y.........H. C. HARROWER.
Chicago...............JOHN RAWLE.
Cincinnati............L. B. HANCOCK.
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Philadelphia..........STACY REEVES.
Providence............WM. W. BATCHELDER.
Rochester.............H. H. EDGERTON.
St. Louis.............CHAS. B. MCCORMACK.
St. Paul..............JOHN W. MAKINSON.
Saginaw...............JOHN H. QUALLMAN.
Wilmington............A. S. REED.
Worcester.............O. S. KENDALL.

Announcement.

The names of the members of the standing committees of the National Association will be given in the next issue of *Carpentry and Building*, together with the names of directors from cities not represented at the recent convention.

Uniformity in Estimating.

The secretary of the National Association of Builders is in receipt of frequent inquiries as to the best method for securing the establishment of uniform prices in estimating for work. The request for this information is, perhaps, most frequently made by the members of new organizations of contractors who desire to arrive at an ultimate result, with an evident lack of recognition of the means necessary to achieve that result. It appears to be the belief of many contractors that the establishment and maintenance of uniform prices in estimating is a proper and possible end to be accomplished. Although such may, however, be the fact, experiments undertaken in this direction, and examples that have been thus afforded, have almost universally demonstated that there has been something wrong in the manner of dealing with the subject. The matter has apparently, in these cases, been approached wrong end first, and the end has been sought without first perfecting the conditions upon which the end is dependent. In the experience of such of the filial bodies of the National Association as have undertaken to secure greater equality in bidding, among the contractors in their several cities, it has first appeared necessary to correct and improve the conditions under which bids were submitted, and to establish a recognized code of practice, to be rigidly followed by all members of the organization seeking to effect the desired change. The effect of establishing and conducting business under a unanimously adopted code of practice has been to secure so great a degree of equality among contractors that the fixing of definite prices for certain kinds of work has been deemed not only unwise, but impractical.

UNIFORMITY IN METHODS.

Uniformity in methods of estimating, and in the manner of the treatment of bids after submitted, which is best secured by uniform observance of some mutually satisfactory code of practice, establishes an equality among competitors; which is, in reality, the end desired by those who advocate fixed prices. Every community of builders possesses within itself the means of overcoming unequal and wrong practices that have grown into existence through years of neglect; for the recognition of the fact that evils exist provides the means for their eradication. In order to assist the builders of the country, and also to take away the experimental character of codes prepared by builders inexperienced in this kind of work, the National Association has prepared a "Code of Practice," which it recommends to all, and which is based upon years of experience of the fraternity at large throughout the country. The secretary of the National Association will gladly supply any builder who may desire the same with a copy of this code.

Indications.

The reports from filial bodies, presented to the seventh annual convention in St. Louis, indicate a great deal of intelligent progress on the part of a large majority of the exchanges. Various subjects advocated by the National Association have been understandingly applied to the specific needs of the exchanges, and the action taken upon questions of internal management, administration, &c., shows plainly that the builders are becoming better acquainted with the possibilities for good which inherently exist in a proper organization. The various recommendations of the National Association are beginning to bear fruit, and in such a way that there is no mistaking the cause. The result of the adoption of any of these recommendations by any of the filial exchanges has been made public, both by letter and through these columns, and other associations have by these means been placed in possession of the results that have followed such adoption. The annual conventions provide opportunity for builders from all over the country to gather together and discuss methods for improving their common interests. The successful examples that have been set by exchanges which followed the advice of the National Association have helped other exchanges to follow in their footsteps, until all are enabled, as was the case at the recent convention, to report progress upon some line or other. All along the line the exchanges have progressed, some in one direction and some in another, but out of the whole a composite of progress is obtained which shows beyond question that the builders of the country are better able to-day to deal understandingly with the principles which govern the transaction of their business, their relationship to their workmen, to each other, and to the public, than they ever were before. Exchanges are to-day adopting preventive measures where in the past only opposition and force were employed. Equitable relationships between contractors are being established by means of carefully observed codes of practice; arbitration is being used where in the past only the law was invoked as an adjuster of differences; also arbitration is being used to the best effect with the workmen, and the actual value of its use is demonstrating itself. The conditions of competition are improving in cities where a well-conducted exchange exists, and the builders generally are beginning to recognize their own importance as a class in the interests of their cities. The reports from filial bodies as printed in full will serve to show conclusively that the conditions prevailing in the building business are improving, and that the improvement is due to united action on the part of the builders. Much of the credit of this condition of affairs is due in the first instance to the existence of the National Association; for through its persistent urging of the need for improvement, builders have come to recognize the same; and through the National Association the means have been supplied. Methods which have left the local builders little to do but to adopt have been devised and urged upon their attention, and when successful results began to appear adoption became more general.

To Secretaries.

The secretaries of local exchanges are requested to send to the national secretary full accounts of all uses to which arbitration has been put in their various organizations during the past year, either between employers and workmen, between members, or between members and the public. Future cases of arbitration that may be brought about by members of the exchanges for any purpose should be transmitted to the national secretary, for the benefit of all filial bodies.

The Uniform Contract.

The revised Uniform Contract is now ready for use, and all members of filial bodies are urged to use this form only, and to assist in its universal adoption. The form is several hundred words shorter than the old one, and is more concise than before, besides embracing a greater field of operation than the original contract. Architects should be urged to use the form, and should be kept supplied with the blanks at all times. The work of revision was most thoroughly carried out. and the present form is more equally fair to builder, architect and owner than it was before.

ELECTRIC PUSH BUTTONS should be clearly visible on the front door, and the more conspicuous they can be made without offending good taste the better. The practice of placing such push buttons in some obscure place, hidden in the shadows of the molding of the door jamb, where they can neither be seen nor found in the dark, is a poor one, causing much annoyance which might quite easily be avoided. The first purpose of a push button, says the *Southern Architect*, is to be useful, and this purpose is best served when it is plainly visible and accessible to those desiring to enter the house.

DESIGNS IN SLATE ROOFING.

IN OUR ISSUE for March we presented illustrations of a number of designs in slate roofing taken from an English architectural journal. We give below additional designs from the same source, remarking in this connection that the combinations of slate may be varied almost without limit, according to taste and requirements:

Before considering a totally different style of ornament, an example recently seen by the writer may be noticed. It consists of diagonal bands of shaped slates, with a few ordinary courses between each diagonal band. In Fig. 33 will be seen exactly what is meant. The shaping is just what has been previously mentioned and described, but the ordinary courses fill in between the diagonal lines in a different way. A little care in starting each of the varieties is all that is required to enable any intelligent workman to manage each of these patterns.

A little center pattern is given in Fig. 34. A dark slate, cut as in Fig. 37, is in the center. The light slates surrounding it are variously cut, both to the round-cornered shapes, Figs. 35 to 38, and to the beveled-cornered shape.

Some of the common slates outside are also cut as shown in these figures. A more elaborate example is given in Fig. 39, where the center is light; next is a series of dark slates, and light again before the regular roofing slates are reached. To work out this design the only shapes necessary are those shown in Figs. 40, 41 and 42, and their arrangement is distinctly shown in Fig. 39. In the next two diagrams, Figs. 43 and 44, other designs are shown, worked out with the same detail as in these previous examples. A pattern of the same style, but much larger, is given in Fig. 45, and in this it will be noticed that there are no cut or shaped slates at all—all are of the usual square form.

It is sometimes desired to have a firm's name shown in the roof of a warehouse or workshop, and this, though usually man-

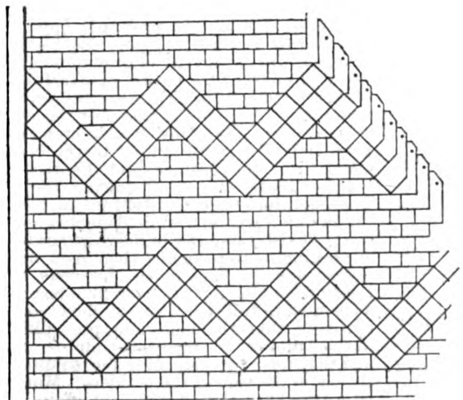


Fig. 33.—A Unique Combination of Cut and Uncut Slate.

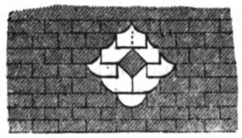


Fig. 34.—A Neat Pattern.

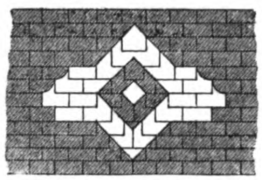
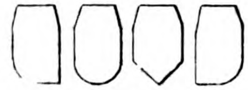


Fig. 43.—Design varied from Previous Examples.



Figs. 35 to 38.—Slate Used in Producing Pattern Shown in Fig. 34.

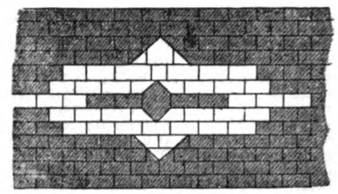


Fig 44.—A Pleasing Design of Light and Dark Slate.

Figs. 40, 41 and 42.—Shapes Required to Produce Pattern Illustrated in Fig. 39.

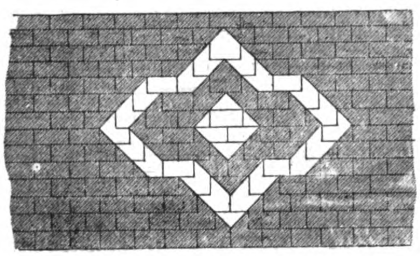


Fig. 39.—A More Elaborate Design.

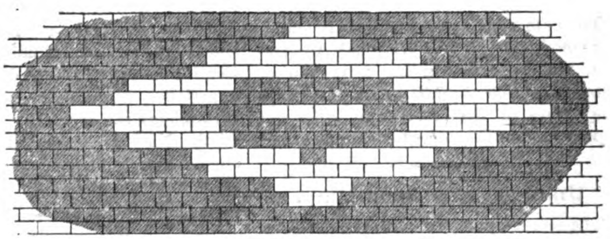


Fig. 45.—Design Made Without Cut or Shaped Slate.

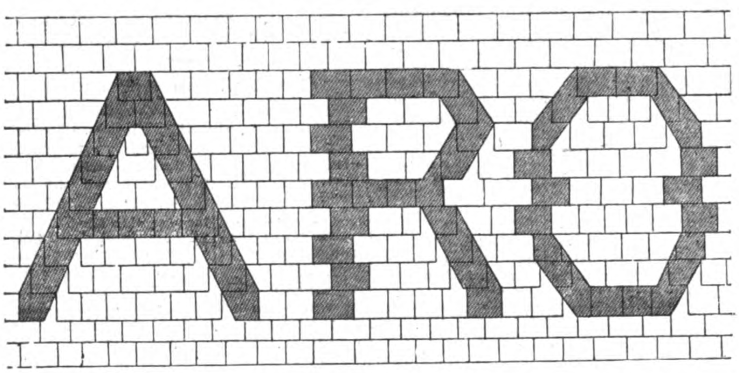


Fig. 46.—Showing how Letters of the Alphabet may be Formed with Slate Specially Cut for the Purpose.

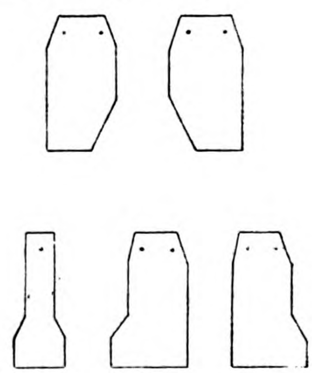


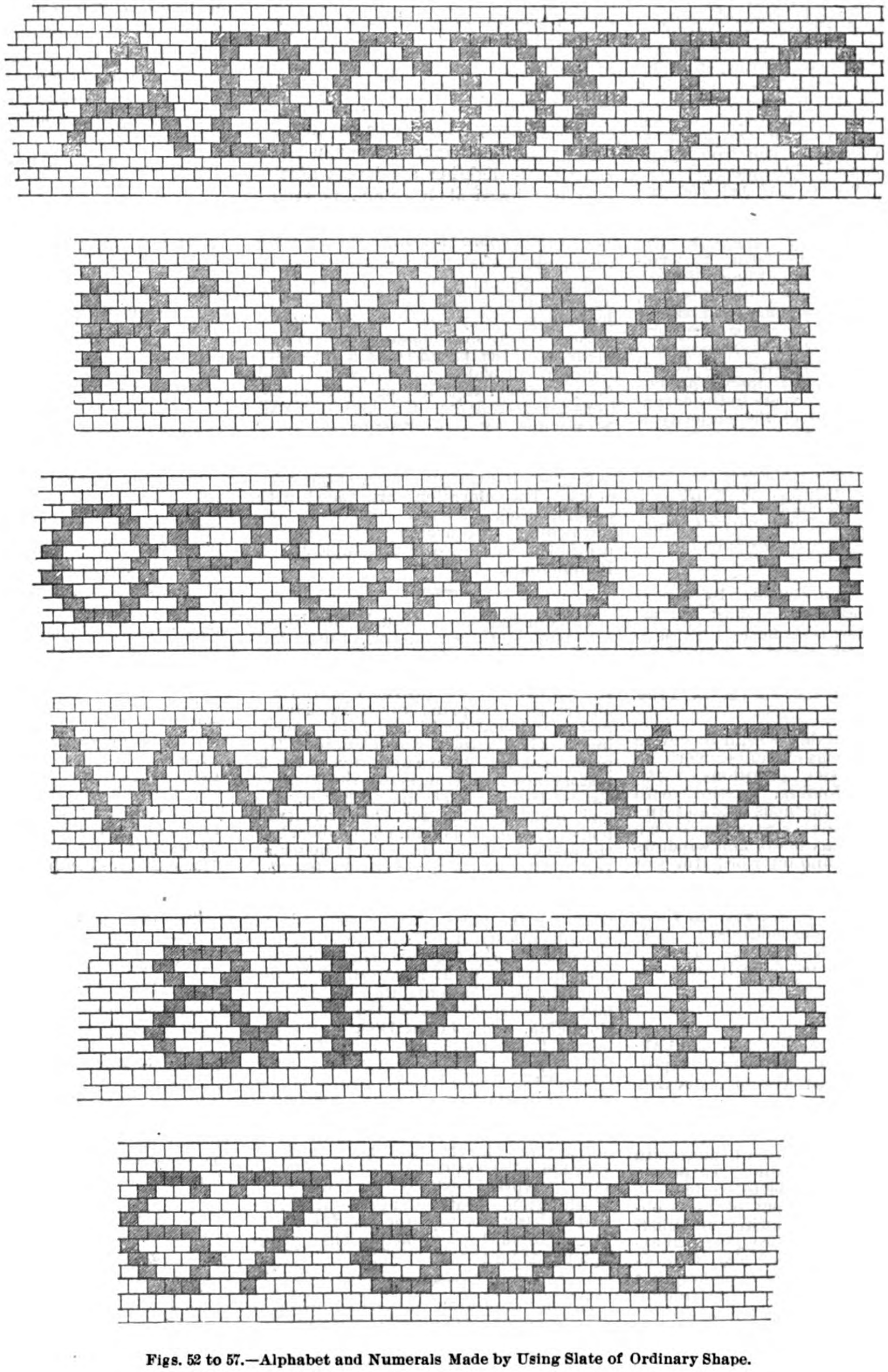
Fig. 47 to 51.—Forms of Cut Slate Used in Making Letters shown in Fig 46.

DESIGNS IN SLATE ROOFING.

aged by means of the paint pot, can yet be arranged in the slating.

It is, perhaps, a little troublesome to manage, especially if the name be such as Macfarlane, Fotheringham, Sons & Co. This would require an immense length of roof to accommodate it. But it is just as well all firm names are not so bulky. The letters require about seven courses of slates to form them respectably. In Fig. 46 is given a sketch of three letters, A R O, worked out in slate cut as shown in Figs. 47 to 51. It may be wondered where Figs. 50 and 51 go. An examination of Fig. 46 will show, however, that they are required immediately above the cross of the A. Fig. 49 is required just a little further up in the same letter. These, it will be noticed, are for nine courses of slates.

All the letters of the alphabet may be easily formed from A R O, and worked out in seven courses. For instance, B may be almost wholly found in R, C in O and D in R, &c., while the diagonal of A will be required in such letters as M, N, V, W and Z. These are all arranged with square-cornered slates of a darker or lighter color than those of the rest of the roof. A complete alphabet and set of numerals, shown in Figs. 52 to 57, inclusive, are given for the use of any one who may want to work a name in a roof. There will then be no difficulty whatever in arranging any name required. Then, though this alphabet is for nine courses, the seven-course one is arranged in the same way as this. With these remarks and accompanying sketches we hope it has been made quite clear that ornament in slating work may be much more frequently introduced than it is, to the great benefit of the public at large.



Figs. 52 to 57.—Alphabet and Numerals Made by Using Slate of Ordinary Shape.

DESIGNS IN SLATE ROOFING.

NEW PUBLICATIONS.

HICKS' BUILDER'S GUIDE. By I. P. Hicks. 5 x 7 inches in size. 160 pages. Illustrated with 114 engravings. Bound in stiff board covers, with gilt side title. Published by David Williams. Price $1.

The series of articles which for something over a year past appeared in the various issues of *Carpentry and Building* under the title of "The Builder's Guide," have now been gathered into book form and are issued to the building trades under the above designation. The work is of convenient size for ready reference and is arranged with the object of best serving the interests of the practical carpenter and builder. The frontispiece is a faithful likeness of the author of the work, and those who have not had the pleasure of a personal interview with him will be able to make his acquaintance by proxy in securing a copy of the book. The aim of the author in preparing this volume has been to point out how mistakes may be avoided in making estimates, &c., and thus enable the carpenter and builder to do their work with greater accuracy. The information presented represents the results of close observation and actual experience of a practical man who has devoted a great many years to the execution of work with which the majority of carpenters and builders are confronted from day to day. The volume is, in effect, a comprehensive guide to those engaged in the various branches of the building trades and is likely to be found both interesting and instructive to carpenters, builders and contractors.

THE CARPENTER AND JOINER. By various experts and authorities. Edited and arranged by Robert Scott Burns. 280 pages. Illustrated with 207 engravings and 25 folded plates. Bound in stiff board covers. Published by Ward, Lock, Bowden & Co. Price $2.

This volume contains within its covers practical descriptions of timber work on a large scale, floors, partitions, roofs, bridges and scaffolding, together with descriptions of the methods used in forming and fitting together wood work on a small scale, such as doors and windows and the exterior and interior fixtures of houses, &c. A special section is devoted to the subject of timber, so treated as to be likely to prove of interest to those engaged in the trades addressed. The volume is written from an English standpoint, but has much in it that will interest American readers.

PEOPLES' POCKET STAIR BUILDER AND CARPENTERS' HANDBOOK. By William Peoples. 247 pages. Illustrated with 51 plates and over 500 engravings. Bound in pocketbook form. Published by the Author. Price $5.

This work gives atttention to matters in which the young stairbuilder, carpenter and joiner are likely to be interested. It consists of an arrangement of ideas obtained from various authorities and modified by the author, whose practical experience covers a period of more than 40 years in the carpentry and stair-building lines. Within the covers of the volume attention is given to carpenters' and stair-builders' geometry, cylindrical sections as applied in the construction of the wreath part of handrails, rules for the measurement of surfaces, dog-legged, open-newel, cylinder, circular and elliptical staircases, together with remarks concerning hip, valley and jack rafters, purlins and splayed work and their bevels. The transverse strength of joist and beams, and formulæ for their safe load, are features of the work. A glossary of architectural terms, covering a number of pages, is likely to prove interesting and valuable in this connection. There is also memoranda for excavators, stone and brick masons, plasterers and carpenters, together with miscellaneous information useful to the architect and builder.

An English Technical School.

The foundations were recently laid at Aston, England, for a new technical school, which is to be arranged on an approved plan. The structure has a frontage of 98 feet on one street and 90 feet on another, and is to be three stories in hight. The basement is divided into modeling room, with rooms for casting, engineering classroom, with engine house and electric lighting appliances adjoining; metallurgical classroom, plumbing workshop, a laundry, storeroom, &c. The ground floor is arranged for a lecture room, elementary art rooms, teachers' rooms, and four classrooms. On the upper floor is a chemical laboratory for 40 students, with preparatory department, lecture room, art classrooms, &c. At the rear of the premises is a one-story structure provided for carpenter's and joiner's work, and having accommodations for 60 students. The buildings will be warmed by low-pressure hot-water pipes, and will be electrically lighted. We understand the style of architecture is English Renaissance with large windows. The elevations are faced with pressed brick, relieved with stone and terra-cotta. The architect of the structure is George H. Cox of 28 Temple street, Birmingham.

THE CORNER-STONE of the White House was laid on October 13, 1792, a little less than 300 years after the discovery of America by Columbus. The commissioners had, on the previous March 14, advertised for plans for a President's house, and on July 16 they held a meeting in Georgetown, and examined the plans that had been submitted. As is history now, they accepted the plan of James Hoban, a Dublin architect, who had made designs for the President's house, framed, it is said, on the model of the mansion of the Duke of Leinster at Dublin, the palace of royalty in Ireland. The stone was in part quarried at Aquia Creek, Md., and brought to a new wharf, built for the purpose, near the foot of Seventeenth street. No memorial of the ceremonial of laying the corner-stone has been discovered. It is certain that the Virginia Free Masons, who had in 1791 laid one corner-stone in the District of Columbia, and who, in 1793, assisted in laying the corner-stone of the Capitol, did not participate in laying the corner-stone of the White House. It was probably laid by Maryland Masons. The building began to rise, however, and in eight years was ready for occupancy. The donations of Maryland, $72,000, and of Virginia, $120,000, assisted to pay for it; and in April, 1800, four months after Washington's death, Congress appropriated $15,000 to pay for its furniture. Thenceforward it became the chief mansion in the nation.

A VERY interesting process is the making of veneering. The logs are first steamed, then stripped of the bark and taken to the cutter. In the cutter, which resembles a large turning lathe, a long knife driven by machinery is made slowly to approach the revolving log, peeling off the veneer into long strips of the desired thickness, varying from $\frac{1}{8}$ to $\frac{1}{32}$ inch. These strips are drawn out on a long table, cut and trimmed into the required sizes, and then are carried to the dryhouses. The veneer is dried in long racks, two strips being placed together, turned so that the frames are opposite, to allow a free circulation of air. After drying it is pressed and packed into bales.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

MAY, 1893.

Brooklyn's Building Operations.

The Commissioner of Buildings in Brooklyn has recently issued his annual report showing the extent to which building operations were carried on in that city during the year 1892. One of the most interesting features is the record of the large number of buildings which were planned and the comparatively small average cost at which they were erected. This condition of things may perhaps be explained, in part at least, by the fact that ground space in the city named is liberal and that the structures put up were for the most part intended for dwelling purposes, rather than for business pursuits. The report of Commissioner Rutan shows conclusively that Brooklyn is, indeed, a city of homes. During the 12 months ending December 31 last there were granted permits for the erection of 4726 buildings, at an estimated cost of $22,962,838. Of these new buildings 1862 were of brick and 2868 of frame construction. Some idea of the general character of the buildings going up in the city of Brooklyn may be gathered from the fact that the permits granted for last year covered 1184 private dwellings, 560 tenement houses, 541 flat houses, 997 dwellings designed for the use of two families, 451 stores and dwellings, 231 stables, 210 workshops and 184 stores and flats. In the way of buildings intended for business purposes there were 88 storage sheds, 50 factories, 31 warehouses, 23 office buildings, 10 each of halls, boiler houses and foundries and 9 churches. Some of the most conspicuous buildings undertaken in Brooklyn last year included the four power houses of the Brooklyn City Railroad Company, the store of Rothchild & Co. and the building of the Brooklyn Storage Warehouse Company. There were, altogether, 9 structures put up, costing more than $100,000 each. The actual number of buildings completed last year was 3692, of which 2308 were frame, 1382 brick and 2 of iron. There were 1263 permits issued for alterations and changes in buildings, at an estimated cost of $1,722,870, these changes consisting for the most part in the addition of stories and the alteration of interiors and fronts.

Teachers' College Training School.

One of the departments of learning which at the present time is receiving a great deal of earnest attention on the part of those having at heart the welfare of the youth of the country is manual training. It has been developed more or less rapidly during the past decade, and by many is regarded as one of the most important and popular forms of school work. A building, which will be devoted to the training of teachers for this work and used by that branch of the Teachers' College, known as the Department of Mechanic Arts and of Form-Study and Drawing, is about being erected in this city on Cathedral Hights, from plans drawn by Architect William A. Potter, who has in no respect sacrificed educational advantages to architectural effects. The Mechanic Arts Building is the gift of a friend of the Teachers College, while the site is on property given to the institution by G. W. Vanderbilt. In speaking of the building, which is to cost not less than $200,000, Dr. W. L. Harvey, president of the college, states that "the Departments of Mechanic Arts and Form-Study and Drawing are both engaged in developing what is known as manual training, and that it is a significant fact that the new structure will be the first one of the kind in New York City, although every other city in the United States of considerable size is already supplied with such buildings affording opportunities for instruction in advanced courses in manual training.

Manual Training High Schools.

"These institutions are known as manual training high schools, and in St. Paul, where there has recently been a fight over the introduction of manual training into the schools on account of its expense the Chamber of Commerce, the Board of Trade and the trade unions sent committees to investigate the work. As a result they were unanimous in commending it, the Chamber of Commerce saying in their report, 'destroy all the schools if you must, but leave us the manual training high schools.'" Gen. Francis A. Walker, in a letter to the president of the college, expresses very clearly the advantages of the manual training school and refers to the fact that all classes of educated men "are more fully agreed as to the expediency of introducing manual training extensively into the schools than they are upon any other project of the time." According to Mr. Harvey the new building connected with the teachers' college will afford more complete and commodious quarters for manual training than can be found in any other city in the country. Both in its plan and in the manner of its conception it differs from other buildings erected for a similar purpose. "It is usual in such cases" he says, "first to put up the building and afterward develop the institution; consequently it is a rare thing for a building to be adapted to the purpose for which it is intended. In the present instance, however, the institution was first developed and afterward the building planned." The work of the manual training school, in connection with the teachers' college is, we understand, to be different from all other forms of manual training work, in that not only boys and girls are to be trained in mechanical drawing, wood work, architectural designing, clay modeling, cooking and sewing, but it will also use the school as a means of training teachers.

Cost of Associations.

Among builders who are contemplating organization, and too often among builders who are already organized, the question of cost enters too prominently into consideration; indeed, is almost invariably allowed to be or become the principal stumbling block to successful prosecution of the objects of organization. This is not as it should be. The real and vital point to consider is, what will it cost if we do not organize? It is not possible to estimate how much has been lost in information, in system, in education, and in money, which all of these other considerations comprehend to the builders throughout the country from their failure to organize long years ago. It is therefore a duty which they now owe to themselves, in correcting the errors of the past, as far as they may be able, not to let the question of cost fill their vision so completely as to shut out the good which is only possible of attainment through their associated effort. A true estimation of the net result will show in every case that the benefit accruing is immeasurably beyond and above the amount of money or time expended. It may be well said: be not niggardly in expenditure; anything that is worth doing at all is worth doing well, and in no field of endeavor is this truism more applicable than in associated effort. It must not be lost sight of, either, that with numbers to divide expense the cost is trivial beyond expression, and no time should be wasted in attempting to find out if the thing cannot be done cheaper. It may be that an opportunity will be lost meanwhile which will cost in the end fourfold the amount haggled over to regain. There never was properly directed endeavor through organized work that did not bring a result much beyond any real or possible cost. In builders' exchanges and other organizations it is well to be liberal in expenditures, and not be continually looking through a magnifying glass at the item of cost—the net result is what is essential, and it will not be possible to spend an amount out of proportion to the good to be gained.

Chicago's Revised Building Ordinance

The revised building ordinance which was recently passed by the city council of Chicago embodies several features which are of interest, not alone to the building trades in that place, but also to members of the craft in other cities. It establishes a Department of Buildings, embracing a commissioner, who is required to be an experienced architect, civil engineer or builder, and a number of inspectors, who shall be architects, engineers, masons, carpenters, iron workers, bricklayers or stonecutters, and who must pass an examination before a committee of one member from each of four named organizations. The ordinance prescribes, among other things, the minimum thickness allowed for walls, and provides for the security of foundations, specifying the amount of pressure to the square foot allowed to the different kinds of soil in the city. It also regulates the size of girders and columns, according to the compression to which the iron work will be subjected, as shown by stated formulæ.

Hight of Buildings.

Another interesting point covered by the ordinance is the hight to which the building may be carried. The limit is placed at 180 feet, measuring from the sidewalk level to the highest point of external bearing walls. It is also provided that the hight of no building of skeleton construction shall be more than three times its least horizontal dimension, and no isolated structure of masonry shall be more than four times as high as its least horizontal dimension. Allowances for wind pressure shall be figured at not less than 30 pounds per square foot of exposed surface for all buildings the hight of which is more than one and one-half times their least horizontal dimension. Another feature of interest is the section which provides that where elevators are built without inclosing walls there shall be at every floor through which they pass automatic closers or doors made in such a way that in case of fire they will fully close each well hole when the temperature therein exceeds 140°. This provision, if faithfully carried out and the law strictly enforced, is likely to assist materially in lessening the loss from fires as well as the number of them.

New College Building.

Through the recent gift of H. W. Sibley a much needed addition to Cornell College will be erected in the near future. The plan, we understand, upon which the new building will be put up is one that was matured and approved by Mr. Sibley and the trustees of the college a number of years ago, and all of the additions which have been made to the college in the way of workshops and laboratories have been built with this general plan in view. The present main building is a bluestone and granite structure 160 x 46 feet, four stories in hight, and the addition contemplated will, in its exterior features, be an exact duplicate of this building. The new structure will contain on the ground floor an area of 106 x 46 feet, which will be devoted to the purposes of a museum, and the apparatus now scattered through all parts of the building and shops will be collected in this apartment. There will also be lecture and class rooms. The second floor will be devoted mainly to the department of marine engineering and naval architecture, and will contain two large drafting rooms, a lecture room and offices for the professors. The third floor will contain two large drafting rooms. This addition is estimated to give to the college ample accommodations for 400 students, and when the proposed enlargement is fully carried out, the building with workshops will meet the requirements of 1000 students. The architect of the addition is Prof. C. Francis Osborne, assistant professor of architecture in the university, and who is also the architect of the new chemical building. We understand that work upon the new structure will be begun at once, and it is the expectation to have it ready for occupancy a year from next September.

Building Material at Chicago.

All classes of building material, except iron and steel, have greatly advanced in price in the vicinity of Chicago on account of the heavy demand created by preparations for the World's Fair. Brick, lime, stone and lumber are all considerably dearer than they were a year since. The most notable rise seems to have taken place in sash and doors and inside trimmings. Discounts on manufacturers' lists which were 65 per cent. last spring are now only 40 per cent., showing an advance of over 70 per cent. on the net price then realized. The World's Fair demand has been a grand harvest for these manufacturers, whose trade had previously suffered most keenly from overproduction. It is now feared that the sudden curtailment of this demand, which will take place in May or very shortly thereafter, will have a disastrous effect. Numerous building projects, however, have been deferred for this very reason, and the building trades of the Northwest may be sufficiently well employed on miscellaneous work during the summer to counteract to a great extent the expected depression following the World's Fair rush.

Architect vs. Builder.

W. H. SAYWARD.

A most interesting and suggestive paper was read before a recent meeting of the British Society of Architects by one of its members on "The Duties and Responsibilities of Architects," in which builders may find much food for reflection. In this paper the position, now so familiar to builders, was taken very frankly and decisively that the architect must safeguard the owner in every possible way so that the contractor may be made responsible for errors of commission or omission, but the paper in no way claimed that either owner or architect should be responsible to the contractor for their errors of commission or omission. Later on the writer enlarged upon the quasi-judicial character of the architect, inasmuch as he occupied the position of arbiter between the owner and the contractor. While there are many other points in this interesting paper which may be discussed, it is enough for our present purpose to consider briefly the two important points above referred to, hoping to open the minds of builders to the peculiarities of the position in which they are placed.

Since the National Association of Builders has been in existence, and it has become natural for builders to examine and discuss the relations existing between them and others, this question of the proper relations which should prevail between builder and owner and builder and architect has received much attention. It has become evident that the long-accepted one-sided condition is susceptible of improvement, and that the duty which the builder owes to himself should impel him to insist upon a change in the direction of greater equity and justice in these matters. It must be plain that the double function which the member of the British Society so clearly defined cannot be logically sustained, and that is the contention which builders must bring forward in the attempt to secure more just relations in this particular.

POSITION OF THE ARCHITECT.

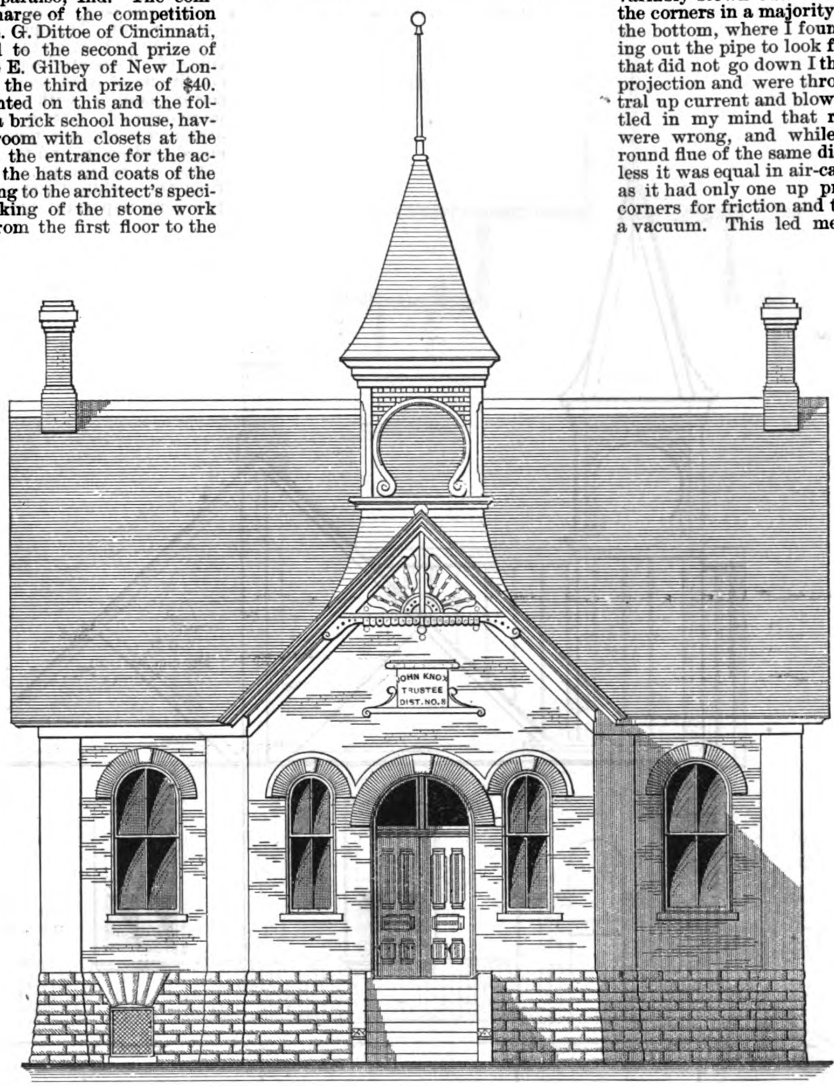
The architect is the servant of the owner from start to finish. Our Uniform Contract recognizes this fact and distinctly mentions him as the owner's agent. It is, therefore, impossible for him to act in that "thoroughly impartial and unbiased manner" which it has been assumed that he will, simply because he is made the arbiter by terms of a contract. The architect's fee is paid solely by the owner, and, however honest he may be, he cannot wholly free himself from the bias which that fact alone creates. In addition to this, it must not be forgotten that in this matter of arbitration the architect, if constituted the judge, is in a wholly improper and untenable position, inasmuch as the questions at issue are almost wholly dependent upon the way and manner in which plans and specifications prepared by this same judge, in his function as architect, are to be interpreted or considered. For any person to occupy the position of arbiter where his own work, with all its variety of interpretation and all of its possibility of failure to furnish full or essential information, is the most important element, is truly improper. It is in a sense making the owner the arbiter; and if that be just, then it would be equally sensible to designate the contractor as the arbiter. In either case it would amount to one of the parties to a contract sitting in judgment on a proposition where his own interest is involved. Builders must find themselves driven more and more to the conclusion that their interests are improperly at stake under any such dispensation as now prevails, and should actively work for a reformation.

PROTECTION OF THE OWNER.

On the other point referred to—namely, the protection of the owner against errors of omission or commission by the builder, while the latter is left defenseless against the errors of commission or omission by the owner directly or indirectly through his agent, the architect—much might be said. It is sufficient in this article to simply ask builders to consider what risks they are constantly taking in making agreements when all their duties are defined with care and penalties which they must pay for failures to perform are accurately described, while the other party to the contract is left free to do or not to do, so far as the terms of the instrument are concerned, no matter how essential to the builder's task and tributary to his successful prosecution of the work are the things which the owner or his agents ought to supply or furnish. Builders should meditate on these points, and after meditation act with their fellows in securing more equitable relations. One of the ways most readily at hand is to insist upon the use of this form of contract, to decline indeed to sign any other, for surely the builder, as one of the two parties to a contract, with an interest equal to and in some respects greater than that of the owner, has as much right as any one to say what form of contract he will sign. He surely ought not to waive this right simply to please the architect, who, as a matter of fact, is not a party to the contract in the sense of assuming any responsibility to the builder. The Uniform Contract is not claimed to be perfect, but it is a great advance out of the confusion into which the limitless variations of individually prepared contracts have led us, and it represents the best present judgment of selected men of both interests. By its persistent use we shall finally secure what is so much to be desired—namely, uniformity—and ultimately, through the service of the joint committee in charge, there will be evolved an instrument still more perfect—as near perfect as possible—by and through the provisions of which the evils above referred to as well as many others will be corrected.

School House Competition—First-Prize Design.

WE HAVE PLEASURE in laying before our readers this month the set of drawings to which has been awarded, under the conditions announced in the December issue of the paper, the first prize of $100 in the competition for school houses, the author being Edward H. Earle of Valparaiso, Ind. The committee having charge of the competition announce that L. G. Dittoe of Cincinnati, Ohio, is entitled to the second prize of $60, and George E. Gilbey of New London, Conn., to the third prize of $40. The study presented on this and the following pages is a brick school house, having one large room with closets at the right and left of the entrance for the accommodation of the hats and coats of the pupils. According to the architect's specification, the backing of the stone work and all walls from the first floor to the roof are to be hand-burned brick, laid in mortar, while for the outside, selected brick shall be employed. The foundation from the grade line to the top of the floor joists is to be faced with rock-faced Bedford buff stone, while the steps, windows and door sills, as well as the keystones and top of the front arch, are to be of the same material. The floor joists are to be 2 x 12 inch hemlock, laid 16 inches on centers, and the rafters and ceiling joists 2 x 6 hemlock, also 16 inches on centers. The floors are to be laid in two thicknesses, the first one to be common surfaced boards, on which is to be placed Georgia pine matched and dressed flooring. The roof is to be covered with shingles laid 4½ inches to the weather. All outside walls are to be furred by 1 x 2 inch strips. The wainscoting is to be matched, dressed and beaded Georgia pine, finished with a neat cap at the top and quarter round at the bottom. The window and door casings are to be of dressed Georgia pine, finished with a neat molding. All the woodwork outside the building is to have two coats of lead and oil paint, while the interior finish is to have two coats of the best hard oil, well rubbed down.



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

School House Competition.—First-Prize Design.—Edward H. Earle, Architect, Valparaiso, Ind.

The cost of the building is given by the architect as $1485, divided as follows: Excavating and grading, $20; brickwork, $640; stone, $180; plastering, $80; carpenter work, $500; galvanized iron, $25, and painting, $40.

What Should Be the Shape of Chimneys?

The same query applies to hot-air flues as well, and it was put and answered very positively by a man of a wide and successful experience as follows:

"Having an idea that it was not all uphill work in a chimney I concluded to investigate the operation of the one in my house to see if there was any down currents in it, as I had heard frequently asserted. I took light tissue paper and made some small light balls of it. was particular not to crush them tight and make them heavy, and also was careful to keep them round. With these I went to the top, and balls that were dropped into the center of the chimney were invariably blown out. Those dropped into the corners in a majority of cases went to the bottom, where I found them on taking out the pipe to look for them. Those that did not go down I think struck some projection and were thrown into the central up current and blown out. This settled in my mind that rectangular flues were wrong, and while the area of a round flue of the same diameter might be less it was equal in air-carrying capacity, as it had only one up pressure, with no corners for friction and tendency toward a vacuum. This led me to making the ends of my partition hot-air flues round, and while they are easier to make and cheaper they are equally as effective as if they had square corners, satisfying me that all flues should be round."

From another equally experienced source this idea has been expressed:

"I believe that in two houses of exactly the same build and exposure, except that one has partition flues for heating and the other round flues of liberal capacity, the house with the round flues can be heated satisfactorily for the six months necessary with at least a ton of coal less, and possibly with a 32-inch portable furnace, where the other house would not be as comfortably warmed with a 36-inch furnace of the same make, using the extra ton of coal and possibly more."

These views of practical and experienced men on a subject of so much interest to the trade open up a question that might be discussed with advantage.

A Plea for the Specialist.

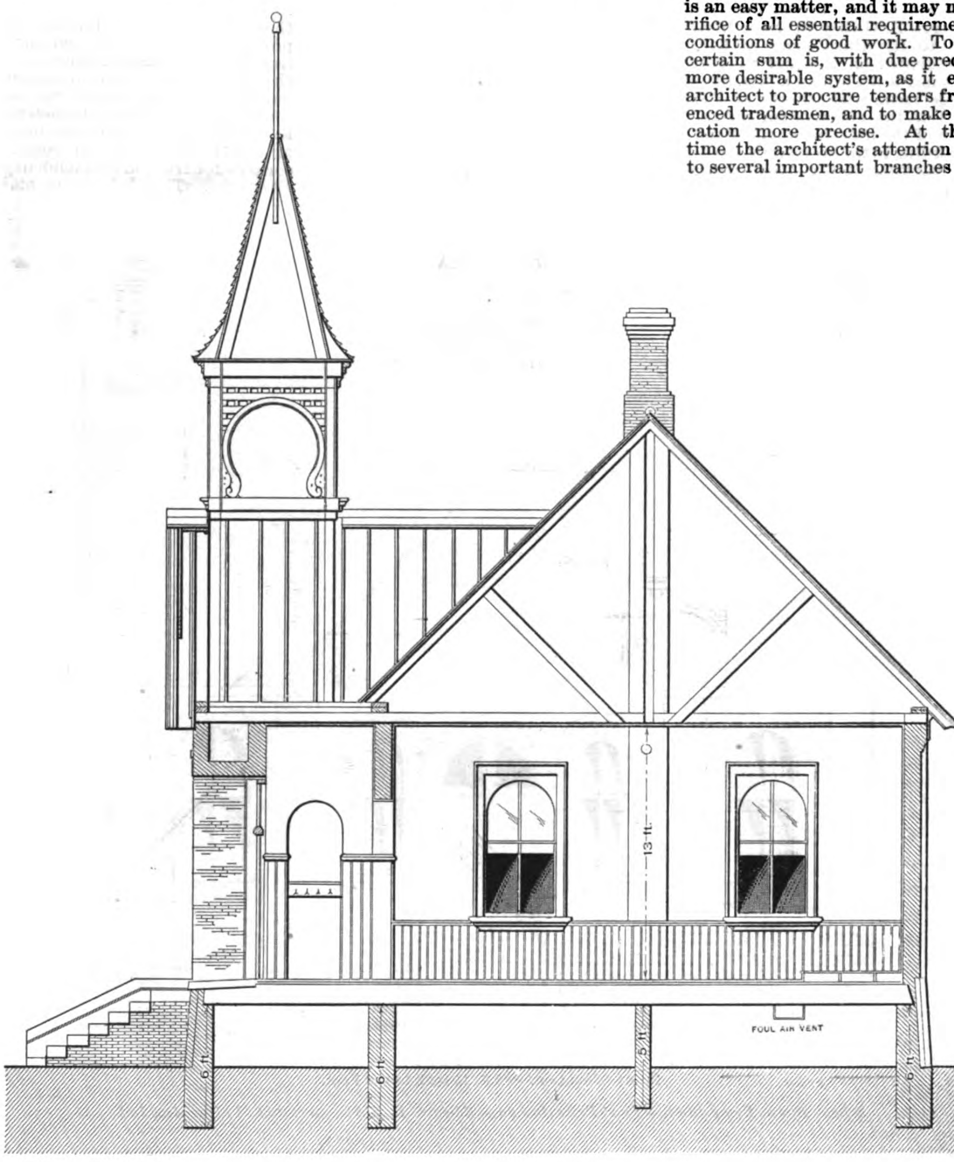
Our English contemporary, *The Building News*, seems disposed to believe that the day of the general specification has gone by and that the only safe plan for architects at the present time in the management of their work is to rely upon the assistance of specialists in the various branches. The story of the architects' difficulty at the present time, from the standpoint of the writer in the journal named, is almost pathetic. The progress of the constructive art is so rapid that the architect, with all effort and with a high order of ability, can scarcely keep apace with the progress that is made. Our contemporary says:

To be able to describe with sufficient clearness and accuracy the requirements of a building in the phraseology of the various trades, and to specify any novelty in construction, are necessary qualifications in the writing of a specification; but they are becoming less possible in these days of multifarious requirements. The applications of science are too numerous to be learned all at once. The trades connected with building increase and become split up into separate branches; materials, patented and otherwise, multiply; and the architect is supposed to have sufficient knowledge of each to decide for himself which system or method or material ought to be used. An overwhelming mass of data is at hand, but the means of applying them are not so easily grasped. For example, we have abundant data and formulæ with regard to drainage and ventilation, all kinds of patterns and types, but the difficulty is to make a selection for a particular purpose, to describe what size of pipe is necessary for a given discharge under certain conditions of gradient or the area of tubes for admission of fresh air or escape of vitiated air for a room of given capacity. At present the architect is dependent on his own calculations, or on those of the contractor or engineer. The same thing applies to any form of iron roof or system of construction of a particular kind. The specification must be explicit, or he has to leave details to the contractor, with undesired consequences.

The how and what to specify in certain cases are questions that puzzle the most experienced architect in these days when sanitary constructive and electric specialties have to be thought of. The customary course is to leave these details very open—that is, to trust to the contractor or subcontractor doing what is necessary, subject to an "approval" that may amount, as it often does, to very little, except to getting all that can be got, and trusting to chance for the result. The approval of ignorance is an easy matter, and it may mean a sacrifice of all essential requirements, or the conditions of good work. To provide a certain sum is, with due precautions, a more desirable system, as it enables the architect to procure tenders from experienced tradesmen, and to make his specification more precise. At the present time the architect's attention is directed to several important branches quite outside the ordinary specification for the builder.

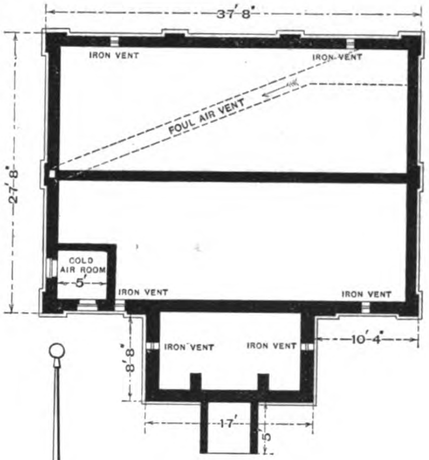
A PROPER SANITARY SPECIFICATION.

To consider for a moment what a proper sanitary specification amounts to for a large building. These are a few of the items: That the cement must be of certain tensile strength per inch after being allowed to set in air and immersed in water for seven days, and be of a certain fineness; that the concrete must be of certain proportions, and the bricks hard and vitrified; that the stoneware pipes be of certain diameter, and to be true in

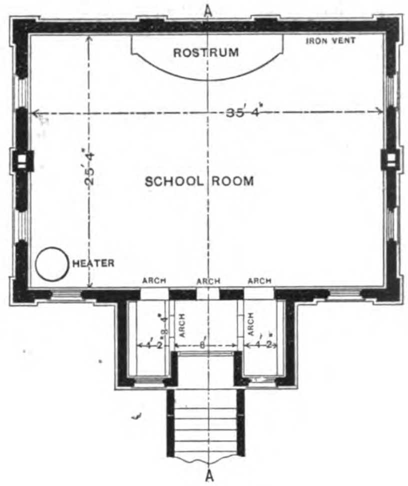


School House Competition.—First-Prize Design.—Section through Building taken on the Line A A of the Floor Plan. Scale, 1/8 Inch to the Foot.

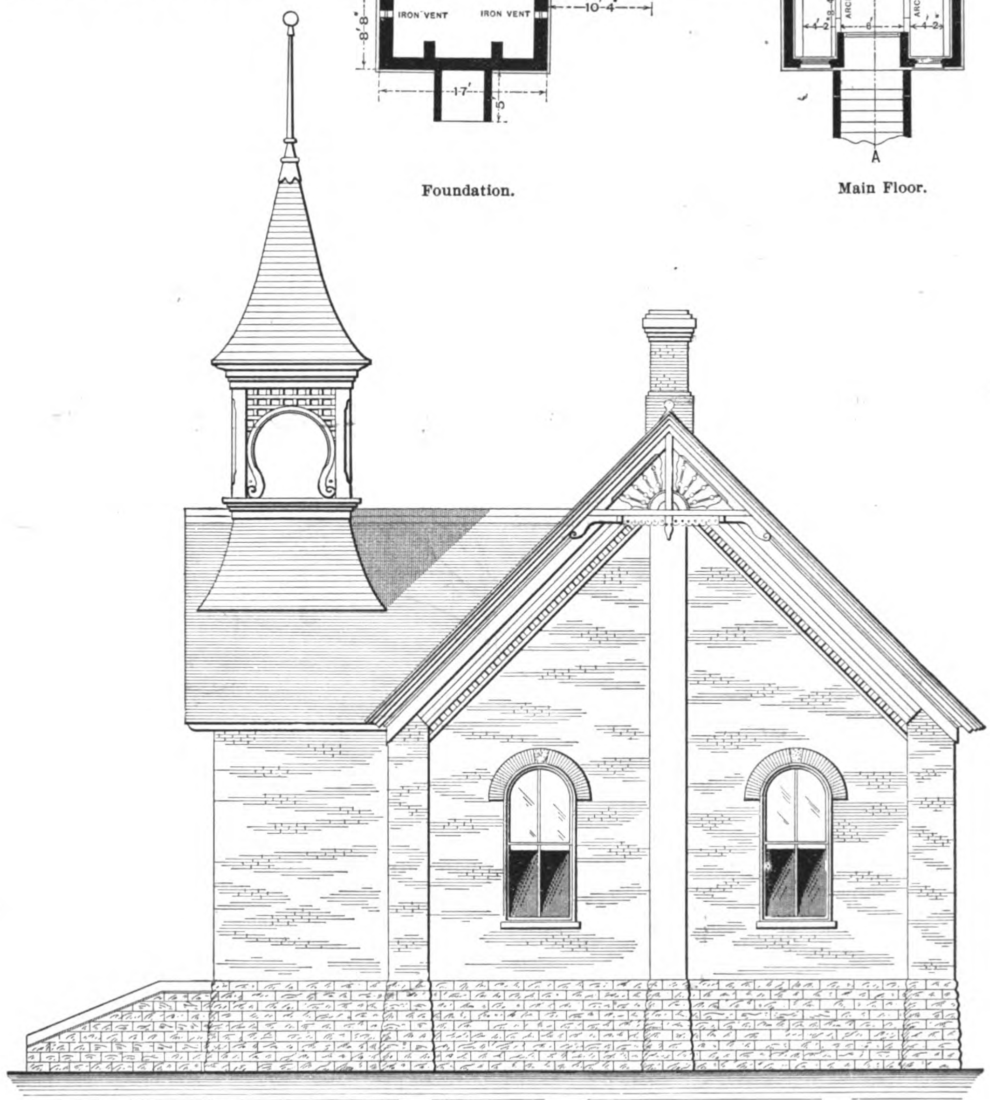
form, and to be vitrified and salt-glazed; to have proper socket-joints, and to be jointed in cement and sand, and the inside wiped clean; that the traps be of certain size and form; that the disconnection chambers are to be of certain dimensions and thickness of brick in cement, and have half-round, straight and curved pipes of particular make; that grease and other gullies be provided of such and such a pattern; that an automatic syphon-flushing cistern of certain capacity be fixed to discharge at every few hours; all this in addition to the usual provisions for soil, waste-pipes, overflows, ventilating pipes, apparatus, &c. Each of these details requires a practical knowledge and a specific description; thus in jointing a particular description of the mode of making the stoneware pipe-joints with cement luting ought to be given if no patented self-adjusting joint be used. Again, a specification ought to be clear as to how the pipes are laid under the house; if cast-iron pipes with caulked lead and yarn joints are to be used; if to be coated with Angus Smith's or other paint; that no branch connection be allowed under the house. Equal care is necessary in specifying connections, and manholes and traps, of course referring to a plan showing every branch drain and manhole. Most specifications pass over the very points about which the utmost care is required, such as the connection of branch drains with house drains by means of an opercular or open glazed channel, so as to admit of inspection and cleaning, or that of soil-pipe foot with house drain—points which are constantly scamped by contractors. In large and important buildings, where a ramified and elaborate system of drainage is required—as for a large block of residential mansions, for hotels, and infirmaries—the safest course is for the architect, if not himself a specialist, to obtain a plan and specification from a sanitary engineer of known experience upon which a contract may be based. Indeed, a matter requiring such expert knowledge as to details can hardly be considered to be in-



Foundation.



Main Floor.



Side (Right) Elevation.

School House Competition.—First-Prize Design.—Plans, Scale, 1-16 Inch to the Foot.—Elevation, Scale, 1/8 Inch to the Foot.

cluded within the architect's function. The details are so numerous and the supervision necessary so exacting that it would be next to impossible to expect the general designer, or even the clerk of works, to devote the time necessary for such a purpose In the preparation of plans the scheme of drainage should be one of the first things. Hence, if an expert has to be consulted, much loss of time and labor would be saved if the work be arranged before the general specification is prepared.

VARIOUS SYSTEMS.

Systems of heating, ventilation and lighting are now no longer within the grasp of an architect in all their details. In either or all of these cases we have to consider not only good workmanship but correct principles and efficiency. An architect may specify a system of "low" or "high" pressure apparatus, but should it fail to answer expectations he would have to undertake a responsibility that would be undesirable. Practically, the engineering firm engaged not only supplies the apparatus but suggests the mode of arrangement, so that an architect's specification is seldom followed in detail. This being the case, is it not better that the architect should consult with the firm and make a special contract? The general system having been decided, the specification ought to contain a full and detailed description of the pipes and apparatus to be employed. For example, in a high-pressure system the pipes are generally $\frac{3}{8}$-inch diameter inside and $1\frac{3}{16}$ inches outside, with a thickness of metal of $\frac{1}{4}$-inch, screwed together with contrary threads, and the apparatus has to withstand a testing pressure before sealing of from 2000 to 3000 pounds to the inch. The radiators can be placed in window recesses, behind curtains, and other confined spaces in coil cases. This system requires channels, which have to be provided in the walls, and it becomes necessary to describe these and other details like stop-cocks and coils.

SPECIFICATION FOR ELECTRIC LIGHTING.

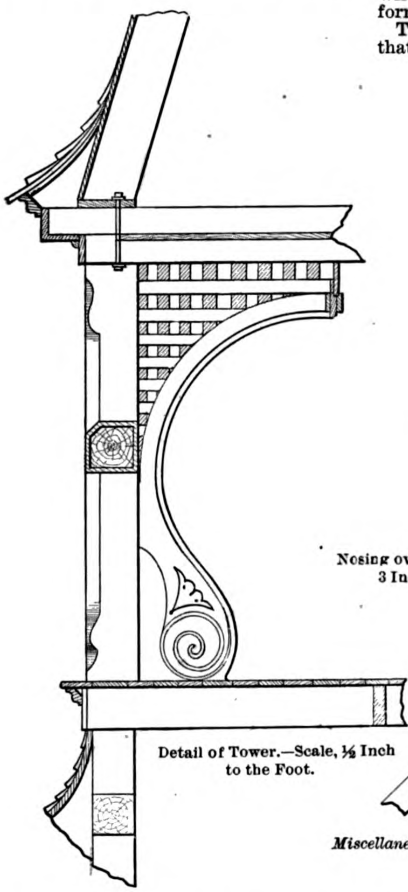
Again, in electric lighting, a specification for a complete incandescent electric-light plant can only be undertaken by one accustomed to the technicalities. The capacity of dynamo, the engine, the number and candle power of the lamps are points which only the expert engineer can decide. In one specification we read: "The dynamo will be of such capacity that, when driven at its rated speed, will furnish sufficient current for so may 16 c.p. incandescent lamps"—a rather too general statement that does not specify any particular kind of dynamo. Again, to say "the building is to be thoroughly equipped from the sources of supply to each outlet with an insulated conduit tube, in such manner as to provide channels for the wires," does not convey any definite information.

The "wiring" of a building is a branch that demands special workmen, as the fixing of an electrical installation, or the engine, dynamos, &c., is a work of a different kind. For this work the insulation of conductors, the number and size of the wires, and the casing are important details of which the architect should be cognizant. The need of protecting the wires and joints and connections from damp is all essential or leakage will occur: the wires must also be of sufficient size to avoid overheating. The kinds of switches, wall attachments, safety fuses, lamp-holders, &c., are items which have to be specified with care. These are matters that cannot be disposed of in a general clause; they ought to be described and their patent names given. It is, therefore, easily seen how important it becomes to prepare specifications for each of these trades, and to make special contracts with firms of known repute. The general specification and contract can no longer provide for these and other branches without detriment to the employer and the trades interested.

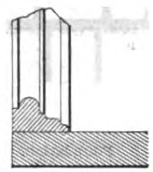
Utilization of Slate Waste.

In some localities, particularly North Wales, artificial bricks and tiles have been manufactured for some time. Flooring tiles, as well as bricks, are made from slate waste. The crushing strain of an ordinary brick, says the *British Clay-worker*, is about 50 tons per superficial foot; that of fire brick is from 300 to 500 tons per foot, while bricks made from slate waste, artificially, have stood a crushing strain of 1000 tons per foot. The materials that are used in the manufacture of artificial bricks or tiles are slate dust and ochre or clay. The slate waste is first placed in a crusher, its dust is raised, after being ground very fine, by means of an elevator to an upper floor, where it is sifted with a rotary sieve. It then falls back to the first floor, where it is mixed and moistened. It is then carried to the hopper of the brick and tile press. Each press has a daily capacity of turning out 6000 bricks. The ochre, on account of its dampness or extreme moisture, is placed in ovens and dried before being mixed with the slate dust. The workmen who are employed in an establishment of this kind, where 10,000 bricks are made every day, will not exceed 20, and most of these are boys.

It is obvious that the expense in manufacturing artificial bricks or tiles is in the labor and fuel account and not in cost of materials. The waste from the slate mills could be furnished for the hauling. On account of the crushing strain, these bricks are more durable than any other pressed bricks or tiles manufactured and are specially adapted to heavy usage, such as flooring tiles for stables, or cellars in warehouses where large casks are stored. They are also extensively used for pavements in streets and sidewalks. Encaustic tiles, as well as enameled flower pots, are also made from this waste. By the mixture of different clays or ochre a variegated brick is made which is adapted for floors in private dwellings, producing a har-

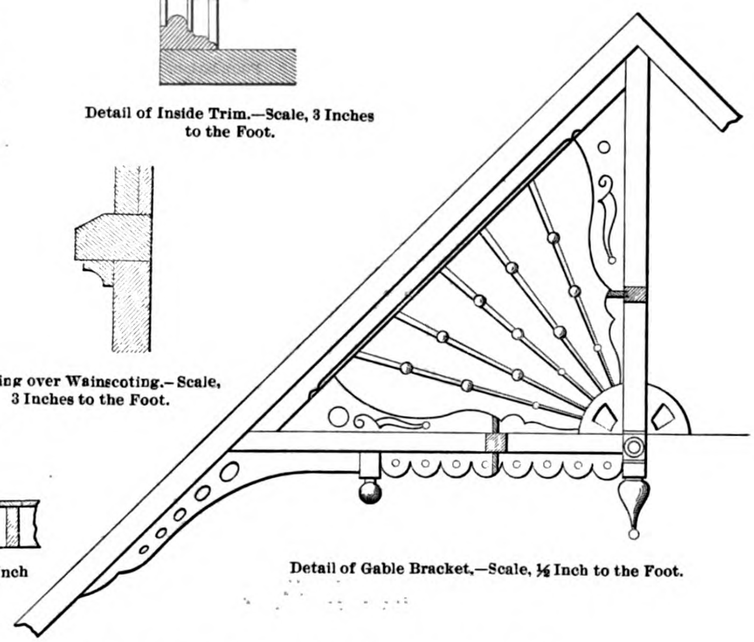


Detail of Tower.—Scale, ½ Inch to the Foot.



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

Nosing over Wainscoting.—Scale, 3 Inches to the Foot.



Detail of Gable Bracket.—Scale, ½ Inch to the Foot.

Miscellaneous Details of First-Prize Design in School House Competition.

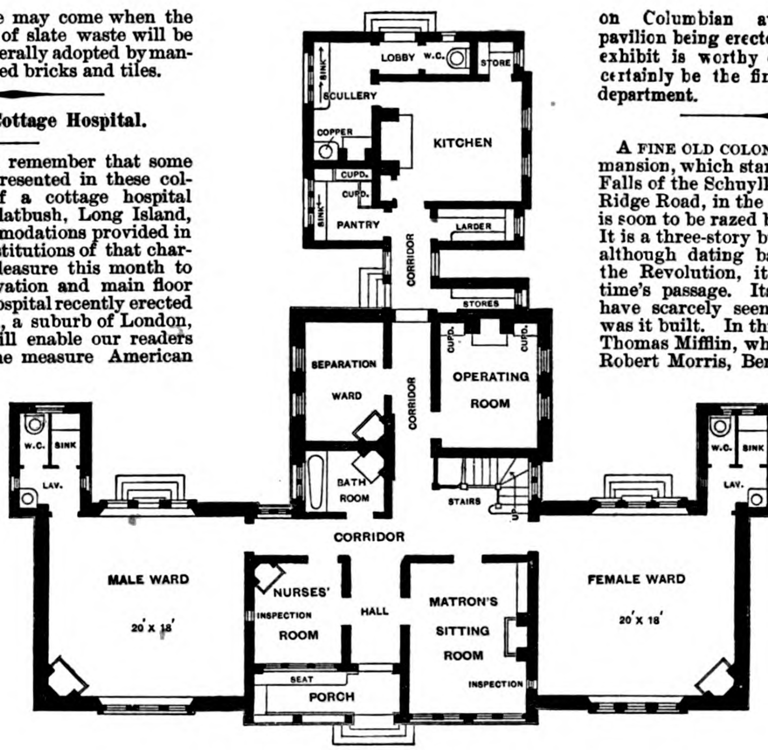
monious and attractive assortment of colors.

The bricks made from slate waste possess the excellent qualities of hardness, closeness of grain, and lightness of weight. They are also sound and of fine texture, and are uniform in color throughout, the surface being the same color as in the interior, so that they do not change by wear. They also have a greater covering capacity than any other bricks. The size commonly used is 10 inches by 5 inches by 2 inches. The time may come when the peculiar properties of slate waste will be recognized and generally adopted by manufacturers of pressed bricks and tiles.

An English Cottage Hospital.

Our readers will remember that some months since we presented in these columns drawings of a cottage hospital lately erected at Flatbush, Long Island, showing the accommodations provided in connection with institutions of that character. It is our pleasure this month to give the front elevation and main floor plan of a cottage hospital recently erected at Willesden Green, a suburb of London, England, which will enable our readers to compare in some measure American with English practice in the matter of hospital accommodations in small towns and suburban places. The structure is faced with red brick and tile, with the gables and first floor treated in timber framing and rough cast. In putting up the building it has been arranged with a view to future additions, which, from the rapid growth of the neighborhood, are likely to be necessary, it is said, within a comparatively short time. From an inspection of the floor plan it will be seen that there is room for something like nine beds, placing four each in the male and female wards at the right and left of the main entrance and one in the separate ward in the rear of the bathroom and opening from the corridor in the center of the structure. The wards, it will be noticed, are arranged upon each side of the central entrance, the dimensions of each being 20 x 18 feet. The wards are well lighted and are ventilated upon a most approved principle. Communicating with the male ward by means of the corridor is a nurses' room, while communicating with the female ward is a matron's sitting room. The bathroom occupies a central position in the corridor, opposite which is the main stairway leading to the floor above. In the rear of the stairway and opposite the separate ward, is the operating room. The building is so planned that the rear portion may be cut off from the front or main part, at the end of the corridor separating the operating and bath rooms. In this rear portion is the kitchen, out of which opens a scullery, pantry, storeroom, &c. Over the main portion of the building on the second floor are three bedrooms and a linen room, access to which is had by means of the main stairs above referred to. The plans for the hospital were prepared by Newman & Newman of 31 Tooley street, London Bridge, and the structure completed is said to have cost about $10,000.

Front Elevation of English Cottage Hospital.



Main Floor Plan.

An English Cottage Hospital. Floor Plan and Elevation.—Scale, 1-16 *Inch to the Foot.*

Pavilion of Solid Mahogany.

One of the most magnificent and unique pavilions within the Manufactures Building at the World's Fair is that which will house the exhibit of the Meriden Britannia Company. This pavilion is little more than 20 feet square, and yet will cost about $40,000. It is being constructed of solid mahogany and plate glass. It fronts on Columbian avenue, opposite the pavilion being erected by Germany. If the exhibit is worthy of the pavilion it will certainly be the finest of its line in the department.

A FINE OLD COLONIAL HOUSE, the Mifflin mansion, which stands on a slope near the Falls of the Schuylkill and back from the Ridge Road, in the city of Philadelphia, is soon to be razed by a recent purchaser. It is a three-story building of stone, and although dating back some time before the Revolution, it shows few marks of time's passage. Its front and exterior have scarcely seen repairs, so stanchly was it built. In this mansion lived Gov. Thomas Mifflin, who himself designed it. Robert Morris, Benjamin Franklin, and other patriots of the Revolution used to ride out from the city to breakfast with the Governor, and such men as Samuel Morris, Clement Biddle, Andrew Hamilton, Samuel Meredith and Timothy Pickering attended the historic dinners given there.

THE new Waldorf Hotel on Fifth avenue and Thirty-third street cost over $5,000,000, and the building is as completely fire proof as it can be made. At each end of the deep building a fire-proof well, lined with fire brick, runs from roof to foundation, inclosing a steel stairway. The greater part of the iron work was furnished by J. B. & J. M. Cornell.

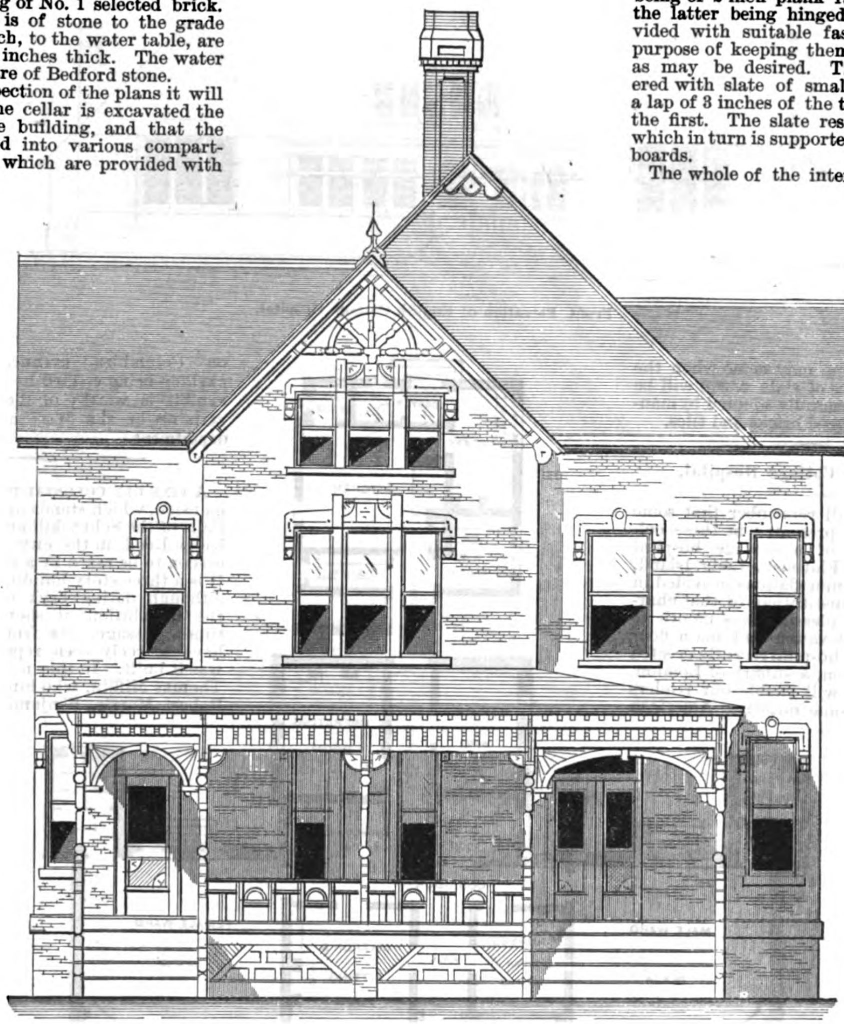
BRICK-VENEERED RESIDENCE.

THE SUBJECT of our supplement plate this month is a brick-veneered residence erected not long since in South Bend, Ind., for Dr. P. E. Ruppe, from plans prepared by Architect C. H. Brehmer of that place. The plate shows the appearance of the house as it stands completed, while the elevations and floor plans, presented upon this and the following pages, indicate the arrangement of the rooms and some of the constructive features. The building is balloon frame with a veneering of No. 1 selected brick. The foundation is of stone to the grade line, above which, to the water table, are brick walls 12 inches thick. The water table and sills are of Bedford stone.

From an inspection of the plans it will be seen that the cellar is excavated the full size of the building, and that the space is divided into various compartments, some of which are provided with cement and others with brick floors. It will be noticed that there is a vegetable cellar, a laundry, a room for the furnace, adjoining which is a space for the fuel, and two rooms intended for whatever purpose may be desired. On the first floor of the house are five rooms and a commodious hall, the latter being entered through a vestibule opening from the porch, which runs across the front and a portion of one side of the building. The parlor and sitting room communicate by means of folding doors. From the sitting room to the right opens a chamber, while directly in the rear is the dining room. Next to the sleeping room is a bathroom, entrance to which can also be gained from the kitchen. The latter apartment communicates with the dining room by means of a pantry, provided with a cupboard and the usual conveniences.

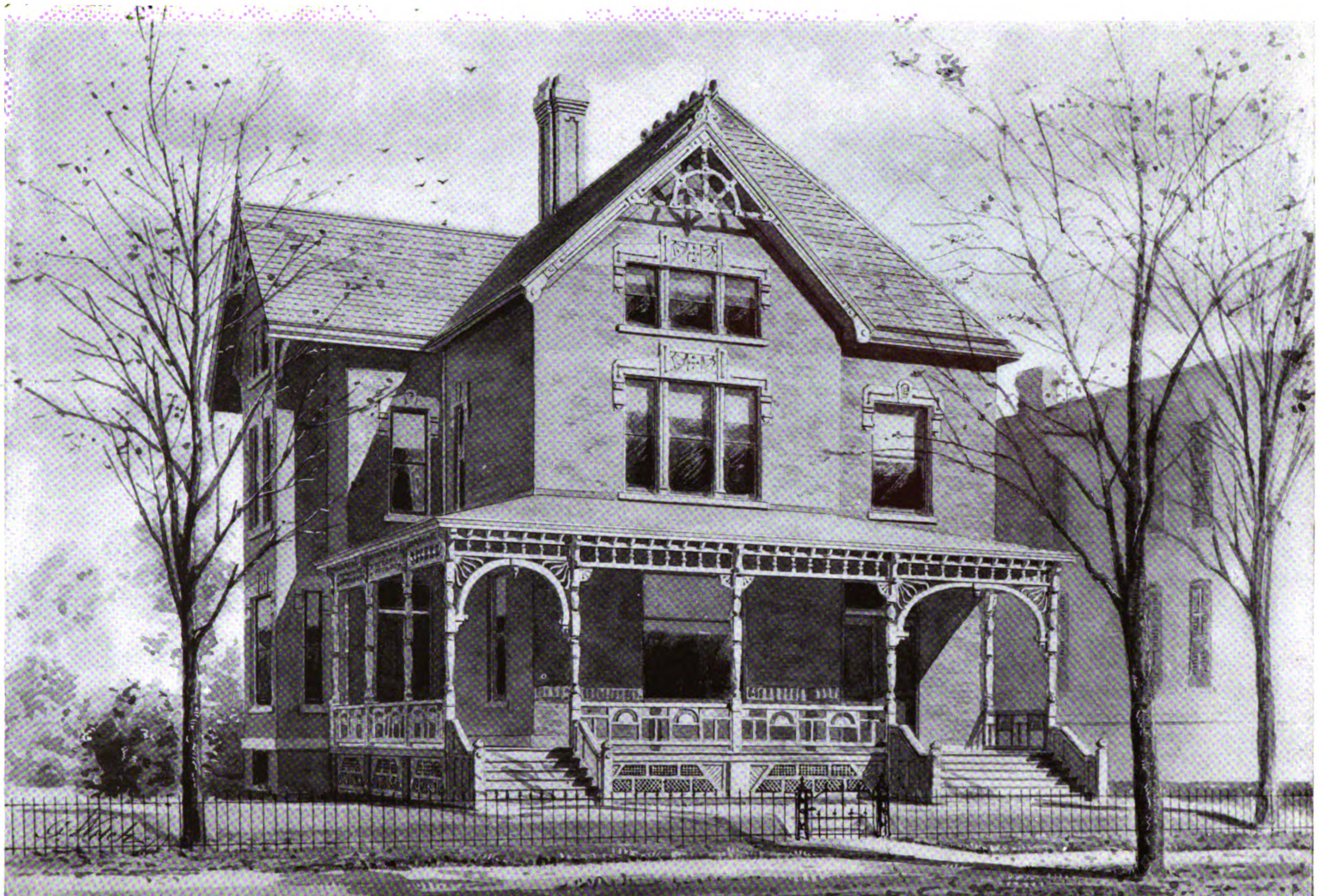
Ascending to the second floor, there are found several rooms, besides a space over the kitchen which, on the plan, is designated as attic room. Opening from each sleeping room is a closet of good size. From the architect's specifications we learn that the second-floor timbers are 2 x 12 and the third-floor timbers 2 x 10, all placed 16 inches on centers. The headers and trimmer beams are 4 inches thick, the floor timbers running the same way, as the partitions are double, as are also the 2 x 6 rafters, over 12 feet in length, these being placed 20 inches on centers. The valley rafters are 2 x 10 double, the door and window studs 2 x 4 double, and the hip rafters 2 x 12 inches. All studding employed is 2 x 4 inches, sized and placed 16 inches on centers, all partitions footing on 2 x 4 inch girders. They also have 2 x 4 double plates on which to rest the second-floor timbers. All angles are formed solid, and all partitions bridged once in their hight with 2 x 4 square bridging. The veranda and porch sills are 4 x 8 inches and the floor timbers 2 x 8 inches, placed 16 inches on centers. The plates are 2 x 4 double and the rafters and ceiling joists 2 x 4 inches, placed 20 inches on centers. All the floor timbers are bridged with 2 x 2 cross bridging, well fitted at each end and nailed. The outside of the frame is covered with tongued and grooved boards, not more than 8 inches wide on the sides, and not more than 6 inches wide on the roof. The inside of the frame is covered and lined with No. 1 building paper previous to lathing. The window frames are constructed in the ordinary manner for veneered buildings, the cellar frames being of 2-inch plank rabbeted for sash, the latter being hinged on top and provided with suitable fastenings for the purpose of keeping them open or closed, as may be desired. The roof is covered with slate of small size, laid with a lap of 3 inches of the third course over the first. The slate rests on heavy felt, which in turn is supported by the sheeting boards.

The whole of the interior finish is in hard wood, that of the parlor being in cherry, the sitting room in ¼-inch sawed sycamore, the dining room in butternut, the hall in oak, the chamber on the first floor in black birch, and the kitchen and bathroom in white ash—all rubbed to a dead gloss. The main stairs are of quarter-sawed oak, as are also those by which the attic is reached. The kitchen and pantry are provided with the modern appliances, and the bathroom contains the usual fixtures. The windows are hung with weights, the hardware trimmings are in bronze, and the parlor and sitting-room windows in plate glass. The cellar is 7 feet in the clear; the first story 10 feet, and the second story 9 feet 6 inches. The attic to the top plate in the main portion is 2 feet 10 inches. From an inspection of the foundation plan it will be seen that at the rear of the house is a 50-barrel cis-



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

Brick Veneered Residence.—C. H. Brehmer, Architect, South Bend, Ind.

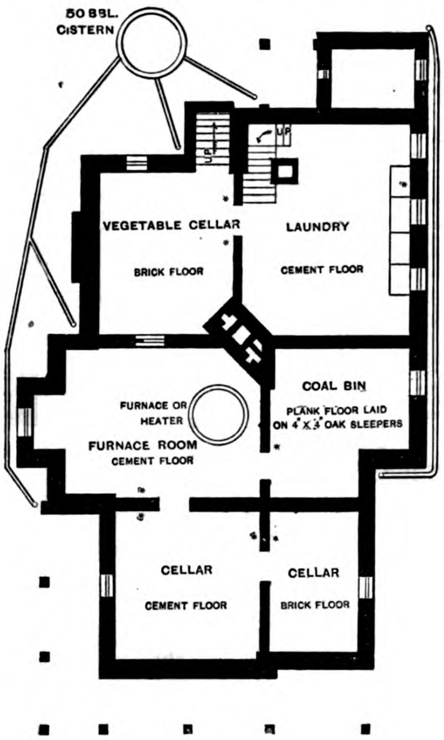


BRICK VENEERED RESIDENCE OF DR. P. E. RUPPE, AT SOUTH BEND, IND.

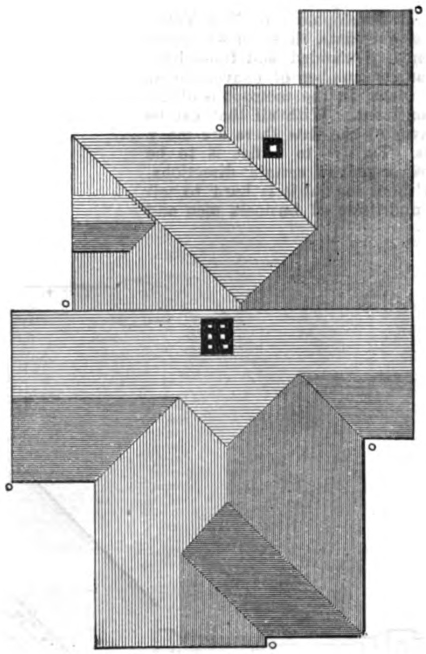
C. H. BREHMER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1893.

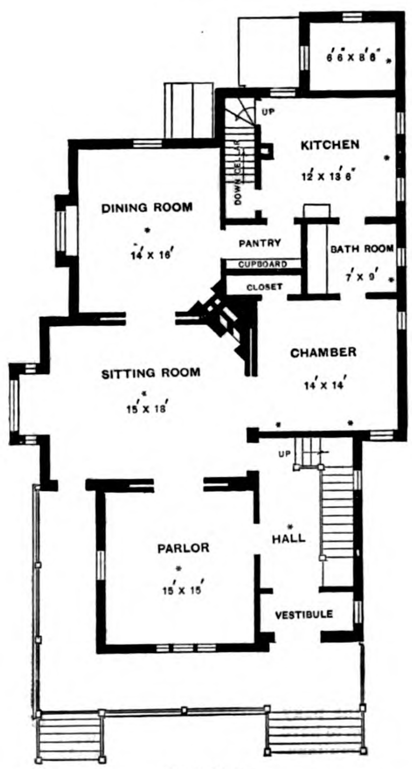
tern, made of 4-inch work, and well plastered on the inside with one coat Portland cement. The cistern is connected with the leaders by 4-inch vitrified pipe, properly graded. The cost of the house, exclusive of furnace and mantels, was $5400.



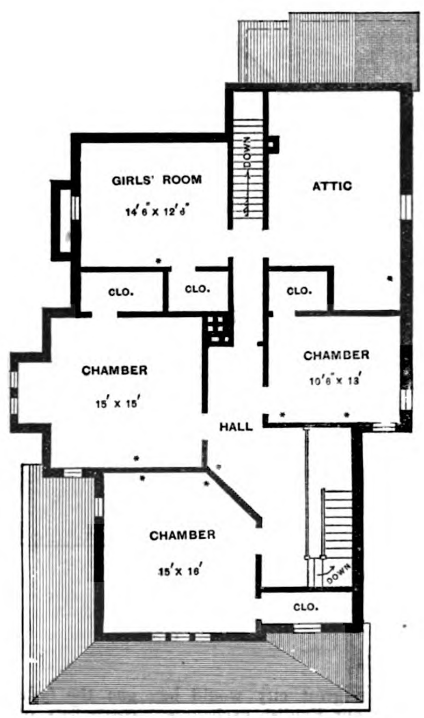
Foundation.



Roof Plan.



First Floor.



Second Floor.

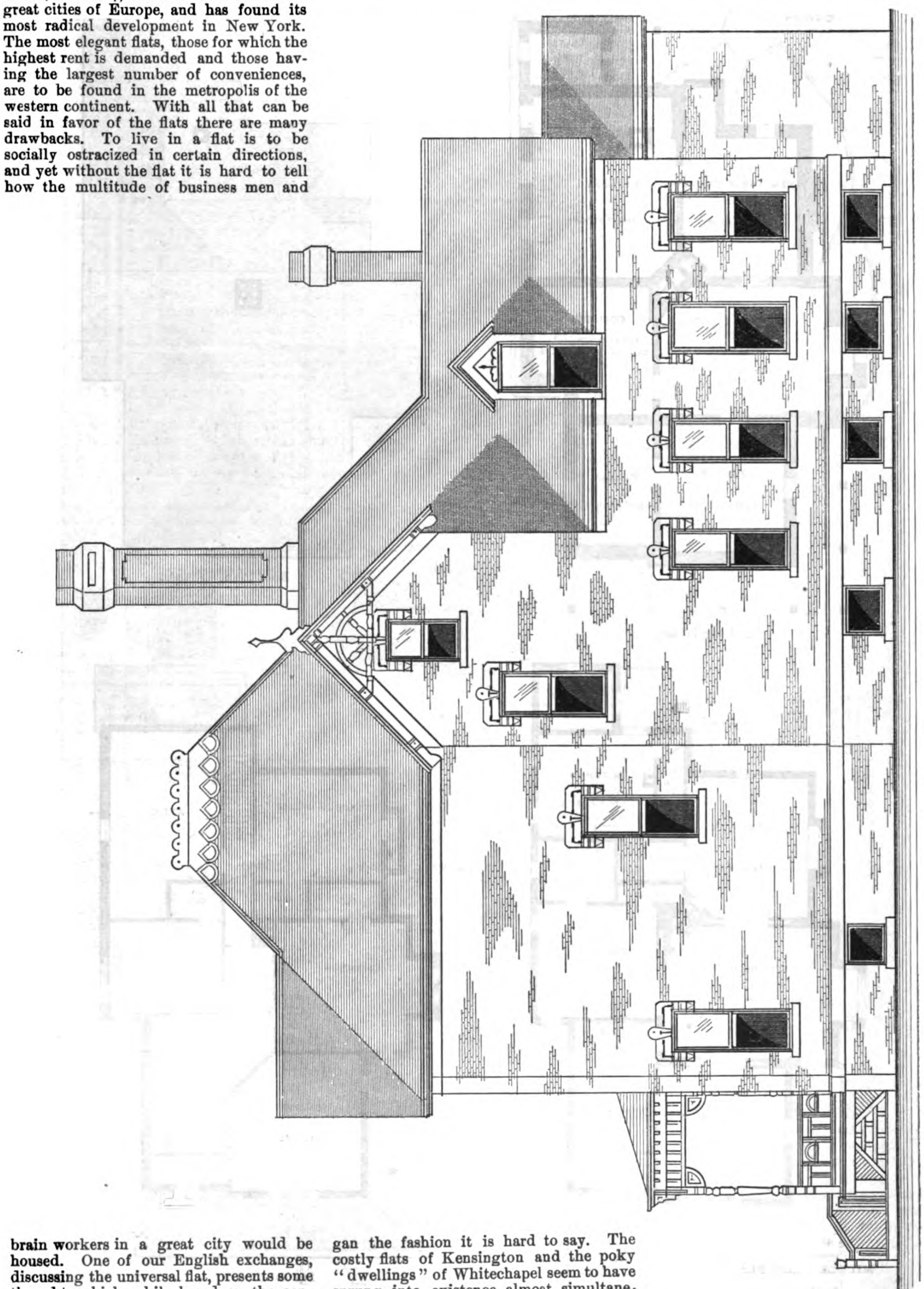
Brick-Veneered Residence.—Plans.—Scale, 1-16 Inch to the Foot.

Flats.

A leading feature of buildings in the large cities at the present time is flats. Wherever we turn we see huge building in progress that are being fitted up as flats. Sometimes these are called apartment houses, and sometimes they are only improved tenement houses, and sometimes they are tenement houses without what may be called "improvements." But "flat" is the commonly accepted term for all buildings devoted to living purposes in which the accommodations provided for a single family are upon one floor. The flat idea is a comparatively modern idea. If we mistake not, it had its origin in Paris. From there it has gone into various parts of the world, including London and the other great cities of Europe, and has found its most radical development in New York. The most elegant flats, those for which the highest rent is demanded and those having the largest number of conveniences, are to be found in the metropolis of the western continent. With all that can be said in favor of the flats there are many drawbacks. To live in a flat is to be socially ostracized in certain directions, and yet without the flat it is hard to tell how the multitude of business men and brain workers in a great city would be housed. One of our English exchanges, discussing the universal flat, presents some thoughts which, while based on the conditions prevailing in London, yet touch upon what also prevails in New York. As likely to interest our readers we present it in full:

LONDON FLATS.

Twenty years ago flats were still a rare novelty in London. Every householder—working class, middle class or upper class—lived under a roof of his own, and had his own street door on the level of the street. To-day the flat is rapidly becoming universal. Which class began the fashion it is hard to say. The costly flats of Kensington and the poky "dwellings" of Whitechapel seem to have sprung into existence almost simultaneously. The growth of the latter, unfortunately, has been immensely stimulated by municipal energy. The buried but unwept Board of Works sank nearly a million sterling in acquiring sites for artisans' dwellings, and the gaunt, cheerless blocks dotted about central London are the consequence. The same policy is being followed by the London County Council. In various districts clearances are already being made at the expense of the council, and if private builders will not come forward to put up the requisite number of blocks the council itself will undertake the work. So far there has been no pause, no sign of hesitation, in this policy of substituting mammoth blocks for two-storied cottages. One word of warning has indeed been given in Charles

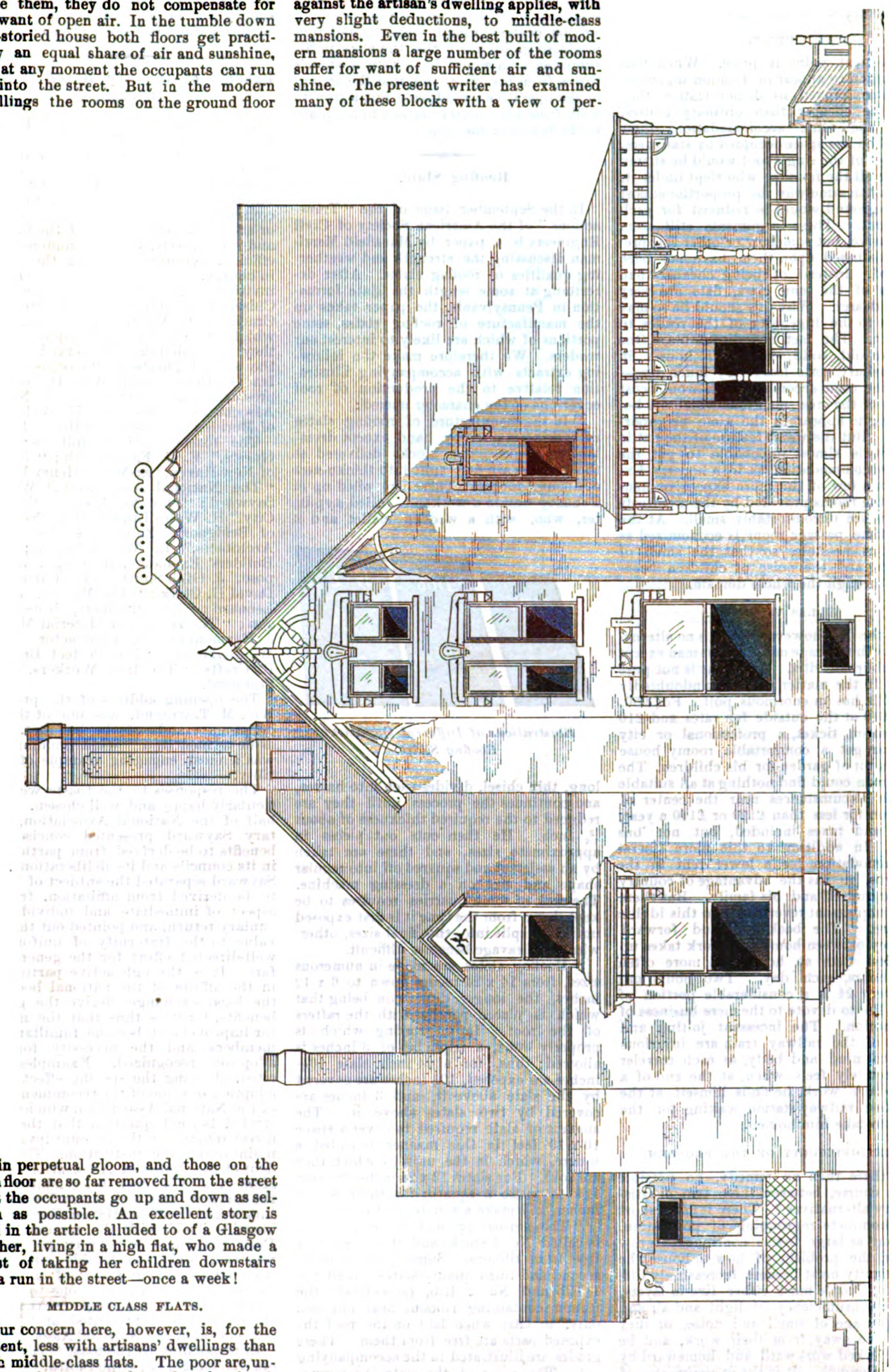


Brick-Veneered Residence.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Booth's second volume on London. An able contributor there points out that, though the sanitary appliances in the new blocks may be as perfect as science can make them, they do not compensate for the want of open air. In the tumble down two-storied house both floors get practically an equal share of air and sunshine, and at any moment the occupants can run out into the street. But in the modern dwellings the rooms on the ground floor are in perpetual gloom, and those on the fifth floor are so far removed from the street that the occupants go up and down as seldom as possible. An excellent story is told in the article alluded to of a Glasgow mother, living in a high flat, who made a boast of taking her children downstairs for a run in the street—once a week!

MIDDLE CLASS FLATS.

Our concern here, however, is, for the present, less with artisans' dwellings than with middle-class flats. The poor are, unfortunately, compelled to take what is offered them, and municipal wisdom has not yet got beyond the conception that the working classes of London should be packed as close as possible in superposed layers. But the middle-class man still has his choice. He can either get rooms in one of the "mansions" of central London, or he can get a house in the suburbs. Both courses have their disadvantages. As regards the flat, what has just been said against the artisan's dwelling applies, with very slight deductions, to middle-class mansions. Even in the best built of modern mansions a large number of the rooms suffer for want of sufficient air and sunshine. The present writer has examined many of these blocks with a view of personal occupation. The fittings have generally been excellent, the sanitary appliances perfect, the outside appearance architecturally satisfactory. Only one thing has been forgotten, that the occupants of the back rooms need fresh air and an occasional glimpse of sunshine. In several of the flats examined the back bedrooms only communicated with the outside air by means of a narrow well running from top to bottom of the block. In others the outlook of the bedrooms was brought to an abrupt termination at the



Brick-Veneered Residence.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

end of a couple of yards by a glazed wall rising to the full hight of the building. This may be a convenient arrangement for the builder, who is thus enabled to economize ground space, but it is distinctly unsatisfactory to the occupant.

PRICE.

The next point is price. When flats first began to appear in London ingenious logicians proved to demonstration they must be cheaper than ordinary houses. With the same accommodation, there would be less space occupied by staircases, the cost of the single roof would be shared among all the families who slept under it, and in the same way the proportional cost of the ground would be reduced for each occupant. These arguments still seem conclusive, but somehow or other the predictions based upon them have not been verified. Instead of being cheaper than houses of the same class, flats are very much dearer. Why this should be so may be left to the ingenuity of the reader to explain. The fact is indisputable. One of the old solid, well-built houses in Bloomsbury costs less—very much less—than the same accommodation would cost in one of the new mansions which are beginning to appear in the same neighborhood. But the worst feature of the flat is that it is almost impossible to get the same accommodation as in a house. Except in a few of the more expensive mansions the rooms provided by the architects of flats are uncomfortably small. At the same time passage room is economized as much as possible, so that the smell of cooking and the noise of children penetrate through the whole domain.

VILLAS VS. FLATS.

To the flat, however, there is no alternative for the average middle class man except the suburban villa. And that is not pure joy. In the matter of cost, undoubtedly the villa has an enormous pull. For £50, plus £10 at the outside for rates and £10 for season ticket, a professional or city man can get a comfortable roomy house with a bit of garden for his children. The same man could find nothing at all suitable to his circumstances near the center of London for less than £120 or £140 a year, rates and taxes included, but not 'bus fares. In addition to this more liberal accommodation for a lower rent in the suburbs, he has the advantage of country air for himself and his family. But there is an unpleasant reverse side to this idyllic picture. The backward and forward journey between home and work takes up not less than an hour, and more often two hours, each day. Two hours out of every 24 is a considerable portion of one's life to devote to the mere business of locomotion. The incessant jolting and noise of the railway train are injurious both to mind and body, as each traveler instinctively feels when, at the end of a hard day's work, he finds himself at the crowded railway station waiting for the train to take him home.

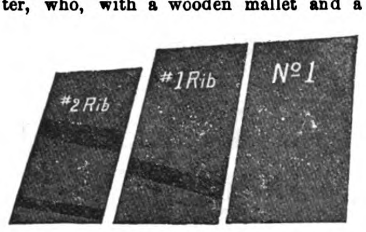
THE DIFFICULTY OF THE PROBLEM.

Is there then no remedy, no possible third course, between these two unsatisfactory alternatives? There is none, short of a complete regrouping of population. As long as large towns continue to grow larger, the problem of how to house the community must become increasingly difficult. People must either live in layers, with an insufficiency of light and air and a surplusage of smell and noise, or they must live away from their work, and be daily jerked workward and homeward by a steam engine. It is the excessive size of London that is responsible for the vices both of the flat and of the suburban villa. And the real problem to be faced is how London, and, in a lesser degree, Manchester, Liverpool, Birmingham and Glasgow, can be reduced in size without the loss of industrial advantages and the intellectual vigor that have accompanied the growth of large towns. Instead of these great centers of human energy, we must somehow contrive to create a multitude of smaller centers, round which population might so group itself that the clerk in his suburban villa would be within a stone's throw from his office, and that the artisan or the operative would have but a step to walk from his country cottage to his place at the bench or the loom.

Roofing Slate.

In the September issue of the "Transactions" of the American Society of Civil Engineers is a paper by Mansfield Merriman discussing the strength and weathering qualities of roofing slates. After describing at some length the slate formation in Pennsylvania, the paper takes up the manufacture of roofing slates, some portions of which are likely to interest our readers. We therefore make the following extracts with accompanying illustration relative to the production of roof coverings of the character named:

"In the manufacture of roofing slates everything is done by hand except dressing the edges. The blocks delivered at the shanties are first split into thicknesses of about 2 inches. These are piled up in a shanty beside a workman called a splitter, who, with a wooden mallet and a



Illustrations of Different Qualities of Roofing Slates.

long, thin chisel, divides each into halves, and continues the process until they are reduced to the required thickness of about $\frac{3}{16}$ inch. He then cuts out pieces in approximate sizes, and these are taken by an assistant and squared off into regular shape and size on a dressing machine. The rock of some quarries requires to be kept damp from the time it is first exposed until it is split into the final sizes, otherwise the cleavage becomes difficult.

"Roofing slates are made in numerous sizes, from 14 x 24 inches down to 6 x 12 inches, the longer dimension being that which is placed parallel with the rafters of the roof. In all roofing which is properly done, a triple lap of 3 inches is allowed; thus, for a 24 inch slate 10½-inches are exposed, 10½ inches are covered by the slate above it, and 3 inches are covered by two slates above it. The amount of slate required to cover a space 10 x 10 feet in this manner is called a square, which is the unit by which they are sold. For slates 12 x 24 inches it takes 114 to make a square; for those 8 x 16 inches, 277 make a square, and so on.

"The normal product of roofing slates is called No. 1 stock, and this is entirely free from ribbons. Some quarries make second and third quality slates, called No. 1 Rib and No. 2 Rib, respectively, the former containing ribbons near one end only, so that when laid on the roof the exposed parts are free from them. These grades are illustrated in the accompanying cut. The color of the slate is a permanent dark bluish gray. The color of the ribbons, however, is nearly black at first, yet, on exposure to the weather, they exhibit a whitish efflorescence and soon show signs of crumbling and decomposition. This is due to the sulphide of iron which they contain, and also to their porosity and softness. Although the price of these inferior qualities is from 20 to 40 per cent. less than that of the standard stock, they should not be allowed on a roof which is to be regarded as a good piece of work."

Banquet of the New Haven Builders' Exchange.

The annual banquet of the Builders' Exchange of New Haven, Conn., which was held on the 12th of April, was one of the most enjoyable events that have ever occurred in the social history of the builders of that city. Nothing that could contribute to the success of the occasion, or add to the enjoyment of the members and their guests, was left undone by the efficient committee having the banquet in charge. The *menu* card presented an inviting list of delicacies, from "Blue Chisel Point Oysters to Plaster Paris Crackers and White Oak Cheese," all of which were as thoroughly appreciated as they were delightfully served. Among the special guests of the occasion were Ira G. Hersey and Wm. H. Sayward, president and secretary of the National Association of Builders; H. Wales Lines of Meriden and ex-Mayor Henry F. Peck.

The toasts were as follows: "Our Guests," F. B. Farnsworth; "The City of New Haven," ex-Mayor Henry F. Peck; "The National Association," Wm. H. Sayward; "Our Neighbors of the Silver City," H. Wales Lines; "Our Neighbors of Bridgport," Zalmon Goodsell; "The Architects," L. W. Robinson; "The Builders' Exchange, Its Origin and Purpose," J. Gibb Smith; "The Carpenters," David H. Clark; "The Masons," Jno. N. Leonard; "The Plumbers," Robert Morgan; "The Dealers or Material Men," A. J. Harmount; "The Contractor," Dwight W. Blakeslee; "The Perfect Brick," S. P. Crafts; "The Iron Workers," L. H. Stannard.

The opening address of the president, Wm. M. Townsend, was one of the most delicious viands of the banquet, being, as he termed it, a "wind pudding," and was a most engaging example of versatility.

The responses to the toasts were particularly happy and well chosen. On behalf of the National Association, Secretary Sayward presented concisely the benefits to be derived from participation in its councils and its deliberations. Mr. Sayward separated the subject of benefits to be derived from affiliation, from the aspect of immediate and individual pecuniary return, and pointed out the great value to the fraternity of uniform and well-directed effort for the general welfare. It is through active participation in the affairs of the national body that the local exchanges derive the greatest benefits, for it is thus that the methods for improvement become familiar to the members and the necessity for their adoption recognized. Examples were cited, showing the specific effect of the adoption of some of the recommendations of the National Association which demonstrated beyond question that there is a direct return for the amount invested in maintaining the institution. The president of the National Association, Ira G. Hersey, also made a brief address upon the subject, and both he and the secretary urged the New Haven Exchange to identify itself with the national body. Both gentlemen were very courteously received, and considerable enthusiasm was manifested in favor of affiliation. The subject is not a new one to the exchange, and it is anticipated that New Haven will be represented at the next convention of the National Association.

In responding to the toast "The Builders' Exchange," J. Gibb Smith, the secretary, made a happy speech. He succinctly reviewed the history of the organization, touching upon the immediate cause for its establishment, the work done and the results accomplished. The exchange was shown to be in excellent condition numerically, with constantly increasing interest and appreciation on the part of the members. An enviable position has been attained by the exchange among the institutions of the city.

The affair was one of the pleasantest of the kind that have been given in New Haven for a long time, and was equally appreciated and enjoyed by guests and members. Social features of this kind produce a feeling of fraternity among builders the satisfaction and benefit of which cannot be overestimated.

Design for Wall Cabinet.

Many of our readers who have lately inquired for designs of furniture and examples of household ornaments are likely to be interested in the illustrations of a wall bracket, which are presented herewith. The design is of such a character as to be made by the skillful mechanic without any great amount of difficulty and when completed will prove an attractive ornament for any room in the house in which it may be desired to place it. Beautiful effects may be obtained by the use of mahogany, walnut or rosewood, all of which admit of a fine finish and high polish. Hooks may be inserted in the wall and the cabinet suspended from them, or the back of the article may be pierced and secured in this way in whatever manner required. The plan view and front and side elevations shown herewith are to a scale of 1 inch to the foot, while the detail of the pediment illustrated in Fig. 4 is drawn to a scale of 2 inches to the foot. Most of the details shown are ¼ full size and indicate so clearly the general construction employed that further description would appear to be unnecessary. The mirrors employed may, of course, vary according to the taste of the maker, but beveled glass will be found to produce a very rich effect. The character of the design is such that it may be very easily modified to suit individual taste and requirements.

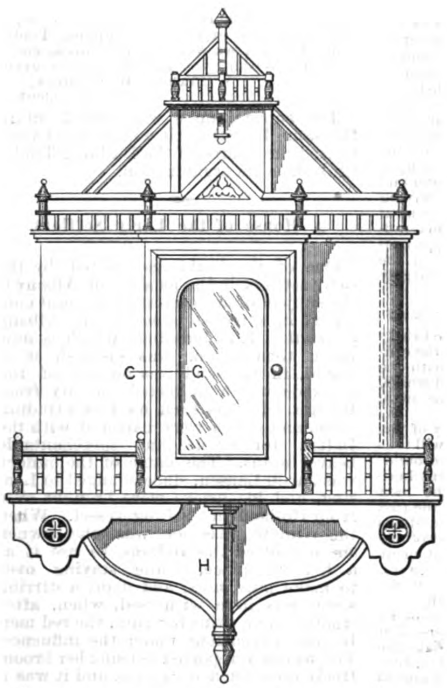


Fig. 1.—Front Elevation.—Scale, 1 Inch to the Foot.

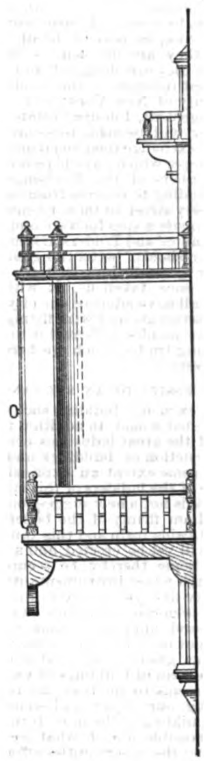


Fig. 2.—Side Elevation.—Scale, 1 Inch to the Foot.

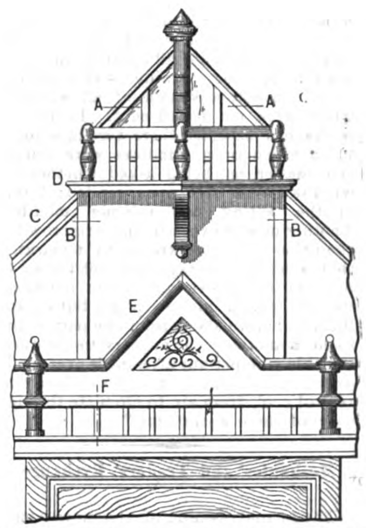


Fig. 4.—Detail of Pediment.—Scale, 2 Inches to the Foot.

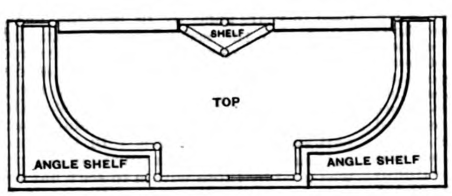


Fig. 3.—Plan View.—Scale, 1 Inch to the Foot.

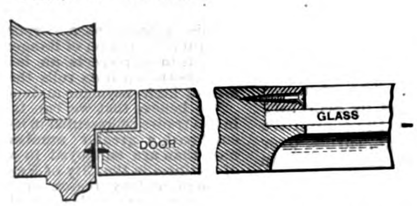


Fig. 5.—Full Size Section through Glass Door taken on Line C G of Fig. 1.

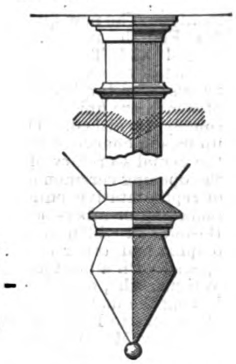


Fig. 6.—Detail of H, Fig. 1.—Scale, 3 Inches to the Foot.

Fig. 7.—Section through Top of Cabinet taken on Line B B of Fig. 4.—Scale, 3 Inches to the Foot.

Fig. 8.—Section through A A of Fig. 4.—Scale, 3 Inches to the Foot.

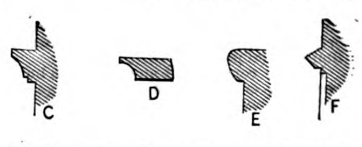


Fig. 9.—Details of Moldings shown in Fig. 4.—Scale, 3 Inches to the Foot.

Design for a Wall Cabinet.

Ceylon to Have a Novel Exhibit.

That Ceylon will make a unique exhibit at the World's Fair is evidenced by the following description of the Ceylon Building: The floor will consist of Ceylon woods. The pillars and beams, capitals and carvings will include the cabinet timbers for which Ceylon is famous. The pillars, capitals and carvings are all reproductions of original objects in the ancient cities of Ceylon, and these will all be worked in ironwood, ebony and satinwood. The gradations of coloring in the carved pillars will be exceedingly striking. The shading is from pale crimson yellow of satinwood to the warm orange brown of the jakwood and the darker tints of margossa, palu and kumbuk. Suriyamara and old root-stem wood of the tamarind are beautiful in the markings. Abundance of light to reveal the beauties of carvings and traceries in the building, the size of which is to be considerable, is to be secured by a large number of windows with beautifully carved frames. One of these window frames will be a reproduction of the stone window from the palace at Yarahu. The building is to cost about $30,000, and will be erected in Ceylon before being shipped to Chicago, so as to give the people an idea of how it is to appear on the shores of Lake Michigan.

Ventilation in London Workshops.

The Public Health Department of the London County Council have issued a report of a medical inspection of workshops in some of the most crowded of the poorer metropolitan districts, which proves that the system of ventilation in these shops is of the most elementary kind. "In no instance," says the report in question, "was any artificial means of ventilation seen. Such interchange of air as might occur could only be brought about by the 'natural ventilation' afforded by the chimney flue and other openings—windows and doors. A note was made of all windows which were not found shut. In the 114 workshops inspected there were in all only 11 in which open windows were found. One master, on being asked whether the windows were ever open, replied: 'Only in the spring and summer months.' Another master excused the overcrowded condition of his workroom by remarking that when the workpeople felt the air to be close and oppressive he did not allow them to remain in one place, but caused them to 'move about from one part of the room to another.' It appears to be questionable whether any attempt is ever made during the winter months to cause a current of cool, fresh air to circulate through some of these workrooms."

Mechanics' and Traders' Exchange.

The formal opening of the new rooms of the Mechanics' and Traders' Exchange of this city occurred on the afternoon of Monday, April 10, with appropriate ceremonies. The new quarters are located at 289 Fourth avenue, between Twenty-second and Twenty-third streets, and consist of an exchange room, consulting rooms, secretary's office and library, all of which are finished in oak and handsomely furnished. The work of fitting up was in charge of Stephen M. Wright, the genial secretary of the exchange. At the opening ceremonies a large number of representative builders were present, including members of sister exchanges in Boston, Providence, Worcester, Philadelphia and other cities. The exercises opened with a brief address by Secretary Wright, who, on behalf of the committee having the matter in charge, turned over the rooms to President G. M. Smith. In substance Mr. Wright said:

Mr. President: Your well-known devotion to the interest of the exchange makes it scarcely necessary to remind you that when it was decided to make this radical change it was your pleasure to designate me as one of the committee to see that these rooms were properly arranged with all the convenience its limits would permit.

For the committee I now say, with but one accord it entered upon the discharge of the duties imposed, and I believe never was a duty more cheerfully performed, for it was felt that they were aiding a movement which would result in a revival of such an interest in our exchange as would bring it up to a proper level of its responsibilities to the entire building industry of this city, which it should so rightfully represent.

Now, Mr. President, the labors of the committee are ended, and to you as the chief executive we turn over these rooms fitted with everything new, bright and cheery. May such signify the result of the departure from the forlorn location we have left, and may the attraction of these rooms win back those of our members who for so long a time have absented themselves, as well as be the cause of adding to our numbers, so that at the expiration of our lease it will be absolutely necessary to seek more extensive accommodations. To that end let us all consecrate ourselves with renewed energy.

Mr. Smith responded in the following language:

Mr. Wright: It is with much pleasure and gratification that I receive the report of the committee charged with the duty of arranging, fitting and furnishing these rooms for the purposes of this exchange; that they are conveniently furnished for business and present a bright and cheerful appearance is evident to every one present here to-day; in the name of the exchange and on behalf of its members, I thank you and your fellow committeemen for the excellence of your work.

It is now my pleasant duty to declare these rooms ready at the close of this brief hour for the business uses of members, and to urge and enjoin each member of the exchange to avail himself of the advantages which they possess by reason of their central location and their completeness of detail, and to see to it that they are devoted to the purposes for which they are designed and in promotion of the best interests of the building industries of the city of New York; and, on behalf of the management, I desire to state that every effort proper will be made to secure to the members of the exchange their enjoyment of the business privileges which have here been provided.

Members of the Exchange and Friends: In deciding to remove from our old quarters in Vesey street to these rooms, we feel that we have made a step forward and that perhaps the Mechanics' and Traders' Exchange is now upon the threshold of better things and of greater and wider possibilities; that the advance having been once taken up, it will continue until we shall have adorned our city with a magnificent structure and with fitting and appropriate ceremonies dedicated it to the uses of the building trades which we here to-day largely represent.

NECESSITY OF AN EXCHANGE BUILDING.

An exchange building such as I have briefly suggested would, in addition to being the center of the great industries connected with the construction of buildings and kindred works, be to some extent an expression of the civic pride of the builders of this city.

This is not a new suggestion to many of you and I am firmly of the belief that it will take practicable form and this much desired building will yet be erected, and a permanent business home thereby be secured to the men through whose instrumentality during the past twenty-five years sixty thousand buildings have been erected in this city at a cost of one thousand millions of dollars; this statement does not include such contract work as sewers, paving, grading, &c., but it is confined to the single item of buildings of various kinds.

It seems to me that the best method of attaining our object and securing the erection of a building in the near future is to make the best possible use of what we have here, conserving the opportunities afforded for business and personal intercourse and the cultivation of friendly relations as a means to an end.

THE EXCHANGE A CORPORATE BODY.

This exchange as a corporate body is not venerable by reason of its age; its record, however, is in all respects an honorable one, and it has borne upon its rolls the names of many men of high character and spotless reputation.

We believe that we can truthfully say that in the trades represented in its membership are employed a greater number of able-bodied men than are employed in any other branch of business in the City of New York; and that through and by reason of this employment more homes are made comfortable than by any other single agency or employment. And it is to the credit of the employers in the trades represented in this exchange, that the workman can so easily start a business of his own and thereby become an employer; instances almost without number occur to each of us where the experienced employer has been succeeded by his foreman or workman, or they have engaged in business for themselves and have had his counsel and advice in their beginnings.

With enlarged membership and a more complete consolidation of interests and responsibilities, this exchange can consistently undertake and possibly succeed in securing the settlement by arbitration of those differences which seem to be constantly arising between the wage earner and the wage payer.

Concluding, I enjoin upon each member the endeavor to make this daily meeting place his sphere of usefulness and helpfulness to his business associates, and in this most practical way show that membership means fellowship.

Addresses were also made by J. S. Stevens of the Philadelphia Builders' Exchange; John J. Tucker, president of the Building Trades Club; Isaac A. Hopper, Andrew J. Campbell, Thomas J. Brady and William C. Smith.

In the evening of the same day the Building Trades Club tendered at their handsome clubhouse, 117 East Twenty-third street, a reception to the president and secretary of the National Association of Builders. The programme consisted of music by Young's orchestra, followed by a number of special features, including character and humorous songs, recitations and legerdemain. Following the musical and literary features, refreshments were served in the rooms on the main floor of the building. During the intermission Secretary Wright stated that the Chicago Exchange was dedicating new quarters on that day, and in response to a congratulatory message sent them early in the afternoon, the following reply had been received:

CHICAGO, April 10.

The Builders' and Traders' Exchange of Chicago, now dedicating its new headquarters, presents the compliments of the season, offers its heartiest congratulations, sincerely hopes and confidently expects the Building Trades Club of New York will, like the brook, go on forever. Wishing you a most enjoyable evening.
CHARLES W. GINDELE,
President.

The entertainment was carried out in the same liberal spirit which has characterized the affairs of the Building Trades Club since its organization.

A House of the Early Settlers.

One of the buildings erected by the early settlers in the locality of Albany is the subject of an interesting account contained in a recent issue of the Albany *Journal*. This building, which is now being torn down, was erected, it is stated, in 1710 and was outside of the stockade which protected the city from Indians. It was then used as a trading store, and goods were bartered with the Indian for whole and merchantable beaver skins. The name of the builder was Jacob Lansen, since changed to Lansing, and his bricks were brought over from Holland in a sailing vessel. When the widow Visscher was the owner she permitted the Indians to use it as a lodging place, while staying over to make purchases, and many a stirring scene was here witnessed, when, after trading their skins for rum, the red men became uproarious under the influence. The widow is reported as using her broom freely upon such occasions, and it was a potent scepter in her hands in restoring order.

High up on the Columbia street gable can be seen the old iron crane that was used in years gone by in hoisting heavy articles to the second story. Another curious feature noticeable from the street is the large door opening on the second floor, originally intended for the reception of articles hoisted from below. This door is divided through the middle, each part swinging on hinges. In the upper half can be discerned a square hole which was used by those within to see what was going on in the direction of the stockade. The windows were furnished with heavy wooden shutters, in the upper parts of which were crescents cut to admit light when they were closed. The crane and divided door are said to have been placed in position when the house was erected. Neither has been used in many a long year.

There are many rare and valuable relics about the old structure. There is an oil painting made directly from the original house. The painter's name is too faint to be deciphered. There are some old Dutch tiles, representing St. Peter hearing the crowing of the cock, and the Prodigal Son, which originally decorated the first fireplace, around which the Indians sat and smoked their pipes with the Dutch traders. There are the old locks and keys of quaint design, still preserved; and all these, together with the divided door with the loophole, crane, and large iron beam pins, have sufficient virtue to entitle them to preservation by the historical-loving people.

CORRESPONDENCE.

Strength of Brackets.

From F. A. U., *Southington, Conn.*—Will some reader of the paper please give me his opinion as to the weight which two brackets like the one shown in the sketch, Fig. 1, will safely sustain? The brackets are 3 feet 6 inches apart, bolted to a 16-inch wall. They are braced and bolted together in a strong manner, the bolts that go through the wall being 1 inch in diameter, with threads cut down to ¾ inch. The weight is equally distributed over the platform, which is 3½ feet square.

Answer.—The inquiry of the correspondent above was referred to a well-known civil engineer, who furnishes the following in reply:

The bracket at first sight seems to be out of proportion. The two 3-inch bolts will entirely cut away both of the members through which they pass, if the pieces are bored, thus reducing the strength of bracket to 0. If we put the bolts on each side of the bracket with cast-iron washers, A, we shall have nearly all of the wood left to use, but we cut up through the platform, which to shearing of the 1-inch rod would equal the load which could be placed on platform. To determine this we take the area of rod = 0.7854 square inch × 8000 pounds (safe shearing strength of wrought iron), which equals 6283 pounds. A load of 6283 pounds on one bracket is all the rod will safely carry without shearing at wall line.

We can now try the strength of the rod to resist pulling apart. The pull on the rod will be caused by the weight coming on brace, which is indicated by the letter D in Fig. 1, and equals $\frac{30.5}{42}$ of the whole load. In strain diagram, Fig. 2, let $a - c = 30.5$. Draw $a - b$ parallel to the rod and $b - c$ parallel to brace.

Then $b - c$ = the strain in brace = 43 and $a - c$ = the strains in rod = 30.5. Therefore the strain in rod equals $\frac{30.5}{42}$ of the whole load on platform. Calling the safe tensile strength of rod 5300 pounds = ¾ inch diameter (= 0.4417 square inch) × 12,000 pounds, the safe tensile strength of wrought iron.

Then the load on platform to produce 571 pounds. To resist this we have 4 × 4 × 360 pounds (safe shearing strength of spruce across the grain) = 5760 pounds, so that no trouble at this point need be feared. From the above we conclude that 1600 pounds on each bracket, or 3200 pounds on two, is all that they will safely carry. To get the applied load we must deduct the weight of brackets, including the 4 and 3 inch bolts and cast iron washers.

This bracket seems faulty in construction in several places. First, in not being supported at or near the bottom of vertical members, either by a corbel or by a bolt which shall take the entire weight of platform and load, thus relieving the upper tie rod of any tendency to shear off at wall line. Then the extremely large bolts (3 inch) could be done away with and a single ¾-inch bolt would probably answer at each joint. The bracket might be constructed as in Fig. 3, the bottom of the vertical member being supported by corbel and the joint at F′ framed and primed with angle, as shown. The lower leg of angle serves as washer for the tie bolt and horizontal leg secured by two lag screws to top members. These will

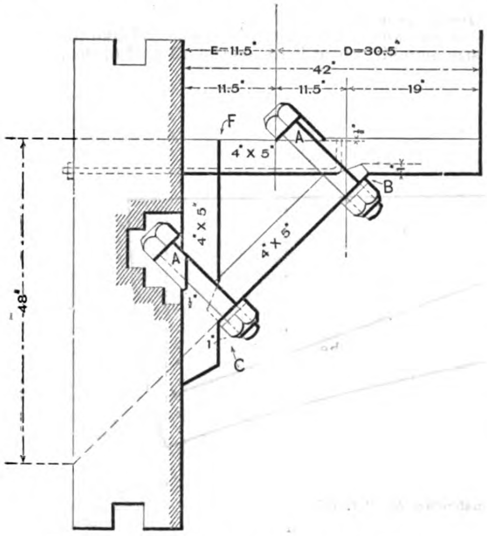


Fig. 1.—Sketch of Bracket Submitted by "F. A. U."

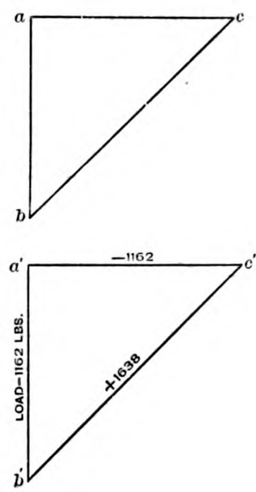


Fig. 2.—Strain Diagrams.

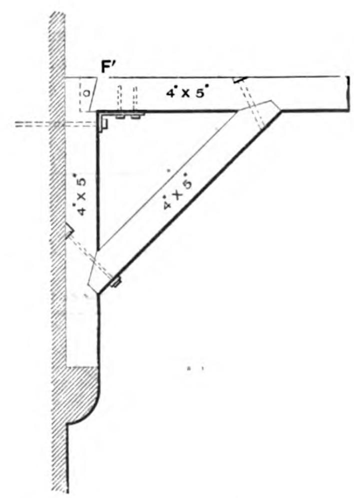


Fig. 3.—Suggested Method of Constructing the Brackets.

Strength of Brackets.

give an evenly distributed load must rest on the horizontal member. But suppose that this is not so, and that the load is evenly distributed. It seems evident that no movement or rupture can take place at joints B and C before the 1-inch tie rod fails, either by pulling apart or shearing off at wall line, or before the part of vertical member above 1-inch tie rod is pushed up through, caused by the weight of bracket and load. This last point seems to be the weakest spot in the bracket. As failure here must be caused by longitudinal shearing, we can determine the strength of vertical above tie rod by finding its safe resistance to shearing along the grain.

By reference to Fig. 1 it will be seen that there are 4 inches above tie rod and that tie rod must be forced through this 4 inches to make failure possible. Then we have 2 × 4 × 5 inches × 40 pounds (safe resistence of spruce to shearing along the grain). This gives 1600 pounds as the largest load that can safely be borne by the one bracket without danger of failure at point F, Fig. 1.

The next weakest point seems to be at wall line, where the load on platform is liable to shear off the 1-inch tie rod. The shearing strain at this point will equal the load, so that the safe resistance to this strain must be $\frac{42}{30.5} \times 5300$ pounds = 7298 pounds. Now having found that the point F, Fig. 1, is the weakest point and that 1600 pounds is the limit of load for one bracket—taking this as the load we find a strain of 1638 pounds to exist in brace. Safe compressive strength of spruce being 650 pounds per square inch, we have to resist this strain 4 × 5 × 650 = 13,000 pounds. There is then no trouble about the strength of the brace. The shearing at head and foot of brace = 1162 pounds. At the top this is resisted by 4 inches × 15 inches × 40 pounds = 2400 pounds, so that the two 3-inch bolts are of little value, simply to keep pieces together. At the foot the 1162 pounds strain is resisted by 4 inches × 6 inches × 40 pounds = 960 pounds, the safe shearing strength of the vertical below joint. This leaves 202 pounds strain to be taken care of by the two 3-inch bolts. The pull on the top member is resisted by the upturned end of tie rod bearing on wood. To pull this out will require 2 × 4 × 21 × 40 pounds = 6720 pounds, so that top member is all right as far as the pulling strain is concerned. At B there might be trouble because of the top member shearing across.

At this point there will be a strain of take the place of bend in 1-inch tie rod, Fig. 1, and the angle will stiffen the joint considerable. A washer on outside of wall would also be better than the nut, as shown in Fig. 1.

Taking the Wind out of Timber.

From H. P. F., *Lapell, Ind.*—I would like some of the readers of the paper to tell me through the columns of the correspondence department how to take the wind out of timber before laying it off.

Interior Finish.

From S. C. M., *Leaf River, Ill.*—Why is it that houses which are finished with Georgia pine casing always have white pine doors? I hope some of my brother chips of experience will explain this.

Keeping Steel Squares from Rusting.

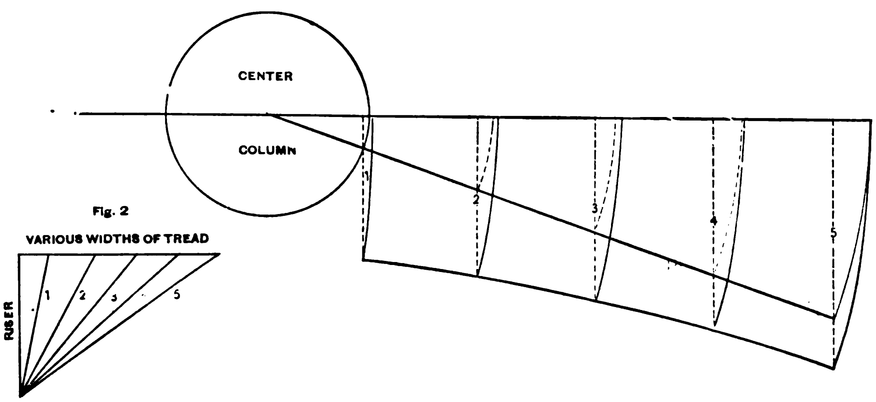
From I. N. M., *Salem, Neb.*—Will some carpenter inform me through the columns of the paper how to keep a steel square from becoming rusty from handling? Some years ago I saw near Winchester, Va., a carpenter who had a steel square, the figures on which were filled in some way with red lead, so that the marks were perfectly plain. The square also had a preparation of some kind upon the body of it which prevented rusting by handling. It looked to me very much as would a piece of oxidized steel.

Eyebrow Windows in Ogee Conical Roof.

From N. A. W., *East Moriches, L. I.*—I would like to have some one tell me, through the columns of the paper, how to frame and finish eyebrow windows in an ogee conical roof, as, for example, in a tower roof.

Stairs for Fire Escape.

From A. L., *Napa, Cal.*—I lately built a circular stairway 40 feet high with about 3 feet rods to be used as a fire escape, and thinking the subject might prove interesting to some of the readers of *Carpentry and Building*, I submit sketches herewith showing the method of procedure. As the stairs were outside the building it was desirable to conceal the soffit with tapered half-inch ceiling, but discovered that both edges being straight it would not work. The ceiling was about $3\frac{1}{4}$ inches wide at the wide end, and we had to work out $\frac{1}{8}$ to $\frac{3}{16}$ inch to the center of each board. After we had done this we dropped them into boiling water and they fitted very well. We did not split or break any of them. I would like to have some practical stair builders give a rule for obtaining the proper form of such a ceiling, or tell me if the sketch which I inclose is correct. The larger drawing represents the plan of step, while the smaller one at the left shows various widths of tread. The lines 1, 2, 3, 4, 5 correspond with the dotted lines of the same numbers shown in the larger drawing. It will be observed that the line drawn through those points is curved.



Circular Stairs for Fire Escape as Constructed by "A. L."

Raising Heavy Roofs.

From J. C., *Cohoes, N. Y.*—I would like to see discussed by the practical readers of the paper the question of raising heavy roofs in single bends, such as those for churches, for example. I should also be interested in reading the methods employed by those engaged in the building trades relating to the practical handling of derricks or gin poles.

Shop Practice.

From OBSERVER, *Allegheny, Pa.*—I am a reader of *Carpentry and Building*, and notice in the December issue that the editor desires letters from the readers of the paper. I am glad to see that the columns are open to any and all who may wish to discuss topics of interest. I wish to say several things about our trade, but have not before had an opportunity to express myself. I have been working 20 years at carpenter and joiner work, and am always learning and willing to learn anything about house building. The various issues of the paper are good in every way and handy to have about the place; but they generally say too much about roofs, and not enough about shop work and the finishing of interior of houses. Some boss carpenters are very peculiar in their manners, and if they have good mechanics or good men they are unable to keep them on account of bad treatment. Some men can do more work in nine hours than others can do in ten or twelve, and yet bosses will pay the inferior man just the same per day. It is no wonder so many journeymen go to contracting and take work at low prices. I want to see good men obtain good wages, and I am sure they will do the work quickly and with entire satisfaction. Another objectionable feature is the way some bosses in the shops and planing mills hurry the work with the wagon waiting at the door. Under these circumstances, the workmanship cannot be expected to be of a high order. It seems to me a simple job to clean doors by hand, and yet plenty of carpenters do not do it right. They use smoothing planes, and consequently make the doors full of bumps. They sandpaper the coarse part of the work first and scratch the stiles in sandpapering up the work. A good jack plane or short fore plane should be used first, finishing up with the smoothing plane and sandpapering the stiles. The result is a good door, finished at the rate of one an hour. All sash of whatever size should be dovetailed at the meeting rails, as no other method will hold for any length of time. It takes a little longer to do the work, but it pays, and the result is something that will stand as long as there is a part of the sash left. A nail should not be put through the tenon to hold it together, although some people do the work this way. A good pin $\frac{5}{16}$ inch in diameter ought to be put through the stiles, even in sash.

Shingling Valleys.

From W. T. T., *Onaga, Kan.*—There is a mistake in my sketch accompanying the article on shingling valleys, published in the April issue of *Carpentry and Building*, which, I think, deserves severe criticism. The tin shingle is represented as lying loose on the butts of the common shingles. This would never do. The edges of the tin shingles should lie entirely under the edges of the common shingles, instead of on top as represented in the sketch published.

Discussion of Handrailing Problems.

From W. G. P., *Toronto, Canada.*—In regard to the papers which have been published during the past year on handrailing, I would like to say a few words. With all due respect to such men as Mr. Monckton and Mr. Secor, is it not a fact that what is wanted at the present day is something which the student can grasp at sight; that is, a drawing that speaks for itself, as it were? Take, for instance, the diagram from "Chips," California, presented in the May number of the paper for 1889, and the whole thing is seen at a glance without reading a word as to what he has to say about it. Even the bevel is so clear that no one has ever asked for an explanation of it, as he evidently expected they would, for he kindly offered to shed further light on the subject if desired. Such men as "Chips" deserve our thanks equally with such men as the above-mentioned authors. I have found a great many young men return to the subject again after once giving it up in despair, frightened by the array of figures, letters, &c., to be found in the works of some of our leading authors upon handrailing. Now, in regard to the system known as the "Falling Line" system (although its superiority cannot be questioned as one can rigidly follow any predetermined line), I have never known one to go to the pains of becoming thoroughly acquainted with it, as it is too much trouble. Now, I think "Chips" has the same idea as myself, as laid down in the October number of the paper. All I want is the spread of the tangents and a level line across them, but if "Chips" will give us another with the two pitches different and requiring two bevels, he will receive the thanks of a great many of the readers of *Carpentry and Building*.

Another system I would like to inquire about is the one mentioned in the November number for 1887. It is by a practical man and it can be seen at a glance that he has an eye for easements, which very few possess. They are almost always too abrupt. Like "Chips'" diagram it needs no references, but at the same time I would like to possess the work of the author if it is published. No doubt it is old, but I do not mind that. I have a great many old things in my library, but they are good. Perhaps "J. A." of Utica, N. Y., will oblige by naming the author.

Sharpening Molding Plane Irons.

From H. D., *New York City.*—In the January issue of the paper "T. B." of Headingly, Manitoba, asks the proper method of grinding and even sharpening irons of molding planes. In the first place, permit me to say that oil stones are not used to grind any tool, their duty being to sharpen the edge after the tool has left the grindstone or emery wheel. If "T. B." has a complete set of molding planes it would be well for him to secure some small oil stones of different size convex edges. The irregular edges consisting of angles, arrises, convexes, concaves and possibly ogees, cannot conveniently be ground on a grindstone. I have always used a fine file for getting in the angles and for the curved edges have employed oil stones. Before filing the irons, however, they should be softened by passing them through the fire, and when filed should be tempered anew. If "T. B." is acquainted with some wood carver, he will perhaps show him how to handle oil stones. If the angle is not sharp enough after having filed it, use an oil stone having an edge less than 90°, or V-shaped.

Filing Saws.

From A. R., *La Crosse, Wis.*—In the sketches which I send is illustrated something that may be of interest to the readers of *Carpentry and Building*, particularly those chips of the craft not wholly seasoned. The sketches show a file handle

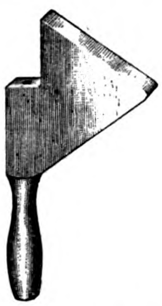


Fig. 1.—Shape of the File Handle.

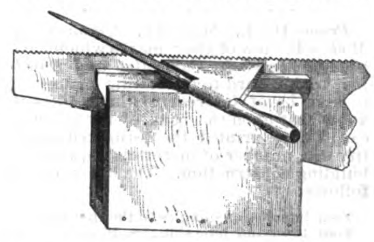


Fig. 2.—Showing the Application of the Handle

Filing Saws.—Sketches Submitted by "A. R."

which will aid the user in obtaining a uniform bevel and hook to the points of his saw. Fig. 1 shows the shape of the handle, cut from an inch board. The recess in it is intended to receive that portion of the file which is not cut. Fig. 2 clearly shows the application of the handle. Let the upper beveled side of the handle strike the blade, thus giving a uniform bevel. Before inserting the file in the handle the operator should see to it that it is twisted in such a way that when the flat side of the handle is held parallel to the cutting edge of the saw, it will give the desired hook. The clamp shown in Fig. 2 can be made with 8-inch sides, about 10 inches high. The jaws are let in a downward slant, securely glued and screwed to uprights. The separator at the bottom is nailed to the sides. This clamp can be used in a bench vise or may be screwed to a piece of plank across a window and tightened with a screw clamp for holding the saw.

Criticisms of First-Prize Design in the XXIst Competition.

From J. C. H., *Chicago, Ill.*—I have been a reader of *Carpentry and Building* for about ten years and have always been interested in it, especially so in this competition. I have partially examined the house plans receiving the first prize and am inclined to think the committee was not competent or showed partiality. Let me call attention to some items which they ought to have seen according to the itemized bill. In the matter of excavating, 62 yards is wrong according to the author's specifications and figures. It will be seen that there is at least 87 yards, and at his price amounts to $21.75, being $6.25 more than his item calls for. He also allows 3900 brick. According to my figures it will take at least 4360, which at his price amounts to $52.32, or an excess of $5.52, The item for plastering calls for 400 yards, while there is at least 490 yards, and at his figures makes $58.80, an excess of $10.80. According to the itemized bill the figures amount to more than the stipulated price. The items figure $1014.38, and adding the excess of the items of excavating, $6.25, brick, $5.52, and plastering $10.80, gives a grand total of $1036.95, This looks to me as if there was something wrong. Then, again, the names of the architect and contractor are the same

From G. A. T., *Butler, Pa.*—In looking over the April issue I notice the names of the winners of the prizes in the XXIst competition and think some one made an error in counting up the cost in the detailed estimate published in connection with the first-prize design. I have carefully added the figures and make the total $1014.38. Now, this is over the fixed amount, and a good bit of the material is No. 2. I think $1.20 per perch laid is pretty low for stone. We cannot get the stone here for a cent less than $1.50 per perch delivered, and the lowest we can get it laid is $1.25 per perch. I also think that plastering at 13$\frac{3}{4}\frac{8}{8}$ cents per square yard is pretty low for the kind specified. The lowest we can get plastering done here is 25 cents per square yard. Now, I do not like to find fault or correct mistakes, but I want to see a fair show, as the one to whom the prize was awarded has exceeded the cost to which the house in the competition was limited.

From C. H. C., *Boulder, Col.*—In footing up the total cost of the first-prize design in the $1000 competition I make the total $1014.38. I wish to know if it is customary to plaster with one coat in the East. I would like to learn how to do a good quality of work with one coat of lime, hair and sand mortar. I am accustomed to three-coat work, or plaster paris finish. In justice to all competitors I think this plan and specification should be rectified. I have 11 years' numbers of *Carpentry and Building*, and want to feel that all have an equal show in prize competitions. I think the committee have overlooked a great many things in this design. I trust, however, I shall not be misunderstood in this matter.

From JOHN P. KINGSTON, *Worcester, Mass.*—In looking over the April issue of *Carpentry and Building* containing my design, which was awarded the first prize in the XXIst Competition, and comparing the published figures with those contained in the estimate I received from the contractor, I find several errors have occurred. One can readily see that in the items of door and window finish. These items should read :

27 sides finish for doors, at 50 cents.....$13.50
14 sides finish for windows, at 70 cents.. 9.80

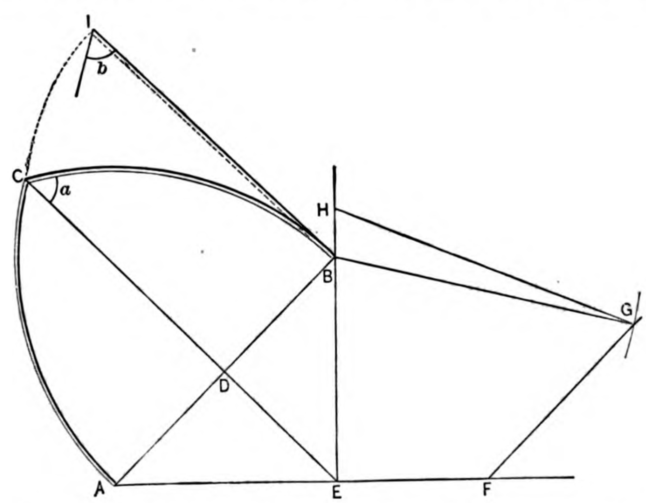
Then again, the item of incidentals is carried out wrong, it being $43.38 instead of $48.38. This makes the total cost $995.58.

Hanging Double-Swing Doors.

From the CHICAGO SPRING BUTT COMPANY, *Chicago, Ill.*—Replying to the correspondent "J. F. R.," whose inquiry appears in the April issue of *Carpentry and Building*, would say that it is not in the mechanical nature of things to hang a door with Chicago blank butts, or any other three-leaved butt of which we have heard, without the door sagging. It is absolutely necessary to use the spring butt above the blank. When the doors are very high they have a tendency to warp, in which case a blank placed between the two hinges will avoid it, and when the doors are low a single spring hinge will operate it, with a blank placed below the spring hinge. In the directions which we send with our double-acting spring butt it is stated that "when the doors are light one spring put at the top and one blank at the bottom will work very well. Never put the blank at the top of the door. Be particular to hang them in perpendicular line." The directions for applying the blank butt are to the effect that the butt is to be put on with the outside leaf ball up on the door or down on the jamb, and always below the spring butt.

Framing a Gothic Window.

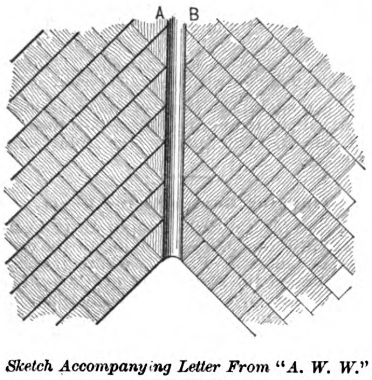
From W. C. M., *Oakland, Cal.*—In the December issue of the paper I notice an inquiry from "J. S. Q" of Morgantown, Ind., as to the method of getting the length of jambs in a Gothic window frame before bending. The accompanying diagram gives the desired solution of the problem, and "J. S. Q." can obtain the lengths of his jambs before bending to a gnat's heel. Referring to the diagram, let A B C represent the jambs in a Gothic window frame. Let E F equal E D and draw the line from F to G. Now let G B equal A B, the radius. Draw from E to H equal to the line D C; let G H equal B I, which is the length of the straight jamb. To find the bevel, describe the arcs as shown at *a* and *b*.



Framing a Gothic Window.—Method of Finding Length of Jamb Before Bending.

Tin Shingles for Valleys.

From A. W. W., *Sudbury.*—Would some of the kindly disposed readers of *Carpentry and Building* express their opinions concerning the use of tin

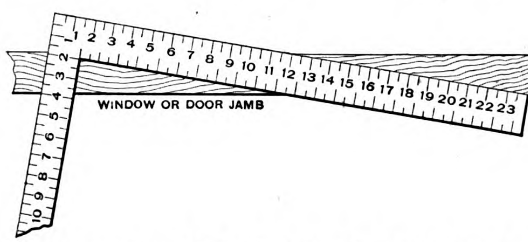


Sketch Accompanying Letter From "A. W. W." of Sudbury.

shingles, or a continuous gutter of wide tin in shingling a valley. I would also like to learn their method of cutting the shingles in the valley. For my part, I have always used a continuous gutter of galvanized iron, zinc or tin, running under the shingles 8 or 10 inches at each side with soldered joints. I cut my shingles so that the grain of the wood runs in the same direction as the valley and abutting against the straight shingles laid next to the valley, as shown on the side marked A of the accompanying sketch. I have, however, been advised to use tin shingles and let the butts finish at the valley, as shown at the side marked B of the sketch. Will the readers kindly furnish information on this subject, as I feel it would be highly appreciated by others besides myself?

Pitch of Door and Window Sills.

From T. R. A., *Ritchey, Mo.*—In reply to "M. E. L.," who asks in the November number of the paper concerning the pitch of door and window sills, permit me to offer the following information: I always make the pitch of door and window sills the same and equal to a rise of 2 inches to the foot, $\frac{8}{12}$ to 4 inches. I always lay the jambs off as indicated in Fig. 1 of the accompanying sketches—that is, 4 inches on the tongue and 24 inches on the blade of the square. I prefer my doors



Pitch of Door and Window Sills.—Fig. 1.—Method Pursued by "T. R. A." in Laying off Jambs.

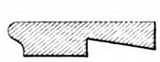


Fig. 2.—Window Stool.

and windows the same pitch, and one good reason I have for using the above pitch is that it members exactly with our mill-made stools, which we obtain from the St. Louis market. In Fig. 2 is shown a sketch of the window stools which we use here. I do not approve of "W. B. V.'s" plan, as his window stool is $\frac{1}{12}$ too great a pitch for our stool.

From O. G., *Lake Mills, Iowa.*—In reply to "M. E. L.," Stryker, Ohio, who asked in a recent issue with regard to the pitch of door and window sills, I would say I always use the same bevel, which is $\frac{3}{4}$ inch in 6 inches. I have employed this pitch for some time and have yet to find any fault with it.

Laying Porch Floors.

From W. W. B., *Toledo, Ohio.*—Will some of the many readers of *Carpentry and Building* give me their method of laying porch floors of $1\frac{1}{8}$ x 3 inch unmatched strips. The hip joint is the point concerning which I desire information. Should or should not a joint be nailed on the hip?

Estimate of Materials.

From D. L. MERRILL, *Union City, Mich.*—In view of the remarks which have been presented in *Carpentry and Building*, with regard to estimating materials, it may be of interest to the readers to know that upon the back of my business card I have printed the estimated quantity of a number of materials required in building construction. The list reads as follows:

Four bunches of shingles to the thousand.

Four thousand pine shingles, 16 inches, will cover five squares.

Three thousand pine shingles, 18 inches long, will cover five squares.

Two pounds three-penny wire nails to 1000 shingles.

One hundred and twenty feet pine flooring will lay 100 feet surface.

One hundred and twenty feet pine siding will lay 100 feet surface.

One thousand feet of lath are 2000 pieces.

One thousand feet of lath will cover 120 square yards.

Twelve pounds of lath nails to 1000 feet of lath.

Forty pickets 2 inches to the rod.

Thirty-five common brick to the foot for chimney—30 of Detroit brick.

Forty of Detroit brick to the foot for well, 20-inch circle.

Two and a half barrels of lime will cover 100 square yards plastering two coats.

One and a half barrels of lime will cover 100 square yards plastering one coat.

One barrel of lime will lay 1000 brick.

One barrel of lime will lay 1 cord of stone.

One barrel of lime, estimate, five-eighths yards of good sand.

One bushel of hair will do for 100 square yards plastering.

One and one-fourth yards of good sand will do for 100 square yards of plastering.

One-third barrel plaster will hard finish 100 square yards.

One barrel water lime will build a 35-barrel cistern.

Two barrels water lime will cement cellar bottom 16 x 24.

Fifty pounds building paper will cover 60 yards.

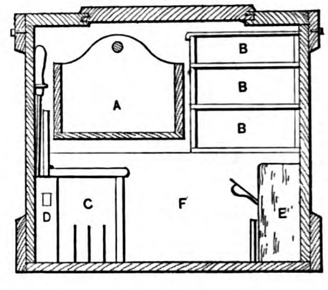
Hanging Sliding Doors.

From O. N. G., *Lake Mills, Iowa.*—Will some practical carpenter who is a reader of the paper tell me what, in his estimation, is the best method of hanging sliding doors in partitions. I would like very much to have the explanation illustrated by means of diagrams.

Note.—With no intention of anticipating the answers which our practical readers may see fit to send in reply to the inquiry of the correspondent above, we would refer "O. N. G.' to the issue of the paper for September of last year, in which he will find in the serial article entitled "The Builder's Guide," an illustrated description of a method of constructing the track and boxing for sliding doors, which may possibly be of interest to him.

Handy Tool Chest.

From J. E. M., *Sacramento, Cal.*—Inclosed herewith I send sketches of a handy tool chest which I built for myself and which I find the most convenient of any I have seen. I have arranged to put my handbox in the chest, as indicated in the



Handy Tool Chest.—Fig. 1.—Cross Section.

cross section, Fig. 1. Nearly every carpenter, I know, is bothered with the handbox when moving from place to place, and if the chest was made as indicated in the sketch this annoyance would be avoided. Referring to the drawing, A is the handbox; B B B tills, the top one being made with a cover; C is the saw till with the lid hung to the chisel rack, the latter being represented by D, while E is the molding rack and F a place for ordinary tools. The tills can be partitioned to suit the different tools. I make the handbox the same length as

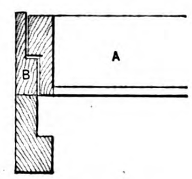


Fig. 2.—Sectional View Showing Construction of Tills.

the bottom till resting on the slide. I make the tills as indicated in the section Fig. 2. A shows the end of the till and B the rabbeted piece or slide. The till being hung in the center allows it to slide easy.

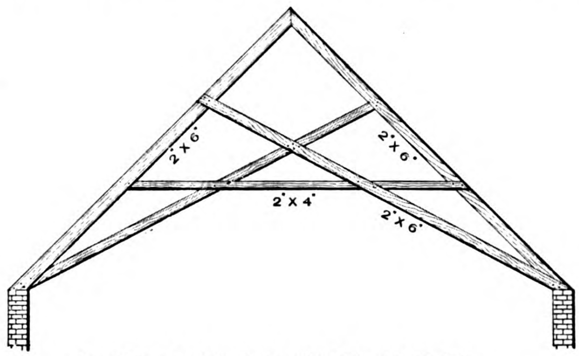
Design for a Six-Room House.

From J. W. R., *Vandalia, Ill.*—I have been a reader of *Carpentry and Building* for several years and would be pleased to see a design for a neat six-room, one-story Queen Anne cottage, with all improvements, such as water closets, bathroom, pantry, china cupboard, bay window, &c. The parlor, sitting room and dining room should connect by folding doors. I have designed a great many houses, but have failed to plan a one story house that just suited me.

Roof Truss Problems.

From C. W. B., *South Denver, Col.*—I send a sketch of a roof truss which I would like to have criticised by the practical readers of *Carpentry and Building*. There is a small church building under construction in this city, and the rafters, which are placed 16 inches from center to center, are trussed as shown in the sketch. The rafters are 2 x 6 inches, the collar beam 2 x 4 inches and the other members

2 x 6 inches. They are all spiked together at the joints where they cross each other. The roof is covered with boards and shingles. The under part of the truss is lathed and plastered. I wish some of the readers of the paper would give me a method of finding the strains in the truss by means of a drawing, or by calculation. I would also like to have a method for finding the amount of horizontal thrust or

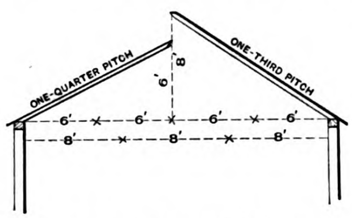


Roof Truss for Church Contributed by "C. W. B."

push against the walls, the latter being of brick, 8 inches thick. Another question I would like to ask is, have any of the readers of the paper ever seen the walls of a building pushed apart and the roof sag where a truss of this form was employed?

Pitch of Roofs.

From A. W. W., *Sudbury.*—Replying to the question propounded by "G. A. L.," in the December number of *Carpentry and Building* with regard to the pitch of



Sketch Illustrating Pitch of Roofs as Understood by "A. W. W."

roofs, I would say that I have several times been asked the same thing. My invariable reply has been that a two-thirds pitch is only a different way of expressing one-third pitch, which is the correct term. The pitch of a roof as mechanically understood is the hight from the top of the plates to the point at which the rafters intersect on the ridge at a run on the rafters from the extreme upper outside corner of the plate as illustrated in the accompanying sketch. In order for a building 24 feet wide to have one-third pitch, the rise of the rafter must be 8 feet, which is one-third the width of the structure and for a quarter pitch the rise of the rafter would be 6 feet, which is one-quarter the width of the building. The sketch which I send will, I think, make my meaning clear.

From P. C., *Cedar Falls, Iowa.*—I notice in *Carpentry and Building* for December that "G. A. L." of South Hanson, Mass., asks what is a two-thirds pitch, and requests the advice of practical men in the trade. I do not claim to be all that the term implies, but try to be as practical as possible. The correspondent also gives his view as to what constitutes a two-thirds pitch, which, as I understand it, is to take two-thirds the width of the building for the length of the rafter. I will just ask him what he would do with a half or one-third pitch. I should think he would have to splice out. It seems to me the question is one which is likely to bring out no little interesting discussion.

From O. L. W., *Dallas, Texas.*—Let me say to "G. A. L" that I have been in nearly every one of the Middle and Western States, and have always found it the rule to express the pitch of roof as the fractional part of the span or width of a building. For example, a building 18 feet wide, with a rise of roof of 6 feet, is spoken of as one-third pitch; if the roof is 12 feet high it is two-thirds pitch.

From F. E. C., *Marion, Ind.*—I notice in the January number of *Carpentry and Building* that "G. A. L." asks what is two-thirds pitch, and then goes on to say that the rafters on a building 12 feet wide, with a two-thirds pitch, would be 8 feet long. Now, I cannot agree with him. Taking the building referred to, which is 12 feet wide, my understanding of the matter would be that a 3-foot rise would equal one-quarter pitch; 4 foot rise would equal one-third pitch; 6-foot rise would equal one-half pitch, and 8-foot rise would equal two-thirds pitch. Using these figures the rafters would be 6.708 feet, 7.211 feet, 8.485 feet and 10 feet respectively in length.

Tool Chest Construction.

From J. E. C., *Marion, Ind.*—I have carefully read the description and scrutinizingly examined the sketches of the many excellent tool chests presented in *Carpentry and Building*, but as yet have seen none that suit me as well as one I built for myself some time ago. I trust the readers of the paper will bear with me while I try and describe what I regard

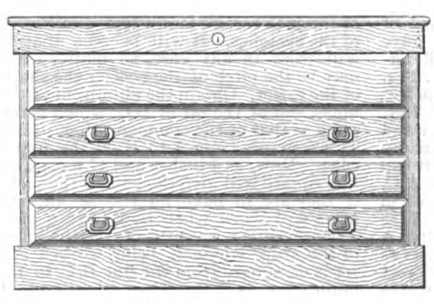


Fig. 1.—Front Elevation.

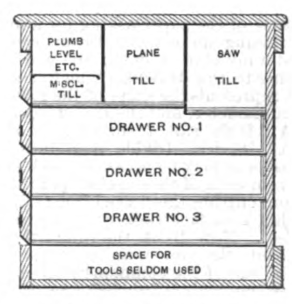


Fig. 2.—Cross Section.

Tool Chest Constructed by "J. E. C." of Marion, Ind.

as a very convenient carpenter's tool chest, the dimensions, of course, being governed by the size and quality of tools to be used. The inside measurements of my chest are 33 inches long, 20 inches wide and 22 inches high. The lid is $\frac{7}{8}$-inch thick with $\frac{3}{4}$-inch nosing, which drops $\frac{3}{8}$-inch and is fastened, as is also the top panel, with nickel finished round headed screws. The body of the chest is of $\frac{7}{8}$-inch stuff with a belt at the top $\frac{5}{8}$ x $3\frac{3}{4}$ inches and at the base by $\frac{7}{8}$ x 4 inches. The corner boards on the ends and rear are $\frac{5}{8}$ x $3\frac{3}{4}$ inches with a 1 inch mold made from California redwood on the corners, base, belt and around the drawers. Fig. 1 of the sketches shows a front view of the chest completed, while Fig. 2 is a cross section showing drawers, tills, &c. In the top of the chest are stationary tills, gained in the body, as shown in Fig. 2. These tills are intended for saws, planes, plumb and level, &c. The front till has a false bottom. Steel squares hang down in the rear of the saw till on steps fastened to the back, going through the bottom of the tills and back of the drawers. Below these saw tills and above the base, are drawers, properly proportioned, so as to give a separate place for different tools, while beneath the drawers is a convenient place for such tools as are least needed. When the tools are all packed away where they belong, I slide two steel rods $\frac{1}{8}$ inch in thickness from the front top till, down through the drawers and back of the base, close the lid, turn my J. B. Miller keyless lock, and go away feeling that all are safe.

From A. T., *Albany, Oregon*—I have been a reader of *Carpentry and Building* for more than a year and have been much interested in the matter published relating to tool chest construction. For instance, there was in the October issue a description of a very nice chest furnished by "G. H. R.," Delphi, N. Y., but the one which appeals to my judgment is the chest described by "C. T. G.," of Pittsfield, Mass. This to use a slang expression, "takes the cake." The correspondent says "the principle of a 'place for everything and everything in its place' holds as good with a carpenter as with a member of any other trade or profession." Not only should he be able to place his hand upon any desired tool without rummaging over the entire kit, but he says he wants to find it free from unnecessary scratches or marks, and if it be an edge tool as sharp at least, if not sharper as he left it. He also says "if he be a sharp man he will keep sharp tools sharpened very sharply. The chest should be strong and the space utilized to the best advantage." Now, here is the point. I would like to ask him how he keeps his sharp tools among the bench planes, framing planes, &c., as he does with the level? I have never seen a practical tool chest where the level is among such tools. Out in this section we always keep it in a drawer by itself, and I think it is the best way. Why should a carpenter keep a level among such tools, especially when they are moved about in a wagon and badly shaken about? The first thing he knows he has to make use of a screw driver in order to repair his level. I cannot complain about "C. T. G.'s" tool chest, but I think if a man is very sharp he will not keep a level among such tools as I have named. One other thing which I cannot understand is this: He says "By the way, I have a conveniently arranged partition which fits snugly against the last molding plane, whether there be five or 15 in the chest." There is nothing in the drawings submitted to show the arrangement of the partition, and I think the matter would be more satisfactory if the correspondent would enlighten us a little on this point. I think, however, all things considered, that it will not take a very sharp man to construct a tool chest like that of "C. T. G." In conclusion I would say that there are no flies on "G. H. R.'s" tool chest.

Framing an Octagon Tower Roof.

From P. H. L., *Denver, Col.*—In reply to "P. A. C." of San Francisco, Cal., whose inquiry appears in the October issue of the paper asking for a method of framing an octagon tower roof, I gave him my plan of doing the work. Referring to the drawings which I send, Fig. 1 represents the shape of the tower, 20 feet in diameter, and the rise of roof, 25 feet. A B is the run of the common rafter and A C its rise. Divide A B into as many parts as may be necessary and square up from each of these points parallel to A C, and cutting the curved line C B, which in this case is struck with a sweep of 38 feet. Now divide the run of the rafter A D into the same number of equal parts as the run of the common rafter A B. Erect perpendiculars from each of these points at right angles to A D and set off from A to E the same distance as that from A to C on the common rafter. Next set off 1 1, 2 2, 3 3, &c., on the hip to correspond with 1 1, 2 2, 3 3, &c, on the common rafter and connect these points. The result is the shape of the hip rafter. As for the jack rafters, their lengths depend on the number necessary. If one is sufficient, its length would be one-half that of the common rafter taken on the working line, and by making the cut for the upper end through this point, as shown at H, Fig. 2, we have the proper length of the jack. The plumb and vertical cuts of the jacks are the same as those on the common rafter. The figures on the steel square which give the cuts for an octagon are 7 inches and 17 inches, the 7-inch side giving the cuts. The figures on the square which will give the cuts for common rafter in this case are 5 inches on the tongue and 12½ inches on the blade, the latter giving the upper cut and the tongue the lower cut. The figures giving the cuts for the hip rafter in this case are 5 and 5⅓ inches on the tongue and 12½ inches on the blade, the latter giving the plumb cut. This, I think, will be readily understood for the reason that the run of a hip rafter on an octagon is one-twelfth greater than the run of the common rafter. My method of obtaining cuts of the jack rafters is illustrated in Fig. 3 of the sketches. It will be seen that it will work in any case, no matter what may be the pitch of the roof or the shape of the rafter. Obtain the plumb cut of the upper end of the rafter B C, which is the same as that of the common rafter. Then square across from A to B on the upper edge. Now, as 7 inches and 17 inches on the square will give the cuts of the jacks if they are to have no rise at all, the same will work when they have a rise. Take seventeen sevenths of the thickness of the stuff which is being worked and set it off square from the line B C to the outer edge, as C D. Then a line from A to C is the bevel of the jacks.

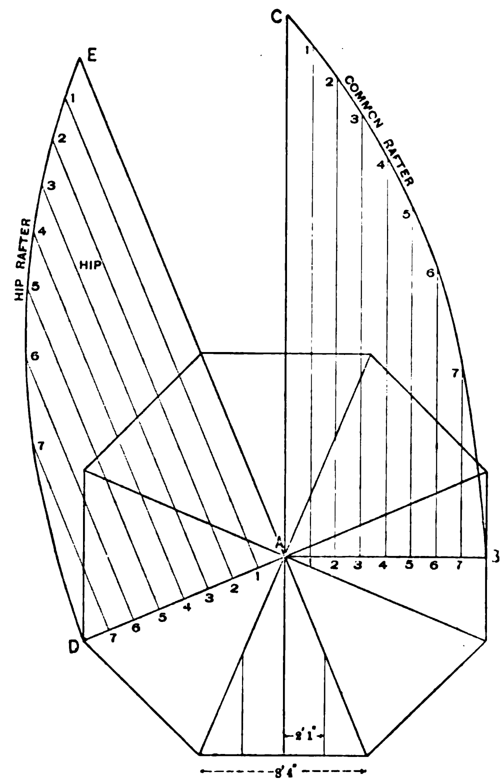


Fig. 1.—Shape of the Tower.

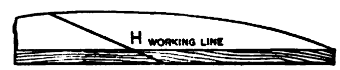


Fig. 2.—Upper or Plumb Cut of Jack Rafter.

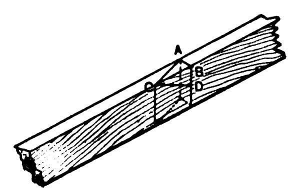


Fig. 3.—Obtaining Bevels of the Jack Rafters.

Framing an Octagon Tower Roof.—Diagrams Submitted by "P. H. L."

Finding the Length of Jack Rafters.

From C. C. G., *Oil City, Pa.*—As I am a reader of *Carpentry and Building*, I have noticed inquiries concerning the method of finding the difference in the length of jack rafters. With regard to the matter I would say to the correspondent who originally inquired, find the length of the common rafter in inches for a 12-inch run, and multiply this by the distance in inches the jack rafters are to be from center to center and divide the result by 12. This gives the difference in the length of jack rafters in inches. For example, if the rise is 12 inches and the run is 12 inches, the run of the rafter is nearly 17 inches. Now, 17 multiplied by 28 inches and divided by 12 gives 39⅔ inches. This is the difference in the length of the jack rafters for a one-half pitch roof where the jacks are 28 inches from centers. This rule will work on any pitch of roof.

Framing Supplement Plates.

From T. B., *Headingly, Manitoba.*—I would ask the subscribers to the paper what they do with the supplement plates which the publishers are so good as to give with each issue of the paper. For my part, I frame a number of them, hanging them in my sitting room. They look splendid, especially the double-page ones. I do this work during the long winter evenings, instead of loafing around hotels, as some men do.

Steam and Hot-Water Heating.

From D. S. McD., *Mount Morris, Ill.*—I hope some of the practical readers of the paper will give a good talk on house heating by means of hot water and steam. The subject is one in which many of us are interested, and valuable hints and suggestions would result from a talk about it.

Note.—The topics mentioned by our correspondent are of such a nature that they can hardly be handled in an adequate manner in the brief limits of the correspondence department of the paper, but as our good friend states, there are many valuable hints and suggestions that might be brought out by a general discussion of steam and hot-water heating, and we trust our practical readers will accept the invitation and submit their views for publication.

Combination Clothes and Tool Chest.

From F. C., *Aspen, Col.*—I am a tramp carpenter and sometimes find it desirable to move about on the railroads. I would like to ask some of the practical readers of *Carpentry and Building* if they will give me a design for a chest in which to keep tools, books and clothes. I want a chest that is light yet strong and something that an ordinary "baggage smasher" cannot break to pieces.

Note.—It is possible our correspondent will be interested in the designs of tool chests which have appeared from time to time in previous issues of the paper. While they may not exactly serve his purpose, they may offer hints and suggestions which will enable him to produce a modified form of chest which will meet his requirements.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers.

President, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.
First Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Second Vice-President, CHARLES A. RUPP, Builders' Association Exchange, Buffalo, N. Y.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago, Ill.

DIRECTORS.

Baltimore, Md	NOBLE H. CREAGER.
Boston, Mass	JAMES I. WINGATE.
Buffalo, N. Y	H. C. HARROWER.
Chicago	JOHN RAWLE.
Cincinnati	L. B. HANCOCK.
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Milwaukee	HENRY FERGE.
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Omaha	N. B. HUSSEY.
Philadelphia	STACY REEVES.
Providence	WM. W. BATCHELDER.
Rochester	H. H. EDGERTON.
St. Louis	CHAS. B. MCCORMACK.
St. Paul	JOHN W. MAKINSON.
Saginaw	JOHN H. QUALLMAN.
Wilmington	A. S. REED.
Worcester	O. S. KENDALL.

Directors for 1893.

Quite a number of the filial bodies have not yet named their directors for the current year, although several times requested so to do. The information is important, so that the official report when issued may be complete. Exchanges which have thus failed to inform the secretary, are requested to send in the names of their directors at the earliest possible moment.

Bulletins.

Following out a suggestion which was made by the secretary of one of the local bodies at the last convention, bulletins on important subjects, which will be sure to interest the individual members of the filial associations, will be issued occasionally from the secretary's office. These bulletins will be sent when possible direct to the individual members, and when their addresses are not known to the national secretary, the bulletins will be sent to the secretaries of the exchanges for distribution.

Occurrences which involve some principle underlying the complicated propositions with which builders are thrown in contact will thus be brought prominently to the attention and builders will be warned or guided thereby so as to protect themselves against or avoid dangers which threaten all in common.

Secretaries of local bodies, and indeed all builders, are urged to send to the national secretary the detail of any matters which they think should be specially circulated for the information of the building fraternity.

Code of Practice.

The editorial of last month in which reference was made to "uniformity in methods," has evidently attracted attention, for during the month there has been constant demand from all parts of the country for copies of the "Code of Practice," which we offered to send to any builders desiring them. This result is most encouraging, for it shows in the first place that our articles in *Carpentry and Building* are attentively read, and that the work of the National Association is found valuable by individual builders in every direction. It would be still more encouraging if all the constituent bodies of the National Association would move with energy in establishing on a firm and effective basis these codes. There is no department in which more active work is needed than in this. The existence of bad practices or the non existence of any definite system in the relation of builders to each other or to architects and owners, is largely due to the lack of organized effort or laxity of effort in bodies organized. The National Association has done its duty in formulating codes. Now the constituent bodies must put them into operation.

Membership in the National Association.

In the annual report of the secretary at the last convention it was stated that in the statistical department we have record of some 50 or more builders' exchanges in various parts of the country, which have been organized largely on the information and advice sent out from the National secretary's office. This statement naturally excites the inquiry, Why, then, are these bodies not connected with the National? Why are they not contributing their part toward its life and usefulness by supporting it financially on the same basis as their sister exchanges which are affiliated, and by lending aid, counsel, advice and experience from the fund of information in which the membership of each local body should be rich? The answer to these queries, in many cases, is that the new exchanges are, as yet, too ignorant of their own powers for their own local work, and too inexperienced in their relations to other organized bodies to realize that they ought to join in the work undertaken by the National Association. Their allegiance will come in due time. There are, however, a very considerable number of exchanges of sufficiently long standing to comprehend the value and importance of the National work, and whose very existence is due to the advice, counsel and assistance of the National Association, who, for either no reasons or for very insufficient ones, keep aloof, and neither lend us their support, experience or information. This is wrong. It is to be hoped that such bodies will speedily see their error and join hands with us.

To All Filial Bodies.

All filial bodies which have not made special effort to introduce the Uniform Contract are requested to take the matter up with vigor, and all bodies which have previously agitated this important subject are now newly urged to work in this direction. The form as revised at the last meeting of the joint committee is looked upon as a great improvement and is meeting with a large increase of approval. All local bodies are requested to destroy the old forms in their possession and secure the revised forms at once.

The publishers will furnish with each order such number of circulars of information in regard to the form as may be necessary, giving the authority for its issuance, terms for the document singly or in numbers, &c., &c.

The circulars or "slips" of information are intended to be sent out with specimen copies of the contract which each local body is expected to send gratis to architects, owners and other interested parties in its vicinity. Secretaries of local bodies should make a point of keeping a supply of these "slips" on hand and in every letter sent out from their offices to inclose one. Much good may be done in this way in disseminating to the public the information we desire they should have in regard to this document, which we believe so well protects our interests in this matter of contracts.

To Secretaries.

All secretaries who have not yet complied with my request for a full list of their members and their private addresses are urged to send the same with as little delay as possible. It is my intention during the current year to approach more directly to the individual than in past years, and these addresses are particularly important for the work anticipated.

WM. H. SAYWARD,
Sec'y N. A. of B.

Announcement.

Owing to an accident which has temporarily disabled my assistant the official report of the Seventh Convention will be still further delayed. Several misfortunes—one of them my own sickness—have combined to delay the publication of the report longer than usual, for which I hope allowance will be made by the filial bodies. To partially make up for the above mentioned delay, arrangements have been made to issue the annual report of the secretary in a separate pamphlet and copies will be mailed to all constituent bodies at once.

WM. H. SAYWARD,
Sec'y N. A. of B.

Administration of Exchanges.

In the April number was presented, under the above heading, the report of the Boston Builders' Exchange as offered at the seventh annual convention, and we now offer the report of the Philadelphia Exchange made at the same meeting. It is intended to present a number of the reports of local exchanges that were offered at St. Louis, in the belief that they will do much good to builders everywhere. It is true that these reports will finally be printed in full in the official report, but *Carpentry and Building* reaches a much larger constituency, and many groups of builders not now organized may be stimulated by reading these reports to see what they can do in the same direction, and then eventually they may become constituent parts of the national body.

PHILADELPHIA, February 8, 1893.

To the President, Officers and Members of the Seventh Annual Convention of the National Association of Builders:

GENTLEMEN.—The Master Builders' Exchange of Philadelphia, through her delegates, sends greeting to the sister exchanges of the National Association and has pleasure in presenting the following report of her substantial progress during the year 1892.

Financially we have nothing to complain of, as all our departments are in a healthy, thriving and prosperous condition.

Cost of building		$162,424.84
Furniture and fixtures		14,361.50
Total		$176,786.34
Bonds outstanding	$100,000.00	
Floating debt	17,357.14	$117,357.14
		$59,429.20

Net Earnings of Each Department for the Year 1893.

Real estate department (net after deducting all expenses)—9⅛ per cent. on net investment	$5,844.56
Exchange department (after large donation for support of Trade School)	2,583.68
Exhibition department (after spending $3000 in advertising and $4500 rent to real estate department)	2,391.46
Net earnings	$10,819.70

The average attendance of members has increased 10 per cent. over the previous year.

Our mechanical trade schools, now in their third term, not only show a gratifying increase in numbers but also a marked improvement in the intelligence and application of the boys constituting the various classes. We look upon this as an indication that our efforts to establish these schools on a permanent basis are meeting with the approval and support of a more highly educated class of people, the ultimate tendency of which will be to elevate the calling of the skilled mechanic.

The trade associations of journeymen have taken an interest in our schools which has been very beneficial, not only by the assistance rendered in advising boys to take the course of instruction but also in allowing our graduates to be employed by master mechanics without factious opposition.

Many applications for admission have been received from other cities, chiefly in the West, but not having day classes we have not been in a position to accept them. The graduates are in demand and find but little difficulty in obtaining employment. A number of young men who are already working at trades attend the schools to obtain better technical knowledge and a more thorough practice than it is possible for them to get where they are employed.

We feel much encouraged in this work and believe that many of our sister exchanges, particularly in the larger cities, would find it advantageous to establish trade schools under their immediate management and control and that the money thus expended would redound to their future benefit.

The exhibition department shows an increase in the amount of space rented and a consequent additional revenue of 10⅛ per cent. over the year 1891. As it becomes better known its advantages are more generally appreciated. The number of visitors to the exhibition during 1892 is estimated at 90,000, and a register which was opened a few months ago shows that visitors hail, not only from every section of the United States but also from almost every other country on the face of the earth.

The real estate department is in good condition, every office in our building being occupied.

CAFÉ.

In our report at the meeting of the National Association last year we mentioned the fact that an additional story had been added to our building for use as a *café*. This new adjunct was rented to one of our best-known caterers, the gentleman, by the way, who served the banquet to the National Association when they met in Philadelphia in 1889. It was opened on June 1, and since then it has been largely patronized by our members, by visitors to the exchange, and by hosts of business men of the neighborhood. The numerous high-class banquets given here to representative financial, commercial and trade organizations is the means of popularizing our exchange and keeping its name prominently in the minds of hundreds of influential business people. It has proved itself a decidedly attractive addition to our building, as well as a financial success to the lessee.

Our membership roll at the close of 1892 shows a decrease of ten as compared with the end of the year 1891. We have at present two hundred and eighty (280) members, as against two hundred and ninety (290) reported at the last annual meeting. While this looks like a retrograde movement it is not so, however, as we have certainly gained in quality through the 26 new members admitted to our exchange more than we have lost through the 36 whose names no longer appear on our roster. Of the 36 whom we have lost, 19 have resigned through discontinuing business and from various other causes, 2 are deceased, and the remaining 15 have been dropped for non payment of dues. Experience has taught us that an individual, firm or corporation not having sufficient interest in our organization to pay annual dues within a reasonable time is not the individual, firm or corporation that contributes by his or their presence or influence to make our exchange a success and we have therefore adopted the plan of purging our membership roll of all such.

Our Arbitration Committee has been called upon to consider two cases during the year, both of which through their efforts were amicably settled. We believe this committee to be of great benefit and importance to our members, and if taken advantage of more frequently would prevent many an expensive lawsuit.

UNIFORM CONTRACT.

Recognizing the manifest advantages derived from the adoption of the Uniform Contract between owner and contractor, approved by the National Association, many of our members are of the opinion that the adoption of a carefully drawn form to cover contracts between principal contractors and sub-contractors would be likewise desirable; the matter was therefore referred some time ago to our Committee on Architects' Plans and Contracts, who, after giving the subject careful consideration, have reported a form which will receive the early attention of our organization. We are gratified to be able to report that the use of the Uniform Contract adopted by the National Association is gaining ground in our city.

Our Committee on Labor has not been called upon during the year to settle any dispute between employer and employee, and the chairman reports that he feels in the condition of a walking delegate who has not earned his salary.

Shortly after the organization of our exchange a Historical Committee was appointed to prepare and publish, at the proper time, a history of its proceedings and to take charge of everything appertaining to its records. This committee has just completed a compilation containing all the notable facts and incidents which have occurred from date of the inception of the exchange to the end of 1892, and the same has been published in the form of an octavo volume, printed on fine paper and handsomely bound in cloth, containing upward of 500 pages, with portraits of past and present officers and a large number of other interesting and instructive illustrations, including phototypes of the front view, ground floor and interior of the various rooms of "The Workingman's Model Home," so many of which have been erected in Philadelphia, thus giving it the name of a City of Homes. Quoting from the preface: "In coming years it will be the duty of the Historical Committee to compile the succeeding chapters to this, the first history of the Master Builders' Exchange of the City of Philadelphia." A copy of the book for the library will be sent with the compliments of our exchange to each of the exchanges constituting the National Association.

Our Committee on Entertainment in their report suggest a day's outing each year, on which occasion members will be allowed to invite one person as their guest, who would be eligible to membership. This recommendation has been embodied in the directors' report to the corporation, and when acted upon by the exchange as a whole will, without doubt, be approved. This suggestion is made with a desire to foster a feeling of personal friendship and sociability among our members, and also with the object of showing others who should be members some of the good things they are losing by not joining the exchange.

The position of secretary has grown to be one which entails a vast amount of work. The volume of correspondence is constantly increasing, and inquiries are being received from all quarters for information on various building subjects until this department of our exchange has come to be a veritable bureau of information. Our literature is in demand from foreign countries, as well as from the cities of our fair land. Representative bodies of other business interests, such as the Commercial Exchange, Maritime Exchange, Lumbermen's Exchange, the Trades League and others are always solicitous of obtaining our co-operation and assistance in furtherance of all matters in which they interest themselves for the public welfare, thus illustrating the high standing and esteem of our exchange in our own city.

Very respectfully submitted,

WM. H. ALBERTSON, President.

Attest: WM. HARKNESS, Secretary.

P. S.—The secretary has been instructed and has great pleasure in presenting a copy of the history of the Philadelphia Exchange to the following officers of the National Association, to wit: All ex-presidents, the president, first and second vice-presidents, secretary, treasurer, assistant secretaries and the second vice-president-elect of the seventh annual convention.

A Modern Residence.

A writer in one of the Washington daily papers thus describes some of the features of the new mansion which is in process of erection for L. Z. Leitner on Dupont Circle in the National Capital:

You can get lost in the basement. There are rooms for all sorts of purposes. Here are two for ice and cold storage. In this ice house you could stow away enough ice for a month, and in it are hooks where the beeves and sheep and game shipped to Mr. Leitner can be kept for weeks. All the beef and mutton used in this house will come from his big farm in Wisconsin. It will be killed by his own butchers and shipped direct to Washington for his use. This is now done at the Blaine mansion. Take a look at the kitchen. The stove is 9 feet long, and you could feed one of John Wanamaker's Sunday-school picnics with the food that could be cooked on it at one time. It has a ventilator over it which runs from the kitchen to the roof, and this is so operated by a fan and an extra pipe that when Mr. Leitner eats sauer kraut or codfish the smell of the cooking will go from the stove up this ventilator, and even after the dish is taken off of the stove the pipes will carry its aroma from the table to the ventilator. Another curious arrangement is the apparatus for keeping the plates warm. I venture to say that this apparatus cost at least $500, for it had to be made especially for the house. It consists of a great boiler of heavy iron as big around as a two-bushel basket and so heated by gas that a coil of pipes running from it to the butler's pantry overhead is always filled with hot water. These pipes run back and forth in the shape of a coil in a cupboard of zinc in the butler's panty, and in this cupboard the plates are kept. They grow warm in a few minutes, and the cupboard is large enough to hold the service of a whole dinner. There is a billiard room in the basement, which is 25 feet square, and this, as the whole house, is heated by hot water, the pipes being so covered up that you can't tell where the heat comes from.

The lighting is to be a revelation. Electricity will turn night into day, and in the dining room and in the music hall the electric lights will be so arranged that no one can see where the light comes from, but the rooms will be brilliantly lighted by the pressing of a button. The whole house has electric lights and electric bells. In each room there is a bell for the butler and the ladies' maid and a third servant, whose name I forget. The lights are so arranged that you can touch one button and light the whole house, or you can turn on the light on a single floor or in a single room. The electric wires of the building are all incased in tubes, so that if anything gets out of order you can pull the wire out from the tube and pull another within it at the same time without disturbing the house. These tubes run all over the house. The tubes for the electric light wires are brass, those for the electric bells are of a different composition, but both are made so that they are non-conductors, and the wires are also wrapped in some non-conducting material.

The mantels are to be magnificent. There is one made of green marble in the dining room running from the floor to the ceiling which is made up of 8000 different pieces of marble, and which looks more like malachite than anything else. The dining room is paneled in mahogany, and some of the most beautiful rooms in the house to me are the bathrooms. These are floored and walled with ivory tilings, and many of them are as large as fair-sized bedrooms. There are 10 bathrooms in the house, all finished in this way, and each equipped with a bathtub of solid porcelain so large that you could scald a hog in it without scratching the sides. I do not know how many bedrooms there are in this house, but many of them are 25 feet square, and the ceilings are about 14 feet high. Nearly every bedroom has its own bathroom, and the rooms are arranged in suites and single, so that you can have just what you want.

TECHNICAL TERMS RELATING TO DOOR HARDWARE.

ONE OF the things the practical carpenter and builder is often called upon to do in the work of putting up a dwelling, whether for himself or a customer, especially if he be situated in a small town or country village where he acts both as architect and builder, is to order the hardware necessary for the finish of the structure. To do this work intelligently and to the best advantage, he must be familiar with the technical terms relating to this particular branch of trade, so that he can explain to the hardware dealer just what he requires. Suppose, for example, the builder finds it necessary to purchase a line of door and window hardware. The first question arising is, What hand are the doors? 2. Are the doors regular or reverse bevel? 3. Are the door stiles beveled or straight? 4. If hinge straps are used, what offset and return is necessary? All these questions come up in the course of the work of completing a line of Hardware trimming, and the failure to get the necessary details or the inaccuracy of the details when gotten is the one large and prominent "snag" upon which the layman is likely to run, says a correspondent, and even in the factory the above noted details are the cause of no little trouble and delay. Hands, bevels and offsets and returns are forever being mixed up.

THE HAND OF A DOOR

is determined as follows: 1. All doors are supposed to open in, and when doing so are termed regular. 2. Doors that open out, or doors that open toward the person when entering a room, are termed reverse bevel. Fig. 1 represents regular right and left hand doors, while Fig. 2 represents right and left hand reverse-bevel doors. A practical demonstration of how to determine the hand of a door is as follows: Suppose a person to be standing in front of door A, Fig. 1. Let the person grasp the knob with his left hand and proceed to walk in the room, still retaining a hold on the knob; it will be seen at once that it will be necessary for the person to turn completely around in order to open the door—as it is a right-hand door—while if the right hand had been used the door would open and the person might retain his hold on the knob and still enter the room without turning around. By this means the hand of a door may be demonstrated to the most obtuse. When a door is reverse bevel, the hand may be determined by standing outside the door, in such a position that the door will swing open without touching the person; standing in this position, the impossibility of opening a right-hand door with the left hand will be obvious, and *vice versa*.

THE BEVEL OF A DOOR

is the term relating to edge of door stile in which the lock is arranged. Bevel on a door is necessary as a matter of clearance, and the amount necessary is regulated by the varying thickness—a thick door requiring more than a thin one. Fig. 3 shows the manner of determining the bevel of a door. This is done by applying a try square to edge of stile. The distance from edge of door, as indicated by dotted lines and space X, to inside of square, is the required bevel, and is given together with Y, the thickness of door. The acknowledged trade bevel is $\frac{1}{8}$ inch in $2\frac{1}{4}$ inches. Closely allied to bevel is the

RABBET OF A DOOR,

as they both relate to stile arrangement and are often used together. As a rule, double doors are made rabbeted, as this arrangement strengthens the doors and tends to make them, to a more or less degree, weather proof. The rabbet is shown in Fig. 4. The amount of rabbet is indicated by the dotted lines and space Z. While there is no standard in regard to rabbet, it is generally understood that $\frac{1}{2}$ inch is regular, and on this basis the lock manufacturers make their standard goods. If the architect had in mind, when designing the plans, that there are details of measurement generally adhered to, much delay in completing house trimming might be obviated. A detail of Hardware trimming that is less easily comprehended than any of the ones aforementioned is that relating to

HINGE STRAP OFFSET AND RETURN.

The modern arrangement of hinge strap and door butt in separate parts brings in details of measurements that, while not intricate, seem to be a stumbling block that cannot be removed. This fact has become so thoroughly impressed on the manufacturer that many of the leading houses keep stereotyped prints of a door section showing the application and necessary measurements in reference to hinge straps. Figs. 5 and 6 show the outside of a door with strap applied, and also a section of a door which illustrates the necessary figure to be obtained. In Fig. 5 the necessary dimensions are shown by dotted lines, width of stile and width of rails, and also the size of butt which is to hang the door. In Fig. 6 the dimensions required are, 1, depth of stop bead; 2, distance from outside edge of door to edge of butt leaf. The former is called the offset, the latter the return.

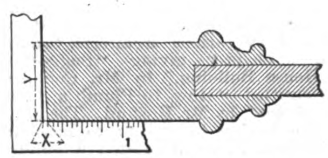


Fig. 3.—The Bevel of a Door.

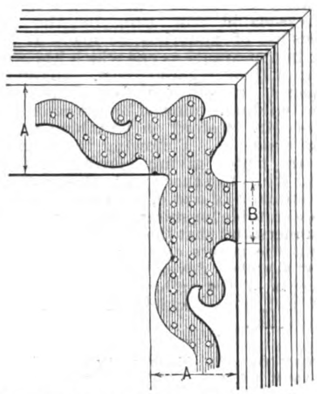


Fig. 5—Application of a Hinge Strap to Rail and Stile.

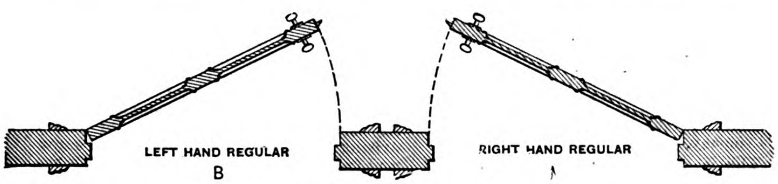


Fig. 1.—Regular Left and Right Hand Doors.

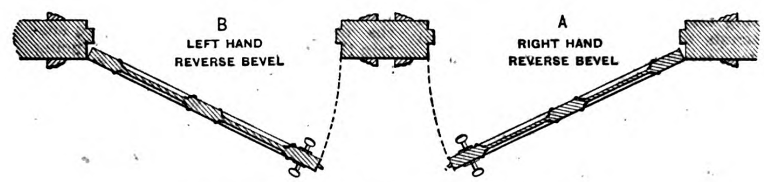


Fig. 2.—Left and Right Hand Reverse-Bevel Doors.

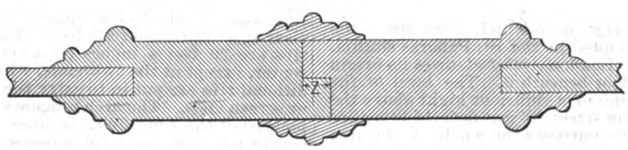


Fig. 4.—The Rabbet of a Door.

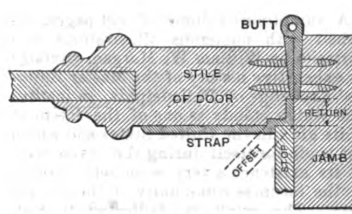


Fig. 6.—Offset and Return of Hinge Strap.

Technical Terms Relating to Door Hardware.

VISITORS to the World's Fair will have the opportunity of going to the roof of the Manufactures Building—the largest in the world—and enjoying there a half-mile promenade. Four elevators, with a capacity of 600 an hour, will take the people to a great platform 200 feet above the floor, from which a magnificent bird's-eye view will be afforded of the interior of the mammoth building with its acres of exhibits beneath. From the platform the visitors will pass to the promenade on the roof, where an unsurpassed bird's-eye view of the entire grounds and buildings will be unfolded.

NEW PUBLICATIONS.

SUBURBAN AND COUNTRY HOUSES. By various architects. Illustrated by means of 44 plates. Bound in cloth with gilt side title. Published by William T. Comstock. Price $3.

This oblong quarto volume contains designs for houses of moderate cost contributed by various architects, together with a chapter giving "Suggestions on House Building," by Mr. Cobb, and one entitled "How to Plumb a Suburban House," by Mr. Hosford. The object of this work is to present to intending builders and those interested in building construction a variety of designs contributed by architects who have made a study of domestic architecture, while illustrating the manner in which a house of reasonable cost can, by the judicious use of materials, be made as artistic in appearance as one which has been put up without regard to cost. The opening pages are devoted to a chapter on house building, followed by the contribution of Mr. Hosford on plumbing a suburban residence. Following these chapters are plates giving elevations, floor plans, &c., together with descriptions and estimates of cost of a large number of houses suitable for suburban construction. We understand that the designs contained within the covers of the volume are not fancy sketches developed in the leisure moments of the architects, but, for the most part, houses which have been actually erected.

HISTORY OF THE MASTER BUILDERS' EXCHANGE OF THE CITY OF PHILADELPHIA, from its organization in the year 1886 to 1893. Compiled for the Historical Committee of the Exchange by Clem. H. Congden. Published by the Sunshine Publishing Company, 1893.

A sumptuous volume of 500 pages, enriched with numerous illustrations and portraits by William W. Morgan, contains an exhaustive history of the Master Builders' Exchange of Philadelphia, an institution which stands as one of the foremost of its kind in the United States and which has made for itself during the seven years of its existence a very prominent position in the business community of the Quaker City. The work is dedicated to Col. Richard T. Auchmuty of New York "in recognition of his generosity and practical interest in the Master Builders' Mechanical Trade Schools of Philadelphia;" a compliment which does honor to the body which offers it as well as to the recipient. The Philadelphia Master Builders' Exchange was the outcome of an idea conceived by Charles H. Reeves, a prominent member of the Master Plasterers' Company of Philadelphia, who in 1886, at a time when the building interests of the city were endangered by labor troubles and excessive competition, presented a plan of organization for those engaged in the building trades to that association for consideration. The scheme met with great encouragement, and in 1887 a charter for the Master Builders' Exchange of Philadelphia was granted. Since then the progress of the institution has been one constant success. A building was acquired in South Seventh street, Philadelphia, which was enlarged and altered to suit the requirements of the Exchange, until it now forms a spacious and handsome structure embracing a permanent builders' exhibition, exchange rooms, offices, café, and every modern feature of convenience and utility for its members. In 1888 a notable feature in connection with the Exchange was the establishment of a mechanical trade school for the manual training of apprentices in crafts connected with the building trades. This departure received substantial support from Colonel Auchmuty, the well-known founder of the New York Trade School, and, next to that institution, it is now the most flourishing and prominent manual training establishment of its kind in the United States. Under the energetic superintendence of W. A. H. Allen, the Philadelphia mechanical trade schools are yearly turning out from their evening classes trained youths whose services are in great request by employers of labor in Philadelphia and its vicinity. The volume just issued gives a full account of this and all the other interests connected with the Builders' Exchange. It is, moreover, as we have said, enriched with a profusion of excellent illustrations, including portraits—with accompanying biographies—of prominent members of the Exchange, views exterior and interior of the building, and a beautiful series of reproductions of the habitations of men from prehistoric times down to the present, taken from the specimens exhibited at the Paris Exposition of 1889. The book is altogether one which will be an ornament to any library.

THE STANDARD GUIDE TO CHICAGO FOR 1893. World's Fair edition. 552 pages. Scarlet cloth. Published by the Standard Guide Company, Chicago.

This is a completely revised edition of Flinn's publication on Chicago, which has now become thoroughly known as one of the best of its kind. It is profusely illustrated and contains a great deal of interesting matter pertaining to the business interests of the city as well as the usual details regarding points of general interest which are handled in guide books. Those who propose to visit Chicago and the World's Fair this summer will do well to provide themselves with a copy of this work, as they may then be able to lay out their time to better advantage.

Roof of the St. Pancras Station.

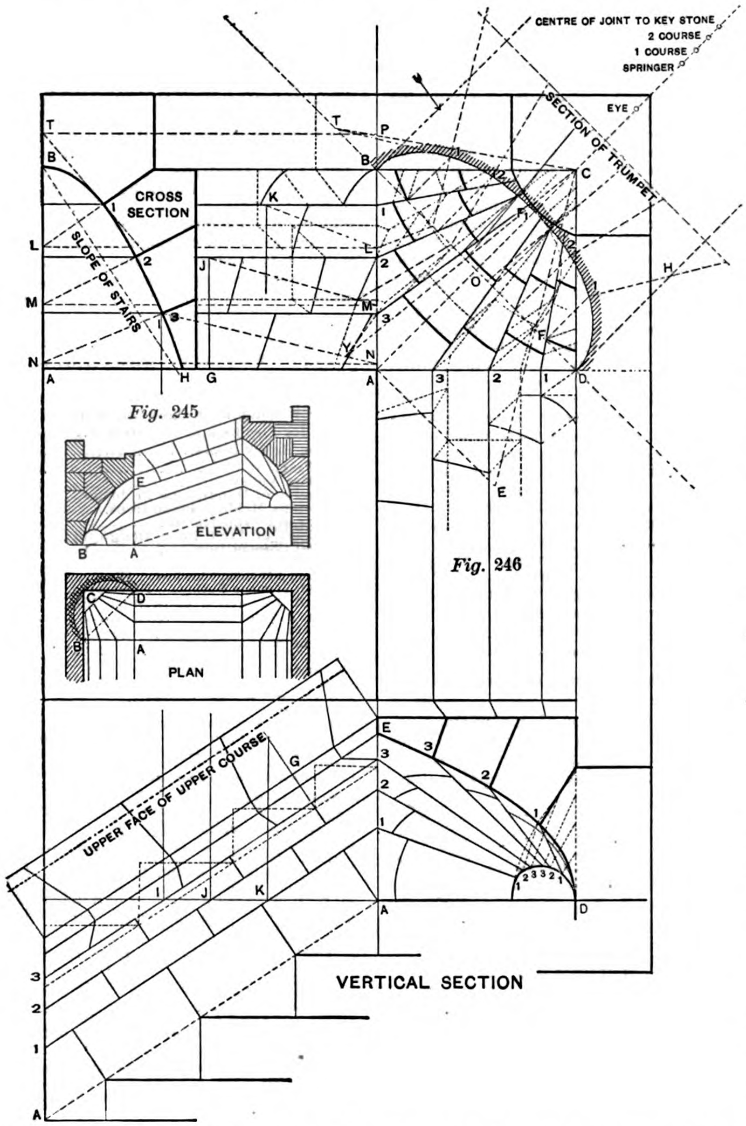
The large arch which constitutes the truss adopted in the St. Pancras station, says the London *Architect*, owes its origin to the floor beneath it. The level of the rails being of a sufficient hight above the adjoining street, it was decided to utilize for traffic purposes the whole of the area beneath the station, and, in order to economize the space to the utmost, it was determined to employ iron columns and girders instead of brick piers and arches to support the platforms and rails of the passenger station. That decision, together with the manifest advantage of having the entire area of the station free from obstruction, gave rise to the particular construction of the roof adopted. In iron roofs, as usually constructed, the depth of the principal is about ⅛ of the span; but at St. Pancras, by adopting one arch, extending across the station, the hight from the tie beneath the rails to the crown of the arch became the effective depth of the truss, and this hight being about ⅝ of the span, all the horizontal strains arising from the dead weight of the roof, its covering, accumulations of snow, &c., would be about the same in the arch of 240 feet span with a depth of 24 feet. Excepting, therefore, such additions as might be necessary for retaining the form and figure of the arch, the actual sectional area at the crown and for about ⅔ of the entire arch does not require to be greater than in an ordinary truss of 120 feet span. There are several other advantages belonging to the arch, one being that, as the weight of the roof is carried at the floor line and does not rest on the tops of the walls, there is no necessity to make the side walls thicker, for not only is the weight on the tops of the walls avoided, but also the rocking motion from the expansion and contraction of an ordinary roof, which, though it may be mitigated, is not prevented by the use of roller-frames at the feet of the principals and appliances of a like nature. It was also apparent that the arch might be made of riveted plate-iron work like that of an ordinary railway bridge, and that expense would be avoided. Again, as to the question of the contraction and expansion of the arched roof, the ties being beneath the ballast, the temperature would vary so little that no provision would be necessary, and for the arched part of the roof, which would alone be subject to appreciable change, the only effect would be a slight rise or fall in the crown. All the arrangements of roller frames or slings, required in ordinary roofs to provide for the effect of variations of temperature would, therefore, be avoided by the adoption of the arch; and, lastly, by having a single arch the cost not only of the columns and their foundations would be saved, but also that of the longitudinal girder required to connect them at their upper extremities, with a valley drain between the roofs, vertical drain pipes and other provisions for taking off the water from the area between the center lines of the two roofs. The question then remaining for consideration was, what depth and form of rib and what additional material must be employed to make an arch sufficient to retain its form under all conditions of stress arising from its own weight, from snow and from heavy gales of wind? The results arrived at were: 1. That the depth of the rib must be sufficient to contain all the lines of pressure generated by the dead load, by snow and by the pressure of the wind. 2. That the sectional area of the metal should be sufficient to sustain the whole stress without producing a strain on the iron exceeding 3½ tons per square inch. 3. That the arch should be riveted together with proper joint plates throughout, so as to give it the advantages of complete continuity. The probable additional cost of principals so constructed of 240 feet span, as compared with principals of two spans of 120 feet and their columns, was estimated at about £6000. The total area roofed in is 18,822 square yards. The distance between the side walls is 245 feet 6 inches, and the clear space of the roof 240 feet. The main ribs are 29 feet 4 inches from center to center, except at the two ends, where additional ribs are put in to carry the gables or screen ends. The arch is made slightly pointed at the top; first, because it was considered that this form possessed some advantage in resisting the lateral action of the wind; and, secondly, because it was considered to have a better architectural effect by giving a defined apex to the interior of the roof. The radius of curvature was diminished at the haunches to give increased head room near the walls.

House-Building in the Bermudas.

Bermudans have very little trouble in building an ordinary house, as a man scrapes enough lucre together to buy a little piece of land and then borrows or begs a cross-cut saw, a hand saw and an ice chisel. He takes off the thin surface of soil and gouges into the coral rock with his chisel. Then he commences to saw into the porous limestone, and presently has a collection of white blocks about 2 feet long, 18 inches wide and 12 inches thick. When he has taken out enough of them he has a cellar ready, and he uses the blocks for walls. Not much timber is required and the process is very simple. But only a Bermudan or an Englishman can do all this, for no foreigner is permitted to own real estate on these islands says a writer in an exchange.

MASONRY AND STONE CUTTING.*

A STAIRCASE WITH AN OPEN, SQUARE WELL HOLE, THE STEPS BEING LAID ON RAKING COVED VAULTS AND THE LANDINGS ON TRUMPET VAULTS.



Masonry and Stone Cutting.—Figs. 245 and 246.—Illustrating Staircase with Square Well Hole, the Steps Being Laid on Raking Coved Vaults and the Landings on Trumpet Vaults.

SINCE the last article on the subject was published considerable progress has been made in the study of scientific masonry in England. The classes at the Guilds Institute have passed their period of probation and are exceedingly well attended, and a corporate body under the title of College of Certificated Masons, has been started by the pupils to promote among masons the study of the scientific part of their trade. The Lower Class initiates beginners to the application of geometry to masonry by studying every year a graduated number of structures specially selected for that purpose. The Upper Class has a far more ambitious object, for it aims at no less than carrying forward the science of masonry beyond the point of development which it has already reached. For this purpose models of rarely attempted or entirely novel structures are executed. In doing this both teacher and pupils find a fair field for exercising their ingenuity, and applying on original problems the principles of geometry they have learned. It may be also stated that already several innovations of importance have been added to the store of masonry features. These will prove of the greatest value to architects in designing when they have mastered them.

The idea of the structure which forms the subject of this lesson is not novel, in so far that structures on the same lines have been erected before. But the way this structure has been worked out by the Upper Class of masonry is entirely new, and gives it a facility of adaptation to various circumstances which it did not possess before, and therefore makes it of more general application.

Trumpet vault is our translation of the French term, *trompe*. In old French, the word *trompe* signifies a large trumpet, and is expressive of the form of that vault. The trumpet vault is a conical vault, the axis of which is horizontal. It is usually used to bridge the space between the inner angle of two walls.

In our staircase the landings are supported by trumpet vaults, the flights of steps by raking vaults forming a coved ceiling round the open well hole. Now, the section of the raking vaults cannot be drawn according to fancy, but it is strictly geometrically determined by the section of the trumpet vault, with the vertical plane A B, Fig. 245, along the edge of the landing.

In the staircases which have been built on this plan, the section B D of the trumpet taken through the opposite angles of the landing is a circle. The trumpet is then a right cone, with its center line A C horizontal, and all the planes of the bed joints pass through the center line as in an ordinary niche. The vertical section A B of the trumpet is a parabola, for it is the section of a cone by a plane parallel to its side. This parabola will be also the vertical section of the raking vault. In fact, we make the trumpet and the raking vault miter along that line. If the trumpet vault be a right cone, as in Fig. 245, then for steps 6 feet long the rise A E of the cove will be 8 feet 6 inches. This would give a coved ceiling of good proportion for a hight of floor of 25 feet, but would be much too deep for a hight of floor of 20 feet.

We designed our model purposely to apply this structure to the staircase of a large hotel at the West End of London. The staircase has three flights with two intermediate landings in the angles. The walls surrounding them are 16 feet and 32 feet respectively. The steps are 6 feet long, leaving a well hole of 10 x 10 feet. The hight from floor to floor is 20 feet. In this case we considered that, to be proportionate to the hight of the floor, the cove should rise only 5 feet. To obtain this result we adopted as section of our trumpet vaults an ellipse instead of a circle, and hence sprang a series of interesting geometrical problems.

To Draw the Section of the Trumpet, Fig. 246.—Turn down the crown of the trumpet round the center line A C; it will take the position C E, in which E is 5 feet above A. If you cut the trumpet by the vertical plane B D, then O F′ = O F will be the highest point of the section. Let the section of the trumpet be an ellipse of which O F′ and O B will be the respective half axes.

To Draw the Vertical and the Cross Sections of the Raking Vaults.—Draw a series of generators of the trumpet. Turn each down round its plane, take the hight of its point of intersection with the vertical plane A D, and place that hight on the section below. The series of points thus found will give the vertical section of the raking vault.

To draw the cross section, first draw elevation of the raking vault, which carries the first flight of steps; then cut it at right angles by the plane A G. Place the levels of the points of the cross section at hights equal to the distances of the generators from the point A on the line A G of the vertical section.

Bed Joints.—Divide the cross section in arch stones, then draw the joint lines on the plan of the first flight, and from the points where they cut A B draw the joint lines of the trumpet to the corner C of the landing.

It has been found that the bed joints of the trumpet and of the raking vault above it form angles projecting inward in the bed joints near the well hole, and, on the contrary, angles projecting outward in the bed joints nearest the wall, so there must be an intermediary position of the bed joint, where the bed joints of the trumpet and of the raking vault lie in one plane. That plane cuts the wall along a line which starts from the apex C of the trumpet, and has the same inclination as the raking vault. We have drawn it as B H in the cross section. Carry the hight A H of the cross section on the line B H of the trumpet section, and from H draw a normal to the section of the trumpet.

*Continued from page 274, October, 1892.

This will be the first bed joint of the trumpet, from which deduce the first bed joint of the cross section of the raking vault.

The planes of the bed joints must be normal to the soffits of the vaults, and, therefore, the joints of the trumpet will be normal to the ellipse which forms its section, whereas the joints of the raking vault will be normal to cross sections.

Tangents to the Cross section of the Raking Vault.—These tangents are necessarily contained in the planes tangent to the surface of the raking vault. Now, as the raking vault and the trumpet intersect one another in a curve contained in the vertical plane A B, it follows that the tangent to that curve is projected on the line A B. On the other hand, the tangent to the intersection is the intersection of the planes tangent to both surfaces in a given point of the intersection. Therefore, to draw the tangent to the section in any point, say on joint No. 1, we must find the intersection of the plane tangent to the trumpet along No. 1 joint with the vertical plane A B. This will be the tangent to the vertical section. The tangent to the cross section will cut the ground line in the same point as that of the vertical section. To carry out the above operation, draw on trumpet section tangent 1 T, then draw the horizontal trace C T of the plane tangent to the trumpet. This trace cuts in P the ground line of the vertical plane A B. P gives the point where the tangent to the vertical section would pass. We take T on the cross section at the same distance as P from the springing line of the raking vault, and we have 1 T, the tangent to which the bed joint 1 must be at right angles.

To Find the Intersections of the Bed Joints.—Find the intersections of the planes of each of the corresponding bed joints of the trumpet and raking vault, with the horizontal plane taken at the level of the springing of the trumpet. The point where these intersections meet is a point of the intersection of the bed joints. Another point is that where the joint lines meet. Take joint No. 8, for instance. The bed joint of the trumpet cuts the horizontal plane along C Y; the bed joint of the raking vault cuts the same horizontal plane along I N; the point Y, where these two intersections meet, is a point of the intersection Y 8 of the bed-joints. These intersections and the back arrises of the bed joints are shown in dotted lines. The back arrises are horizontal, and are therefore parallel on plan to the intersections of the horizontal springing plane (such as C Y) with the bed joint planes.

Eye and Cross Joints.—The arch stones of the trumpet must butt against an eye formed of one stone. The outline of the eye and cross joints must follow the lines of curvature of the surface. In a right cone sections parallel to the base and the generators will be lines of curvature. Lines of curvature always meet at the right angles. If you pinch a cardboard cone or lamp shade the deformed base still meets the generators at right angles; it is, therefore, a line of curvature of the new cone. That line of curvature has the property of having every cone of its points at an equal distance from the apex of the cone, and by experiment it has been found that its projection on the main meridian plane (here the horizontal plane) is an arc of a circle. Take, therefore, a point on the crown line of the trumpet at an equal distance from the apex C of the cone to two other points selected on the wall lines. Draw an arc through these three points, and you have the plan of a line of curvature which you may adopt for the outline of the eye or for any cross joint. To draw the outline of the eye and cross joints on the vertical section, plumb down the points where they cut the bed joints or other generators. The eye joint may be considered as drawn on a cylinder of which its plan is the base. To work the stone a development of this cylinder with the eye joint must be made.

The surfaces of the eye and cross joints are formed by a series of normals to the surface of the cone. Draw these normals by turning down the planes which contain them. Mark the points where they cut either the upper plane of the landing or the horizontal plane at the level of the springing. Plumb these points on to their respective lines on plan and elevation, and through them draw the plans and elevations of the normals. Then mark the series of points where the generators of the eye are cut off by the side walls.

The surfaces of the eye and cross joints are developable surfaces. To produce the molds to fit them, turn round each surface until its center line lies flat on the horizontal plane, then unroll the surface each way from the center line.

The bed joints of the trumpet are obtained by turning each bed joint round the trace of its plane.

To prevent the stones of the upper course of the raking vaults slipping into the well hole, the cross joints are made to radiate from a point in the plane of the upper face of the course.

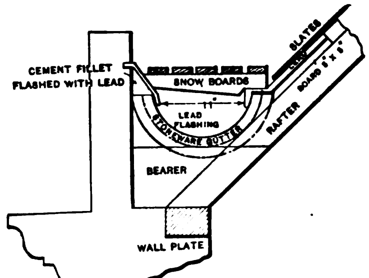
The stones of the trumpet should be worked from the bed joints by means of bevels. The soffit of the stones should be begun by an operation plane; then the intersections of the soffit operation plane with the surfaces of the cross joints should be marked. From the outlines on the soffit operation plane, and on the back plane of the stone, work the cross joints. The surfaces of the cross joints once worked, the molds must be placed on them, and the outlines of their intersection with the soffit marked. Then finish the soffit with straight edge.

This kind of structure for a staircase is far superior, both practically and æsthetically, to the usual stairs with steps housed into the walls. Here the steps are simply placed on the back of the vaults, and can be removed when worn out without in any way interfering with the structure.

These vaults are very easily executed in concrete, and when plastered they offer a beautiful field for decoration in the Pompeian style. Let us hope that this kind of structure will soon take the place of the bent-girder eyesores which disfigure too many of the staircases of England.

Durable Gutter Construction.

A rather novel form of gutter construction is that recently brought out by an English manufacturer, and which is shown in cross section in the accompanying illustration.



Cross Section of Durable Gutter Construction.

The gutter is made of stone ware with lead flashings, and is covered in such a way as to keep the trough from clogging. The gutters are manufactured in a variety of decorative designs, and are supported on molded Ruabon bricks, which are said to be both ornamental and inexpensive. They require no painting, and both the cornice and roof gutters are unaffected by extreme changes of temperature. The form of gutter construction here illustrated is being placed upon a number of buildings in Atherton, England, and, we understand, with pleasing results. Although the arrangement of parts here shown represents a form of English practice, it may prove interesting, if not suggestive, to many of our readers.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

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DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

JUNE, 1893.

International Congress of Architects.

One of the features incident to the World's Fair is an International Congress of Architects, which will convene during the latter part of July in the permanent Memorial Art Palace in the city of Chicago. We understand that the object of this congress is to bring together eminent architects of all countries for friendly intercourse, comparison of methods and results, and the promotion of their mutual interests in the profession. To this end the leading architects of each country are invited to present, in a clear and graphic manner, the progress, achievements and special lines of development in architecture. A variety of subjects have been selected, including ancient and modern apartment houses; the health effect of laundries and kitchens in dwellings; modern stables, both large and small; the responsibility of architects in structural matters, as well as records, plans, decorative matters, &c.; clients' rights to service of drawings, the ownership of the same; mechanical engineering in architecture and the architect's responsibility therewith; the modern steel construction; fire proofing of buildings up to the present time, and kindred topics. It will be seen from the above that there are many subjects of no little interest to the building trades to be discussed, and it is to be hoped that the congress will result in great good to the trades and professions concerned.

Epworth League Memorial.

During the past month there was dedicated in the city of Cleveland, Ohio, a handsome building known as the New Epworth Memorial Methodist Episcopal Church, which marks the site where the Epworth League was founded. The new church is a notable building constructed of gray St. Lawrence marble, rock hewn, in irregular blocks, and surmounted by a magnificent dome 125 feet high. The area covered is 140 x 115 feet, the main auditorium being 75 feet square. This room is finished in oak, while the decoration of the ceiling is stucco in an elaborate design, and in the arches are fitted 150 incandescent lamps, besides a 60-lamp chandelier. The seating capacity of the auditorium is 1100. The most beautiful feature of the room, however, is the Epworth League window, 16 x 32 feet, and representing the Epworth "Wheel." South of the main auditorium are the Sunday school rooms, with a capacity of 1200. The 18 classrooms clustered about the main one are closed by rising doors, which are lifted by a hydraulic ram regulated from an electric switchboard at the superintendent's desk. The ceiling is of paneled glass, like that of an art gallery. The finish of the room is in Georgia pine. There are also ladies' parlors, and an Epworth parlor, each with a seating capacity of 300. By means of the rising doors these rooms can all be thrown into one, giving a seating capacity of 2800. In the basement is the pastor's office, with a fireproof vault for church records, a large reading room and library for young men, a kitchen and a dining room. The lighting of the building is done by electricity and gas, and the heating system is a combination one. The architecture of the structure is a combination of Byzantine and Romanesque, the designer of the building being S. R. Badgley of Cleveland.

Power for Small Shops.

The need of power in small shops on special occasions has been too keenly felt to require comment, but the ordinary power plant presents many objections and entails expenses that are unwarranted by the work to be done. With the advent of electric lighting in so many cities and larger towns, the electric motor may prove to many an acceptable solution of the problem. It requires no licensed engineer or fuel, makes no dirt and is always ready, while its management or control is simple and confined to the lever which completes the electric circuit and the switch lever which graduates the current to the work. The cost of the electric plant compares favorably, power for power, with that of plants previously available for small work. When installed for intermittent use, a contract, varying in price with the locality, can, we are told, be made with the local electric company to supply a small power for one-tenth to one-fifth of the cost of steam. Many of the small shops in this city have already adopted the electric motor for power purposes, and as much of the machinery of the small wood working and carpenters' shops can be advantageously run by this means, it is more than likely that electricity will find increasing favor in that field.

Improved Building Conditions.

There is perhaps no surer indication of the improved conditions which obtain in the building business, as compared with those existing a decade ago, than the number of influential builders' organizations which exist in prominent cities of the country. During the past five years the character of these organizations has assumed a plane which puts them in line commercially with other mercantile bodies which have been in existence for many years. Some of these associations of builders have erected homes for themselves and have become established in the public eye in so honorable a manner as to lend a dignity and consideration to the business of the building contractor which never before existed. There is no question that this condition of affairs is truly indicative of improvement which promises to extend to every branch of the trade with that steady progress so plainly observable in the establishing of organizations. The various questions and problems which confront the individual builder are afforded means for ventilation and consideration which is already resulting in better relationship between employers and employed, and a more equitable adjustment of the rights of each. The tone of the whole fraternity is constantly growing higher, and there are frequent manifestations of desire on the part of communities of builders to adjust differences between themselves and others by arbitration and by means which are to-day as common as they were unusual ten years ago. This constant effort to bring about honorable relationships offers beneficial examples to builders everywhere, which, although the strike and lockout are frequently employed, produce a most salutary result upon the present relation of one of the most important problems in existence to-day—the labor question.

Wire Rope for Elevators.

Those who have never stopped to consider the matter, or investigate the subject to any extent, would probably be greatly surprised to learn of the quantity of wire rope which is used in the operation of elevators in office buildings and warehouses. Take, for example, a seven-story structure devoted to office purposes, and in which there are only two elevators, and it is found that nearly a mile of 1-inch rope is required for the elevator equipment. It can readily be seen from this statement that the consumption of wire rope for this purpose alone throughout the country is enormous. The construction of very large office buildings, above four stories in hight, is of comparatively recent date, the movement being scarcely ten years old. In fact, there are not a few important cities in which construction of this character has but just begun. It is probable that already the consumption of wire rope for passenger and freight elevators in buildings is as large as in any other single channel; and this is but one of the numerous developments of business enterprise which is steadily increasing the general consumption of iron and steel.

Drexel Apartment House.

A structure which, when completed, will probably rank among the most expensive apartment houses in the country, if not in the world, is now in process of erection in Chicago, Ill. The building, or rather series of buildings, which will constitute the apartment house, is being put up on Fifty-first street, between Cottage Grove avenue and Drexel Boulevard, the length of the front being 578 feet and the depth 185 feet. It will be nine stories in hight, with the central pavilion surmounted by a picturesque tower 216 feet high. Each corner pavilion will also have a tower 170 feet high. The portion for which contracts have recently been closed will contain 96 suites of apartments, with a total of 350 rooms, and cost about $500,000. When the entire structure is completed, which is expected to be some time in 1895, it will contain 1800 rooms and will have cost $2,000,000. The materials employed will be Seneca brownstone for the face work, and hollow tile and slow-burning material for other portions. The style of architecture is to be French Renaissance, relieved by Ionic columns and ornamentation. The apartment house was designed by William A. Youmans & Brother, and is being put up by a number of capitalists, prominent among whom is William Turkington.

Wiring Buildings for Electric Lighting.

The use of electricity for lighting purposes in office and other business buildings has become so general in the principal cities of the country, that no modern structure at the present day is considered complete which lacks in this particular. Even in places where there are no electric lighting plants and where it is not possible at the time to conveniently and economically employ electricity for the purpose named, the prominent buildings are wired during the process of erection so that as soon as electricity is introduced the necessary fixtures can be installed and the completion of the work quickly accomplished. Commenting on this feature of building equipment as viewed from the English standpoint, the London *Builder* in a recent issue says:

As the majority of large buildings which are now being built, or which will be built during the next few years, will probably before long be fitted with electric light, it seems desirable that this probability should be taken into account in their construction. At present no one can calculate on the surprises in store for the electrical contractor. No superficial examination of a building can enable him to tell what sort of stuff he will encounter in running his mains from floor to floor and from room to room. There may be thick stone work, concrete, or steel girders; or there may be merely timbering or plaster. His men may be able to get a hole through a wall or floor in half an hour, or they may take more than half a day. If the contractor has estimated for the former and it takes the latter, he loses; but as a rule he is more wary, and the gain is on his side if he comes across a piece of soft material, while he is careful not to lose if it should prove tough. Contractors, however, would have a much clearer basis for estimate, and their rates of charges would be lower, if they could count on some preparation in the building for carrying electric cables through walls or flooring. It is too much to expect that the owner of a building which is in course of erection will put in all the necessary wiring for electric light unless there is the immediate prospect of that light being used. The cost of doing so would be considerable and the money would lie idle for some time. But there is little or no cost involved in arranging that at every top corner of a wall there should be two circular holes in the solid material—one connecting the two sides of the wall and the other running up to the floor above. These holes might be carefully covered over so as not to disfigure the wall, and their existence would be an immense saving in cost and labor in putting wires throughout the house at any subsequent time.

The Annual Fire Bill.

It is somewhat startling to be told that the average yearly destruction of property by fire in the United States reaches the immense figure of $100,000,000. Still more so, when we stop to consider that this great sum is an absolute yearly loss incurred by the wealth of the nation, that it is so much property completely blotted out of existence. For although some $70,000,000 out of the total is paid through the insurance companies, every dollar of this amount comes, not out of the coffers of the companies or the pockets of the stockholders, but from the policy holders. Now, it is asserted by recognized authorities that the majority of these conflagrations, which are annually taking such a large slice out of the country's means, arise from *preventable causes*. Therefore, it seems a clear case where the proverbial "ounce of prevention" should be brought into active play. Americans are apt to plume themselves upon the excellence and efficiency of their city fire departments, which may here represent the "pound of cure," but little has been done toward the *prevention* of fires, which, after all, should be the first solicitude.

Fire Prevention.

This subject is treated with considerable ability by C. John Hexamer in a paper on "Causes of Fires," printed recently in the *Journal* of the Franklin Institute. Mr. Hexamer is strongly of opinion that the modern lavish use of glass and iron, which is so noticeable in the new store and business buildings of cities, has increased and will still further increase the terrible annual fire waste. The want of care in regard to the paraphernalia of heating, lighting, &c., and its relation to the accumulation of rubbish and the inflammable material stored in these tinder boxes, furnish food for reflection. Looking at the immense hazards run daily in nearly all such establishments it is only wonderful, says our authority, that we have not more fire losses. This, however, is but meager cause for congratulation. Something must be done to remove the main causes of fire. The remedies for the present state of things suggested in the paper above quoted as the only efficacious ones, and which should be adopted without delay, are: 1. A national bureau for ascertaining fire hazards. 2. Better building laws. 3. Inspection and reinspection by faithful, competent and well-paid men. 4. The co-operation of the press in instructing the public in the vital importance of this matter. 5. The supervision and inspection of mechanics erecting heating and lighting paraphernalia. 6. The appointment of a "fire coroner" in all cities, who must be an expert. It is time the public awoke to the importance of this question of fire prevention, of which it is even more ignorant than of matters of hygiene.

Exchange Buildings.

W. H. SAYWARD.

It is with peculiar satisfaction that the National Association of Builders calls the attention of all filial bodies to the dedication of the new home of the Milwaukee Exchange. This affair was named for the 20th inst., and before this issue is placed in the hands of its readers the elegant structure will have been dedicated to the uses of the builders of Milwaukee.

It is very gratifying to note the growth of the idea of ownership of buildings among the exchanges affilated with the National Association, and it is to be hoped that this year will see a goodly number of others started. In every case where this scheme has been undertaken it has not only proved a good business venture for the exchange, but it has also encouraged individual builders to have offices in which to conduct their business.

The old fashion of builders to do all their writing, estimating, bookkeeping, &c., under the roof of their dwellings must be abandoned. It is neither a good business habit nor a good domestic habit. No builder can attend to the detail of his building operations during the day, and then with any degree of satisfaction to himself or others continue his labors within the walls of his dwelling—a place which should be devoted to his domestic privacy and sacred to his social and home affairs. Life is crowded enough in any event, and it is a most harmful practice which encumbers the domestic life with the details, cares and worries of business.

Every man owes something to his family, and when he gets through with his day's work he should leave business behind, and by all means not have within his own home any business conveniences to encourage him to keep at work when he should be free for the other duties of life. Exchange buildings offer to the builders opportunities to concentrate the details of their work, and already those who have taken advantage of it cannot conceive how they got along in the old way. Business is facilitated, systematized, made to run orderly, and the builder himself is freed from the ever-present business demands which previously followed him and occupied his mind and time into the hours which should be devoted to his family and other social and domestic duties and pleasures. Let us all move in the direction of getting as much as we can out of the busy, hustling world which absorbs so much of life. Exchange buildings with offices for builders are a prime necessity of the day.

In this connection the National Association notes with great satisfaction the efforts that are being made by the Building Trades Club of New York to put the building project into operation in that city. If the plans outlined are carried into effect, as they most surely will be, the structure erected in the metropolis of the country for a building trades exchange will be a veritable Mecca for the whole building fraternity of the country. A hearty Godspeed is offered to the New York brethren, and the hope is cherished that a speedy fruition may follow their efforts.

PARSONAGE OF THE METHODIST EPISCOPAL CHURCH AT SOMERVILLE, N. J.

F. V. BODINE, ARCHITECT

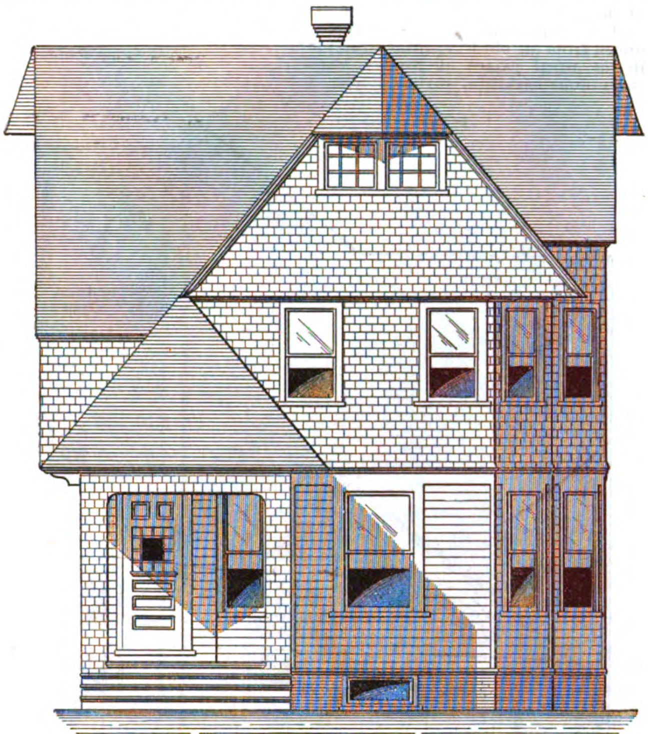
SUPPLEMENT CARPENTRY AND BUILDING, JUNE, 1893.

For floor plans, elevations, etc., see pages 145-148.

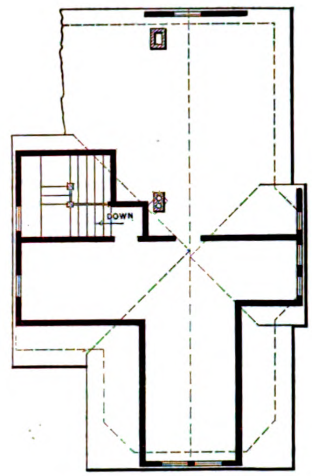
DESIGN OF A PARSONAGE.

THE METHODIST EPISCOPAL SOCIETY at Somerville, N. J., have recently completed the erection of a very neat and well arranged parsonage, according to plans prepared by architect F. V. Bodine of the place named. The cottage embodies a number of features of interest to the carpenter and builder, both by reason of its general treatment architecturally and the arrangement of the several rooms which it contains. We have taken the trouble of securing an excellent photograph of this cottage as it stands completed, and present a reproduction of it this month as a supplement plate. The elevations, floor plans and some of the details of construction are presented upon the pages which follow, and will enable the reader to obtain a clear idea of the general features which have been incorporated by the designer. An inspection of the first-floor plan shows that provision has been made for four rooms of good size, in addition to a hall of such a character as to permit its use for reception purposes. The location of the parlor, sitting room and dining room is such as to permit the three to be thrown into one should occasion render such a course desirable. The kitchen is at the rear of the house, communicating directly with the dining room and also with the front hall. It will be noted that space has been utilized to good advantage, nooks and corners being devoted to closets, which are always desirable features of a dwelling. On the second floor are three large sleeping rooms, the pastor's study and a bathroom. The position of the main stairs is such as to render all these apartments readily accessible directly from the hall.

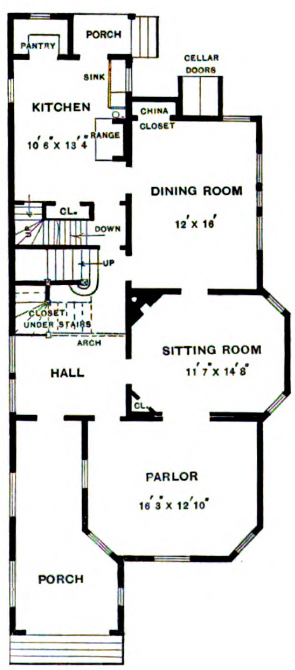
The foundation walls of the building are 12 inches thick up to a level with the grade line, above which are brick walls 8 inches in thickness. The sills employed are 4 x 10 inches; the first and second floor joists, 2 x 10, placed 16 inches from centers, and the third-floor joists, 2 x 8, also 16 inches from centers. The studding is 2 x 4, placed 16 inches from centers, while that about the windows and doors is 3 x 4 inches; the hip and valley rafters are 2 x 10 inches, the common rafters 2 x 6 inches, placed 20 inches from centers; and the plates, posts and tie beams 4 x 6 inches, all being of white hemlock. The exterior of the frame from the sills to the plates and gables is sheeted with tongued and grooved hemlock put on diagonally. Over this is building paper, which in turn is covered to the first story with clear 6-inch siding. The second story and gables, as will be seen from an inspection of the eleva-



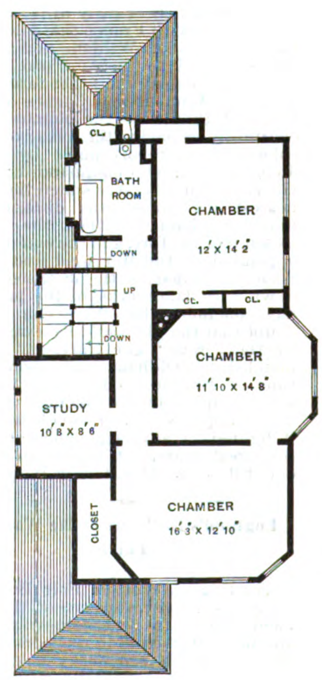
Front Elevation.



Attic Plan.



First Floor.



Second Floor.

Design of a Parsonage.—F. V. Bodine, Architect, Somerville, N. J.—Elevation, Scale, ⅛ Inch to the Foot.—Floor Plans, Scale, 1-16 Inch to the Foot.

tions, are covered with 5 x 18 inch cedar shingles. The rafters are first covered with surfaced hemlock boards, and then with heavy felt, carrying 8 x 16 inch best quality slate. The gutters and leaders are of galvanized iron. The first story of the house, up to the belt course, is painted with two coats of lead and oil, as are also the cornices and trimming, but of a different tint. The shingles on the first story and gables are left in the natural wood. The gutters and valleys are painted in two coats of metallic roofing paint.

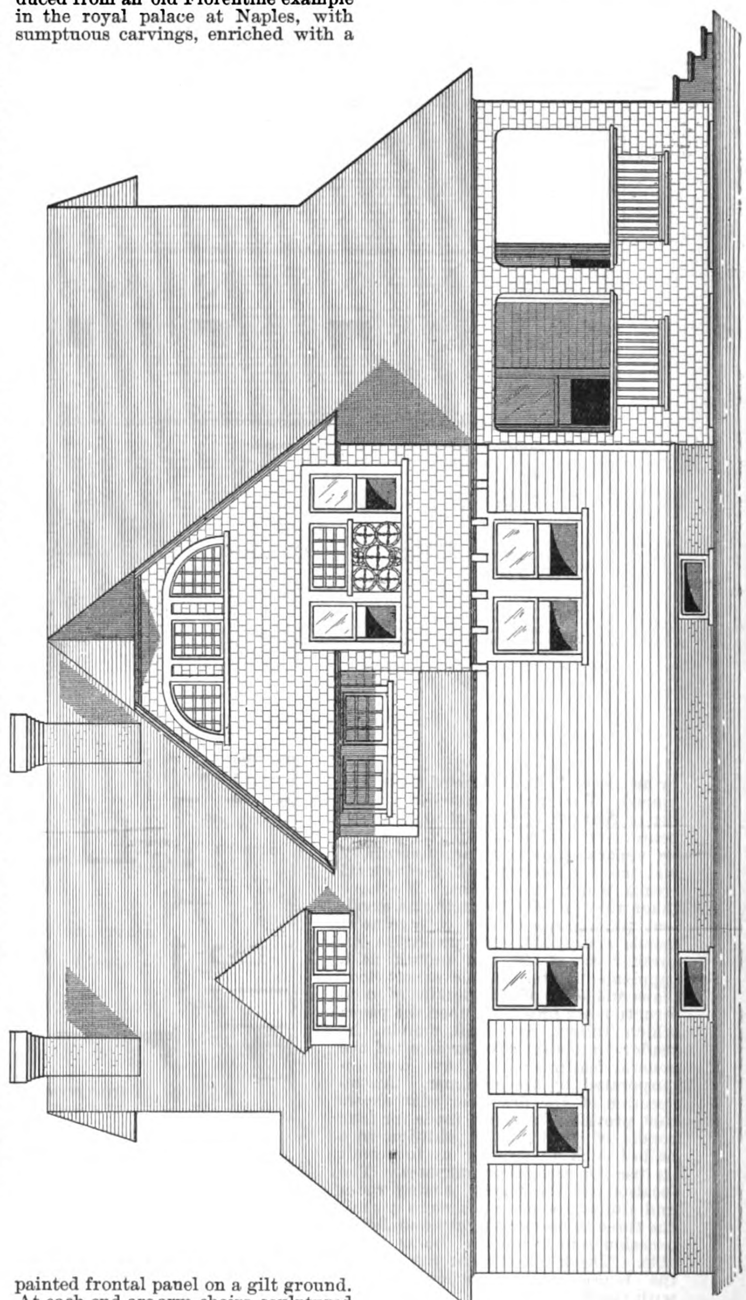
With regard to the interior, we learn from the builder, James B. Brown of Somerville, N. J., that the main rooms on the first floor are finished with yellow poplar. The stairway, which is a continuous open flight from the first floor to the attic, is also finished in the same style. The kitchen and the entire second floor are trimmed in yellow pine. The doors on the first floor are finished in five panels of yellow poplar, while those in the kitchen and on the second floor are of white pine. The hardware on the first floor is of metal bronze, and on the second floor of iron bronze.

An Historical Building.

About ten miles from Baltimore, Md., and two miles from Pikesville is located the McDonough estate, on which is an old stone building erected somewhere about the year 1693. It is known as "The Garrison," and is so designated on a map of Baltimore bearing date of 1755. The structure was evidently intended originally as a fort, for its massive stone walls are pierced with openings here and there for the muskets of the defenders. It covers an area of 20 x 50 feet, and the heavy oak posts and beams give an idea of its great strength. The walls are now whitewashed and the interior is coated with a dark brown kalsomine. Historical search would seem to warrant the belief that it was one of three forts built by the Council of Maryland in 1692 or early in 1693, during the war with France that followed the accession of William and Mary and extended to the American colonies. The site of the other forts was in Anne Arundel and Charles counties. At that time the Indians were constantly menacing the settlers of the colony. In a report made by Capt. John Oldham, who commanded "The Garrison" in 1696, it is stated that the nearest log house was distant ten miles. Oldham described the exact location of the fort, and the committee appointed by the Maryland Historical Society, comparing the distances laid down with landmarks of the present day, concludes that there can be no doubt that the old building examined by them was "The Garrison" commanded by Oldham. At about the time of Braddock's defeat in 1755 it was occupied by the colonial troops. There appears to be no evidence that it figured in any engagement during the great wars, but there can be no doubt it is the oldest fort in Maryland.

England's Building at the World's Fair.

The English World's Fair Building is acknowledged, says one of the Chicago papers, to be the most perfect specimen of its kind in the park. The entrance doors are heavy oak, with brass hinges and wooden locks. They open into what is called the hall, a large room with a fireplace at each end and a double staircase at the back. The modeled plaster ceiling is copied from one in Queen Elizabeth's palace in Wales, which was built by the Wynns of Gwydir in 1550, and that over the stairway and hall on the second floor is from Haddon Hall, seat of the Duke of Rutland, the most perfect example of an old English mansion to be found in England. The fire places are wide and comfortable-looking. The andiron dogs are monstrous and the grates have at each end the lion and unicorn rampant. In the alcoves made by the stairway are two suits of armor of the time of the holy war. In the center of the hall is a monumental coffer reproduced from an old Florentine example in the royal palace at Naples, with sumptuous carvings, enriched with a



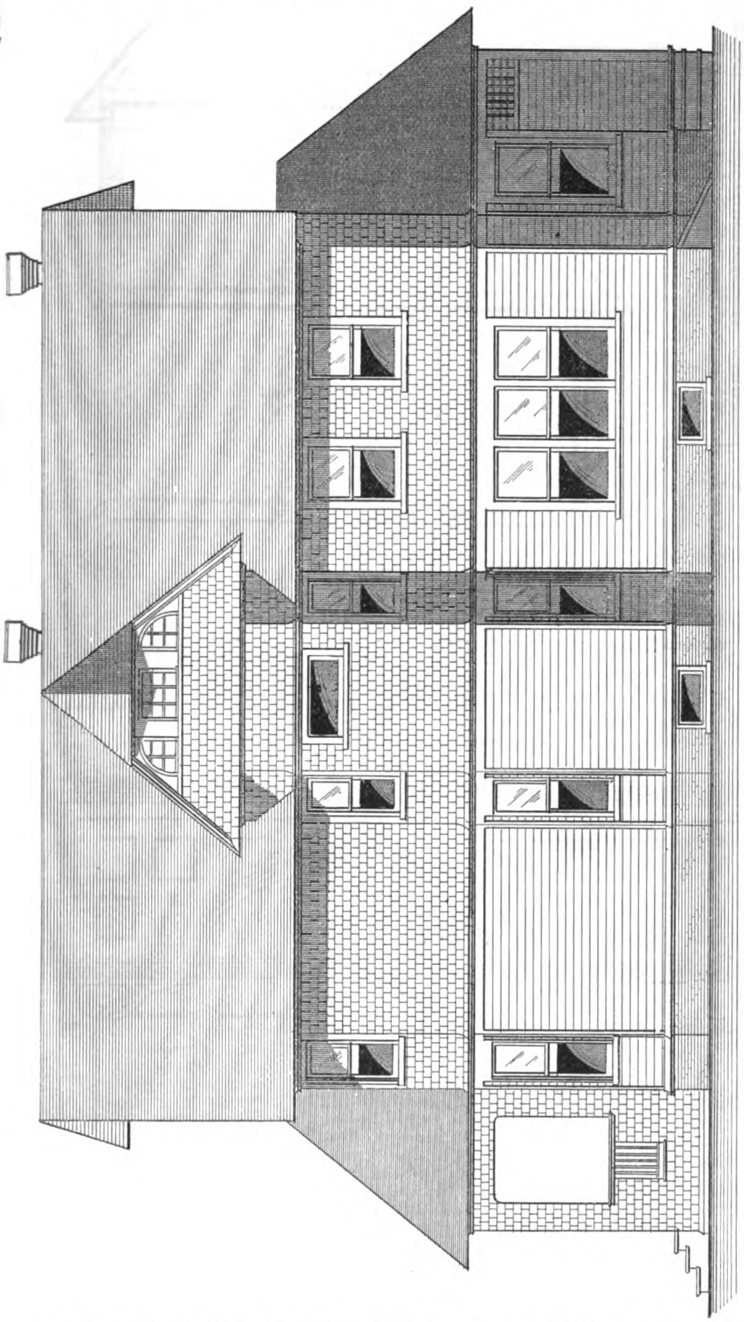
Design of a Parsonage.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

painted frontal panel on a gilt ground. At each end are arm-chairs, sculptured in bold bas-relief, one representing the discovery of America and the companion *fauteuil* being of the old kind known as the "cackle" or "gossip" chair in the style of the Francois premier.

On the left of the hall is the library, entirely in oak, and the shelves are filled with volumes by British authors in morocco. The furniture partakes of the sedate characteristics of a reading room, and is copied from originals in the Cluny and South Kensington museums.

The waiting room is at the right of the entrance and has that refined air so peculiar to English homes. The windows are wide and deep, with old seats arranged in them. The ceiling is Elizabethan and the walks are covered with embossed leather of the pattern designed for the ballroom at Sandringdam. The finishing of this room is like the others, of an old period. Oak tables, desks and sideboards are scattered about, and rich, rare vases stand in the nooks.

In all of the rooms the floors are of hard wood covered with huge Wilton rugs, especially woven in Oriental designs. The grand staircase is wide and easy. On the second floor is the meeting room of the commissioners. It is furnished in antique oak, and the seats and lounges are such as may be found in the Carlton and Reform clubs, and other such places devoted to men's comfort. The rest of the second floor is given over to offices. The one occupied by the popular commissioner, Sir Henry Wood, is particularly handsome. It occupies the southeast corner, with low, broad windows looking out into the lake. The desks are massive affairs of carved oak, and the walls are hung with pictures. Lounging seats are in the windows and the walls are beautifully decorated. The building is lighted by electricity, but the incandescent globes are hidden under the strap work of the Elizabethan chandeliers. A characteristic fence surrounds the building, and old English lamps light the veranda, which is broad and inviting. The name Victoria House was given it by the Queen, who has taken a great interest in the exposition.



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

Erection of Scaffolds.

The City Council of Toronto, Canada, recently passed a law governing the erection of scaffolds in that place which says that all scaffoldings used by bricklayers or other builders in the erection, repairing, altering or improving of buildings, chimneys or other structures, shall be built and constructed as follows :

BUILDERS' SCAFFOLD.

Standards or uprights to be of live, sound Norway pine, tamarack or spruce (tamarack preferred). Distance between each standard 8 or 10 feet, and butts of said standard placed in the ground to the depth of not less than 2 feet 6 inches, and when placed upon stone flagging or granolithic sidewalk, to be put in good sound cement or other barrel, or a box 2 feet square by 2 feet 6 inches high, and filled with sand or other suitable material. The standards to be not less than 4½ inches at butt, and 2½ inches at the top diameter, and in a very high scaffold to be increased in size.

Ledgers same material as standards, not less than 3 inches diameter at small end, and no ledger to be taken off the standards that would allow a greater distance from the ground than 10 feet. Putlogs to be of ironwood, white oak, or other suitable material, the said putlogs to be butted, flattened or squared at the end which enters the wall, and not to be removed according as the scaffold rises. One course of planking, the entire length of scaffold, must remain on each tier of the said putlogs. The putlogs not to be less than 3 inches diameter clear of bark. Three putlogs to be placed under planks 12 feet in length, that is to say, one putlogs at each end and one in the center. (When planks 16 feet long are used five putlogs shall be used). Planks to be 2 inches in thickness, and of sound pine, spruce or hemlock, 10 to 12 inches in width.

Scaffolds to be stayed from ledgers on to the joists through the openings, and in the absence of openings, to be stayed by other sufficient means.

Racking braces to consist of poles and be tied with ropes. Ropes not to be less than 16 feet in length, and ⅝ inch thick, except in case of small scaffolds, when rope ½ inch thick may be used.

Ladders in all cases to reach 5 feet above the landing stage, so that plenty of hold will be afforded men when landing off.

When bricks are laid from the inside of fire-proof buildings, there shall be a temporary floor of 2-inch plank laid on the girders or temporary joists all around the inside of walls and not less than 6 feet wide; and when bricks are laid from the inside of buildings not fire proof which have joists not over 14 inches apart, then the temporary floor may be of 1-inch boards 6 feet wide and placed all around the building.

In all cases where the inside of scaffolding is built from the foundation the same as the outside scaffolding, the temporary floors above mentioned shall not be required.

When trestles are used, the hight to be from 4 to 6 feet, and to be made substantial, of good material ; and when a scaffold is formed by putting trestles one upon another, it shall not be over 18 feet in hight—that is to say, not more than three trestles shall be used of the hight of 6 feet each.

Where required all overhead protections to be placed fully under scaffolds. When building out to the street line, boards or planks to be placed where the workmen pass under.

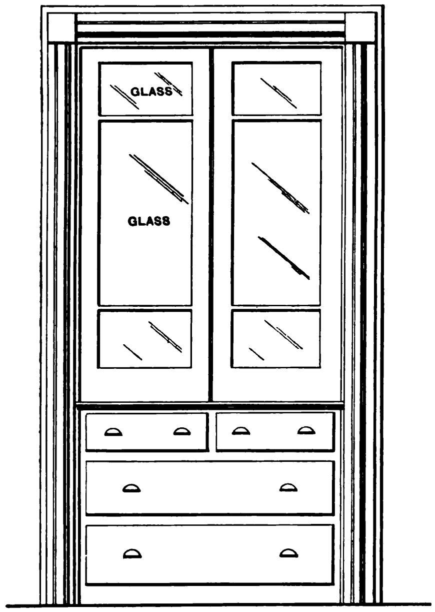
All scaffolding used by carpenters in the erection, repairing, altering or improving of buildings, chimneys or other structures, shall be built and constructed as follows :

CARPENTERS' SCAFFOLDING.

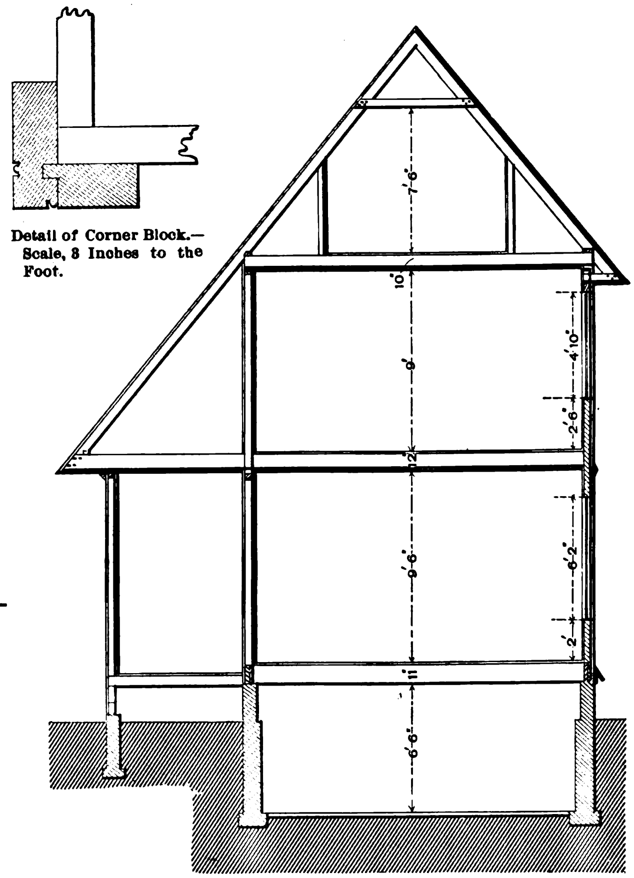
All uprights of said scaffolding to be 4 x 4, sound and free from objectionable knots, the brackets nailed to them and to the building, and to be 1 inch in thickness and not less than 10 inches wide, properly nailed to building and upright ; and when there is no opening to nail said bracket, then a piece 1 inch thick and 6 inches wide to be notched to secure the bracket, and nailed solid to the wall and to the upright. The boards laid on this to walk on to be 2-inch plank, sound and free from knots, or else two 1-inch boards, laid one on top of the other.

When bracket scaffold is put up, the leg to be sound and not less than 2 x 6 on edge, set at the proper angle to prevent the bracket from tipping from the wall.

When scaffold projects from windows, the bracket to be 1-inch thick by not less than 10 inches wide and 6 inches deep, both brace and bracket well nailed to window, and the brace well nailed to bracket also.

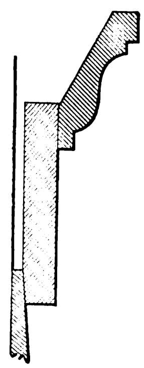


Elevation of China Closet.—Scale, ¼ Inch to the Foot.

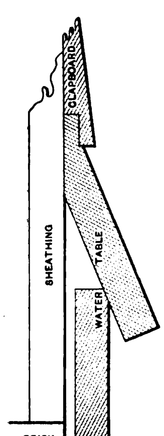


Detail of Corner Block.—Scale, 3 Inches to the Foot.

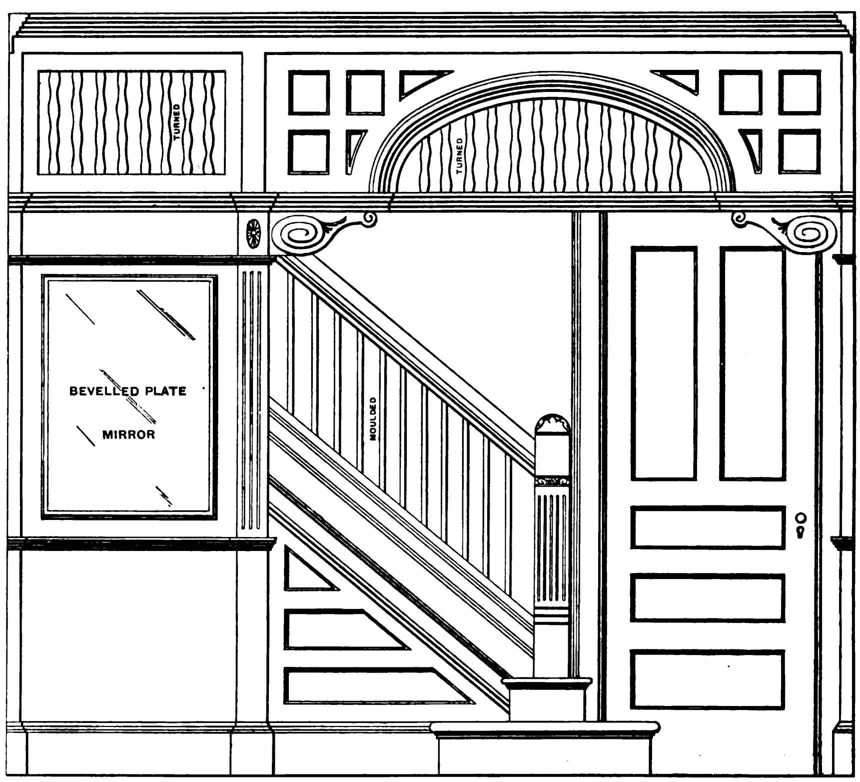
Cross Section.—Scale, ⅛ Inch to the Foot.



Detail of Belt Course.—Scale, 3 Inches to the Foot.



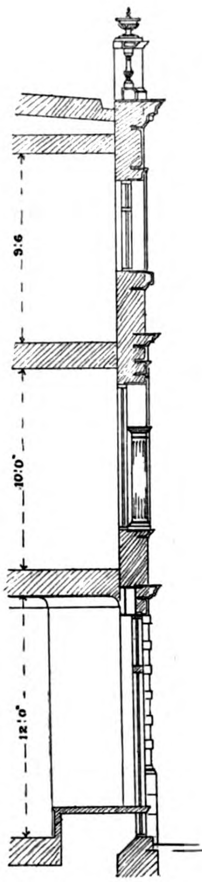
Section at Water Table. – Scale, 3 inches to the Foot.



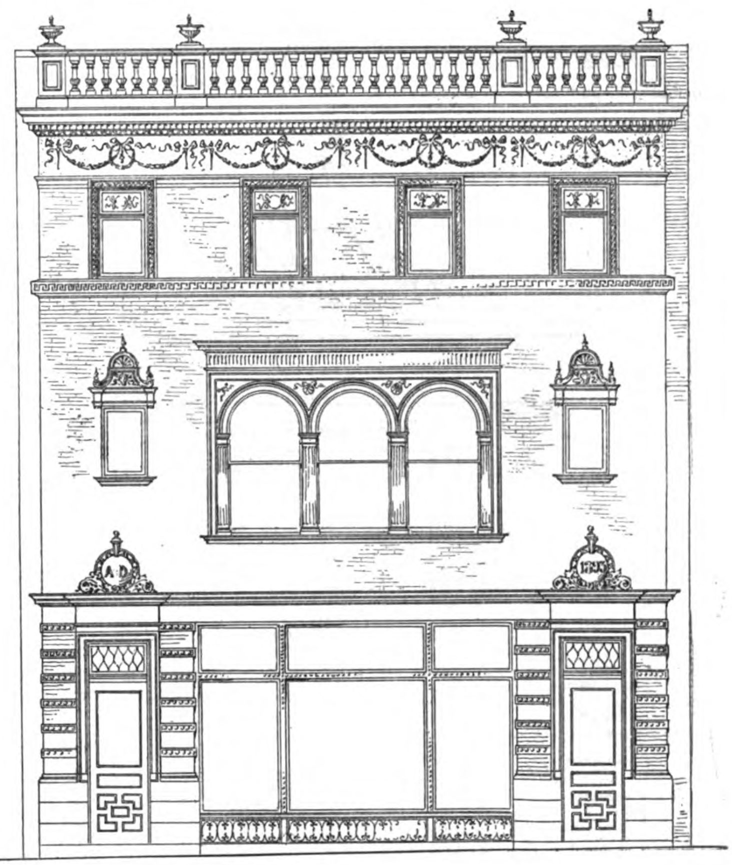
Detail of Main Stairs.—Scale, ¼ Inch to the Foot.

Miscellaneous Details of Parsonage of Methodist Episcopal Church at Somerville, N. J.

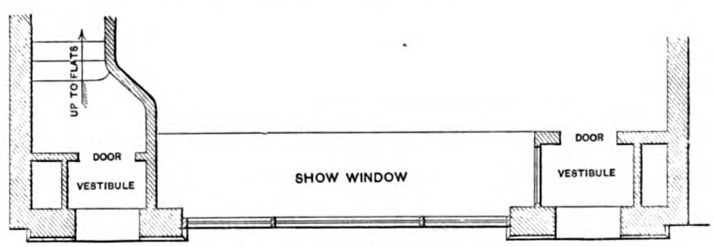
COMPETITION IN STORE FRONTS.



Section.



Front Elevation.—Scale, ⅛ inch to the foot.



Plan View.—Scale, ⅛ Inch to the Foot.

Competition in Store Fronts.—First-Prize Design.—Louis G. Dittoe, Architect, Cincinnati, Ohio.

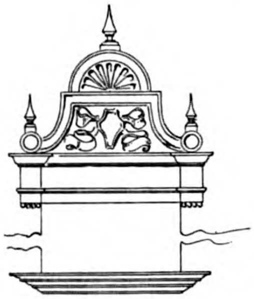
AS OUR READERS will remember, we announced in the issue for December of last year a series of competitions, one of which had for its subject store fronts of a character usually demanded in connection with buildings adapted for erection in small towns and country villages. According to the conditions of the competition, which was the twenty-third conducted under the auspices of *Carpentry and Building*, the material used in the front could be brick, cast iron, galvanized iron, terra cotta, or, in fact, any material preferred by the designer. The contestants were also at liberty to select either two or three story buildings as the subjects of their studies, and they were to vary in width from 20 feet to 33⅓ feet, according to preference. The requirements of the competition called for a front elevation of the store, showing all parts of the building from the sidewalk line to the top of the cornice, and a sectional view to correspond with this elevation. There were also to be details of the different parts, drawn to scale, as well as a brief description of the construction, with mention of the materials employed and an estimate of cost, the latter omitting glass and door and window hardware. The committee to which was intrusted the award of prizes in this competition has reached its decision, which we take pleasure in announcing in this issue.

The first prize of $100 is awarded to Louis G. Dittoe of 805 Neave Building, Cincinnati, Ohio, and the second prize of $75 to A. K. Miller of Turtle Creek, Pa.

The drawings submitted by Mr. Dittoe were of such a neat and handsome character that we have reproduced them by what is known as the direct process, and take pleasure in presenting them upon this and the following pages. In considering the subject of this competition, the author states that his first impulse was to restrict the design to the second and third stories only, which would be carried on an iron lintel, supported by two or more iron columns. Though this method, he writes, is a thoroughly practical one, it would not only sacrifice the design of the first story, but also that of the upper stories, however good they might be in themselves. Having duly considered the matter, the designer concluded to adopt a scheme that would be no less practical, but much more architectural and pleasing in its effect. The author informs us that it is the intention to have the front composed of brick, with terra cotta trimmings, except the architraves around the entrances and the heavy base course, which are to be of stone. The following extracts from the specifications submitted by the author of the first-prize design will prove interesting in this connection.

BRICK WORK.

All face brick in the front are to be good, hard, well burned pressed brick, the color being of a pinkish



Details of Small Windows in Second Story.

buff. The brick is to be backed with a good quality of building brick, and to have good bond about every seventh course. All brick are to be laid up wet in a good quality of lime mortar, and the front to be neatly pointed with mortar of the same shade as the brick.

TERRA COTTA.

All molding, string courses and ornamental portions shown on the front, except that part specified to be of stone, must be of a good quality hard-burned terra cotta, straight, true and in as large pieces as possible. The color is to be a salmon, a trifle darker than the brick employed. All terra cotta is to be anchored firmly to the wall wherever necessary. The cornice is to have ⅜-inch anchors 3 feet long, and as many as there are pieces in the top member of the cornice. The balustrade is to be firmly set and to have a 2½-inch gas pipe run through the rail. All the balustrades are to be doweled top and bottom.

STONE WORK.

The base course, including molding over it with architraves around entrances, is to be of good quality sandstone of a pale red color, a trifle darker than the terra cotta. The stone work is to run entirely through the wall and to be cut clean and sharp in strict accordance with the drawings. It is to be dressed straight and smooth, laid up in a good quality mortar and pointed with mortar the same shade as the stone itself.

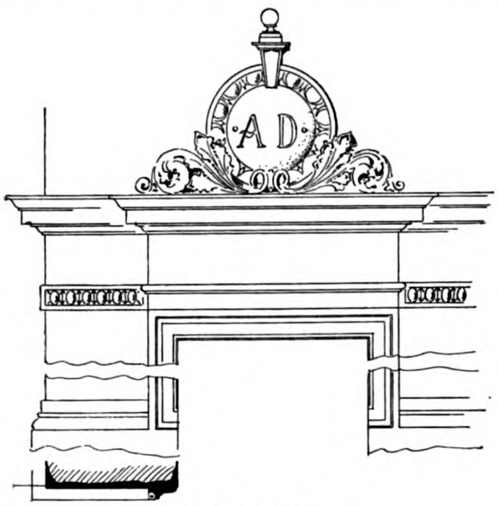
IRON WORK.

The iron worker must construct and set in place the girder, made of good quality flexible rolled wrought iron. The top and bottom plates of the girder are to be ½ x 13 inches, the web plates ⅜ x 17 inches and the angles and stiffeners ⅜ x 3 x 4 inches. The total length of the girder is to be 18 feet. The iron worker must also furnish all anchors and ties required by the terra-cotta men in their work.

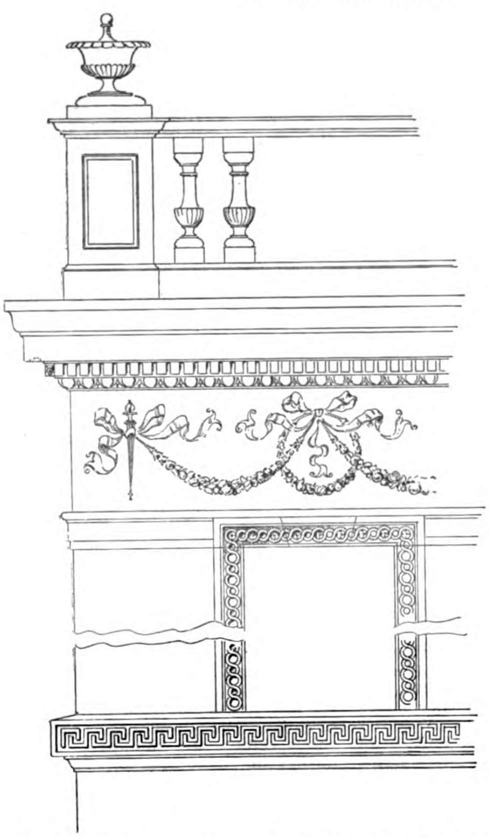
APPROXIMATE COST.

The author of the first-prize design furnishes the following figures as the approximate cost of the front here illustrated:

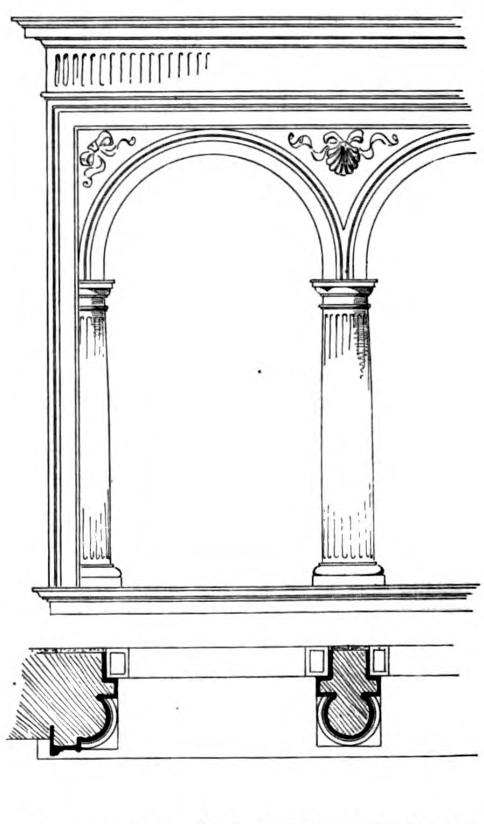
Brick work	$850
Terra cotta	900
Stone work	170
Iron work	185
Total cost	$2105



Finish Over Main Entrance.



Details of Third-Story Front, with Cornice and Balustrade.



Elevation and Plan of Arched Windows in Second Story.

Competition in Store Fronts.—First Prize Design.—Miscellaneous Details—Scale, ⅜ Inch to the Foot.

WHAT BUILDERS ARE DOING.

PRESENT INDICATIONS throughout the country point to a quiet beginning of the season's work among the builders, notwithstanding the many local disturbances between employers and workmen, which would seem to show the reverse to be true. Such disturbances as are reported are in very few instances of either a general or serious character, and the large centers are almost entirely free from menacing complications. In the more prominent cities it is seldom that a year has opened up with so little trouble between employers and employees. There seems to be a sort of epidemic of strikes throughout New England, but from appearances at the present writing they will doubtless be adjusted before they have gone far enough to seriously injure the business for the year. Most of these strikes have occurred in cities where there are no organizations of builders and where the men have been in a much better condition to take united and effective action than the employers. Throughout the Western and Middle States apparently the most satisfactory conditions prevail, while murmurings are heard from among the workmen throughout the West. The general prospect of the amount of building to be done this year bears out the promise of the earlier season, there being no excessive increase or decrease reported from any locality, although the statement is made that in some of the Western States there is at present more work than workmen.

Baltimore, Md.

The project for the erection of a new building by the Builders' Exchange of Baltimore, which has been so long in preparation, has been put in operation, with the prospect of excellent and creditable results. It was originally intended to tear down the building which now occupies the site of the new home of the exchange, but it has been determined to use a portion of the old building, the foundation and lower story of which were found to be suitable for the use of the exchange. The plans call for a granite and brick building nine stories high, with elevators and all modern improvements, and which will be a worthy rival to the best office buildings in the city.

The first floor will be fitted up for fine stores, with heavy French plate-glass fronts. In one portion of the floor will be the offices of the exchange. The second floor will be given up to an exhibition hall, committee rooms, and an office for Secretary and Superintendent Miller. The seven floors above will be filled with handsomely appointed offices, which will be occupied by architects, contractors and builders.

Boston, Mass.

The situation of the builders of Boston is slightly uneasy, owing to the agitation among the carpenters and painters for more pay and shorter working hours. The feeling is one of uncertainty only, owing to the fact that at present, the building season not having fully opened, no extended strike has occurred, and it is not positively asserted by the workmen that one will occur. Everything is quiet in the other branches of trade, and the amount of work projected for the season is up to the average.

Buffalo, N. Y.

The builders in the various cities of the country who have attended the conventions of the National Association of Builders will learn with keen regret of the recent accidental death of James Boland of the Builders' Association Exchange of Buffalo. Mr. Boland was one of the most earnest workers in the interest of his local exchange as well as the National Association, and was a man whose strong characteristics and genial and happy disposition made for him warm friends of all who knew him. His loss was seriously felt by the members of the Buffalo Exchange, where the utmost respect and regard were demonstrated upon the sad occasion of his death.

The Builders' Exchange has been considering the relative merits of the building law of Buffalo and the new State law recently adopted at Albany, at the request of the Mayor of the city. Buffalo was offered the opportunity of choice between the State law and its own present existing ordinance, and the Mayor referred the matter to the Builders' Exchange as being the most capable source of information on the subject in the city. The committee appointed by the exchange to investigate the subject, which consisted of George Deuchscherer, Charles A. Rupp and Charles H. Kellogg, reported in favor of the State law, stating that it covered the ground much more thoroughly than the present Buffalo law, and was in every way the more desirable and efficacious of the two.

Reports read at the annual meeting of the exchange, April 26, showed the organization to be in good condition.

The association also chose a new administration. These trustees were elected to manage its affairs during the forthcoming year: Charles A. Rupp, H. C. Harrower, Alfred Lyth, W. S. Collingwood, George W. Carter, Alfred A. Berrick, Edward M. Hager, George Duchscherer, M. J. Byrne.

After the trustees had been chosen they met and elected these officers to serve during the ensuing year: Charles A. Rupp, president; H. C. Harrower, vice-president; Alfred Lyth, treasurer; J. C. Almendinger, secretary.

Among matters of public interest recently considered by the exchange is the amendment to the city charter, known as the police commission bill, passed at the State capital through the efforts of the legislators from the city and county. The exchange most severely condemned the action of the State legislators as having exceeded the authority of their office. The exchange also voted to co-operate with other commercial bodies to prevent the enactment of further snap legislation affecting the city of Buffalo.

The situation between the building contractors and their employees has been somewhat complicated by the demands of the workmen in several branches of the trade. While there appears to be no danger of a general strike, the plasterers are out at present on a demand for $3.50 in place of $3, and a nine-hour work day. The carpenters and bricklayers have presented grievances to their employers and the latter, as well as the plasterers, are seeking to adjust their affairs by means of an Arbitration Committee from these unions and the Mason Builders' Association. A compromise has been offered by the employers to the striking plasterers, which was refused by the workmen, and at this writing the men are still out.

Chicago, Ill.

The Builders' and Traders' Exchange of Chicago has changed its quarters so long occupied on LaSalle street to new rooms in the Ogden Building at the corner of Clark and Lake streets. The new rooms were elaborately fitted up and furnished with every convenience for the transaction of the business of the members. On the occasion of the dedication of the new quarters an enjoyable programme was prepared which included speeches by many of the prominent members, excellent music and a delightful banquet. Nearly all the 600 members of the exchange were present and a most enjoyable time was experienced.

President Gindele in his address touched upon many points of interest and importance, among which was one phase of exchange work the benefit of which is frequently overlooked. In speaking of the best means of rendering the action of the entire exchange effective and influential he pressed upon the members the necessity of thorough organization of each trade by itself. On this subject he spoke as follows:

I also recommend that all affiliating bodies of the building trades composing this exchange, who are not already organized as separate associations, will organize in order that more harmonious feeling among themselves may be created, and to the end that they may be in a position to recommend and demand legislation favorable to their interests, and further, to be able to adjust all differences between them and their employees, by the system of arbitration, thereby preventing strikes with their attendant evils. I can state, as a matter of fact, of which I am well advised, that all of the trades which have organized, and have adopted the system of arbitration, are entirely satisfied with its workings, and in my judgment, it is only a matter of time when arbitration will be generally adopted throughout the land, and strikes and lockouts will become unknown.

The strikes to which frequent reference has been made in the daily press as affecting the building interests of Chicago were largely confined to the workmen at the World's Fair, operations in the city proper being comparatively little disturbed. The present prospect for the coming building season in Chicago is for a large business, though not up to the standard of last year.

Cleveland, Ohio.

The situation in Cleveland among the builders is disturbed by the demands of the bricklayers and carpenters. The bricklayers are seeking to secure an eight-hour day, with no reduction of pay, and the carpenters want an increase of wages to a level price of 30 cents per hour for all workmen and a nine-hour day. There appears to be some indication that the carpenters may receive their demands, although it is stated that both mason and carpenter contractors have refused to accede to the demands of the workmen. Reports from the Builders' Exchange show that the contractors generally are opposed to conceding shorter hours without corresponding reduction of wages. The outlook otherwise in the building trades promises a profitable season all around.

Cincinnati, Ohio.

There has been comparatively little disturbance in the building trades of Cincinnati this spring, and present indications seem to show that the season will be little disturbed by differences between employers and workmen. The painters' strike, which has been on for several weeks, is in a fair way to be satisfactorily settled. The scale of wages prepared is $2.50 per day of eight hours, instead of $2.61 of nine hours paid last year. Reports from the Builders' Exchange show that organization to be in excellent condition, with the members looking forward to a profitable season's business.

Detroit, Mich.

From the published reports of Superintendent Gurney of the Builders' and Traders' Exchange of Detroit, showing the amount of work undertaken by members of the exchange, building operations in that city seem to be in good condition. No labor troubles are reported, and so far as appearances go there is no present prospect of any disturbance that will seriously affect the business for the coming year. The Builders' and Traders' Exchange is in a prosperous and healthy condition and is steadily increasing in members and influence. The showing made by this organization during the past year is a most satisfactory one, the numerical strength being more greatly increased than during any other similar period of its existence. The recent move into its present quarters, thus concentrating the building interests into a given locality, as well as providing means for securing more fraternal feeling among the members, has been of the greatest benefit to the organization.

The builders of the city were saddened by the recent death of one of the oldest and best-known of their number, Alexander Chapoton, Sr. Mr. Chapoton was prominently connected with many of the improvements throughout the city as the result of the efficient discharge of his duties as a commissioner of public works. He was 75 years old and a man whose character and integrity endeared him to all who knew him.

Grand Rapids, Mich.

During the month of April the Grand Rapids union bricklayers struck for an eight-hour day, demanding the same wages which were paid last season for a nine-hour day, viz., 45 cents per hour. Contractors were for a time hindered in the prosecution of their work by the strike, but although it has not been officially declared off, there are at present sufficient bricklayers in the city who are willing to work nine hours to supply the demand. All other branches of the trade work nine hours, and the mason contractors are opposed to working less than the others. The Builders' and Traders' Exchange is in good condition and the members are anticipating the usual amount of building during the coming season.

Lowell, Mass.

The Lowell builders have been somewhat hindered at the beginning of the season by the strike of the bricklayers for higher wages. The bricklayers have issued a statement to the public in which they set forth the reason for their action. They claim that they were promised 42 cents an hour some three years ago, but the promise has never been made good. They state that the building trade was never better than during the past two years, and that the contractors have been figuring upon 42 cents an hour as a basis. They say that several concerns have offered to pay them the price they demand, but that they haven't sent their men to them, because the contractors would claim they were trying to undermine their business.

Members of the Master Builders' Exchange state that they are opposed to the demands of the bricklayers, and are standing firmly together in opposition to the demands of the workmen. None of the other trades as yet are affected, and notwithstanding this difficulty the prospect for the coming season is excellent.

The sad death of John H. Coggeshall, secretary of the exchange, cast a gloom over the entire membership. Mr. Coggeshall has been secretary of the exchange consecutively for several years, and performed the duties of that office in such a manner as to make his loss severely felt by the organization. He was one of the most active in bringing about the present fraternal feeling which exists among the builders of the city, and much of the credit of the present prosperous condition of the Builders' Exchange belongs to him. Earnest resolutions of sincere regret on the occasion of his death were drawn up by the exchange, to which every member sincerely subscribed.

Milwaukee, Wis.

The date set for the dedication of the new home of the Builders' and Traders' Exchange of Milwaukee was May 20. An elaborate programme had been prepared, which included a banquet with speechmaking, music and other diversions suitable to the occasion. A most enjoyable time was anticipated by all the members.

The carpenters and plasterers are discontented with their wages and hours of labor, the latter having struck during April, and it is stated that they are gaining their demand through the gradual yielding of the employers.

New York City.

The past two months have seen the usual amount of labor disturbances in New York City, but none has been of sufficient importance to cripple any one branch of the trade. The prospect for the coming season seems at present to be very good, there being but little apprehension on the part of the contractors that the general strikes of last year will recur this season. A special meeting of the Building Trades' Club was held May 15 to discuss the question of erecting a new building for the club It was decided that a building be constructed at a cost of $1,000,000, and a committee will be appointed at once to raise the money, select the site, and make the other necessary arrangements.

Omaha, Neb.

The members of the Builders' and Traders' Exchange of Omaha have suffered an almost irreparable loss in the death of their late president, N. B. Hussey. Mr. Hussey had been confined to the house for a long time, and a fatal termination of his illness was not wholly unexpected. All through his connection with the Builders' Exchange Mr. Hussey had been one of the most active and effective workers in its interests, having been largely instrumental in bringing about the present improved condition of the organization, as well as improved conditions of the building trades in the city generally. Mr. Hussey was of the disposition that makes warm and lasting friends, and his genial personality and earnestness had much to do with his success as the presiding officer of the exchange. His loss will be seriously felt by all, and appropriate expressions of grief and respect have been passed by the exchange.

The condition in the building trades as regards the relationship between employers and workmen is quiet, with no prospect of being disturbed in the near future. The amount of work now on hand for the coming season promises greater activity in the trades than existed last year, and there is little prospect that the workmen will run the risk of disturbing what promises to be a profitable season for all.

Philadelphia, Pa.

The outlook for the coming year in Philadelphia is at present exceedingly good, there being apparently no questions between employers and workmen which cannot be settled amicably. The amount of building already projected promises to bring the season's work up to the average.

The Master Builders' Exchange with its usual activity has been considering various subjects of importance to its members and of interest to the public at its recent meetings. Among the questions affecting the welfare of the city in which the exchange has interested itself are the opening of the boulevard from the City Hall to Fairmount Park; the amendment of the building law and others of equal importance

On the evening of April 20 the exhibit department of the exchange was thrown open to a large number of invited guests. A delightful programme was prepared for the occasion, which was thoroughly enjoyed by all This exhibit is unique in its perfection, being the most elaborate and complete collection of building materials in this country, if not in the world. The exchange has recently issued to the architects of the city as well as others interested in building sample copies of the Uniform Contract, urging its use in preference to any other form. The question of advisability of discussing subjects not directly connected with the building business was up for consideration at a recent meeting of the exchange. The matter was not definitely settled and will come up for final action at a future meeting, but the following resolution was adopted :

It is the sense of this meeting that this exchange shall take part and discuss questions relating to the public welfare.

Rochester, N. Y.

Carpenters of Rochester are making an effort to secure increased wages. They want 30 cents an hour and a ten-hour day. They claim that the wages of carpenters have been depreciating for the past two or three years, while contract prices have remained the same. At this time the contracting carpenters have taken no definite action, and the outcome of the demand of the workmen is uncertain. It is reported from the Builders' Exchange that that organization is in excellent condition and is steadily increasing in its influence for good in the building trades. An average season is expected by the contractors.

St. Louis, Mo.

The Builders' Exchange of St. Louis had a melancholy duty during the past month of passing suitable resolutions upon the death of one of its most prominent members, Patrick McGrath. Mr. McGrath had long been one of the most active members of the exchange, and his loss will be sincerely mourned. The effect of the recent convention of the National Association has been to increase the interest of the members in the exchange and its affairs. That organization is in a most prosperous condition, both numerically and financially, and is fully recognized as one of the influential commercial bodies of the city.

Notes.

The contractors of Auburn, N. Y., have formed an association for the purpose of securing united action upon the request of the workmen for increased wages and shorter hours. A. W. Roseboom was elected chairman of the preliminary meeting, with Charles W. Schutt secretary. Permanent officers will be elected at a later meeting.

Brooklyn contractors are being watched very closely for violation of the ordinance regarding the obstruction of streets.

A number of builders of Binghamton, N. Y., have formed an organization to be known as the Builders' Association of that city. Its object is to prevent ruinous competition and shut out irresponsible competition. The meeting was presided over by D. A. Davis, G. N. Balcom acting as secretary. J. M. Wright made a short speech on the benefits to be derived from association.

The several organizations comprised in the Building Trades League of New Haven are contemplating a demand on the builders for a schedule making eight hours a day's work, with no decrease in pay. Nine hours now constitute a day's work.

The various building trades of Des Moines, Iowa, are making a united and persistent effort to secure the establishment of an eight-hour day. The contractors desire to secure legislation on the subject which will establish eight hours uniformly throughout all the trades. It is probable that nothing of a completed nature will be accomplished this season.

A Mason Builders' Association, embracing 25 members, was organized recently in Fall River, with these officers: President, John M. Murphy; vice-president, Chauncey H. Sears; treasurer, John J. Highlands; secretary, John Crowe. This organization is intended to form the nucleus of a builders' exchange.

The carpenters of Harrisburg, Pa., have been striking for $2 50 for a nine-hour day. Up to this time no settlement has occurred.

The contractors and builders of Jackson, Mich., have organized an exchange and have become incorporated under the laws of the State. Among the prominent builders connected with the movement are Robert Lake, James C. Riley, Nelson M. Sweet, Edric H. Hague, Alfred Graver, Daniel J. Doig, Willis A. Alexander, Chas. A. Howind, Henry D. Conway and Robert H. Graver.

The Builders' and Traders' Exchange of Kansas City has carried out one of the recommendations of the National Association in securing the appointment of one of its members to an office within the gift of the city for which builders are peculiarly adapted. W. W. Taylor, one of the oldest members of the exchange, has been appointed to the Board of Public Works and his fellow exchange members have given him the warmest and fullest indorsement.

The Builders' Exchange of Pittsburgh has moved into new and elegant quarters at 411 Market street. On the occasion of the change appropriate dedicatory exercises were held, which included a banquet and other pleasant features. It is proposed to establish a building exhibit in connection with the new rooms. The conspiracy trial against some of the members of the Builders' Exchange which was begun last year was again decided in favor of the prosecutor, Judge White deciding that the members of the exchange unlawfully combined against a contractor who was not a member of that organization.

The carpenters of Pawtucket, R. I., after a short strike for a reduction of hours from ten to nine with decrease in wages, returned to work practically successful, there being but few men out of work on account of the strike.

The first step toward the organization of a builders' exchange at San Jose, Cal., May 8, was taken at a meeting which was attended by leading contractors and material men in all lines connected with the building trade. The meeting was presided over by W. S. Boyles, and George H. Bentley acted as secretary. Committees on Permanent Organization and Rules were appointed. The object of the exchange is to bring all responsible contractors and material men into closer relationship and adopt methods that will place all branches of the business on a better footing and which will result advantageously to themselves and the public in general.

A builders' exchange has been organized at Superior, Wis., with the following officers: President, William Noonan; first vice-president, J. W. Hinkley: second vice-president, J. W. Smith; third vice-president, F. X. LeDoux; secretary and treasurer, J. F. Tostevin; directors are William Noonan, J. W. Hinkley, F. X. LeDoux, J. W. Smith.

At a recent meeting of the contractors of Salem, Mass., for the purpose of organizing for mutual protection, a constitution and by-laws were adopted, and it was voted to name the new organization "The Master Builders' Association of Salem." An election of officers took place with the following result: President, Benjamin F. Touret; vice-president, James F. Dean; secretary, C. H. Osborne; Board of Directors, Joseph M. Parsons, G. W. Pitman, C. B. Pinnock, Paul B. Pattern. A membership of 40 is already enrolled.

The bricklayers of Springfield, Mass., up to the time of going to press had been on a strike for eight weeks in an effort to secure shorter hours. The strike at the beginning was not considered as serious, but as time passed, and efforts on both sides proved futile, other complications have arisen which may protract the strike indefinitely. The mason builders have formed a temporary organization for the purpose of securing unity of action in treating the situation.

The carpenters of Toledo, Ohio, after a short strike for 30 cents an hour and other demands regarding hours of labor, working rules, &c., have settled their troubles by a compromise which included concessions from both employers and workmen. Both sides are happy over the outcome.

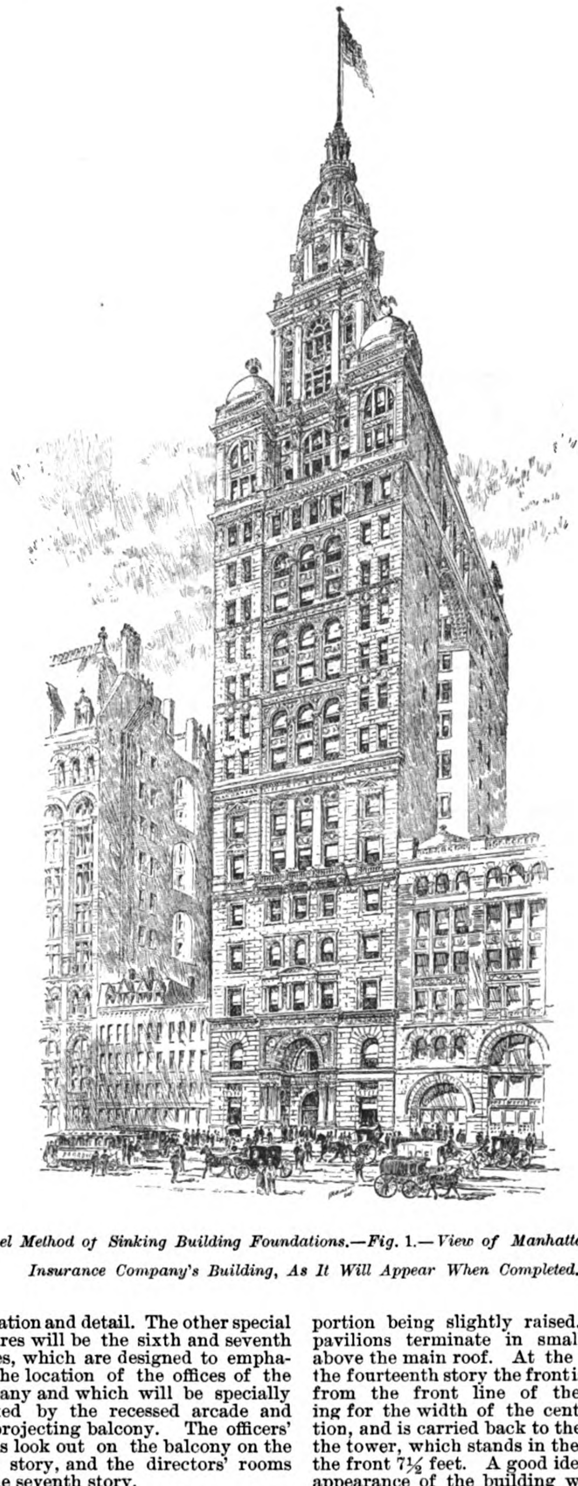
NOVEL METHOD OF SINKING BUILDING FOUNDATIONS.

OUR READERS will recall brief reference a short time since to a structure now in progress of erection on lower Broadway in this city, and which, when completed, will probably be one of the most notable office buildings in this country, if not in the world. It is being put up by the Manhattan Life Insurance Company on a comparatively small plot of ground, and when it is finished will measure 348 feet from the curb line to the foot of the flagstaff, or 408 feet from the bottom of the foundations to the top, as, by reason of the peculiar character of the soil, it is necessary to sink the supporting piers of the building down to bed rock, 60 feet below the line of the sidewalk. The work now in progress is attracting much attention on the part of architects, contractors and builders, for the reason that the so-called "pneumatic process" of sinking the piers has been adopted and the cantilever principle, so well known in bridge construction, been employed in distributing the load of the columns proper over the piers built by the use of caissons. It is probably the first time this method has been used for carrying down the foundations of a large building, although it is common enough in the construction of bridge piers and foundations in or near the water. Why it is so peculiarly adapted to this particular case will be understood when we say that at a distance of some 50 or 55 feet below the level of Broadway there is solid rock upon which is superimposed mud and quicksand, making the use of piles out of the question. Further interest is added by the fact that it is absolutely essential to support and protect the foundations of the walls of the adjoining buildings on the north and south sides during the sinking of the foundations for the new building, thus rendering the ordinary open cut for the removal of the material resting upon the rock out of the question. By the adoption of the "pneumatic process" it is possible to sink the piers to bed rock without disturbing in any way the material, except a section equal exactly to the largest section of the caisson going down. In addition, as the caissons are all made of steel, they can be sunk very near the building line, thereby serving practically to widen the base of the whole structure. The idea of the employment of caissons in this case and of the distribution of the load by means of cantilevers was first proposed by C. O. Brown, president of the Riverside Bridge & Iron Works.

GENERAL DESCRIPTION.

The building is being erected after plans of the architects, Kimball & Thompson of No. 55 Broadway, New York. The frontage on Broadway is a trifle more than 67 feet, the depth on New street being 119 feet on the north line and 125 feet on the south line. The building proper is to be 16 stories high on the Broadway front and 17 stories high on the New street front. It will have a hight of 242 feet from the Broadway sidewalk to the top of the main roof, and a hight of 254½ feet on New street. Rising from the main roof on the Broadway front will be a tower, terminating in a dome, which will increase the hight of the building from the Broadway curbstone to the foot of the flagstaff to 348 feet. The style of the Broadway and New street fronts will be Italian Renaissance, richly ornamented. The special features of the Broadway front will be the arched doorway extending through two stories, with a recessed vestibule, also of stone, extending back in the building 13 feet, the sides and ceiling being richly ornamented. The spandrels of the arch outside are to have cartouches on which will be inscribed the date of the foundation of the Manhattan Company and erection of the building, together with the seal of the company. This part of the building will be the richest in ornamentation and detail. The other special features will be the sixth and seventh stories, which are designed to emphasize the location of the offices of the company and which will be specially marked by the recessed arcade and the projecting balcony. The officers' rooms look out on the balcony on the sixth story, and the directors' rooms on the seventh story.

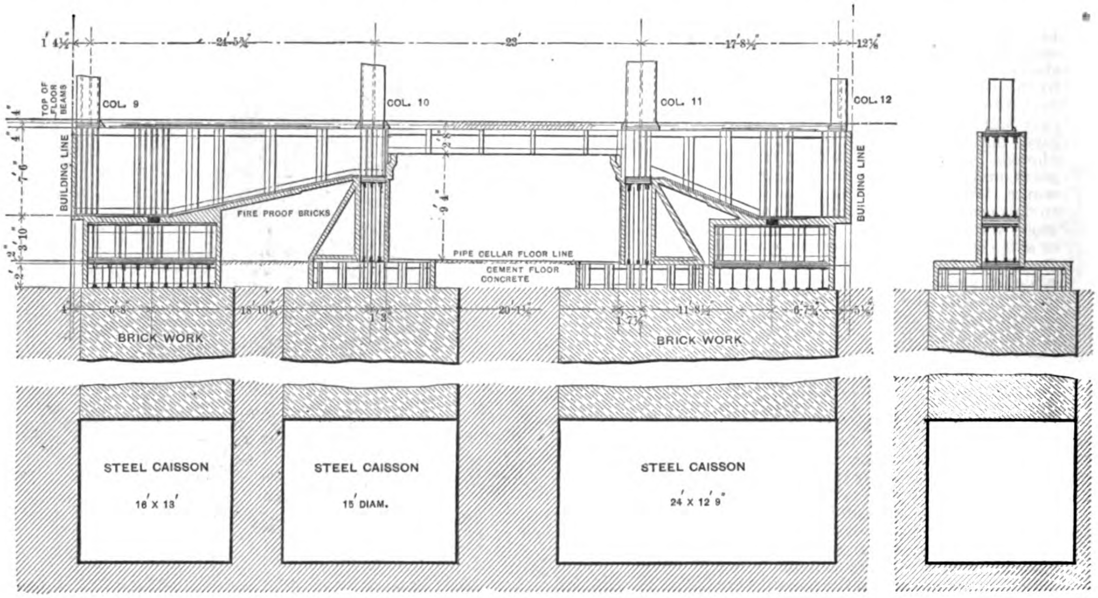
In the design the architects have aimed to preserve as much as possible a solid, dignified character and to avoid excessively large openings. The front is unbroken from the sidewalk to the sixth story, except by the large doorway. From the sixth story upward the front is more irregular and is marked by side pavilions, the central portion being slightly raised. These pavilions terminate in small domes above the main roof. At the level of the fourteenth story the front is retired from the front line of the building for the width of the central portion, and is carried back to the face of the tower, which stands in the rear of the front 7½ feet. A good idea of the appearance of the building when finished may be gained from Fig. 1 of the



Novel Method of Sinking Building Foundations.—Fig. 1.—View of Manhattan Life Insurance Company's Building, As It Will Appear When Completed.

engravings. The inner line of offices are lighted from a large open court on the south side of the building, thus giving every office abundant light and air. On the sixth floor there is a spacious rotunda two stories in hight, with a domed ceiling richly decorated in relief. This rotunda is designed for the public entrance to the company's offices. There will be five hydraulic elevators for the use of the public and two electric elevators for the use of the company. Careful attention has been paid throughout to the fire-proof qualities of the building. There will be no metal work exposed to the action of fire, all being covered with fire-proof materials. All the staircases above the first story will be of marble and iron, and all the floors of halls and corridors will be laid in mosaic. For the special ventilation of the offices there will be a large chamber formed above the ceiling of all the corridors and connected with ventilating shafts. there will be, all things considered, ample space on the lower floors.

The caisson considered as an aid in sinking foundations through wet material consists of an inverted box having a sectional shape according to the work it is intended to do, sometimes circular, rectangular, square or irregular. The principle is that as long as the air pressure in this box is maintained equal to or slightly above the pressure upon the outside down to the lower edge of the caisson, it will be impossible for any water to enter. Work is carried on in the chamber formed by the caisson, in the vast majority of cases the work of laying the masonry on top of the caisson being carried along at the same time. As the work of excavation advances the caisson sinks, the air pressure in the inside being reduced slightly until the dead weight of the caisson itself and the masonry upon the top of it are sufficient to overcome the frictional air under pressure. The reversal of this operation permits of the passage from the caisson through the air lock to the outside; in the latter case, of course, the air under pressure in the air lock being permitted to escape into the atmosphere. After the caissons have been sunk to bed rock they are cleaned out and filled with concrete, thus forming a continuous masonry pier from the rock up to the surface of the ground. In Fig. 2 is represented a cross section through the foundations of the building, showing the piers resting upon the caissons and supporting the steel cantilevers which carry the frame work of the building. The view at the extreme right of the engraving is a vertical cross section through one of the piers. There are 15 caissons employed, some of which are placed at right angles with the foundation walls, and others are arranged obliquely. This is done in order that the cantilever,



Novel Method of Sinking Building Foundations.—Fig. 2.—Cross Section through Foundation of the Building, and Vertical Cross Section through One of the Piers and the Cantilever.

Each office will be connected with this chamber by registers under the control of the tenant. At the head of each of the ventilating shafts there will be electric exhaust fans supplying the motive power for the extraction and discharge of the vitiated air from the offices. The heating and power system will be supplied by three Scotch marine boilers placed under the sidewalk on Broadway.

THE FOUNDATIONS.

It is, perhaps, not too much to say that a few years since it would have been impossible to have erected on so small a ground area a building possessing the foundation load this one will ultimately have without using so much of the space as to render the lower floors small and of insignificant value. By carrying the foundation piers, however, down to bed rock as here proposed, introducing the cantilever principle for distributing the load over the several portions of the foundations formed by the caissons and employing the skeleton steel frame construction, by which the main loads are carried and the masonry shell supported, with proper bracing to withstand strains due to wind pressure, grip or resistance, due to the material that it is passing through, bearing upon the outside surface. Entrance to the caisson is effected through what is termed an "air lock," sometimes only one of which is employed, and sometimes two, one being for men and the other for material. This air lock is a small chamber provided at each end with a door, the doors opening inwardly, or toward the inside of the caisson. We will suppose that the inner door of the caisson is closed and the outer door open. The inner door of the caisson is firmly held in a closed position by reason of the interior air pressure, which it is not expected in the case of the caissons under consideration will at any time exceed 12 or 15 pounds to the square inch, equal to about from 27 to 34 feet head of water. Entering the air lock the outer door is then closed and the air under pressure admitted through a suitable valve into the air lock. As soon as an equilibrium has been established—that is, when the air in the air lock has become of the same pressure as that in the caisson—it is evident that the pressure on the inner door will be equal on both sides and it can be opened, as the outer door then prevents the escape of the which is shown in cross sectional elevation in Fig. 2, may properly distribute over the foundations the load carried by columns 9 to 12. Arranged at right angles across the top are two sets of channel beams, which serve not only to stiffen the roof but also to bear the load of masonry erected upon it during the sinking.

COLUMN SUPPORTS.

There are 32 columns for carrying the building, and as it is essential that the load should be brought to the center of the top of the piers, bolster shoes were adopted. These bolsters consist of two systems of girders, arranged at right angles to one another, and upon the center of the top of which rests the cast-steel shoe of the column. The construction of these girders is very plainly brought out in Fig. 2. It is evident that this method provides for the equal distribution of the weight over the entire base of the pier, preventing thereby any one section from carrying more than its share of the load.

CANTILEVERS.

The cantilever through columns 9, 10, 11 and 12 is shown in Fig. 2, which also indicates the relative location of the three caissons carrying this particular structure. These cantilevers consist of a system of plate girders arranged in box form, as shown in the cross sectional view to the right in Fig. 2. The center of the bracket, as shown to the extreme left in Fig. 2, has an extreme hight of 7 feet 6 inches. It should be particularly noted that the columns at the ends of the cantilever are on the building line with the exception of space sufficient for the insertion of fire proofing bricks, which in Fig. 2 are indicated by the hatched surfaces. The inner ends of the two brackets of the cantilever are united by a connecting bridge of plate girders 2 feet 8 inches deep. The inner ends of the brackets carry the columns 10 and 11, the columns 9 and 12 being supported upon the outer ends. The load supported by the outer columns is transferred to the bolster shoes at the center at the points indicated in black, so that although both of the end columns are beyond the outer edges of their respective caissons the load they bear is transferred by means of the cantilever and bolster shoes so as to be evenly distributed over the base of the piers formed by these caissons.

Roofing Slate.

In an article contributed by George H. Harris to a recent issue of *Stone* on the subject of Slate and Slate Quarrying, interesting reference is made to the manufacture of roofing slate. He states that a block is raised from the quarry and placed in close proximity to the building occupied by the slate makers. The block is then either sawed across the grain or broken by one of the slate makers, so that a certain sized slate may be made from it. It is then split into pieces 2 inches thick, and the slabs pass to the second slate maker, who cleaves them as thin as the quality of the slate will permit. We quote from the description as follows:

A hundred slate set upon edge and packed closely together should occupy 22 inches in space. Where the cleavage is imperfect the slate makers do not obtain more than three or four slates to the inch. A slate trimmer, which cuts the slate into regular sizes, is indispensable, and is always found in every slate maker's building. In cleaving slate down to the proper thickness there may be a blind seam or some obstacle which breaks the slate. This piece is cut with the slate trimmer into a smaller-sided plate. For instance, the block is first designed to make 24 x 12. Defects may occur so that they may get a few 24 x 12, or a few 20 x 12. The sizes of slate vary from 12 x 6 to 24 x 18 The most salable sizes commence at 20 x 10 and run to 24 x 18. Allowing 3 inches lap, when laid, there are 533 pieces in a square of slate which measures 12 x 6 inches. In 24 x 18 there are 76 slates to the square. A square of Vermont slate will weigh about 600 pounds. In order to furnish a yard so that there is a sufficient number of slate on hand to make sales from it will be necessary to have at least 100 different sizes of slate, and a carload is 50 squares of each size. At W. H. Lloyd's quarry, near Fairhaven, Vt., which is devoted exclusively to purple roofing slate, a gang of three men will make 15 squares of slate per day. The crushing strain of Vermont slate, which has been tested by F. R. Hutton, M. E., of New York, shows the resistance to be 12,870 pounds to the square inch. The durability of Vermont slate cannot be determined, from the fact that the first slate, which were quarried 46 years ago, and the first buildings which were slated from these slates, about the same time, are in as good condition to-day as they were the day they were first placed upon the roof, with the exception of an occasional breakage.

There are slate quarries devoted to roofing slate entirely, while there are other producers who manufacture mill stock and also roofing slate.

Many firms throughout the slate belt, having become well satisfied in regard to the superiority of the Vermont slate, are willing to place their goods in competition with any foreign article of a similar nature. Foreign demand for colored slates has gradually increased within the past four or five years, so that at the present time this branch of the slate industry has become a matter of considerable importance.

Since the "tide in the affairs of men" has changed, it may be proper to mention the first slate quarries developed in the Vermont and New York slate bed, and at a time when the people of New England were entirely dependent upon foreign markets for slate. It has been stated that the first quarrying in Vermont was done by Col. Alanson Allen of Fairhaven, in 1839. In 1847 Mr. Allen commenced the manufacture of roofing slates. In 1848 F. W. Whitlock of Castleton, Vt., opened a quarry in that town about forty rods north of the north line of Poultney, and in the vicinity of a quarry opened afterward and called the Eagle quarry. In 1851 Daniel and S. E. Hooker opened the first quarry in the town of Poultney, Vt. In 1852 John Humphray opened the Eagle quarry, near Hydeville, Vt., and E. D Jones opened a quarry in the same vicinity. In 1853 the Eagle Company were incorporated and commenced the manufacture of roofing slate under the superintendence of Dr. Goldsmith. W. L. Farnham & Son opened a quarry in 1853, and in 1860 Mr. Griffith Hughes opened the "Evergreen," previously mentioned. The year 1860 seemed to be prolific in opening and developing quarries. Six were opened in that year. The increase was slow—about three or four new quarries being added to the list every year up to 1872—when there appeared to be a decided change, and quite a number of new quarries were included in the list that year. The product of the slate quarries amounted to but very little previous to this time, on account of the slow methods of quarrying. But very few if any of the modern mechanical appliances were in use at that time.

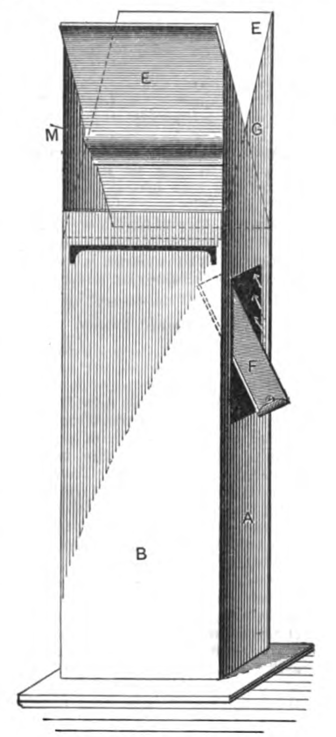
The pioneer who commenced active operations in developing slate quarries 40 or 50 years ago is worthy of a great deal of credit for his foresight, his indomitable will, sagacity and perseverance, and yet it must be admitted that the prosperity of the slate industry has been developed within the past 20 years. The demand for slate makers and quarrymen from the old country or from Wales appears to be greatly in excess of the supply. A slate maker in Wales receives about $1 per day wages, while the laborer performing the same labor in this country gets $2 for the same time. A family which consists of a man and his wife and five children arrived in this country last fall. The husband and two boys were given work at the Eureka quarry. The first month's labor revealed the fact that the second boy, who was only 10 or 11 years of age, had earned more as a signal boy in this country than his father had earned in the same time as quarryman in Wales. The father, in the meantime, had more than trebled the wages he had received in Wales.

The importance of the slate industry and the magnitude of its trade is demonstrated in the large number of orders that are being received from foreign markets. The export trade has nearly doubled in the past two or three years.

The annual output of roofing slate throughout the slate belt of Vermont is between three and four hundred thousand squares. Vermont produces a greater variety of colored slates than any other State, while the output of her milled stock is larger than that of any other State.

An English Chimney Top.

In the accompanying illustration we present a general view of a chimney top which has recently been brought to the attention of the building trades in England. It is so constructed as to prevent down drafts, while increasing the up drafts, and is offered as a remedy for smoky chimneys. It is rectangular in cross section, and the inventor states that by a slight alteration it can be used as a ventilator to carry off vitiated air or dangerous gases from pipes connecting with the basement of a building or with sewers. In the construction of the device here illustrated the top is provided with a metallic shutter or flap, marked E, which works on bearings, G M. It is arranged to oscillate from side to side, the base resting against either one side or the other, according to the direction of the wind. The lower end of the metallic flap E is less distant from the bearings G M than the upper end, so that the latter is tilted according to the direction from whence the wind is blowing. The added weight of the upper end retains the portion E in position until it is reversed by a current of air in the opposite direction. In either case, however, the shutter E prevents the air from entering the chimney in a downward direction, while facilitating up drafts. The metallic shutter F, shown in the side of the device, is deflected at times by the action of a passing current of air, as indicated in the engraving. This causes a strong upward draft, so as to carry off the smoke and increase the current of air that is flowing upward. The lower end of the flap E is weighted, so that when the pressure of the wind decreases the flap assumes a more vertical position.

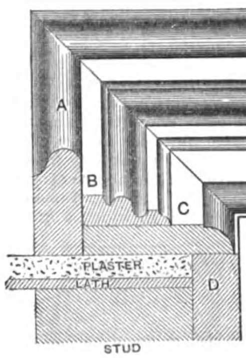


General View of an English Chimney Top.

CORRESPONDENCE.

Designs of Interior Finish.

From L. T. B., *Hamburg, Iowa.*—In answer to "N. D. C.," Dixon. Ill., and others, requesting designs for inside finish, I send herewith sketch of trimming I have used, which I think looks very well. Referring to the sketch, A is the wainscoting cap No. 371 and



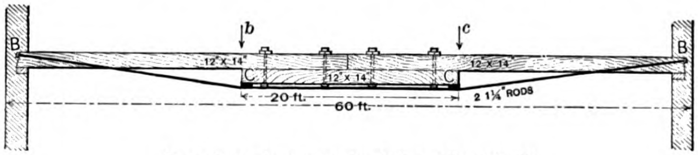
Sketch of Inside Finish Contributed by "L. T. B."

measures $1\frac{1}{8}$ x $2\frac{1}{2}$ inches; B is a band molding No. 252, and measures $\frac{3}{4}$ x $2\frac{1}{4}$ inches; C is the casing, $\frac{7}{8}$ x $3\frac{3}{4}$ inches, while D is the door or window jamb.

Barn Truss.

From J. W. S.. *Council Bluffs, Iowa.*—I have been a subscriber to *Carpentry and Building* for a number of years and come to it now for the first time for a little information. Inclosed I send a rough sketch of a truss, and would like to know the weight it is capable of carrying. There are two iron rods $1\frac{1}{4}$ inches in diameter running the entire length of the truss, one on each side, as represented by B B, and held in position by two iron plates at C C.

Note. — We have reproduced the sketch submitted by our correspondent, and present it in this connection with the answer furnished by a well known civil engineer, who says: The beam itself for such a span without truss rods would be nearly useless. The weight of the beam itself, including four $\frac{3}{4}$-inch bolts and the two truss rods $1\frac{1}{4}$ inches

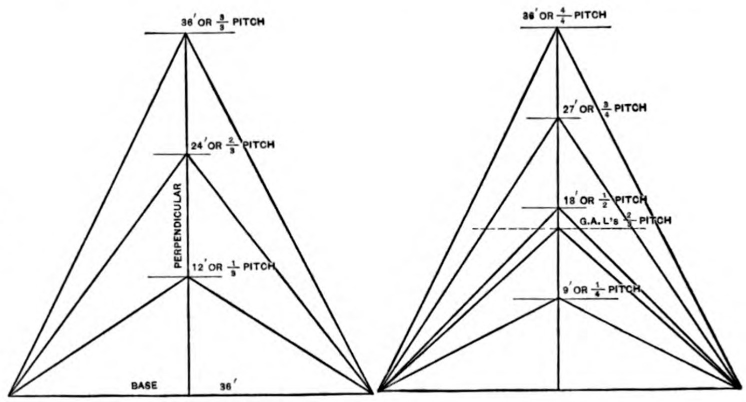


Barn Truss Accompanying Letter of "J. W. S."

in diameter, is about 4730 pounds. The center reinforcing piece forms a continuous strut. It is a waste of timber, and adds useless weight to the trussed beam; two angle iron bars would answer the purpose far better. The rods must carry the entire load coming upon the struts, or loads which by supposition may be concentrated at *b* and *c*. The area of a $1\frac{1}{4}$-inch rod is 1.227 square inches; the safe load in tension is 5 tons per square inch, or safe load for both rods acting together is 12.25 tons. As to transverse strength, owing to the method of trussing, the 60-foot beam may be considered to act as three separate beams or as three continuous beams. Safe load on the two outer portions, each 8.172 tons. Safe distributed load on central reinforced portion, transverse strain, is about 70 tons, considered by itself, independent of its adjoining members; considered as struts, the outer portions act as separate posts, and have a safe strength of 12.9 tons. It is unnecessary to calculate the central reinforced portion. A concentrated load of $5\frac{1}{4}$ tons at *b* or *c* would produce the maximum stress allowable in the rods, so that this is really the load that could with impunity be brought to bear upon the truss.

Pitch of Roofs.

From G. N. H., *Marysville, Mo.*—In answer to "G. A. L." of South Hanson, Mass. I would say that I do not agree with him as to what constitutes a two-thirds pitch. I claim that two-thirds pitch, as shown in Fig. 1 of the sketches, is a rise of the comb of the rafters two-thirds the width of the building. If we take a structure 36 feet wide, we find one-third pitch to be 12 feet above the plate and three-thirds 36 feet above the plate. Now, where would be two-thirds pitch? According to "G. A. L.," the point of the rafters would be below one-half pitch, as indicated in the diagram Fig. 2. I will not venture further, but will ask what is meant by the term pitch. What is no pitch and what is a full pitch?



Pitch of Roofs.—Figs. 1 *and* 2, *Submitted by "G. N. H."*

From J. C. M., *Oregon, Ill.*—In the December issue is published a question, What is two-thirds pitch? I have always understood it the way the editor describes it in the first part of his note in that issue.

Brick Veneering a Frame Building.

From A. W., *Frankfort, N. Y.*—As an old subscriber, I beg to ask through the Correspondence Department of the paper whether it has ever been tried, and with what result, to veneer with brick, on all four sides, a three or four story frame building. I am aware that there will be an unequal settlement between the brick wall and the frame, and desire to know how the bad effects of such a settlement can be avoided. What would be the best method to adopt in constructing such a building? A statement of the materials employed would also be greatly appreciated.

Tank Hoop Problem.

From L. G. K., *Kansas City, Mo.*—If the unfortunate tank hoop problem has survived the late storms and heavy blows, kindly allow me to give it a few raps by offering the following approximate circular methods for ascertaining the circumference of a circle: Multiply the diameter by 3.1416 +, or go to the other extreme, using 3.14159265358979323846 +, or multiply by 22 and divide by 7, all of which amounts to the same thing. Multiply the diameter by $3\frac{1}{7}$, which is too great by one part in 792, nearly. As some one may desire to knock this off the (circular) ring, it may be well at this stage to state that 3 1416, &c., written above, was taken from a standard work, and also the eight decimals we will use have been compared with several different tables. For the proof, note the following:

$$792 \times 22 \div 7 = 2489.1428 +$$
$$\text{and } 792 \times 3.14159265 = 2488.1414 -$$
$$\text{Difference}\ldots\ldots\ldots\ldots \quad 1.0014 +$$

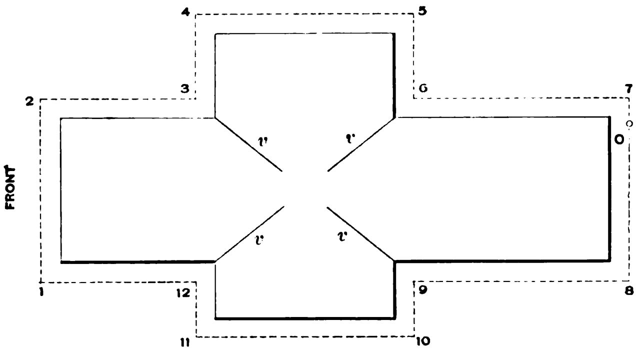
To correct the error the following deductions may be of interest, as with them the circumference of a circle may be obtained with great accuracy: Multiply the diameter by 22 and divide by 7. With a circumference of 792 to 800 feet deduct 1 foot. Now, with a circumference of 100 feet deduct $1\frac{1}{2}$ inches; with a circumference of $66\frac{2}{3}$ feet deduct 1 inch; with a circumference of 50 feet deduct $\frac{3}{4}$ inch; with a circumference of $33\frac{1}{3}$ feet deduct $\frac{1}{2}$ inch; with a circumference of $16\frac{3}{4}$ feet deduct $\frac{1}{4}$ inch. If the method here presented shall prove interesting to some one who may wish to use the convenient rule called 22 and 7 my effort will not have been in vain.

Cellar Walls of Cobblestones.

From S. A. S., *Barton, Vt.*—Will some of the practical readers of the paper tell me what they think of cellar walls made of cement and cobblestones?

Roof with Single Leader Pipe.

From D. G., *New Hampton, Iowa*.—I would be pleased to have the opinion of *Carpentry and Building* with regard to a matter which I will try to explain. Inclosed find outline plan of roof of a two-story dwelling house 60 feet deep, the roof being about one-fourth pitch. The solid lines represent the eaves, the broken lines hanging gutter or eave trough. The figures 1 to 12 are 12 miters in the trough, eight outside and four inside. The size of the trough is 4½ inches. The entire run is 170 feet. The distance between 5 and 6 is 5 feet and between 9 and 10 3 feet. Please bear this fact in mind, as it may help to the solution of a difficulty made apparent further on; *v v v v* are four valleys terminating in four inside miters. O, at the southwest corner, is the only outlet and down pipe in the system. This job was put up last summer, and is not satisfactory, as the water flows over at 5, 6, 9 and 10. The owner was particular that there should be but one outlet. I gave it as my opinion at the time that there would be serious trouble, considering the great number of right angled miters in the trough, and experience proved that I was correct. I claim that the rush of water in the valleys, terminating in the short runs between miters 5, 6, 9 and 10, retards the uniform flow or dams it up, causing the water to flow over at those points. I apprehend also that no reasonable amount of fall would overcome this tendency to fill to overflowing. About the only thing, aside from more outlets, that suggests itself to me is a much larger trough and increased fall, the present fall being 6 inches. The proprietor avers that more than the present outlet is impracticable, owing to no sewerage, nature of soil and close proximity to other property. Reconstruction is the word passed to headquarters, and I would like to have an opinion expressed through the columns of the paper.

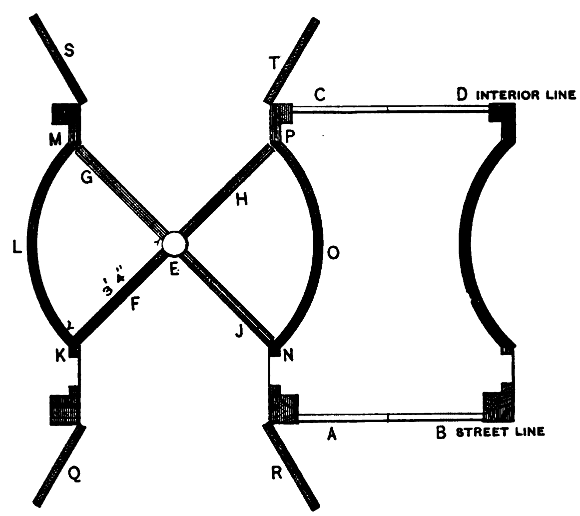


Roof with Single Leader Pipe.—Sketch Accompanying Letter from "D. G."

Note.—We think the last suggestion made by our correspondent is by all means the best, namely, to reconstruct the whole thing and put in more leader pipes. Of course the difficulty could be overcome by increasing the size of the gutters, as there must necessarily be a flow toward the outlet, and the only thing is to have the gutters of sufficient size to hold it, even though it be dammed up at the corners. The suggestion that the water flowing down the valleys forms an obstruction to what flows through the gutters from the other part of the roof is plausible, and we think explains the trouble. The water coming down with considerable velocity may flow against the opposite corner of the gutter and divide, part of the stream backing up away from the outlet and necessarily damming the flow. A possible remedy that suggests itself would be to put in a deflector at the bottom of each valley which would throw the water into the run of the gutter so that it would not flow directly across and give rise to back water. The introduction of this deflector, however, would probably make it necessary to widen the gutter where it passes the bottom of the valleys. This might give a queer architectural effect, but would possibly prove a remedy and permit the owner to dispense with more leader pipes, against which he has such an objection. We would like to hear from members of the trade in this matter.

Turnstile Storm Doors.

From E. R., *Chicago*.—The tallest of the tall buildings of Chicago is the Masonic Temple, 22 stories high, which is located at the corner of State and Randolph streets. The main entrance to this building was provided with two lines of swinging doors to prevent the air from entering in tremendous volume and rushing up the great elevator shafts. There are five sets of such doors, to accommodate the vast multitude of people who pass in and out of this huge building daily. These doors were at first arranged as shown in the accompanying plan, A B representing the outer doors and C D the inner. It was found that, as people were continually passing in and out during business hours, the doors were kept "on the swing" and consequently open most of the time, thus affording an opportunity for the air to enter after the manner of a cyclone. To remedy this condition of affairs, turnstiles were placed in alternate doorways, filling the entire space from top to bottom. In the engraving, E represents a wooden post which turns on iron pivots, the lower pivot entering the floor and the upper pivot the ceiling over double doorway. F, G, H, and J are four glazed wooden doors secured to the post, thus forming the turnstile. These doors have rubber faces. The wood work on either side is represented by K L M and N O P. Glazed sash are placed at K and N. The doors Q, R, S, T can be secured in the position shown while the turnstile is in use. As the affair is arranged, people can enter the building through the turnstile by passing to the right and leave in the same manner, yet at no time is there presented a free passage for cold air to enter the building. During cold weather the doors similar to A, B, C and D are fastened, but can be used when the weather permits, thus allowing people to enter by these doors in place of the turnstile, if desired.



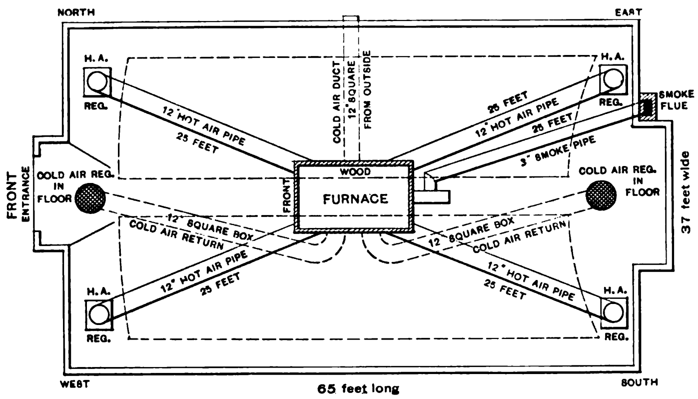
Turnstile Storm Doors.—Entrance to Masonic Temple, Chicago.

Warming a Church.

From W. D., *Oxford, N. S.*—Inclosed please find the plan of a church heated by a wood furnace which was put in some time ago, but does not heat satisfactorily. It is large and capable of heating a building much bigger than the one shown by the plan. I have an idea of my own on this matter, but would like to have your opinion through the columns of *Carpentry and Building*. The smoke pipe is connected to the flue on the outside, running through the cellar dug out underneath the church, and is not incased.

Note.—The plan submitted by our correspondent shows the location of the furnace, the smoke flue and various other necessary fixtures, with their dimensions. While it would be desirable to know the depth of the cellar, hight of the ceiling in the audience room, and hight of the furnace, the details given are sufficient to show that care has been taken and that good workmanship has been employed, so that the trouble lies in planning the job and not in the execution of the work. A better flow of hot air through the 12-inch pipes could be secured by making the two cold-air return boxes or ducts equal in capacity to the four 12-inch hot-air pipes. The cold-air register faces must be of ample capacity to allow this quantity of air an easy passage to the two ducts; also enlarge the cold-air duct through which the air is taken from the outside to equal in area three-fourths the combined cross area of the four 12-inch pipes. These changes will improve the flow of hot air, but not to the extent which will be required to heat the church in a satisfactory manner. Assuming that the ceiling of the church is at least 15 feet above the floor, the total cubic space to be heated would amount to 36,000 cubic feet. To perform this amount of work properly would require four pipes, each 15 inches in diameter. The cold-air duct from the outside of the building to the furnace should then be 477 square inches in area; a cold-air duct 32 x 15 inches would be about the proper proportion.

The two cold-air return pipes or ducts should each be equal to two 15-inch pipes—that is, 354 square inches in area—and provided with a suitable register face in the floor. Properly placed division plates must be provided in the furnace setting, so that the currents of air from the ducts will not interfere with each other before they come together in the hot-air or mixing chamber. The hot-air or mixing chamber should be at least 12 inches high above the top of furnace. Suitable dampers should be placed in the cold-air duct and also in the return pipes, so that the flow of air can be regulated. The hot-air pipes should have a rise of at least 1 inch in every 12 inches from the furnace to the hot-air registers in the floor, and when the length of the pipes is so near the practical limit more rise should be given. If the cellar is a very cold one they should be well wrapped with a non-conductor to prevent any undue loss of heat from this source. To provide a good draft, the chimney must have ample area, and the smoke pipe, if necessary to prevent its becoming cooled before it connects to the chimney, should either be incased by a larger pipe or otherwise protected. If it is allowable to place the hot-air registers in the side aisles, this should be done, as it would shorten the hot-air pipes with great advantage and increase their rise, as well as the distance between the hot-air registers and the cold-air return.



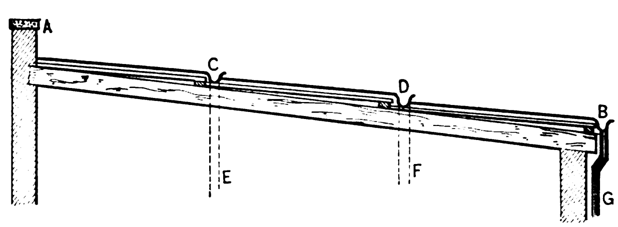
Warming a Church.—Plan Showing Furnace Pipes.

Learning a Trade Under Difficulties.

From F. A. D., *Oakland, Cal.*—In the January number I read the letter from a correspondent who says "give American boys the preference in learning trades," &c. I will give a short account of how I tried to learn a trade, and would like to hear others give their views. I tried by all manner of means to learn bricklaying. As the union regulated apprentices it was absolutely impossible. Germans, Swedes, &c., after carrying the hod in their own country come out here as bricklayers. Next I tried to be a carpenter. After carrying lumber, sweeping out the house, running errands, &c., for nearly two years for pay which would not buy the clothes I wore I became discouraged. At last I went into an architect's office. The first year I received no salary, the second year $1 per week for six months, and the next six months $2 per week. I did all the sweeping, copying specifications, running errands, &c. At the end of two years I was told that as times were dull and work slack I was not needed; at the same time two men were kept working, one a young Englishman and one a German. I have waited for nearly two years, but good times have come and gone and I still wait to get back to learn to be an architect. This is the way the California boy learns a trade. I would like to know if this is justice. One thousand young boys are roaming the streets unfit for anything because they have no trade. The iron works in San Francisco import apprentices from England and Scotland.

Parallel Troughs on Roofs.

From J. B. M., *Saquache, Col.*—**In the case of large buildings that are covered with a standing-seam tin roof, the water course is too long. As enormous quantities of water rush to the lower part of the roof, the standing seams are covered and some of the water is liable to find its way into the building. Would it not be a good plan in such cases to put a number of troughs across the roof, each of the troughs being provided with a down spout at the side of the building? In the accompanying diagram let A B represent the side view of a long roof. The usual trough would be placed at B, and the down spout at G. By having parallel troughs at C and D, and down spouts at E and F, the great rush of water at B would be avoided, troughs C and D each taking their share, which would be conveyed away by means of the down spouts E and F. Will the readers of *Carpentry and Building* give their ideas regarding the value of the scheme?**



Parallel Troughs on Roofs.—Plan Suggested by "J. B. M."

Decimally Marked Steel Squares.

From J. M. B., *Monroeton, Pa.*—In the December number of *Carpentry and Building* the editor requests subscribers to write to the Correspondence Department, asking questions, &c. I therefore take the liberty of inquiring if any of my brother chips have any knowledge of a carpenter's steel square marked decimally—that is, the foot divided into 10 inches and the inches into tenths, twentieth, hundredths, &c.? It seems to me that a square so marked would be as much superior to the present method as our currency system is to the English system of pounds, shillings and pence. My attention was first called to the matter when using, for measuring bark, wood, &c., an engineer's rule marked decimally, by the ease with which the contents of any size or shape of pile could be found. If there are any such squares I should like to get one; if there is not, I should think some of our inventors would do well to give the matter attention.

Artificial Stone.

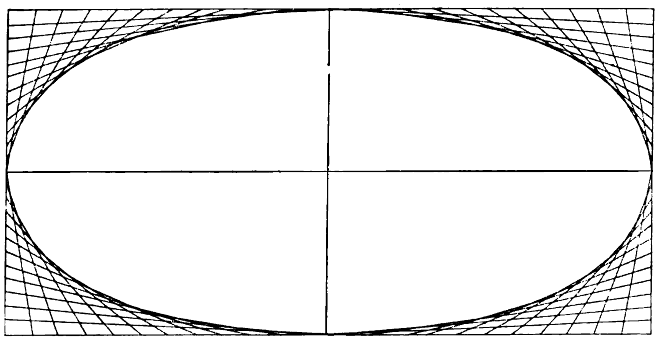
From S. C. S., *Maschipon, Va.*—I would like to ask through the Correspondence Department of *Carpentry and Building* the method of making artificial stone. I understand they are making artificial stone at the Norfolk Navy Yard for the purpose of dry docks. If any reader can give me information on this subject I shall be greatly obliged.

Note.—One of the more recent processes of making artificial stone is thus described by a writer in one of our contemporaries and may be of interest to our correspondent:

Silicic acid, after being ground to powder, is cleansed from all impurities by ordinary means, and 5 to 10 per cent. of it mixed up in warm river or rain water, which is either applied to slaked or well-burnt lime or is added to hydraulic lime. The resulting product of this process, which is silicate of lime, is mixed with sand and small portions of fluorspar. This mixture may be cast into molds, so as to give various shapes, as desired, and on being removed, the castings are allowed to dry for from 12 to 24 hours, after which time they will be as dry as atmospheric air. They are then brought into a steam boiler and steam blown through so as to drive out all air, after which the boiler is herimetically closed up and the steam let in under a pressure of 10 atmospheres. In this high pressure steam bath the stones remain for 48 to 70 hours, afterward being submitted to a bath of boiling and saturated chloride of calcium during 6 to 12 hours, also under a pressure of about 10 atmospheres, in the boiler, and the condensed water may be used for the bath. These stones are allowed to dry in the open air, or when desired to dry quickly, steam may be circulated inside of the boiler after the chloride of calcium has been withdrawn, and before the stones are taken out. Like ordinary stones, they are readily colored and polished.

Constructing an Ellipse.

From M. M. M., *Gravelton, Mo.*—As a subscriber to *Carpentry and Building* I can say I am well pleased with it and take especial delight in reading the correspondence and advertisements. I think the contrivance of "A. D. E." is a good one for drawing an ellipse, as it seems to be practical

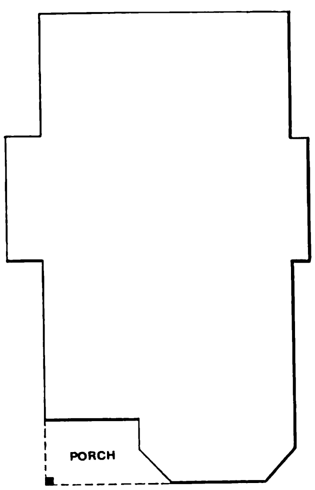


Method of Constructing an Ellipse Suggested by "M. M. M."

and easily manipulated. I think, however, a practical carpenter should be able to draw almost any diagram by means of his steel square. I give a sketch of an ellipse which can be drawn with the steel square, and would say that the same principle could be used in drawing a complete and correct circle by making the dots an equal distance apart on the four equal sides.

Framing a Roof.

From A. E. E., *Deer Creek, Ill.*—I would like to have some practical



Plan of Roof of Dwelling "A. E. E." Desires to Frame.

reader of the paper show me how to frame the roof of a dwelling, the plan of which I inclose.

Setting Corner Blocks.

From A. B. C., *Greenfield, Mass.*—I would like to ask through *Carpentry and Building* the correct way of putting on corner blocks where the wood is to be finished on the grain? I desire to know whether the grain of the wood should run the same way as the side casing or with the top casing?

Note.—Without attempting to anticipate the answers which our correspondents may send to the above inquiry, we would say that practice appears to vary in different sections of the country. In one part the grain of the block is allowed to run with the grain of the head of the casing, for the reason that the wood is likely to shrink more or less, no matter how well the timber may be seasoned. Another practice is to place the corner blocks so that the grain of the wood runs up and down, the claim being made, however, that if the trim is to be painted, it does not matter how the grain runs. If, however, oil finish is employed, the result is improved by having the grain run perpendicularly. We shall be glad to have our practical readers discuss the question, as there seems to be a difference of opinion in the trade.

Making a Square Timber Octagon in Cross Section.

From C. R. H., *Murray, Utah.*—In the issue for December I notice a communication of "E. F. B.," Rochester, N. Y., in which he gives a method for making a square timber octagon in cross section by the use of a square. His letter conveys the impression that he is the author of the method, as he says he has never seen it in print. I simply desire to correct this impression, for if the correspondent will refer to Hodgson's work on the steel square and its uses he will find this formula, together with several others, clearly defined and simplified. One method there given is in my opinion more convenient than that with the square by "E. F. B." It is accomplished with a 2-foot rule, which a carpenter is always supposed to have about him. The figures on the rule giving the gauge lines are the same as by the other method—namely, 7 and 17.

Designs for Counters and Shelving.

From H. P. F., *Lapell, Ind.*—I would like to have some of my brother chips contribute plans and elevation of store shelving, counters, &c., as I feel they would be of great benefit to the younger members of the profession, of which I am one.

Determining the Difference in the Length of Jack Rafters.

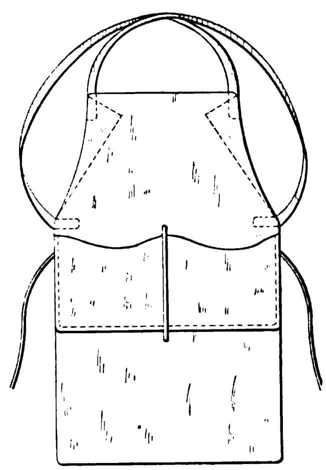
From F. C. P., *Petowsky, Mich.*—In reply to "D. H. M.," Waterbury, Conn., who inquired in the February issue of *Carpentry and Building* for a rule by which to determine the difference in the length of jack rafters of any roof, I offer the following: On the steel square, take 12 inches on the blade and the rise of the roof, 12 feet run, on the tongue, and measure the distance across. This length in inches multiplied by the number of feet the jack rafters are to be on centers, will give the required length in inches. For example, if the roof rises 11 inches per foot run, measure the distance from 11 on tongue to 12 on the blade of the square, which is $16\frac{1}{4}$ inches. Now, supposing the jack rafters to be 16 inches, or $1\frac{1}{3}$ feet, on centers, we have $16\frac{1}{4} \times 1\frac{1}{3} = 21\frac{2}{3}$ inches, which is the difference in the lengths of the jack rafters.

Combination Kitchen Sink and Closet.

From C. E. T., *Monona, Iowa.*—I desire to ask through the Correspondence Department of *Carpentry and Building* for a plan for making a kitchen sink which can be used as a kitchen sink and cupboard. I desire the cistern pump to run up in it, or to be placed at the end of it.

Bench and Nail Apron.

From J. C. M., *Oregon, Ill.*—There have been several illustrations of nail aprons in *Carpentry and Building* during the past few months, but I like my pattern fully as well as any I have yet seen. It requires 1 yard of material to make it, the width of the apron being 18 inches and the length according to the hight of the wearer. The top corners are turned under to conform to the width of the shoulders. The shoulder straps are attached at both ends, as shown in the sketch which I send, though crossing on the



Bench and Nail Apron as Made by "J. C. M."

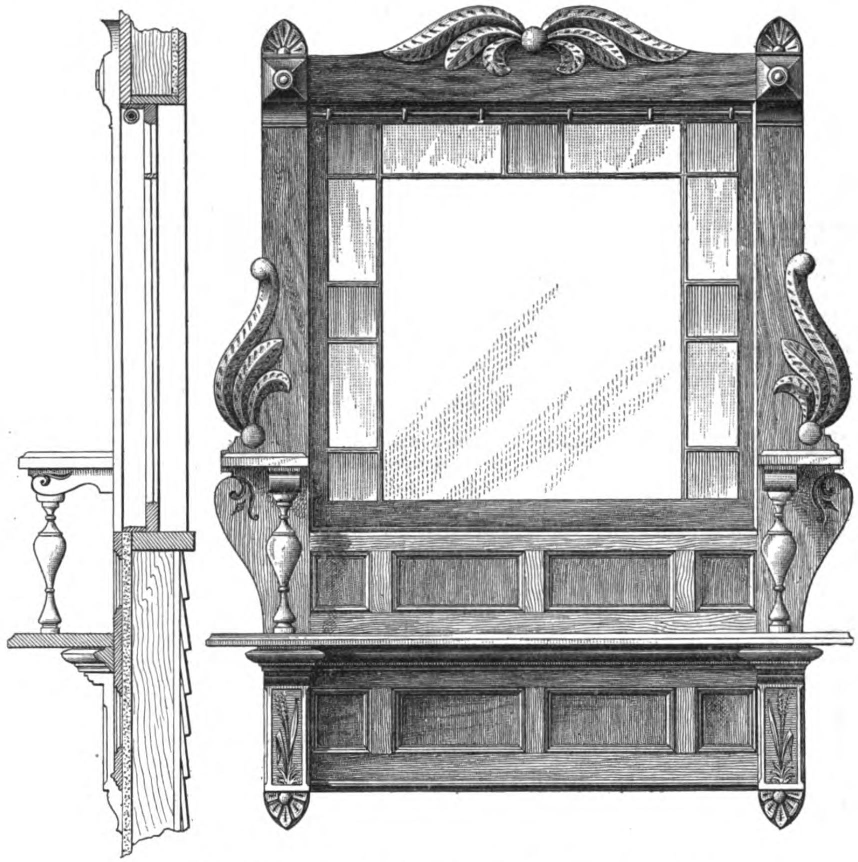
back the same as suspenders. The strings lower down on the apron are intended to tie behind the back. The pockets are double and sewed on at the most convenient points. The back of the pockets is also made double thickness. There is a piece sewed on between the pockets to keep them from tearing down. An apron made in this way does not allow the weight to come on the neck when the wearer bends forward, as is sometimes necessary for him to do.

Trussing a Floor.

From W. B., *Central Valley, N. Y.*—In the June number of *Carpentry and Building* for 1888 there is a design showing a method of trussing a floor which is claimed to have been put in practice. It would seem to me to be impossible for a truss of the kind and span shown to sustain the floor and the moving weights to which it would naturally be subjected without sagging, if not collapsing. I would like to hear from the person who made use of the truss, as I have been looking a long time for a method of sustaining floors without using too much depth of story.

Mantel Finish for Window.

From L. H. H., *Sullivan, Ind.*—In the parlor of a dwelling recently erected in this section there was a square marginal window which, if finished the same as the rest of the room, would give a cheap and somewhat stumpy appearance. In order to overcome these objections I finished it as indicated by the inclosed sketch, making, I think, a very convenient mantel and adding an appearance of elegance to the room far in advance of the actual cost of the window. The work is of white walnut or butternut, and the carving is what might be termed flush panel work. It is executed for the most part with a veining chisel and an ordinary flat firmer. The sketch which I send shows sectional view and a front elevation of the window, and so faithfully represents the general design that further explanation does not appear necessary.



Mantel Finish for Window Adopted by "L. H. H." of Sullivan, Ind.

Circle on Circle.

From J. F. M., *Pocatello, Idaho.*—Having seen in the prospectus for 1893 an invitation to all readers to state any difficulties with which they may meet in their experience, I desire to present a difficulty which I cannot comprehend. I do not write in a spirit of criticism, but merely for information and as a suggestion to contributors. I would not presume to ask the readers' attention if I did not believe that I am also speaking for hundreds who are not versed in geometry, but who are excellent mechanics, yet who are very anxious, like myself, to learn the fundamental principles of every problem offered in the Correspondence Department. It is the Editor's endeavor to make *Carpentry and Building* as popular and instructive to mechanics as possible, so I trust he will excuse me if I make a request on behalf of a vast number of mechanics like myself who know nothing about geometry. Men who know geometry are the mechanics who least need instruction, consequently I belong to that class of workmen which, I believe, it is the desire of the Editor to reach. I tried the assistance of several mechanics, but they did not comprehend the problem as well as I did myself, so I resort to the columns of the paper for assistance, knowing it will be given. Several times have I grumbled at my thick-headedness when I could not follow the instructions given with the diagrams, and I generally came to the conclusion that I must be dull of comprehension or that the contributor seemed to find pleasure in using grandiloquent geometrical terms which only serve to confuse the young engineering readers and make them lose heart when they cannot follow. I make no claim to know geometry, neither are geometrical terms used among mechanics. All scientific principles are susceptible of some and complete explanation to any person who really possesses such knowledge as is usually had in the public schools. It ought to be the main object of every contributor to explain in plain, every-day language the elementary principles involved in the solution of every problem, which most of the experts love to clothe in a maze of mystery, so as to render further pursuit hopeless to any but a mathematical scholar. The problem I desire to thoroughly understand is in the issue of *Carpentry and Building* for November, 1892, copied from an English periodical and written by W. G. Wood of Australia. It is a semicircular arch of double curvature. I cannot see how molds for stones 1 and 5 can be right—no curve at all, and "face mold for outer side" of 2 and 4 stones surely cannot be complete. The face mold for the section I cannot get or understand. I think the explanations accompanying it are a little mixed. Now, perhaps some stone cutter who may have worked out the problem will explain away my difficulty and give his experiences with the diagram shown in the November issue. I would ask him if it is thoroughly practical. Possibly Mr. Secor will explain the matter for us. He gave us a most excellent example in a clear, simple manner in the December issue of last year of how to build a center of double curvature. Now, something as clear as that in stone work would be entirely satisfactory.

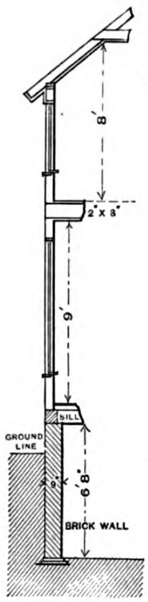
Preventing Season Crack.

From A. W. S., *Shickshinny, Pa.*—I would like to find out through the Correspondence Department how to treat handles, mallets, &c., turned from green wood so that the latter will not season crack. I have tried soaking in linseed oil and painting, but it does not seem to serve the purpose. I have heard that steaming would do the work, but I do not know how to treat the articles in this way.

CHEAP FRAME COTTAGE.

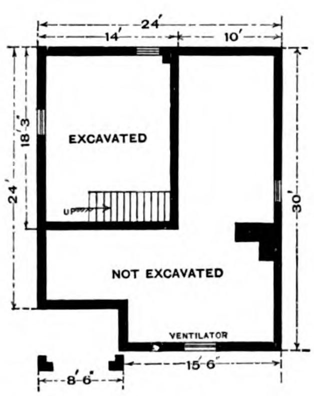
IN THE ANNOUNCEMENT of the decision in the Twenty-first Competition, being that for $1000 houses, and published in the April number, our readers will remember that the second prize was secured by C. W. Tetwiler of Poplar Bluff, Mo. The drawings submitted by this contestant have been engraved, and we take pleasure in presenting them in this issue. In forwarding the study the author states that the accommodations afforded consist of six rooms, the arrangement of which will be found convenient for a family of small size. On the first floor is a hall of sufficient capacity to contain a part of the stairs and leave ample room for passing to the dining room and also to the parlor. These rooms are of good size, as is also the kitchen. The pantry and cellar are convenient to the kitchen, and of ample dimensions for the purpose. The second floor has three sleeping rooms, each well lighted and ventilated, and opening from which is a closet.

The material specified in the construction of this house includes sills 6 x 6 inches; first floor joist 2 x 10 inches; second floor, 2 x 8 inches; studding and rafters 2 x 4 inches and plates 4 x 4 inches. The studding at the corners and openings is to be doubled, while the joists, studding and rafters are to be placed 16 inches from centers. The framing timbers are to be of yellow pine and each of its kind to be sized to equal width. The outside walls of the building, except the gables, are intended to be covered with cypress drop siding, with close-fitting joints. The gables are to be covered with sawed cypress shingles, laid 5 inches to the weather. The porch columns and balusters are to be of poplar, while the porch floor is to be of yellow pine laid in white lead. The roof of the cottage is to be covered with cypress shingles, laid 4½ inches to the weather. The parlor and hall are to be finished in yellow pine, with molded casings and base, with head and plinth blocks, the other finish throughout the house being plain. The newel post, rail and balusters of the main stairs are to be of oak. The cost of the house is placed by the author at about $990.

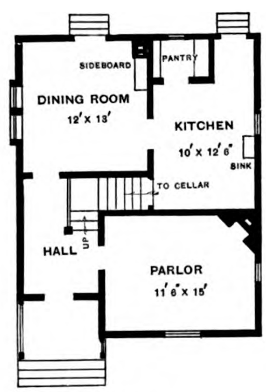


Section.

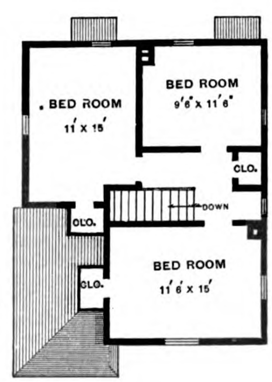
Front Elevation.—Scale, ⅛ Inch to the foot.



Foundation.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

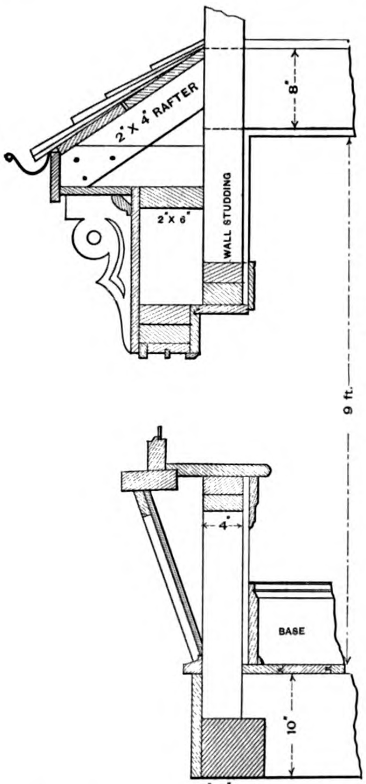
Cheap Frame Cottage.—Second-Prize Design in Competition for $1000 Houses.—C. W. Tetwiler, Architect, Poplar Bluff, Mo.

Cottage Building Abroad.

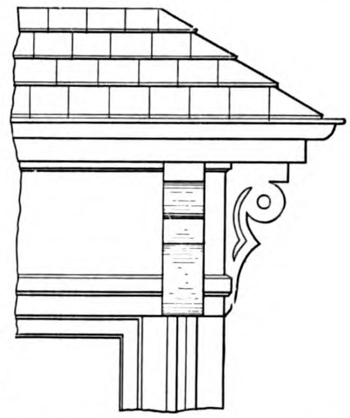
A writer in one of our foreign exchanges presents his ideas concerning the manner in which cottages should be erected in order to produce the most satisfactory results, from both economical and sanitary points of views. What he has to say is interesting, but we question very much if his plan will find great favor with American readers. He says:

There are two improvements which I think might be made in cottages which would add greatly to the comfort of the inhabitants. First, as to heating. At the present time the upper rooms derive no benefit from the fires below. A medical man said to me some time ago, "People in cottages often say to me, 'Well, doctor, I am quite warm in bed and well wrapped up.' Yes, I said, you may be, but at the same time you are breathing cold air and chilling your lungs at every breath." This is quite true, and a dry, warm atmosphere is one of the chief things to be considered in case of illness, and indeed for keeping in good health. In small houses a fire in a bedroom is a great difficulty, as I know full well.

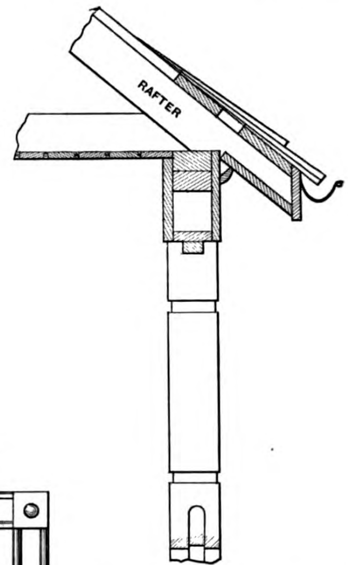
I would propose that the usual chimney breast should be done away with, and that the chimney should consist of an iron pipe or sanitary earthernware pipe carried up from the lower room through the room above, so that it may radiate heat into both rooms; on either side I would build up a wing of brick work projecting a brick and a half, and before this might be placed wire work in the lower room. The pipe at the top of the bedroom would disappear in an ordinary chimney stack, while a clear space would be left between the pipe and the wings for the heat to circulate. By this means the bedroom over the kitchen would always be kept dry and would at all times be



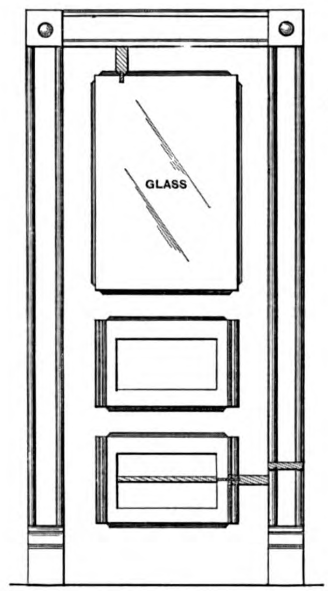
Details of Water Table and Main Cornice.—Scale, ¾ Inch to the Foot.



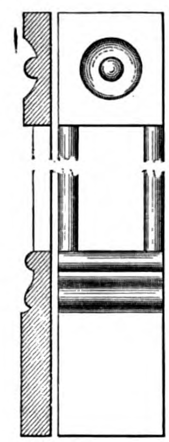
Details of Recess Window.—Scale, ¾ Inch to the Foot.



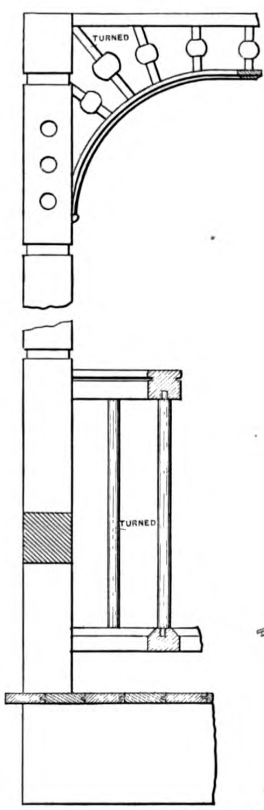
Details of Porch Cornice and Columns.—Scale, ¾ Inch to the Foot.



Detail of Front Door and Trim.—Scale, ½ Inch to the Foot.



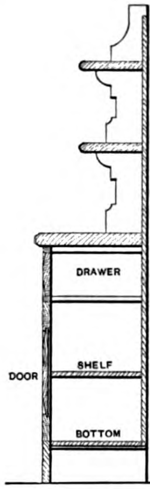
Details of Head and Plinth Blocks.—Scale, 1½ Inches to the Foot.



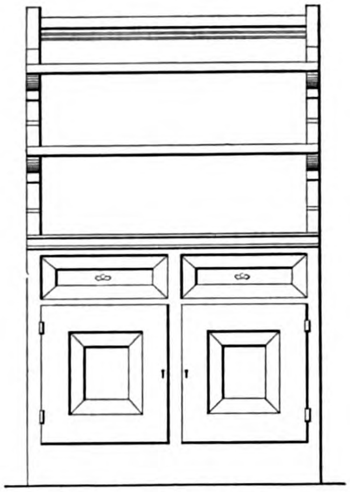
Details of Front Porch.—Scale, ¾ Inch to the Foot.

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

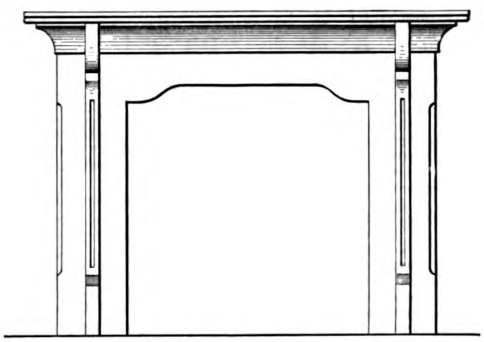
Miscellaneous Details of Cheap Frame Cottage.—Second-Prize Design in Competition for $1000 Houses.



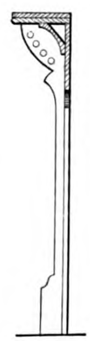
Vertical Section through Sideboard.—Scale, ½ Inch to the Foot.



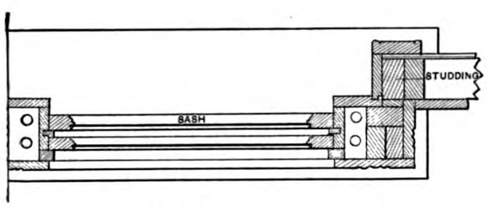
Front Elevation of Sideboard.—Scale, ½ Inch to the Foot.



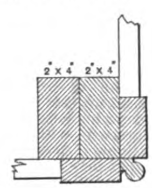
Elevation of Mantel.—Scale, ½ Inch to the Foot.



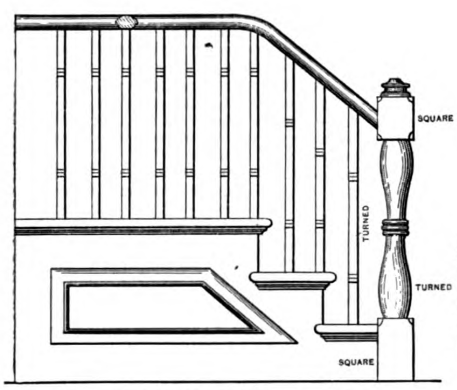
End Elevation of Mantel.—Scale, ½ Inch to the Foot.



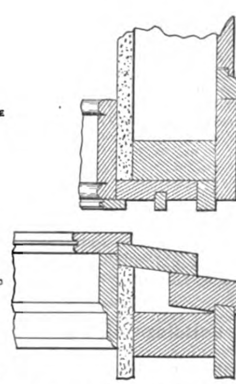
Cross Section of Recess Window.—Scale, ¾ Inch to the Foot.



Detail of Corner Boards.—Scale, 1½ Inches to Foot.



Elevation of Stairs in Main Hall.—Scale, ½ Inch to the Foot.



Cross Sections of Window Head and Sill.—Scale, 1½ Inches to the Foot.

Miscellaneous Details of Cheap Frame Cottage.—Second-Prize Design in Competition for $1000 Houses.

healthier and more comfortable than sleeping in a damp, cold atmosphere. The cost would be absolutely nothing extra in a new building. The fixing, length and material of the pipes are merely matters of detail. The pipe could be colored stone color, like the funnels of steam yachts—or indeed any color.

Again, why is all the roof space to be shut up and not utilized? In a room of 10 feet square with an ordinary pitched roof, ceiled in the usual manner, there is a loss of 200 or 300 cubic feet of breathing space. I would propose that the flat ceiling should be given up and the rafters either underdrawn, match-boarded or covered with wire-wove material or linoleum. If there should be a necessity for a tie beam in such small rooms, then a tie beam 6 inches square, with a king-post in the middle, both nicely molded, would be, not an eyesore, but a pleasant feature in the room. In case of larger rooms, if it was desired to have all the roof space free from the tie beams, a flat wall plate 1 foot wide, consisting of two 2-inch planks with ½ inch boiler plate, the lengths properly riveted together, all bolted secure, would sustain a great lateral thrust from the rafters of the roof. The roof should have a layer of felt. These suggestions, of course, are applicable to any house. In a country like this we want all the warmth, pure air and comfort we can get in our houses.

Galvanized Iron Buildings.

Galvanized iron is said, by the *Australasian Ironmonger*, to be in considerable demand for school buildings in the country districts of Australia where the population is not altogether fixed. Its advantages over stone and wood for this purpose have been proved by experience. Stone buildings of the cheapest kind were found very costly, the dwindling of the population often leaving the stone schools a worthless asset on the hands of the Government. Wooden schools lined with wood required paint every now and then, and besides, through shrinkage of the timber, the dust, as well as hot and cold winds, entered between the boards, to the discomfort of the children. Of late years galvanized iron, whitewashed outside and lined with wood inside, has been resorted to, and it has now been found more satisfactory to use galvanized iron solely. Instead of using wood lining, 28-gauge small fluted corrugated iron is used, the building being sun-proofed internally and externally with a preparation of lime, sugar, salt and boiling water to prevent the absorption and subsequent radiation of the sun's rays. An experiment has been tried with two iron schools, one sheathed with wood and the other with iron, with the result that the former has been found to get two or three degrees warmer during the day than the iron-lined room. Besides its sanitary advantages, the cost of an iron building is considerably less than a stone or wooden structure, and if the population moves the school also can be moved without material detriment.

A WRITER in one of the foreign papers states that in painting wood one coat takes 20 pounds of lead and 4 gallons of oil per 100 square yards; the second coat, 40 pounds of lead and 4 gallons of oil; and the third the same as the second—say 100 pounds of lead and 16 gallons of oil per 100 square yards for three coats. The number of square yards covered by 1 gallon of priming color is found to be 50; of white zinc, 50; of white lead paint, 44; of lead color, 50; of black paint, 50; of stone color, 44; of yellow paint, 44; of blue color, 45; of green paint, 45.

New York's Convention Report.

The following report of the delegation from the Mechanics and Traders' Exchange of New York City to the seventh convention of the National Association is so comprehensive in its character and deals with the subjects under consideration with such intelligence that it is here given as a most excellent presentation of the benefit and importance to be derived from the annual meetings of the national body. Members of local builders' organizations throughout the country will observe from this report that an exchange in a city as important as New York finds the recommendations of the national body well constituted to procure for the builders the correction of existing evils in their business with certainty and effect. It is evident from the axiomatic character of the principles advocated by the National Association and referred to in the report that its recommendations are applicable to the affairs of the builder equally in all localities. The opening of the report gives the names of the delegates; touches upon the fact that the full delegation participated in each session of the convention and refers to the number of delegates present and the cities represented. It also alludes to the fraternal feelings established by these meetings, and refers to the more important questions considered. With regard to the modified form of the Uniform Contract the report says:

It is now hoped for a more general use of this form of contract as being the best calculated to protect the builders' interest, but such must depend to a very great extent upon the builders themselves insisting upon this form being the one acceptable to them, and declining to sign any other, for a careful examination will show its even-handed fairness to both parties to the contract.

It is very evident that many architects will not voluntarily adopt this form for the reason, which they frankly admit, that the older forms give to them and to their clients, the owners, a greater advantage over the builders. This is an entirely improper position, for a contract of this nature should in no way give more advantage to one than to the other party to it, and it has been the purpose from the first to provide in the Uniform Contract an instrument which should give even-handed justice to all concerned in it.

LIEN LAW.

The question of a general lien law received considerable attention, and invoked an interesting and instructive discussion, but the conclusion was finally reached that the subject was one for the disposition of the local exchanges as the differences in the various lien laws may dictate.

The discussions upon the question of arbitration and apprenticeship were exceptionally thorough in the full treatment of the subjects in all their phases. It was exceedingly gratifying to learn that the plan of arbitration as advocated by the National Association had not developed, during the past year's experience, a single flaw, where it had been put to a test, but seems to be generally considered as near an equitable method as can possibly be devised.

APPRENTICESHIP.

The subject of apprenticeship was divided into several separate heads: Whether the workmen have any right to control the number of apprentices which shall be taken by an employer? Whether the employers and workmen in joint action have any right to control the number of apprentices which any employer shall be permitted to employ, and whether any one, employer or workman, has any right to interfere with a boy's desire to learn a trade? The prevailing opinion seemed to be that proper boards of arbitration, composed of equal numbers of employers and workmen, were best qualified to make such rules as should govern the number of apprentices which an employer should be permitted to employ.

TRADES SCHOOLS.

The prevailing sentiment seems to be that the trades schools would best solve the problem of the right of an "American boy" to acquire a trade if he had the desire, and it was therefore earnestly recommended that the local exchanges encourage the organizing of trades schools when possible. It was reported that the school maintained by the Philadelphia exchange was in a flourishing condition, and that manual tuition was a part of the high-school system of both the cities of Baltimore and Wilmington.

REPORTS OF FILIAL BODIES.

Unquestionably the most interesting feature of the convention was the presentation of reports from all the filial bodies, which occupied one entire day. They were listened to with closest attention from beginning to end. They fully exhibited the various phases of the situations existing in the building trades of the several cities, and suggested methods of treating conditions which could not be brought out by any other better means. There was not a delegate present that was not benefited by the instructive information contained in the several reports, and a perusal of an epitome of them in the March number of *Carpentry and Building* on file in these rooms would be of service to every member of the exchange.

It is gratifying to report that in almost every exchange the feeling is manifestly gaining foothold that the ownership of a building which shall be a home for the exchange is one of the most essential elements to success in permanent and effective establishment of the local bodies. Not a year has gone by since the establishment of the National Association and its announcement of the belief that such undertakings are not only legitimate, but full of promise for the best life and opportunity of builders' exchanges, that great steps have not been taken in support of this theory by one and another of the filial bodies. While at the birth of the national seven years ago no one of the builders' exchanges had a vestige of ownership rights in the buildings they occupied, to-day finds six exchanges in full possession of completed buildings, one exchange with land purchased and plans made and two exchanges with the project well under way.

MARC EIDLITZ.

A touching tribute was paid by the convention to the memory of our late associate, Marc Eidlitz.

It is somewhat difficult without appearing to weary you to enumerate the many subjects considered by the convention, all of which were of vital importance to the entire building industry, and your delegation are more than ever impressed with the importance of the National Association. Any local exchange may be unduly elated or depressed by conditions existing and is likely to reach its conclusions as to the general condition by the local one, but by a central organization, a wider and more comprehensive outlook will result in a truer judgment as to the prevailing conditions throughout the whole country and certainly, were the principles and code of practice as formulated by the National Association after careful and mature deliberation thoroughly adopted for use by the membership of the exchange, many troubles which annoy and embarrass them in the management of their business affairs would be lightened or entirely removed. While the National Association has no power to enforce, it has ever been ready to consider and advise upon any subject when presented by a local exchange.

The report closed with a resolution of thanks to the Builders' Exchange of St. Louis for the generous hospitality which it extended to the visiting delegates to the convention.

Buildings of Papier Mache

Papier maché, or paper compressed almost to the solidity of iron, is declared to be the great solid of the future. The *Hospital* has just heard of a new and portable hospital which is made of this compressed paper, large enough for the accommodation of 20 beds. When folded up, this building (if one may so call it) condenses itself easily into a load for three transference trucks, which trucks on their part are planned to form the basis of the hospital, T-shaped joists of iron keeping their foundation steadily in place. Over this there is a flooring of compressed paper boards, which being varnished adapt themselves to cleanliness; the walls and ceiling are formed of the same material, while tie beams, composed of thin wire of galvanized iron, connect the parallel walls. Ventilation is provided for by means of holes bored between the walls and the ceiling, and the windows are somewhat ingeniously made of wire gauze, with some transparent coating. It yet remains to be seen how far this portable paper hospital will adapt itself to the ever-increasing requirements of modern hygienic demands, and whether it will satisfactorily stand the test of coming out fireproof.

Draft of Tapering Chimneys.

One of the German papers presents a record of some experiments made with chimneys with a view to ascertaining the effect upon the draft, the results of which appear to refute some of the generally accepted theories. The writer in our foreign contemporary says:

The prevailing belief that the draft of a chimney is increased by narrowing it from below has been found, by repeated comparative experiments on a small scale, to be an erroneous one. A test was made in this way: In place of an ordinary chimney there were built two, the average cross section of which were exactly the same, but the one widened toward the top, while the other narrowed to an exactly equal extent, the two chimneys having a common partition wall. The two chimneys were so arranged that smoke and heat had exactly equal access to both. Means were also provided for shutting off the excess of external air to the fire, either wholly or partially. The firing was so conducted as to make much smoke in order to render the effect distinctly visible.

When air got free and equal access all round the fire, there was little difference in the smoke of the two chimneys, though there was a slightly greater draft in the wide-topped one. When, however, the excess of external air was partially shut off, the draft up the narrowing chimney rapidly fell off and came to nothing, as if the access of fire gases to its lower part had been entirely shut off. A damper was then put upon the wide top of the widening chimney, so as to cut off successively one-half, two-thirds, three-fourths and nine-tenths of its area, yet the narrowing chimney remained out of action. To restore the action of the narrowing chimney it was necessary to make the damper close the widening chimney almost altogether. When the total draft was reduced to a minimum by reducing the air supply to the lowest point, the difference between the draft of the two chimneys was made most distinctly discernible.

The proportions were not suitable for tall chimneys; the object was to ascertain the physical law in the first place. For chimney stacks 85 feet high it has, however, been ascertained that an increase in the diameter equal to one-half to 1 per cent. of the hight is very practicable and does not involve much thickness of the base, while it gives the chimney a strong draft, and enables it to work a boiler at five atmospheres for a 50 horse-power engine. The same principles apply to ventilation shafts, which are very much more effective when made as inverted cones than when made parallel.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers.

President, IRA G. HERSEY, 166 Devonshire street, Boston, Mass.
First Vice-President, HUGH SISSON, 19 W. Saratoga street, Baltimore, Md.
Second Vice-President, CHARLES A. RUPP, Builders' Association Exchange, Buffalo. N. Y.
Secretary, WILLIAM H. SAYWARD, 166 Devonshire street, Boston, Mass.
Treasurer, GEORGE TAPPER, 159 La Salle street, Chicago, Ill.

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Saginaw...........	JOHN H. QUALLMAN.
Wilmington..... ...	A. S. REED.
Worcester	O. S. KENDALL.

Appointment of Committees.

The President of the National Association of Builders has been somewhat delayed by sickness in the appointment of the standing committees for the current year, but announcement is now made of the following :

COMMITTEE ON UNIFORM CONTRACT.

George C. Prussing......... ...Chicago, Ill.
John S. Stevens.... ....Philadelphia, Pa.
Arthur McAllister ......Cleveland, Ohio.

COMMITTEE ON LEGISLATION.

Edward E. Scribner, ...Chicago, Ill.
Paul Reisen............ Milwaukee, Wis.
George W. Libby......Minneapolis, Minn.

COMMITTEE ON RESOLUTIONS.

W. G. Vinton.... ....Detroit, Mich.
Alexander Chapoton, Jr....Detroit, Mich.
E. Austin, ...Detroit, Mich.

COMMITTEE ON STATISTICS.

J. Milton Blair, ...Cincinnati, Ohio.
Samuel D. Tippett.......Cincinnati, Ohio.
W. A. Megrue...... .....Cincinnati, Ohio.

COMMITTEE ON BUILDING LAW.

John J. Tucker..........New York, N. Y.
O. T. Mackey.... .. ....New York, N. Y.
George Watson.... .....Philadelphia, Pa.

COMMITTEE ON LIEN LAW.

Anthony Ittner.... ....St. Louis, Mo.
Joseph L. Gurdey.... ......St. Louis, Mo.
Jeremiah Sheehan...... ....St. Louis, Mo.
Charles W. Gindele...... ....Chicago, Ill.
William H. Alsip...... ......Chicago, Ill.
J. E. Twiname.... ......Indianapolis, Ind.
J. E. Shover...... ......Indianapolis, Ind.

Special Committees.

In accordance with the vote of the seventh convention the president has, in appointing standing committees, endeavored to group the same so that they will be from cities that are convenient to each other, the purpose being, as stated at the convention, to secure greater efficiency in the work of they committees. In the appointment of these committees it will be noted that that they are taken entirely outside of the Board of Directors, this being done for the purpose of enlarging the interest in the National Association routine work. In the appointment of special committees, which will come later, the president will select from the members of the Board of Directors, of which due announcement will be made.

Subscriptions to "Carpentry and Building."

Several of the secretaries of local associations have notified the National Secretary that they are making special efforts to secure subscriptions from the members of their exchanges to *Carpentry and Building*. This is very gratifying and it is hoped that all local secretaries will take up this matter with vigor. The periodical in question is the channel through which the National Association endeavors not only to reach its members, but builders generally, and the fact that the announcements made in its columns result in communications sent to the secretary's department in large numbers every month, is evidence that the work done is appreciated and is bearing good results. It is urged, therefore, with a good deal of force, that the paper should be peristently presented to individual members of all local bodies, in order that the ideas and proceedings of the National Association may be given the widest possible circulation.

Report of the St. Louis Convention.

The report of the seventh convention will be issued in a few days, and, in accordance with the vote of the convention, will be sent in separate copies to the delegates present at the convention, a few copies being sent to each local exchange to be kept in its library. It should not be forgotten by all parties interested that the last convention voted, as a matter of economy, that only 500 copies should be printed, and that these should be bound in cloth, instead of the larger number that had previously been printed in paper covers of previous conventions.

The issuance of the report of the seventh convention of the National Association of Builders provides a greater opportunity for comparing conditions in different cities as effecting the interests of the builders than any that has thus far been presented through the medium of these reports. The statement of conditions existing in the local exchanges as prepared by the secretaries presents a much more beneficial view of the various conditions existing in the building business than could be given in the scope of a single paper prepared by the National Secretary. The local secretaries are thus afforded the opportunity of choosing the best methods for securing improvements in any given conditions that have been adopted by sister exchanges in other cities. The experimental character of any effort in the direction of curing existing evils may be avoided, as distinct and specific results are shown in the treatment of the same conditions by one or more of the other exchanges For instance, the method adopted by one exchange for securing the establishment and adoption of an equitable code of practice shows to another exchange just what results follow the use of a given plan. Local exchanges are thus enabled to choose between the plans adopted by the various exchanges for securing the same result, as they can see beforehand what has been done by builders in other cities. In these reports from filial bodies the benefits to be derived from adopting the recommendations of the National Association are shown and the efficacy of the principles advocated are clearly demonstrated by the large gain and improvement secured through their application. Secretaries of local exchanges would do well to carefully peruse all the reports from filial bodies which appear in the report of the convention and to note the means adopted in different cities for securing the needs most desirable for establishing builders' organizations upon a plan which shall produce the best possible results, such as an effective code of practice, just and honorable relationship between members themselves, members and the public, and between employers and workmen, and such other conditions as conduce to the general welfare of the trade.

To all Local Secretaries.

The National Secretary begs to remind all secretaries of local associations that he is very much in need of correspondence from them in carrying on the work of the National Association, and he begs that they will forward to him as frequently as possible, not only such items of interest as may occur in their locality and exchange, but also such matters as they would like to have circulated among the other filial bodies, as matters of information, or in which they desire co-operation.

Payment on Contracts.

To assist the National Secretary in an article which he is preparing upon Payments on Contracts, all builders connected with filial bodies are requested to send information to the secretary's office touching the promptness with which payments are made to builders upon contracts which they are executing. A part of this inquiry is directed toward the custom among builders of delaying requests for payments, when due; and as this laxity has caused much dissatisfaction among those who depend upon the general contractor for payment, it is important to get as many facts as possible in this direction.

Uniform Contract.

The secretary of the National Association begs to notify all filial bodies that the Uniform Contract Blank in its perfected form is being largely called for all over the country by individual builders, architects and others. These calls are frequently from localities where builders' exchanges connected with the National Association exist, and in every case the secretary has informed the parties requesting copies that they might have secured them of their local body of builders if they had applied to it. It is important that every filial body should have copies of the uniform blank on hand, and to distribute the same without waiting for application from architects or others. The circulars in relation to Uniform Contract, to which reference was made in last month's number, are now ready for issuance by the publishers and it is again urged upon all filial bodies to secure a supply and keep the ball rolling by sending out these circulars in connection with all letters issued from secretaries' offices. The influence of the local bodies in the work of agitating the importance of the Uniform Contract cannot be underestimated and it is hoped that every means will be taken to push the blank into notice in all directions.

Reports from Delegates to Conventions.

The attention of all filial bodies is called to the very admirable report, printed in this issue, from the New York delegation in regard to the last convention. The failure of delegations to make full and accurate reports to their local bodies of the doings at conventions causes much criticism and dissatisfaction, and it is hoped that this very full action of the New York delegation will be suggestive to other delegations which may have been remiss in this particular. The work of the National Association depends for its effectiveness upon the intelligent way in which the ideas are disseminated by local bodies, and in no way is this made more manifest than in the reports brought home by delegates sent for a special purpose.

Location of Exchange Rooms.

The attention of the National Secretary has been called to the fact that certain of the filial bodies which are contemplating the erection of new buildings have located their exchange rooms on the first floor, while in some cases the other extreme has been taken of placing the exchange rooms in the very upper stories. It is the opinion of those who have had the most experience in these matters that a location either upon the first floor or in the upper story is a mistake. The true location for a builders' exchange is unquestionably upon the second floor. This location is just enough removed from the street to make it sufficiently retired and still not far enough away to prevent it from being easily accessible by those who may not care to wait for an elevator. To have an exchange upon the upper floors where elevator service is necessary is all very well when nothing else is taken into consideration, but elevator service for a busy exchange is not sufficient, and one flight of stairs is enough to climb. All exchanges are advised in building anew, or in locating, to have their exchange rooms on the second floor.

Death of Director N. B. Hussey.

It becomes the painful duty of the Executive Committee of the National Association to notify the directors and all filial bodies of the death of National Director Nathan B. Hussey, president of the Builders and Traders' Exchange of Omaha. Mr. Hussey's death had been anticipated for some months as he had been suffering from a very painful illness, a fatal termination of which seemed most probable.

The National Associations suffer a severe loss in the death of Director Hussey, he being one of the most able and interested of coadjutors in the national work. Through his personal afforts the Omaha Exchange has been built up with intelligence and vigor, and the recommendations of the National Association have been followed out with a great deal of particularity and care.

As there will be no mid-year meeting during this year action on the death of Mr. Hussey must be postponed till the next annual convention, but the president of the National Association takes this opportunity to promulgate this sad information to all directors and affiliated bodies throughout the country.

It is gratifying to note that the Builders and Traders' Exchange of Minneapolis, to which city the body of Mr. Hussey was conveyed for interment, took charge of the ceremonies in that city.

A Good Example.

The Master Builders' Exchange of Philadelphia, which has in many ways set the mark for organizations of builders throughout the country, has lately been considering a phase of its work, which sets an excellent example to all similar organizations. A question came up as to the advisability of considering or acting upon questions not directly connected with the building interests, and at a recent meeting the subject was thoroughly discussed. While the matter was not finally disposed of, a resolution was passed placing the exchange on record as being in favor of considering all subjects of public welfare. In the discussions of the subject the trend of thought seemed to be largely in favor of continuing to keep the exchange among the foremost of the institutions of the city which are active in considering subjects which affect the welfare of its citizens. The secretary stated that frequent communications were received asking for action upon such subjects as silver legislation, &c., and it was such subjects as these which brought about the consideration of the question. There seemed to be an almost unanimous opinion in favor of acting upon all questions which affect the city and which could be properly acted upon by the exchange, or which are acted upon by other commercial organizations. Such action as this and the position thus taken before the public, tends to place an association of builders not only in a position equal with bodies of such a character — as boards of trade and chambers of commerce, but to establish the builder in a position which he should occupy from the importance of his calling. Every exchange in the national body would benefit itself by considering all questions of public interest to the citizens of the community in which it exists.

Modeling in Clay.

There are two methods of preserving the productions wrought in clay, writes Maude Haywood in the March *Ladies' Home Journal*. One is to have them cast in plaster and the other is to have them baked in the kiln, thus producing terra cotta. In order to insure the best results in the latter case the clay must be free from impurities, and the work built upon a single support which can be easily removed when the model is fired. Yellow, red or gray clay may be employed, producing respectively white, yellow and red terra cotta. Artists can procure the different clays in working condition from the larger dealers in art materials or direct from the pottery, while small packages of dry clay, containing a few pounds in each, are obtainable at almost any art store. Dry clay can be prepared for use by soaking it in water until it is of the right consistency to work readily in the fingers. In order to effect this well, the clay should be broken up in small pieces, and when sufficiently moist, kneaded well together until all lumpiness has entirely disappeared, and the clay is sufficiently moist to be thoroughly pliable and yet not wet enough to be sticky and to adhere to the fingers. Work that is not successful enough to warrant preservation may be thus broken up and the clay used again and again; the more it is worked with the better and more pliable it becomes. The clay is kept moist by means of wet cloths laid over it, with preferably an outer covering of water proof fabric. A little experience will soon teach a student just how to keep the clay in good condition. Usually the cloths will require wetting afresh once, perhaps twice, a day; this depends, however, upon the atmosphere in which it is kept.

St. Luke's Hospital.

The cornerstone of the new St. Luke's Hospital, which is to be erected on the bluff overlooking Morningside Park, in the upper portion of New York City, was laid with impressive ceremonies in the early part of May. The new hospital when completed will consist of nine semi-detached buildings, four of which will stand on 114th street and five on 113th street, the principal fronts being toward the latter thoroughfare, adjacent to the grounds of the Cathedral of St. John the Divine. It is stated that only four or five of the buildings will be erected at present, the others being added as the funds of the institution warrant. The basement of the hospital will be of granite, above which brick with stone trimmings will be employed. The walls and ceilings will be of non-absorbent material and the interior finish comparatively plain.

New Tower of London.

The new tower of London, which is being erected in a pleasure park of 120 acres, lying between Willesden and Harrow, suburbs of London, is intended when finished to be 150 feet taller than the Eiffel Tower. The foundations for the tower have just been completed, and consist of immense blocks of granite. The ground is so sloping and uneven that while one set of footings appears about 5 feet above the surface another is 7 feet below, a third 5 feet below and a fourth at least 20 feet below the surface. The cost of the foundation is said to have been between $25,000 and $30,000. On top of the English tower will be an observatory and rooms for scientific experiment.

THE SMALLEST LOCK ON RECORD, we believe, is one manufactured by Mark Scaliot, a London locksmith, in 1578. It consisted of 11 different pieces of steel, iron and brass, which, together with the key belonging to it, weighed only 1 grain. The same artist also constructed a chain of gold, containing 43 links, which he fastened to the lock and key, and upon these being attached to the neck of a flea the insect was able to draw them with ease.

HANDRAILING AS TAUGHT TWO CENTURIES AGO.

THE YOUNG MECHANICS of the present day, and for that matter many of the older ones, are doubtless curious about methods of doing work in their line which prevailed a century or two ago, and peruse with avidity the literature obtainable bearing upon the features in which they are specially interested. There are numerous publications which throw light upon different phases of carpentry as taught in the days of our forefathers, but none, perhaps, are more highly regarded or oftener consulted than the works of Peter Nicholson. In considering in his Architectural and Engineering Dictionary the subject of "Joinery," using the term now in its broadest sense, he gives a list of English writers who up to that time had treated of this branch of the art, and among them he mentions Halfpenny, an author who seems to have been the first to consider handrailing from a purely geometrial point of view. As this particular branch of carpentry is of special interest to readers of this journal, we venture to reproduce a number of diagrams, with accompanying explanatory text, which appeared in Halfpenny's "Art of Sound Building," published in 1725, and embodied in Mr. Nicholson's work above referred to. The extracts are as follows:

"*To find the raking arch or mold for the handrail to a circular pair of stairs, in such manner that it shall stand perpendicularly over its base, or arch of the well hole.*

"Fig. 95.—First describe a circle equal to the breadth of the well hole, whose diameter is U W; as also another from the same center, whose diameter is A G, to represent the plan of rail; and divide the circumference of the greater circle into the same number of equal parts as you would have steps once around the circle.

"This being done, take the back, or rake of the bracket, equal to C F, in your compasses, and setting one foot in A, with the other strike the arch *h*; also take the hight of one step, as A C, Fig. 96, and setting one foot in B, with the other strike the arch *i*; and when this is done take the distance from A to *h* in your compasses, and setting one foot in *h*, with the other strike the arch *k*, and take the hight of two steps and with one foot in C, draw the arch *l* to intersect the arch *k*, and so on. The intersecting points of the arches *h i*, and *k l*, and *n o*, and *r s*, and *t u*, are all at the same distance from one another, and the lines B *h*, C *k*, D *n*, E *p*, F *r* and G *t*, being the risings or hights of the steps in Fig. 96, B *h* being the hight of one step, C *k* of two, D *n* of three, E *p* of four, F *r* of five, and G *t* of six. Now, if these lines are raised up perpendicular on the circle A D G, it is evident that the point of intersection of the arches *h* and *i* will stand perpendicularly over the point B; of the arches *k*, *l*, over C; of the arches *n* and *o*, over D; of the arches *p*, *q*, over E; of the arches *r* and *s*, over F; and of the arches *t* and *u*, over G. Now, if nails be struck into the intersecting points of the said arches, and a thin rule be bent round them, you may describe the arch A *h k n p r t*, by the edge thereof, being the mold to strike the arch of the rail with.

"*The arch or mold of the rail being found, as above, how to prepare the stuff of which the rail is to be made, and work the twist thereof, without setting it up in its due position.*

"Fig. 97. First strike two circles, whose diameters are equal to U W and A G, in Fig. 95, and next consider into how many pieces you glue the rail, which in the semicircle let be six, as in the example. Now, divide the semicircle into six equal parts, as E F, F M, M S, S L, L D and D K; from each of these points of division draw lines to the center A, as A E, A F, A M, A S, A L, A D and A K. Then from F raise F G perpendicular from the back at the lower end, to make the twist of the rails. The lines being drawn, you are next to consider after what manner they are to be applied in the working of the rail. Take the piece of timber, of which you design to make the first length, which is represented in Fig. 98, and plane one side thereof straight, and cut it to its bevels *a c*, *b d*, answering to D R A and R D A, Fig. 97, and both ends thereof being also cut to the raking-joint of the rail, proceed thus: Take that part of the raking-arch in Fig. 95 which answers to the first length of the rail, as A *h* in the arch A *u*, and lay it on the upper side of Fig. 98, from *l* to *h*, and strike the arch *l h*, then take E *c*, equal to G *h* or N *p*, in Fig. 97, and set it on the line *b d* from *h* to *m*, Fig. 98, and strike a square stroke at pleasure from *m* to *g*; also take *c d*, equal to *h i* or *p o*, &c., Fig. 97, and set it on the line from *m* to *g*, and draw the line *h g*, which represents the back of the rail when it is worked, and is equal to E *d* or G *i* or N *o*, &c., Fig. 97. This being done, represent the lower end of the rail *h g k i* at right angles to *h g*; as also the upper end *l c o n* at right angles to *l c*, and baste out the inward arch *c m* square from the upper side *a b c d*, as *m g*; and take a thin lath and bend it close to the side thereof, from *c* to *g*, whereon strike a line along the edge of the lath, and so the lines *l h* and *c g* are your guides in backing the rail, which, when done, turn the piece upside down, and with the mold strike an arch equal to *l h*, from *a* to *k*, and baste out to A F, and equal to the hight of one step. Also, at the point M, raise M N perpendicular to A M, equal to the hight of two steps; and in like manner at the points S, L, D and R, raise the perpendiculars S I, L Y, D E and R L, respectively equal in length to the hight of three, four, five and six steps. Then draw a line from G to R, parallel and equal to A F, as also another from N to *y*, parallel and equal to A M; another from T to W, parallel and equal to S A; another from Y to B, parallel and equal to L A; another from E to H, parallel and equal to D A; and another from L to P, parallel and equal to K A. From the point A draw the line A B, perpendicular to A E, and equal to the hight of one step; also at the points R *y*, W, B, H, P draw the lines R L, Y Z, W X, B C, H I, P O, all equal to the hight of one step, and respectively perpendicular to R G, Y N, T W, Y B, E H, L P, and draw the hypotenuse E B, L G, Z N, T X, Y C, E I, L O. This being done, set off the width of the rail from E to *d*, G to *i*; N to *o*, T to *u*, Y to *a*, E to F and L to *m*; and set the stem of a square on the line E B, till the blade touches the point *d*, and draw the line *c d*. Moreover, set a square on the line G L, and where it cuts the line R G, as in point I, draw the line *h* I; and in like manner draw the lines *p o*, U N, Z *a*, *g* F and *n m*. Then the angles E *d c*, G I *h*, N *p o*, &c., and the rest of the little black spaces as you see in the figure, do represent the twisting of each piece, and what must be taken off the side to the lines *l h* and *o k*; then you have one side and the back squared, which is the greatest difficulty in the formation of a twisted rail, because the two other sides are found by gauging from them.

"*Note.*—If the triangles in Fig. 97, and lines whereon they stand, be supposed to be raised up perpendicularly, then will the lines A B, R L, Y Z, W X, B C, H I and P O join to each other and produce one line perpendicularly over A equal to seven risings or hights of the steps. But in working a rail of this kind you have need of but one triangle, A B *c* E *d*, because they are all equal and of but one effect in working, they being drawn only to satisfy the curious in the nature of the thing."

Following the presentation of the examples here given, Mr. Nicholson refers to the methods of Halfpenny in finding the molds for elliptical staircases, and says:

"He finds the molds for elliptical staircases in a similar manner—viz., by finding an arch line divided into equal parts, so that each of them may be equal to the hypotenuse of the pitchboard and the distance of the points of division in succession respectively equal to the hights of the steps. This principle is to be understood in all staircases where the steps are equally divided at the well hole, whatever may be the form of the plan; but in elliptic staircases the degree of twist is different, and, therefore, requires a pitchboard to be made for every portion.

"It is hardly possible to conceive any method so distant from principle as that here shown. The squaring of the wreath is altogether guessed at, not to mention the great disadvantage in making the rail in so many pieces. If the rail were really executed, the above method would then be a prop-

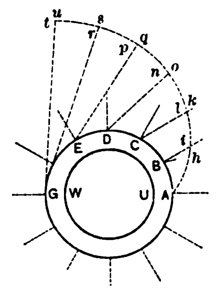


Fig. 95.

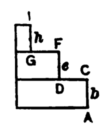


Fig. 96.

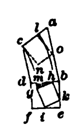


Fig. 98.

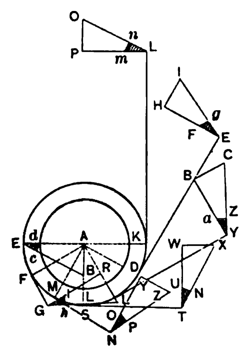


Fig. 97.

Handrailing as Taught Two Centuries Ago.

erty, but the molds never can be obtained from any construction in plano upon the same consideration. It is astonishing that any attempt should be made at demonstration for the support of a method so entirely destitute of principle as the above."

Building a Cistern.

The homes of our people are not all within reach of the city water supply; nor are they all located near pure springs, or water courses. In many cases, the only water supply available is to gather what falls upon the roofs in the form of rain or snow, and store it in ample cisterns or reservoirs for use as needed. Very often the supply is found to be short at a time of year when rains are infrequent, and the householder is subjected to great loss and trouble in consequence.

An examination reveals a break in the cistern through which the water has leaked away into the earth. The cement or plastering was cracked, broken, or scaled off by the pressure of the surface water in the earth outside of the cistern.

The trouble was in the faulty construction. The plan usually followed, says J. A. Reep in the *Clay Worker*, is to dig the hole or excavation in the earth the size and shape desired. An arch is turned over it with bricks, the spring of the arch resting on the clay, 3 feet or less below the surface. A curb is put over the top, and the inside of the excavation receives a coat of cement, plastered or troweled down on the clay walls. A cistern built in this manner is neither reliable nor durable, and is a source of much annoyance. Where the earth is solid clay, free from rock, sand or gravel, such cisterns can be built for use of stock, or uses other than for drinking or household purposes. But in no case do we advise building them, because of their liability to be a receptacle for surface drainage.

CISTERN VS. WELL WATER.

Good cistern water is better for all cooking and domestic uses than well or spring water, because of its freedom from inorganic salts in solution, which leaves it in its natural state, known by the property of softness. It will not form incrustations or deposits of lime in boilers, pipes, kettles, &c. Soap will not curdle or be wasted in the use of soft water. Vegetables can be cooked quicker and better, while tea should always be made of soft water. There are but few housekeepers who do not know the value of an abundant supply of pure cistern water. Doctors often advise their patients to abandon the use of all hard water and use cistern water instead.

When it is recognized as being not only a convenience, but a positive necessity and luxury as well, it seems strange that the average home builder does not always include a cistern of large size and permanent construction, among the first additions to the home place.

To build a cistern that will give entire satisfaction will require more care and expense than is usually given. But the returns will justify the extra care and expense involved.

EXCAVATING.

The excavation or pit should be made $2\frac{1}{2}$ feet wider than the diameter of the cistern when finished, and 1 foot deeper. A good size for ordinary homes is 8 x 14 feet in depth, with the floors slightly hollowed and the sides contracted or narrowed near the bottom—somewhat like a jug or egg shaped.

After bringing the bottom or floor of the pit to the proper shape, it should be well rammed, to fill up any cavities or soft places in the earth bottom. Then spread on a heavy coat of cement mortar, and continue it at a foot or two above on each side all around. When the mortar begins to set, pave the bottom with a course of bricks set on edge, well cemented between joints.

The walls of the cistern are started on this floor, beginning with a course of skewbacks to bring the bottom course level all around. On this course start your wall with sufficient space to allow an 8-inch wall of brick work all around and far enough away from the side of the pit to permit the brick work to receive a good heavy coat of cement mortar on the outside of the wall and connected with floor all around at the bottom.

OUTSIDE COAT OF CEMENT.

This outside coat of cement is of more importance than that on the inside, as its office is to keep all surface water from penetrating.

As fast as the wall is carried up the space back of the brick work should be carefully filled with damp clay, well rammed down in shallow layers. The walls are to be carried up and again drawn in at the top or narrowed gradually.

Three feet below the surface an arch is sprung over the top, and a neck or opening left to receive the curb.

The inside is then plastered with a coat of cement mortar, well troweled down. The cement should be the best quality of Portland or Rosendale mixed in the proportion of one bushel of cement, and two of clean, sharp sand, mixed dry and tempered for use as needed. When the walls are all plastered, make a wash with cement and water about the consistency of whitewash, then take a half-worn broom and brush the walls with the prepared cement wash, to smooth them down. When the wall has set, go over it again and it will close up all the holes and make it practically water proof.

THE FILTER.

Every cistern should be provided with a filter, built in the same manner as the cistern, except as to size and thickness of side walls. It need not be over 6 or 7 feet in depth and 4 feet in diameter, and distant from the cistern proper 6 or 8 feet. It should be lined with a 4-inch brick wall, cemented in the same manner as cistern, and provided with a 4 or 5 inch sewer-pipe connection leading from the bottom of the filter to the cistern. A few brickbats or coarse gravel can be arranged around the opening to prevent the filtering material from washing into the pipe.

Fill in the bottom with 18 inches of coarse gravel and graded down to fine gravel at top; over this put 2 feet of coarse charcoal and graded to fine coal on top and well settled and leveled down; over the top of the coal spread a double thickness of burlap sacking and put in close to the walls of the filter; then fill up with a foot of clean washed sand, which is the filter proper.

THE TOP.

The top must be arranged to allow it to be examined occasionally and all silt or sediment scraped off of the top and fresh sand added; or a layer of salmon brick can be laid on their flat side on top of or in a bed of sand. These can be taken up and renewed as they become foul. If the brick are dispensed with, the water entering from the conductor should fall on a slab of rock to prevent the sand from being stirred or washed through the coal below.

A cistern built as described will last for ages, and be a source of comfort to the householder.

The writer recalls one where he once lived in a town in Ohio, where the grading of a new street and a railroad left a lot standing high and dry and necessitated the grading down of the lot. This exposed the whole length of the cistern, which was left intact like a great jug. It was turned over on its side and rolled out into the street whole, where it was broken up with a sledge hammer.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

JULY, 1893.

Architecture at Columbia College.

Probably no better evidence could be given of the character of the work done during the past year by the students taking the course of architecture at the School of Mines, Columbia College, than the exhibition of drawings recently held in the rooms occupied by the department. The School of Mines, it may be interesting to state in this connection, offers a complete four years' course in architecture. The chief part of the instruction, covering architectural history and elementary design, occupies a period of three years, while the fourth year is devoted to advanced work in designing as well as construction and practice. At the recent exhibition examples of the work done by the four classes filled several rooms, the studies in design being so arranged that the visitors could take in, almost at a glance, the entire course of instruction in this particular branch. In one of the other rooms were displayed illustrations of architectural history, while in the lecture room was to be found the bulk of the third year's work in design. Perhaps one of the most interesting features of the exhibition was the work executed by the two graduates of the school, who last year had the Traveling Fellowships established by Charles F. McKim. One exhibited several highly finished designs, a drawing of a modern building for an industrial school and a number of sketches. The other graduate exhibited a series of studies made in Paris and a large number of sketches of buildings in France and Italy. The exhibition was held through several days and was viewed by numbers of interested spectators.

Dispensing with the Kitchen.

The idea that the kitchen of the private dwelling can, under certain well-defined conditions, be dispensed with, is not new, nor are there lacking records of efforts which have been made in this direction. Ever since Bellamy's "Looking Backward" was read and digested by the public, attempts at co-operative housekeeping, by which a kitchen centrally located was made to serve for many families, have been made, but with results not altogether satisfactory. From accounts which reach us through the daily papers another attempt looking to the abolition of the kitchen in the private dwelling is about to be inaugurated. A number of Colorado ladies have become deeply interested in the problem and propose to demonstrate the scheme in the Colorado Building at the World's Fair. The plan will then have a thorough trial in Denver, the scheme involving the erection of a block of 44 houses, covering an entire square. In the center of this square a building is to be placed and used as a common kitchen, dining room and laundry. The idea is to have a competent steward, who will purchase provisions at wholesale prices for all, and the meals, prepared by good cooks, will be furnished either in a common dining room or in private apartments, as may be desired. The houses will surround the kitchen in the form of a hollow square, so that all will be easily reached from the central building. In matters of this kind, as with most others, it is natural to expect objections to be raised as to certain features of the scheme. One of these is to the effect that the plan does away in part with the domestic privacy of the home. This objection is not insurmountable, as a dining room could be placed at the rear end of each dwelling, and have served therein breakfast, dinner and supper direct from the central kitchen. After the meals the dishes could be taken back to the kitchen and washed, in readiness for the next meal. Such an arrangement, it would appear, should not be very expensive per family, while the convenience to the housekeepers could hardly be overestimated. The dwellings would be entirely independent of each other and have every feature of ordinary houses except as to the kitchen. This problem is being earnestly considered by the advocates of the Denver scheme, and the outcome is likely to be awaited with no little interest, not alone on the part of the building trades, but by the general public as well.

Ventilation of Basements and Cellars.

In all our large cities many basements and cellars are occupied as shops and stores, or as saloons of some sort, and the ventilation in them is proverbially bad. When a basement is entirely above ground, and has an ample cellar below it, it presents no greater difficulty in the matter of ventilation than rooms situated higher up in the building; but when, as is very often the case it is about half way under ground, or is substantially or actually a cellar, perhaps extending out under the sidewalk from 14 to 16 feet, and has no means of admitting daylight except through thick glass set in iron frames in the sidewalk itself, ventilation becomes extremely difficult in many cases, especially if there be not an ample subcellar below. A plan by which a cellar may be thoroughly ventilated has recently been worked out by a heating engineer in a neighboring city. The design was made for a billiard saloon in a large cellar situated beneath a restaurant. In this scheme air is taken in through areas in the rear of the cellar, and is to be forced through galvanized iron ducts extending entirely around the bottom of the basement room under the row of chairs provided for spectators, which are ranged around the apartment. The lower part of this duct—that is to say, that part which lies on the floor of the basement—is provided with openings that deliver the air forced in through corresponding openings through the floor into the cellar below, where, in winter, it is moderately warmed by passing it through box coils, whence it passes through distributing ducts arranged under the floor to numerous registers, also arranged around the room, and opening just above the platform for chairs that entirely conceals the main duct. The plenum is obtained by the use of a blower driven by a gas engine placed in the cellar below; but this may possibly be supplanted by an electric engine, when the installment is erected.

Functions of Organization.

The responsibility of organizations of both employers and employees in the building trades is becoming established in the courts of this country and in England. There have been many efforts to determine exactly the amount of responsibility vested in these organizations, but only recently has the result in this country been at all satisfactory. It has been impossible to state just how far an organization of employers or workmen could be held responsible for action taken at their instigation. In one of the western cities two cases were recently tried, which serve to show both sides of the question from a legal standpoint. A case was decided against certain members of a builders' exchange and the illegality of a boycott clearly established, although the action was not brought against the exchange as an organization, but against certain individual members. On the other side a case was decided against a walking delegate of a workmen's union, the judge declaring that the efforts of the delegate in securing a strike on the part of members of his union was illegal In England the court of appeal has recently decided a case which was brought directly against an organization. The plaintiff was a stone mason who had contracted to furnish a quantity of dressed stone, together with the labor for a certain job. The contractor refused to conform with the working rules of the stone-cutters' union and at the instigation of that organization the men quit work. The contractor sued the union for damages and procured a judgment recovering the amount of his loss. The case was appealed and the judgment affirmed by the higher court.

Legal Responsibility.

The establishing of legal responsibility on the part of organizations of this character, whether employers or employed, cannot fail to result in an improvement in the condition which exists for all concerned. Action will become more conservative and both sides will realize more fully the benefits to which organized effort can be carried without infringing upon the legal rights of others. The recognition of a limit in this respect will be an added factor in bringing about a recognition of the importance of mutual action which includes consideration of both parties to any given condition or relationship. Already in the relationship between employers and workmen in the building trades, the change for the better is becoming more radical and rapid as the employers become more widely organized and better able to treat as a whole with the workmen on subjects of mutual concern. The individual and arbitrary action which formerly existed on the part of the employers is fast disappearing under the beneficial influence of organization. The more fully the functions and powers of legitimate organizations are understood the better will be the condition of both sides. Again, the compulsory recognition that there is a limit to which the members of an organization as such can go will foster and assist the establishment of means for bringing about more equitable relations between both parties upon the basis of arbitration or mutual settlement, for as soon as both sides comprehend that their organization can be legally dealt with as though it were an individual the members will be less inclined to advocate hasty or unjust action. Everything that contributes to the development of the comprehension of the rights which belong to a body of men acting in concert cannot fail to be of great benefit, no matter how severe the cause of that development may be, for out of the increased knowledge thus obtained the equity of their relationship to others becomes so clearly apparent that unwise or unjust action diminishes in proportion as the laws which bound the rights of others become more distinctly visible.

Organizations of Employers.

The building trades offer the best possible facilities for adjusting differences between employers and workmen upon an honorable and just basis, because of the fact that union of action is more easily attainable on the part of the employers than in almost any other trade. Organization of employers is a condition which the employees should most desire, for out of united action much more justice will ultimately prevail to both sides than where many on one side act against a single individual upon the other. Notwithstanding the fact that primarily many organizations of employers are established for the purpose of combating the action of the union, good will ultimately grow out of a consideration by all concerned of the questions at issue. This fact, while it may appear detrimental to the accomplishment of the immediate desire of the workmen, should not, however, be considered as such, for it must be remembered that while the workmen have been organized much longer than the employers and become more familiar with the machinery and operation of organized effort, the employers have been struggling to maintain an unequal relationship of one against many, until in sheer desperation they have formed themselves together for the purpose of establishing an equality of power. It is impossible, as is constantly being proved, that where the best elements of both sides form the component parts of careful organizations, unjust conditions could be very long maintained by either side, for it is evident that as soon as equality in power is established arbitration must follow, for there is no longer ability on either side to maintain unjust or unequal conditions. The immense importance of every successful case of amicable relationship maintained between organizations of employers and unions of workmen cannot be overestimated, not only from the benefit to the community in which such conditions exist, but on account of the value of the example.

Glass-Roofed Streets.

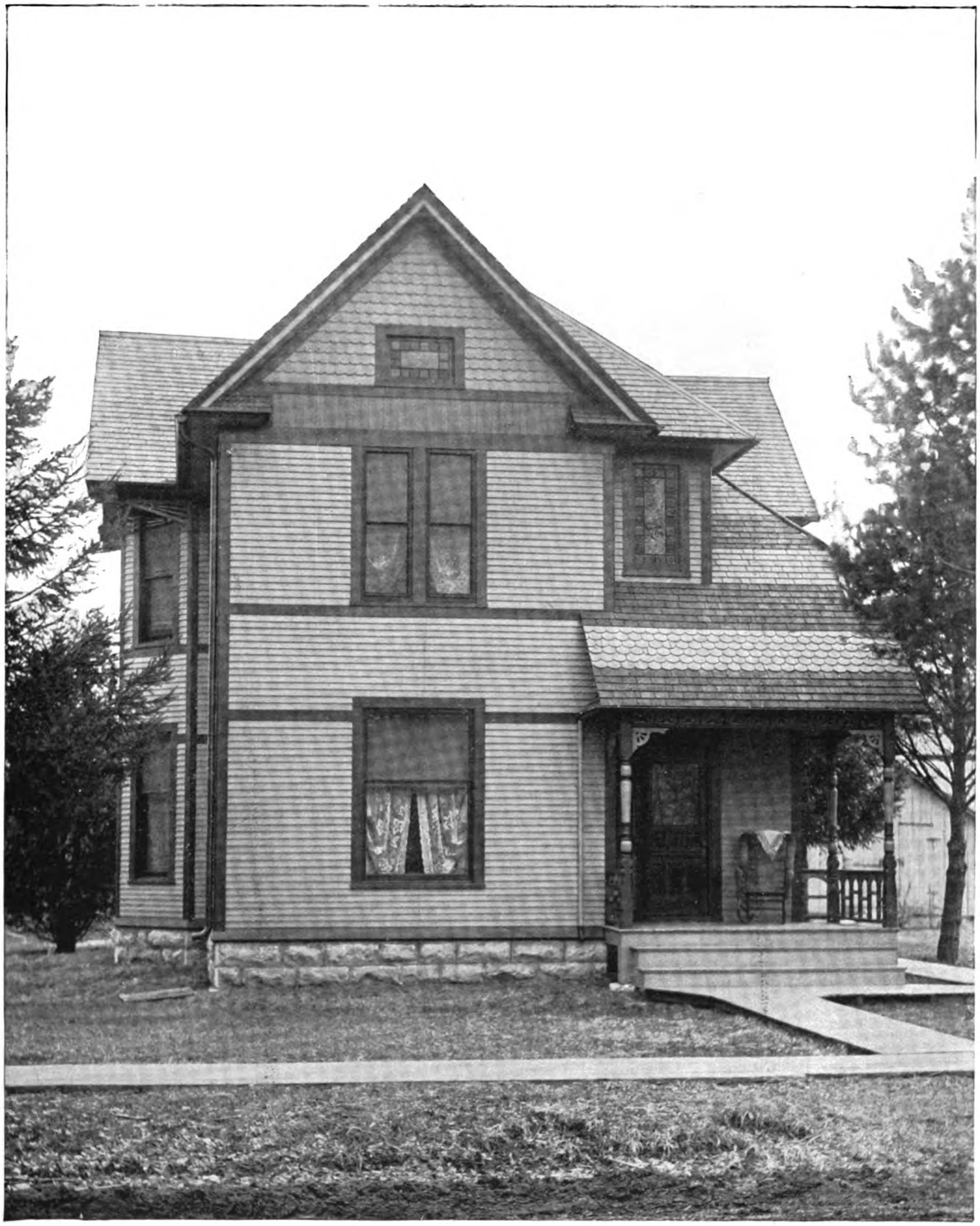
Some attention has recently been given in English papers to a proposition for covering the principal streets of London with glass roofing, supported by iron girders. Ventilation is to be secured by the free passage of air from end to end of the streets, and by the openings from the sides at street crossings. The object appears to be to keep the streets dry, which purpose would doubtless be measurably attained, but other inconveniences would be introduced. A street under glass would be intolerably warm in bright summer weather, and it would smell like a stable. To cover sidewalks with glass roofing would, however, be a real improvement in cities, keeping the sidewalks dry, conveying rain water into the gutters much more effectively than the canvas awning now so much in vogue, and not interfering with that thorough and constant change of air necessary to keep city streets in a wholesome condition.

Pratt Institute of Brooklyn.

Few nobler or more beneficent monuments have been left by American men of wealth than that which perpetuates the name and memory of the late Charles Pratt in his native city of Brooklyn. The great educational establishment known as the Pratt Institute, based as it is upon an appreciation of the dignity, as well as the value, of intelligent handicraft and skilled manual labor, stands out as a grand and enduring testimony to the truth and soundness of its founder's conviction that the manual and industrial education of its individuals underlies all the prosperity and progress of a community or a nation. The idea of a perfect education conceived by this practical philanthropist is one in which mind, eye and hand are together trained, securing symmetrical development. This idea it is which is being carried out in its integrity in the Pratt Institute. While literature, science and art are taught, the students, both male and female, are trained in handicrafts of some sort, as an essential part of their general education, although they may not propose adopting manual labor as their business or profession in after life. This feature is considered on an equal basis with the regular academic studies, and is calculated to invigorate the mental faculties of the student and prepare him more fully for the ordinary activities of life, giving him a discipline and strength of judgment which cannot fail to have a fortifying effect upon his character. To those, however, who do propose to take up a handicraft as their calling in life, the education such an institution offers, adding mental to manual training, must be invaluable.

English Methods.

From a tabular statement of wages paid and hours worked in England, prepared by W. Knox, secretary of the National Association of Master Builders of Great Britain, and covering conditions existing among masons, bricklayers, plasterers and their laborers, carpenters, plumbers, painters and slaters, it is shown that workmen in these branches of trade in this country receive very much higher wages, although the hours worked are approximately the same. From the statement made March 25, as to particular demands and concessions granted or pending in the cities in which the National Association is represented, it is seen that practically the same general conditions prevail there as exist here, although somewhat different in form. The large majority of the demands of the English workmen involve the adoption by the employers of union working rules, which seems to show that English workmen are at least partially satisfied with their wages, but that a dissatisfaction exists with the condition under which they are compelled to work. A radical difference exists between the methods of the English workmen in treating with their employers, which is, that a strike with them seems to be a last resort, and that persistence in urging their claims, without open breach with their employers, is the means by which they secure their desires. In almost every case of a difference between the employer and workmen the report states that the settlement is still pending, which indicates that the matter is under consideration and that work is still going on without disturbance.



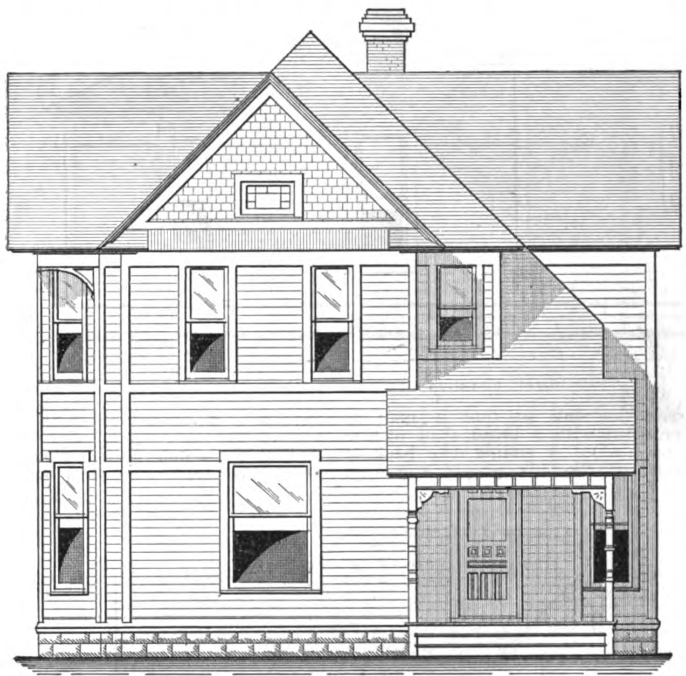
COTTAGE OF EDWARD FOX, AT WASHINGTON, IOWA.

W. S. WYLIE, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JULY, 1893.

COTTAGE IN WASHINGTON, IOWA.

THE SUBJECT of our supplemental plate this month is a neat and attractive cottage, erected a short time ago for Edward Fox from plans prepared by W. S. Wylie, architect, of Washington, Iowa. The elevations, floor plans and details, which are shown upon this and the following pages, give an idea of the arrangement and construction employed. The house here shown has no cellar, although in some of the other dwellings which the architect has erected from the same floor plans, slightly modified, this feature has been provided. The house is covered with 10-inch ship lap, on which is are employed, such as are made by the mills and kept in stock by dealers handling material of this kind, so that there is less variation in the style of finish in different houses than would otherwise be the case. Mr. Wylie expresses the wish in this connection that more of the Western builders would contribute to *Carpentry and Building* plans of houses that have actually been erected, as each section of the country has its own peculiarities in building construction, and a presentation of designs from different localities would prove both interesting and valuable to all concerned. He states that the cottage which we present herewith can be built in Washington, Iowa, for $1450 and pay a good profit to the builder.

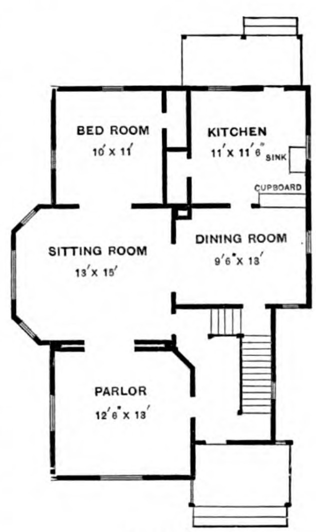


Front Elevation.

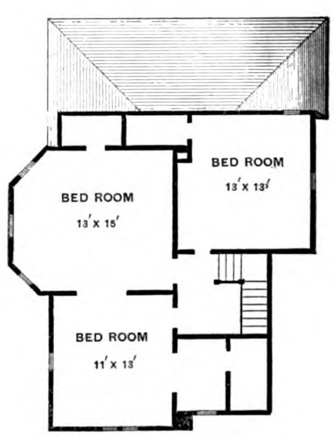
laid a good quality of building paper, and this in turn is covered with narrow pine lap siding. The gables are covered with wide siding, cut in such a way as to imitate shingles. The roof is covered with clear white pine shingles. The floors of the cottage are laid with selected fence flooring, except the kitchen, where yellow pine is employed. The interior of the house is finished with soft pine pilaster casings and head and base blocks. The stairs are finished in red oak.

An inspection of the floor plans shows that on the first floor are five rooms, so arranged as to utilize the space to advantage. The sitting room and parlor are connected by means of folding doors, although the opening may be concealed by *portières* if desired. Opening from the sitting room at the rear is a sleeping room and at the right the dining room. On the second floor are three sleeping rooms, each provided with a closet of ample size.

Mr. Wylie states that in the smaller towns of the West less money is expended upon the outside of the house than is done in the East, although for the same money, it is claimed, as great convenience and fully as much room is secured. In the finish of houses standard patterns of moldings and casings



First Floor.



Second Floor.

Cottage in Washington, Iowa.—W. S. Wylie, Architect.—Elevation, Scale, ⅛ Inch to the Foot.—Floor Plans, Scale, 1-16 Inch to the Foot.

Hints on Building.

In building a home, it is of the first importance to start right. This can only be done by knowing what you want before you start. It is impossible to adopt more than a very small per cent. of the many suggestions which our friends freely offer, and therefore it is well to bear in mind the fact that we are to build for ourselves, not for our friends, and then set out to please ourselves.

Practical builders and those who have had experience do not need any suggestions, but those contemplating building their first house may welcome a few, born of experience. For the benefit of such, I give the following, says Henry L. Hines in a recent issue of the *Home Builder and Furnisher:* As I said before, know what you want—that is, the general character of house, number and size of rooms, &c. It is well to settle this before calling in the services of an architect. It is well, in getting ideas, to look over various houses, noting their general plan, their advantages and disadvantages. When you are settled on what you want, give your ideas to your architect. It is generally safe to defer to his taste in elevations.

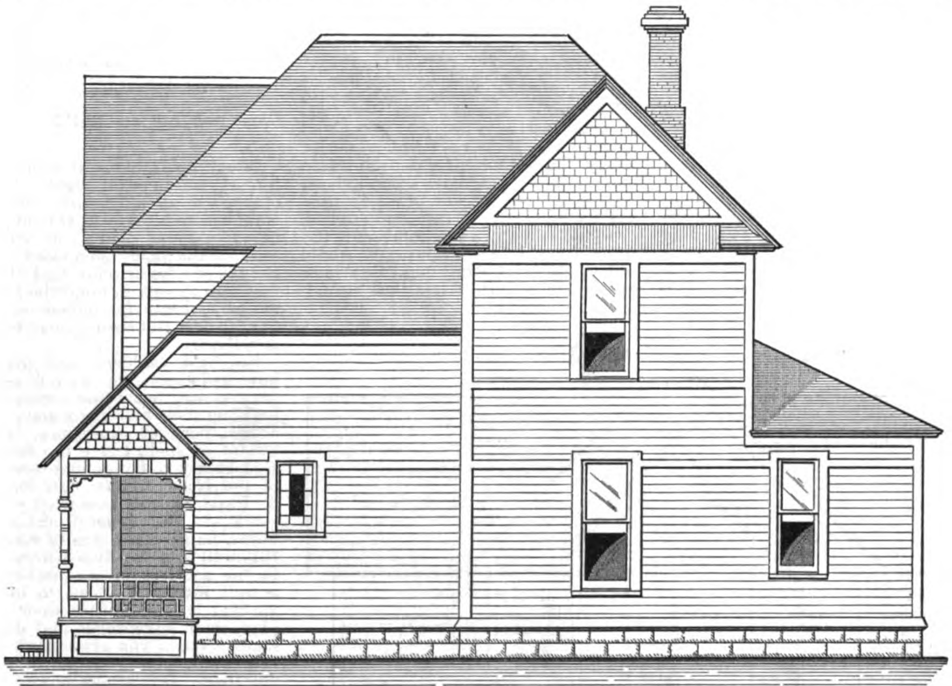
If you have set your price for the building, your architect should be able to get you out plans and specifications upon which contractors will give bids near to your figures. They do not always do this, and you may find it necessary to modify your plans.

Get the inside of the house to suit you, and the outside will take care of itself. That is, locate the windows, doors, &c., where you want them, from the inside, without regard to external appearance, and let the architect do the outside. By all means make your house roomy. The tendency for several years has been toward small rooms. Sleeping rooms 12 x 12 feet are none too large, and are generally ample in room. For an ordinary family, a dining room 15 x 12 feet will be found about right, but a foot of space added to each dimension will be appreciated when the house is occupied; or a foot can be sacrificed if found necessary. As to the parlors, tastes vary, some preferring cozy rooms, while others prefer spacious ones; still, there is a happy medium which it is safe to adopt if one is building what may eventually be thrown upon the market.

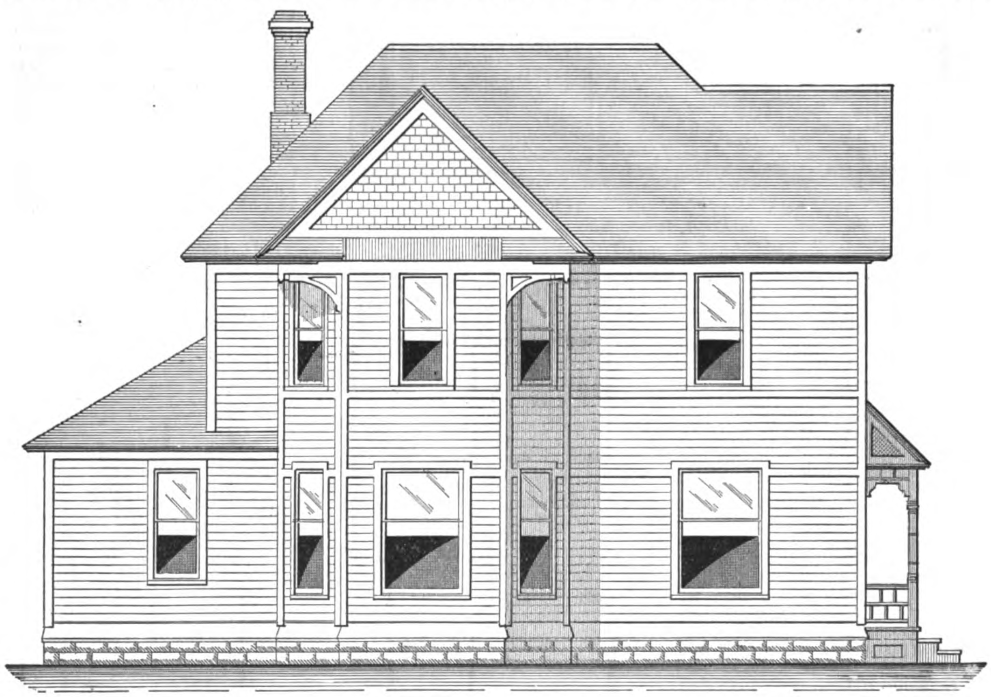
The kitchen should be planned primarily for convenience. A closet in this room, with shelves, is desirable, and ordinarily the space beside the chimney can be utilized for this. Locate the sink so that it may be provided with a broad shelf at one end, and if a sliding door back of this, or the sink proper, can open into the pantry, it should be provided.

Too much care cannot be exercised in planning and executing the plumbing. Cut anywhere else, but do not spare expense in making this feature as perfect as possible. Good plumbing is expensive at the outset, but it lasts, and the danger from sewer gas, leaking pipes, &c., is reduced to a minimum.

Often the mistake of not piping for gas is made, especially when building on a street not yet supplied with this illuminant. The amount saved is too trifling to be considered, while the expense of putting in gas pipe afterward,



Side (Right) Elevation.



Side (Left) Elevation.

Cottage in Washington, Iowa.—Elevations.—Scale, ⅛ Inch to the Foot.

if desired, is far from small. Again, no mistake will be made by wiring for electricity at the same time.

The frame of the house should be spruce, of the following dimensions: Cross and outside sills, 6 x 8; first and second floor joists, 2 x 8; third-floor joists and rafters, 2 x 6; outside and main studding, 3 x 4; partition studding, 2 x 3. The studding and floor joists should be placed 16 inches on centers, and the rafters, 20 or 24 inches.

The floors should be lined with square-edged hemlock boards, 1 inch thick, and the outside walls should be covered with spruce. Match boards, 1 x 10, well nailed with 10d. nails, will prove satisfactory, but expense may be saved by using straight-edged boards. Still, matched boards are well worth the extra cost.

Have the floors bridged through center of ceiling with 2 x 3 stock, truss over all door openings, and cut headers at top and bottom of all window openings.

Use only pine clapboards, laid not over 4½ inches to the weather. These will hold paint better than spruce and, as they cut longer, make fewer joints. The other outside finish should be of well seasoned pine.

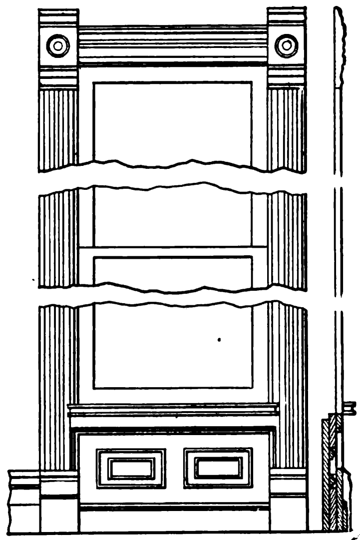
If you have piazzas—and you should have large ones—floor them with hard pine 1 x 4, blind and top nailed, and have the ceilings of pine, ½ x 4. A roomy piazza adds a great deal to the comfort as well as the looks of a house.

Hardwood finish is desirable, but white wood, finished natural or stained, makes a neat finish. The following dimensions of finish usually prevail: Casings, 6-inch molded; base, 9-inch; stool caps, 3-inch; stops, ½ x 1¾; corner blocks, 6⅛ x 6⅛ x 1⅛; base blocks, 6⅛ x 9⅛ x 1⅛. For these dimensions, if a chair rail is used for the dining room, molding ½ x 5 is correct.

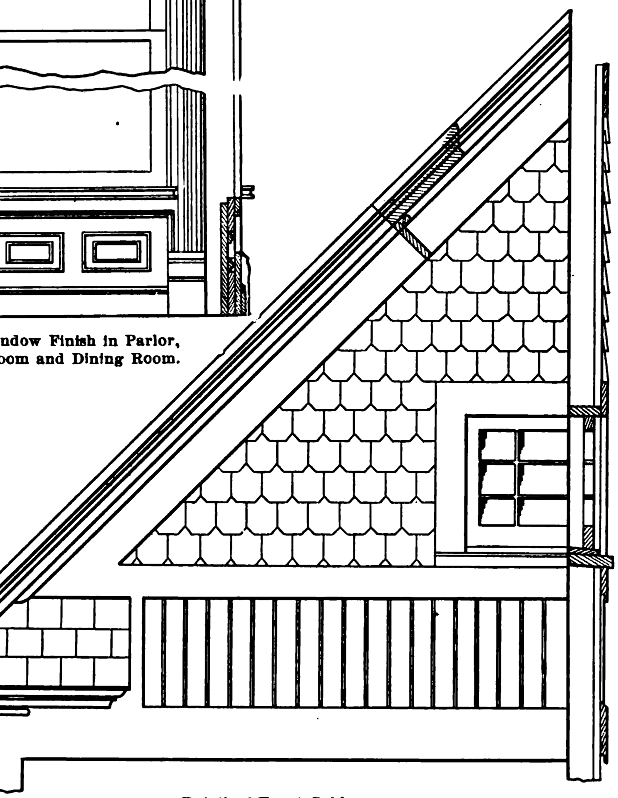
White maple stock, 1 x 3 inches, makes good kitchen and pantry floors; pine should be used for floors that are to be carpeted. Shingle the house with the best cypress shingles, or use slate. Cheap shingles are expensive.

Without further suggestion as to details, let me say that it is well to study your specifications carefully before you let your contract, as it is very easy to omit some item, and "extras" count. Specify everything—size of windows, kind of glass and number of panes to the sash; how they shall be hung and the quality of cord used; size and kind of door butt, and kind and quality of door trim in general; the size and kind of nails to use in the different work—in fact, get in every item, and then you may escape with but $5 to $25 in extras.

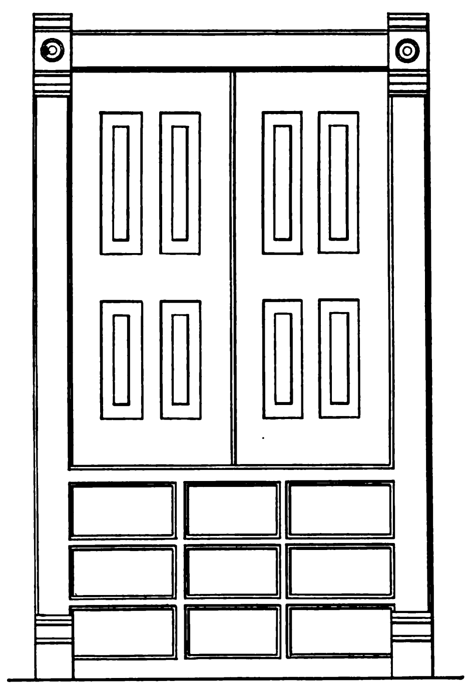
Building your first house will be fascinating, but soul-tiring. Hundreds have lived through it, and experienced the same delays, annoyances and desire for more fluency in the use of swear words that you will experience. The first experience in building a house is a great educator, and he who goes through it with serenity is fitted to strap on his wings and hover.



Detail of Window Finish in Parlor, Sitting Room and Dining Room.



Detail of Front Gable.



Detail of Double Cupboard on Dining-Room Side.

Miscellaneous Details of Cottage in Washington, Iowa.—Scale, ¼ Inch to the Foot.

Building Operations in Washington City.

According to the records of the Building Inspector's Office, the operations in the national capital during the year 1892 involved the expenditure of more money in the construction of houses than in any previous twelve months in the history of the city. This resulted from no boom, but a steady increase in building improvements, and speaks well for the future of the city. Probably the most important feature of the records is the indication that the tendency is in the direction of better and more attractive houses than has characterized the operations of the past. The number of new buildings put up during the year was 3271, involving an outlay of $8,536,152, while additions and repairs were made in connection with 1473 buildings at a cost of $914,894. The records also show that for the first four months of the present year there was spent in buildings $2,986,770, the operations being pretty well distributed over the city.

HINTS ON PATTERN MAKING.

ONE of the subjects which is attracting more or less attention among our readers is that of pattern making, and those who have made inquiries with regard to the matter are likely to peruse with interest the following, which is taken from a recent issue of an exchange :

The pattern shop is one of the most important departments in a plant for the manufacture of machinery. It is here that the plans of the mechanical engineer are first developed, and upon the skillful manner in which the patterns are constructed, and those plans faithfully carried out, depends much of the future success in the manufacture of the machine. The skillful pattern maker, by accurate calculations for shrinkage, finishing and the contingencies of the foundry, saves a great amount of labor and annoyance in the machine shop. It is unreasonable to expect perfect castings from imperfect patterns, and the molder is often blamed for imperfections of the castings when the fault may be traced to an imperfect pattern. Molders, as a class, have sins enough of their own to answer for without the addition of the sins of the pattern maker. Patterns are, as a rule, necessarily expensive, and should be carefully constructed, so that they will retain their shape and proportions for future use, and to this end the selection of materials and the manner of joining the several parts together becomes an important item. For all ordinary purposes, especially for patterns of considerable size, good, clear, well-seasoned white pine is the best, and to obtain the best results it should be seasoned in the open air in the usual way. The sap of all woods contains a large percentage of water, and to get rid of this is the object in seasoning. Pine wood, besides water, contains a large percentage of turpentine in the sap, and in seasoning it, it is desirable to retain as much of this as possible, as it dries to a hard substance when seasoned in the open air, and helps in a measure to fill up the pores of the wood, and renders it close and more impervious to water, and less liable to be affected by dampness. Kiln-dried lumber, although extensively used at the present time, is not as good for this purpose. The heat and moisture used for this purpose expels, not only the water, but other ingredients; which leaves the grain open and brash, and patterns made from such materials are more liable to absorb dampness and warp than otherwise. In constructing patterns, especially those of considerable size, it is customary to build them up of several pieces glued together: this making more reliable work provided good glue is used and proper care manifested in putting them together. No two pieces should be glued together with grain crossing at right angles, for, no matter how dry the lumber may be, there will always be some shrinkage, and, as lumber shrinks almost entirely in its transverse section, it is sure to warp, unless the glue gives way so as to allow part to shrink in its natural direction. In either case the pattern will be unfit for further use until it is repaired. It is not good practice, either, to glue up stuff for patterns with the grain of each piece running parallel with the other, as such patterns are deficient in strength and are liable to split. The most practical way is to arrange the several pieces so that, when put together, the grain will run diagonally across each piece, at an angle of about 25 or 30 degrees. Pattern stuff prepared in this manner will have sufficient strength to prevent splitting by use and handling, and the tendency for warping will, to a great extent, be avoided. In building up circles the cants should be short and cut lengthwise of the grain, as far as possible, so that the grain of each course as it is laid together to break points may cross each other diagonally.

THE USE OF NAILS.

It is customary with some pattern-makers to use nails or brads in each course as it is laid up, but pegs made of maple or hickory are much better, and, when the stuff is sufficiently thin to admit of it, the common pegs used in shoe shops are very cheap and convenient. The advantage of using pegs instead of brads or nails is that, being driven in glue, they hold better, and the cants are not as liable to spring apart when exposed to the warm, damp sand in the foundry ; besides, they never give the workman any trouble when turning it ; and experience has demonstrated that patterns put together in this manner are much more durable than otherwise. Some pattern makers use but little judgment in the use of glue, and seem to have an idea that the more glue they can get between two surfaces the better ; yet every experienced mechanic knows that exactly the reverse is the case. With a good joint, and clear, fresh, thin glue, the least that is retained between the two surfaces the better and stronger will be the joint. In hot weather glue soon sours, turns black and becomes rancid. When in this condition its strength is impaired and it is unfit for use. Alcohol mixed with it will prevent souring, but as soon as it is healed up the alcohol evaporates, and its effects are lost. The most effective preventive is sulphuric acid, but the acid should not be applied clear. For an ordinary glue-pot about 15 drops of the acid mixed with a couple of spoonfuls of water may be applied ; while this in no way impairs the strength of the glue, it will effectually prevent souring, and keep it fresh and clear.

GEAR PATTERNS.

For small gear patterns that are to be in constant use, cut patterns of iron or brass are no doubt the best and cheapest in the end ; but if wood patterns are required they should be made of some harder wood than pine ; mahogany or cherry is considered the best for such work. After the hub is turned to the proper size and width of face, the blanks for the teeth may be glued on and dressed in their places. With large, wide-faced gears, it is not convenient to do so ; the blanks for the cogs are usually glued to dovetailed slips, or the dovetail formed on the under side of the blank so that, when fitted to the rim, or dressed off and laid out, they may be removed for the convenience of finishing them. The dovetails should be a perfect fit, and the blank well fitted to the rim ; otherwise they will vary the pitch when dressed and replaced again. In constructing patterns for heavy castings, such as lathe and engine beds, the careful and even distribution of metal in each part is an important consideration, and in order to give some particular part the requisite strength to withstand a heavy strain, it is sometimes necessary to put more metal in some other part where it is not needed in order to prevent the casting from being distorted in shape or cracked by the unequal construction caused by one part cooling faster than another. With the frame work for lighter machinery the same allowance for shrinkage must be provided for. But where a frame is composed of several parts, some of which are much lighter than others, and yet it is necessary that the whole should be cast together, it is well to make the lighter portions in curves as far as the nature of the work will permit. Sharp edges and square corners should also be avoided as far as possible. A small cove in each corner will add much to the convenience of molding, besides adding to the strength of the casting and insure it against cracks, which are liable to open at these points by shrinkage in cooling.

TAKING FROM THE SAND.

The pattern maker should also exercise good judgment in making provision for withdrawing the pattern from the sand ; but, as no two patterns are just alike in this respect, no definite rule can be followed. In intricate patterns, which require considerable skill and care on the part of the molder in withdrawing them from the sand, if the nature of the work will admit of it, considerable more draft should be allowed for this reason. But plain patterns may be nearly straight, provided their surface is perfectly smooth. For much draft, especially with gearing, is very objectionable, for it is impossible for such gearing to run together accurately, and bear the whole length of the tooth or cog, unless they are either chipped and filled, or planed straight. If gear patterns are made accurate and true, and the face of the cogs perfectly smooth, there will be no difficulty in molding them if they are nearly or quite straight. All patterns before being used should be well covered with at least two coats of pure shellac varnish. After applying the first coat, and when it is perfectly dry, the surface should be well rubbed down with fine sandpaper, and all imperfections, such as nail holes and sharp corners, not already provided for, should be carefully filled with beeswax and rubbed off smooth before the second coat of varnish is applied. After a pattern has once been used, it is good practice to again rub it off with very fine sandpaper and apply another coat of varnish. Many well-made patterns are ruined in the foundry by not being provided with the proper facilities for rapping and drawing. The molder must have some means for attaching his appliances for lifting it out, and, if suitable provision is not made for this purpose, he will screw his lifter in any part of the pattern that is most convenient, and the chances are, that it will split the first time it is used, or be badly marred up. Iron plates should be let into all patterns with holes threaded to suit his lifters, and well secured by either screws or rivets, and, if a sufficient number are attached, the molder will respect the pattern and use them. Wood patterns should never be allowed to remain in the foundry ; as soon as they are used they should be taken to the pattern room, brushed off and placed in such a position for future use that they will not become warped or sprung.

IN THE erection of dwelling houses at the present day one of the objects constantly held in view is the ornamentation of the exterior walls in such a way as to promote the most pleasing architectural effects while adding to the picturesqueness of the locality in which the building may be erected. The monotony of the red brick front has become of a character to be somewhat offensive, and it is not therefore to be wondered at that many people paint such walls all sorts of colors. A white brick, made as in the old style red brick, and said to be as durable in all respects, has been introduced, and it is thought that it will lead to the manufacture of bricks of other colors.

SECOND-PRIZE DESIGN IN STORE-FRONT COMPETITION.

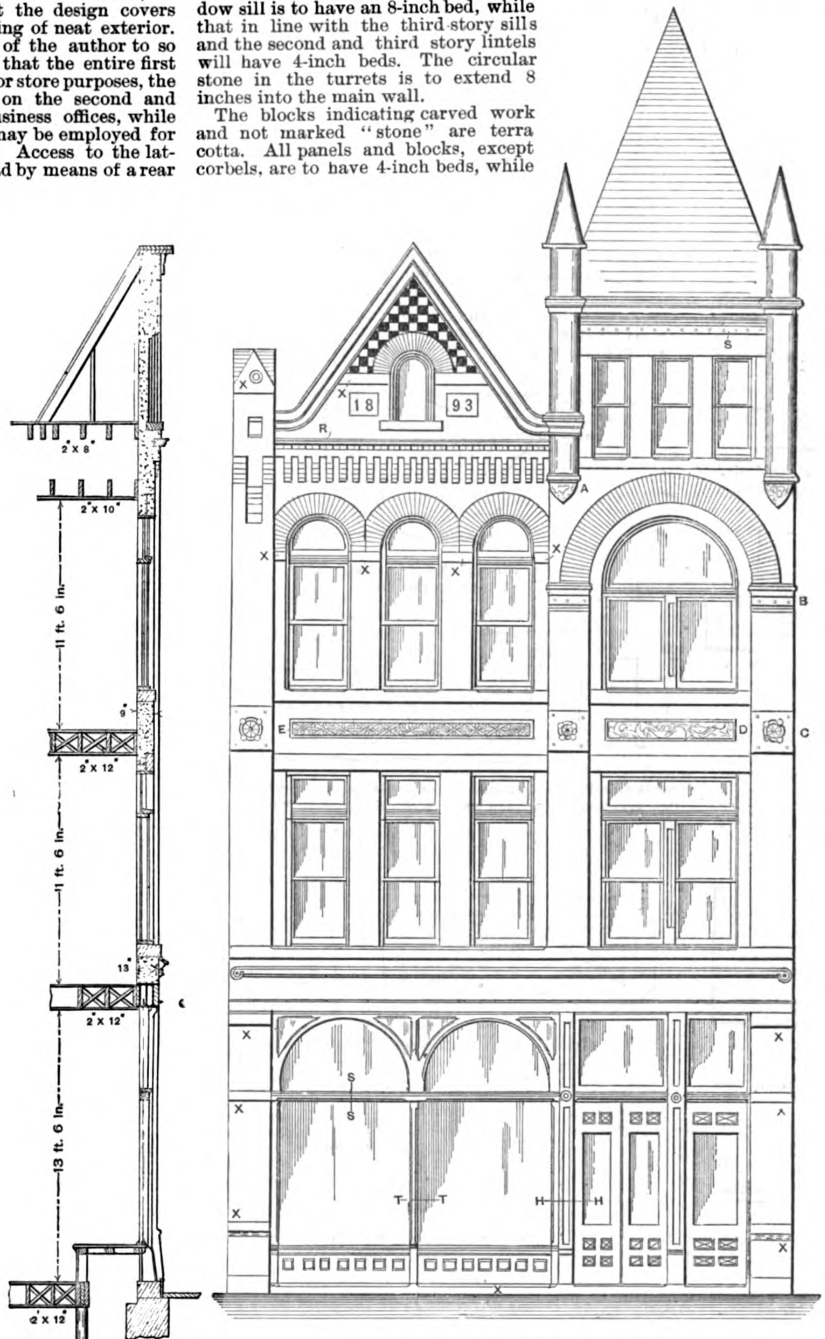
THE DRAWINGS of the store front which we have pleasure in presenting to our readers this month were awarded the second prize in the XXIII Competition, the author being A. K. Miller of Turtle Creek, Pa. It will be seen that the design covers a three-story building of neat exterior. It is the intention of the author to so divide the interior that the entire first floor can be used for store purposes, the two front rooms on the second and third floors for business offices, while the rear portions may be employed for living apartments. Access to the latter rooms can be had by means of a rear stairway, as well as through the main entrance at the front of the building.

According to the specification of the author of the design, selected brick laid in red mortar, relieved with trimmings of terra cotta, are to be employed for the front, the arches and turrets being of suitable molded brick. The blocks marked X on the elevation are to be of stone, those between the sign board and the plinths having 8½-inch beds, and cut smooth. The terminal on the pier is also cut smooth, with sunken rosette, as shown. The cut stone in line with the second-story window sill is to have an 8-inch bed, while that in line with the third-story sills and the second and third story lintels will have 4-inch beds. The circular stone in the turrets is to extend 8 inches into the main wall.

The blocks indicating carved work and not marked "stone" are terra cotta. All panels and blocks, except corbels, are to have 4-inch beds, while the corbels are to have 8-inch beds. The blocks in the pediment forming panels are terra cotta with rough faces.

The brick work above the first story is to be carried by three 15-inch steel beams, 60 pounds to the foot. The beams are to be bolted together with separators, and have a pine plank bolted on each side. The beams are to rest on iron bed plates 1 inch thick, 20 inches wide by 22 inches long.

The cornice of the pediment and tower, as well as the terminals on the turrets, are to be of galvanized iron.



Section.

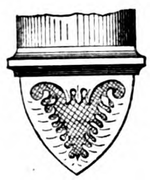
Front Elevation.—Scale, ⅛ Inch to the Foot.

Second-Prize Design in Store-Front Competition.—A. K. Miller, Architect, Turtle Creek, Pa.

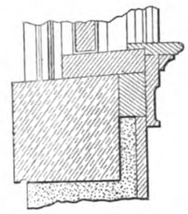
With regard to the tower, the brick work is to be carried up around two sides, while the remaining ones are to have a studding wall, sheeted and covered with slate. The tower roof is to be covered with No. 1 Pennsylvania black slate, laid on roofing felt.

All wood work on the outside of the building, as well as the galvanized-iron work, is to be painted with two coats of pure lead and linseed oil, except in the first story, which is t› be grained, filled and oiled with two coats of hard oil. The interior wood work of the first story is to be grained, filled, oiled and varnished, while the second and third stories are to be grained and varnished.

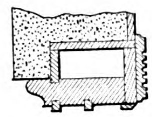
The estimated cost of the front of the building, including tower, is placed by the author of the design at $775. This sum, it may be remarked, does not include glass, window and door hardware.



Terra Cotta Ornament at A of front Elevation.—Scale, ½ Inch to the Foot.

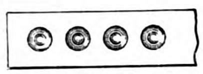


Vertical Section through Third-Story Window Frame.—Scale, 1 Inch to the Foot.

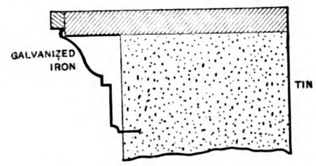


Horizontal Section through Window Frame.—Scale, 1 Inch to the Foot.

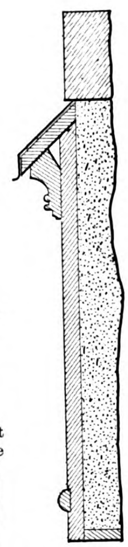
Terra Cotta Ornament at D of Front Elevation.—Scale, ½ Inch to the Foot.



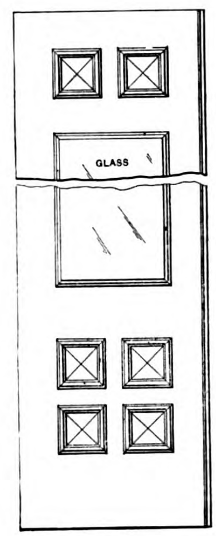
Ornament at S.—Scale, 1 Inch to the Foot.



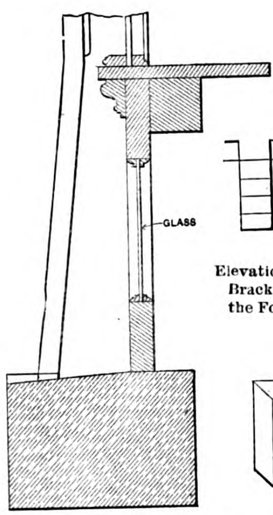
Section through Main Cornice.—Scale, 1 Inch to the Foot.



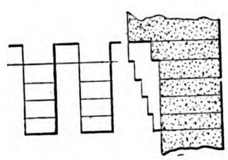
Section through Sign Board.—Scale, 1 Inch to the foot.



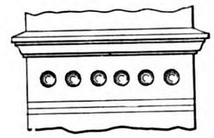
Detail of Door.—Scale, ½ Inch to the Foot.



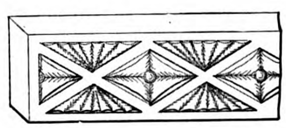
Section through Panel Work under Show Window.—Scale, 1 Inch to the foot.



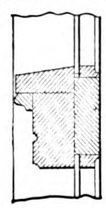
Elevation and Section of brick Brackets.—Scale, ½ Inch to the Foot.



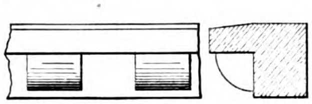
Terra Cotta Ornament at B.—Scale, ½ Inch to the Foot.



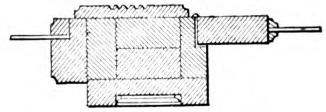
Terra Cotta Ornament at E.—Scale, ½ Inch to the Foot.



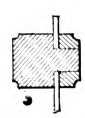
Section through S S.—Scale, 1 Inch to the Foot.



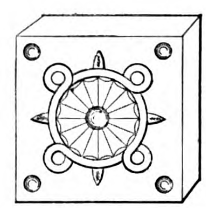
Terra Cotta Ornament at R of Front Elevation.—Scale, 1 Inch to the Foot.



Section through H H.—Scale, 1 Inch to the Foot.



Section through T T.—Scale, 1 Inch to the Foot.



Terra Cotta Ornament at C.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Second-Prize Design in Store-Front Competition.

Color to Paint Houses.

The best color for houses among trees is pure white with green blinds, says a writer in a recent number of the *Southern Architect*. This may seem out of date to painters and experts in high art, who are well acquainted with all new fads in color that come with the advent of spring, but nothing will show off a home that is embowered in trees, or a farm house that is somewhat hidden among trees, better than pure white. Fresh, green foliage and a green sward make not only a pleasing contrast, but the color suggests cleanliness and tidiness as no other color will. Again, most colors are prepared, and since adulteration is rife, prepared paints soon become dingy. There are pure leads, and any reliable dealer will inform inexperienced buyers the brands that are pure. After the first good painting it can be renewed by light coats and at a nominal expense without expensive trimmings, and the whole building will have the appearance of looking "sweet and clean." The above applies to suburban residences and farm houses with large yards abundantly planted in trees, but when buildings stand prominent, without a setting in trees, and they are large, expensive and elaborate in design, and the principal feature is the house itself, fancy painting is in order, and pure white does not show to the same advantage as on a home among trees.

A SIMPLE SUBSTANCE for fire proofing combustible materials has lately been brought forward by a Russian inventor, and its efficacy tested with very gratifying results under the auspices of the Moscow Imperial Society of Agriculture. In the public trials made a shanty was built entirely of straw, and, after being covered with the paste, was subjected to a hot fire, the straw, under this operation, merely changing from a yellow to reddish-brown color, without igniting or even cracking. The society in question has, it is stated, decided to introduce this new invention or process throughout the Empire, considering that it must prove of the highest value in villages where the houses are thatched with straw. The cost of this preparation, as well as of applying it, is said to be very slight.

WHAT BUILDERS ARE DOING.

THERE is a quietness in the building trades throughout the country and the condition may be presumed to indicate that employers and workmen are sufficiently well satisfied to make radical action on either side unnecessary. The few differences which have been reported are so insignificant when compared with the vast number of workmen employed that the whole fraternity may be considered as being, at the present time, in a most excellent condition, for it is a fact that the amount of building operations being carried on in the country is about up to the average. The satisfactory increase in the establishment of organizations by employers may be considered as indicating a growing appreciation of the value of dealing as a whole with the conditions which confront them and which they have formerly attempted to deal with as individuals. In the cities where the older organizations exist a long continued contact with each other has permitted all concerned to learn that both sides are anxious only to secure an honorable recognition of their rights, and where the bitterness of haste and arbitrary action has worn away, the true value of careful organization is clearly demonstrated. These examples, which are practical and can be studied by all, show to the newer organizations just what their future may be, if their dealings are honorable and impartial with those whose interests are so closely identified with their own. The legal proceedings instituted against organizations of builders will serve to establish just how far the action of such organizations may be lawful, and therefore will be of benefit to the fraternity at large. Wages and working rules throughout the country generally are more favorable to the workmen than they have been, which, together with the fact that the building interests are usually active, indicate that the trades are in a prosperous condition.

Baltimore, Md.

At the annual meeting of the Builders' Exchange of Baltimore, President Hugh Sisson declined a re-election on account of increasing age and business requirements, and Noble H. Creager was elected in his stead. The other officers chosen were as follows: First vice-president, William Ferguson; second vice-president, Isaac S. Filbert; third vice president, George Bunnecke; secretary, E. D. Miller; treasurer, B. F. Bennett; directors, J. B. Sisson, George W. Hetzell, Thomas L. Jones, Thomas F. Krug, Benjamin Franklin, J. J. Kelly, A. J. Denson, Jefferson J. Walsh, George W. Walther, August Wehr, J. T. Lawton, Henry A. Seim. The membership was reported to be 135, an increase of 17 per cent during the year. The exchange is in excellent financial condition, and the members are well satisfied with the result of last year's work and anticipate that the coming year will be as good, if not better. This organization has been a success from the date of its inception, and has brought about a feeling of fraternity among the builders greater than that which ever before existed and which is steadily increasing to the mutual benefit of all concerned. The project for a building of its own to be erected by the exchange is steadily progressing. Preceding the meeting and election of officers a banquet was served and various addresses were made on subjects of interest to the members The attendance was large, and everybody seemed to enjoy themselves

Boston, Mass.

The Boston dealers in building materials are still actively endeavoring to secure an amendment to the lien law of the State. An organization has been formed under the name of the Building Materials Association for the purpose of forwarding the movement, and several letters have been issued to all members of the building trades of the city. The following is the last one issued up to the present time:

We wrote you some time ago relating to the advisability of obtaining necessary legislation to give parties furnishing materials to be used in the erection and alteration of real estate, a lien law for such material on the same terms and conditions as is now had for labor.

We have received replies from hundreds of representative houses of the State, who not only have signified their approval of our efforts, and believe in our work, but have with enthusiasm offered their services, and are aiding us in every way in their power.

Are you in favor of giving a lien upon real property for material on the same terms as is now had for labor?

If you have given the matter the attention which the subject demands, we are quite sure you will agree with us that in all fairness such a law should be put upon our statute book.

The alteration in the lien law such as desired would enable the dealers in building materials to file a lien against the owner of a building in which material has been incorporated, without definite notice to the owner of intention to do so. Under the present law it is necessary for the dealer to notify the owner before a lien can be filed against him, and it is the removal of the requirement of notice that the dealers desire to secure. As will be observed, the letter states that replies have been received from hundreds of representative houses of the State, but it says nothing as to the opinion of the building public or the contractors on the subject, and the closing paragraph seems somewhat contradictory in the light of the fact that it would seem "in all fairness" that the owner should at least be entitled to a notice of lien upon material in his building, which he supposes has been paid for by the contractor. As the law stands already, the dealer has the power of lien, and it seems only just that exercise of this power and legal protection, which is granted to no other trade, should be protected by a notice to the owner that the dealer intends to collect from him an account which belongs to another to pay. It would seem that the legislation desired was unfair, for in the nature of the case only one side is represented in the movement.

Buffalo, N. Y.

At the time of going to press it is rumored that a strike in the building trades of Buffalo is impending which may involve all branches. The union plasters have been on a strike for over two months. They demand $3.50 a day and were offered $3.25, but refused to accept and are still holding off. The strikers are backed up by the Building Trades Council, which is composed of 22 unions connected with the building trades. There is no certainty that the strike will occur, and at present the employers do not seem to be much alarmed at the prospect. Two hundred and fifty union stone cutters are on strike for weekly payment of wages. The employers have been paying fortnightly and refused to make a change. Nineteen out of the 20 yards are closed up. The men are well organized and prepared for a long siege. The Builders' Association Exchange is in excellent condition and the unity of the members demonstrates daily the wisdom of establishing a home for its members.

Indianapolis, Ind.

The lathers of Indianapolis are on a strike for an increase in wages, but otherwise the building trades seem to be without disturbance. The members of the Builders' Exchange are nearly all busy, and it is now expected that the present activity in the building trades will continue throughout the season. The exchange is in excellent condition, both as to finances and membership, and the endeavor is being made to establish the custom of daily meetings during 'change hour for the transaction of business.

Lowell, Mass.

The strike of bricklayers in Lowell still continues, with but little prospect of early settlement. About a month ago the contractors offered to take all striking workmen back and pay them their demand for all first-class workmen, which is 42 cents per hour, and 40 cents an hour for others. This offer was refused by the workmen, who stick to their demand for 42 cents for all union workmen. The bricklayers have been receiving assistance from the International Union, and have lately been paying the men on strike $12 per week; this will be continued so long as the strike lasts. Five hundred dollars has been received from the Masons' Union of Brockton. The present prospect is that the building business of Lowell will be seriously injured by the strike, for the employers are well organized and are distinctly opposed to granting a level price of 42 cents to all handlers of the trowel. The offer of the master builders which was mentioned above is the last action they have taken, and they consider that they have done their duty, and are making efforts to import non-union workmen from other cities. The employers are more or less successful in this effort, although the workmen are using every means in their power to prevent these men from working. The Bricklayers' Union of Boston is interesting itself in this strike, and is endeavoring to prevent Boston bricklayers from going to Lowell. There have been several temporary compromises made by contractors who had time jobs on hand, but there is apparently no tendency upon the part of the employing bricklayers, as a whole, to yield. The Master Builders' Exchange is in excellent condition, and the members of the other trades are in full sympathy with the masons, and will give them all the assistance in their power in their effort to overcome the strike.

Louisville, Ky.

The Louisville hod carriers have been making trouble in the building trades, and it is stated that they have been intimidating non-union workmen to such an extent that the Mayor has been asked to afford them police protection. Several instances of violence have been reported. The employers are very firm in their position against the hod carriers, and it is stated that under no circumstances will they yield to their demand. Aside from this disturbance, all is quiet in the building trades, and from present indications it appears that there is little likelihood of the other branches of the trade becoming involved.

Milwaukee, Wis.

The new building erected by the Builders and Traders' Exchange of Milwaukee was dedicated on May 20, and, in addition to an extended comment upon the event which appeared in the June issue, the following programme of the dedicatorial exercises is given. The dedication began at 2 o'clock in the afternoon with prayer by the Rev. J. Foley. J. J. Quinn followed with the opening address, and J. C. Bartholf, secretary of the Real Estate Board, spoke about "Milwaukee and Her Progress." Other addresses were delivered by ex-Presidents Thomas Mason, L. J. Mueller and C. F. Kindt. The evening's exercises, at 8 o'clock, were held in the banquet hall on the top floor of the building. A prayer was offered by the Rev. Judson Titsworth before the banquet. Thomas R. Bentley, president of the Builders and Traders' Exchange, presided, and in his address gave a review of the work accomplished by the exchange. Toasts were responded to as follows: "City of Milwaukee," Ald. H. F. Fehr; "Our State," Gov. Peck; "Our Country," John Johnson; "Architecture," George B. Terry; "The Builder," C. W. Gindele; "The National Builders' Association," M. B. Madden of the Chicago Builders and Traders' Exchange. Many builders from abroad were present, and the event was the most auspicious that has occurred in the history of the Milwaukee builders. This exchange was organized in 1887, and the progress it has made offers an example that could be followed with profit by any organization in the country. All its action has been liberal and progressive and the result of its existence is distinctly visible in the improved condition of the building trades of the city.

NEW EXCHANGE BUILDING.

The new home of the Builders and Traders' Exchange is a model of convenience. It has been erected at a cost of $100,000, and stands on the northeast corner of Grand avenue and Fifth street. It has a frontage of 50 feet on the former and runs back 103 feet on the latter. The building is six stories high, with a basement. The basement, first and a part of the second story are of buff Bedford limestone, and from this point to the roof the material is Milwaukee brick with terra cotta trimmings. The interior throughout, with the exception of the basement, is finished off in live oak, the latter being in pine. The first story is utilized as stores, being divided off into one large and one small salesroom. The stairway leading to the second floor is on the east side of the Grand avenue front, and in the rear are two improved swift-running elevators, leading from the basement to the floor above. The Builders and Traders' Exchange and the Builders and Traders' Association occupy the whole of the second story, which has been arranged especially for their accommodation. A large assembly room, in which the general meetings of the members are held, extends across the Grand avenue front and back along the west side 80 feet, being 45 feet wide across the front, and then narrows to accommodate the stairway, hall and elevators. In the rear of this large room are two telephone closets, each supplied with doors leading from the main room and thence into the office of the secretary, in the rear. Just west of and adjoining the secretary's office are two rooms used by contractors in figuring on contracts, and east of the main hall, in the rear of the elevators, is another figuring room, the ceiling of which is of glass, forming the base of a light court, which is in turn covered over with a large skylight. In the rear of the secretary's office and occupying the extreme northern portion of the floor is the directors' room, a large and pleasant apartment, well lighted from windows on the west and north. East of this again are a series of toilet rooms.

The third, fourth and fifth stories are fitted up with offices *en suite*, ten on each floor the largest being 24 x 15 feet, and the smallest 9 x 11 feet. All of these offices, with the exception of one of the smallest on each floor, is provided with outside light There are also conveniently located toilet closets on each floor.

The sixth story is arranged in a large hall, 32 feet wide by 99 deep. The Grand avenue front is devoted to a large and very handsomely appointed parlor, with toilet rooms adjoining, while in the rear are smoking rooms and closets. The rooms are 16 feet between floor and ceiling and are nicely suited either for lodge rooms for a secret society, or for dancing and card parties.

The basement is 9½ feet high, and has been arranged for a barber shop, with five bathrooms attached, and for a restaurant. The latter is provided with a main room 28 x 44 feet, with four smaller rooms 9 x 10 feet, and a kitchen 13 x 12 feet, toilet rooms, &c.

Two boilers are located under the sidewalk, at the north end of the building, which furnish steam for heating purposes and power for a large pump that drives the elevators under the so-called compression system, the water being forced into a tank.

Owing to the extreme thickness of the walls at the second story, occupied by the builders and traders, the large double windows are arranged to give them the appearance of bay windows, which entirely relieves the angular effect that would be apparent were they set horizontal with the wall.

The stories are different in hight, as follows: The first 15 feet in the clear; the second 13; the third and fourth each 11 feet; the fifth 12 feet, and the sixth 16 feet. The building complete cost $100,000, and is among the best arranged office structures in the city.

New York City, N. Y.

A meeting was recently held at the Building Trades Club of New York City, which will eventually prove to have been an important event in the history of the building trade of the metropolis. The project which has been under way for some time to erect a structure which shall be recognized as the home of the building interests of the city, received an impetus which will undoubtedly end in its fulfillment. The following members of the club were appointed as a committee on the establishment of a building trades exchange for New York City: A. J. Campbell, Isaac A. Hopper, Augustus Meyers, John J. Roberts, Clarence W. Gaylor, Thomas E. Byrne, Edwin Outwater, Geo. Moore Smith, Henry A. Maurer, James B. Mulry, Jacob S. Browne, Chas. A. Cowan, Warren A. Conover, John L. Hamilton, A. E. Conover, and *ex officio* President John J. Tucker, and Secretary Stephen M. Wright. The committee was authorized to consider the whole question of the corporation of the Building Trades Exchange, the selection and purchase of a site, the erection of a building and the negotiation of such loan as may seem desirable. There is no question that sufficient backing for the project can be had from different members of the club, for, undoubtedly, such a building as is contemplated would prove a profitable investment. It is proposed to invest $1,000,000 in the building. A sub-committee has been appointed, with full power to employ counsel and prepare a formal plan for incorporation. This sub-committee will determine upon the financial plan by which the scheme will be carried out. Secretary Wright states that the sub-committee is already at work, and will soon have the articles of incorporation ready for submission to the general committee. There is no question about the final success of this undertaking, for those who have the matter in hand are among the representative men in the building trades of the city. The wonderful success of the Building Trades Club has forecast the success of the Building Trades Exchange when it shall have a suitable home that will attract and centralize the active building interests of the metropolis.

The benefit of an organization like the Building Trades Club is further exemplified by the fact that it presents such an admirable opportunity for bringing builders together on a social basis in a semi business way. The importance of this organization, as well as its convenience to the builders of New York City, is shown in the fact that the following associations of employers in the building trades have established headquarters at the club, where they meet weekly, semi-monthly and monthly, according to their necessities:

Association of Blue Stone Dealers, Association of Manufacturers of Cabinet Work and Furniture, Electrical Contractors' Association, Granite Association, Iron League, Marble Industry Employers' Association, Mason Builders' Association, Master Carpenters' Association, Master Painters and Decorators' Association, Master Stair Builders' Association of New York and Brooklyn, Slate and Metal Roofers' Employing Association, Society of Architectural Iron Workers, Tile, Grate and Mantel Dealers' Association, United Building Trades, Building Material Dealers' Association.

There are but few labor disturbances in the city at present when the number of workmen employed within its limits is considered. The Plasterers' Laborers' Union has secured $2.75 a day and eight hours over $2.50 for a day of nine hours without a strike, the contractors at once agreeing to the scale. The electric wiremen are having some trouble, but an early settlement is expected. All things considered, the condition in the building trades of New York City is better than it has been at this season for a number of years.

Omaha, Neb.

The building interests of Omaha are progressing favorably, and the present year will, apparently, bear out the promise of the early season. Most of the contractors are busy. A movement is on foot to establish an organization for the purpose of forwarding the general interests of the city, which is to include all branches of business. The Builders and Traders' Exchange has combined its forces with those of the Commercial Club, with which the movement started, and is becoming permanently identified with the active interests of the city. The exchange is in excellent condition, and the members are growing to comprehend more and more the possibilities for benefit that exist in such an organization.

Philadelphia, Pa.

Early in June the Plasterers' Union demanded an increase of wages from 40 cents to 45 cents per hour. The plasterers' laborers and wheelbarrow men also demand an increase from $2.50 to $2 75 per day. There are about 400 laborers out on strike. The Master Plasterers' Association has had several meetings to consider the subject, and has refused to yield to the demands of the workmen. They have agreed to secure such help as is available at the old terms, and to employ these men upon such contracts as necessitate immediate completion. They have also determined to secure workmen from other cities if the strike continues.

Chairman Allen, for the employers, has addressed a communication to the journeymen in which he reviews the condition of the trade for the past 30 years. Among reasons given for declining to grant the increase asked for are that plasterers' wages rank higher than those of other mechanics, and that to further increase them would result in injury to employer and employee. The competition of firms outside of the plastering business is noted, and the claim made that these people employ foreigners, and so cut down prices on work. Some of the union's rules are held to be detrimental. But two apprentices are allowed. Only union men can be employed, no matter how far from the city the work is to be done, so many valuable contracts are lost every year. A mutual understanding and co-operation is asked for.

James W. Smith, corresponding secretary of the union, in reply to Mr. Allen, holds that although competition is keen and often ruinous, the employers must blame themselves, and have the powers to remedy it. Men are said to be overworked, and endurance counts for more than skill. Continuous work throughout the year is not given, and the average wages are from $11 to $12 per week for that time. "No reason exists," writes the secretary, "for such a state of affairs, and so it is reasonable to ask for an advance."

Portland, Maine.

The combined efforts of the Building Trades Council of Portland, to bring about numerous changes in the conditions which now prevail in the building trades of the city, have resulted in the adoption by the members of the exchange of the following resolutions:

It is hereby agreed between the contractors and builders of this city that,

Whereas, We believe in the right of each and every contractor to employ such men as he may consider for his best interest, and to make such trade with his men as to pay and hours of labor as they may agree upon, and,

Whereas, Certain "trades unions" have taken it upon themselves to publish a form of mutual agreement which will, if enforced, deprive us of our individual rights and independence; therefore, be it

Resolved, That we will in all building operations be governed by our own individual judgments as to the employment of men, their hours of labor and pay, that we will allow no interference with our men by these "trades unions" or their representatives; and be it further

Resolved, That in dealing with our men, we will do so individually and in no other way, in no wise recognizing the "trades unions" or any representative thereof; and be it further

Resolved, That, if any serious attempt be made to interfere with our men, or our work, we will take all available legal measures to protect our rights; and be it further

Resolved, That we will give our aid and support to each other in carrying out the principles hereinbefore set forth.

Wilmington, Del.

The union plasterers of Wilmington struck early last month for an increase in wages from $3 to $3.50 per day. The men state that they gave the contractors notice about three months ago of their intention to strike if their demands were not acceded to. The employers say that they cannot afford to grant the increase. The building business has not been up to the mark this season, and the cost of materials has also increased. It is generally agreed by all interested in and familiar with the building trade that the present is a bad time to strike, owing to the unsettled condition of the business generally, and that there is little prospect of the strikers gaining their desire. The members of the Builders' Exchange are in sympathy with the employing plasterers, and will assist them as much as may seem necessary. The exchange is in excellent condition, and is taking increased interest in the affairs of the city. The organization is one of the progressive institutions of the city, and is assisting builders into a position of influence and importance to which the extent of their calling entitles them.

Notes.

The Mechanics' Exchange of Salem, Mass., which has recently been reorganized has begun its new career in the right way, having purchased a new home for itself in one of the most desirable localities of the city.

The trades unions of Des Moines have formed a federation for the purpose of better treating with the employers who are represented by the Builders' Exchange. The relationship between the employers and workmen has been strained for some time and it is expected that this movement will bring about better conditions between the two.

About 100 hod-carriers are on a strike at Wilkesbarre, which has thrown out the bricklayers. The men were getting $1.98 per day and demanded $2.

The Carpenter Builders' Association of Chicago is slightly at odds with the Carpenters' Council. The trouble is that the new agreement entered into between the two bodies provides for the payment of 40 cents an hour for an eight-hour day and the bosses think this is more than they can pay. They allege that non-union bosses secure men at 30 cents an hour for a ten-hour day.

The strike of bricklayers and masons at Utica, N. Y., for level price of $3.50 per day of nine hours, which commenced on May 1, has been settled, the contractors agreeing to the demands of the workmen. The building laborers are promising to go on a strike for an increase in wages from 15 to 20 cents per hour. Contractors state that they cannot afford to pay the demand.

The builders of Niagara Falls have formed an association and have established their headquarters in the Gluck Block, which is centrally located and well adapted to their use. The organization is now fairly on its feet, and promises to be of benefit to the fraternity.

The builders of San José have organized a builders' exchange and elected the following officers: President, E. A. Van Dalsem; vice-president, W. P. Dougherty; secretary, F. H. Mabury; treasurer, James B. Wyatt; financial secretary, J. J. Cherrie. The following signed the roll: W. P. Dougherty, E. A. Van Dalsem, F. H. Mabury, J. J. Nikirk, Harry Pierce, J. H. Nichols, A. D. Daunes, J. P. Jarman, Frank Stock, James Wyatt, Mike Kenney, W. J. Rogers. Committees were named as follows: Membership—Nikirk, Stock and Nichols. Printing—Nikirk. The object of the organization is to unite all contractors and dealers in the building trades.

The Kansas City builders, as represented by the members of the Builders and Traders' Exchange, are taking active measures to secure better home patronage of architects and building material dealers. A resolution has been passed asking all who contemplate building to employ architects and let their contracts at home.

The Leavenworth builders have formed a Builders' Exchange under the advice of the National Association. The new exchange starts out with 38 members. The rooms will be open daily from 11 to 12, so that members may meet together for the consideration of matters of mutual interest. The officers elected are as follows: President, W. T. Yoakum; vice-president, H. W. Coldren; secretary and treasurer, Robert Yoakum; directors, John Wilcott, Joseph Cake and John Wright.

The union carpenters of Madison, Wis., have been on a strike for about two months against the employment of non-union workmen. There is little prospect of success for the carpenters, as the employers are making a firm resistance and state that they will not yield to the demands. The carpenters have decided to enter the contracting business on the co-operative plan and have determined to purchase a mill from some one of the contractors and go into business for themselves. There is apparently no prospect of this enterprise being carried out.

The contractors and builders of Oshkosh, Wis., have formed an organization under the name of the Builders and Traders' Exchange. The following officers have been elected: President, Joseph Weber; vice-president, Charles Meyer; secretary, F. E. Worden; treasurer, Henry Kitz; directors for one year, William Hoppe and Casper Fluor; two years, Anton Miller and F. Brown; three years, Leopold Frank and W. H. Bell. The object of the organization is the protection of its members. Meetings will be held semi-monthly, at which different matters will be discussed and thereby keep the members posted. The organization has been incorporated.

The Rockville, Conn., carpenters have secured a nine hour day with ten hours' pay after a short strike, the contractors universally agreeing to the change.

The builders of Waco, Texas, are at work forming an organization for their mutual protection. Preliminary meetings have been held and permanent organization was to have been formed on June 10.

The builders of Springfield, Mass., have established headquarters in the Athol block and completed their organization by electing officers for the ensuing year as follows: President, E. A. Blodgett, vice president, E. W. Shattuck; secretary and treasurer, E. L. Graves. The organization will be known as the Springfield Builders' Association. A comfortable reading room will be fitted up and a committee be appointed to find a suitable location. Meetings will be held once a week. The membership already numbers about 60, and there is every prospect of a successful future. The strike of bricklayers has still an official existence, although the employers claim that they have all the workmen they can use.

German Apartment Houses.

A very interesting account of the apartment houses in Berlin, their general construction, arrangement of rooms, facilities afforded, cost and other details is contributed to a recent issue of the *Evening Post* of this city, by one of its correspondents traveling abroad. Among other things the writer says:

For those who would keep house in Berlin, the markets are superior, rents are moderate, and appartments exceedingly attractive. I say "apartments" because apartments only are to be had, since the Germans, with the exception of a very few of the nobility and the extremely wealthy, never think of living in a whole house in a city like Berlin.

The Berlin apartment houses are built on an entirely different principle from those in New York. Since the law requires that one-third of the area of a building lot be left free as an open court, each flat has plenty of light and air. All the houses are built around one large court, and all the rooms are lighted by windows on the street or this court; thus small air shafts are unnecessary and dark rooms practically unknown. The court is usually paved or covered with concrete though sometimes a small grass plot and flower beds are found, which belong to the occupants of the first floor. Since the law forbids the erection of a house higher than the street on which it stands is wide, Berlin houses rarely have more than four stories, and in the older parts of the city, where the streets are narrow, they have only two stories and a basement. Since only a very few of the newest houses have elevators in them, this law is a wise one, for the stairs would be an insurmountable objection to the apartments were they built very high.

ARRANGEMENT OF ROOMS.

The average Berlin flat is extremely attractive and commodious in its general arrangement. The rooms are all larger and lighter, and the ceilings higher, than in the average New York apartment. There are two general plans of arrangement, the differences depending almost entirely upon whether the house has one or two entrances. The apartments that have two entrances, one on the street and a rear entrance from the court, are the most desirable. The door opens, as a rule, into a small hall, off of which open the parlors, dining room, and one bedroom. The parlors front on the street, and the dining room, with one large window on the court, forms the connecting link between the back hall and the front rooms, and is so characteristic a feature of a Berlin flat that it is called the "Berliner Zimmer," or "Berlin room." From the back hall, running parallel to the court, open the bedrooms, bathroom, and kitchen, and from this hall also lead the back stairs to the court.

In the houses with but one entrance the arrangement is decidedly inferior. The first room from the front door is the kitchen, because all supplies have to be carried up the front stairs, and the kitchen must be near the door. In order to reach the parlor, one must go through a long hall past all the bedrooms, bathroom, and kitchen, and must know exactly what is cooking for dinner. In both kinds of houses the rooms are always light and the corridors dark, unless the bedrooms have ground-glass doors, which is often the case.

CONVENIENCES.

All the houses have city water and gas in them, and the halls and court are kept clean by a porter, who lives in the basement, and who generally carries on a little business of some kind, so that all the houses, even in the purely residential part of the city, have small shops under them, while in the business streets the entire ground floor is given up to business purposes. Nearly every flat has a balcony large enough to accommodate from four to six people comfortably and connected by glass doors with one of the front rooms. The windows of the Berlin houses do not slide up and down as do ours, but open into the rooms like doors. All the newer and better houses have double windows, so arranged that the inside sashes may be removed in summer. It may be of interest to notice here that the windows and doors in Berlin do not open by means of round knobs. The German knob is an ornamental metal handle some 4 or 5 inches long, and placed at least a foot higher up on the door than our knobs are.

Each tenant has a small locked bin in the cellar in which to keep his coal and wood and a small attic room for the storage of trunks, &c. In the cellar of the houses is a washroom, used by all the tenants, who have their regular times for washing, and in the attic is a large drying room; thus all the wet clothes have to be carried from cellar to garret, for the washroom is seldom at the top of the house. There is but one pantry in a Berlin flat, and that is in the kitchen. Wardrobes must be used in all the rooms and cupboards must stand in the dining room and halls; but the rooms are all so large that no inconvenience is experienced from having such large pieces of furniture about.

CHARACTER OF THE FINISH.

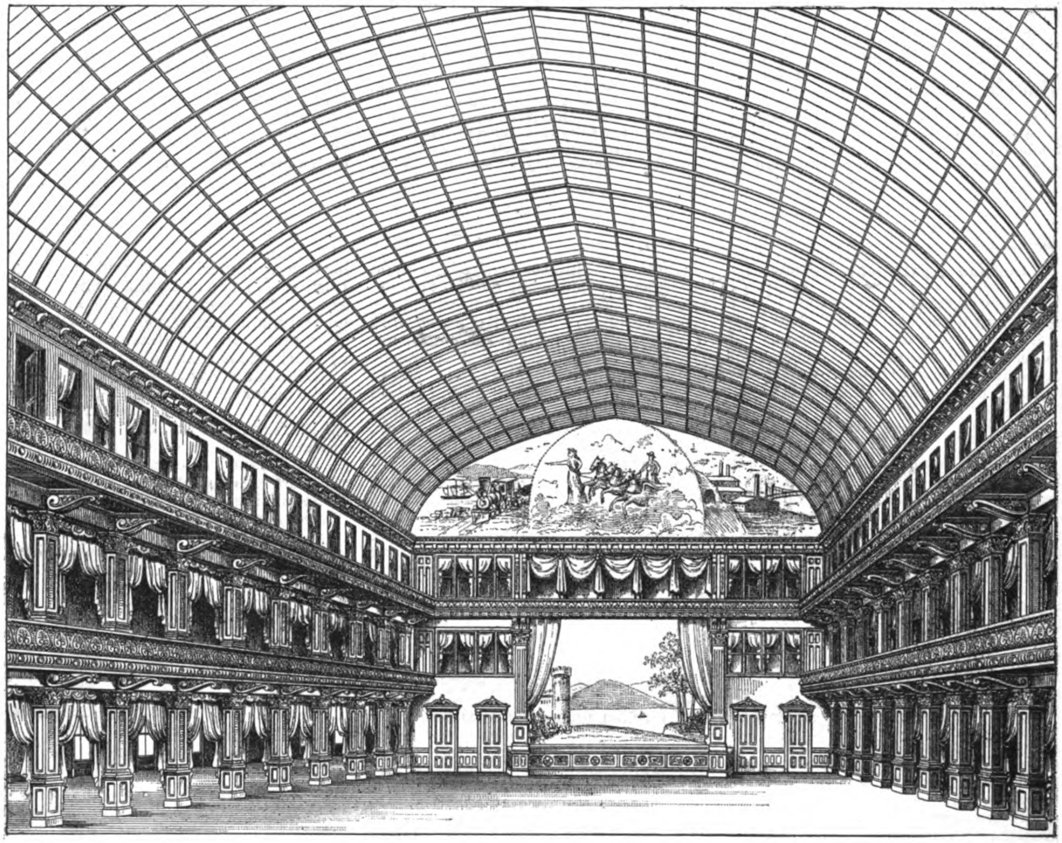
The newer Berlin apartments are handsomely finished and decorated and have beautiful inlaid hardwood floors in the parlors and dining room, stained floors in the bedrooms, and tiled floor and lower walls in the kitchen. Large rugs are used by all; one never sees carpets fitting to the room and tacked down. The walls and ceilings are tastefully papered and ornamented with fine moldings, which are tinted as a rule with very good taste.

RENTS.

Rents are extremely moderate in Berlin. For less than $40 a month one can get a flat of at least eight rooms and bath, all large, well lighted, and beautifully decorated and finished, and surpassing in every particular an apartment of the same price in New York, and this flat will be situated in the most desirable part of the city, convenient to all horse-car lines, fine markets and shops, and not on the very limits of civilization, as is often the case with New York flats which are moderate in rent. In addition to this, furniture of all kinds may be rented at very reasonable rates.

ROOF OF THE GRAND CENTRAL PALACE.

ONE OF THE MANY buildings of the Eastern metropolis in which local as well as visiting builders and contractors find much to interest them is what is known as the Grand Central Palace or the New York Industrial Building. It is located next to the Grand Central Railroad Station, from which it doubtless derives its name, and occupies the entire block bounded by Lexington avenue, Depew place and Forty-third and Forty-fourth streets, New York City. It covers an area 200 x 275 feet, and has a floor space of 310,000 square feet. The special feature of this structure which at once arrests the attention of those interested in building construction is the glass arch over the auditorium, which has a clear span of 84 feet and is 155 feet in length. The illustrations presented herewith give some idea of the extent of this roof and the methods of its construction. Fig. 1 is an interior view of the auditorium, while Fig. 2 is a sectional view through the building, illustrating the method of supporting the glass roof, which embodies a peculiar adaptation of the Hayes system of iron and glass roof. It is at the same time an arched ceiling and roof of glass, supported by seven pin-connected steel trusses, each weighing 17 tons, which rest upon the walls above the glass work and are not seen from below. Another feature to which particular attention is directed is that no shadows are cast. From these trusses are suspended 6-inch steel ribs, transversely to which are 3-inch angle iron purlins. Upon purlins are secured the immediate bearings for the glass, which are the guttered bars and horizontal frame work, so arranged that they permit the collection and discharge of all vapor or moisture which may condense upon the under side of the glass. The arrangement involves an intricate application of the system, and embodies special features not before employed in glass-roof construction. The supporting trusses perform the dual function of sustaining the roof-ceiling, as described, and also of supporting the floor to the summer garden, which is to form one of the most attractive features of the building. The arrangement as embodied in this building was conceived by L. R. Mestaniz, a member of the Industrial Association. The structural iron work was carried out by Charles O. Brown, civil engineer of the Riverside Bridge & Iron Works, Paterson, N. J., and the superstructure of glass by George Hayes, of New York City.



Roof of the Grand Central Palace.—Fig. 1.—Interior View of Auditorium.

Treatment of Floors.

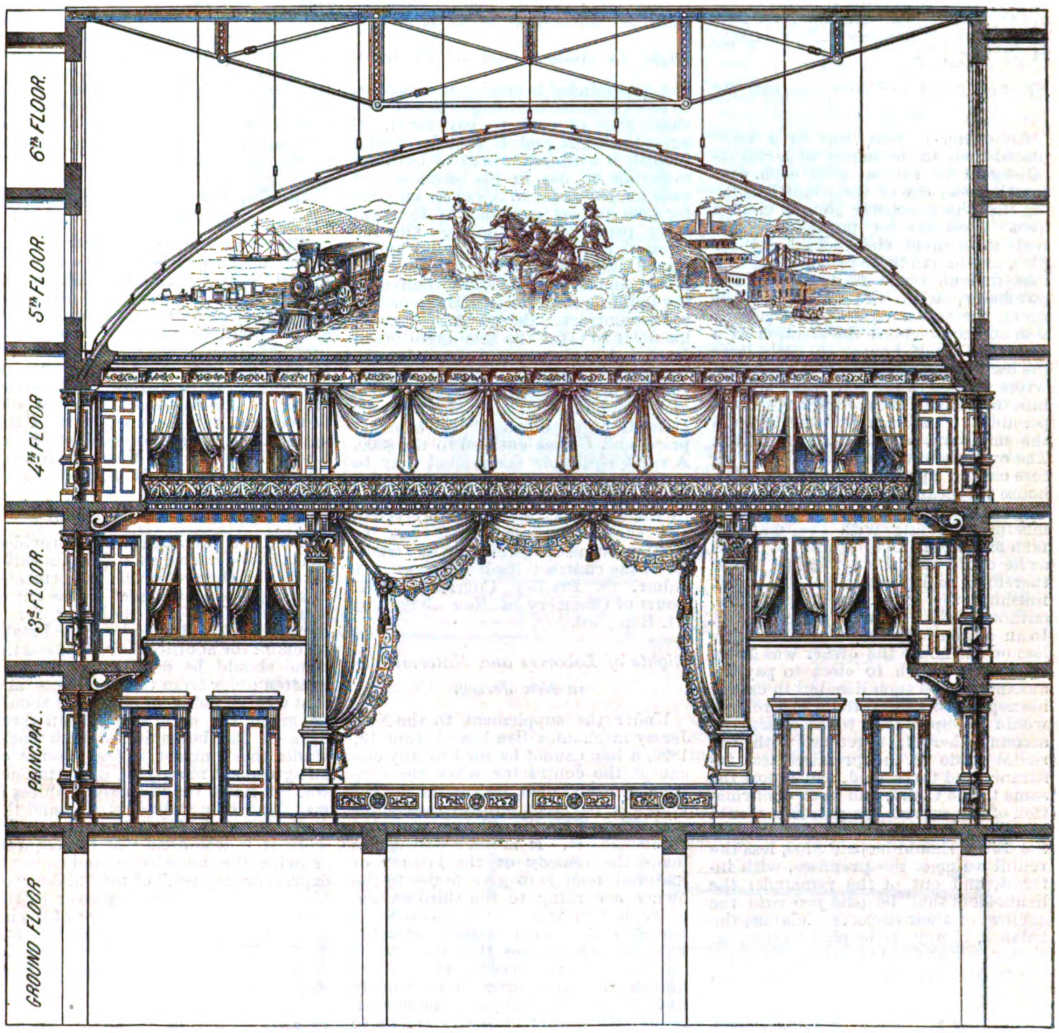
For the benefit of those who may be interested, a compilation of some suggestions on floor staining and painting from the *Queen* is timely and may be of value:

The first thing to be done is the smoothing down of roughness with a plane or chisel, and the stopping of too wide cracks with a paste made of plaster of paris and water in which glue has been dissolved. This is preferable to putty for several reasons. Mix a litle at a time, and keep it warm to prevent it from setting too soon after mixing.

Where the floor is quite smooth the stain must be applied with as large a brush as can conveniently be handled, taking care to lay it on evenly and without smearing the wainscot boards. A good way to prevent this is to hold a piece of pasteboard or tin against the wainscot and work with the brush close up to this.

The stain is made as follows: Vandyke brown mixed into a paste with water, and thinned down with a strong solution of alkali. Washing soda is as good as anything for this, though some prefer potash or ammonia. The fumes of the latter, however, are unpleasant to inhale, and it is dangerous stuff. If ammonia be used, the stain can be applied with a sponge or soft cloth which is free from fluff.

After the stain is quite dry, the stained portion must be sized. The size should be fairly hot, or it will set or congeal on the floor instead of soaking in; but it must not be too hot, or else the grain in the boards will rise up in small but unsightly little ridges. These ridges, if not too deep, can be removed by the use of fine glass paper. Finally, when the size has completely dried, the floor must be either waxed—*i.e.*, polished with the familiar beeswax and turpentine—or varnished. The better the quality of the varnish used the longer it will last. Two coats of hard oak or copal varnish will give a fine and a durable surface.



Roof of the Grand Central Palace.—Fig. 2.—Sectional View through Building.

Other processes are ebonizing, painting and papering. Ebonizing floors can be very easily done by boiling logwood chips in water (say one pound of chips to one quart of water) till the liquid is well colored. Apply this to the floor evenly and carefully, giving a second application if the boards are very close textured. When this is quite dry, apply in a similar way a strong solution of sulphate of iron in water. A good chemical ink-like black will be the result, which, after sizing, may be varnished like any other stain, or preferably it may be polished with beeswax and turpentine. The duller surface so given is better, artistically speaking, than the glaring, shining surface given by a varnish—at any rate where a black stain is used.

Plain painting is a process that requires to be very well done, if it is to look well, and takes longer than staining. The floor must have a preliminary coat, called priming. This, when dry, must have any roughness removed, and must then be painted with the required color. Two coats of paint had better be given (though occasionally one may be found enough), to be followed by one or two thin coats of good hard-drying varnish. It is, of course, somewhat easier to get variety in color with paint than with stain, and painting or ebonizing is to be preferred where the flooring boards are very much discolored and soiled. A very dark room would be considerably lightened and enlivened by painting the floor with a color suited to the general scheme of decoration.

Where the high gloss of a varnished surface is considered an objection the floor, after being stained, may be polished with beeswax and turpentine. It takes some hard work and plenty of elbow grease to get anything like a good surface on the floor, and most domestic polishers are satisfied with what they are pleased to call an egg-shell polish—in other words, very little polish at all.

Instead of wax polishing, the comparatively old-fashioned method of oil polishing may be adopted. Linseed oil—raw or boiled—is rubbed into the floor with a rubber, and the more rubbing the better for the look of the floor when finished.

A Monster Girder.

The largest girder ever shipped in one piece is now being put in place in the new Broad street station, says a recent issue of one of the Philadelphia papers. It is 58 feet 1 inch long, 10 feet 6 inches in hight, and rests on a plate 2 feet 6 inches broad. The Philadelphia Bridge Company, its makers, claim that this giant, weighing 110,780 pounds, is the heaviest and largest steel girder ever turned out complete by an iron works in the United States. The girder is placed across Fifteenth street on the south side of the great station, and is designed to support the weight of the seven stories of brick of the office building on the Market street front.

The girder was rolled into Broad street on two flat cars of 100,000 pounds capacity each last Thursday. Its journey from Pottstown, where the works of the company are situated, was uneventful, although the train attracted much attention along the line. Immediately on its arrival it was run in on the temporary track alongside its destined position, and on Friday the work of putting it into place began. Since then the men have been moving it into position by hydraulic jacks, but only yesterday was it raised on its own base above the exact position it is to occupy. Unless some accident happens it is expected to be in place by Saturday.

The girder was so large that it could not be constructed within the works at Pottstown, and the entire work of erection was carried on in a field alongside the iron shops. It took about two weeks to put it together after the steel plates of which it is built were made. It has three webs running through its entire length. When in place over Fifteenth street it will have a clear span of 56 feet, and will be 37 feet above the sidewalk.

LAW IN THE BUILDING TRADES

Purchasers Cannot Enforce Curb-Line Covenant.

A purchaser of a lot whose deed contains a covenant against the erection of any building within a certain distance of the curb line cannot maintain an action against a subsequent purchaser of an adjacent lot from his grantor for violation of a like covenant, when there was no such covenant between the two purchasers; and their grantor, although he required similar covenants from all purchasers, did not covenant with the first that he would exact them from the first subsequent purchasers.—Mulligan *vs.* Jordan, Court of Chancery of New Jersey, 24 At. Rep., 545.

Effect of Building Under Contract for Sale of Land.

An owner of four lots in a body placed them in the hands of a real estate agent for sale at $600 each, one-fourth cash; one of the conditions being that the purchaser should erect a house upon the lot purchased. The real estate agent then sold a lot for $600, one-fourth to be paid as soon as a loan thereon could be effected. The purchaser, with the assent of the agent, thereupon entered into possession and commenced the erection of a story-and-a half house. A little later the owner was advised of the sale and wrote a letter to the purchaser urging him to complete the contract as soon as possible. This letter was sent through the mail and returned to the writer. The owner waited several months before calling upon the purchaser. The house was nearly completed. The purchaser then informed the owner of a misunderstanding with the material man and others and he did not know as he could use the lot. The owner thereupon took possession of the house, finishing the same, erecting fences, outhouses, &c., at an expense of $100. In an action to foreclose a mechanic's lien on the house the owner was given 30 days in which to elect to pay the amount due on such lien, but in case of his neglect or refusal to do so a referee would be appointed to ascertain the amount thereof, together with the rental value of the premises, less insurance and taxes paid, and report the same to the Court, and upon confirmation of the report the premises would be ordered sold and out of the proceeds the owner should be paid $700, less the rental value of the premises, with interest, and out of the remainder the lienholders shall be paid *pro rata* the amount of their respective claims, the balance, if any, to be paid to the purchaser.—Irish *vs.* O'Hanlon, Supreme Court of Nebraska, 52 N. W. Rep., 695.

Kind of Possession of Land that Gives Title.

The essential use and occupation by one claiming adversely must be of such unequivocal character as will reasonably indicate to the true owner visiting the premises during the statute period of limitation, commonly 20 years, that, instead of suggesting the probable invasion of a mere occasional trespasser, they unmistakably show an exclusive appropriation and ownership.—Roberts *vs.* Richards, Supreme Judicial Court of Maine, 24 At. Rep., 425.

Lumber Furnished for Several Buildings Under One Contract.

Where lumber was furnished to the owner of a lot for the erection of three separate houses thereon, which were built at the same time, and, when partly finished, were mortgaged separately, and all the lumber was furnished under one contract and no separate account was kept of how much went into the building of each house, under a Connecticut statute, giving the right to a mechanic's lien on every building in the construction of which, or of any of its appurtenances, the claim arose though the person furnishing the lumber, he was entitled to a lien on each house for what lumber went into its construction, but he could not have one lien on all the houses for lumber used in the construction of them all.—Wilcox *vs.* Woodruff, Supreme Court of Connecticut, 24 At. Rep., 521.

Right to Assign Part of Contract.

A was minded to employ B, a builder, to erect a house to cost $5800, but was short $800 of cash to pay for it. C agreed with A and B that he would furnish B with $800 worth of building materials to use in his business and take his pay for it in A's notes on time for $800 as part payment of the contract price of A's house. On the strength of that arrangement A and B signed the contract for building the house, and B built it, and C delivered the building materials to B according to his contract. Before A had given his notes to C for the $800 creditors of B served notices upon A under the mechanics' lien law of New Jersey. But the arrangement between A and B and C amounted to an assignment by B to C of so much of the contract price, and C was entitled to the $800. A valid equitable assignment may be made of a portion of the contract price of a building contracted to be erected by the assignor, but not yet erected, and such assignment need not be written nor accompanied by any transfer of the contract itself.—Laingman's Admr. *vs.* Bradley, Currier & Co., Court of Chancery of New Jersey, 24 At. Rep., 505.

Rights of Laborers and Material Men in New Jersey.

Under the supplement to the New Jersey mechanics' lien law of June 19, 1890, a lien cannot be filed by any one except the contractor, when the contract is duly filed, unless the owner makes a payment to the contractor without taking the releases provided for in said act. If no such payment is made the remedy of the laborer or material man is to give notice to the owner according to the third section of such lien law. If a payment is made by the owner to the contractor without such releases, then the laborer or material man may file and enforce his lien without resorting to his remedy under the third section. The burden is on the laborer or material man to show that payment has been made by the owner to the contractor, and then the owner, to bar the lien, must show that he has taken the releases.—Anderson Lumber Company *vs.* Friedlander, Court of Errors and Appeals of New Jersey, 24 At. Rep., 434.

Effect of Changes in Building on Bond for Performance of Contract.

In an action upon the bond of a contractor given for the faithful performance of a contract, for the construction of a building where the contract contained a clause by which the owner retained the right to alter or modify the design, and to add or diminish from the contract price, and the owner and the architect were at liberty to make any alterations in the plan, form, construction or detail described in the drawings and specifications without making void the contract, and it is found by the referee trying the case that a change was made in the plan of the building by moving the wall out 2 inches, and the specifications were changed by substituting walnut, cherry and poplar instead of pine in certain portions of the building, these changes and modifications were provided in the contract, and the bondsmen were not released by reason of such changes, and when it is found that the original specifications exhibited to the bondsmen, with numerous alterations noted therein, were taken by the architect to be copied, and it does not appear that the additions made upon the copy are material, and the original is inadvertently destroyed in the architect's office, the destruction of the original specifications will not avoid the contract or release the bondsmen.—McLennan *vs.* Willington, Supreme Court of Kansas, 30 Pac. Rep., 183.

Notice Requisite for Mechanics' Lien in Indiana.

Where in Indiana a contract was made, and materials for it were furnished to the contractor part before the notice to the owner, and part after such notice, under Elliott's Supplement, section 1692, providing that a person furnishing materials for a contractor, to acquire a lien, must give notice to the owner at or before the time the materials are furnished, a lien would be acquired only for such part of the materials as were furnished after notice.—Hubbard *vs.* Moore, Supreme Court of Indiana, 31 N. E. Rep., 534.

Extras Under Contract.

A written building contract provided that the contractor should, to the satisfaction of the architects, perform and finish "all work included in the entire completion" of the building for a named sum, and that he should make no claim for additional work unless the same should be done pursuant to a written order from the architects, and that written notice of all claims should be given the architects within three days of the beginning of such work. Under this contract, in the absence of an agreement modifying it, the builder was not liable for extra work unless it was done on a written order; and the contractor could recover for extra work if it was done "at the request, or with the knowledge and consent, express or implied," of the builder "or his agent," without a waiver by the builder of a written order, or of his independent promise to pay for the work.—Wortman *vs.* Kleinschmidt, Supreme Court of Montana, 30 Pac. Rep., 280.

Damage From Dropping of Mortar.

Where a person sustains damage by the dropping of mortar and bricks during the erection of a wall next to the premises occupied by her, the party for whom the wall was being erected is not liable for such damage, but the contractor would be, if any one, if it was not a necessary result of the building of the wall, but was caused by the negligence of the contractor or of his servants. The injury caused by dust arising from the dumping of loads of brick near a person's residence might be so trifling as not to be actionable, or there might be evidence of such excessive and long-continued annoyance therefrom as to warrant the submission of the question of damage caused thereby to the jury.—Pye *vs.* Faxon, Supreme Judicial Court of Massachusetts, 31 N. E. Rep., 640.

THIRD-PRIZE DESIGN IN TWENTY-FIRST COMPETITION.

WE DEVOTE a portion of the space at our command this month to the presentation of the design receiving the third prize in the competition for $1000 houses. In submitting the drawings the author calls attention to the fact that all the rooms can be entered directly from the hall with little waste of space; that closets of ample size are provided both on the first and second floors; that the parlor and dining rooms are so situated, one to the other, as to be easily warmed, and that the kitchen, sink, pantry, &c., are conveniently located with regard to the dining room. Another feature to which reference is made is the regularity of the plan of the house, which renders it easy of construction, while permitting of an attractive exterior. The author also states that a solid wall is laid under the rear porch, so that it may be temporarily inclosed by sash in winter, or permanently protected, as may be desired. The floor plans clearly indicate the arrangement of the rooms on the two floors, and the elevations and details presented on the pages which follow give an idea of the appearance of the house and its construction.

SPECIFICATION.

From the specification furnished by architect Thomas E. Jennings, Brasher Falls, N. Y., who is the author of the design, we take the following as being likely to prove interesting in this connection.

MASONRY.

Excavation. — Excavate to proper depth for a cellar 6 feet 6 inches, so that the wall will show 2 feet above grade. Excavate for porch piers and rear walls so that stone work will start 3 feet below grade. The excavations to extend 6 inches outside of exterior line of building.

Stone Work.—Lay large flat stones at bottom of all walls, said footing course to extend 6 inches beyond outside line of finished walls. All walls 1 foot 6 inches thick of good flat building stone, well laid in good lime mortar.

Porch piers well laid with flat stones to grade. Lay good stone footing for cellar piers and chimney

Brick Work.—All bricks to be hard and well burned, laid in good brick mortar.

Chimney.—Chimney to be built according to plans. Outside walls 4 inches thick, partitions 2 inches. All spaces between bricks must be well filled with mortar. Select best brick for outside work.

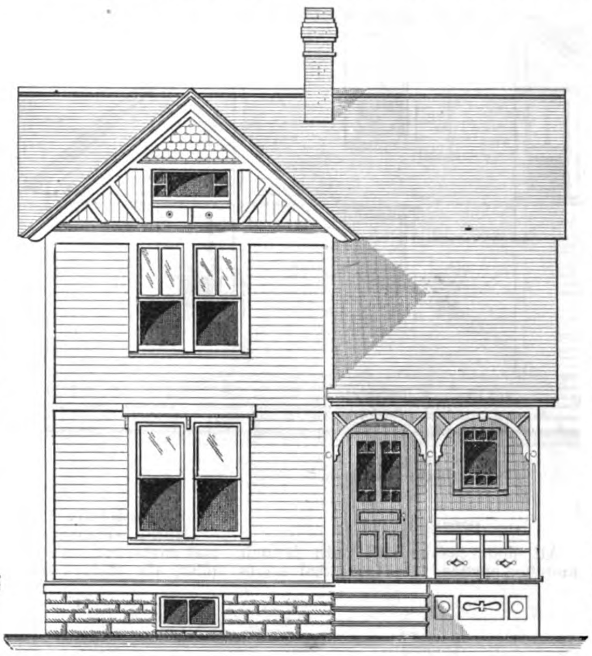
Cellar Piers.—Build cellar piers 12 x 12 inches and cap with flat stone, size of pier.

PLASTERING.

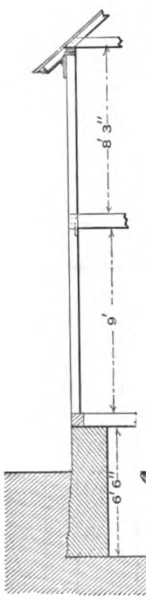
All walls, partitions and ceilings of first and second story to be well lathed with spruce lath and plastered two coats with good plastering mortar made at least ten days before putting on. Second coat to be what is known as sand finish, well troweled.

CARPENTRY.

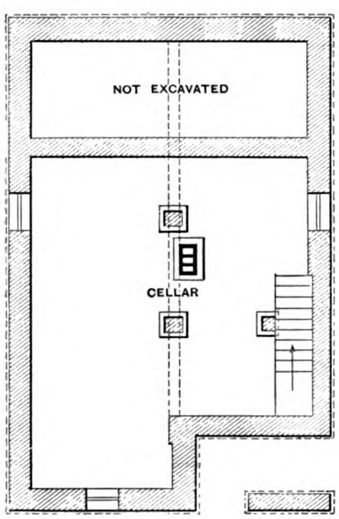
Timber for frame to be of spruce or hemlock, free from bad knots or other defects to impair its durability or strength. Studs, floor joists and ceiling joists set 16 inches to centers, raft-



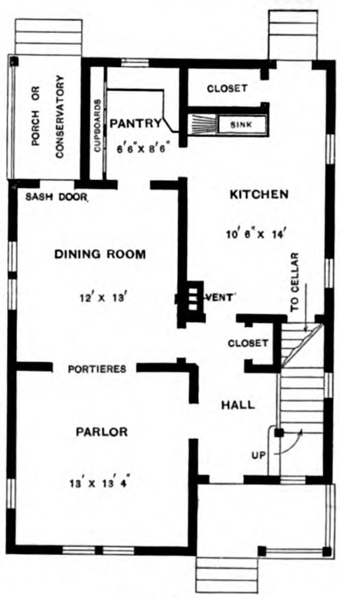
Front Elevation.—Scale, ⅛ Inch to the Foot.



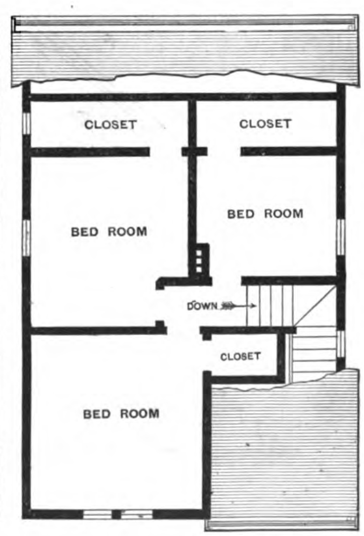
Section.



Foundation.



First Floor.



Second Floor

Scale, 1-16 Inch to the Foot.

Third-Prize Design in Twenty-first Competition.—Thomas E. Jennings, Architect, Brasher Falls, N. Y.

ers 2 feet to centers. Studs, 2 x 4 inches; floor joists, 2 x 8 inches; ceiling joists, second floor, 2 x 6 inches; rafters, 2 x 4 inches; sills, 6 x 8 inches; girders, 8 x 8 inches.

Frame to be of balloon construction, well joined and spiked together. Walls plumb and straight, studs doubled at all openings, all joists bearing partitions to be doubled.

Outside of frame to be covered with ⅞-inch hemlock boards well nailed to all the studs.

EXTERIOR FINISH.

Cornice, window frames, porches, &c., to be made according to drawings of sound, dry pine. All outside walls must be covered with good building paper to extend under casings, corner boards, &c.

Clapboards.—No. 1 spruce 5 inches wide laid 3 inches to the weather. Gables finished according to elevations and details.

Roof.—Cover rafters with hemlock boards closely laid and well nailed.

Shingles to be best cedar laid not more than 5 inches to the weather.

INTERIOR WORK.

All floors to be laid with ⅞-inch matched spruce, free from bad knots and shakes. Flooring must be well seasoned. Line first floor.

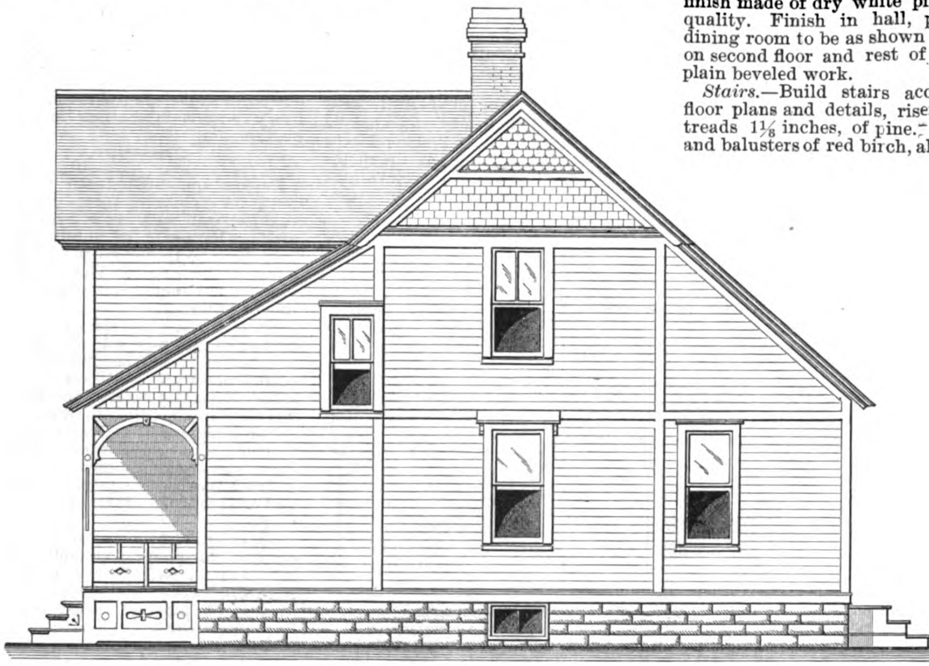
Partitions.—Set partitions according to floor plans with 2 x 4 inch studs, 16 inches to centers. Studs doubled at all openings.

All openings to have grounds for receiving plastering.

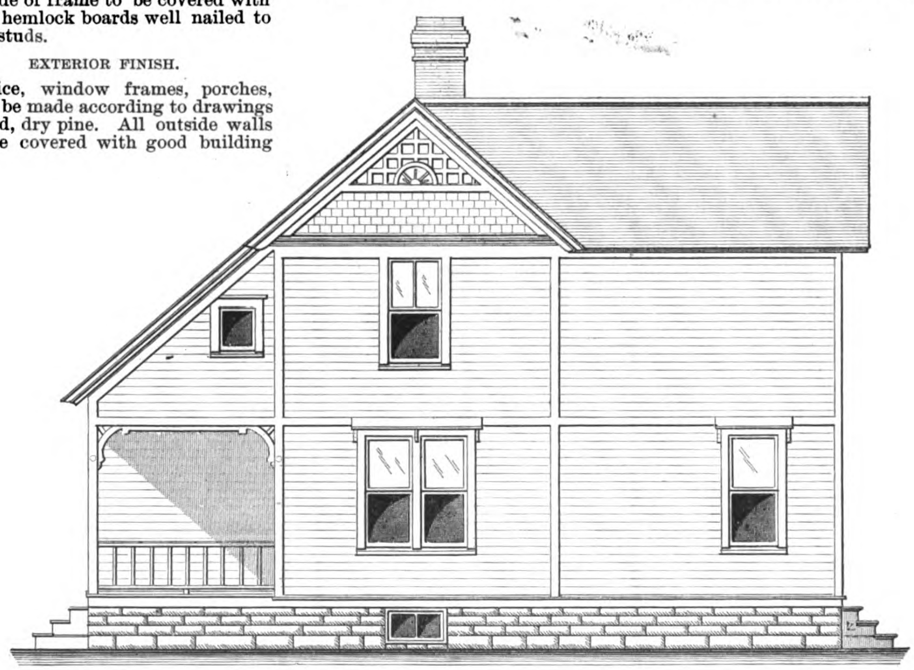
Interior finish to be put on after plastering is thoroughly dry. Interior finish made of dry white pine of good quality. Finish in hall, parlor and dining room to be as shown in details; on second floor and rest of first floor plain beveled work.

Stairs.—Build stairs according to floor plans and details, risers ⅞ inch, treads 1⅛ inches, of pine. Rail, post and balusters of red birch, all made according to details. Cellar stairs of pine.

Pantry.—Finish pantry with shelves and cupboards as shown in first-floor plan, six shelves on a side. Under broad shelf place three tip-forward bins; cupboards finished with doors made of matched pine ⅞ inch thick. Glass to be double-thick American A

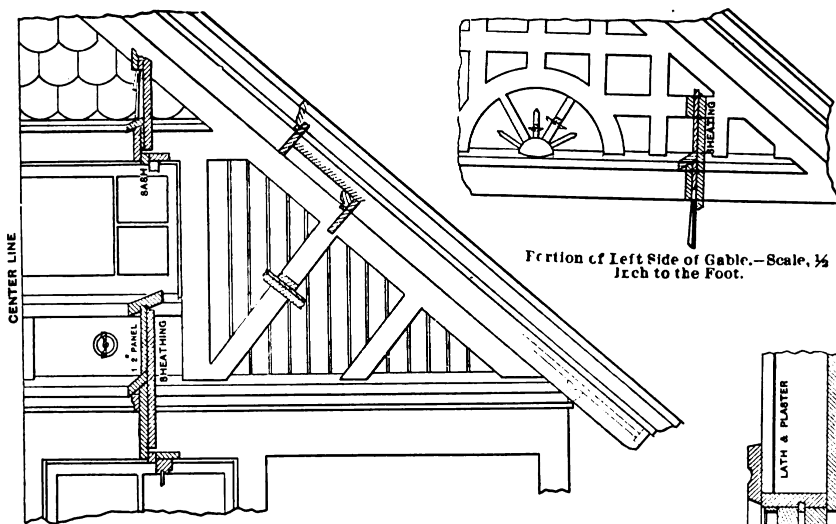


Side (Right) Elevation.



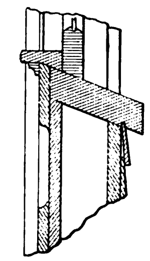
Side (Left) Elevation.

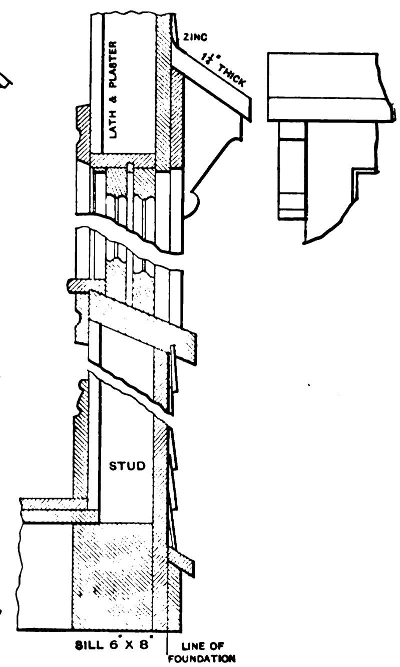
Third-Prize Design in Twenty-first Competition.—Elevations.—Scale, ⅛ Inch to the Foot.



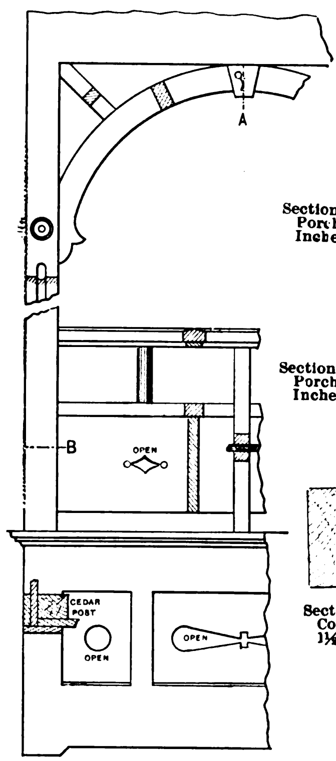
Details of Front Gable.—Scale, ¼ Inch to the Foot

Portion of Left Side of Gable.—Scale, ½ Inch to the Foot.

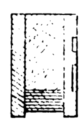

Section through Sill of Parlor Window.—Scale, 1 Inch to the Foot.

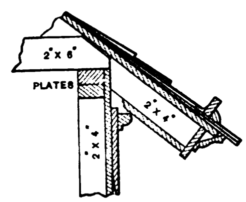


Section Showing Details of Water Table and Window Cap and Sill.—Scale, 1 Inch to the Foot.



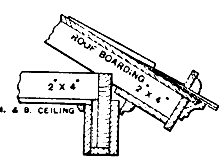
Details of Front Porch.—Scale, ½ Inch to the Foot.


Section at A of Front Porch.—Scale, 1½ Inches to the Foot.

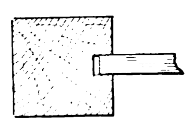


Main Cornice.—Scale, ½ Inch to the Foot.


Section of Rosette in Porch.—Scale, 1½ Inches to the Foot.

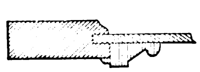


Porch Cornice.—Scale, ½ Inch to the Foot.

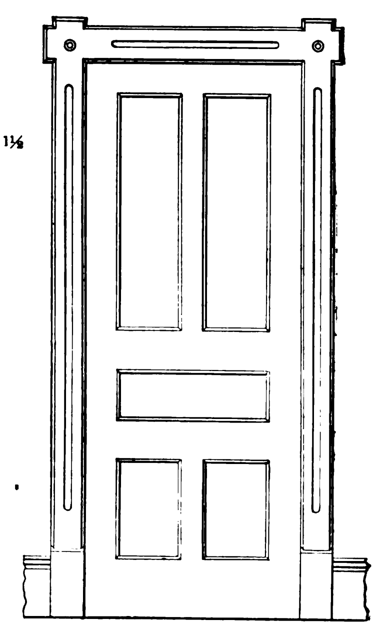

Section through Porch Column at B.—Scale, 1½ Inches to the Foot.


Section of Trim.—Scale, 1½ Inches to the Foot.


Section of Inside Doors.—Scale, 1½ Inches to the Foot.


Section of Front Doors.—Scale, 1½ Inches to the Foot.


Section through Base Board.—Scale, 1½ Inches to the Foot.


Inside Door.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Third-Prize Design in Twenty-first Competition.

glass. Large windows hung with sash balance.

Doors.—All doors to be No. 1 white pine doors. Front door made as shown in elevation and detail 1¾ thick. Other first-floor doors 2 feet 8 inches by 6 feet 10 inches, 1⅜ thick. Second-floor doors and closet doors 2 feet 6 inches by 6 feet 6 inches, 1¼ thick. All doors to be hung with loose-pin japanned butts of sufficient size. Front door to have 4-inch mortise lock with night-key attachment, bronze face; also bronze knobs and trimmings. Other doors to have mortise catches with brass face and jet knobs. Principal doors to have bolts.

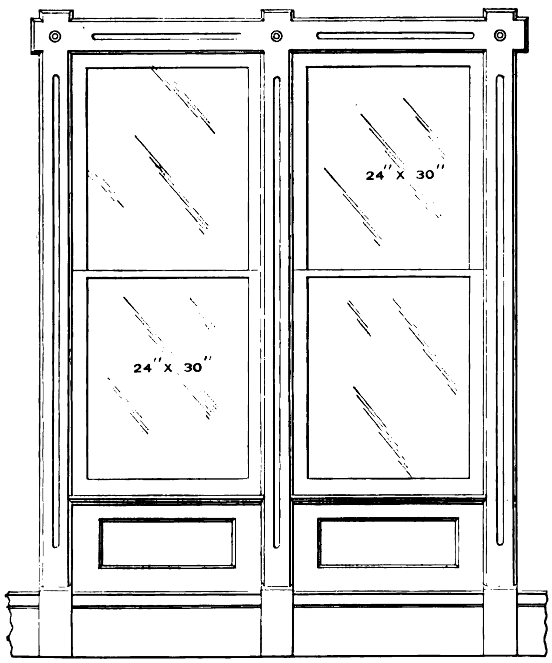
PAINTING.

Use ocher and oil for priming exterior, and putty all wood work after priming. Paint exterior in shade as directed, with best oxide of iron paint and linseed oil, two coats over priming. Shingled roof not painted. Paint interior finish in tints as directed, three coats, with best ground in oil paints.

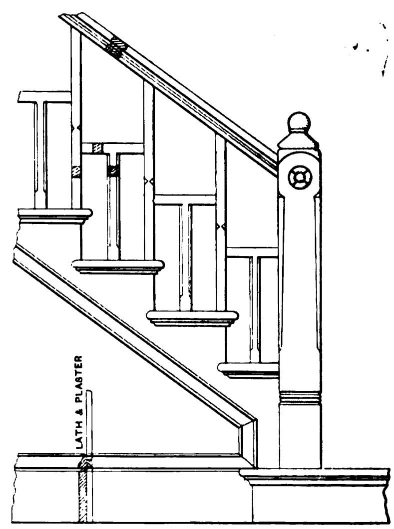
boards is much greater in green than in dry wood, and that the convex side of the curve is always toward the heart. This warping, due to unequal shrinkage, and to the more open texture of the tree, is not found to occur in the middle plank or board of the log excepting as it may, in slight degree, reduce the breadth.

Fire-Proof Construction in Buenos Ayres.

An old Scotch underwriter, in a letter to the Glasgow *Herald*, remarking the constantly occurring fires, relates his experience in going to Buenos Ayres, and says: "I was astonished to find no need for fire insurance offices there, as the whole city is fire proof, and not from using the arch or iron, but a hard wood which is brought down the river 1000 miles. The joists of this hard wood bear rails, which are placed near enough to bear long, thin bricks, on which tiles are laid in lime, with a carpet above. The roofs are constructed in the same manner, and are terrace-like. No 'boxing' of doors and windows, nor skirting nor wainscoting of wood, but plaster and stucco instead. If a bonfire made of a cartload of sticks and shavings were ignited in any room it would slowly burn through the joists, making an opening of say a yard across, and down would fall a few bricks and tiles, but there it would end; the house could not be set on fire. No burning alive of people at Buenos Ayres, now the most popular city in the Southern hemisphere—no throwing children out of the windows, nor in all the towns of Argentine and Uruguay. The world is kept poorer by the constant loss of property of all kinds by fire. If these losses were avoided all commodities would rise in value, just as they did after the discoveries of gold in California and Australia; the farmer would sell his grain and potatoes, importers their produce, manufacturers their goods and workmen their labor all at higher prices, because the world would be richer. As for the humanity side of the question, why should we build combustible houses of wood when iron, lime and plaster are so cheap? We should at least begin with infirmaries, asylums and workhouses. A few years ago the lunatic asylum at Lenzie took fire, and the plan the governor took to calm the patients was to promise a high tea, and that they were to stand in the corridors ready to assist the cooks. This was successful, and so were the efforts to extinguish the fire after doing some damage; but had the building been fire proof there would have been no alarm. The large city of Boston, United States, has lately taken up the matter of fire-proof houses. The municipality gave notice that they were going to build a house as a trial—eight of the rooms to be constructed by eight builders, each to use his own judgment to make his room fire proof, as a bonfire would be lighted in each simultaneously. It was done, and when all was dry the eight bonfires were lighted, and all the rooms stood the test intact save one, in which the plaster had fallen off the walls, as the builder had used wooden laths instead of iron strips. Can our Glasgow architects design a fire-proof house, and compare the cost with existing structures?"



Elevation of Parlor Window.



Details of Hall Stairs.

Miscellaneous Details of Third-Prize Design in Twenty-first Competition.—Scale, ⅛ Inch to the Foot.

Birch rail, post and balusters of stairs well finished in natural wood.

TINNING.

Line all gutters properly. Conductors of tin 3 inches in size. Furnish good valley tin soldered into proper lengths. Step flash chimney and turn in tin at joints of brick. Furnish all other necessary flashings.

The estimated cost of the house is placed at $997, divided as follows: Excavation, $19; mason work, $143.50; carpenter work, $643.75; plastering, $110; painting, $65.75; tinners' work, $15.

A WRITER in one of our exchanges says that the wood on the north side of a tree will not warp as much as that from the south; and that if trees are sawed in planes running east and west as the tree stood, it will warp less than if cut in the opposite direction. However this may be, it is certain that the tendency to warp when sawed into

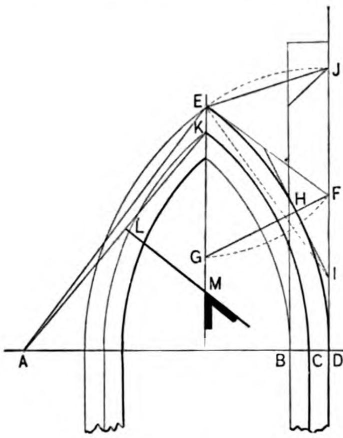
Swiss Brick.

In Switzerland there is made a glass brick, or a brown building block, formed flask shape, with a short neck at each end, and measuring 8 inches in length, 6 inches in width, and 2½ inches in depth. Running through the center is an air chamber. The edges of the brick are covered, recessed or ribbed and grooved to receive, when laid, a suitable cement of plastic material of such character that after it has hardened it will constitute a suitable frame or setting to keep the entire mass, roof or wall, solidly together. The forms or molds, says an exchange, are pleasing to the eye, the line or ridges being clear and smooth, and of sufficient thickness or strength to stand a pressure of 150 to 200 pounds to the square foot.

CORRESPONDENCE.

Framing a Gothic Window.

From H. G. K., *Philadelphia.*—In the December issue of *Carpentry and Building* "J. S. Q.," Morgantown, Ind., desires to know how to obtain the length of jamb for a Gothic window frame before bending. Referring to the sketch which I inclose, let A B

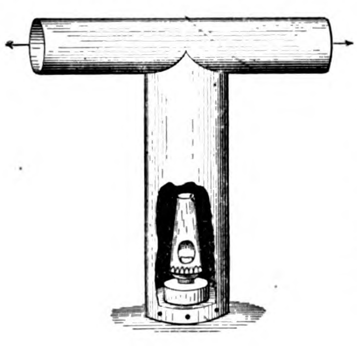


"*H. G. K's" Method of Obtaining the Length of Jamb for a Gothic Window Frame before Bending.*

C D represent the radius and B D the thickness of the jamb. From the point A draw the line A E to the crown of the arch. At right angles to A E draw E F. Now set one foot of the compasses in E, extending the other to F, and describe the arc cutting at G. Draw F G, and at right angles to F G drew H I, touching the curve at the point H. Now set one foot of the compasses at I, extending the other to E, and describe the arc cutting the point J; then J D will be the length sought. To find the bevel, draw A K, and at right angles to this line draw L M, as shown. The angle at M will be the bevel sought.

Heating a Hennery.

From COUNTRY.—In looking over the pages of an agricultural paper not long since, I saw illustrated a device for



Device for Heating a Hennery.

heating a poultry house, and as there have been a number of articles in *Carpentry and Building* on the arrangement of henneries, I send a sketch of the heater, together with a description, of such interest as it may possess.

An ordinary lamp, having a tin chimney, with a piece of mica in front of the chimney, so as to show the flame, is surrounded by an ordinary stove pipe—the larger the pipe the better—or a sheet-iron or tin pipe may be made for the purpose, a board being arranged at the bottom of the pipe, by tacking the pipe to the board, for the lamp to rest on; or, if preferred, two cross strips may be placed at the bottom in place of the board, as they will allow more air to come in. Air holes are cut all around the pipe, so as to permit of a free circulation of air. A sliding door or one to raise and lower may be arranged for placing the lamp in the pipe or for taking it out for filling, or the bottom strips may be arranged for that purpose. No solder is used. All the parts should be riveted. At the top is a cross piece, also made of iron or tin, the arrows indicating the direction of the heat.

The heater may be hung up by wire, which is attached to a hook on top, from the roof, but within 3 feet of the floor to prevent interference or contact by the fowls. If preferred the heater may rest on the floor, but should then be enveloped in a wire cage to protect it from the hens. Any kind of lamp or small coal oil stove may be used, but the chimney should be of tin—riveted, not soldered. It is best to have the whole heater made by a tinner of tin or sheet iron, and about 10 inches in diameter and 20 inches high, the cross piece being also 20 inches long, but stove pipe may be used over a small lamp. In place of the cross piece a tin plate may rest on wire pegs, raised 3 inches over the top of the pipe to allow of free draft. By this arrangement the heat is distributed in both directions from the center of the

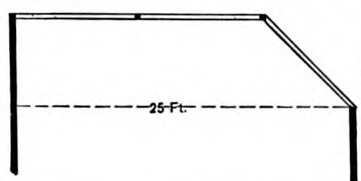


Diagram Submitted by "O. L. W."

poultry house. It is only necessary to keep out frost; hence 40° or 50° above zero is warmth enough, and the house will also be kept dry. There will be no injury from foul air or carbonic acid gas, as plenty of air will always find its way in. This should be used only on cold nights.

An Interesting Problem.

From O. L. W., *Dallas, Texas*—I send a sketch of a building which is 25 feet wide, and it is desired to have three openings of equal width. Two of these are to be directly in the front, while the third is at the corner, making equal angles with the front and side. What I desire is the exact width of each opening and the method of solving the problem. An exact answer is required. The sketch which I send will illustrate my meaning.

Carpenters' Apron.

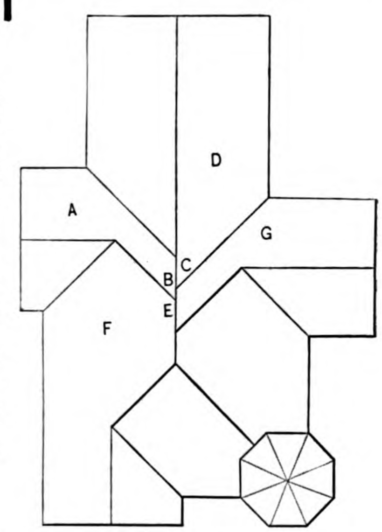
From E. G. W., *Elgin, Ill.*—I send a sketch of a carpenters' apron which I desire to submit to the readers of the Correspondence department. On the right side of the two large pockets is attached a hammer belt, while on the left is a rule pocket. The shoulder straps are not fastened together where they cross at the back, as one might infer from a hasty inspection of the drawing. A back band, attached at the lower end of the shoulder straps, passes around, buttoning on the right side. The apron is made of heavy drilling and is of the following dimensions: The distance from top to bottom is 22 inches. The width of the

Carpenters' Apron Recommended by "E. G. W." of Elgin, Ill.

two large pockets, including that for the rule, is 14 inches. The length of the shoulder straps is 2 feet 2 inches, and the length of the back strap 12 inches. This makes a very convenient apron, especially with the hammer strap attached, as by this means the hammer is always within convenient reach and ready for use.

Framing a Complicated Roof.

From W. B. S., *Flemington, N. J.*—Inclosed I send a sketch showing plan of a roof for a house that I am about building, the scale being $\frac{1}{16}$ inch to the foot. Referring to the drawing, I would say that if I make it a square or half



Plan of Roof Accompanying Letter from "W. B. S."

pitch roof the point B of roof A will be 3 feet higher than the point C of roof D, and the point E of roof F will be 3 feet higher than the roof G. I would like to ask the practical readers of *Carpentry and Building* what plan of construction they would suggest for such a roof.

Cistern Construction.

From C. E. S., *Tacoma, Wash.*—I would like to ask some of the practical readers of *Carpentry and Building* to give me their ideas on cistern construction and filters for the same. We have hard pan out here, and some cement on it, while others brick it and cement on the brick.

Note.—Our correspondent may find something interesting in the way of suggestions in the article published in the June issue bearing the title "Building a Cistern."

Concrete in Building Construction.

From J. S. K., *Anchorage, Ky.*—In reply to F. T. Camp, whose communication appeared in the December issue of *Carpentry and Building*, I will give him my experience in connection with the form of building construction to which reference is made. Something like two years ago I erected a two-story frame cottage, with a one-story extension at the rear, in which was located the kitchen. Beneath the latter was a cellar measuring 7 feet in hight. The kitchen was 16 x 16 feet, as indicated in Fig. 1 of the sketches. It was supported by cedar posts placed 4 feet between centers, the sills being spiked to the top of the posts, the arrangement being shown in Fig. 3. The foundation posts under the main portion of the building were set 3 feet 3½ inches to 4 feet apart, according to circumstances. These posts were set in holes 18 inches square and 3 feet deep in the ground, the base being a flat rock, as indicated in Fig. 2 of the sketches. Along under the sill and inside of the posts was a plank backing, as shown. The cellar was dug only 3 feet in the ground, the dirt being graded so as to run off the water. The cellar wall below ground was 12 inches thick from the inside planking and was 7 inches thick from the ground or grade line up to the sills. The part above ground was coated outside with pure cement ½ inch thick. The mixture was made of one part of cement and three parts of rock crusher siftings well rammed in. There was no paper employed, but I put sheeting inside, and made a smooth cellar wall, which can be kept clean, dry and rat proof. Thus far it has proven a good job. An 8-inch round tile pipe was put around 5 feet from the outer wall of the cellar, as shown in the plan view, Fig. 4. This terminated in a dry well 15 feet deep, placed as indicated. The pipe was readily accessible in case of repair, and has kept the walls and cellar floor very dry. The planking on the cellar wall was locked at the corners. Three sides of the house were exposed to the weather, the exception being the side wall next to the dining room. The cellar door, as indicated in Fig. 1, was a part of the kitchen floor, and was placed near the outside door to facilitate the unloading of material for the cellar. The kitchen was made large, and was added about a year after the main part of the house was put up.

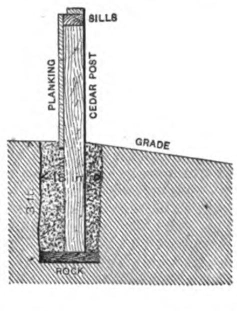


Fig. 2.—Section Through Foundation Post of Main Part of the House.

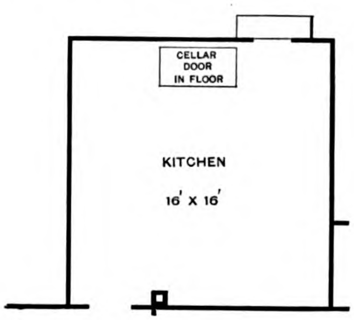


Fig. 1.—Plan of Kitchen.

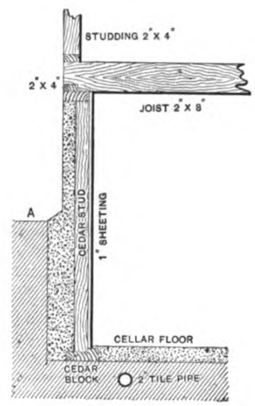


Fig. 3.—Section Through Cellar Wall and Floor.

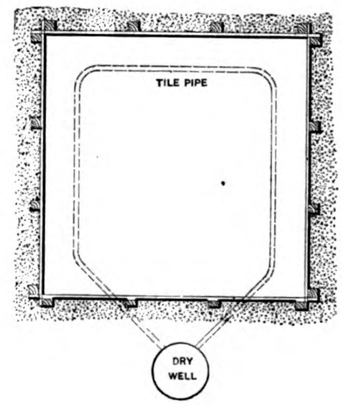


Fig. 4.—Plan of Cellar Showing Position of Drain Pipe.

Concrete in Building Construction.

Finding the Curve of a Hip or Angle Rafter.

From A. E., *Long Branch, N. J.*—In the April number of *Carpentry and Building* "P. H. L." of Denver, Col., gives his method of finding the curve of a hip or angle rafter. I profess to be ignorant in many points in carpentry, and would like to know from "P. H. L." how he gets his curve lines on the hip or angle. He says, erect perpendiculars parallel with A B and cutting the curve lines B C. I would like to ask if he has obtained the curve before he draws the perpendicular line and then traces through the perpendiculars? How does he get the curve by tracing through the lines made? I would also like to know how he gets the curve from F to D. It seems to me that the lengths of the lines are limited, for he says; "Join these points together and the result is the correct shape of either hip or valley rafter."

Cleaning Zinc.

From F. T. B., *Headingly, Manitoba.*—I notice an inquiry from "I. DeV.," Glen Cove, for a way of cleaning old zinc. Here is a recipe for the purpose: Take 5 cents' worth of muriatic acid and 1 pint of clean water. Make a solution and wash the zinc, which will appear like new. After my friend has tried his experiments I hope he will let us know the results.

Interior Finish.

From S. W., *Newark, Ohio.*—In response to "N. D. C.," Dixon, Ill., I would say his proposition in the February issue is a very unfair one. He states that he has gotten up something entirely different to anything he has ever seen in the way of interior finish for dwellings, and without giving the readers of the paper a description of it he, in the same breath, asks for any original designs that we may have, so he can finish a second residence different from the first. This circumstance reminds me of a similar one that occurred some years since. Two jobs of work were let to different contractors, A and B, both to be done by day's labor. B heard that A was paying better wages than he, and on inquiry found it to be a fact. B then asked A what percentage he charged the owner, to which A truthfully responded. But when A asked B what he paid his men and what percentage he charged the owner he was in both instances met with evasive replies. Now, I do not like that "dog in the manger" spirit. If "N. D. C." has succeeded in getting out something original in the way of interior finish, let him give the readers of *Carpentry and Building* the benefit thereof and then ask for drawings from others in that spirit. By so doing he can get up a discussion that, in my estimation, will be interesting to all builders who are so situated that instead of having their plans furnished by an architect, they are obliged to do the best they can for themselves. This city, with a population of 15,000, has no resident architect, and the result is we have less attractive looking houses than any city of a similar size in the United States, unless it be under the same conditions.

Hanging Doors with Double-Acting Blank Butts.

From J. E. S., *Mason City, Iowa.*—In answer to "J. F. R.," Pettisville, Ohio, who asks in the April issue of the paper for a method of hanging doors with Chicago double-acting blank butts, permit me to say that the door will not sag from the top if a blank is placed at the bottom of the door and a double-acting spring hinge at the top. This, in my opinion, is the proper way of putting on the butts.

Self-Supporting Partitions.

From F. J. C., *Allentown, Pa.*—I have been an interested reader of *Carpentry and Building* for four years, and have found in it many points of interest and instruction. Thus far I have not asked any questions, but will do so now. I send two sketches representing

of the paper, and I am, I believe, the first from Newfoundland.

Electric Bell Work.

From OLIVER TWIST.—There are, doubtless, a large number of mechanics in country towns who do a little electrical work occasionally, and a larger number would probably be glad to do a little if they only knew how.

Let us suppose that Mr. Robinson has built a nice house, and, wishing to purchase a door bell, has called at the hardware store. The dealer can then explain to

tor annunciator, as we show here, may be placed in a kitchen and connected with the front door, dining room, parlor or chamber or any other places desired.

B represents the battery, which is made up in this case of three Leclanche cells, commonly known as the sal ammoniac or telephone battery—(two are generally enough for this size of annunciator, however)—connected up in "series," as it is called—that is, you must connect the carbon pole of one cell with the zinc pole of the next, and so on. You will notice that there are five binding posts on the top of the annunciator, one for each of the four numbers or names and one marked Z. A is a rear view of the annunciator showing how the magnets are connected, which operate the shutters or needles in

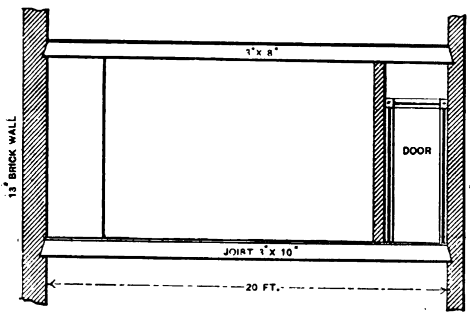


Fig. 1.—Elevation of Stairway on Second Floor.

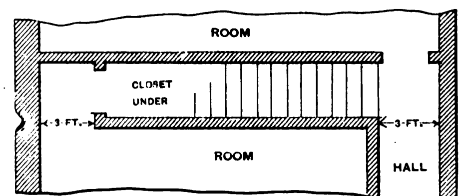


Fig. 2.—Plan View of Staircase.

Self-Supporting Partitions.—Sketches Submitted by "F. J. C."

the plan and elevation of a staircase on the second floor of a storehouse. Fig. 1 shows the elevation and Fig. 2 the plan. There is no support below and the weight to be carried is considerable. The joists of the second floor are 18 inches on centers, and I am of the opinion that the partitions should be trussed. One of the partitions, however, does not extend from wall to wall, there being a space of 3 feet at both ends, as shown in Fig. 2, so that I cannot employ the usual method of trussing. I would like to ask the readers of *Carpentry and Building* how to construct the partitions so that they will be self-supporting. I would further state that the third-story plan is arranged in the same way, and therefore is some extra weight. I should like to have the opinion of my brother chips on this question.

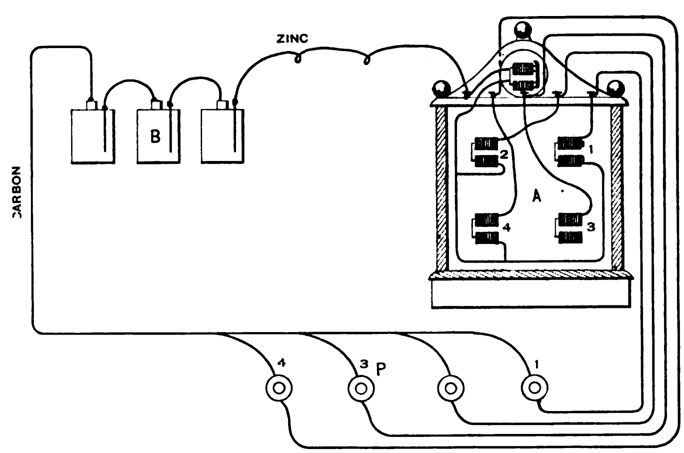
Concave and Convex Valley Rafters.

From W. W. P., *East Liverpool, Ohio.*—I have read with great interest articles on roof framing by I. P. Hicks, published in *Carpentry and Building*. A question has arisen in my mind which I would like to see illustrated, if it is not asking too much. I would like to have Mr. Hicks or some of the experts in roof framing show the proper method of getting out concave and convex valley rafters.

Making a Skylight Tight.

From W. B. W., *St. John's, N. F.*—I would like to ask through *Carpentry and Building* what is the best way of making tight a chimney or skylight on a flat roof with ¾-inch fall to the foot and covered with felt and gravel, or with three-ply felt? Sometimes we use the three-ply felt and sometimes we use the gravel. In this connection, I would ask which is the best way to put on the gravel and pitch—to begin at the bottom and work up, or work down from the top? The practice here is to work down, but I should be glad to hear from readers in other sections of the country. This is my first experience as a contributor to the columns

him that he can fit up in the residence an electric bell that has advantages not found in any other kind. The bell may be placed in the kitchen or in any other part of the house and rung from a neat little "push" on the front door, which is much nicer than a gong fastened directly upon the door, which makes noise enough in the street to attract the attention of all the neighbors. Well! That is what Mr. Robinson wants, and he gives an order for one. If it is put in satisfactorily, the Smiths and the Joneses will want one also, and thus the mechanic may fill in a



Electric Bell Work.

"slack" time when he might otherwise be looking for a job.

Now, to help a little more I have made a sketch, which by the aid of a little study will enable any one not only to connect up a single bell, but any number of pushes with a bell.

In order to distinguish from what part of the building the call comes we must have an indicator, or annunciator, as it is called. They are very useful in a private house or hotel, and a four-indica-

front. These will be already connected when you purchase it, but it is just as well to know how they operate.

You can first locate the pushes where you desire them. Then run one wire from each push direct to the corresponding number or name on the annunciator, without connecting with any other wires on the way there. Now take a wire from the carbon pole of the battery to the pushes. This wire may be "branched" or "tapped," as shown in the sketch, as may be found most convenient for the connections. If you now take a wire from the pole

marked Z to th zinc pole of the battery direct your "wiring" will be complete. You will find directions on the battery how to set it up, so that it is needless to repeat them here. A few remarks may not be out of place, however. Do not put two wires underneath one staple. Do not twist two or more wires together. Either of these may cause contact between the wires and complete the circuit, which would cause the bell to ring continuously or run down the battery.

Problem in Roof Construction.

From J. E. H., *Selma, Ala.*—In answer to "J. C. B." of Hamilton, Ont., I inclose a sketch, Fig. 1, showing my method of roofing the building, the plan of which was given in the July number of the paper. Referring to the plan, it will be seen that ridge No. 1 is higher than ridge No. 2, and that the hip rafters 1, 2 and 3 are longer than 4 and 5, while 6 is very short, running as it does from the end of ridge 1 to the end of ridge 2. It will also be observed that the hip rafters 1 and 2 extend to the ridge, while the latter runs through to the point of the gable. The first pair of gable rafters can be of any size desired. I should make the hip and valley rafters 2 x 8 inches and the common jack rafters 2 x 5 inches.

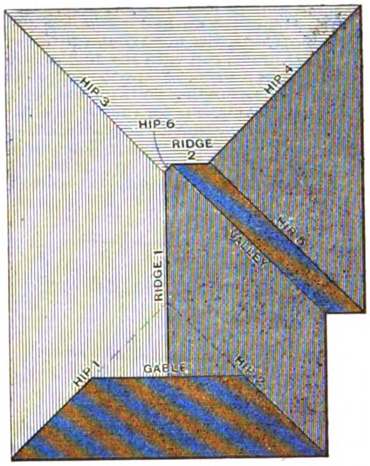


Fig. 1.—Plan Recommended by "J. E. H."

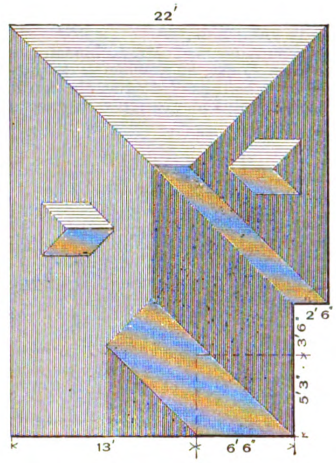


Fig. 2.—Solution of the Problem, Contributed by "G. B. M."

Problem in Roof Construction.—Methods of Framing Suggested by two Correspondents.

From G. B. M., *Paris, Ky.*—In answer to "J C. B." of Hamilton, Ont., who ask for a method by which he can frame his roof as shown in the July issue of *Carpentry and Building*, I send a sketch, Fig. 2, which may be of interest. My idea is to place a gable over the main portion, or front, of the building, and put a small window in the gable and a dormer on each side, as indicated in the sketch. The dormers will give light and ventilate the attic, so that it can be used, while at the same time they tend to render the building a little more ornamental.

Who Owns the Range Boiler?

From W. H., *Alma, Mich.*—I would like an expression of opinion on a question which came up recently in the sale of a house and lot in this place. A sells B a house in which there is a range boiler connected with a kitchen sink. Does the boiler belong to A and can he remove it, or does it belong to B and must remain in the house?

Carpenters' Bill and Time Blank.

From I. P. Hicks, *Omaha, Neb.*—As being of interest to the readers of the paper, I present a carpenters' bill and time blank, designed especially to meet the wants of carpenters and contractors doing a general jobbing business. The first blank line after the heading is for the name of the carpenter or contractor, the second is the date line, and the third is for the name and address of the carpenter doing the labor. In the column rulings there are spaces for material, cost of material, number of hours and cost of labor. In doing job work it frequently happens that the carpenter buys or takes from the shop each day some material for use on the job, and in the space designed for material there are three lines for each working day of the week in which to record the amount of material used as the work progresses from day to day. The last line at bottom is for the owner's name and amount due. These blanks are designed for carpenters' and contractors' use in the following manner: The contractor supplies his workmen with the blanks, giving them instructions to fill out and correctly keep an itemized list of material used and their time for the labor. These blanks are turned over to the contractor by his men as often as work is completed or the occasion requires, and he settles with the owner by them. This method does away with a great many disputes and misunderstandings in regard to material and labor employed in the general jobbing trade; and should any dispute between owner and contractor arise, the contractor can bring up his workman to corroborate the statement on the blank. It frequently happens that owners who have very little knowledge of carpentry are surprised when the contractor presents his bill, and many doubt its correctness, thinking it is an overcharge; but by the proper use of the carpenters' bill and time blank many little disputes and annoyances will be avoided.

These blanks, which measure about 7 x 8½ inches, are for daily use in the small jobbing business, and will be found particularly useful in that line.

THE CARPENTERS' BILL AND TIME BLANK.*

....Carpenter and Contractor.

PLEASE EXAMINE AND SEE IF THIS IS CORRECT BEFORE SIGNING.

For week ending 189

Name .. . . Address. ....

Material used.	Cost of material.	No. hours.	Cost of labor
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Owner's name .. .. Amount due .			

* Copyrighted, 1893, by I. P. Hicks.

Moving Buildings.

From J. M. W., *New Oxford, Pa.*—I would like to see in the columns of the paper some good method of moving a building from one place to another. The structure I desire to roll away is 30 x 36 feet in size, two stories in hight. It is a frame building, and is to be rolled about 400 yards. I would like to have some one advise me as to the method of doing the work successfully.

Action of Mortar on Timber.

From S. C. M., *Leaf River, Ill.*—I should like to ask through the columns of the paper for information with regard to beam filling joist—that is, filling up to the bottom of the floor with stone and mortar. Some people in this section claim it will rot the joists, and I should like to hear the views of some of my brother chips in regard to the matter.

Note.—With regard to the question raised by our correspondent we would say that it has been discussed in previous issues of the paper with the result of showing the existence in the trade of a wide difference of opinion. In one instance a correspondent tells of the use of mortar as a filling for a part of the space between the floor joists, with the result of rotting the timber to such an extent that repairs were necessary within a comparatively short period. The mortar was put in to the depth of about 4 inches and the floor laid in the usual manner but before the moisture had wholly evaporated. On the other hand, cases are cited where a grouting composed of broken stone, sand and lime has been used with entirely satisfactory results. We submit the inquiry, however, to our practical readers in the hope that they will still further discuss the subject and relate their experience in the matter.

Shelf Design.

From J. F. B., *Wellington, Ohio.*—In the November issue of *Carpentry and Building* "O. G. C." of Grand Junction, Col., asks for a design suitable for a shelf and brackets of a character to be put up in a well-furnished. room. In reply to that request I send sketches of a shelf which I made for my house. The wood I employed was black walnut. The shelf is 3 feet long and has two pairs of brackets, one being placed 3 inches from the ends. The brackets are 2 inches apart and between the two pair in the center is a nice scroll for ornamental effect. Fig. 1 of the sketches shows a front view of the shelf and one pair of brackets, while Fig. 2 represents a section through the shelf and indicates the manner in which it is supported. I use a ⅜-inch gouge to produce some of the ornamental features, and every ¾ inch I pick out a chip. I think the sketches which I send are sufficiently clear to indicate the method of construction adopted.

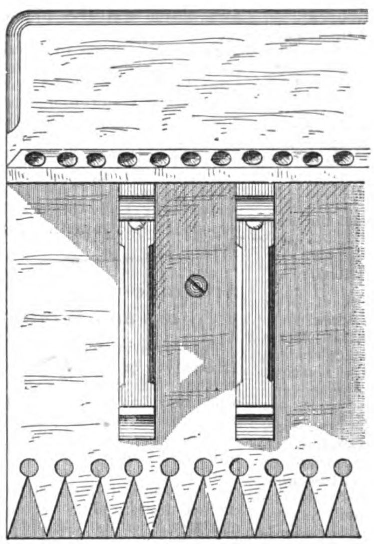


Fig. 1.—Front View of Shelf Showing one Pair of Brackets.

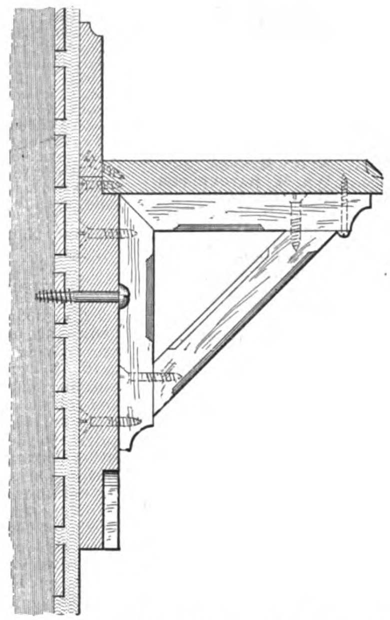


Fig. 2.—Section Showing Manner of Supporting It.

Shelf Design Submitted by "J. F. B." of Wellington, Ohio.

Warming a Church.

From J. R., *Cincinnati, Ohio.*—Seeing the church plan of "W. D.," Oxford, N. S., and your comments on it in *Carpentry and Building*, I thought I would like to give my opinion and learn what I could from the criticisms on it. The plan seems to give all required dimensions except the hight of the ceiling in the audience room, the depth of the cellar and the hight of the furnace. From the plan it is fair to assume that the church in question is not exactly modern, consequently an average hight of ceiling would be about 18 feet and the cellar not over 6½ feet, and the furnace at least 5½ feet, to the top of the brick casing. These have seemed to me to be near enough correct to adopt in forming an opinion. As the entrance of the church is at the coldest end and where the air pressure is greatest, the furnace should be located at least 10 feet further that way. The length of a hot-air pipe to be practicable depends on the sharpness of the pitch it has, and if my conclusion as to the depth of cellar is correct, the pipes would have to be taken out of the side of the furnace to get a rise of 1 foot in 25 feet, which is not enough, as it should be at least an inch to the foot in runs of half that length and twice as much in runs of this length. To run a pipe at so little pitch due north or west such a distance, means that the air will move so slowly that it will cool to the extent of inefficiency before it arrives at the register. To run a pipe to the extreme south or east wall is unnecessary, for as soon as the air gets through the register it will move to that part of the building at once. So it seems to me that the intentions, which are to distribute the air, are killed by the manner in which they are carried out.

All of the cold-air ducts are too small; those from the church should have a capacity equal to the heat pipes and that from out of doors equal to three-fourths of their capacity. If the furnace burns well and heats up promptly the smoke pipe is not open to criticism, though many might wish it covered. I think the hot-air pipes should be made 14 inches in diameter, with registers whose faces have an area one-third greater than that of the pipe. The registers should be moved so as to shorten the pipes, and if still placed in the side aisles those at the front should be brought 10 feet back from where they now are and those at the other end be brought at least 20 feet further toward the front. If the pipes are shortened in this way and the expense of enlarging them is to be avoided, the pipe that is left after shortening them should be used to run to additional registers in the middle aisle; the pipe leading toward the front should not be over 10 feet long and the pipe running in the opposite direction 15 or 18 feet long. The cold-air duct coming from the side of so long a building will generally have a current of air blowing across its mouth and air may at times be drawn out, while seldom forcing directly in, so that the furnace will not be properly supplied with air. To overcome this, at the mouth of the duct a board should be set up opposite to it and 2 feet away, and the space at the top covered from it to the building. To the outer upright board should be loosely hinged a valve long enough to swing and reach either side of the opening of the duct. This would prevent the air passing the air duct without entering, no matter how the wind blew, and would prevent the wind blowing directly into it.

Air supply, location of furnace, length of heat pipes, their lack of pitch and the wrong location of registers are all open to criticism, in my opinion, and I hold myself open to criticism.

From F. H. J., *Rochester, N. Y.*—In answer to "W. D.," Oxford, N. S., whose letter about heating a church appeared in *Carpentry and Building* for June, I would advise him to dispense entirely with all hot-air pipes in the cellar and take the heat direct from the top of the furnace through a large round register. He will find he can heat the church without any trouble by this method. The hot-air pipes are altogether too long as shown in his plan, for by the time the hot air travels through their length it gets considerably cooled. I heated a church in a country town some five years ago, the size of the building being 30 x 80 feet and 14 feet high. I put a good solid cast-iron furnace with 25-inch fire pot in the cellar so all the heat came out of the top of the furnace in the center of the middle aisle. I did not use a cold-air box, but set up the furnace about 6 inches from the cellar bottom. That furnace gave the very best results, besides costing considerably less. Not far from this same church is a brick church, which has four leaders from the furnace, but it never gave satisfaction. The trustees are now contemplating having it changed and the heat taken from the top of the furnace.

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Worcester ....O. S. KENDALL.

The Uniform Contract.

The benefit to be derived by the building fraternity at large from the use of the Uniform Contract has prompted the secretary of the National Association of Builders to issue the subjoined notice to the builders of the country. The great value of this contract, which has been prepared by the representatives of both sides after most careful and impartial consideration from forms drawn by individual architects or owners, is self-evident. The certain knowledge on the part of the builder that so long as he uses the Uniform Contract he knows exactly the interpretation which can be put upon any of its clauses is of more value than can be definitely estimated. By the use of the Uniform Contract in all cases a builder can have a dozen jobs under contract at once with no feeling of uncertainty as to the different requirements which would exist provided each one of these jobs was being carried on under a different form of contract, as was formerly the case when each architect was in the habit of preparing his own form of contract. The following is the notice which is to be sent out from the office of the secretary of the National Association to the builders of the country whether they belong to filial organizations of that body or not :

TO ALL BUILDING CONTRACTORS.

The "Uniform Contract," a form of agreement adopted and recommended for general use by a joint committee established by the National Association of Builders and the American Institute of Architects, is hereby urged upon your attention.

If you are to sign a contract for building work, remember that your position, as one of the contracting parties, entitles you to as much choice in the form of contract used as the owner or his agent, the architect; indeed, your responsibility is so great that you cannot afford to ignore this point.

The Uniform Contract has been prepared with great care by a committee, as stated above, representing both interests, and is the most concise and perfect form now in use; by it your interests as a builder are carefully guarded, and you may safely accept the document in all its general provisions, taking care that the written portions in the space provided are in conformity with your proposed undertaking and special agreements in relation thereto. Particular notice should also be taken that no erasures of the printed clauses or interlineations therein have been made in such manner as to vitiate the force of the same.

These blanks can usually be obtained of the builders' exchanges in every prominent city of the country, but in event of failure to secure them there they can be had in any quantity, promptly, of the licensed publishers, the Inland Publishing Company, 19 *Tribune* Building, Chicago, at the following prices:

100, $1.10. 500, $4.25. 1000, $8.

Payment, preferably, should accompany order, and should be made by money order or bank draft payable to the order of the Inland Publishing Company. If local check is sent New York or Chicago exchange must be added.

You are urged, not only in your own interest, but in the interest of the whole building fraternity, to insist upon the use of this form in all contracts you may be called upon to sign. Respectfully,

WM. H. SAYWARD,
Secretary National Association of Builders.

Bureau of Information.

Filial bodies, or members of filial bodies, are reminded that when they are seeking information either in regard to customs or practices in building matters, that the readiest and best method to obtain the same will be by addressing their inquiries to the National Secretary, who, either through his correspondents in various parts of the country or through the columns of this paper, will be able to obtain the information desired. Inquiries of the above nature will receive immediate attention, and should be addressed to Wm. H. Sayward, secretary N. A. of B., 166 Devonshire street, Boston.

Example of American Associations.

The principles of organization which are recommended by the National Association of Builders to local associations throughout the country have worked such desirable results that they are being adopted in various localities of the English-speaking world. Frequent inquiries are received by the secretary of the National Association for material to assist at the formation of builders' organizations, as recommended by that body, from foreign builders, especially in Canada and Australia. The example offered by the successful operation of American builders' exchanges has been beneficial to our brethren abroad, where, up to the present time there have been few organizations of builders such as exist to-day in most of our prominent cities. The steady progress of our builders toward a better knowledge of the true principles of equity involved in the conduct of the building business presents an example which is of benefit to the world. The American contractor is rapidly coming to deal intelligently and effectually, by means of his organization, with the questions which were formerly decided upon an individual basis or which were allowed to lapse for lack of proper consideration. Through his organization to-day he deals with the questions raised by the workmen, with the problem of apprenticeship, with the necessity for honorable and well defined practices between himself and his fellows, as the questions were never before dealt with in this country.

Codes of Practice.

The attention of the National Secretary is daily called to the fact that but little advance has been made by filial bodies in securing the improvements in practice comprehended in the codes formulated and recommended by the National Association.

The importance of persistent work in this direction is evident, and all filial bodies are urged to agitate this matter. It is not to be expected that complete reforms are to be immediately gained, neither is it claimed that the codes recommended comprehend all or exactly what may be accomplished. They are, at least starters, and every constituent body of the National is expected to do something in this direction.

Arbitration Between Employers and Workmen.

The essential features of the plan of arbitration or settlement of affairs of mutual concern of employers and workmen, as recommended by the National Association, have never been successfully assailed, and it becomes more and more evident as time rolls on that harmony can best be secured by the adoption of this method. All filial bodies are urged to recommend again and again to the various branches of business connected with them the fairness and good business principles involved in this plan, and secure as rapidly as possible its adoption. The detail will be found in the official report of the fifth annual convention, which was held in New York in 1891. Copies will be furnished also by the National Secretary on application.

Special Trade Associations.

The wisdom of establishing separate trade organizations within the membership of builders' exchanges should be more fully recognized. In every exchange where the members belonging to different branches of the building trade have formed themselves into sub-organizations the result has proved most beneficial and has made the work of the exchange much more intelligent and direct in its action. The functions of an exchange are primarily to bring together the members for their mutual benefit from a business standpoint, to facilitate the transaction of their affairs, and to afford a rendezvous for daily conferences upon business subjects. The action of an exchange, which is called upon, as a whole, to deal with a labor question because of the lack of special trade associations, must necessarily be indirect and more or less ineffectual, for, unless a very serious complication threatened, it seems unnecessary that the contractors in all trades should become implicated where only one trade is affected. Thus if a difference occurs between the employers and workmen in the mason branch of the business the matter could be much more intelligently treated and settled by the masons themselves, provided they had a special organization of their own. In extreme cases the approval of the full exchange might be asked upon decisions reached by any of its special trade organizations. By this means those directly interested in the settlement of a question affecting only their own branch of the trade would deal with it first without compelling other members to participate in the adjustment of unimportant subjects. By means of these sub-organizations each separate branch of the trade can settle all questions pertaining distinctly to that branch with much better result than would be possible by any other means. The establishing of these associations within an exchange is of benefit to the organization, because it takes out of its functions the necessity of dealing, as a whole, with every petty question that might arise affecting only the members of some one trade, thus permitting it to become more distinctly a business organization, which is in reality the true character of the exchange advocated by the National Association. In all filial bodies in which this recommendation has been adopted the results have been most favorable, and the example set by such exchanges should be followed by all.

National and Local Secretary.

To insure the best results being obtained by the filial bodies from the recommendation of the National Association of Builders, there should be constant and intelligent intercourse between the office of the National Secretary and that of each local body. Without a comprehensive relationship between these two it is next to impossible for either to derive the full benefit that should accrue from their connection with each other. The National Association should have constant information as to conditions existing in every locality, in order that it may compile and prepare for dissemination the material which is to form the basis for mutual protection and advancement. Unless the local secretaries are in frequent correspondence with the National Secretary it is very difficult for the latter to deal intelligently with conditions existing in their cities, and the information possessed by the National Association must be obtained from other and more or less uncertain sources. On the other hand, the local exchanges are deprived of the full benefit of the work possible to the National Association in just such proportion as the National Secretary fails to receive intelligent information as to existing local conditions; for it is evident that out of the greater amount of material the greater amount of good can be culled for the benefit of the members of the various exchanges. In this connection, if a local secretary fails to apprise the National Secretary of important matters occurring in his locality, he proportionally curtails the information of the National Secretary, which is to be used for the benefit of the whole, by failing to supply him with a knowledge which must be of benefit to builders generally. It is one of the vital functions of the National Secretary's office to supply all local exchanges with plans for improvement and benefit that have been adopted by any one of the exchanges. All information of this character must first go to the central office and be distributed from there, for by no other means yet devised can the widely scattered exchanges come into possession of information that is as beneficial in one locality as it is in another. The National Secretary must look to some member of each local exchange for information, and that member is the secretary; and it is necessary that the local secretaries should recognize the fact that matters which may seem unimportant to them may be of the greatest importance when combined with other seemingly unimportant information from other exchanges. They are, therefore, urged to constantly keep the National Secretary posted upon matters transpiring in their exchange and under their observation. The closer and more intimate the relationship between the local and the National secretaries the more efficacious will be the work of the National Association, for out of the close connection between the two greater comprehension of purpose and harmony of action are bound to ensue.

The 'Change Hour.

In referring to the ineffectual results of efforts to establish a habit of attendance at the rooms during the 'change hour, a secretary of one of the local exchanges, in writing to the National Secretary, attributes the cause to the existence of special trade organizations within the exchange. He said that "one reason why the members did not congregate daily as a whole is because of the daily meetings of the separate organizations which exist in the exchange." If this secretary is attributing the proper reason to the inattendance of his members, it is evident that these members have failed to comprehend the true purpose for which a builders' exchange, such as that advocated by the National Association of Builders, is established. The 'change hour, as has been stated in these columns frequently, is not advocated for the accomplishment of the purposes incidental to the meetings of special trade organizations, but is one of the vital principles in the purpose for which an exchange exists. Where the members of an exchange are in the habit of meeting daily during the 'change hour the purpose is clearly defined as being first to facilitate the transaction of business. The daily meetings of the different trade organizations in separate council assist at the transaction of the builders' business only in so far as the settlement of questions affecting relationship between employers and workmen, &c. Through these meetings the members of these special trades do not come in contact with any outside of their own branch of the business, and hence a daily meeting is but a faint reflection of the benefit which obtains from the custom of regular gatherings of members of all branches of the building trades. In an exchange such as exists in several of the more prominent cities of the country the members are very largely dependent upon the 'change hour for practical assistance in meeting with others of their own calling, which could be obtained by no other means. It cannot be stated too frequently that the purpose of the exchange hour is distinctly business, and, as has been before stated, out of the personal and daily contact which follows the establishment of a well-attended 'change hour grows a feeling of fraternity and friendliness which enables the builders to form associations which result in the cementing of the whole trade into a body which is thus enabled to assume a place among other organizations to which, by the dignity of its purpose and the extent of its field of operation, it is entitled. The officers of every exchange should use the means in their power to make every member comprehend the fact that his attendance during the 'change hour is first and foremost for his own benefit, and that, naturally, what benefits him will benefit others. The fact that it is slow work to secure such attendance is no argument against the benefit which is bound to be gained after it is secured.

Apprenticeship System.

The Mason Builders' Association of Boston has a large number of circulars on hand covering the full system of apprenticeship which it had adopted in co-operation with the Bricklayers' Union of that city, under the form of arbitration recommended by the National Association of Builders. Any parties wishing copies of the same will be cheerfully furnished upon application to the National Secretary, at his office, 166 Devonshire street, Boston.

Resolutions.

The idea seems to prevail that resolutions upon which action may be anticipated by the National Association are only to be presented at annual conventions, but this is an erroneous impression. The action taken on resolutions at conventions would be much more valuable if the text of the propositions were in the hands of the Committee on Resolutions weeks, or even months, before the convention assembles, as the committee would thus have ample time to digest the ideas presented, and much greater justice would be done both to the party offering the resolution and to the association. Every interested person is, therefore, urged to send to the National Secretary at once any resolutions or ideas as to needed reforms. These will then be transmitted to the Committee on Resolutions for their consideration, to be finally presented for action at the next convention.

Novel Method of Sinking Foundations.

With regard to the article published in our last issue describing the novel method employed in sinking the foundations for the 17-story building now in process of erection on lower Broadway for the Manhattan Life Insurance Company of this city, Messrs. Kimball & Thompson, the architects, call attention to a slight error of statement in connection therewith. As printed the article gave the credit of the employment of the pneumatic caissons to C. O. Brown of the Riverside Bridge & Iron Works. The architects inform us that Mr. Brown's position was that of consulting engineer for the iron and steel structural work, while the suggestion of the use of the caissons came from the architects' office, and was the outcome of the cylinder caisson used by Mr. Kimball in the erection of the Fifth Avenue Theater. In that instance Mr. Brown manufactured the caisson, but from suggestions made by Mr. Kimball. The architects also state that they are indebted to Charles Longsmith for the application of these caissons to meet their requirements.

THE loss by the great fire at Fargo, N. D., by which the principal business portion of the city was destroyed, is now placed at $3,500,000, while the insurance will not amount to one-quarter that amount.

WHAT is said to be one of the simplest ways of removing varnish from woodwork is to apply, as a solvent, a mixture of turpentine and alcohol in equal proportions. If the varnish does not come off easily with this, more alcohol should be used.

Corrugated Iron Partitions.

A number of store buildings in Chicago are being changed into hotels for use during the World's Fair, after which they will be again used for commercial purposes. Among the problems presented in thus changing the interiors is how to construct the numerous partitions in such a manner that they can be taken down without injury to the building and at the same time be cheap and to a certain extent fire proof. In over ten of these buildings corrugated iron is used for the partitions. Light studding is placed in the usual manner, or if it is desired to have a circulation of air through the building, the studding does not reach the ceiling—a top plate being in a condition to be sold at a slight discount on the original cost.

The matter was placed in the hands of Architect Chas. C. Scott, who devised a method for constructing the partitions without injury to the iron, as shown in the following illustrations. In Fig. 1, which shows the partition in elevation and section, A B represents a sheet of corrugated iron 10 feet in length. The iron is secured at the floor by quarter round pieces, C and D, which are nailed to the floor. The dotted lines indicate the studding which supports the cap mold E. The iron is held in position at the top by means of the molding F, which is nailed to the cap mold E. In the front view J' H' represents a stud, the profile of which is indicated by K'. The cap mold is indicated by E', the top mold by F' G' and the quarter round by C' D'. In the plan, Fig. 2, two of the studs are shown at M and N. The quarter round molds are placed inside the partition, as indicated by O P. The studs are notched to receive the chair rail S T, and the molds C and F of Fig. 1 can be placed in the same manner. As will be seen in Fig. 1, the iron is secured at the floor by the molds C D, and at the top by the mold F, without driving nails through the iron.

In Fig. 2 the method of securing the iron is shown at Q and R. Brads are driven over the edges of iron and into the

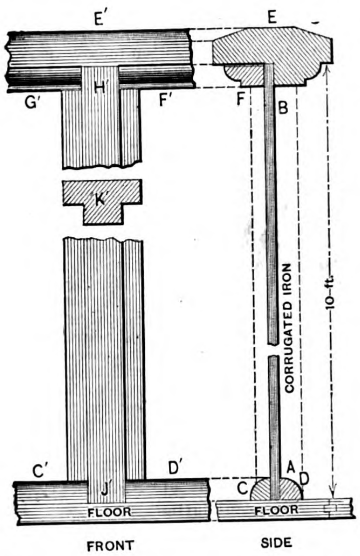


Fig. 1.—Elevation and Section of Partition.

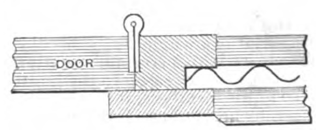


Fig. 3.—Method of Hanging Door.

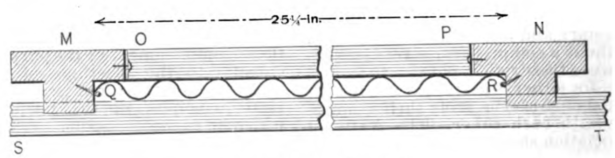


Fig. 2.—Plan of Partition.

Corrugated Iron Partitions.—Illustrations Showing Method of Construction.

used to hold the parts in position. Corrugated iron is then nailed on the studding, the sheets being placed perpendicular or horizontal to their length, as is most convenient. In either case it has been necessary to drive nails through the iron in order to fasten it securely to the studding, thus injuring the iron in case it should be desirable to sell it after the partitions are taken down.

Boddie Bros. own a six-story building that extends 146 feet on Jackson street and 100 on Franklin. This building has been occupied as a wholesale house, and was unobstructed with partitions. As the building was to be unoccupied until December, it was resolved to convert it into a hotel for the accommodation of World's Fair visitors. For this purpose five of the upper stories were to be divided into rooms, the first being retained for restaurant, barber shop, office, &c. Lath and plaster partitions would be too expensive, besides there was not sufficient time for their erection. Board partitions were out of the question, not being sufficiently fire proof. It was decided to use corrugated iron in the construction of the partitions, providing they could be made in such a manner as to use commercial iron and not injure it in any way, so that when the partitions were taken down the iron would be studs, thus holding the iron in position. The method used in hanging door to stud is shown in Fig. 3. For the construction of the partitions in this hotel, which is to be named the Great Western, 1400 squares of corrugated iron and 85,000 feet of molding will be required.

Architecture at the Brooklyn Institute.

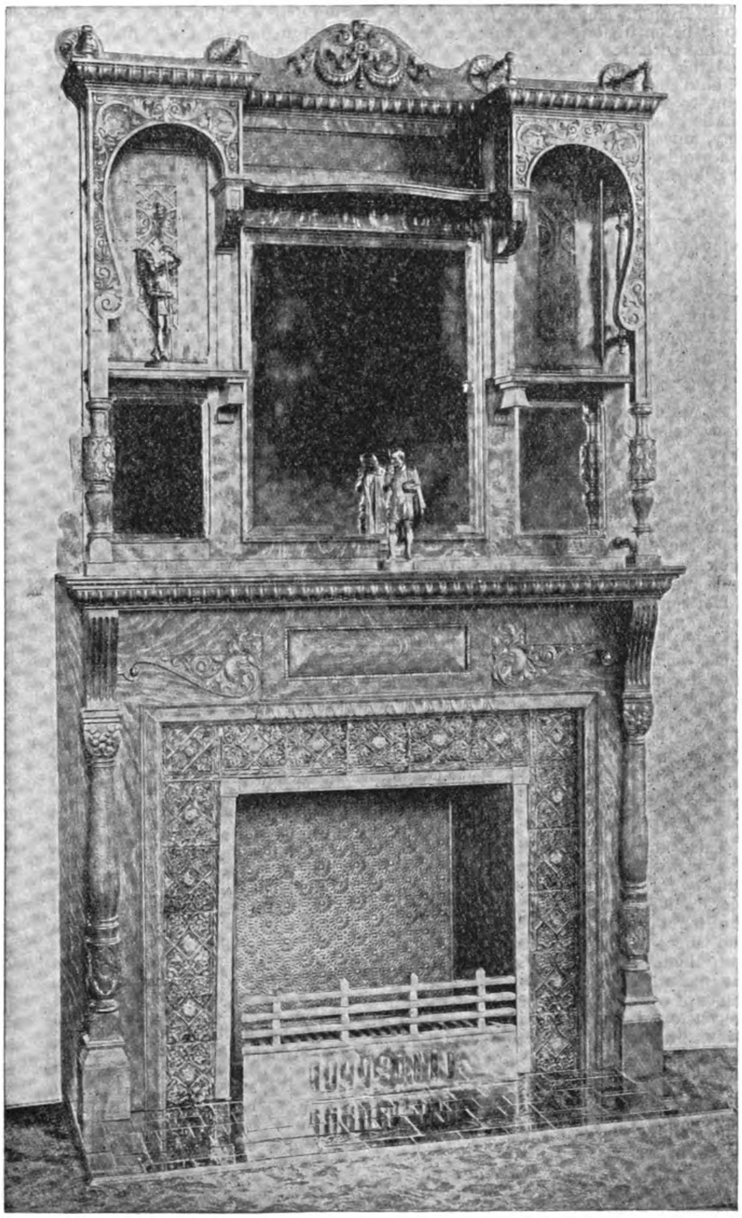
The Department of Architecture of the Brooklyn Institute of Arts and Sciences recently held its annual meeting for the election of officers and committees for the ensuing year. The result was the election of Walter Dickson to the office of president; Isaac L. Ditmas as vice-president; Albert L. Brockway as secretary, and Gustave A. Jahn as treasurer. We understand that the department numbers something like 100 practicing architects and 200 students in offices and studying architecture. The annual exhibition of drawings, which closed a short time since, is said to have been the most successful of any in the history of the institute. During the school term the average attendance in the Department of Architecture was 60, meetings being held five evenings each week under able teachers. An interesting feature of the course was a series of weekly lectures by Professors Clinton, Plimpton, Sturgis and Goodyear, and some of the practicing architects.

The Oil Stone for Sharpening Tools.

The keen edge which is to be produced by means of the oil stone can only be insured on a tool which has been previously properly ground on a grindstone. The bevel produced by that means has simply to be ground on the oil stone at its extreme end, so that a much smaller facet, at a slightly greater angle, is made on the bevel. There is considerable art in the manipulation of tools on the oil stone to produce the desired result. The wire edge left from the grindstone has to be reduced by grinding till it finally breaks off: then a few more strokes of the tool on the stone will make the edge perfect. The flat side of the tool, forming the edge opposed to the bevel, is generally gently applied to the oil stone to remove any trace of a wire edge on that side. The process of sharpening a chisel on the oil stone will serve as a guide to the method pursued for many other tools. The stone, which has been wiped quite clean, and having a flat surface, is laid upon the bench with one end toward the operator, and a few drops of olive oil are placed upon it. The chisel, held by the handle with the right hand and steadied with the fingers of the left grasping its blade, is placed on the stone, bevel downward, somewhat slanting toward the breast. A few strokes, taken the entire length of the stone, will distribute the oil upon it evenly, and also enable the operator to notice the correct angle at which to hold the tool while sharpening. The motion given to the chisel must be parallel to the top of the stone, and this is somewhat difficult for an unpracticed hand. The hands have a tendency to place the chisel more upright at the further end of the stroke, and to depress the handle as it is drawn nearer to the breast. If a wide chisel is placed on the stone with its blade edgeways toward the operator, and in that position worked to and fro by the hands, as though sharpening, the faculty of moving parallel to the stone will be rapidly acquired. This done, a straight flat facet may be ground on any tool, no matter how thin its edge may be. It is frequently conducive to producing a good edge if the tool be moved on the stone in small circles, the position and size of which are continually varied. The small bevel made on the oil stone should be equally as flat as the large one. A rounding facet is not only indicative of bad workmanship on the part of the sharpener, but also has a detrimental effect on the cutting powers of the tool. A plane iron may be judiciously set finally for accurate work by wedging it in such a position that it projects somewhat less than ⅛ inch from the sole of the plane stock, and then carefully oil-stoning the edge with the end of the stone resting on the wood.

New Design of Wood Mantel.

One of the many new patterns of wood mantels which have been brought out by the Interior Woodworking Company, 307 and 309 Wabash avenue, Chicago, is illustrated herewith. The designs of the mantels manufactured by this company are exclusively their own, the mantels themselves being made of thoroughly seasoned and kiln-dried hardwood lumber, selected for fine quality and handsome figure. The carving is executed in the most artistic manner and the workmanship and finish are of the highest order throughout. Mantels are kept in stock in antique oak and natural cherry. Oak can be finished natural, red, old English, antique and bog. Birch can be finished natural, imitation natural cherry, imitation mahogany and imitation old cherry. Cherry can be finished natural and imitation mahogany. With each wood mantel the company furnish tile facing, hearth, wrought-brass frame around inside of tile facing, dumping bottom club-house grate, ash-pan or ash-pit cover, blower, set of fire brick and a damper to close the flue when not in use and to regulate draft when the fire is burning. A very fine illustrated catalogue giving a number of the company's leading designs in mantels has just been issued.



New Design of Wood Mantel.

A model workshop for the manual training school at Brookline, Mass., is about to be erected at a cost of $30,000. The building will be 150 x 170 feet in size, modeled after an old English schoolhouse, and be equipped with a 15-horse motor, foundry, forge room, machine tool room and lathes.

Working Rules for the Building Trades of London.

The new working rules for the building trades of London, issued by the Central Association of Master Builders of the city named, and which went into effect in November last, are as follows:

WORKING RULES FOR ALL TRADES EXCEPT PLUMBERS.

1. That the working hours in summer shall be 50 per week.

2. That during 14 weeks of winter, commencing on the first Monday in November, the time shall be worked for the first 3 weeks 8½ hours per day; during the 8 middle weeks 8 hours per day; and the 3 following weeks 8½ hours per day.

3. That the present rate of wages for skilled mechanics and laborers shall be advanced ½ penny per hour.

4. That overtime when worked at the request of employers, but not otherwise, shall be paid at the following rates—namely: From leaving-off time until 8 p.m., time and a quarter; from 8 p.m. to 10 p.m., time and a half; after 10 p.m. double time. No overtime shall be reckoned until each full day has been made, except where time is lost by stress of weather. On Saturdays the pay for overtime, from noon to 4 p.m., shall be time and a half; and after 4 p.m., and on Sundays, double time. Christmas Day and Good Friday shall be paid for the same as Sundays.

5. That employers shall give 1 hour's notice or pay 1 hour's time, on determining an engagement. All wages due shall be paid at the expiration of such notice, or walking time if sent to yard.

6. That men who are sent from the shop or job, including those engaged in London, and sent to the country, shall be allowed as expenses 6 pence per day for any distance over 6 miles from the shop or job; exclusive of traveling expenses, time occupied in traveling and lodging money.

7. That payment of wages shall commence at noon, or as soon thereafter as practicable, on Saturdays, and be paid on the job. But if otherwise arranged, walking time at the rate of 3 miles per hour shall be allowed to get to the pay-table at 12 noon.

8. That employers shall provide, where practicable and reasonable, a suitable place for the workmen to have their meals on the works, with a laborer to assist in preparing them.

9. That wages earned after leaving-off time on Fridays and Saturdays only shall be kept in hand as back time.

10. That the term "London district" shall mean 12 miles radius from Charing Cross.

11. That six months' notice, on either side, shall terminate the foregoing rules, to expire on May 1. The foregoing rules shall come into force on the first Monday in November, 1892, but the increase of pay to bricklayers shall commence from the first week in July.

WORKING HOURS FOR ALL TRADES EXCEPT PLUMBERS.

For Fourteen Winter Weeks.

For Three Weeks Commencing the First Monday in November:

First five days of each week, 7 a.m.

to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4.30 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 47 hours per week.

For the Next Eight Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 44½ hours per week.

For the following Three Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4.30 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 47 hours per week.

For Thirty-eight Summer Weeks:

First five days of each week, 6.30 a.m. to 8 a.m, 8.30 a.m to 12 noon, 1 p.m. to 5 p.m.

Saturdays, 6.30 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 50 hours per week.

Masons and joiners in shops to have one hour for dinner all the year round, and work half an hour later than the time specified for the winter months, thus making the same number of hours as worked outside on jobs—namely, as laid down in Rule 2.

Carpenters and joiners who are in receipt of full wages, and who have been employed for two hours less than the hours mentioned above, shall, on discharge, receive one hour's notice, to be occupied, so far as practicable, in grinding tools, with one hour's pay in addition.

WORKING RULES FOR PLUMBERS.

1. That the working hours in summer shall be 47 hours per week.

2. That during 14 weeks of winter, commencing on the first Monday in November, the time shall be for the first and last three weeks, 44½ hours: during the eight middle weeks, 42 hours per week, in all cases where the other trades cease work at 4 p.m.

3. That the present rate of wages for skilled plumbers shall be advanced one halfpenny per hour from the first Monday in November, 1892.

4. Payment for overtime and all other rules to remain in force as at present.

WORKING HOURS, ETC., FOR PLUMBERS.

For Fourteen Winter Weeks.

For Three Weeks commencing the First Monday in November:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4.30 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 44½ hours per week.

For the next Eight Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 42 hours per week.

For the following Three Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4.30.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 44½ hours per week

For Thirty-eight Summer Weeks.

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 5 p.m.

Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon. Equal to 47 hours per week.

Overtime.—Plumbers being required to work overtime shall receive, from 8 p.m. to 11 p.m. time and a half: from 11 p.m. to 7 a.m. double time. Saturdays, from 1 p.m. to 5 p.m. time and a half; from 5 p.m. to 7 a.m. (Monday) double time. Sundays double time. Any plumber being discharged shall receive one hour's notice.

District and Expenses.—For plumbers, the term "London District" shall mean 6 miles radius from Charing Cross; and any skilled plumber sent to work over 4 miles from his employer's workshop shall receive all traveling expenses. If sent over 8 miles from his employer's workshop he shall be entitled to 1 shilling per day extra, with the usual allowance for lodgings, and all traveling expenses. Should there be no accommodation for him to reach his work at 7 a.m., he shall be entitled to 1 shilling per day, unless he travel in the employer's time and be paid from 7 a.m.

All other rules to remain as at present in force.

NEW PUBLICATIONS.

KNOTS, SPLICES, HITCHES, BENDS AND LASHINGS. Illustrated and described by F. R. Brainard, Ensign, U. S. Navy. New York: Published by the Practical Publishing Company. Price, $1.

A useful little pocket manual has been compiled by Ensign Brainard, giving concise instructions in the manipulation of the various knots, splices, bends and lashings generally used. The diagrams, numbering 127, which accompany the text clearly illustrate the directions given. Tables of the circumference, weight, and working and breaking strength of the various dimensions of hemp, iron wire and steel wire ropes will be found useful, while a glossary, at the end of the volume, presents definitions of the various terms used in connection with the operations of knotting and splicing.

THE SLIDE RULE. By William Cox. 44 pages, size 5¼ x 8¼ inches, bound in cloth, published by Keuffel & Esser Company. Price 75 cents.

This is the third edition of a well-known work, to which the author has added a full description of the "Duplex" slide rule, an improved form of the Mannheim, which he has invented and patented. Besides clear instructions as to the method of using this valuable instrument, the book contains extensive tables of equivalents for rapid and easy conversion of geometric and other quantities, graphic demonstrations of the working out with the slide rule of some 80 different formulas and practical examples occurring constantly in mechanics, engineering, and even business. The "Duplex" slide rule, unlike all others, has scales on both sides, their arrangement being such that the working out of many complex calculations is very much simplified, while the solutions obtained of certain every-day problems are in a much more convenient form. The work considered as a whole is one likely to prove interesting and instructive, and should be found in the library of trade literature of every wide-awake and progressive mechanic.

THERE is some possibility that the Philadelphia mint, instead of being rebuilt, will be transferred to Washington, where it would be under the immediate supervision of the Director of the Mint.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

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DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

AUGUST, 1893.

Col. R. T. Auchmuty.

The news of Colonel Auchmuty's death, given in another column, will come as a shock to many who knew and loved the man. It is, however, some consolation to feel that he passed away leaving the great work of his latter life complete. He had the satisfaction of seeing the enterprise which he founded single-handed, and engineered to a successful issue, flourishing and standing on the firm basis now held by the New York Trades School. The importance of Colonel Auchmuty's work and the untiring zeal and labor expended by him in its accomplishment cannot well be overestimated. Possessed with a passionate enthusiasm for promoting the welfare of young men and a clear idea of the best means for insuring their welfare—namely, to help them to help themselves, the Colonel set himself to work to carry out his conceptions with an earnest purpose and determination which brought success with it. The influence of his personality, too, was far-reaching. Hundreds of students who have passed through his school are now witnesses in every quarter of this country and in Canada to the wisdom and efficiency of Colonel Auchmuty's methods of training, and many feel the beneficial effects of their personal contact with this best type of Christian gentleman at a time of their life when good influences were most needed. In the New York Trades School a lasting memorial will stand, always linked with his name, and in it, "he being dead, yet speaketh."

Wind-Proof Houses.

The recent disastrous cyclones that have been devastating towns and agricultural sections in the Western States point clearly to the need of a much more secure system of building for the cyclone districts—a system in which sheet metal will probably occupy a prominent place among materials employed for the purpose. At present, and probably for a long time to come, wood must be relied upon for frame work, but for the outside, as well as for the roof, sheet metal as a covering for a truly wind-proof house possesses advantages found in no other material. A wind-proof house is one that can neither be blown down nor have its windows blown in by any wind generated in a natural way. It might have been said, also, one that cannot be blown upward by any natural wind, since accounts of the way buildings are destroyed by the cyclones indicate that many of them are lifted bodily and carried a considerable distance from their foundations.

Wind Pressure.

In order to make the wind press down instead of lift up a building, the sides of the structure should be inclined inward from the bottom upward, as in the Egyptian style of architecture, of which the Pyramids may be taken as an extreme example and the Tombs Building, in New York City, an example of less pronounced application of this principle. A proper amount of inclination would cause the wind to press a building down upon its foundations with greater force than its lifting power. Such a building, having a frame of strength sufficient to withstand the lateral pressure of a cyclone, anchored so that it cannot be slidden off its foundation, while at the same time carrying a continuous covering of sheet metal and provided with stout sash, glazed with small panes of glass, could be made to withstand the force of any cyclone. Of course, the designing of such a building would introduce some novel problems for the consideration of architects, and which would include modifications in methods of heating, ventilation and plumbing; but there can be no doubt that if the attempt was made to construct frame buildings that would safely withstand a wind pressure of, say, 80 pounds per square foot, which is probably as great as is exerted by any natural wind, the desired result could be obtained without any notable difficulty and without extravagant cost.

The World's Fair.

Every returning visitor to the World's Fair is becoming an active missionary in his home in behalf of that grand undertaking. The influence of this labor of love can hardly be overrated. The enthusiasm of a friend or an acquaintance is catching. It is far more convincing than columns of cold type. Doubts are dispelled, objections are quickly overcome and the conviction is reached that ways and means must be carefully studied to settle the question whether a visit is feasible. Questioning concerning some special interests put to the returning traveler often fails to bring satisfactory information and stregthens the belief in the necessity for personal inspection. We may confess that we have been taken by surprise by the unanimity of the enthusiasm aroused with persons differing widely in temperament and in tastes. A good deal of downright wicked work on the part of some of the daily newspapers, notably in the East, is being undone now by those who come home to relate their experience. Whatever may have been the shortcomings during the early days following the opening of the fair, they are now completely removed. The exhibition is a harmonious whole, beautiful beyond anything yet created by man in this country, and in grandeur surpassing any similar attempts at home or abroad. Architecturally and artistically the structures of the White City will prove a revelation and are likely to cause a reaction to a purer and chaster taste in our public buildings and private dwellings. We look forward to as decisive an influence upon the taste of the people as was that created by the Centennial Exhibition. Gaudy frills will not sell as well as they have done, and it will be a wise course on the part of manufacturers of goods ornamented in any way to closely watch developments in this direction.

Increasing Attendance.

Until now the visitors to the fair appear to have been drawn from a moderate distance of Chicago, while the majority of those who have traveled further than 200 miles are well-to-do people. From a study of those in attendance and talks with many people we are convinced that the rush has really not begun yet. That it is coming we have little doubt. Lower rates of fare, the steadily growing interest, and the fact that the vacation season is at hand, will all contribute to swelling the attendance. It is beginning to be understood, too, by the financially timid, that the tales of extortion rest on a very slim foundation. Experts who expect to be overwhelmed with novelties in their own special branch will be doomed to disappointment. Our technical press is too vigilant and too enterprising to permit of many startling revelations. But in these days of specializing, the manufacturer, the business man and the engineer can spend many hours profitably in an inspection of exhibits illustrating recent progress in cognate industries. But after all the main object and the principal achievement, from an educational point of view, of this like every exhibition, is the enlightenment which it brings to the masses, whose range of vision it expands, whose mental activity it stimulates and whose tastes it elevates. The World's Fair, which is Chicago's glory, is becoming the pride of every American, and is bound to have a wonderfully invigorating effect upon the people.

Ways and Means.

The increasing frequency with which members of organizations in the building trades meet together upon a purely social basis, or for the combined purposes of pleasure and business, may be taken as an indication that the fraternity at large is growing into a much truer relationship to itself, as regards the individuals which compose it, than it has ever before occupied. The custom which has been adopted by many of the organizations of serving lunch, or a dinner, on the occasion of regular meetings, and transacting the business over the cigars, has been peculiarly successful in bringing about two desirable results—full attendance and thorough discussion. It is a lamentable fact that, except upon extraordinary occasions, it is difficult to secure a full attendance by the members of any organization at regular meetings, and it is always a fact that it is difficult to secure active participation in debate from such members who are not ready speakers. The serving of a dinner before the business meeting obviates in almost every case both of these conditions, for it nearly always secures a large attendance and the incidental conversation and friendly warmth which prevail during the dinner paves the way for a freedom of expression and complete interchange of opinions which is difficult to secure where nothing has occurred to lead up to such freedom of speech. This custom of serving refreshments previous to the discussion of the business of a meeting has been in vogue among organizations in other lines of business, particularly in the East, for many years and has been attended with the greatest success. Various organizations of builders have followed this practice for some time with the most satisfactory results, and its use is suggested to organizations of builders as being most efficacious in securing the two most desirable features o a meeting—full attendance and free discussion.

Plasterers' Associations.

A good example of the benefit to the building fraternity at large, and in a direct line with the possibilities of organization which have been commented on in these columns frequently, is the establishment of a National Association of Plasterers. As a result of a gathering together of builders from all parts of the country at the annual conventions of the National Association of Builders the need of a national association of plasterers made itself felt, and because of the varied character of the delegates to these conventions the best possible opportunity was given for its establishment. Such events as these point out clearly the way in which organizations act; the needs of the fraternity become apparent and organization is the means through which they are supplied. Such phases as these fail to receive full recognition as being the direct outgrowth of organization, and exemplify many other similar benefits which are allowed to pass unnoticed and unidentified, as being one of the beneficent results of associated effort.

Manual Training.

In a recent conversation on manual training for boys, one who is interested in the management of a small trade school complained bitterly of the unexpected difficulties he met with in obtaining the consent of parents for their boys to attend the manual training classes provided for them. The school in question is designed to cultivate a taste for handicrafts in the younger lads of the eastern district, New York. The idea is to prepare the boys for eventually joining one of the more advanced trade schools with a view to entering some useful and remunerative mechanical trade, such as carpentry, painting, plumbing, sheet metal working, &c. Instruction is gratuitous, and the hours are so arranged as not to interfere with the daily work of boys who may be in other employments. Everything is done to interest them by providing lectures and entertainments, in addition to the practical instruction. But notwithstanding these inducements the parents, although mostly in the poorest circumstances, do not care to have their children trained for manual labor. Their preference is that they should learn bookkeeping, or in some other way be fitted for clerkships or kindred occupations. They are not far-sighted enough to look ahead into the future prospects of either kind of work, and it is a difficult matter to persuade them that the best interests of their children mostly lie in the opposite direction to that toward which they incline.

Dignity of Manual Labor.

Parents cannot understand that in training boys as mere writing machines or counter servers they are launching them on a market which is and always will be overstocked, while in fitting them for skilled labor they give them an education which, provided their moral and mental qualities are reliable, will insure for them steady and well-paying employment in the present, with the prospect of early independence and a position, when they have reached the upper rounds of their trade ladder, to which not one in ten among the more stylishly appareled crowd of clerks can ever aspire. The pecuniary advantages, present and future, of the skilled workman in such trades as are taught in manual training schools are in this way infinitely superior to those attaching to the average run of clerkships. But beyond and above this consideration there is, when rightly understood, a dignity and an ennobling character about the labor of the hands which recommends it to all honest and right-thinking minds as a thing to be admired, and which does not exist to the same degree in the so-called genteel occupations to which so many misguided youths of the poorer classes are devoted. "The dignity of labor," although a term too often prostituted to unworthy purposes by demagogues and agitators, so that to some noses it has acquired a stale and canting odor, is yet as true a phrase as ever gained currency. This grand expression needs to be put up in its rightful position in the sight of all the rising generation who may be inclining to bow at the shrine of kid gloved and stiff-collared gentility to the disparagement of the claims of honest and heaven-blessed manual labor.

American Institute of Architects.

By the time this issue of the paper reaches our readers the annual convention of the American Institute of Architects will be in progress at the new Memorial Art Institute in Chicago. The program laid out is an interesting one and the meeting should develop a large attendance, as many will very likely improve the opportunity of visiting the World's Columbian Expostion at that time. The secretary of the association issued to the members some time since a circular of information setting forth the rates for accommodation at various hotels and naming the Grand Pacific as the headquarters of the Institute. A large number of papers have been prepared for presentation at this convention, among those dealing with subjects of general architectural interest being the following: A Review of Chicago's Architecture; Engineering in Architecture; The Influence of Building Laws upon Architectural Development; Ethics in Architecture; A Review of Recent Plumbing Practice; Superintendence in Architecture; Foundations of Buildings; Fire Proof Construction and the Practice of American Architects, and the Aeration of Cities and Their Buildings. The authors of these papers are well known to the architectural profession and the proceedings promise to be of a highly interesting character.

British Imperial Institute.

A notable event in the commercial history of Great Britain and her colonies took place recently in London when the magnificent building, known as the Imperial Institute, was opened by the Queen in the presence of representatives from every part of the British Empire. The institution is an outcome of the jubilee celebrations which six years ago marked the fiftieth year of Victoria's reign. It is designed as a kind of focus to draw closer together the ties which bind the mother country and her colonies and dependencies, and, in the words of an official notice, "to be a meeting house for over-seas men when they come home, a show room and exchange for over seas produce, a great practical book of reference for information about every part of the Empire; bringing about a closer connection between its component parts by a variety of interests—commercial, social, intellectual and sentimental." The main scope of the institution is industrial, and the edifice will be a great trading fountain head, where the best and latest information regarding the various portions of the Empire may be obtained. Permanent exhibitions of goods have been placed there by the governments of all the British possessions, and it will contain an imperial museum. Large and handsome rooms are provided as conference rooms, where the representatives of the colonies may meet on important occasions, as well as other apartments devoted to the social objects of the institute. In these rooms colonists visiting England may, for a moderate subscription, enjoy the advantages of a high-class club, with the other special advantages which the institute is designed to provide. The idea has been enthusiastically taken up in all parts of the British Empire, and the colonists have entered fully into the spirit of the undertaking, the cost of the building, which was nearly $2,500,000, having been subscribed in a few months.

COLONIAL HOUSE AT FOREST HILL, N. J.

H. GALLOWAY TEN EYCK, ARCHITECT.

For Plans, Elevations, Details, Etc., See Pages 199-203.

STUDY IN COLONIAL ARCHITECTURE.

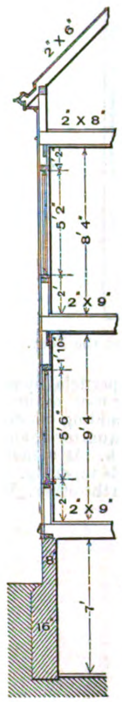
THE SUBJECT of our supplement plate this month is an interesting example of colonial architecture, as represented in the dwelling erected a short time ago at the corner of Elwood and Degraw avenues, Forest Hill, N. J. The building, which is equipped and finished throughout in a first-class manner, was constructed for architect H. Galloway Ten Eyck of Newark, N. J., from plans prepared by himself. Our readers will be able to form a very good idea of the features incorporated by inspecting the illustrations presented upon this and the following pages, representing, as they do, floor plans, elevations and constructive details.

The dwelling has under its entire area a cellar, which is 7 feet in the clear. The bottom is cement and the foundation walls of brick and stone.

Upon the first floor, as may be seen from an inspection of the plans, are four large rooms, a butler's pantry and a hall 7 feet in width, which extends from the front of the house almost to the rear. At the further end of the hall is the main staircase finished in hardwood and leading to the second and third stories. The landing of the staircase is lighted from the rear by windows of ornamental glass in leaded bars. At the left of the first flight is a closet, which can be utilized to good advantage for coats, hats, rubbers, umbrellas, &c. Each room on the first floor is readily accessible from the main hall, while the position of the dining room, parlor and library is such that they can all be thrown into one should occasion demand.

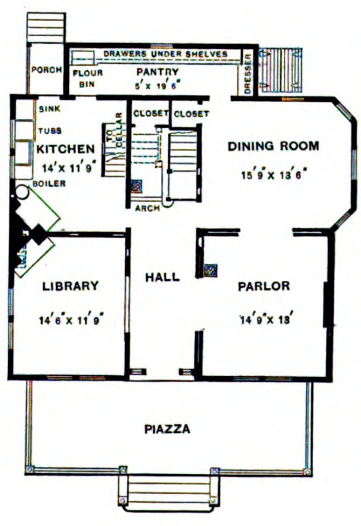
The second floor has four good-sized sleeping rooms provided with ample closet space and a bathroom fitted up in excellent style, the plumbing being exposed and the piping nickel plated. The attic has one finished room, with ample space for three others if desired. The finish of the house throughout is white wood in its natural color. The walls are adamant plaster, sand finish, and tinted in water colors. The flooring is 1 x 3 inch North Carolina pine.

In the construction of this house the sills, plates and corner posts are 4 x 6 inches, the first and second floor joist 2 x 9 inches, the third floor joist 2 x 8 inches, the rafters 2 x 6 inches, and

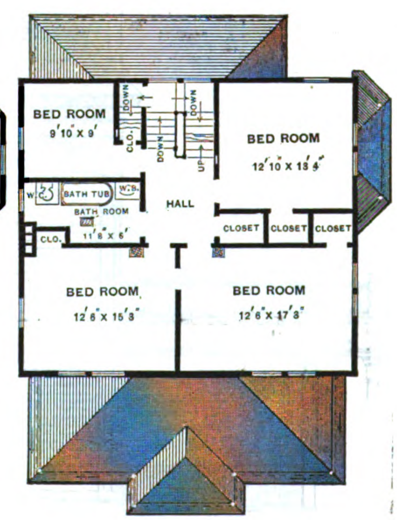


Section.

Front Elevation.

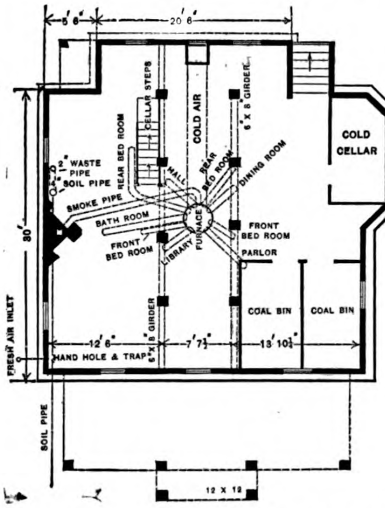


First Floor.

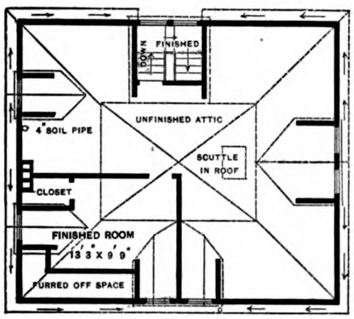


Second Floor.

Study in Colonial Architecture.—H. Galloway Ten Eyck, Architect, Newark, N. J.—Elevation.—Scale, 1/8 Inch to the Foot.—Floor Plans.—Scale, 1-16 Inch to the Foot.



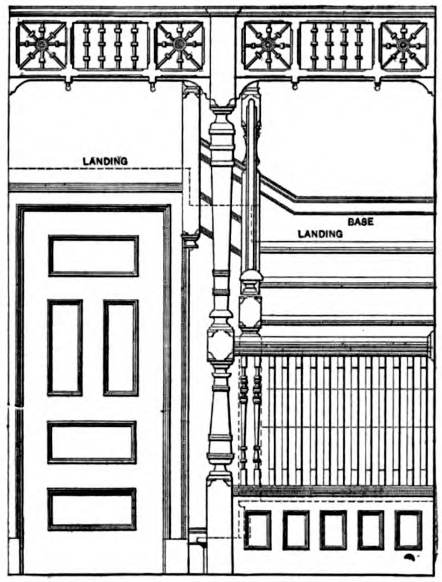
Foundation Plan.—Scale, 1-16 Inch to the Foot.



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

the outside and partition studding 2 x 4 inches. The girder in the cellar is 6 x 8 inches, resting on brick piers.

The outside covering is of 1-inch boards, put on diagonally, over which is laid water proof sheeting paper, and on this in turn are placed 6-inch white pine clapboards. The roof is covered with 18-inch sawed cypress shingles laid on 1 x 2 inch lath. The deck and piazza roofs are covered with tin. The house is heated by means of a furnace in the basement, the position of the floor registers being plainly indicated on the plans presented in this connection.



Main Stairs as Viewed from the Front Door.—Scale, ⅜ Inch to the Foot.

Board Measurement.

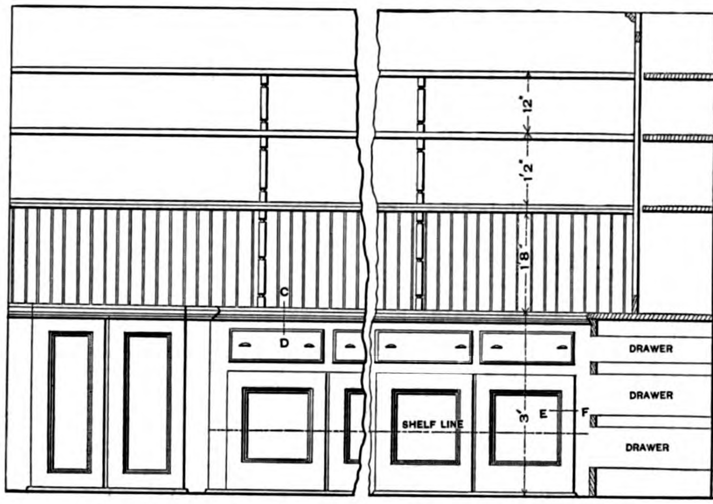
One of our exchanges gives the following relative to board measurement:

Boards are sold by superficial measurement, at so much per foot of an inch or less in thickness, adding one-fourth to the price for each quarter of an inch thickness over an inch. It sometimes happens that a board is tapering, being wider at one end than the other. When

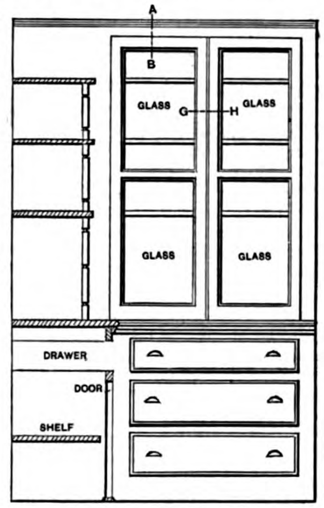
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Study in Colonial Architecture.—Plans, Elevation and Detail.

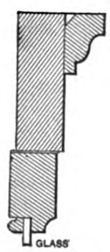
this is the case (if it be a true taper), add the width of both ends together, and half their sum will express the average width of the board. Again: if the board does not taper regularly, take the following course to find its area: 1. Measure the breadths at several places equi-distant. 2. Add together the different breadths and half the two extremes. 3. Multiply this sum by the straight side of the board and divide the product by the number of parts into which the board was divided. It is usual in measuring rough lumber to pay no attention to fractions of an inch in the width of the stuff. If the fraction is more than half an inch, it is counted as an inch; if less than half an



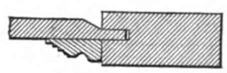
View of Pantry Looking toward the Window.—Scale, ⅜ Inch to the Foot.



View of Pantry Looking toward the Dresser.—Scale, ⅜ Inch to the Foot.

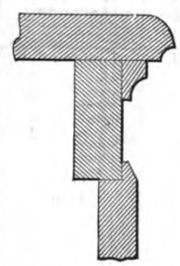


Section through A B.—Scale, 3 Inches to the Foot.



Section through E F.—Scale, 3 Inches to the Foot.

Section through G H.—Scale, 3 Inches to the Foot.



Section through C D.—Scale, 3 Inches to the Foot.

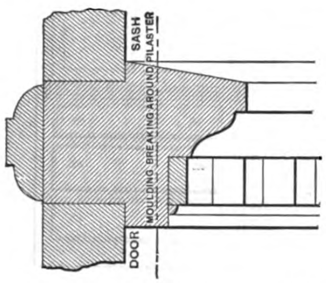
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Study in Colonial Architecture.—Elevation and Miscellaneous Details.

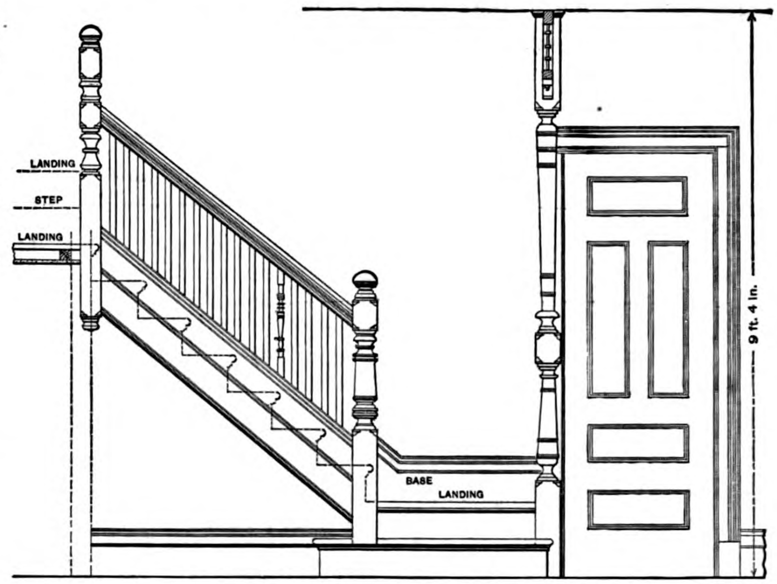
inch, it is not counted. Thus, a board $10\frac{5}{8}$ inches wide would be measured as 11 inches wide; if only $10\frac{3}{8}$ inches wide, the board will pass only as 10 inches wide.

Durability of Timber.

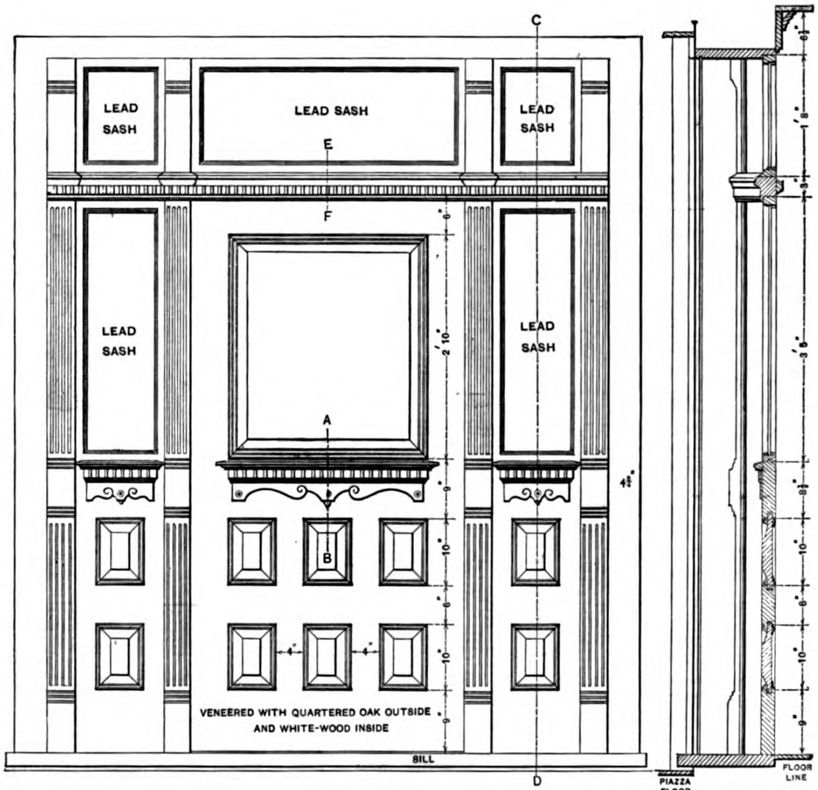
In situations so free from moisture that we may practically call them dry the durability of timber is almost unlimited, says an English exchange. The roof of Westminster Hall is more

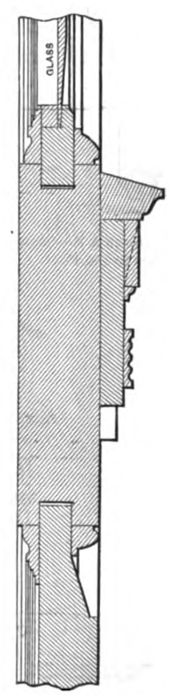


Section of Transom Bar at E F.—Scale, 3 Inches to the Foot.



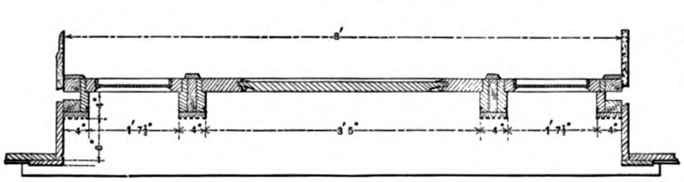
Details of Main Stairs.—Scale, ¾ Inch to the Foot.



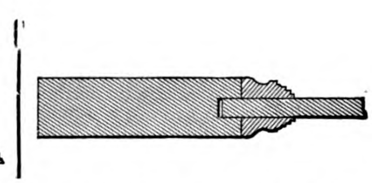


Section through Front Door on the line A B.—Scale, 3 inches to the Foot.

Elevation of Front Door and Section on the line C D.—Scale, ½ Inch to the Foot.



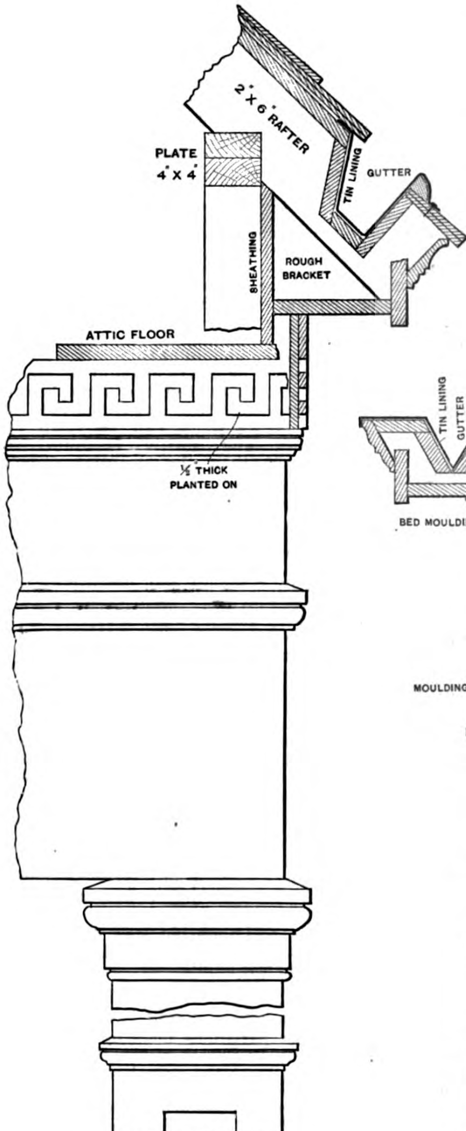
Plan of Front Door and Side Lights.—Scale, ½ Inch to the Foot.



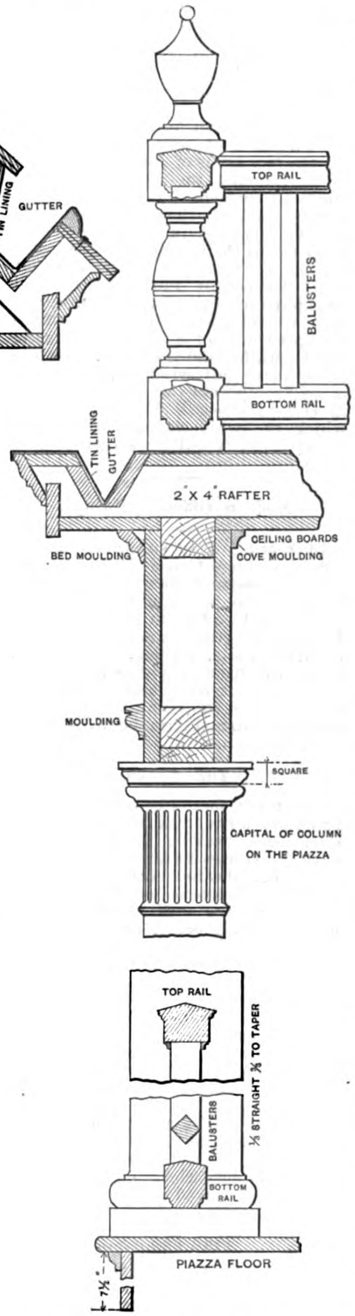
Detail of Inside Door.—Scale, 3 Inches to the Foot.

Study in Colonial Architecture.—Miscellaneous Details.

than 450 years old. In Stirling Castle are carvings in oak, well preserved, over 300 years of age. Scotch fir has been found in good condition after a known use of 300 years, and the trusses of the roof of the basilica of St. Paul, Rome, were sound and good after 1000 years of service. Wood constantly wet in fresh water is quite as durable. Piles were dug from the foundations of old Savoy Palace in a perfectly sound state after having been down 650 years. The piles of old London Bridge were found sound and perfect 800 years after they were driven. While the acidity of bog water retards decay it seems likely that part of the preservative property attributed to the stagnant liquid should be ascribed to the salts of metals or alkaline earths held in solution and deposited among the woody fibers. In the above situations the action of natural agents cannot be improved. But in certain other conditions man must resort to preservative processes to secure permanence of structure. When wood is damp we have to guard against dry rot. When wood is alternately wet and dry we have to guard against wet rot. When wood is constantly wet in sea water we have to guard against *teredo navalis* and *limnoria terebrans.*



Details of Main Cornice.



Details of Porch Cornice, Column and Rails.

Study in Colonial Architecture.—Miscellaneous Details.—Scale, 1 *Inch to the Foot.*

Window Design.

In one of our foreign exchanges recently appeared an article on window design, which we reprint as being of possible interest to our readers:

Little attention is given to the modes of setting out and spacing window openings. We find architects following a certain style with a blind adherence to some example rather than pursuing a definite principle in the design of their elevations. The rule of studying plan and elevation simultaneously hardly appears to be followed. An elevation is sketched out after the plan has been made, and the openings are left to take their chance. Lucky if they fall into anything like order or good spacing. The amount of light and the hight and width of each opening are questions that first demand the thought of the designer, as upon these points the relation of opening to wall space will be regulated. If the rooms are of some depth from front to back the windows ought to be proportionately large or high; but if shallow, they may be made smaller. Our remarks here, however, concern the design of windows in a façade as one of the means of expression, and this, it must be confessed, is a subject that has given way largely to question of mere style. There are, it appears to us, two main causes of failure in the design of our façades —1, the crowding of small windows, and 2, the want of distinctive character in their design.

CAUSES OF FAILURE.

A number of equal-spaced windows in a front is distracting and unsatisfactory, and is generally the mark of inferior design. The second fault has arisen mainly from the idea that an elevation is a given space which has to be filled with windows and pilasters and other decoration without any regard to solids or voids. The lesson for the designer to learn is the effect of altering the proportion of opening to solid walling, for if he once understands the result of the alteration, he can bring the resources of his art to the problem. Let us for a moment consider the subject in an experimental way. Suppose there are three windows, the two intervening wall piers being each, let us imagine, equal to the width of opening. Let us further imagine the windows to be perfectly plain openings in a flat wall, and, say, of the proportions of double squares. Above these openings are three others of similar size and proportions. The effect upon the eye is that there is as much solid as void, the windows look what they are, simply openings, and there is no design worthy the name of architectural in such an arrangement. A wall pierced by oblong apertures at regular intervals can have no design except mere mechanical division. There is enough of the wall to be recognized as such. We may surround each window with a molding or architrave, which will tend to disguise the hole-in-the-wall idea a little; but this framing does not alter the effect. But let us introduce a pilaster or a column in each of the two intervening solids, and the interest will be immediately centered on the piers. A little importance may be gained for the windows by placing pediments upon them, and converting their jambs into pilasters; but still the piers will retain their prominence, and the façade will be visibly enriched by the change—be made, in fact, architectural, the whole effect hightened. Any Italian Renaissance façade illustrates this kind of design. We may widen the piers, making them one and a half of the windows, but still they will not lose the essentially pier character, but if we widen them still more—say, to three-window widths—the wall character will return.

NARROW PIERS.

On the other hand, let us make the piers narrower. They will assume more and more of the mullion character. So that by this little trial we have learned two things: 1, by planting a column or a pilaster on a pier between windows we can change entirely the character of the design and convert the wall into a pier, altering entirely the hole-in-the-wall appearance; on the contrary, when the piers or wall spaces are widened the window becomes a feature, and attention is centered upon it more or less, according as it is pronounced by ordinances or decoration.

This general and broad division of the subject, therefore, naturally suggests, first, attention on the window opening, and, second, on the pier or mullion. When the window area is, therefore, reduced in comparison with the wall, the eye at once is arrested by it, its form and decoration, but when it occupies a large area proportionately the solids come into notice. This consideration may help architects to decide when they ought to pay attention to the external decoration of their windows, and how they might give some character and expression to their designs by taking into account the disposing of their piers and mullions. At present we see very muddling arrangements; some architects appear to think that there is no art in window distribution, that it makes little difference whether they are near one another or far apart; they imagine that close-set windows ought to have as much decoration as those with considerable wall space around them.

GENERAL TREATMENT.

Two things are pretty evident—namely, that in commercial buildings, in which large windows or open fenestration is necessary, the design of the elevation will be mainly in the distribution and arrangement of the piers or mullions; but when the apertures are small, these apertures require the chief consideration, and a large amount of ornamentation may be lavished on them. The window may be looked upon as a point of interest—like a framed picture on a wall. In the Italian Renaissance it may have the usual ordinances of engaged columns, entablature and pediment, with plinths and balustrade below, or the Palladian decoration, consisting of a pediment supported on consoles outside the architraves, which we may see in the Banqueting House at Whitehall, or the rusticated forms we see at Greenwich Hospital. All these are so many different ways of framing the window, and making it a distinctive feature on the decoration of the façade. The wall in this case is neutral and appears simply as a background to the windows.

We see buildings where the apertures are so distributed that no distinctive feature is made of them, and the wall space is frittered with pilasters and other ornament. These designs fail, because neither the pier nor the window has any distinctive character in the design. Many of the hotels in Northumberland avenue have been spoilt by non-observance of the simple rule, and the result is a confused arrangement, the eye is distracted by a multiplicity of small openings and details instead of being led to the windows or the piers.

EFFECTS OF SPACING.

The effect of spacing and distribution of window openings is one of the most powerful in the limited means of the phonetic in architecture. A building pierced by a few small apertures, like a fortress or a prison, has all the heaviness and gloominess characteristic of these structures. On the contrary, the open fenestral façade awakens sentiments of precisely the opposite character. Even the ignorant in architecture are affected variously by the proportion of wall to window. There is something austere and repellent in the crenellated and machicolated keep, gay and attractive about Henry VII's Chapel, or the King's College Chapel, Cambridge. The relation of solid to void appeals to our sympathies, and is one of those elements of the poetic in architecture which must ever be recognized.

In London, Manchester, Leeds, Glasgow, we have opportunities of studying the two kinds of fenestral composition referred to—the former the mullion treatment and the latter the pierced wall. In the commercial parts of the city and in Manchester and other towns the window has gradually become to mean an arrangement of voids divided by mullions, the wall disappearing in the demand for glass. Some times this style of façade assumes the appearance of a frame work made up of uprights and transoms, the apertures being all windows. We have many examples of this sort to be seen in Oxford street and in the city, in which the windows constitute large open panels divided by strips of masonry.

Modern Office Buildings.

In treating of the subject of modern office buildings, George Hill presents a series of recommendations as to the materials to be employ d, which is likely to interest many of our readers. He says the frame should be of mild steel, columns, girders, beams, &c., using the usual commercial shapes. The various parts should be riveted together, and the column connections so made as to maintain the full strength of the column.

THE WALLS.

The walls should be made with buff brick and terra cotta fronts and common brick backing for the façades, with the stories forming the basement of stone if desired, although this requires a judicious selection of the stone. The rear walls should be made with common brick, and the courts either lined with enamel brick and with the beds and builds made flat, which would be the case wherever the courts are internal ones, or else painted three coats of paint, finishing with one coat of enamel paint. The facing brick, where of a different size from the backing, should have every brick anchored with a Morse wall tie as often as the courses fall even. The inner faces of the walls that are exposed to the weather should be furred, using the usu l 2-inch furring blocks, the usual hollow bricks of Haverstraw size having proved to be a delusion, so far as excluding moisture goes.

FIRE PROOFING.

The fire proofing may be either of the hollow flat arches, familiar to all, or of the new Manhattan type, either having proved to be good. The blocks, if used, should be so used as to fill up nearly the entire space between the flanges of the beams so as to require the minimum of filling, and the pipes and wires run in shallow channels run in the under flooring. The columns should be fire-proofed either by the use of slabs of fire clay, each slab securely wired to the others in the course, or else the column should be outlined with small L's and wire lath stretched over and plastered thoroughly, the writer's preference being for the wire lath and plaster. Every portion of the frame should be so treated, including the columns that are so laid out as to aid in the wind-bracing, and especially covering all columns that are inclosed in stone. If the framing is carefully laid out the beams will so come that it will be practicable to show them, using either high skewbacks or the Manhattan arches without the hung ceiling below, thus effecting a small economy in cost.

FLOORING.

The flooring in the halls should be either a marble mosaic or else a granolithic laid with a marble border, there being a small difference in favor of the granolithic. The toilets should be similarly treated. In the offices the flooring should be of Georgia yellow pine left untreated, but, of course, mill-dressed and carefully laid.

PLASTERING.

The plastering should be a rock plaster, hard finish, with the plaster carried into all jambs and reveals, with the corners rounded off and a small cove at the ceiling, say of 6-inch radius. The partitions should be made of a rock plaster put on corrugated iron lathing supported at intervals of about three feet by means of small channels or I's secured to the floor arches above and below. These partitions are but two inches thick, can be easily re moved, and should be somewhat cheaper than the ordinary 4-inch blocks.

FINISH.

The trim should be of white oak, filled, hard oiled and rubbed to an egg-shell finish, the base being made about 1¼ by 8 inches and the architraves about 4 inches wide over all, with a backing and back mold carried down to the floor, affording something for the base to stop against and mitering around all openings. The window trim would be similar in character, with the inner molding carried around across the top of the base and under the stool cap, so as to form a small panel under the sill. Chair rails and picture moldings are matters of choice, and the former is seldom of any great use.

HALLS.

The halls should have either a Keene's cement or Mycenian marble wainscot with marble base and cement cap, or the rock plaster can be run for a cap and a marble base put in, and then the space between painted with an enamel paint.

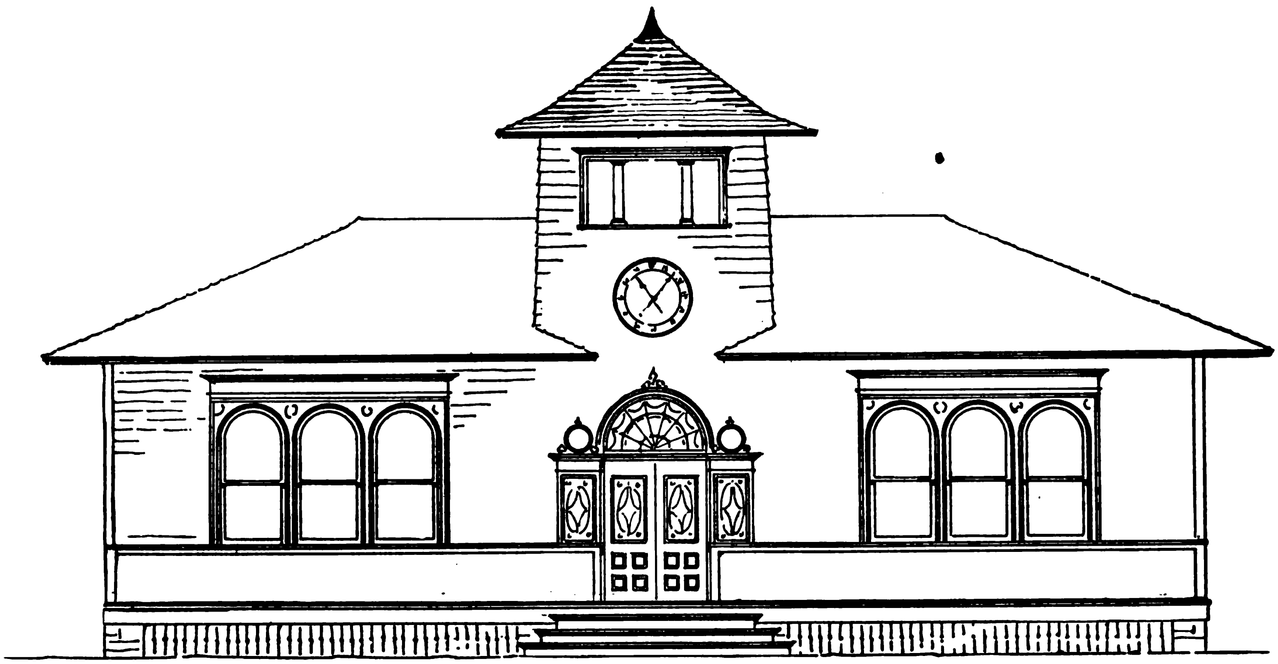
LAVATORIES AND CLOSETS.

The toilets should have the water-closet partitions made of oak carried about 10 inches above the floor on brass legs; the urinal stall should be made of marble and the urinals either the long-lipped urinal with the "Parsons" flushing tanks for each stack, or else Mott's Shank patent with individual tank. The water closets should be either a wash-out closet or else a pedestal hopper, with the seat simply a wooden rim carried on brass brackets and a copper-lined wood cistern. The wash basins should be oval, with the patent overflow and half S traps close under the fixture, with the supply pipes placed close under the slab and with shut-off cocks for each one.

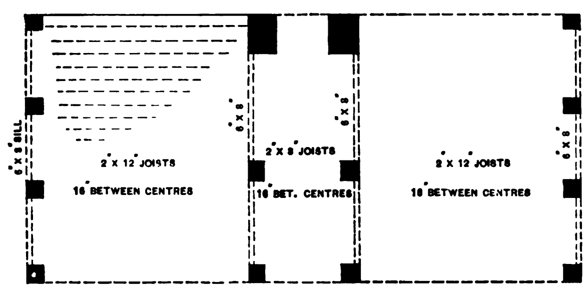
THE Department of Architecture of the Massachusetts Institute of Technology has recently completed arrangements with M. Despradelle, a distinguished graduate of the Ecole des Beaux-Arts, to take the position of associate professor of architectural design, made vacant by the death of M. Létang.

DESIGN FOR A $1500 SCHOOL HOUSE.

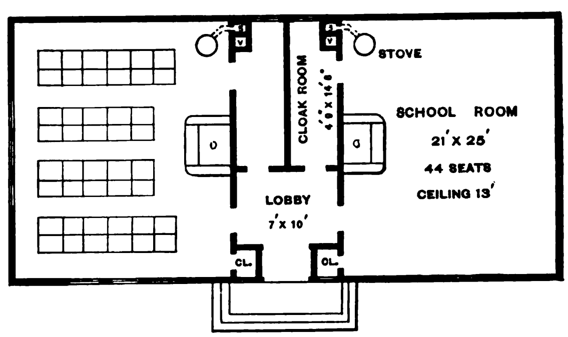
We have pleasure this month in laying before our readers the second prize design in the School House Competition, the author being Louis G. Ditroe of Cincinnati, Ohio. An inspection of the drawings submitted shows that the main floor is divided in such a way that the pupils upon entering the structure can pass into the class rooms or directly to the cloak rooms, as desired. Each of the latter apartments measures 4 feet 9 inches by 14 feet 6 inches, while the class rooms are each 21 x 25 feet in area, and affords accommodation for 44 pupils. From the author's specification we learn that it is the intention to construct the piers, which are to be carried 3 feet below the grade, of limestone, and the exterior face to be neatly pointed. The timber employed is to be, for the most part, of white pine, the floor joists in the class rooms being 2 x 12 inches; the floor joists in the cloak rooms, 2 x 8 inches; the ceiling joists of the two apartments, 2 x 6 inches and 2 x 4 inches respectively; the rafters of the main roof, 2 x 6 inches, and the studding and tower rafters, 2 x 4 inches, all placed 16 inches on centers. The floor joists are to have two rows of bridging to each long span. The frame for stacks is to be of double joist, and the roof is to be sheeted with $\frac{7}{8}$-inch stuff, covered with shingles. All windows are to be box framed with $1\frac{3}{8}$-inch sash, and good quality locks, weights and sash chord. The walls and ceilings of all rooms, closets, lobby and vestibule are to be lathed and plastered as three-coat work. The interior and exterior wood work, except shingles and floor, is to be painted with three coats of lead and oil. The color of the exterior is to be Indian red ground with dark green trimmings. The interior wood work is to be a light green.



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



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



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

Design for a $1500 School House.—Louis G. Dittoe, Architect, Cincinnati, Ohio.

DETAILED ESTIMATE OF COST.

The following detailed estimate of cost, furnished by the author of the design, is of interest in this connection:

	Quantity.	Price.	Total.
Excavation	12 cub. yds.	$0.25	$3 00
Masonry	10 perches.	4 00	40.00
Brick work	2,400	10.50 M.	25.20
Stone copings	2	1.75	3.50
Plastering	504 sq. yds.	.25	126.00
Painting	590 sq. yds.	.18	106.20
Glass	302 sq. ft.	.05	15.10
Hardware, including nails	....	....	28.00
Tin Work:			
Hanging gutter	232 feet.	.10	23 20
Fall pipe	60 feet.	.10	6.00
Flashing, &c	50 feet.	.06	3.00
Carpenter Work:			
Floor joists, 2 x 12 inches, school rooms	1,936 sq. ft.	....	....
Floor joists, 2 x 8 inches, cloak rooms, &c	352 sq. ft.	....	....
Studding, 2 x 4 inches, walls and partitions	1,708 sq. ft.	....	....
Rafters, 2 x 6 inches, main roof	1,528 sq. ft.	....	....
Rafters, 2 x 4 inches, tower roof	675 sq. ft	....	....
Ceiling joists, 2 x 6 inches, main ceiling	980 sq. ft.	....	....
Ceiling joists, 2 x 4 inches, cloak rooms, &c	130 sq. ft.	....	....
	6.709 sq. ft.	17.50 per M.	117.41
Weather boarding	2,800 sq. ft	2.25 hund.	63.00
Shingles	15,200	.45 hund.	68.40
Sheathing for roof	2,080 sq. ft.	2 50 hund.	52 00
Sheathing for sides	2,240 sq. ft.	2 50 hund.	56.00
Cornice strips, &c., 1⅛-inch thick	350 sq. ft.	.05 sq. ft.	17.50
Interior finish, ⅞ x 4 inches	112 lin. ft.	.04 feet.	4.48
Base, ⅞ x 7 inches	270 lin. ft.	.05 feet.	13 50
Doors, plain, 1⅜-inch thick	10	2.75	27.50
Doors, glass panel, 1¾-inch thick	2	5.00	10 00
Door frames, plain	10	1.50	15.00
Window frames, triple	4	28.00	112.00
Window frames, ordinary box	2	4.50	9.00
Front door frame, transom, side lights, sash, &c.	1	....	25.00
Flooring, ⅞ x 3 inches	1,350 sq. ft.	2.50 hund.	33.75
Material for platforms and steps	....	....	6.00
Wainscoting, ⅞ x 5 inches, matched and beaded 3 feet high	800 sq. ft.	.04	32.00
Inscription panel, in place of clock	....	....	4 00
Carpenters' labor	....	....	450.00
Total cost	....	....	$1,495.74

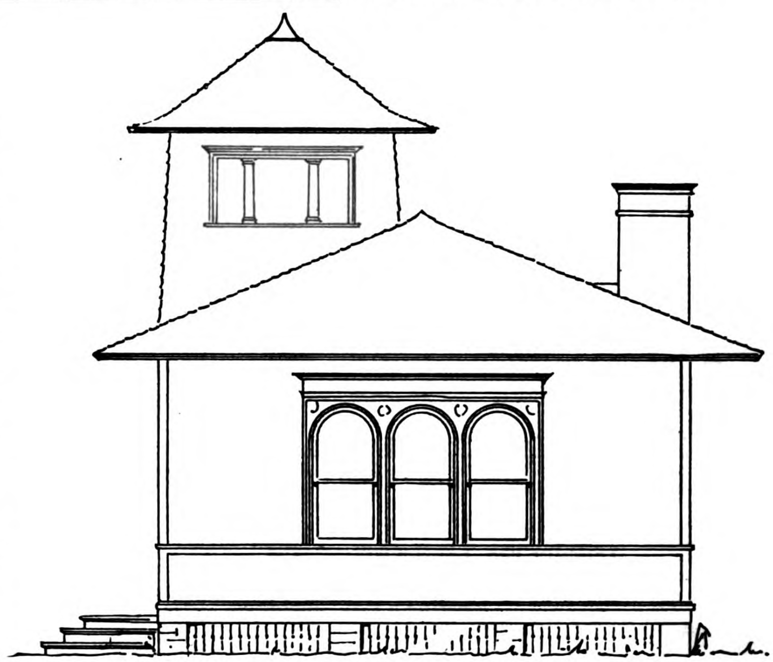
An Old New Jersey Dwelling.

The oldest dwelling house now standing in the State of New Jersey is located at Oxford Furnace, it being the large mansion directly opposite the store of the Oxford Iron Company. It is known as the Flower House, and is know to have been built in 1742 by William Shippen, who had some time previously received a grant of 10,000 acres of land from King George of England. The mansion consists of two stories and a basement, with walls 3 feet thick. It was built to stand the ravages of time, and so well has it faced the storms of 151 years that to-day it is in a wonderful state of preservation. The great chimneys that start from the cellar and rear themselves far above the sloping roof, resemble huge towers built within the house. The fire places, seven in number, are large openings in the chimney walls and are lined with iron plates. The back plates are ornamented with the British coat of arms. When changes were made in the old house several years ago these fire places were walled up. John Jourdan, a Philadelphia banker, spent a summer at Oxford Furnace some years ago, says one of the New York dailies, and while being shown through the house he noticed the coat of arms on the middle iron plate of the only fire place not closed up. He received permission to remove the plate, and it now forms part of an interesting collection owned by the Philadelphia Historical Society. The Shippen family, who originally built this house, came from England and settled in Philadelphia about the year 1735. They were a wealthy family, and moved in the best society. During the Revolutionary War, while Philadelphia was in possession of Lord Howe, Dr. Shippen's was the social headquarters of the officers. Dr. Shippen's daughter Peggy married Benedict Arnold. William Shippen, who built this house, was a son of Dr. Shippen and a brother-in-law of Benedict Arnold. He occupied the house for a number of years with his family. Every fall friends would visit him from New York and Philadelphia, and a grand hunt with hounds would take place. All during the winter the old stone house would echo with sounds of revelry, as the guests warmed under the stimulating effects of the well-filled wine cellars.

In this old stone house Judge Robeson lived for some years, and here his son, Gen. George M. Robeson, Secretary of the Navy under President Grant, was born.

Tradition says that Shippen was never married to the woman with whom he lived at Oxford, although several daughters were born to them. He did, however, provide each with a marriage portion. Shippen's wife—if she were his wife—was very fond of wine, and under its mellow influence would become extremely hilarious. Shippen concluded that he would break up these orgies by locking the wine cellars. But she proved more than a match for him. During his absence she set one of the colored male servants at work to cut a hole through the stone wall that separated the kitchen fire place from the wine cellars. He first removed the iron plate emblazoned with the British coat of arms from the back of the fire place, and then with pick and crowbar he made a hole large enough to admit the woman's body. After drawing a supply from one of the casks she would return to the kitchen and slide the iron plate in place.

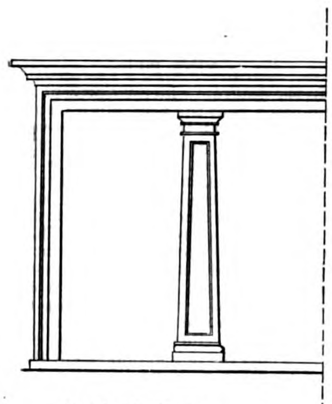
Dr. Shippen did not end his days in Oxford. It is more than probable that he returned to Philadelphia, the home of his ancestors. After his departure the old house and the magnificent surroundings fell into decay and passed into other hands. As the years sped by many owners lived in the old stone house, great changes came about, until to-day the grand mansion of a century and a half ago is nothing but an ordinary boarding house. The walls are as firm as when first built and there is no doubt that they will last a century more.



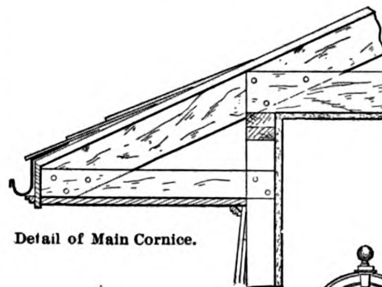
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Design for a $1500 School House.

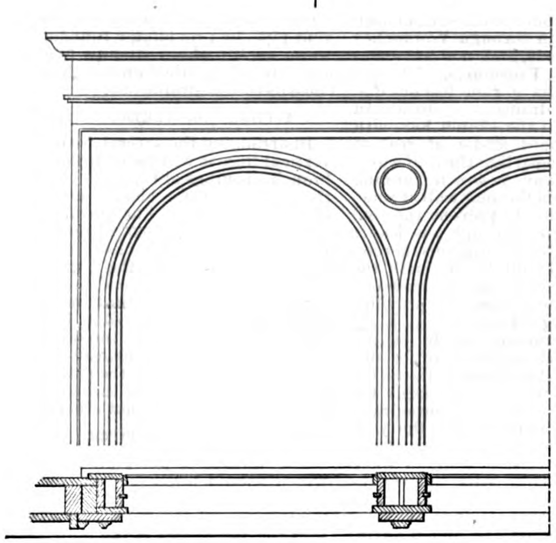
THE FASHION of staining white pine in imitation of more expensive woods is not in good taste, says a Southern architectural paper. The sham is at once apparent, and the effect is garish and vulgar. White pine itself is a beautiful wood for interior finish if properly treated, but the soft, silky texture of the grain is spoiled by the attempt to imitate walnut or cherry. Where other than the natural color is desired, artistic effect may be produced by some of the aniline dyes, and staining in the various tones of green. Light brown and yellow preserve the texture and grain of the wood, and may be made to harmonize with any ordinary surroundings.



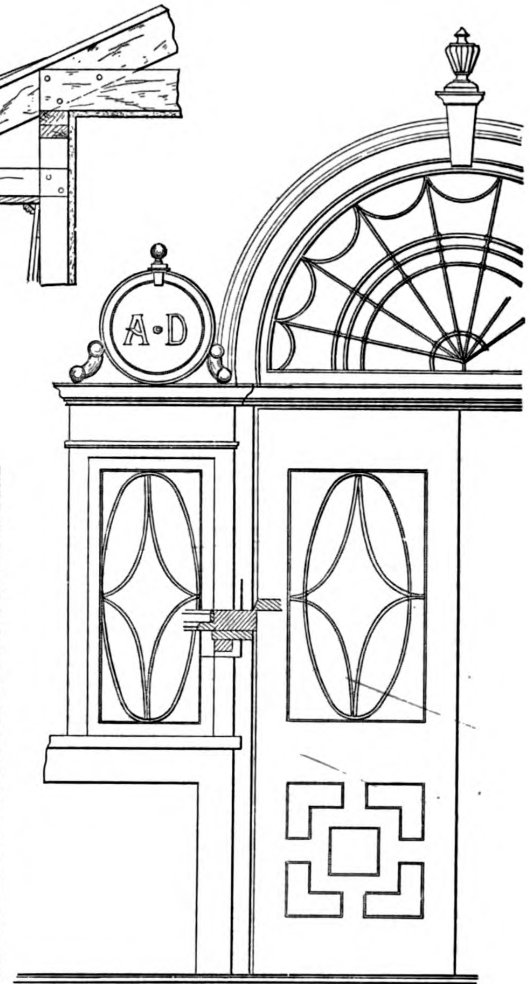
Opening in Tower.



Detail of Main Cornice.



Section and Elevation of Triple Windows.



Details of Front Doors.

Miscellaneous Details of a $1500 School House.—Scale, ⅛ Inch to the Foot.

Architectural Revivals.

Architecture must be studied as a living thing, not as a dead language, says T. G. Jackson in the *Nineteenth Century*. The Gothic Renaissance has done its work. With all its faults and extravagances it has been the parent of all that is good in our modern architecture. It formed an inevitable stage in our reawaking from the state of coma into which all art lapsed under the Regency. No revival of art has at any period come about except in this way; it has always begun by the attempted revival of a bygone and dead style. It was so with the attempted Renaissance of the dead Roman art by Charlemagne and the Lombards, which failed in its prime object, but resulted in the new and living Gothic of the Middle Ages. It was so again with the Italian Renaissance of the fifteenth and sixteenth centuries, which again began by a servile worship of the antique, but ended by filling Europe with a neo-classic art almost as far removed from the Vitruvian model as Gothic itself. And so it will be with us if we turn our opportunities to good account.

We began by careful and even slavish reproduction of Gothic architecture, hoping and believing that we should breathe new life into it and make it rise up and walk. We have tried it with Tudor, with fourteenth century work, with early French, with thirteenth century geometrical, with all the phases of Gothic — English, French, Italian, German, and even Spanish; and yet, though we have managed to get our figure on its legs and prop it upright, it refuses to walk, and we are as far from making it live as we were 50 years ago; live, that is, in the sense of being a spoken vernacular art in which everybody—architect, builder, mason, cabinet maker, hedge-carpenter — naturally and inevitably expresses himself without stopping to choose his style, his methods and his forms. And so, history tells us, it must be.

The dead Gothic will never live again any more than the dead classic, but from its ruins ought to arise, and will arise if we work honestly and rationally, and not like mere antiquaries and copyists, something new, something that lives, a modern art which will be to us what the bygone styles were to those who speak to us through them. Signs are not wanting, especially here in England, that this new growth has begun; let it be ours to secure it freedom for its development, and to save it from being stifled by the dull load of professionalism.

THE wooden parts of tools, such as the stocks of planes and handles of chisels, are often made to have a nice appearance by French polishing, but this adds nothing to their durability, says an exchange. A much better plan is to let them soak in linseed oil for a week, and rub them with a cloth for a few minutes every day for a week or two. This produces a beautiful surface, and at the same time exerts a solidifying and preserving action on the wood.

PLUMBING FOR A CITY HOUSE.

THERE are doubtless many of our readers who, while not actually called upon to execute the work, are interested in the method by which the plumbing of a house is installed and in the provisions which are made for adequately ventilating the system of piping employed. They are also interested for the reason that many of them have more or less to do in preparing the way for the plumber, who requires not a little carpenter work to be done before he can properly place the piping and fixtures in position. In making provision for the plumbing work the carpenter who desires to see a well-finished job will bear in mind the fact that where a large pipe or a series of smaller ones is to pass, the framing should be done in the same general manner as around a chimney or flue, rather than by cutting huge chips out of joists, beams, studs, &c., and thereby weakening them to that extent.

As showing what constitutes the system of house plumbing as prescribed for the city of New York we present the following, which covers many points of interest and value to the members of the building trades.

In selecting the class of house for illustration care has been taken to avoid extremes. The sectional view herewith presented is that of a popular style of private dwelling (a three-story and basement house) which is largely in vogue in the newer portions of this city, and is better calculated on that account to correctly represent the number and arrangement of fixtures throughout the building.

As it is always better to commence at the foundation, the house drain in the cellar and the soil, waste and vent pipes, rising therefrom to above the roof, claim first attention. The diameters of these pipes, respectly, are: The house drain, carried diagonally alone the wall, is 5 inches the vertical line of soil pipe into which the waste matters from bathroom and kitcqen fixtures discharge, 4 inches; the vertical line of waste pipe receiving the discharge from basins, 2 inoles; while that of the vent pipe, in each case for soil and waste pipes, is 2 indhes The fresh-aia inlet pipe, which is set on the inlet side of the running trap on the house drain, is also 4 inches, and all of the iron pipes supposed to be of the grade known as "extra heavy."

THE HOUSE DRAIN.

In setting the house drain in position, care must be exercised that the descent is uniform, and as steep as the depth of the sewer in the street will allow without prejudice to the proper level of the trap at the front wall, the seal of which might be otherwise destroyed. Unless under exceptional circumstances, the house drain should be carried either along the ceiling, properly supported by pipe hangers bolted to the beams, or, as in the appended diagram, along the wall. The opening in the front foundation wall through which the drain is carried to connect with the house sewer outside the building should be larger than the outside diameter of the pipe, and the upper part thereof protected by a slab to prevent possible injury to the pipe by the settling of the building. If the house sewer—that is, the branch sewer from the house wall to the main sewer in the street—is earthen pipe, the iron pipe from the cellar should be carried so far beyond the house line, before connection with the earthen pipe is made, as to avoid all danger of breakage through the weight of area walls or steps above the earthen pipe.

In accord with New York Health Department rules, a disconnecting trap is set on the house drain, inside the front wall, for the purpose of serving as a barrier to the entrance of sewer gas into the pipe system of the house. This is a running or half S-trap, same quality and diameter as the house drain, and furnished with a hand hole hub for cleaning purposes on the inlet or house side. This hand hole is fitted with a gas-tight brass cleaning screw, which can be opened when required for the removal of obstruction from the trap. If the trap supplied is what is known as a double-hub trap—that is, with a hub opening on both the inlet and outlet side, the latter opening should be closed by means of an iron plug calked in in the usual manner. Both of these openings are, however, sometimes utilized, the one on the inlet side for connection for the fresh air inlet, and that on the outlet side as a cleaning hole, but this is a dangerous arrangement, as the latter opening is in direct communication with the street sewer, and if opened in the cellar for the purpose of removing obstructions from the trap, sewer gas, during such removal, will have unrestrained entrance into the building, and the trap as a preventive will become worse than useless.

The house drain should be well supported, and when carried along the cellar wall, as in the diagram, a pipe hook should be supplied for every 5-foot length, so as to relieve the joints from strain, and it is advisable where vertical pipes discharge into the house drain to have a brick support built at that point for the same purpose. The vertical or rising lines of soil and waste pipe should always discharge into the house drain through Y-branches and one-eighth bends, and not as sometimes done through T-openings. It is also good practice to have rain leaders dis charge into house drains, so as to aid in cleansing them. In the sketch herewith the 4-inch galvanized leader at rear of building is so arranged that the roof water is utilized in this way, a 4-inch running trap being set inside the rear wall at junction with drain pipe to prevent the foul air from escaping up through the leader and entering windows contiguous thereto. The leader trap should be set with the hand hole for cleansing on the leader or inlet side and should also be provided with brass cleaning screw.

Yard and area drainage has to be provided and the serface water to be discharged through the house drain, the branch drains to be trapped inside the cellar before they enter the house drain. If the yard level inlet permit, the yard drain can connect with the leader at the bend where it enters the wall, in whch case the leader trap will answer the double purpose. If the yard drain his to be brought into the cellar from some other point, it must be independentl trapped before it connects with the house drain, and the same rule is applied to the front area drain, which must be trapped and discharged into house drain on the inlet side of trap at front wall. By this arrangement the roof water and the surface water of yard and area are utilized to keep the house drain properly scoured. Drains with perforated plates are set in the yard and area drain pipe.

FRESH AIR INLET.

The fresh air inlet pipe is inserted in a T-opening set in main drain on house side of main trap. It is intended to provide a current of fresh air for the pipe system in the building, and with this object in view it is carried, in this city, to the sidewalk near the curb, and the opening, which must be at least 10 feet from nearest opening, is covered with a metal grating. The hub of the T in the cellar, into which the inlet pipe is calked, should invariably be set perpendicularly. Sometimes it is set in the side of drain pipe, or horizontally, which is not good practice, as in the latter case the sewerage, if checked in its flow at the trap on main drain, will naturally turn aside into the inlet branch and by clogging the opening render it useless as a passage for fresh air. This cannot occur when the T is set in an upright position. And inasmuch as the regular flushing of the main drain will have little effect in cleansing the inlet, a recurrence of stoppages will in time render the inlet pipe of no value. In country places, however, better facilities offer for making the fresh air inlet pipe useful, and care should be taken that it is not omitted from the house plumbing system.

VENT PIPES.

In the diagram which we present it will be noticed that the vent pipes which are intended to vent the traps in the vertical soil and waste pipe lines, instead of starting upward from above the traps of the lowest fixtures, in each case they commence below the lowest fixture, starting from a Y-branch connection with the soil and waste pipes respectively. This is a rule adopted by the Health Department to afford means of disposing of the rust from the inside of the vent pipes, which is liable to settle in the lowest trap on the line. This, in many cases, is but a 2-inch trap, which would readily become choked up. Under the new arrangement the iron rust or other matter falling through the vent pipe, instead of lodging in a trap, is carried down into the house drain through the Y on soil and waste pipe and is carried away with the sewage into the street sewer. This arrangement of the vent pipe, by providing a foundation, as it were, makes the vent pipe firmer than under the old method and on the whole is considered a desirable one.

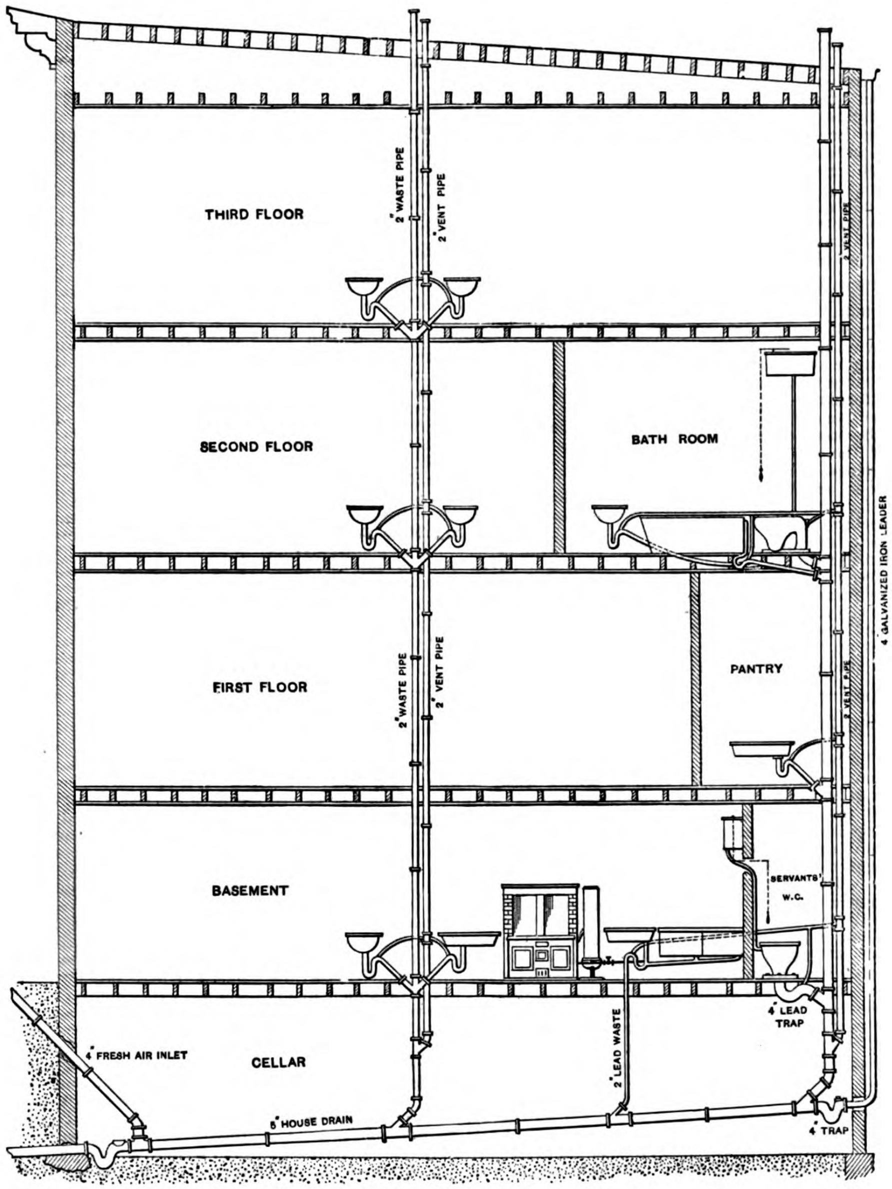
FITTINGS ON VERTICAL LINES.

In arranging the several fittings on the vertical lines it will be seen that separate branch openings are always called for in the case of water closets unless where space is limited. For instance, in the bathroom, as illustrated, a 4-inch Y-branch is provided for water closet and a 2-inch separate opening for the bath and basin waste. If circumstances, however, prevented the insertion of the 2-inch Y-branch in the vertical soil-pipe line, it would be permissible to discharge the wastes of the bath and basin into the lead soil pipe of water closet provided the discharge pipe was made to enter on the outlet side of the water-closet trap, not otherwise.

TESTING PIPES.

The testing of the pipes is something which should never be overlooked. The methods most in use are by water and air while some of the more advanced claim that the smoke test is the best. We will confine ourselves to the two former methods, and will first deal with the water test. As the success of the test depends on how the joints are made, the plumber must bear in mind that a large quantity of oakum put carelessly in the hub and molten lead indifferently calked in will not resist the pressure of a column of water in the pipes. The joint must be made by using just sufficient oakum to form a bed for the lead, and ramming it so tightly home as to prevent any of the lead forcing its way through the joint into the pipe. For every inch in the diameter of the pipe 12 ounces of lead are required, all of which should be poured into the joint at once, as it is of very questionable advantage to make a second pouring of hot lead over the cold lead in the joint. For a 2-inch joint in iron pipe 1½ pounds of lead are required, for a 4-inch joint 3 pounds of lead, and for a 5-inch joint 3¾ pounds. The size of the ladle to be used will therefore be readily understood by the plumber. It is very desirable that the entire system of soil, waste and vent pipe, both lead and iron, should be tested at once. This can be done by securely plugging the opening of the house drain on the outside of the building before it is connected with the sewer, capping all the lead wastes before attaching the fixtures and then filling up the pipes to the roof. If the test is satisfactory every joint, both those of the iron pipe and the ferrule work, may be relied upon as proof against sewer gas, while if there is weakness in any joint or a defect in any of the pipes it will be readily detected. If from inability to cury in inches, each inch being considered equivalent to ½ pound pressure to the square inch. When the pressure test was first introduced the New York Health Department required 10 pounds, equal to a 20-inch column of mercury, but this extreme requirement has been modified and a 5-pound pressure test is now considered satisfactory. If a joint is suspected of leaking during the air test an application of soapy water will readily enable the plumber, by the appearance of air be made, when setting up the vertical line of vent pipe, that the T openings to receive the trap vents are set sufficiently high to secure that incline without having to set the trap further from the fixture than good practice warrants, in order to secure the desired result.

The water closet in bathroom, which is presumably of porcelain, the trap and bowl in one piece, needs careful setting. The soil-pipe branch from closet to 4-inch opening in vertical soil pipe is lead, not



Sectional View Showing Plumbing for a City House.

procure water the air test is applied, the plugging is to be done in the same way, except that a piece of gas pipe is inserted in the plug in one of the hub openings and either a pressure gauge or a mercury gauge is attached. The air pump, connected with the gas pipe by a rubber tube, is put to work and air pumped into the pipes until the required pressure to the square inch is obtained. In determining this pressure preference is given to the mercury gauge, the pressure being indicated by the hight of the column of mercury bubbles, to locate the exact spot where the application of the calking tool is required.

SETTING FIXTURES.

The fixtures represented in our diagram do not need much reference, if we except those in the bath and kitchen. In setting these in position it is desirable that each trap be as near as possible to its respective fixture, and the vent pipe from the crown so inclined that water of condensation will drain into the trap. Provision should less than 6 pounds to the square foot (the Health Department calls for 8 pounds) and is flanged over at bathroom floor level on a brass floor plate having a 4-inch opening, the edges around which are usually countersunk to admit of the lead flanges. The closet is set on this floor plate, a rubber gasket or a cushion of red lead putty being set between the closet and the plate, both of which are then bolted together. Some of the floor plates have the edge of the opening in plate beveled instead of countersunk, in which case the lead soil pipe is not flanged over, but is cut flush with the plate and the beveled space filled with solder, uniting floor plate and soil pipe in an effective manner.

The servants' water closet is a flush rim hopper set in a compartment entered from the yard. The 4-inch lead trap, properly vented, is under floor and discharges into soil pipe in cellar. The cistern for flushing is set in the kitchen, over the washtubs, the chain and pull being brought through the wall. This is done to prevent the water in cistern freezing, which would be almost certain to occur if set directly over closet bowl. One trap suffices, under Health Department rules, for the sink and the washtubs in the kitchen, the 2-inch lead waste pipe from the tubs discharging into the sink waste pipe above the trap on the inlet side, which in turn empties itself through a Y-branch into the house drain in cellar.

Safes under fixtures and the safe wastes leading to the cellar are omitted from the diagrams, but plumbers, as a rule, know all about them.

PIPES ABOVE ROOF.

In extending the vertical lines of pipe above the roof care should be taken to avoid the use of offsets, owing to the danger of lodgments of snow, and the resultant danger of being closed up by the formation of rust. The pipes should be extended full-bore straight through the roof—the hight of the extension of the soil (or waste) pipe and the vent pipes terminating at different levels, so as to avoid the consequences of down drafts—that is, the foul air discharged from one pipe being carried back into the dwelling by the other. Until recently the Health Department required all pipes 4 inches or more to be increased 1 inch in diameter above the roof, and no roof extension to be of less caliber than 4 inches. At the present time no enlargement of pipes above the roof is called for.

The Doorway in House Construction.

A very important feature of the house in more than one respect is the doorway. It is, in fact, a most prominent part of the structure, says *Trefoil*, and only too many are the possibilities between making it a work of art like the masterpieces of Ghiberti on the Baptistery in Florence, or leaving it a mere aperture in a monotonous expanse of wall, which reminds us forcibly of the hole in the fence or the crude entrance of a tent, from which the door doubtless took its origin.

In many instances the entire effect of an otherwise pleasing structure is hopelessly marred by the treatment accorded the doorway, and more than one façade is reduced to the commonplace by the utter neglect or the architectural decoration to which the door, if any part of the building, is most legitimately entitled. To the eye, the doorway and the roof line are the critical points in a building, and the good treatment of either will do much toward remedying the defects of a poor design.

It will hardly do, however, to blame the architects for the stagnation of public taste for half a century in regard to architecturally meritorious doorways. In this country, particularly among a class of owners that, above all others, might have done so much to bring about the much needed revolution of an architectural sense, art has been subjected to rules and restrictions that might aptly apply to card etiquette, but the effect of which upon architecture can only be deplored. When a doorway essentially ugly has come to be considered the only proper thing by a vast number of people in the community, the era of the studied commonplace can be said to have reached the climax.

This was pre-eminently the case some 20 years ago. Our revolutionary forefathers in this respect had better taste; they followed the classical ideals they had with a zeal that gave us, if not a new style, at least a strong impulse toward something good. The decadence was, however, rapid. In 1850 doorways were mere holes in the wall, and thereafter followed a period of barren ugliness and dull respectability, an era of unredeemed bad taste, from which the newer departures in architecture, and its more general appreciation, are beginning to save us.

Col. Richard T. Auchmuty.

Many readers of *Carpentry and Building* will learn with unfeigned sorrow of the unexpected death of Colonel Richard T. Auchmuty, the founder of the New York Trades School, which took place at his summer home in Lenox, Mass., on Tuesday, July 18. The immediate cause of death was œdema, or dropsy of the lungs. The Colonel sustained a severe injury to one of his legs during the war, from which he suffered more or less for many years. Last March the limb was amputated, and Col. Auchmuty was believed to be regaining strength after the operation. He was able to be moved about in his chair until last week, when a collapse set in and he sank rapidly.

Richard Tylden Auchmuty was born in New York City in 1831, and was a member of an old New York family that emigrated to this country from Scotland early in the last century. His great-grandfather, the Rev. Dr. Samuel Auchmuty, became rector of Trinity Church in 1768. After graduating from college, Colonel Auchmuty studied architecture with James Renwick, whose partner he subsequently became. He was appointed Assistant Adjutant-General of Volunteers at the outbreak of the war, and served during the years 1862 and 1863 in the Army of the Potomac. Ill-health compelled him to apply for relief from active duty in the field, and he received orders in 1864 to report for duty in Washington. He remained in the War Department until the close of the war, with the added rank of Major. While still quite young Colonel Auchmuty married Miss Ellen Schermerhorn of the well-known New York family. Miss Schermerhorn was the daughter of the late P. A. Schermerhorn, and she survives her husband. The fortune brought him by his wife, added to his own, enabled him to retire from active business life and devote his time and energies to philanthropic pursuits. Colonel and Mrs. Auchmuty had no children, and spent large sums in unostentatious charity.

Colonel Auchmuty will be best remembered as the founder and promoter of the New York Trades School, to the interests of which he devoted the best energies of his life for the past twelve years. This institution was established by him in 1881, after considerable study of the subject of manual training as conducted in Europe. About $50,000 were originally laid out in land and buildings. Although meeting with many discouragements and obstacles at first, the Colonel labored indomitably with tongue, pen and purse for years until success came, and his project and the system of manual training devised by him blossomed into the widely known and successful establishment which now serves as a model for all similar enterprises throughout the country. Last year the school was incorporated and Colonel Auchmuty and his wife, in addition to the previous gifts, presented the sum of $100,000, J. Pierpont Morgan at the same time donating $500,000; so that the institution now stands on a firm basis, and will endure as a noble memorial of its founder and benefactor. "The Colonel," as he was always called by the students, worked hard in the management of the school, which he was accustomed to visit almost daily, talking to his "boys," imparting kindly advice, and receiving their confidence and affection in exchange. Singularly winning in manner, with a kindly tact and generous, broad mind, all who came in contact with him formed a respect and admiration for the man; and many a youth has testified to the benefit which the colonel's personal influence worked on his life. Colonel Auchmuty also assisted materially in founding the mechanical trade schools of the Builders' Exchange in Philadelphia, to which he contributed $3000 a year for the first three years of its existence. Often urged by his friends to stand for public office, he always declined on the plea that his time was too fully occupied in the management of his beloved trade school. Colonel Auchmuty was a vestryman of Trinity Church, New York, and a trustee of the Cathedral of St. John the Divine, and was active in many good works in this city and in his summer home at Lenox. Always modest and retiring, he was little seen in fashionable gatherings, but among "his boys" he found his truest happiness.

Painting Iron Work.

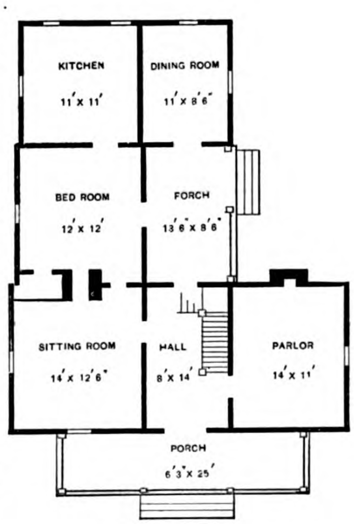
A good many architects, as well as painters, have the idea that anything is good enough with which to paint iron work so long as it is not intended to be exposed to the direct action of the air, says a writer in a late issue of *Painting and Decorating*. Hence it is that the cheapest kind of material and the poorest kind of labor are employed in painting the constructive portions of the building, which are hidden away behind the brick walls and terra cotta fire proof construction. Indeed, it frequently happens that the iron manufacturers get so rushed to supply their orders in the midst of a busy season that the columns and plate girders are shipped to the job guiltless of paint. It then becomes impossible to paint the inside of these pieces of constructive iron work. Because when buried away in the building they are impossible to get at, it is not to be supposed that they are absolutely free from the ravages of rust, or the destructive elements, which might perchance attack them. Brick and terra cotta are more or less porous, and are certainly neither impervious to gases nor water; even cement is not moisture proof. How can we be sure, then, unless we take particular pains before the building is erected to paint each particular piece or scrap of iron that goes into it, that the rust is not silently eating away our structural skeleton which holds the whole in place. For this reason too much care cannot be taken in the selection of a proper paint to use for the purpose. And it is well worth a painter's while to experiment with such a material as may seem best adapted to the purpose. A mere inspection of the painted surface after exposure is not sufficient to determine whether it is a true preservative to the iron. We should scrape the covering of paint from the surface of the metal, and then the iron should be carefully examined to see whether any rust has been going on beneath the apparently perfect surface, since many a paint is more or less permeable by moisture, while showing no apparent evidence of decay.

CORRESPONDENCE.

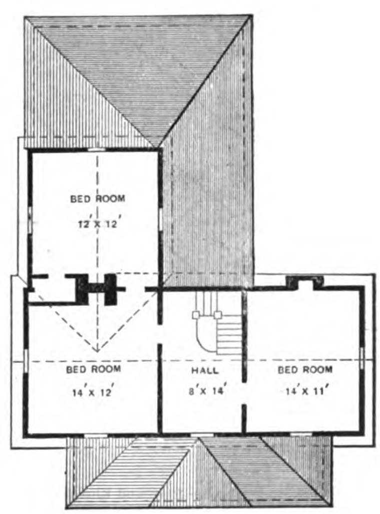
Design for Cheap Country House.

From J. S. Z., *Morganton, N. C.*—For the benefit of "H. B.," Justus, Ohio, who asked in a recent issue of *Carpentry and Building* for plans of a cheap country house, I submit sketches herewith which I think will probably fill the bill. The drawings are so clear that I think they will not need any explanation. However, should "H. B." desire further information regarding the drawings which I send I shall be glad at any time to hear from him.

Cheap Country House.—Front Elevation.—Scale, ⅛ Inch to the Foot.



First Floor.



Second Floor.

Scale 1 16 Inch to the Foot.

Arrangement of a Stable.

From W. K. T., *Houstonville, Pa.*—I would like some information with regard to the best arrangement for a stable covering an area, say, of 30 or 34 feet by 40 feet, and suitable for eight horses and three or four vehicles. I want something I can drive into and unhitch the horses, allowing them to go to their respective stalls without the necessity of their passing outside the building. If any of the practical readers of the paper can give me information on the subject I shall be greatly obliged.

Scales on the Sector.

From C. W. B., *South Denver, Col.*—Will some one please give me through the columns of the paper an explanation of the scales on a sector? I have an instrument of this kind and do not understand some of the scales upon it. There are on one side three scales radiating from the center and marked "S T T." There are also three other scales which do not radiate from the center and are marked "N S T." On the other side there is also a scale marked "S." The use of these I do not understand. There are also scales of lines, polygons and chords on the sector of which I know the use.

Answer.—The three radial scales of the sector marked S, T and T are lines of natural sines and tangents, and are used for the trigonometrical solution of the various parts of triangles, the manner of employing them being based upon the general principle which governs all calculations with the sector—that a given lateral distance is to its corresponding transverse distance as any other lateral distance is to its corresponding transverse distance. Now, in trigonometry, in any triangle the sine of the angle opposite a given side is to the given side as the sine of the angle opposite a second side is to the second side, and as the sine of the angle opposite the third side is to the third side. The sines of the angles being therefore made lateral distances on the radial scales S, the sides of the triangle opposite these angles naturally become transverse distances from one radial scale to the other radial scale. The same method applies also to the scales T of tangents. The radial scales marked S on the other side of the sector are scales of natural secants, but they are little used.

The three long scales along the edge of the rule, which do not radiate and are marked N, S and T, are logarithmic scales of numbers, sines and tangents, and are similar to those on an ordinary slide rule, being used in the same way by taking off the distances with a pair of dividers or with a slip of paper. In using these it must be borne in mind that multiplication is effected by adding the distance represented by one factor to the distance represented by the other factor, when the total resulting distance represents the product; and in division the distance corresponding to the divisor is subtracted from the distance corresponding to the dividend, the quotient being represented by the remaining distance. Multiplication is, therefore, always performed forward to the right, and division backward to the left.

Figures on a Two-Foot Rule.

From G. S., *Mount Sherman, Ky.*—Will some of my brother chips tell me the use of the figures on a two-foot rule? It is made by the Stanley Rule & Level Company and is No. 78½ and No. 72½. The figures which I refer to are on the inside edge of the rule. There is a row of small figures and there are also four small stars in the line.

Note.—We submitted the inquiry of our correspondent to the makers of the rule mentioned, and they reply that the figures and graduations are "drafting scales," used in drawing plans, and are ⅛ inch, ¼ inch, ½ inch, &c., to the foot. Each of the larger divisions that is figured represents one foot, while the finer gradations are inches.

Plans for a Five-Room House.

From A. A. N., *Lafayette, Ind.*—I wish some of the many readers of the paper would give me plans of a five-room house, one story in hight. I would also like to see a front elevation.

Striking a Spiral Arch.

From J. A. F., *McKinney, Texas.*—In a late issue of *Carpentry and Building* I notice a letter from "D. F." Philadelphia, in which he presents a problem relating to the spiral arch, and asks how to properly construct it, the manner of getting out the arch stone, making the patterns and cutting the face of the arch In answer to this inquiry I send a number of diagrams with explanatory text. Referring to the cuts, Fig. 1 shows the plan, A B representing a square section and A F the face of the arch. Fig. 2 indicates the manner of striking an ellipse, which may be done with a string and pencil or trammel in the usual manner. Draw F G and at right angles to it draw the line D E. Make A B the semi-major axis equal A O of the plan. Lay off on A C as the semi-minor axis, the distance A P of Fig. 1. Now, the curve, cutting the line F G and passing through the points A D, will represent the extrados. The intrados are described in the same manner, taking H O of Fig. 1 as the semi-major and C P as the semi-minor axis. In Fig. 3 is shown the manner of finding the points in the face of an elliptic arch. Locate the focii H H and at a point where a joint is required, say at B, draw lines from H H to it. Bisect the angle at B and the bisecting line will be the required joint. The joints for the opposite sides of the arch may be found by producing the bisecting lines until they cut the line O E as indicated in the diagram. Fig. 4 shows the manner of obtaining the pattern for voussoirs. First describe the ex-

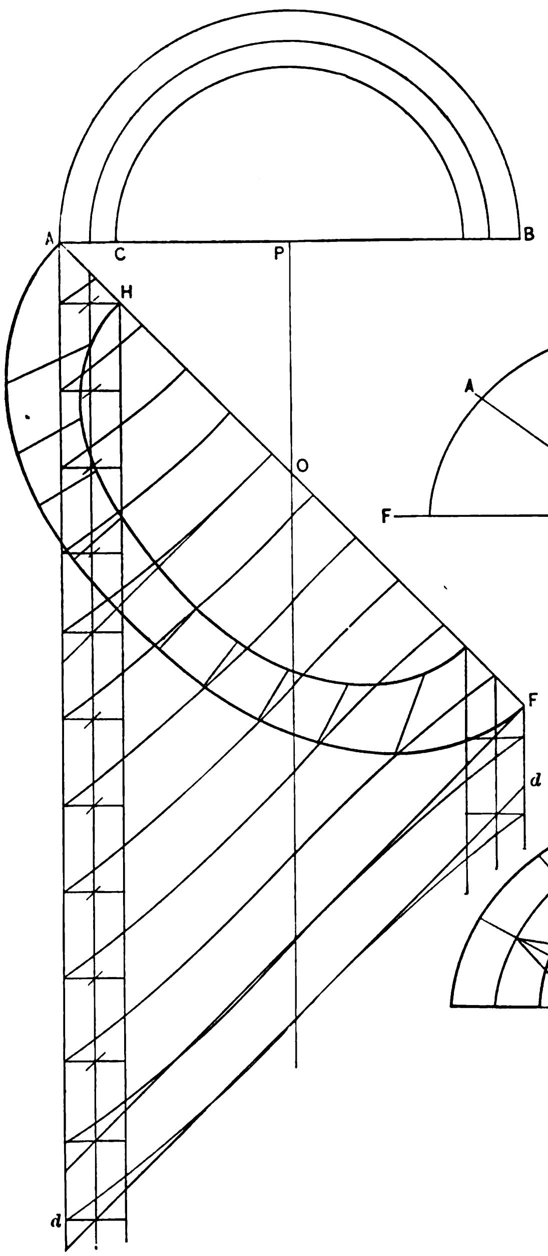


Fig. 1.—Plan and Elevation.

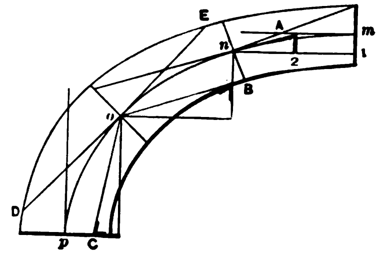


Fig. 4.—Showing the Method of Obtaining the Patterns for the Voussoirs.

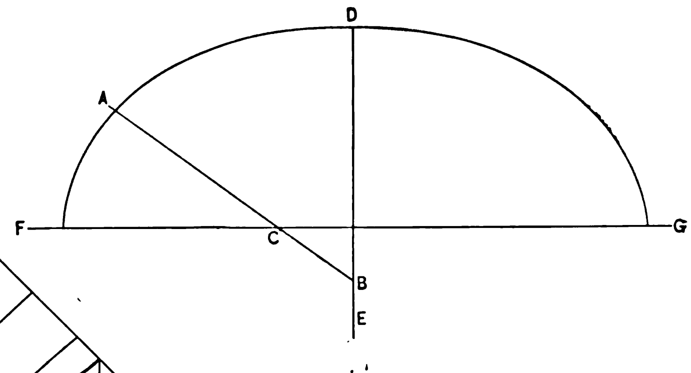


Fig. 2.—Manner of Describing an Ellipse.

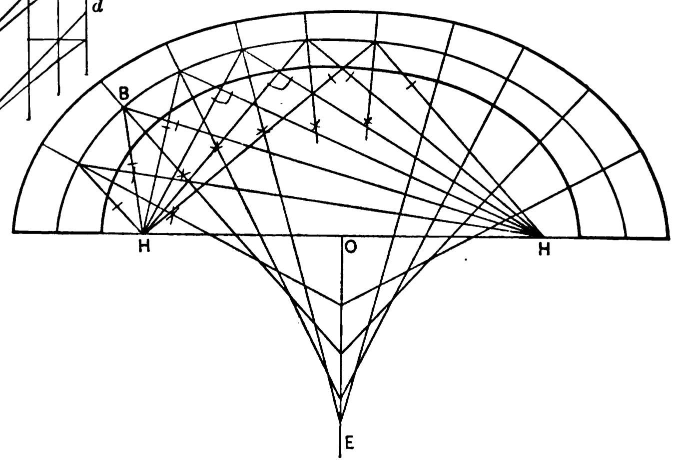


Fig. 3.—Diagram Illustrating the Manner of Finding the Joints in the Face of the Arch.

Striking a Spiral Arch.—Diagrams Accompanying Letter of "J. A. F."

trados and intrados. Now, suppose the voussoirs are worked from m to p in three sections. At the points of division draw the joints, and at right angles to them draw the tangents, as D E, for the purpose of obtaining the bevels for the twist of the voussoirs, proceeding as follows: At right angles to the joint m draw n, bisecting it at 2. At right angles to n draw 2 A cutting the tangent from the joint m at A. From the joint n draw A n and the bevel at A will be the twist from m to n. The remaining bevels are found by drawing plumb and level lines to the joints and bisecting them as indicated. The bevel at B is the twist from n to o and the bevel at C is the twist from o to p.

In Fig. 5 of the sketches is shown the manner of cutting the face of the arch in a line with the spandrel. The cut at A is nearly square, while owing to the twist of the voussoirs the cut across the bottom at B is what is termed a square miter, producing the increased width of the face as the springing plane is approached, and the shape of the voussoirs in the face, as shown in Fig. 1. The manner of applying the patterns of the voussoirs to the section from m to p of Fig. 4 is indicated in Fig. 6. The width across the extrados and intrados increases as their springing plane is approached. The difference in the width may be found by taking the distance of the bevel across the width of the square end for the width of the twisted end. The bevels are applied for the twist the same as in handrailing. Fig. 7 is a projection of the voussoirs running through at d d of Fig. 1.

I am not a stone cutter, but it seems to me that instead of running the voussoirs at right angles to the face, as shown in the plan view Fig 1, and indicated in the drawings submitted by "D. F." on page 143 of *Carpentry and Building* for last year, that they may be run parallel with the springing plane, as in Fig. 8 of the accompanying sketches. In that instance the voussoirs as they appear in the face are similar to the face in Fig. 3. In Fig. 9 are given bevels by which to cut the voussoirs in the face of Fig. 8 on a line with the spandrel.

At A is the bevel for the joint A B, and across the extrados of the vous-

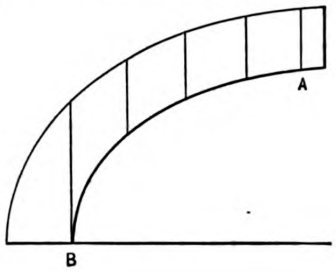


Fig. 5.—Method of Cutting the Face of the Arch in a Line with the Spandrel.

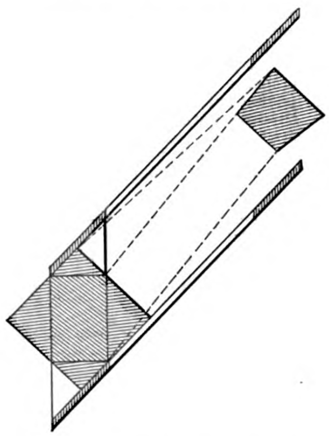


Fig. 6.—Application of the Patterns of the Voussoirs to the Section from m to p of Fig. 4.

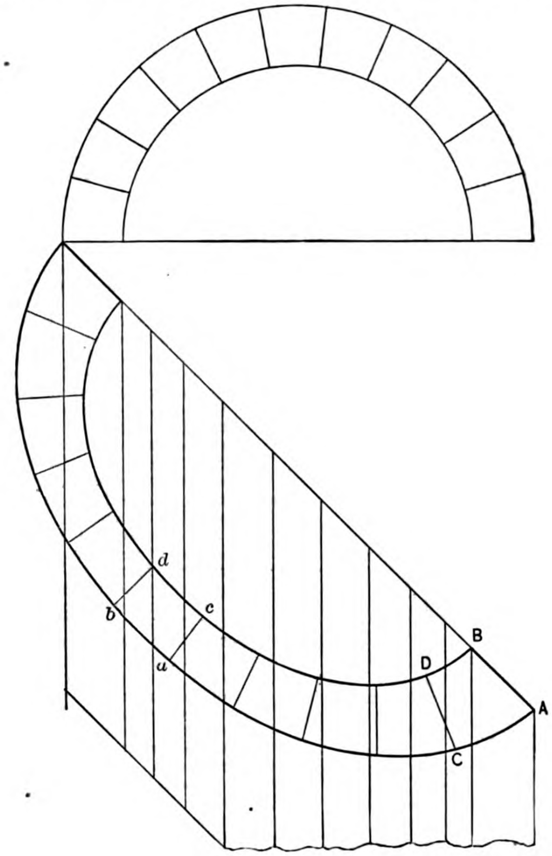


Fig. 8.—Plan and Elevation Showing Voussoirs Running Parellel with the Springing Plane.

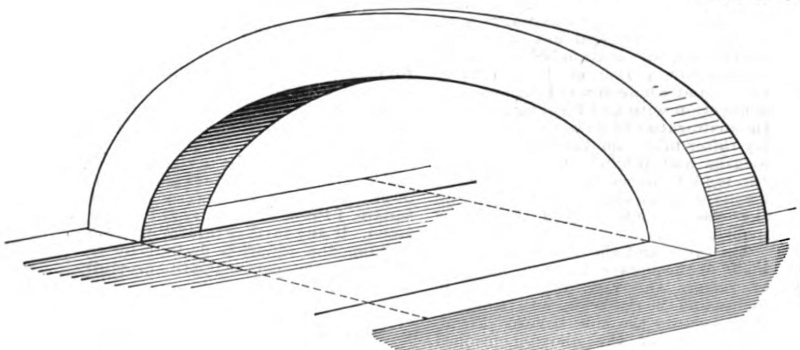


Fig. 7.—Projection of a Voussoir on the Line d d of Fig. 1.

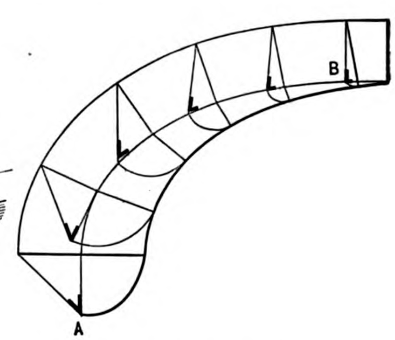


Fig. 9.—Bevels for Cutting the Voussoirs in the Face of Fig. 8.

Striking a Spiral Arch.—Diagrams Accompanying Letter of "J. A. F."

soir at a b and of the intrados at c d of Fig. 8. At B is the bevel for the side of the voussoirs opposite the joint at a c, and across the extrados at A C, and the intrados at B D. The intervening bevels are applied to the intervening voussoirs in like manner. The voussoirs in the plan, Fig. 8, are of the same shape the entire length, while in the plan, Fig. 1, they not only increase in width, but the bevel between the voussoirs at the top of the arch gradually die out as they approach the springing plane.

Rule for Finding Lengths of Rafters.

From MARK PATTERSON, *New Rochelle, N. Y.*—Seeing in the issue for November an inquiry from "H. A. B.," Moreno, Cal., for a rule by which to find the lengths of rafters, I send a description of a steel square, which, I think, will give him the desired information. In order to find the length of jack rafters for roofs of any pitch divide the length of the main or common rafters by its run in feet and the product thus obtained will be the length of a rafter of one foot run. If the rafters are placed one foot apart deduct the length of the rafter of one foot run from the length of the main or common rafter, and if placed two feet apart deduct twice the amount from each succeeding jack rafter. The square, of which I send a sketch, and shown in general view in Fig. 1, gives a great deal of information not to be found on any other square. In the first place, it gives the length of the hip and valley rafters of any rise from 1 inch up to 18 inches, having a regular run ; also their side bevels at their intersection, as well as the top and bottom cuts.

In the second place, it gives the length of main or common rafters of any rise from 1 to 18 inches of one foot run and their top and bottom cuts.

It also gives the lengths and side bevels for jack rafters of any rise from 1 inch to 18 inches of one foot run, together with their top and bottom cuts, being the same as main rafters of the same rise.

The octagon scale gives the proportions of the sides of an octagon to its diameter, also bevels or cuts at the intersection.

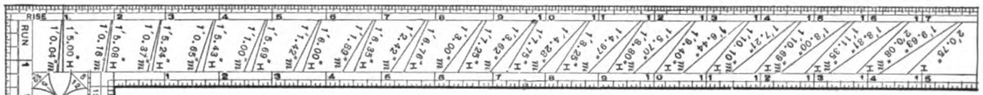
There is a scale of hundredths of an inch shown full size in Fig. 2, so that where the lengths of rafters show hundredths of an inch the compasses can be readily set and the lengths obtained. Fig. 1 shows the scales upon the blade of the square and may be considered as a jack-rafter table. Upon the tongue is a main-rafter table and diagram, m, giving the lengths, pitches or angles; also the top and bottom bevels of main rafters for a rise of 1 inch to 18 inches and whose run is 12 inches. In connection with and forming a part of the main-rafter table is a hip and valley rafter table and diagram, h, giving lengths and pitches of rafters whose run is 16.97 inches, or the diagonal of a square whose sides are 12 inches and the rise of which is 1 inch to 18 inches.

The table and the diagram on the blade of the square illustrate the gain of rafters the run of which is 12 inches and the rise is 1 inch to 18 inches. It also shows the side bevels. Forming a part of the above-mentioned table and diagram is a table and diagram showing the gain for hip and valley rafters the rise of which is 1 to 18 inches and the run is nearly 17 inches. This diagram also gives the side bevels of hip or valley rafters of 17 inches run (nearly) at their intersection.

The octagon scale shows that five-twelfths of its diameter will be the length of its sides. For instance, a square of 12 feet diameter would require sides of 5 feet, when it was changed to an octagon.

Suppose it is desired to find out how much shorter each jack rafter for a hip roof must be in order that the rafters may be 1 foot apart. If we look at the jack-rafter table on the blade of the square, we will find the length of any jack rafter the run of which is 12 inches and of any rise from 1 to 18 inches. If the roof has a rise of 6 to 12 inches run, we look opposite Fig. 6, the rise, and find figures 1 foot 1.42 inches as the length of the jack rafters. This would be the length that we should have to shorten each jack rafter if the jacks were set 1 foot apart. If we set them 2 feet apart we must shorten each succeeding jack rafter twice as much. The first jack rafter would be the same length as the main rafter, allowing one-half the thickness of the hip. To obtain the side bevel for jack set the bevel to the angle on the square opposite the rise the rafter makes. In this case it would be opposite figure 6. If the decimals in the figures confuse the framer let him take his pocket rule and lay it on the square on the line marked "Length of jack rafters." The end of the rule should extend to the end of the square over and beyond the octagon scale. Then let him take the length of his rafter on his rule for the rise his main rafters make in running 1 foot. This will give the length to shorten jack rafters set 1 foot apart.

Examples might be given in obtaining length of main hip or valley rafters of any pitch, but the diagrams on the square, I think, will be readily understood. If any further information concerning the square is desired by the readers of the paper I will cheerfully answer all inquiries.




Rule for Finding Length of Jack Rafters.—Fig. 1.—Steel Square as Arranged by Mr. Patterson.—Scale, 4 Inches to the Foot.

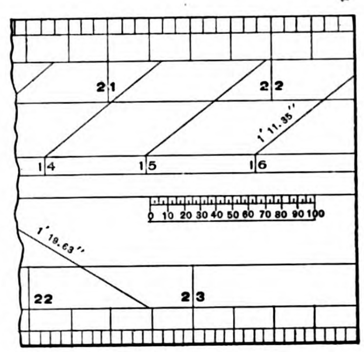


Fig. 2.—Decimal Scale, Full Size.

Method of Rapid Estimating.

From A. B. C., *Brandon, Mass.*—Will some of the readers of *Carpentry and Building* kindly open a discussion of the following method of rapid estimating? A short time since the thought occurred to me to estimate joist, flooring, studding, boarding, siding, sheeting, rafters and shingles by the square. I find by setting dimension stuff 16 inches between centers that

One square of 2 x 4 = 50
One square of 2 x 6 = 75
One square of 2 x 8 = 100
One square of 2 x 10 = 125
One square of 2 x 12 = 150

and so on to the end of the chapter. I would like to know if this method is in use, and if so to what extent. I hope to see the question taken up and discussed at length.

The Use of Artificial Stone.

From C. J. W., *Berkley, Va.*—In this month's (June) issue of *Carpentry and Building* there is a communication from "S. C. S." of Maschipon, Va., relative to the use of artificial stone at the Norfolk Navy Yard. In reply, permit me to state that they are not making artificial stone at the navy yard, neither are they using it at the dry docks. What they are doing is making concrete blocks for dock walls on the river front, and these are prepared from the usual formula of hydraulic cement, sand, gravel and stone chips cast into blocks and laid in the manner usual for stone. The correspondent named will, no doubt, be able to appreciate the difference between artificial stone and concrete.

Problem in Groined Ceilings.

From R. S. N., *Minneapolis, Minn.*—I would like to have some of the readers of the paper answer a question in which I am deeply interested. Fig. 1 represents a ground plan; Fig. 2 shows a plan of the ceiling, while Fig. 3 represents an elevation showing the line of the ceiling and the line of the roof. Referring to Fig. 1, A represents

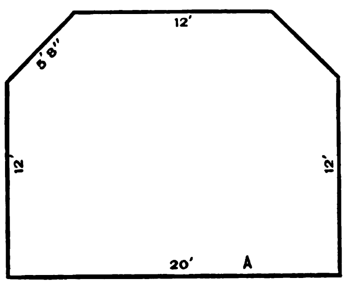


Fig. 1.—Ground Plan.

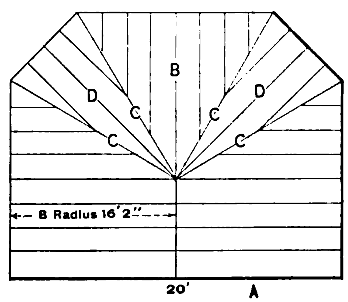


Fig. 2.—Plan of Ceiling.

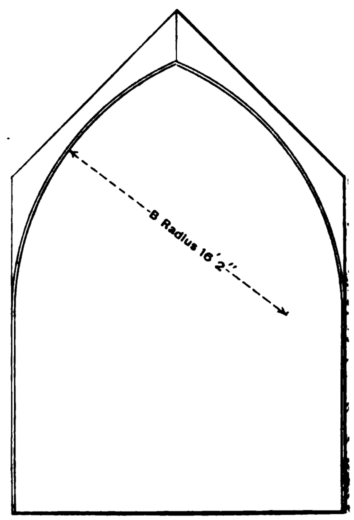


Fig. 3.—Elevation Showing Lines of Roof and Ceiling.

Problem in Groined Ceilings Submitted by "R. S. N." of Minneapolis, Minn.

the width of the building, 20 feet; while C and D are the radii required to construct the circles at C and D, so that the sections between the groins or hips of the ceiling will be perfectly true with each other. The idea is to have a perfect ground work for the lath and plaster. What I want to know is the method of getting the required radius and I should like to have this fully explained by the correspondent answering the question.

Southern Houses.

From W. H. W., *Tampa, Fla.*—Having taken *Carpentry and Building* for the past nine years, I have, of course, seen its development from a somewhat ordinary monthly to a first-class paper. I am, however disappointed in it in this respect: One of the most important classes of buildings seems to be neglected, or to receive a poor showing. I refer to store fronts and street façades. If the subject is well considered I think you and many others will admit that the present store fronts as a rule exhibit great poverty of design. Indeed, so to speak, they are "all run in one mold." There is, I think a very extensive field in this direction, and much originality and good design and detail should be forthcoming. Now that I am troubling you, may I, with all respect, say that with the many admirable designs of dwelling houses, and they monopolize with their details the principal part of the paper, I have never seen the design that was, to all intents and purposes, of any real use as a Southern house. An architect to understand the requirements must live on the spot. Eight months out of twelve southern life is, essentially, an outdoor existence, and narrow halls, doors to rooms, except bedrooms, of course, and cramped and pokey staircases are an abomination. The great *desideratum* is air, and plenty of it. Hang *portières* to the room openings and loop them up. If a chilly blast comes on they can readily be lowered and the place made snug and cosy.

One other point, the east and west must have piazzas. During the heat of the day when the sun is southerly, it is almost perpendicularly over one's head and the piazzas are not so imperative, though, of course, it is a comfort to have them. But the westerly or afternoon sun is the most oppressive, and a low wide veranda, not less than 9 feet, is almost a necessity of existence with comfort. I have seen houses erected here from Northern plans which have been perfect ovens in their intense heat. It must be clearly understood that unless a piazza gives shade across its entire width, the refraction from the floor counteracts any benefit that may otherwise accrue.

Note.—We are glad to have such free and frank expressions of opinion from practical readers of *Carpentry and Building*, as it permits us to see where, in the eyes of those we are seeking to interest, the paper can be improved. With regard to designs of store fronts and street façades, we would inform this and other readers that under the twenty-third competition we have received a number of designs, showing the fronts of buildings intended for business purposes, and many of these we shall have pleasure in presenting at an early date.

Our correspondent above so clearly defines the essential features of a typical Southern house that we are led to ask if he cannot furnish drawings of buildings of this character, and if he can supply photographs of completed houses so much the better? We extend this invitation to our Southern readers generally, and trust they will send us a number of designs, accompanied by photographs, if possible, of dwelling houses which have recently been erected in the section of country in which they reside.

Brick Veneered Buildings.

From D. A. K., *Pawtucket, R. I.*—I would like to know the pros and cons regarding brick plating of frame buildings, with a single course of brick.

Note.—We cannot perhaps do better than refer our correspondent to the letter given below, which was received in answer to the inquiry of "A. W." whose communication appeared in *Carpentry and Building* for June of this year.

From F. T. C., *New York.*—In reply to the correspondent "A. W.," Frankfort, N. Y., who asked in a recent issue about brick veneering a frame building, I would like to say that in some localities it is a more favorite mode than in others. In cold climates it is more practiced than in milder ones. I know of a four-story hotel having been erected in the veneer style in Saratoga, N. Y. It was known as the "Columbian" and stood on South Broadway, covering an area about 75 feet front by 150 to 175 feet deep. It burned down after some eight or ten years, and the brick veneer fell off in great sheets, endangering the lives of firemen and workers. It seemed, however, to stand well enough without season or settling cracks. For small houses brick veneering answers very well, but the brick must be hard and of even burning, and built on a good stone wall foundation. The frame can be sheeted or not, but in my estimation the building is better for being sheeted. A stone water table can be used bedded on the stone foundation, and 4-inch thick brick work built up against the sheeting or face of the studs. It should be achored every course or two and 2 feet apart by ten or twelve penny nails, driven half in and the heads left in the joints. The mortar used may be of lime and sand, with one-third cement as well. Window sills may be of stone, or wood gotten out the size of the stone, dressed, painted and sanded. The window and door lintels are generally arched in brick. The evil effects of settlement may be largely counteracted by using well seasoned timber, the best, in fact, obtainable, and making as close brick joints as possible. There should also be used a large proportion of cement in the mortar.

Laying Porch Floors.

From H. H. R., *Seaville, N. H.*—If "W. W. B.," Toledo, Ohio, will "herring bone" his porch floor hip—that is, cut a square butt on his flooring instead of the miter—and lay the porch floor from both sides alternately, he will have a first-class and neat looking job.

WHAT BUILDERS ARE DOING.

THERE CONTINUES to be an unusual quietness throughout the building trades of the country. There is seemingly less activity than there has been for some time past. Building operations are somewhat curtailed by the stringency in the money market, although there are no cases reported of extreme depression. The relationship between the employers and workmen all through the country seems to be unusually quiet, the large cities being extremely free from disturbances. Throughout the West, with possibly the exception of St. Louis, business is very quiet, and there seems to be little prospect of immediate improvement. The condition should not be understood to indicate unusual lack of activity, but the character of the work seems to be largely that which is necessary, rather than that which indicates the extensive investment that follows a free money market.

Chicago, Ill.

The building operations in Chicago are quiet, although there is still enough to do to keep the builders busy. The danger of another strike among the carpenters seems to have been averted by the findings of the Board of Arbitration of the bosses and the men. The commission, after agreeing that 40 cents an hour was not too much for competent workmen, agreed to modify the rate of wages from July 1 to October 1, by a deduction of 5 cents an hour. It was also agreed to allow union carpenters to work for non-union bosses, provided that the union rate be maintained.

Cincinnati, Ohio.

It is reported from the Builders' Exchange of Cincinnati that although things are quiet in the building trades the amount of work in process of completion is about up to the mark. The Exchange is pursuing the even tenor of its way and the members are gradually becoming more imbued with a sense of the value of such an institution. The Exchange is doing some good work in the way of urging the adoption of the Uniform Contract, the value of which was considered of sufficient importance by the *Commercial Gazette* of that city to warrant its being printed in full. There are no labor complications of a serious nature existing or pending.

Cleveland, Ohio.

The bricklayers' strike which begun about two months ago, and which was noted in these columns last month, has ended, the men having returned to work on the nine-hour basis. The stonecutters who struck in sympathy with the bricklayers and also for the purpose of securing a half holiday on Saturday are still out in an endeavor to secure their desire in reference to the short day Saturday. Nearly all the trades are working on the same basis that existed last year and everything is quiet excepting the case mentioned of the stonecutters. The Builders' Exchange is in excellent condition and the benefits of this form of organization among the employers in the building trades are asserting themselves more and more every day. The Exchange has recently issued a neat handbook containing much valuable information to builders, such as classified list of members, the building laws of the city, lien laws, list of architects, &c.

Detroit, Mich.

The members of the Builders and Traders' Exchange of Detroit recently participated in a delightful excursion to Star Island, where a dinner was served. The affair was a most delightful one, and the members turned out well, and all enjoyed themselves thorougly. The moving of the Exchange into the present quarters has proved itself, as was expected to be, distinctly for the better. The entire occupancy of a building by builders has centralized the interest of the trade and has materially improved the standing of the organization by bringing it before the public in a much more prominent and favorable light than it ever before occupied.

Indianapolis, Ind.

Things are generally quiet throughout the building trades in Indianapolis. The lathers, who went on a strike several weeks ago for an advance in their wages, have surrendered and returned to work at the old scale. The men demanded an increase of 50 cents per day over the scale of last year, which was refused by the contractors, and the strike was ordered. The men remained firm, being confident that the strike would be successful, as one or two of the contractors had agreed to their terms. On account of the length of the strike, however, several members of the union were brought to the low-water mark financially, and this, coupled with the scarcity of work to be done, influenced the contractors to hold off for a while longer, and then four of the union men surrendered and agreed to return to work at the old scale. This settled the strike, and all of them returned at the old price.

Lowell, Mass.

A new complication in the bricklayers' strike of Lowell has presented itself. A contract for laying 1,000,000 brick has been awarded under peculiar circumstances to a contractor, who employs union workmen only. The contract was originally let to a member of the Master Builders' Association, but the members being under an agreement with each other not to employ union men, it was impossible for the original contractor to undertake the work without breaking his agreement. Apparently, in order to avoid breaking the letter of his agreement with the members of the Master Builders' Association, he sublet the contract to a man whom, it is claimed, is one of the strikers. The members of the Master Builders' Association, are very much incensed against the action of the contractor in question, claiming that he has broken faith with them fully as much as though he had yielded to the demands of the strikers himself. The following article from the Lowell *Mail* of July 11 puts the position between the bricklayers and their employers in a nutshell:

The issue between the master builders and the brickmasons has been over the question whether the former should have the privilege of employing whom they chose and paying the men what they earned, rather than being compelled to hire only union men and pay them all a regulation price established by the union. A combination to secure this right is not an unjust one, though it may not be satisfactory to the members of the bricklayers' union. It is really in the interest of the people who may hereafter have buildings to erect. The master builders have been ready to pay whatever men were worth, whether 42 cents per hour, or 50 cents or 25 cents, but they have not wished to pay 42 cents to 25-cent. men. This is the sum and substance of the contention, as we understand it, and the matter would have been settled long since had the bricklayers not received aid from outside that enabled them to send out of town men who had been hired to come here and take work that was refused by the mechanics of this city because they could not dictate terms to their employers. There has been a serious delay on some buildings because of the condition of things, and the interests of the city have undoubtedly suffered, while the workmen themselves have lost money they could ill afford because of the shortness of the building season.

Lynn, Mass.

All of the union men who were in the employ of Strout Bros., building contractors of Lynn, are on a strike because non union tenders for masons are employed. The strikers are members of the Lynn Building Trades Council. They first endeavored to induce the tenders to join the union, and, failing, a strike was ordered on all of the buildings which the Strout Bros. are erecting.

The Council held a meeting and voted to remain out until the non union men were discharged, and denounced the action of the contractor. The contractor says that he advised the tenders not to join the union, and that he is paying as high prices as any other contractors. The result will be, he says, that the skilled workmen in the Building Trades Council will be withdrawn.

Minneapolis, Minn.

The building interests in Minneapolis are quiet. There is little action among the workmen, although there is considerable complaint of low wages. The painters are at work perfecting a union. At a recent meeting a number of speeches were made giving reasons for and advocating the establishment of a union. The burden of the whole matter seemed to be that the prices paid for skilled workmen in this city are far too low, resulting from the fact that inexperienced men are able to command as high wages as those who have more thoroughly learned their trade. It was stated that union would, in time, give complete control of prices, and would result greatly in favor of the men. It was also said that Minneapolis is the worst city in the country in which to work, the painters being behind the times in demanding their rights.

Philadelphia, Pa.

Operations in the building trades of Philadelphia are very quiet, the strike among the plasterers being the only disturbance among the workmen which has occurred for some time. The journeymen struck because the bosses would not advance the pay from 40 to 45 cents an hour; also the plasterers took under their wing the lathers and laborers and demanded that these two branches of this trade should also receive higher wages. The master plasterers refused to meet the demand of the journeymen and since then have been employing non union men.

At a meeting participated in by both employers and workmen for the purpose of settling the strike, the journeymen compromised by giving up their support of the laborers and others outside of plasterers, and they also agreed to allow the master plasterers to hire 50 per cent. of non-union men to work in the country. After these concessions were made the question of wages was taken up. The journeymen wanted the advance of five cents an hour. The master plasterers were willing to split the difference and increase the pay to 42½ cents an hour, but it was decided to hold a meeting and get the voice of all the boss plasterers. This meeting was held, and it is understood that the plasterers will, in all probability, get what they ask for. The settlement as proposed by the master plasterers was that they would concede the advance of five cents per hour to 45 cents if the plasterers would agree to these three propositions: The employment of 50 per cent. of non-union plasterers on out-of-town work; the abolition of the amalgamation between the lathers and laborers, and to agree to take the non-union men now employed by the master plasterers into the union upon proper application, provided there are no charges against the men on the union's books.

At a subsequent meeting the plasterers agreed to accept the terms, with the amendment that, instead of ending the amalgamation between the lathers and laborers at once it be done at the end of the year, as an immediate break was not considered honorable to the laborers. The amendment will be submitted to the master plasterers, and, if accepted, the strike will be declared off.

St. Louis, Mo.

Building operations in St. Louis are reported in good condition, the amount of work on hand being very satisfactory. Late in June the roofers struck for $3 a day for foremen and $2.50 per day for all journeymen, and after being out a little over a week the strike was settled by a compromise of $2.75 a day for foremen and concession for $2.50 for journeymen. Only one employer was seriously affected by this, but his employees numbered about 125. The Builders' Exchange is making preparations for a grand excursion on the river to be held on August 17. The excursion will include a stop at Chouteau Park, where there will be feasting, music and speaking. A very elaborate affair is expected, and accommodations have been prepared for 3000 people. The largest steamboat on the river, the "Grand Republic," has been engaged. The following Executive Committee have the matter in charge: W. J. Baker, Patrick McKay, C. C. Jackson, Jas. Kearney, Jno. O'Connell and J. P. Kelly.

St. Paul, Minn.

The Builders' Exchange of St. Paul has filed an amendment to its article of incorporation decreasing its capital stock and limit of liability to $1250. The plasterers struck on July 1 for $3.50 for a day of eight hours. Due notice was sent to the employers, together with an announcement that the employees would receive any communication the employers desired to make at Labor Hall any time during the day. Four of the contractors engaged in important work immediately conceded the demand, and it is expected that the men will ultimately gain their end, although the other contractors remain firmly opposed to the concession. The mill owners are endeavoring to establish uniformity in the scale of wages to be applied to the employees in all of the mills. A list of all of the scales paid by the different mills showed that there is a wide difference among them, the scale ranging from 15 to 50 cents on each class of work.

Wilmington, Del.

The strike of plasterers in Wilmington for an increase of wages from $3 to $3.50 per day still continues although it is probable that no decided victory will be gained, as the men are slowly returning. Work on hand has at no time been seriously impeded by the action of the plasterers, and all other branches of the trade are quiet. Business is in a fair condition. Reports from the Builders' Exchange show that organization to be in a good condition.

Notes.

The carpenters strike at Madison, Wis., has been declared off. The refusal of other trades to co-operate by striking against working with non-union men, the success of the contractors in securing men from outside, and the return of 25 per cent of the strikers to work, convinced the majority that the strike was a failure. The places of nearly one-half the strikers, or about 80, have been filled with new men, whom the contractors refuse to discharge, so that many of the strikers will have to seek work elsewhere than in Madison. Although the building business is brisk, this is the second effort to establish union recognition and control in Madison this year, and both have proved disastrous failures to the projectors. No further trouble is anticipated in any of the trades.

The new Builders' Exchange at Duluth has begun its career by an excursion to Stony Point. The members fished and indulged in athletic games to their heart's content, and a very pleasant day was spent. There were about 30 builders in attendance, which represents practically the membership of the new organization.

Since the lather ' union of New Bedford was organized a standard of $2 per 1000 for laying laths has been established, and nearly all the contractors in the city have agreed to the new scale. It is expected that the workmen will be able to secure a full recognition by all employers of the new rate of wages.

The new organization at Salem, Mass., has been incorporated under name of the Master Builders' Association. Since the formation several new members have been voted in, and the following permanent officers elected: President, Benjamin A. Touret; vice-president, James F. Dean; treasurer, E. Henry Morse ; secretary, Charles H. Osborne; directors, G. Thomas Pinnock, Joseph N. Parsons, C. Burns Balcomb, George W. Pitman, Paul B Patten. The alterations of the rooms in the bank building will soon be completed, and the association will have very comfortable quarters.

Davenport, Iowa, has been having a strike of carpenters, and it is stated that the employers have been gradually giving in to the demands of the workmen until there are but few concerns that still hold out. These, it is expected, will soon join their competitors, and the carpenters will have gained their end.

The members of the Springfield (Mass.) Builders' Association are at work on the details necessary to put its organization upon a thoroughly practical basis, and is looking for a permanent location. The association will in all probability make its headquarters in the Board of Trade rooms, as the directors have offered favorable terms and the members will probably accept them. There are several other places which have been offered to the association, but these rooms seem to be the most central and best fitted for the purpose. The meetings have been held in the Athol Building The strike of bricklayers still continues, but the workmen are hopeful of success. One by one the contractors have compromised with the strikers on the reasonable concessions offered until at least one-half of the local contractors are working their men on the eight-hour schedule. The remaining contractors have no fault to find with the demands of the strikers, but are holding out for the purpose of trying to break up the Brick Layers' Union. But what makes the outlook bright for the strikers and the union contractors is the fact that the public prejudice against the eight-hour day, which was fanned by the nine-hour contractors has almost died out and prospective builders are inclined to let all classes of contracts figure on their jobs and award the contract to the lowest bidder. The nine-hour contractors, who are paying unusual wages to unskilled workmen, cannot compete with the eight-hour contractors who employ the best of masons at $3. 0 or $3.75 a day Consequently it will not be long before the nine-hour men will find it to their advantage to compromise with the strikers

The refusal of the largest mason contracting firm to work their men eight hours instead of nine is a serious drawback to the success of the strike, which, together with the fact that building operations are being cut down and the amount of work thus lessened, leaves the ultimate outcome of the strike very much in doubt. This strike has brought about many reminiscences of the past; and, as an example to the steady improvement in the conditions which the workmen have undergone, an old employer says that during the summer of 1876 he employed masons to work for him in building a block on State street for $2 a day and the carpenters received $1.50, while the brick cost $4.75 a thousand. The masons worked ten hours a day. One of the union men now asking for $3.50 a day with eight hours worked in the fall of 1873 and the summer of 1874 in Holyoke for $1.75 for ten hours' work.

The builders of Bridgeport, Conn., are making a united effort to secure from architects fuller and more complete plans and specifications of work. They are assisted in this effort by the Building Inspector. The Builders' Association has drawn up resolutions addressed to the architects, in which they call attention to the vital necessity of having more definite plans or details than the ordinary scale drawings to figure on This effort will doubtless result in some mutually satisfactory arrangement between the contractors and architects, as the former have approached the architects in a friendly and fair spirit.

The union brickmakers of Pittsburgh claim to have established their scale of wages and hours in all the brickyards in that vicinity, and that there will be no general strike, as was expected, although there are several matters yet to be settled. Outside manufacturers, it is claimed, have been competing with Pittsburgh brickmakers, and have been paying their workmen less wages and an effort is being made to either stop this competition or to secure the adoption of the standard scale by these manufacturers. The carpenters are hard at work perfecting their union at all points for the purpose of making a strong stand for increased wages. They are meeting with considerable success, and claim that 90 per cent. of the workmen are members of the union.

Combination Heating.

At the Fifth Annual Convention of the Master Steam and Hot-Water Fitters' Association, recently held in Chicago, a paper was read by George D. Hoffman on the subject of combination heating, which covers many points of interest to builders. We quote from it as follows:

In selecting the matter of combination heating as the subject of my discourse, I am free to confess that I did so with some misgivings. It is such a common fault, not only among heating engineers, but also among the other learned professions, to condemn that method or system which is foreign in its teachings from that particular system from which they derive their knowledge. Thus, the allopathic doctor condemns every move or treatment of the homœopathic doctor, and the Methodist minister claims that the Baptist minister is all wrong ; that their particular plan is the only one that will insure salvation to the world-weary sinner, and yet the objective point with each differing school is the same ; each doctor strives to cure his patient and each minister to save the soul intrusted to his teachings. It is only natural, therefore, with these precedents, that heating engineers should condemn almost unheard systems of heating which are outside of their particular line.

You, gentlemen, call yourself master steam and hot-water fitters, and there is hardly a man among you who will not take a contract for either steam or hot-water fitting, and who will not acknowledge that each system has its particular merits, and each in its way is worthy of the careful consideration of any prospective buyer ; and yet it is within my short recollection in this business when steam men declared war to the knife against hot-water heating, and the advocates of hot water were equally strong in their condemnation of steam. To-day there is hardly a man among you who does not and will talk against and condemn from every point the system of furnace heating. It is said that furnaces are dirty, dusty and unhealthy, because they admit smoke and gas into the living rooms. It is also said that a furnace burns the air, and that one side of a furnace-heated house is always cold, while the other side is too hot. Inasmuch as a combination heater is a combination of a furnace and a steam or hot-water boiler, it is necessary for me to defend the system of furnace heating against the calumny of its opponents. Taking the accusations—dirty, dusty and unhealthy—in their order :

SO-CALLED BURNT AIR.

It is a well-known fact that all systems of heating are dirty, and all systems of indirect heating are particularly so. The reason for this, as we all know, lies in the fact that dust is an ever-present quantity in air, although it may be imperceptible to the naked eye. Even in a darkened room, which is hermetically sealed to the influence of the outside air, the presence of dust is made discernible even to the naked eye by the admission of a ray of sunlight. This is the evidence of the unceasing changes which the material world is continually undergoing—the irrefragable proofs that the visible matter of the universe is slowly and almost imperceptibly passing through a series of transmutations which affect both organic and inorganic nature.

In all systems of heating, both direct and indirect, where air is brought in contact with heated surfaces, these minute atoms of animal and vegetable matter, which are carried suspended in the air, are charred or burned by contact with the heated surface of the furnace or radiator, as the case may be, and this gives rise very frequently to the opinion (more particularly so in furnace work than in steam or hot water) that we burn the air. Now, the air itself is not burned, as it is impossible to burn air without combustion.

I remember reading an interesting article several years ago in the *Scientific American*, in which an elaborate test was made of this very subject. Air was taken from one receptacle and passed through, between and over wrought-iron plates, which were heated to an intensity of 2000° F., and then passed into another receptacle; and after the air had sufficiently cooled it was subjected to a chemical test and found to contain all the life giving qualities that it had previous to its passage over these plates.

INDIRECT HEATING SYSTEM.

The theory of furnace, or any other system of indirect heating, is one of displacement—*i. e.*, all the air in a room or building to be heated by this method must be displaced by the warmer air from the furnace, and, as this air cools from contact with the cold walls and other surfaces in the room, it must in its turn be driven from the room by a further introduction of warm air from the furnace. With a sufficient number of open fire places, or other means of drawing off the cold air from the rooms, the flow of the air from the furnace or indirect radiator is continuous and natural, and if the supply of air to the furnace or indirect stack is from the outside, there is a continual flow of fresh dust as well as fresh air. As cheap, poorly constructed furnaces are not considered "in it" in this article, and as well-constructed furnaces do not leak gas, smoke or dust from their combustion chambers, the above argument against the furnace on account of its being dirty is the only one that will stand the search light of unprejudiced investigation. Very few blessings are unmixed with evil, and in my opinion the blessing of an abundance of fresh air more than offsets the evil of the accompanying dust.

DRY AIR.

The main argument advanced to uphold the statement that the furnace is unhealthy is that it drys the air, thereby inferring that the original moisture contained in the air before its entrance into the heating chamber of the furnace was lost by contact with the heating surfaces of the furnace. We also very often hear this same argument advanced against steam heating, but nothing can be further from the truth. Air when saturated with moisture contains, at 32° F., one-one hundred and sixtieth of its weight in water, at 59° it contains one-eightieth and at 86° one-fortieth, doubling its capacity for moisture with each increase of 27° F.

We can readily see by the foregoing that instead of losing the moisture, we have simply increased the capacity of the air for moisture with increase of temperature. If allowed to remain in this condition the effect would not only be deleterious to persons occupying the room so heated, but the effects would be disastrous on the furniture and the wood work of the room. It is a well-known scientific fact that rapid evaporation has a cooling effect, which enables one to withstand a much higher temperature without discomfort than would be possible in an atmosphere heavily charged with moisture. Thus we read every summer of numerous heat prostrations in New York, where the atmosphere is extremely humid with a temperature of not over 90° F., while in the high dry altitudes of some of our Western States a temperature of 100° to 110° in the shade is successfully withstood. In artificial heating a happy medium is the desideratum, and in all well-constructed furnaces ample provisions are made for supplying the extra moisture made necessary by raising the temperature of the air.

As to whether I have in the foregoing made a successful defense of the subject of furnace heating is a question which you, gentlemen, must decide upon. In any event I shall drop this subject at this point from now on, and simply treat of the main subject of my discourse.

THE COMBINATION SYSTEM.

The word "combination" may be defined as the result of combining or joining together two or more different elements or systems into one harmonious whole. There are several distinct and different systems of heating, and the combining of any two of these systems into one would naturally result in a combination system. The specific form of combination heating which I wish to treat of is obtained by a combination of steam or hot water and air, or, as it is commonly called, furnace heat. The advantage of the combination system in buildings suitable to its use are manifold, but in order that these advantages may be made apparent, it may be necessary to diverge a little. Heat is supposed by many to be an actual and discernible substance, and until within a very few years even the more advanced students of natural physics were of the same opinion. Later investigation has shown that heat is nothing more nor less than molecular motion, consisting in case of air of nearly uniform rectilinear motions, with sudden changes in direction and velocity when the molecules come too near one another; in case of a liquid of irregular wandering of its molecules, and in case of a solid of orbital or oscillatory motions. By the foregoing definitions it will be readily seen that air will absorb heat much more rapidly than either liquids or solids, and as in combination heating we are depending for fully 50 per cent. of our heat on air heat, the natural conclusion is that a combination heater will give results in the rooms to be heated much quicker than either straight steam or straight hot water.

Heat is communicated from one body to another in three ways, viz.: Radiation, convection and conduction. Radiant heat passes from one body to another at a distance through the air in straight lines and with great velocity, but it does not, to any appreciable extent, warm the air through which it passes. Conducted heat passes from one particle of matter to another at insensible distances, as an iron bar with one end in the fire becomes gradually heated at the other end. Convected heat is the movement of the heated body itself from one point to another, as the circulation of hot air or hot water. In combination heating we again have an advantage over straight steam or hot water, as we utilize in the rooms to be heated two of the three processes of heat distribution—*i. e.*, radiant and convected heat—while in steam or hot water only the radiant heat is utilized.

VENTILATION.

One of the most important features of combination heating is the fact that where the air supply is taken from the outside, as it always should be, it insures a perfect ventilation throughout the building, as well as heat. The necessity for ventilation is very little appreciated by the general public, but as heating and ventilation have always seemed to me to be inseparable, and as the people naturally turn to our profession for their knowledge of these matters, it might be well for me to ask, What is ventilation, and why is it necessary? Ventilation is the act of replacing foul, impure air, in a confined space, with pure air. Please note that word "replacing." Times without number have I had people assure me that they had looked out for the ventilation of their house, as they had fire places in all the principal rooms. When asked if they did not know that "Nature abhorred a vacuum," and that their fire places would not exhaust unless there was some means provided for replacing the air thus removed, would reply, "They had not thought about that, but guessed there would be enough leaks in the doors and windows, anyway." I could cite any number of leading authorities and read whole chapters showing the necessities of ventilation and the vast consequences of the result of continued breathing of impure air, but a mere statement of the component elements of air will suffice for this article. If we divide air into 10,000 parts, its composition would be as follows: Oxygen, 2096; nitrogen, 7900 and carbonic acid 4 parts. When the proportion of carbonic acid in a room is increased from the normal amount of 4 parts in 10,000 to between 6 and 7 in 10,000, a faint, unpleasant odor is usually perceptible to one entering from the fresh air; if the proportion reaches 8 parts the room is said to be close. According to some authorities, a full-grown man at rest will exhale through the pores of the skin and from his lungs nearly ¾ cubic foot of carbonic acid per hour. Taking a room containing 2500 cubic feet of air in its normal condition, we find that the air contains 1 cubic foot of carbonic acid. Now, let us suppose this room to be a sleeping room, not ventilated, occupied by two persons eight hours each night. If the windows and doors of the room were closed during the eight hours, the natural portion of carbonic acid would be increased to about 13 cubic feet (or 1 part to 200), and the occupants would arise in the morning with depressing headache. A person coming into the room from the outside would declare the air to be "foul," and a man does not need to be a crank on ventilation to reach the conclusion that such a situation would be anything but healthful. This condition could be obviated, to a certain extent, by raising the windows, but that practice is dangerous in results, is a prolific source of colds and sickness, and as a means of ventilation totally unreliable, not to mention the morning's discomfort of arising in a cold room. Accurate ventilation will replace the air in a given room every 20 or 30 minutes without draft.

FINAL ADVANTAGES.

I wish to call attention here to the reason why the combination heater will from natural causes give more perfect and greater results in ventilation than it is possible to obtain from indirect steam or hot water, more particularly hot water. The force which we use to crowd the fresh air into the room and drive the foul air out is due to the expansion of the fresh air by heat. Air expands one-four-hundred and ninety-first of its bulk for every degree it is heated above 32° F.

Thus it will be seen if we heat the air 50° warmer than the surrounding air we have increased its bulk very nearly one-tenth. The greater the difference in temperature the greater the expansion, and, as a natural consequence, the more rapid the movement of the warmer air. On a moderate winter day the indirect radiator in a hot water job is rarely heated over 130° to 140° F., and as it is not possible for the air in passing through the stack to absorb more than from one-half to two-thirds of its heat, the temperature of the air flowing into the room under such conditions will rarely exceed 75° to 80° F. As the force with which the air comes into the room depends upon the difference in temperature of the air in the stack and the air in the room, it will be readily seen that the movement must be very sluggish. With the combination heater, the air coming in contact with the fire and smoke surfaces only, the temperature is raised much higher, with the result of a rapid flow of a large volume of air into the room in question.

Now, one more point, then I am through. In installing a combination job great care should be taken to place the heater as near the center of the work as possible, locating all air registers as near the heater as practical, so as to insure short connecting pipes in the basement. Always locate registers away from windows or cold walls, selecting, if possible, the warmest side of the room. Cold and warm air are always antagonistic, and you should give the warm air all the advantage possible if you wish for the best results.

Lastly, the combination system of air and water heating particularly is in the market to stay, and to you who are interested in residence or school heating the subject is worthy of your most careful consideration.

Antiquity of Glue and Veneering.

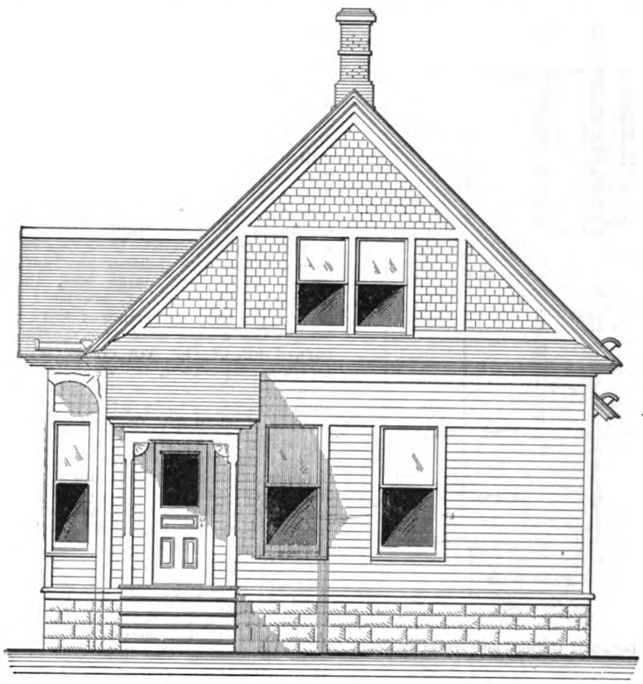
Among the many occupations of the carpenter, says a writer in a foregn exchange, that of veneering is noticed in the sculptures of Thebes as early as the time of the third Thothmes, who is supposed to be the Pharaoh of the Exodus, and the application of a piece of rare wood of a red color to a yellow plank of sycamore or other ordinary kind is clearly pointed out. And in order to show that the wood is of inferior quality the workman is represented to have fixed his adze carelessly in a block of the same color while engaged in applying them together. Near him are some of his tools, with a box or small chest made of inlaid and veneered wood of various hues, and in the same part of the shop are two other men, one of whom is employed in grinding something with a stone on a slab, and the other is spreading glue with a brush. It might, perhaps, be conjectured that varnish was intended to be here represented, but the appearance of the pot on the fire, the piece of glue with its concave fracture, and the workmen before mentioned applying the two pieces of wood together, satisfactorily decide the question and attest the invention of glue 3300 years ago.

To Darken Oak.

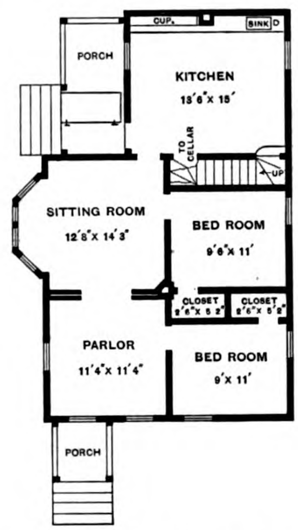
A writer in an English paper says that to darken oak for decorating woodwork fumigate the material with ammoniacal vapor, which effectively produces the dark coloring so much desired. In accomplishing this, the method consists in placing the material to be darkened in an approximately air-tight room in which no light enters; or for small work a packing box will suffice, the joints or cracks to be well pasted over with paper. In this room or receptacle for depositing the furniture or other articles is placed a flat porcelain or earthen vessel filled with ammonia, the vessel containing the liquid being, of course, set on the ground or floor, that the fumes or vapor may strike to advantage the article to be darkened. If the apartment is large, two or more vessels containing ammonia may be employed, and allowed to remain until the desired effect is secured. The ammonia does not touch the oak, but the gas that proceeds from it acts in a peculiar manner upon the tannic acid contained in oak, browning it so deeply that a shaving or two may actually be taken off without removing the color.

A Low Cost Cottage.

The illustrations which are presented herewith, represent a neat frame cottage which is likely to interest those of our readers who are contemplating the erection of buildings of this description. The drawings call for a story and a half cottage, having parlor, sitting room, kitchen and two sleeping rooms upon the main floor and a finished attic. The sitting room, it will be observed, has a bay window, and is connected with the parlor by folding doors. Each sleeping room has opening from it a commodious closet, a feature likely to be appreciated by all. The arrangement of the rooms is such that one chamber opens from the parlor and the other from the sitting room. In the rear is the kitchen, from which ascends the stairs leading to the attic. Along one side of the kitchen is a cupboard having shelves inclosed by panel doors above the counter shelf, while below are drawers, shelves, and meal and flour bins, arranged to tilt forward. At the right of these is the sink, beneath which are shelves and panel doors. A cellar is under the kitchen. The studs are 2 x 4 inches, and 12 feet in length. We learn from the author of the design, O. I. Fitz, Rock Island, Ill., that the house will cost in that locality $1100.



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



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

A Low-Cost Cottage.—O. I. Fitz, Architect, Rock Island, Ill.

Something About Mortar.

The cohesive and adhesive strength of mortar in weather-bound brick work is due, not to its peculiar hardness, for that is a quality which it cannot be said to largely possess, but it is due rather to its elasticity. It is frequently found when cutting away or removing portions of this kind of work, says F. Walker, in one of our English contemporaries, that a stout chisel may, without experiencing much resistive force, be driven into the mortar joints without any apparent effect beyond that of displacing so much of the mortar as previously occupied the space taken up by the chisel, the larger portion of the displaced mortar being driven into a closer molecular proximity than previously existed. The ancient Romans, who seem to have done all things well, are accredited with the practice, in the preparation of their mortars, of forming pits and burying the newly made mortars for a considerable time before using them, a statement sometimes adduced (and not unreasonably so) to account for the strength and durability of their work. In criticising the remains of old work, it is well to remember that in that, as in all things, we have the survival of the fittest; that the bad work of the ancients (if they did any) is gone, like Prospero's "insubstantial pageant faded," leaving "not a rack behind," and we are left only with the good from which to draw our inference of the whole.

Such a process of mortar-making, however desirable, cannot in these go-ahead days of heavy city ground rents and suburban building of mushroom growth be now indulged in. But the really practical man is often astonished to find in specifications emanating from high places the following words: "No more mortar to be made up at one time than is necessary for the day's consumption." This is a necessary provision when building in the winter season, and it is necessary to provide at other seasons that the mortar shall not lie about in thin isolated beds or layers until all moisture is extracted from it. But it is desirable under all other circumstances that it be allowed to lie sufficiently long to admit of the unequally burned parts of lime taking in sufficient moisture to make them soluble, as lime that is not well burned imbibes water very tardily.

Where this is not done these parts will slake in the brick work, forcing out portions of joints in their immediate vicinity and raising considerable portions of the overlying brick work off its beds. Such under-burned parts of lime are, when slaked, distinguishable by a dark bluish gray color, and if exposed sufficiently long to the air, will resolve themselves into a fine powder.

The limes in general use in and about London are the Dorking, the Merstham and Halling, and are known as gray or stone lime. These limes are used for the first and second coats of the plasterer—viz., the rendering and floating coats, as they acquire in setting a hardness which the chalk or pure limes never attain, the chalk lime being suitable only for the third or finishing coat, known technically as "setting," and which acquires its hardness by the process of troweling to which it is subjected by the plasterer when mixed with about one-third of fine washed sand or otherwise gauged with plaster of paris.

Well-burned gray stone limes imbibe water greedily, slake freely and quickly if supplied with sufficient water, while the eminently hydraulic limes imbibe water less freely and slake very tardily, and for this reason blue lias lime, when in the lump, should be covered over with sand for two or three days and copiously supplied with water before putting it in the mortar pan, the wet sand retaining some of the water applied, and to some extent preventing the escape of the heat generated in the incipient stage of the slaking process, which two factors combined are generally considered to accelerate the slaking.

The advantage claimed for mortar that has been made up sufficiently long to allow it to properly cool is that the outer skin of the mortar heap becomes sufficiently hard by the process of surface evaporation and the attraction of atmospheric carbon to imprison within the bulk sufficient moisture to slake the badly burned portions of lime, in the shape of "core," that may be in the mortar, to set up in its incipient stage the chemical action which we are told takes place between *silex*, or sand grains, and dissolved lime, coating the individual grains, or *nuclei*, and filling up the microscopic spaces which must exist between all angular grains, however small they may be.

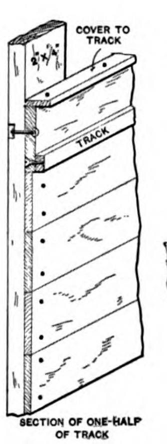
By a proper process of retempering

the mortar the particles are driven closer together, the excess of water is eliminated, and the mortar acquires a characteristic known to workmen practiced in the use of mortar by the name of toughness, in which state it can be used with infinitely less liability to shrinkage than a newly-made mortar.

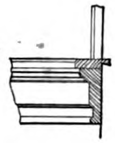
Walls built with retempered mortar and bricks sufficiently wetted—that is, wetted to a degree short of absolute saturation—a degree which can be better determined by the practical workman than prescribed here—produces the best results. By all means avoid the use of super-saturated bricks.

It not infrequently happens that a bad mortar is produced from good material, and the one chief thing productive of this is the modern mortar pan, coupled with the impractical idea of many of our so-called builders of to-day (largely—very largely—recruited from the ranks of builders' clerks, with a knowledge of building commensurate to the making out a list of items under the head £ s. d., and circumscribed by the four edges of a sheet of foolscap) that any unskilled workman—*i. e.*, unskilled in that particular branch, can turn out a bed of bricklayers' mortar. This work more often than not is assigned to the engine driver, who does the double duty of engine driver and mortar-pan attendant. If he be a competent driver, the chances are that he knows little, and cares less, about mortar; and years of practical experience in the supervision of work has taught the writer that the mortar is turned out of the pan either imperfectly incorporated, or, what is more frequently the case, is overground to such a degree as to be little better than mere dust when dry, the grit and body of the sand being ground out of it.

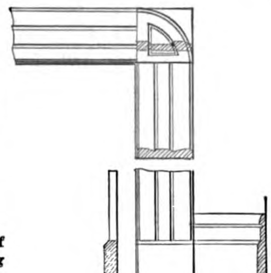
The objection to loam in sand is that it deteriorates the setting and indurating properties of the lime, coating the sand grains and forming a separating medium between them and the lime, to the injury of the tensile and cohesive strength of the resulting mortar. Mortars made of unclean or loamy sand are very liable to shrinkage and cracks. The use of water impregnated with loam or clay should be avoided, both in slaking the lime and in retempering the mortar.



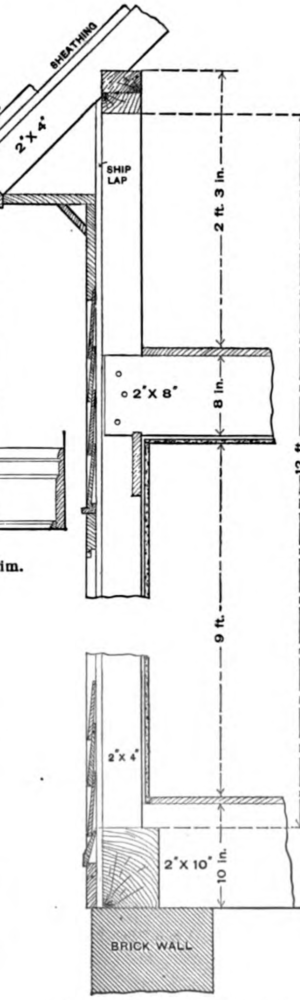
Showing Method of Putting up Sliding Door Track.



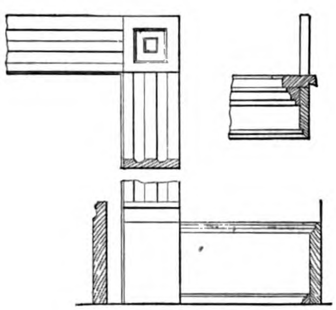
Detail of Molding.



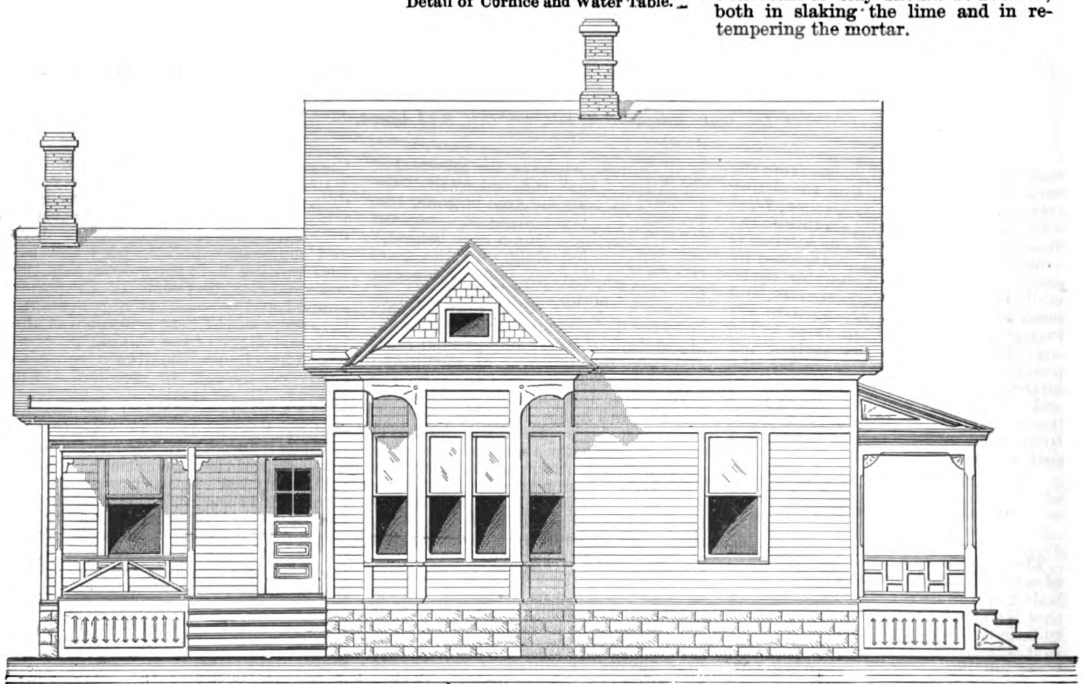
Details of Main Trim.



Detail of Cornice and Water Table.



Detail of Kitchen Trim.



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

A Low Cost Cottage.—Miscellaneous Details.—Scale, ¾ Inch to the Foot.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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A New Filial Body.

The new Builder's Exchange at Waco, Texas, has made application for membership in the National Association of Builders. The Waco builders have only been definitely at work a little over a month in perfecting their organization, and one of their first moves was to make an application for admission to the national body. This makes two cities in the great Southwest now represented, and the example of Waco and San Antonio should be followed by builders in other large cities in that vicinity. The National Association gladly welcomes affiliation from all builders but particularly from those situated in territories that have been comparatively unacquainted with the national work and which will so largely extend its field of operation.

Notice to Secretaries.

The attention of the secretaries of all local exchanges is drawn to the fact that they should urge their members to destroy all old forms of the Uniform Contract and use only those which have been issued since the revision. The old form bears in the upper left-hand corner the announcement of its approval and adoption by the American Institute of Architects, the Western Association of Architects and the National Association of Builders, while in the present form the name of the Western Association of Architects is dropped, that organization having been absorbed by the American Institute. For the sake of uniformity it is best that the old form should be destroyed, and it is suggested to the secretaries that this request be made to all members of their various exchanges, and that the new form be kept on hand in sufficient quantities to cover all needs.

Organization and the Individual.

When a man enters into business he does so with the definite purpose of accomplishing certain results, and, therefore, brings to bear upon its details all his energy and persistence, for in no case does he expect the desired results to produce themselves without unremitted, intelligent labor in their behalf. Success cannot be obtained without persistence and singleness of purpose. No matter how wise or skillful a man may be, he must apply all his talents and wisdom to the accomplishment of success in whatever line of business he may engage, and must be content to patiently do this day after day until the objects sought are within his reach. He may be ever so wise and skillful, and yet if the qualities which, rightly directed, mean success, are applied interruptedly without persistence to one object, or are devoted continually to new enterprises, in the hope of securing greater profit, success is rarely gained. The same general rules which are applied to the success of the individual can be applied to the success of an organization. The work of a builders' exchange will never be successful without persistent and long-continued effort. As in the case of the business man, success means a succession of gains, however small, until the surplus of gain is sufficient to offer protection against every emergency. The position of an organization is almost identical with that of the individual, in that its action becomes individual in its relationship to the community—that is, an organization speaks with one voice, no matter how varied may be the character of its membership. The various members stand to the success of an organization as the various characteristics and capabilities of the business man stand to his success, and without the united and earnest action of the members on one hand, and the total abilities of the individual on the other, success cannot be obtained. Half-hearted endeavor never brings success. The work of an organization of builders such as is advocated by the National Association is retroactive in its character, in that it cannot be successful without the cooperation of the individual, and is valueless to the individual without the action of the organization.

It is the combined effort of individuals that makes the effort of the organization, for without the effort of the individual the practices and projects of the organization become void, and the organization a meaningless institution. The individual, in this connection, means every member, for without the co-operation of the entire membership success is not likely to result. For instance, a code of practice, most excellent and perfect in its intent may be formulated, calculated theoretically to confer great benefit upon the builder, and yet unless each member of the organization applies this code to the transaction of his business, it remains a theory only and the work of the organization in this particular is without result. This example serves to show both aspects of the situation, for the organization only becomes purposeful and beneficial upon the united action of its members, and the members are only benefited when the organization acts as an integer; the work of the organization, in this sense, to mean specific gain to the fraternity through action of the organization, as such, which in turn, is the result of the united action of its component parts—that is, the individuals who form its membership. All must work together for the common good, because should one individual only adopt a code of practice, advocated for adoption by the whole, that individual would be at a great disadvantage because of the minority of his position. Let the majority adopt, and the code or any other desirable form becomes effective. Thus, success depends upon the effort of the individual, but it also depends upon the effort of every individual who goes to make up the organization.

The Principles of the National Association.

The constant insistence in urging the principles and recommendations of the National Association of Builders is continued for the purpose of familiarizing the building public with their intrinsic truth and merit. The truth of a principle and the merit of a recommendation must be comprehended and realized before it can be practically applied. Builders for whom the recommendations of the National Association are prepared should make themselves familiar with every method which it advocates for the improvement of the conditions under which they transact their business. Thorough study of these principles and recommendations, which are continually being presented in these columns in all of their various phases, cannot but result in recognition of their truth and equity, and which must, therefore, command approval, and if approval, co-operation. The principles of the National Association are self-evident truths and the recommedations are the outgrowth of the application of these truths to the builder's business; but they are useless to the builder who makes no application of them, just the same as abstract unapplied truths are useless in any calling of life, and the results to the individual of the application of these principles depends largely, if not entirely, upon the individual himself. Of course, there are certain inactive individuals in every community who are bound to reap the benefit of the activity of the other members of that community by profiting, without labor, from improved conditions which follow active efforts to establish justice and the right. This is the condition which exists everywhere, for in matters of reform the pioneer work is done by the few for the benefit of the many, and yet to secure the full benefits, which are the outgrowth of this work, each individual must do his share, at least in applying the methods thus formulated.

Builders' Exchange Requisites.

The experience of the older builders' exchanges, which have been in existence long enough to become thoroughly familiar with the requisites of success, has demonstrated that there are certain requirements which must be observed if the highest degree of usefulness in organized or associated effort is to be obtained. The peculiar character of an exchange, organized for exchange purposes as understood and advocated by the National Association of Builders, provides an opportunity for actual, practical benefit to all concerned, which under proper administration covers a field of action possible to no other trade. The distinction between a builders' exchange and a simple organizaton of builders, such as carpenters' associations, &c., is very marked. The exchange embraces both the contractor and the dealer in materials, in all branches of the building trades, and is essentially an institution created for the purpose of facilitating all business incident thereto. In an association of builders such as a masons' or carpenters' association, the scope of operation is limited to the consideration of matters pertaining to the relationship between employers and workmen, and in creating harmonious action upon subjects of mutual concern which alone affect the members of single branches of the trade. While organizations of this character are exceedingly beneficial as far as they go, and perform phases of necessary work which could be accomplished in no other way, the immensely larger field covered by an exchange demonstrates the superiority of the latter form of organization. The exchange in its very nature facilitates the establishment of such organizations among the separate trades as already exist in nearly every city in the country, because of the fact that it includes in its membership all branches of the trade.

CHARACTER OF AN EXCHANGE.

An example of the true character of an exchange might be fitly shown by supposing that all of the various associations of master builders existing in a given city were joined together, including the dealers in building materials, for the purpose of securing some common ground upon which all business matters relating to their calling might be transacted. With associations of builders confined to one branch of the trade, in a city where no exchange exists, action is brought about by the necessity of meeting some emergency, or, as the result of deliberation, in meetings held in the evening seldom oftener than once a month. On the other hand, a builders' exchange brings the representatives of the different branches of the trade together daily and out of this daily contact the needs of the builder are crystallized and become apparent to all concerned. Another advantage of the exchange, in grappling with questions affecting the builder, is that instead of holding meetings for the purpose of ascertaining what the needs of the builder are, as is the case with an association which affects only one branch of the trade, the constant daily contact is bound to bring about sufficient discussion upon topics needing reform to secure recognition in the minds of all of the necessity for action. It is impossible that men pursuing the same business and meeting together day after day, primarily for the purpose of transacting the details of that business, could do so without improvements constantly suggesting themselves. In no other form of organization can the concensus of opinion be secured so well as in that which embraces in its formation all factors to a proposition — that is, representatives from all branches of a given trade.

EFFICIENCY.

The efficiency of an exchange depends very largely upon the fulfillment of certain general requirements. In the first place the quality of the membership very largely affects the usefulness of the organization, as a large promiscuous membership is less likely to produce results than a small one in which the material has been carefully selected, with reference to the honesty and responsibility of the individuals who compose it. The careful selection of a membership may possibly defeat great numerical strength, but it establishes reputation in the community, and makes identification with the exchange a thing to be desired by all engaged in these trades. The erection of a high standard of dealing and workmanship by an exchange, necessarily tones up the whole business standard of the fraternity in its vicinity, thus bringing the whole body politic up to the level created. Unscrupulous dealing seems at times to prosper, but there is no question that honest and concerted effort by a portion of a business fraternity is bound to establish a standard which will prevail in the end, to the detriment of the inefficient and unscrupulous. Reputation for skill and fair dealing is just as necessary to the success of the builder as to the banker, and these attributes are best conserved for the builder through the medium of a membership in an exchange which demands that every applicant shall be possessed of these qualities. The admission of all comers to membership in an exchange, without regard to their standing in the community, would be almost sure to introduce into the organization those unsafe elements which always exist in larger proportion than the safe ones. Once permit this unsafe element to become identified with an exchange and the natural conclusion is that it is admitted because it is up to the mark, and is satisfactory to the majority. One method of maintaining a wholesome organization is by making failure in business terminate membership. This may seem to be a hardship, but the welfare of the organization must be first, and the interest of the individual becomes secondary. Through failure the relationship of the individual is so changed that his continuation in membership could not be permitted without an investigation as to the cause of his failure. As no person is debarred from making application for membership, that privilege is always in the hands of the person who has failed, and if he applies for renewal of membership his standing is subjected to the same scrutiny as that of any other applicant, and the cause of his failure would then come under consideration in the least embarrassing way. If the causes of failure were considered while the individual who had failed were yet a member, the organization would be subjected to the necessity of an investigation and possibly to the necessity of fixing a penalty, such as censure, suspension or expulsion. The failed party always having the opportunity for readmission is not injured by being dropped from the rolls, and if he is readmitted he is thereby exonerated from wrong doing, as such readmission on the part of the exchange demonstrates that his fellow builders, who have examined his case, have found him worthy of membership.

MAINTAINING MEMBERSHIP.

Another method for keeping a membership up to the standard is by the provision for complaint of the member against another for improper practices. This complaint should be heard before the whole body, and the complainant should be subjected to certain penalties if he has brought his action without just cause. This opportunity for complaint acts as a wholesome restraint, inducing members to be circumspect in all their dealings with each other. The establishment and adoption of a code of practice by the members of an exchange creates a standard which will be precedent for the whole fraternity, those outside of the exchange as well as those in it. The adoption of an equitable code is always bound to bring about the correction of certain evils which have attended the treatment of bids in the hands of architects and sub-bids in the hands of general contractors, and other details affecting the transaction of the building business. Concerted action alone can bring about the adoption of such a code, and concerted action can best be obtained by means of an organization which embraces all branches of the trade.

AIDS TO STANDING OF AN EXCHANGE.

Active participation in municipal affairs that are identified with building interests always helps to give the exchange a standing before the public, as has been frequently demonstrated by the excellent work done by many of the older bodies, such as revising building laws, &c. The introduction of social features is always beneficial, as they are sure to bring about a greater friendliness and fellow feeling among the members and assist at cementing the bond of sympathy which should hold it together. To most perfectly assist the transaction of the builder's business, an exchange should be centrally located; its rooms should be easy of access and provided with every necessary convenience. The exchange rooms should be recognized first and foremost as being the daily rendezvous of the members, where they can come together for business purposes, and thus avoid the time wasted in the necessity of visiting different persons in their different offices, perhaps in different parts of the city. The usefulness of an exchange cannot be overestimated where the organization is properly established and its affairs properly administered, for the composite character of its membership in the very nature of things brings to the surface requirements of the entire fraternity. It is useless to expect that an exchange can be instantly established in its full power, or that the members can be made to instantly comprehend the full value of an exchange as a factor for their individual benefit, but the experience of many of the exchanges in the National Association has demonstrated that in a wonderfully short time the benefits of an exchange have established themselves beyond contradiction and have been recognized by all.

The following statement of the several amounts of gold and silver carried by the leading countries of the world has been published in a report of the Director of the United States Mint:

Great Britain, gold	$550,000,000
Great Britain, silver	100,000,000
France, gold	800,000,000
France, silver	700,000,000
Germany, gold	600,000,000
Germany, silver	210,000,000
Russia, gold	190,000,000
Russia, silver	60,000,000
United States, gold	654,000,000
United States, silver	575,000,000
Canada, gold	16,000,000
Canada, silver	5,000,000
India, silver only	900,000,000
China, silver only	700,000,000

ENGLISH BOND IN BRICK WORK.

ONE OF THE FEATURES of brick work which always has more or less of interest even for those who are skilled in the art of laying brick is that technically designated as "bond." This is not to be wondered at, for it is the fundamental principle underlying all brick work, and in proportion to the correctness or inaccuracy with which the bonding is carried out depends the strength and symmetry of the work when it is finished. In discussing this phase of the subject in one of our English exchanges J. Woodley presents some comments of a character likely to interest many readers of this journal. Among other things he says:

The most incompetent bricklayer that ever handled a trowel is fully alive to the necessity of "breaking joint" on the face of his work, it being considered an unpardonable fault if he is caught, even in the case of the most rough description of walling, with a vertical or "cross joint" directly over a similar joint in the course immediately under the one he is laying, technically known as a "straight joint." It is also a poor workman who is not aware of the importance of preserving, or, at the very least, some decent attempt to preserve in face-work a plumb line with the "perpends" — that is to say, that every brick, as placed in the first course, should be kept in the same position in every alternate course, in a direct vertical line to the top of the wall. Again, every skillful and intelligent bricklayer knows that in the first setting out of the bond in the commencing course of a wall intended for face work the several features in the elevation of that particular wall should be taken into account, and the position of every brick arranged accordingly, so as to obviate the necessity of any

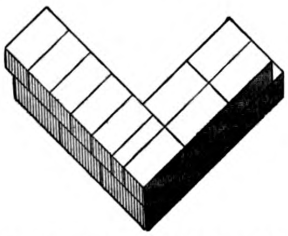

Fig. 1.—External Angle of Wall One Brick in Thickness.

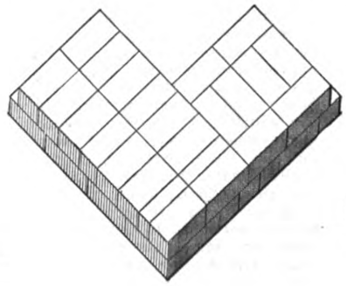

Fig. 5.—External Angle of Wall Two Bricks Thick.

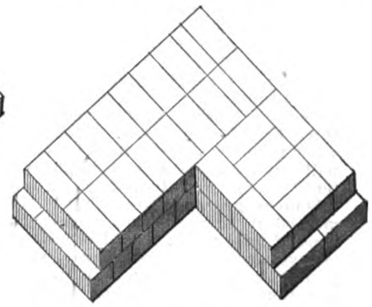

Fig. 6.—Interior Angle of Wall Two Bricks in Thickness.

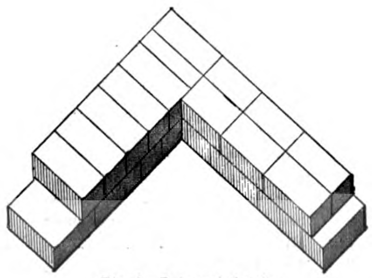

Fig. 2.—Internal Angle.

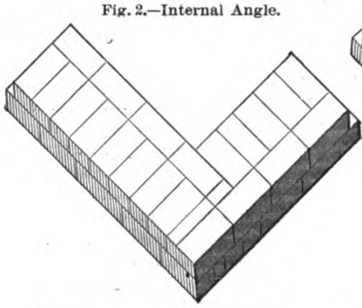

Fig. 3.—External Angle of Wall One and One-Half Bricks Thick.

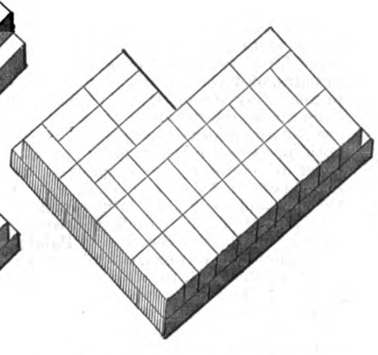

Fig. 7.—View of External Angle Two and One-Half Bricks Thick.

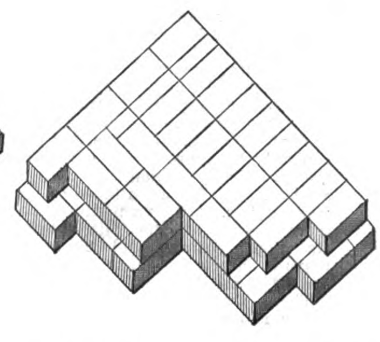

Fig. 8.—Appearance of Internal Angle of Wall Two and One-Half Bricks Thick.

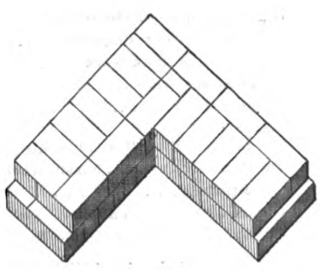

Fig. 4.—Internal Angle of Wall of Same Thickness as that represented in previous Figure.

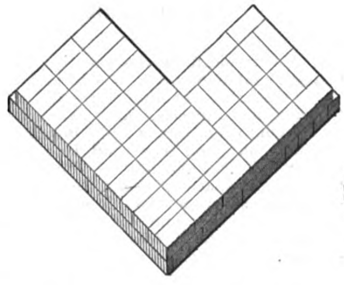

Fig. 9.—External Angle of Wall Three Bricks Thick.

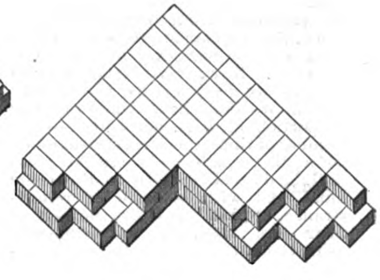

Fig. 10.—Internal Angle of Wall Three Bricks Thick.

English Bond in Brick Work.

change in the perpends as the work is developed. Every bricklayer, skillful or unskillful, understands the meaning of "Flemish bond," and the difference between it and so-called "old English bond," but, until within the last few years, very few indeed ever troubled themselves to any serious extent about bonding in the section of a wall.

Perfect bond in brick work means—if it means anything—that the bonding in the section of a wall should be carried out with the same regard to integrity as the face, and this condition can only be obtained by the adoption of old English bond, illustrated by the accompanying diagrams, Figs. 1 to 10 inclusive, which represent external and internal angles from one to three bricks in thickness. Moreover, a few minutes' study of these examples will serve to prove what a simple matter it is when rightly understood, and it is no exaggeration to say that by this method it is possible to construct a mass of brick work, no matter how extensive or intricate in character, as perfect in its bonding as is the construction of a fabric of cloth which is woven without a false stitch.

One of the most difficult things to impress upon a bricklayer who has not been previously taught or thought it out for himself, is that when a wall contains in its thickness an odd half brick—say a one and a half, two and a half, three and a half bricks, and so on—the bonding in the internal angle is not the same as when the wall is made up of even whole bricks, as, for instance, a one, two or three brick wall and upward. A glance at the accompanying diagrams will be sufficient to explain the why and the wherefore.

There is an especial feature inseparable from perfect bond in brick work, the full value and importance of which can only be appreciated by those who are practically acquainted with the subject. The feature alluded to is the "closer," or, as it is sometimes derisively spoken of, the "little brick." Its proper position and the part it plays is clearly demonstrated in each and all of the diagrams.

There are instances wherein the closer is completely elminated from the face of the work, a three-quarter being substituted for a whole stretcher on all the external angles and the symmetrical appearance, to say nothing of the integrity of the bond in the interior of the wall, being thereby sacrificed to the dislike of those "little bricks."

In regard to the use of "bats," or broken bricks, it is usually provided in the specification of a contract for brick work, that no bats are to be used other than what is necessary to make out the bond. Now, it is certain that so long as we have bricks, it is equally certain we shall have a more or less proportion of bats, according to the number of times the bricks are handled before they reach the bricklayers; and in these days of competition, these bats must, and will, in spite of remonstrance, be used. It is not the fact of their being used, but the manner of using them, that makes their employment objectionable. Instead of being bundled into the walls indiscriminately, they should be carefully distributed, and placed in proper form in the same manner as if they were whole bricks, in which case the bond transversely, or lengthways of the wall, will be the same as if they were whole, while across the wall the defect in the bonding will be to a great extent mitigated.

The smallest church in the world is said to be located on the Isle of Man, the structure being only 10 feet square. The other extreme is St. Peter's at Rome.

Piers in Architecture.

Although the bulk or breadth and thickness of piers must depend in a great measure upon the solidity required for the building and the weight they have to support, yet in order to secure architectural effect the breadth of the piers should never be much less than one-third of that of the arches, supposing the latter to be open ones, otherwise, says the London *Builder*, the effect will be meager and deficient in solidity of appearance. And in architecture excess of solidty, even approaching to heaviness, is generally a lesser defect than the contrary one. Much also depends not merely upon the width, but the proportions of the arches themselves, for if very wide or less than twice their width in hight greater breadth is required in the piers than when the openings between them are of lofty or narrow proportion. In some external arcades or piazzas the piers are exceedingly narrow or slender compared with the arches, so much so as to be little more than square pillars or insulated pilasters with arches springing from them. It would be better, therefore, in similar cases to treat them altogether as such, converting their imposts into pilasters or antæ caps. Piers are frequently decorated with either pilasters or engaged columns, in which case their breadth must be such that the archivolt moldings of the arches will fill up the space between the openings and the columns. In many instances columns are substituted for piers, placed either singly or in pairs, and the arches spring either immediately from their capitals or from an entablature over them. There are again many examples in which both piers and a lesser order or sub-order of columns are employed, the latter being insulated on each side of the pier and their entablature forming the impost from which the arches spring. Palladio's Basilica, or Palazzo di Ragione, at Vicenza, affords an example of the kind, in which the faces of the piers themselves consist of a larger order in half columns, so that the whole composition resembles a series of what are termed arched Venetian windows entirely filling up the spaces between the larger columns. Besides these and other modes of decoration, niches are occasionaly introduced as ornaments to piers.

Ancient Heating.

A very old method of heating dwellings, and one which is still practiced considerably in China and some other oriental countries, and which was known to the Greeks and Romans, was based on good sense and economical principles. This method consisted in having a space of from three to ten inches between the floors, through which the heat and smoke traveled to an opposite wall, where provision was made to have the heat and smoke run up flues to the second floor and then pass through a similar space under the second floor. Of course, the spaces between floors were fire proof and were made accessible from top covering, so that repairs or cleaning might be readily done when required. We have no record of the manner in which the heat was generated and conveyed to the ducts under the floors, or how the smoke was finally carried from the building, but it is reasonable to suppose that some sort of brick furnaces were used with connections of some kind with the spaces between floors, and that the smoke was disposed of through flues or chimneys, just as we moderns dispose of it.

CONTENTS.

CARPENTRY AND BUILDING

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96-102 READE STREET, NEW YORK.

SEPTEMBER, 1893.

Another New York Theater.

The number of play houses of which the city of New York can boast at the present time is to be increased by the addition of a handsome building now under way at the corner of Thirty-Eighth street and Broadway, adjoining what is known as the Casino. The theater covers an area of 83 x 122 feet and is six stories in hight. The material employed for the greater portion of the exterior is Indiana limestone, although on the Thirty-Eighth street side buff brick is used to some extent. The style of architecture is Italian Renaissance in its severest form. At the time of writing the walls have been completed and the roof is being constructed. One of the novel features of the theater, when fully equipped, will be found in the chairs of the gallery, which are to be similar to those used in the orchestra circle. The chairs are large and comfortable and will number 1500. The interior decorations will be highly artistic, the prevailing colors being cream and gold. The cost of the edifice complete is estimated at something over one and a quarter millions of dollars.

The Right Spirit.

An interesting reversal of the general method of procedure between employers and workmen recently occurred in a prominent Southwestern city. The union workmen in the building trades desired to secure uniformity of working rules, wages, hours, &c., but were unable to do so on account of lack of unanimity among the employers. An effort was made to secure definite action on the part of the employers, but with indifferent success, and the workmen, as represented by a certain union, then endeavored to secure the establishment of some form of organization among their employers for their mutual protection and advantage. Correspondence by the workmen was begun with the secretary of the National Association of Builders on the subject, and advice was asked as to the best form of organization for employers. In addition to this, he was urged to make an effort to secure the establishment of a builders' exchange in the city in question. This spirit is one which is likely to bring the employers and workmen together upon a friendly and beneficial footing, and it is this spirit which should pervade all relationships between capital and labor.

Eccentric Architecture.

Building is a matter in which eccentricity is very apt to show itself on the part of individuals who are otherwise supposed to be in complete possession of their senses. Instances are numerous in ancient and modern history in which persons have set to work to build odd dwelling houses, or other erections, embodying some extraordinary ideas of their own, in design, construction, or decoration. Occasionally the thing is done purely for notoriety, but more often it is the outcome of some mental kink on the builder's part. Such objects are, in fact, usually the work of "cranks." The late Duke of Portland, one of the wealthiest of English peers, was a remarkable case in point. This individual expended immense sums and gratified his mental twist—for he was undoubtedly insane on this point—in the construction of a great suit of subterranean chambers and galleries in his beautiful estate of Welbeck Abbey. The work included magnificently appointed stables for some hundreds of horses, and a vast riding school, the whole being illuminated by gas. Why he should have wanted to burrow underground when he had hundreds of broad acres on which to build, and a splendid old mansion above ground, no one but himself could tell. But there the excavations remain to this day, a monument of wasted time, labor, and treasure—of no earthly use or advantage.

A Costly Mansion.

The latest thing in architectural oddities, however, is announced as being in course of construction in this country in the shape of a mansion constructed almost exclusively of steel and glass, which is to cost, not counting the decorations, the sum of $1,500,000. According to accounts given in the press a retired diamond mine owner from South Africa, said to be worth $25,000,000, has purchased a 500-acre tract in the Temescal district of California, where he purposes erecting for himself a lordly pleasure house which is not to contain a foot of timber or wood in any shape, and in which even the use of stone is to be restricted to a few marble and onyx sculptures and decorations. The materials to be used will be iron, steel, aluminum, brass, bronze, copper, platinum, silver, glass, concrete and cement, the foundations being of steel and concrete. The building, as described in an architectural journal, will be about 230 feet long by about 100 feet wide. At one end it will be surmounted by a tower 115 feet high, at the other end by a similar tower, but of lesser size and hight. A striking feature will be the sides below the cornice, which slope to the ground with a curve at an angle of about 45°. In the sloping sides are set huge oval windows 12 feet long and made to conform to the line of the sides or walls.

The Roof.

The roof will be a huge gable extending the entire length of the building and terminating in another gable at right angles, in which are placed immense stained glass windows, one of which will be 50 feet long and 30 feet wide. The roof is to be made of copper and the walls or sides of comparatively thin steel sheets. One would think this building would be intolerably hot in summer weather, while hail storms, which are not infrequent in that part of the country, would play havoc with the glass and cause a lively rattling on the metal roof and sides. On the whole, we should think a good old-fashioned frame house, costing but a small fraction of the sum mentioned for this mansion, would give a better return in solid comfort. Perhaps, however, the builder may be a crank on the subject of fires, in which case he might feel more at ease in such a thoroughly fire-proof fabric.

A Novel Profession.

The host of labor disputes which have marked the past few years in England, and the great loss and inconvenience attendant upon strikes, have caused the evolution of a new profession in that country. There has arisen a class of leaders of men, termed "strike defeaters," whose business is that of breaking down strikes, not by physical or military force, but by the more peaceful method of doing the work of the strikers until they come to terms. One of the most prominent of these individuals, whose name is Graeme Hunter, is described as a powerful, energetic man in mind and body, who lives with his men, but rules them with strict discipline. His methods are in some respects peculiar, and appear slightly arbitrary to an American mind. As described by English journals, Mr. Hunter's system is as follows: He has the reputation of never interfering in a strike until all means of settling it have been exhausted and he believes the strikers to be in the wrong. Then he simply puts his men to work and keeps them at it. He tells his hands how much he gets to do the job, and the way he makes his own remuneration is by simply dividing the whole amount among them according to their labor, less 1 penny out of every 5 shillings they earn, over and above the expenses incurred. He has under his control some 3200 men, whose average wages are about $6 a week, besides board and lodging. They are all obliged to live together near to where they may be working, and Mr. Hunter insists on every married man sending home at least £1 a week to his wife, paying them this amount in postal orders, collectable at the home of the wife. Fines are exacted for the absence from work, &c., and no recognition of union rules is had. It is said that eight of his gangs were recently employed at eight ports, including Liverpool, Glasgow, Greenock, Dublin and Bristol, by which it would seem that these men are all-round laborers and not skilled workers.

Wages Abroad.

The statistics which have recently been gathered by the Royal Commission on Labor of the United Kingdom are highly interesting and valuable, especially to the working classes, for the reason that they show the average rate of wages, the total earnings and savings of the working people of Great Britain and Ireland, and the loss by strikes and lockouts. In the final compilation and classification of these statistics for publication they are to be compared, where available, with similar data from other countries. From the report it is gathered that there are employed in regular industry in the United Kingdom, in round numbers, 7,800,000 men, 2,500,000 women, 1,700,000 males under 15 years of age and 1,200,000 girls, a total of about 13,000,000 people. Thirty-three separate occupations are enumerated in the returns which aggregate these figures. The total amount of wages paid yearly is given as about $3,165,000,000, being $240 per head for men, women and children. The normal wages of men in the 33 occupations enumerated average $320 a year; of women, $163 a year; boys, $117 a year, and of girls $90 a year. Sixty per cent. received wages of $4.80 to $7.20 a week and of the remainder 5 per cent. earned less than $4.80 a week and the rest over $7.20. The building trades average about $350 a year. In 1891 the loss of wages on account of strikes and lockouts was placed at $7,500,000. The total membership of trade unions is given as 817,000 in a working population of over 13,000,000. As may be supposed immigration plays a not important part in the labor of Great Britain. The number of immigrants to that country in 1891 intending to stay within the borders was 21,000. In 1892 the number was 4000 less. Wages are lowered in some trades by these immigrants, says the report, but only a few trades seem to be so affected. Still the matter is an important one and is being carefully considered with a view to stopping undesirable immigration.

Mass in Building.

The relative majesty of buildings depends more on the weight and vigor of their masses than on any other attribute of their design; mass of everything, of bulk, of light, of darkness, of color, not mere sum of any of these, but breadth of hem; not broken light, nor scattered darkness, nor divided weight, but solid stone, broad sunshine, starless shade. There is not a feature, however apparently trifling, to which the principle cannot give power, says one of the London architectural papers. The wooden fillings of belfry lights, necessary to protect their interiors from rain, are in England usually divided into a number of neatly-executed cross bars, like those of Venetian blinds, which, of course, become as conspicuous in their sharpness as they are uninteresting in their precise carpentry, multiplying, moreover, the horizontal lines which directly contradict those of the architecture. Abroad such necessities are met by three or four downright penthouse roofs, reaching each from within the window to the outside shafts of its moldings; instead of the horrible row of ruled lines the space is thus divided into four or five grand masses of shadow, with gray slopes of roof above, bent or yielding into all kinds of delicious swells and curves, and covered with warm tones of moss and lichen. Very often the thing is more delightful than the stone work itself, and all because it is broad, dark and simple. It matters not how clumsy, how common the means are that get weight and shadow—sloping roof, jutting porch, projecting balcony, hollow niche, massy gargoyle, frowning parapet; get but gloom and simplicity, and all good things will follow in their place and time; do but design with the owl's eyes first, and you will gain the falcon's afterward.

Cheap Contract Work.

The evils of cheap contracting are constantly coming to light, says a recent issue of one of the London architectural journals. A case brought before the Birmingham County Court recently will be useful as a warning to those contractors who are under the impression if they "pull through" the contract somehow, so as to pass inspection, they have nothing more to fear. A general opinion prevails among some contractors that they are not responsible for contingencies; that a building owner has no claim upon them to make good any cracked wall owing to yielding foundations. Judge Chalmers has refuted this idea, and his verdict will be indorsed by all who have any regard for the binding nature of a contract. The action was brought by a goldsmith against a builder to recover £50 (about $250) damages for so negligently building two houses that part of the walls fell down. There was a counter claim made for balance of account for work done. The houses contracted for were built at the back of others, and the land sloped downward toward them, so that a retaining wall was required to support the ground. The wall bulged and cracked and the defendant's attention was called to it. Something was done, but the work was left in a worse state, and the wall, scullery, &c., fell. Plaintiff arranged with defendant to supply the necessary material for rebuilding the wall, the latter to be responsible for the labor. The defendant commenced the work, but declined to finish it, whereupon the plaintiff engaged another builder to put the houses in repair for a certain sum. The foundations had not been carried down to the solid ground, nor the walls built thick enough to resist the pressure of the settling ground. It was alleged by the defendant that the fall was due to the bursting of the drains owing to the frost and the consequent yielding of the ground. The defendant commenced rebuilding the wall, but as plaintiff refused to pay for the fresh work, he declined to go on. His Honor said the work was improperly done, and gave a verdict for plaintiff for the damages claimed.

CAUSE OF WEAKNESS.

The weakness no doubt arose from the sloping ground. To obtain a level it was necessary to construct a retaining wall, which apparently was built too thin to resist the pressure and weight of the new houses. There was an attempt to make good, and the houses were nominally completed; but other defects appeared in them, and a portion, as above stated, fell. Nothing is stated about any terms of the contract between the parties as to the thickness of the wall or any other stipulation. The defendants had evidently contracted at a lower price than they were justified in doing, considering the nature of the site and the slope of the ground, and, by making good certain defects in the walls, they acknowledged their responsibility to some extent. One lesson to be drawn from this case is that cheap contract work does not pay, even when the contractor is not bound by any strict contract, and has it nearly all his own way. As there is no allusion in the report to any specifications or drawings, we may infer that there were none. The judge's remark that the work had been "improperly done from beginning to end," represents the class of work one is accustomed to meet with under the circumstances. Foundations and earth work, if there is any, are invariably neglected or scamped when a low tender is accepted, for they constitute a kind of margin which the contractor hopes may be made to recoup him. Sometimes he just manages to secure that modicum of stability necessary to prevent failure, but often, as in this instance, he trusts too much to accident; but the initial mistake renders all further work of no avail.

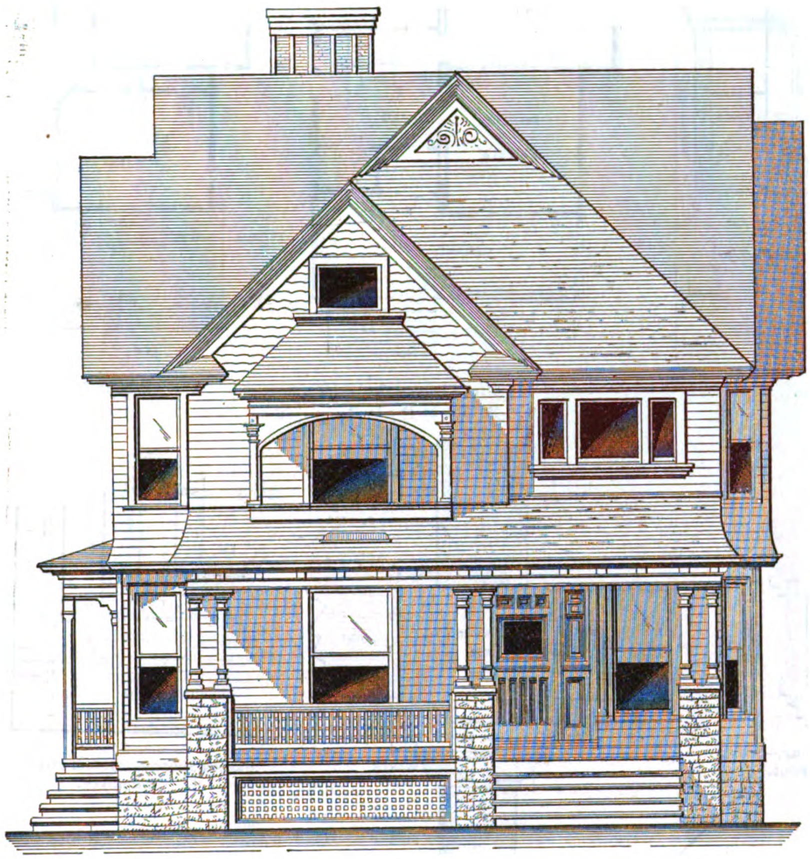
LESSONS TO BE LEARNED.

The other lesson should be taken to heart by employers who are reckless or niggardly enough to obtain tenders without a properly drawn up contract and specification. A large number of persons who propose to build think it justifiable if they put the work in the hands of a contractor who has tendered a very low price. There are hundreds of builders who are anxious to get work on the easy terms of only having to satisfy the owner, who has neither technical knowledge, specification nor contract. They can afford to underbid, because they know they are their own masters and can by a process of cutting down labor and materials recoup themselves. Inadequate foundations, inferior materials and scamped labor are their main resources, being just those which will pass with persons whose acquaintance with buildings is untechnical. Builders themselves who are led to take contracts of this kind will also learn that their liabilities do not cease with delivering up the building to an employer, but that they are responsible for contingencies that may occur during progress or after the work is completed. A builder who undertakes the erection of a building on a reasonable contract and finds that the foundations ought to be made deeper than he had calculated in his tender, or that a retaining wall must be made thicker than he had assumed, is conscientiously bound to represent the fact to the employer, and if he will not consent to a change or to the extra, decline to take the responsibility. Such contingencies may or may not be due to the builder's fault; but in any case, to protect himself and his employer he is called upon to judge of the circumstances as the work proceeds and to act upon it. But if he undertakes to do the work properly whatever may happen, accepting all responsibility, for a certain sum, he places himself in a position out of which no law will extricate him, however unreasonable or low the price is he has tendered.

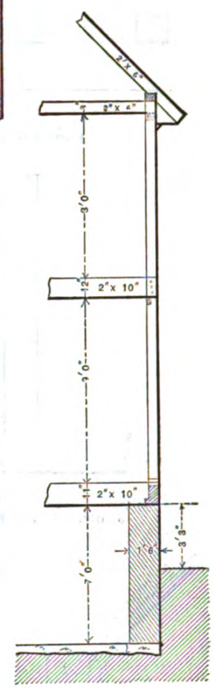
A DWELLING IN ROCHESTER, N. Y.

THE DWELLING which we illustrate by means of the engravings presented herewith, and our supplemental plate was recently erected on Park avenue, Rochester, N. Y., for M. T. Knapp, from drawings furnished by John R. Church, architect, of the place named. Provision is made for four good-sized rooms and a hall, together with numerous closets, upon the main floor of the house, while on the second floor are four sleeping rooms, rear stairs allow the second floor to be reached without the necessity of a person passing to the front of the house.

The foundations are of stone, the underpinning and veranda piers being laid up with 6-inch courses, rock faced. The sills resting on the foundation walls are 6 x 8 inches, halved together at the angles. On top of the sills is spiked a 2 x 6 inch piece, in order to raise them to the hight of the joist, showing the construction employed for the passage of hot air and soil pipes. The timbers, it will be seen, are framed with a space of 5 inches between them, for the passage of the pipes, and are supported by 5-inch gas-pipe posts in the cellar instead of brick piers. The reason for this, the architect states, is that in his section the price of iron posts with "waste nut" at top and bottom is about the same as a 12 x 12 inch brick



Front Elevation.



Section.

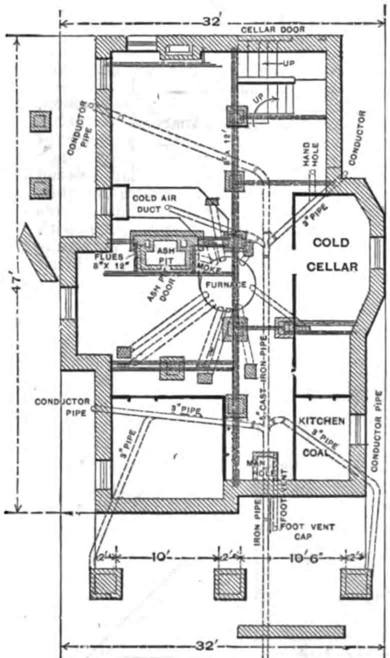
A Dwelling in Rochester, N. Y.—John R. Church, Architect.—Elevation and Section —Scale, ⅛ Inch to the Foot.

bathroom, together with linen and other closets. From an inspection of the plans it will be seen that each of the three principal rooms on the first floor may be entered directly from the hall, while the kitchen and library may be reached from the outside by means of the side hall and porch. The front hall has opening from it an alcove fitted with a seat and arranged for use as a small reception room, should occasion require. The parlor and library communicate through an arch, while the dining room and library are separated by folding doors. The kitchen is cut off from the dining room by a commodious and well-equipped pantry which serves the double purpose of keeping the odors of cooking from the dining room while permitting the necessary culinary appliances to be retained within convenient reach. The

the arrangement being shown in the sketches presented on page 228. Before raising the studs a sill 2 inches thick and ⅞ inch wider than the studs is spiked in place, this forming a ground at the floor to which to nail the base. The sill effectually closes any opening between the joist and the studding which might otherwise continue from the cellar to the attic. This form of construction also constitutes a ground for the plasterer, as the plastering throughout is carried to the floor back of the base. Between the studs back of the wainscot the walls are "back plastered."

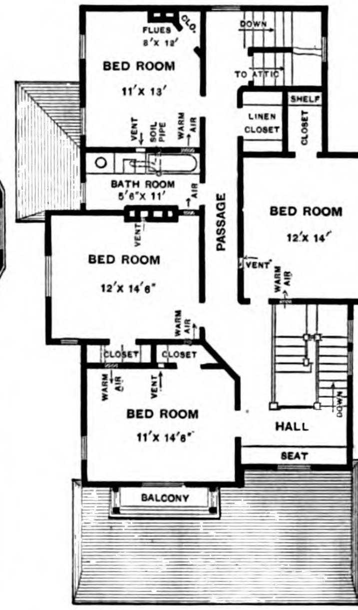
The sills or timbering through the center of the house and supporting the joist are built up with 2 x 12 inch plank, framed with double mortises for double tenons on the ends of the joist, as indicated in the sketch pier, while the finish is much neater. A 2-inch oak cap is placed on top between the "waste nut" and the timbering, as shown in the sketch referred to.

The framing timber is of hemlock, the plates being two thicknesses of 2 x 4 inch stuff, the sills for porch and veranda 6 x 8 inches, the joist 2 x 8 inches and the ceiling joist and rafters 2 x 6 inches. The first and second floor joist are 2 x 10 inches, placed 16 inches from centers, and the attic floor joist are 2 x 6 inches, also placed 16 inches from centers. The framing of the house is of the ordinary balloon type, the second-floor joist being supported on a 5-inch ribbon, and spiked to the studs. The author states that before raising the studs of the partitions a sill is placed on the timbers supporting them and on the floor for those that are set after the floor is laid.

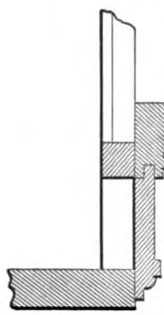


Foundation.

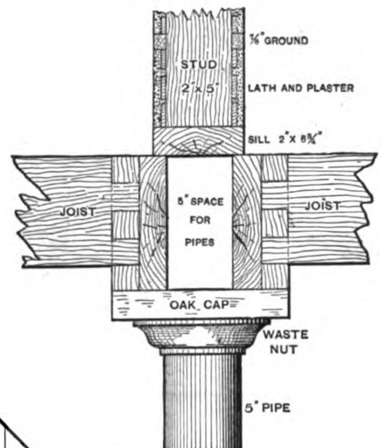
First Floor.
Scale, 1-16 Inch to the Foot.



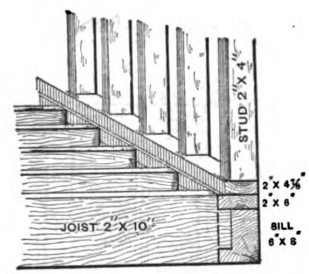
Second Floor.



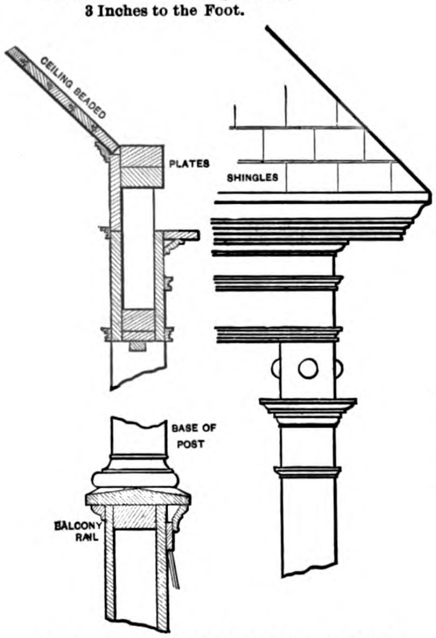
Detail of Window Casing.—Scale, 3 Inches to the Foot.



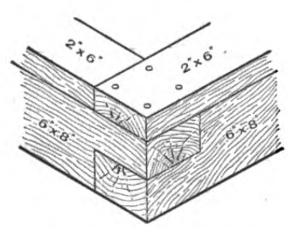
Section Showing Construction at First Floor for Passage of Hot Air and Soil Pipes.—Scale, 1 Inch to the Foot.



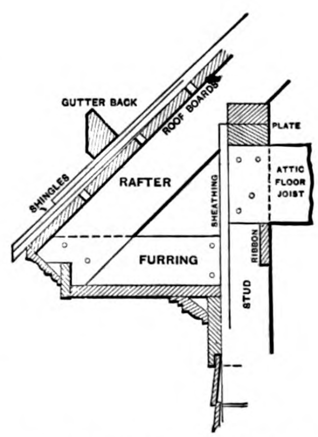
Sketch Showing System of Framing Employed.



Details of Balcony--Scale, ¾ Inch to the Foot.



Method of Framing the Sills.



Section Through Cornice at Gables.—Scale, ¾ Inch to the Foot.

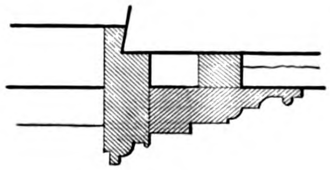
A Dwelling in Rochester, N. Y.—Floor Plans and Miscellaneous Details.

RESIDENCE OF M. T. KNAPP, PARK AVENUE, ROCHESTER, N. Y.

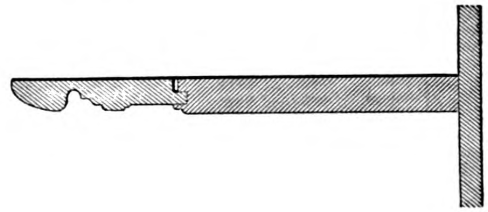
JOHN R. CHURCH, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1893.

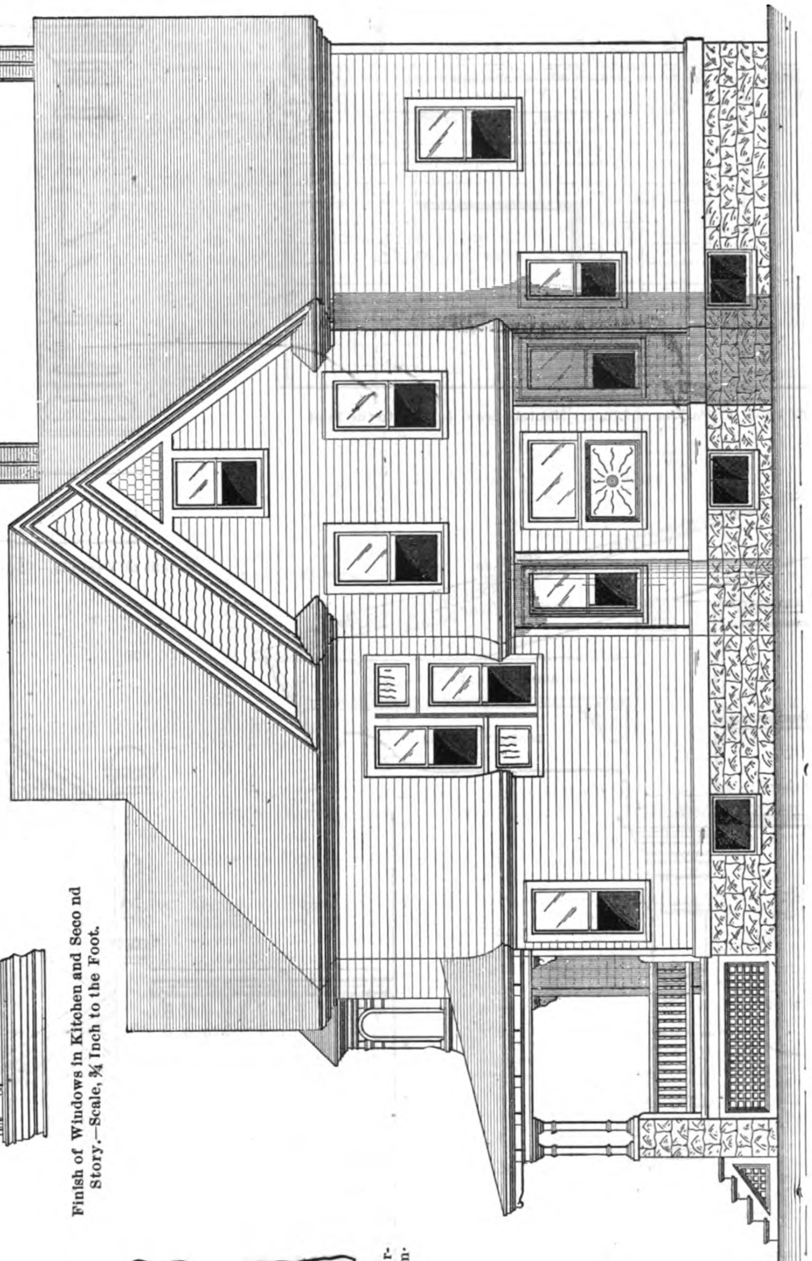
For Floor Plans, Elevations, Details, Etc., See Pages 227-230.



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

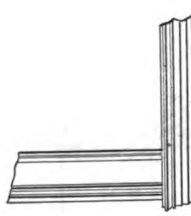


Detail of Base.—Scale, 3 Inches to the Foot.

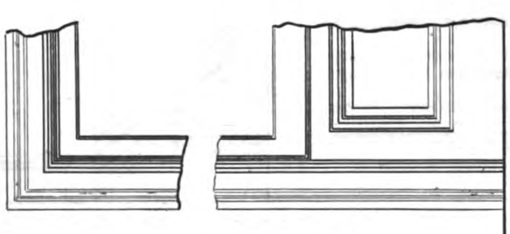


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

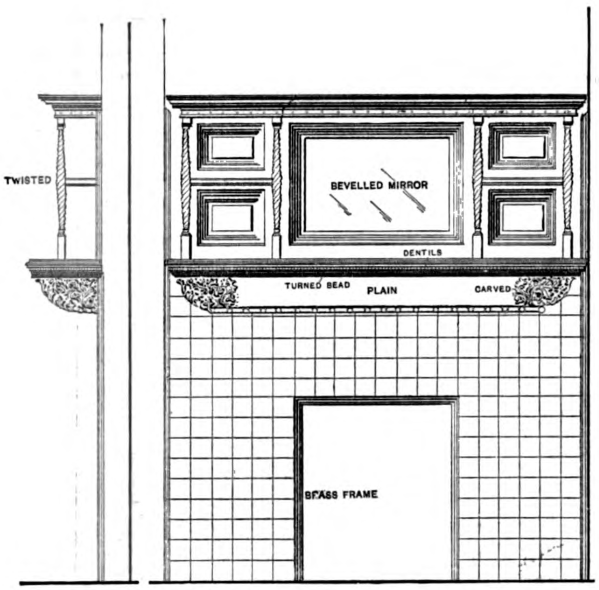
A Dwelling in Rochester, N. Y.—Elevation and Constructive Details.



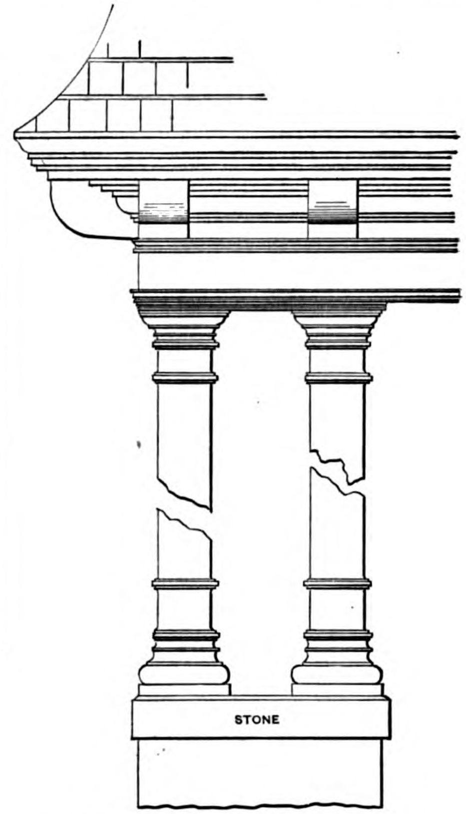
Finish of Windows in Kitchen and Second Story.—Scale, ¾ Inch to the Foot.



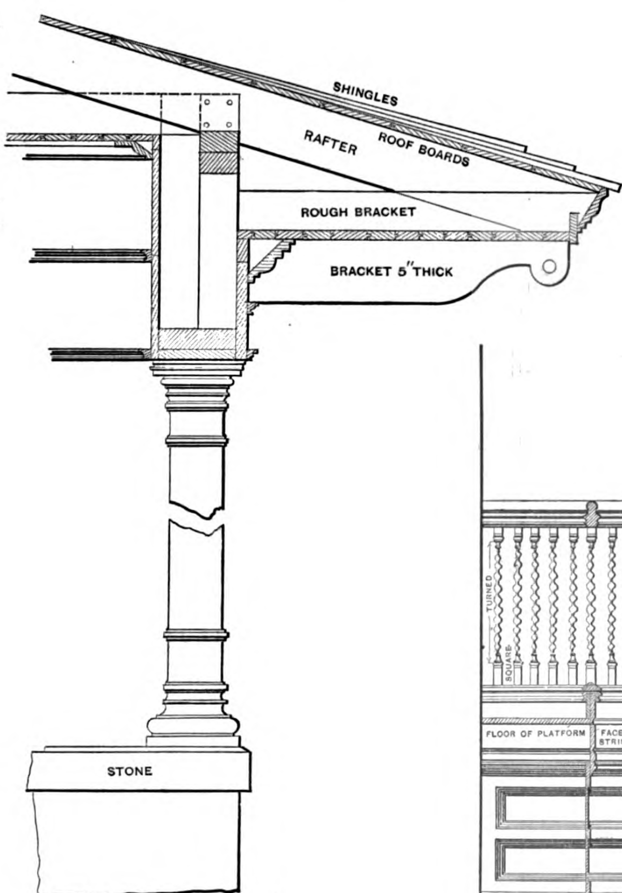
Detail of Window Finish in Parlor, Library and Dining Room—Scale, ¾ Inch to the Foot.



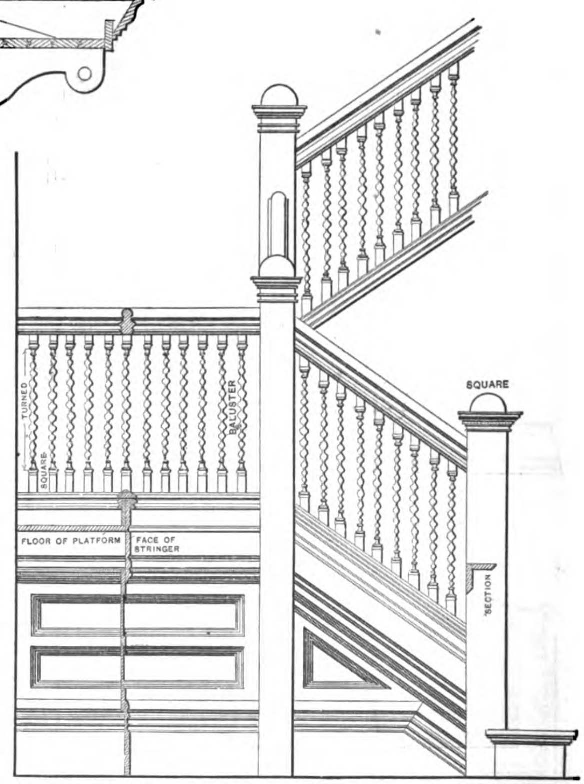
Side and Front Elevations of Library Mantel—Scale, ⅛ Inch to the Foot.



Details of Veranda.—Scale, ¾ Inch to the Foot.



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



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

Miscellaneous Details of Dwelling in Rochester, N. Y.

This sill is made 1¾ inches wider than the studs, projecting ⅞ inch on each side, as shown in the sketch above referred to. This forms a ground in the same manner as noted in connection with the studding of the outer walls. The corner posts are 4 x 6 inches; the studding 2 x 4 inches, placed 16 inches from centers; the common and jack rafters 2 x 6 inches, placed 2 feet from centers, and the valley and hip rafters 4 x 8 inches.

The frame is covered with ⅞-inch planed and matched sheeting, upon which is placed one thickness of heavy red rosin-sized building paper well lapped so as to make a tight job. The side walls and gables are covered with first-quality pine siding finished against the corner boards at the first story and mitered at the corners of the second story. In the gables the siding is cut to a wave pattern, as shown. The rafters are covered with 1-inch rough hemlock boards, which carry first-quality pine shingles, dipped before laying in creasote stain for 11 inches of their length and after laying had one coat put on with a brush. The hips are covered with a 4-inch course run up after the straight courses are laid, forming the hip roll, as shown.

The interior finish in the front hall, library, parlor and dining room is of oak, while the rest of the house is in white wood, all being filled and varnished. The floors in the hall and dining room are of hard wood ⅞ inch thick, laid in narrow strips 2 inches wide, with a border of six strips of the same material laid around at the walls and filled in with straight courses. The floors are smoothed, scraped, sandpapered and then polished. The flooring in other parts of the house is of pine.

The building is heated by a furnace, the position of the registers being indicated on the floor plan.

AN ATTRACTIVE BUILDING is about to be put up at Montclair, N. J., for use as a children's home. The plans of the structure, which have been prepared by Architect Joseph Ireland of New York City, call for a building 80 feet in length by 60 feet in width, and three stories in hight. The first story will be of field rubble stone, and will be inclosed by a long veranda on the front and a *porte cochere* on one side. The second and third stories will be under an ample gambrel roof, which will extend outward over the eaves and also from the roof of the veranda, resting on pillars of terra cotta. These stories will be broken up by a dormer and lattice windows, and will be entirely of shingles. The first floor will be devoted to administration offices, parlors, reception rooms, dining room, kitchen and storerooms; the second story will contain the girls' dormitory, with apartments for the matron and attendants, while the third floor will be given up to the boys' dormitory. The home is designed to accommodate 40 boys and girls, and is to be strictly non-sectarian. While in the home the children will receive both religious and other instruction, embracing manual training and the rudimentary branches of education. It is expected that the building will be ready for occupancy late in the fall.

Combination Kitchen Sideboard and Flour Bin.

An article of kitchen furniture in the making of which many of our readers are doubtless often called upon to display their skill is a flour bin, or chest, in combination, perhaps, with a sideboard, dresser or cupboard. The article which we illustrate in Figs. 1 and 2 is capable of ready manufacture and when completed serves not only a very useful but ornamental purpose as well. The size of the sideboard is 4 feet 6 inches long by 2 feet 3 inches deep, the dresser top being 2 feet 9 inches high, and the rack 2 feet 9 inches to the upper shelf. The drawers are 10 inches wide and about 18 inches long by 3, 4, 4½, 5 and 6 inches deep, respectively. The corner posts of the framing are 2 x 2 and the rails mortised in them 2 x 1 inches in size. The boards employed are ¾ or ⅞ inch thick when dressed and are let into the corner posts as indicated in Fig. 3 of the cuts, which represents a plan view. The mechanic is well aware that in making articles of this character it is well to employ wide rather than narrow boards in order to save joints, as the latter are preferably matched and glued so as to be as nearly as possible invisible. The lid is hinged to open at the front of the rack, while the chest is divided by ⅝-inch stuff into two or three compartments, as circumstances may require. The rack can be made of 9 x ¾ inch boards and the shelves faced with a molding, a cross section of which is shown in Fig. 5 of the cuts. The uprights are screwed to the dresser top with slanting screws sunk in flush and stopped. The plate rack is about 11 inches deep, the shelf below being about 13 inches from the plate shelf so as to give ample room for large dishes. A crockery stand may be fastened perpendicularly to the back of the dresser or may be taken 2 inches forward, as indicated. The holes in the top shelf for the turned spindles are about 2½ inches from center to center. The panels of the chest are molded with 1¼-inch moldings, and the drawer fronts may be either molded or beveled, according to taste. The drawings so clearly indicate the general construction that our practical readers will have no difficulty in making a device of this character if they so desire.

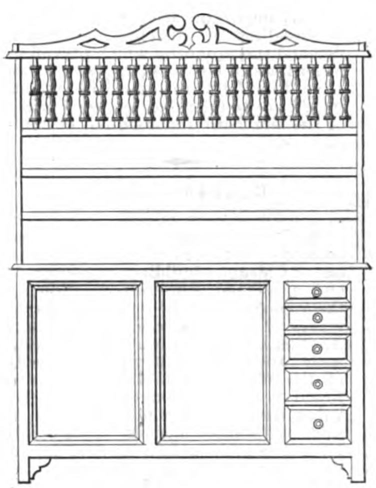


Fig. 1.—Front Elevation.

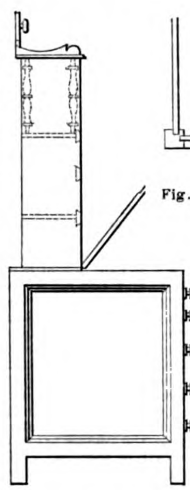


Fig. 2.—End Elevation.

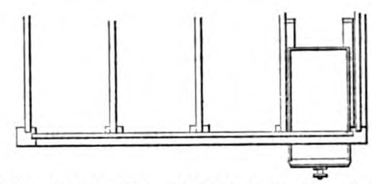


Fig. 3.—Plan View, Showing Divisions in the Chest.

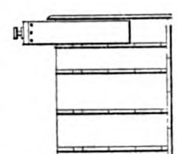


Fig. 4.—Section of End, Showing Drawer Rails.

Fig. 5.—Full Size Section of Molding for Edge of Shelves.

Fig. 6.—One of the Spindles of the Plate Rack.

Combination Kitchen Sideboard and Flour Bin.

A Lien Law Example.

The following letter indicates the character of an effort that is being made by certain dealers in building materials to secure lien-law protection on Government work. The letter has been extensively issued, and an earnest effort is being made to secure sufficient co-operation from dealers in building materials throughout the country to make the movement a success:

Owing to the irresponsibility of many parties who become contractors under the United States Government, and that at the present time we have no security for sales of materials, &c., made to the said contractors except their promise to pay, the Government recognizing no responsibility for any material furnished by the dealers to the contractor (this applies to all contracts made by any and all branches of the Government), believing we ought to have the same protection from the United States as in this and the State of New Jersey, wherein we are fully protected by the lien laws of said States, it is proposed to introduce before the next Congress a bill, which, before presentation, shall have the approval of the Secretaries of War, Navy and Treasury Departments, and that will give us such security that will make it impossible for dealers to sustain any loss in the future arising from sales to Government contractors.

Should you be willing to join in this movement and be assessed for your share of contingent as well as final costs that will necessarily be incurred, I will be glad to hear from you at an early day, with such

suggestions regarding this proposed action as you have to offer.

The passage of such a bill you will admit is desirable.

To responsible contractors such a bill will be advantageous for the reason that competition will be limited; if you have any friends who are contractors, kindly call their attention to this movement, and ask their aid and co-operation.

Yours very truly, ———

It would seem that the material dealers had a better remedy in their own hands than that which is suggested by the letter, for in the very first line it is stated that many of the contractors of the Government are irresponsible. If such is the fact the legislation desired would put a premium upon Government contracting by irresponsible men. The remedy which is in the hands of the dealers is the refusal to sell their material to men whom they know to be irresponsible; and there is no better means in existence for wiping out irresponsibility among contractors than such a course of procedure. In equity there is no more reason why the dealer in building materials should have special legal protection against his customer than the grocer or the butcher. The sentence "the passage of such a bill you will admit is desirable" applies only to the dealer who desires to sell his material to a man whom he knows to be irresponsible; and the false reasoning in the last sentence of the letter is distinctly manifest, for, instead of limiting irresponsible competition, the statutory legislation desired would increase it by permitting contractors who could not pay for their material to come in competition with contractors who could. Such reasoning as this is specious and should be carefully studied by all responsible contractors.

Inflammable Materials in Houses.

Greater loss of life has occurred from the inflammable nature of particular buildings, and the consequent readiness with which they have taken fire and burnt, than from the transmission of fire from one building to another, says a writer in one of our English exchanges. It is in the buildings in which the incendial fire originates that loss of life occurs, and not in buildings to which any such fire may be communicated. People have time to escape from a neighboring building before the danger reaches them, be the separation of the buildings ever so slight; but escape from a building in which the fire has been brewed, if the expression may be used, is too often found to be impossible. The Legislature has confined itself almost exclusively, hitherto, to providing for the protection of property; that is to say, its prescriptions have been to prevent the spread of fire from building to building, whereby property alone is hazarded; while the danger to human life from fire originating in a building remains almost as wholly unprovided for by legislative enactment as it was before the fire of London. In the twilight of a summer's evening, while the inmates were almost all awake and stirring, Raggett's Hotel in Dover street took fire, and, through the rapidity with which it burnt, many lives were lost; while but a few months before that event four persons had been burnt to death in a house in Guildford street because of the inflammability of the inside of the building. In both these cases there were efficient party walls which prevented the fire from doing any serious injury to the buildings next adjoining laterally, and the brick external walls tended to protect the buildings opposite to the buildings burnt. With stairs of stone, or other substance not easily ignitible, supported by brick walls, internal partitions of brick work, or even brick-nogged partitions, floors less susceptible of fire than simple combinations of fir joists and deal boards, intimately connected with and bearing upon hollow quartering partitions—with these securities, or with some of them only, in the cases referred to, the combustion must have been at least far less rapid than it was, and the escape from death and mutilation of all the inmates in one of the two cases certainly, and probably in both, would have been secured.

Bond and Percentage.

Among the customs prevailing in the building business, and which have existed so long without strenuous opposition on the part of its members that they have come to be considered necessary, is the practice by the owner of demanding a bond from the contractor for the fulfillment of a contract, and at the same time retaining a certain percentage of the money due the contractor. The practice is distinctly inequitable and one which permits the owner to keep the contractor under a bond which does not decrease as the contractor's liability decreases, but remains the same as before the work was undertaken, even though 90 per cent. of it were completed. One of the best illustrations of this is the one by Colonel McAllister of Cleveland in his dress as president to the National Association of Builders, as follows:

> A builder agrees for $500,000 to erect a building complete. He is required to give bond of indemnity for not less than $100,000 conditioned that he shall complete the work in accordance with certain drawings and specifications which are to be interpreted by a gentleman who is the paid agent of the owner, and in addition to this bond there is reserved payment of not less than 15 per cent. of each of the partial payments provided for under the agreement, which reserved payment remains in the hands of the owner until the building is completed (usually 30 days after completion and acceptance). When the building has been carried to within $20,000 of completion and the builder has been paid according to agreement up to that time, the owner has in his possession $72,000 worth of work which has been completed by the builder and not paid for, and his bond for $100,000 to secure the completion of $20,000 worth of work, and at the completion of the work and prior to acceptance the owner has $92,000 of the builder's money and a bond for $100,000.

That this practice is inequitable and unjust is evident on the face of it, for it amounts, in practice, to the owner holding a bond from the contractor to insure a fulfillment of something which has already been fulfilled and the retention of a large sum of the contractor's money for at least 30 days after the completion of the job. This custom virtually reverses those which exist in other lines of business, for in them it is the man who pays or owes the money who gives the bond, and not the man who contracts to deliver the goods, for the reason that the goods represent what is due the seller from the buyer. In the case of a building under contract, with payments to be made at certain periods during the progress of the work and a bond exacted for the completion of the entire job, the bond should be decreased in proportion as the liability of the contractor to the owner decreases. In many cases of municipal work a certified check for a large sum must accompany each contractor's bid. A large bond is required, and 25 per cent. of the money due the contractor is retained by the city at each payment and on the last payment until at least 30 days after the completion and acceptance of the work. The result of this custom is that the successful bidder has the amount of his certified check and 25 per cent. of the labor and material he has put into the job tied up in the building, as well as being under a bond to the owner, the amount of which is the same after the contractor's work is finished as it was when he began. The architect, acting for the owner, accepts the material and the work done from time to time as the building progresses, and in no case is the contractor relieved of the necessity of providing indemnity for that portion of the work which has been accepted by the owner through the architect. In reality, the amount of the contractor's guarantee to the owner increases as the responsibility decreases. The inequity of a contract carried out under such conditions as these is manifest, and unnecessarily ties up, without interest, large sums of the contractor's money. There is no excuse for the existence of this custom in the present times, except that it is the result of antiquity which has not yet been outgrown. Like many other pernicious customs, it has been allowed to remain in force simply because it exists and because builders formerly accepted it without complaint. To-day, when the contractor has reached a point where his business transactions are equally important with those in any other calling in existence, he should demand the equalities which prevail in other lines of business; he should decline to submit to exactions which would not be tolerated by the banker or the merchant under similar circumstances.

Rapid Construction.

Not long since we referred in these columns to the rapidity with which one of Chicago's buildings was erected, and presented illustrations showing the appearance of the structure at two stages of the progress of the work. Another example of the rapidity with which the builders in this metropolis of the West push their operations is found in the erection of a grain elevator, having a storage capacity, it is said, of 3,680,000 bushels This building was commenced on the first day of the month and 33 days later was completed and being used for business purposes. In the construction of the building, which was of the ordinary crib style, more than 8,000,000 feet of lumber were employed. The elevator is equipped throughout with electric lights and completely furnished with modern machinery. It is stated that from 600 to 900 men were continuously employed night and day in its construction.

IT IS STATED by an exchange that French builders, who have carried the art of hardening plaster to where it is used for flooring, either in place of wood or tile, employ for this purpose six parts of good quality of plaster intimately mixed with one part of freshly slaked white lime finely sifted. The mixture as thus composed is laid down in as quick time as possible, care being taken that the trowel is not used upon the surface for too long a time; after this the floor is allowed to become very dry, and is subsequently saturated in a most thorough manner with sulphate of iron or zinc, the iron giving the strongest surface, its resistance to breaking being found to be 20 times the strength of ordinary plaster. It appears that with sulphate of zinc the floor remains white, while when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of an attractive mahogany color, this being especially the case if a coat of copal varnish is added.

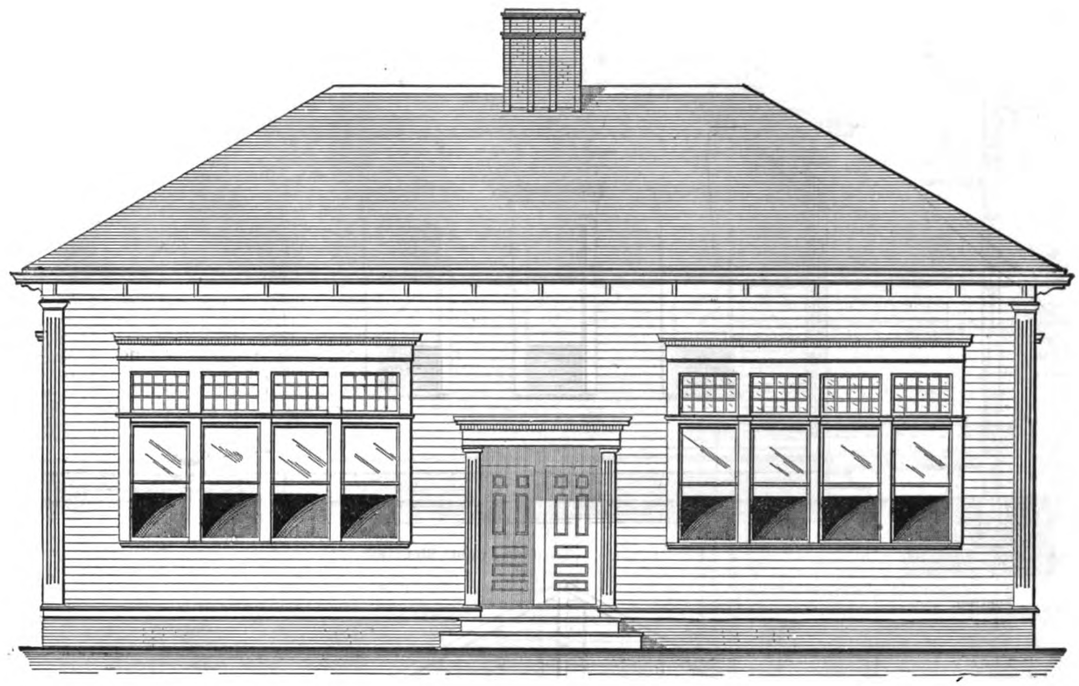
THIRD-PRIZE DESIGN IN SCHOOL HOUSE COMPETITION.

THE DESIGN securing the third prize in the competition for $1500 school houses was contributed by George E. Gilbey of New London, Conn., and is presented in this issue for the consideration of our readers. An inspection of the engravings shows a building of neat exterior, arranged with two school rooms on the main floor and at the rear an extension devoted to an entrance of ample dimensions, closets for wearing apparel and a space for fuel. The entrance for teachers is at the front, through the loggia. Each school room is 24 x 26 feet in size and has accommodations for 38 pupils. From the author's specifications we learn that the girders are designed to be 6 x 6 inches; the sills 4 x 4 and 4 x 6 inches; the floor joists 2 x 8 inches, placed 16 inches on centers; the ceiling joist 2 x 5 inches, placed 20 inches on centers; the rafters 2 x 6 inches, placed 24 inches on centers; the studding 2 x 4 inches, placed 16 inches on centers; posts 4 x 6 inches; plates 3 x 4 inches and ties 1 x 6 inches. The sheeting is to be of first-quality planed hemlock boards, not more than 10 inches wide, those used on the roof being laid with 2-inch openings between them.

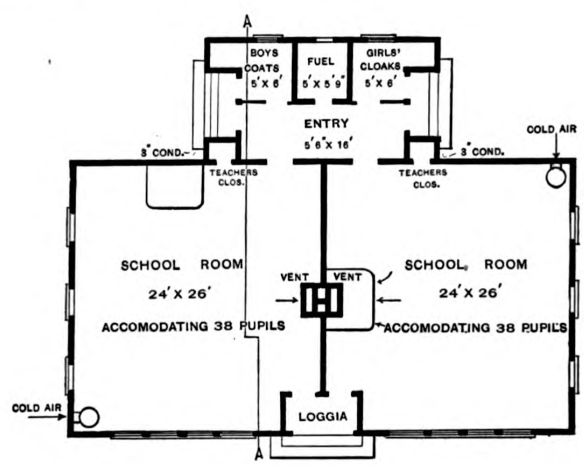
The sheeting boards are to be covered with building paper, on which, in turn, are to be placed first-quality clear, dry white pine clapboards, laid not over 4¼ inches to the weather. The roof is to be covered with 18-inch cedar shingles, placed on rosin-sized building paper and laid not over 5½ inches to the weather. All the floor joists in the building are to be bridged every 5 feet with 1 x 3 inch stuff. The ceilings are to be cross furred with 1 x 2 inch furring strips, placed 16 inches on centers. The flooring throughout the house is to be hemlock, laid diagonally over, which is to be placed a ⅞-inch yellow pine floor, resting on rosin-sized building paper. The wainscoting is to extend around the interior of the building for a hight of 3 feet and consist of ⅞-inch North Carolina pine not over 3 inches wide, the whole to be finished with a molded cap. The coat and cloak rooms are to have partitions of ⅞-inch North Carolina pine, 5 feet high, where shown on the plans, leaving openings 6 inches between the bottom of the partitions and the floor. Batten doors of the same material are to be hung on double acting hinges. The two platforms are to have ⅞-inch North Carolina pine risers and treads of the same material as the floor. All inside doors are to have 4-inch mortise tumbler locks, with brass face and strikers, japanned roses and escutcheons and jet knobs. The entrance doors are to have 4-inch mortise tumbler locks, bronze metal faces, strikers, knobs, roses and escutcheons.

The building is to be painted with two coats of pure linseed oil and white lead, tinted with yellow ocher for the body of the work and white for the sash and trimmings. All interior finish is to be left bright and have one good coat of liquid filler, followed by an application of one coat of varnish.

The estimate submitted by the author of the design here presented



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



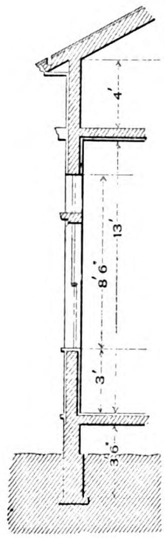
Main Floor Plan.—Scale, 1-16 Inch to the Foot.

Third-Prize Design in School House Competition.—George E. Gilbey, Architect, New London, Conn.

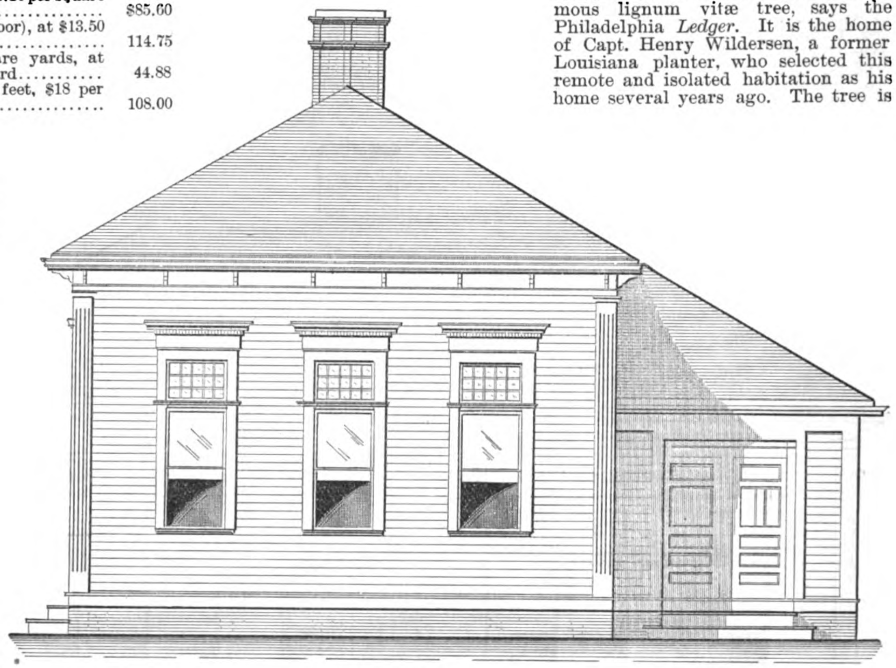
gives the total cost of the building at $1499.43, distributed as follows :

ESTIMATE OF COST.

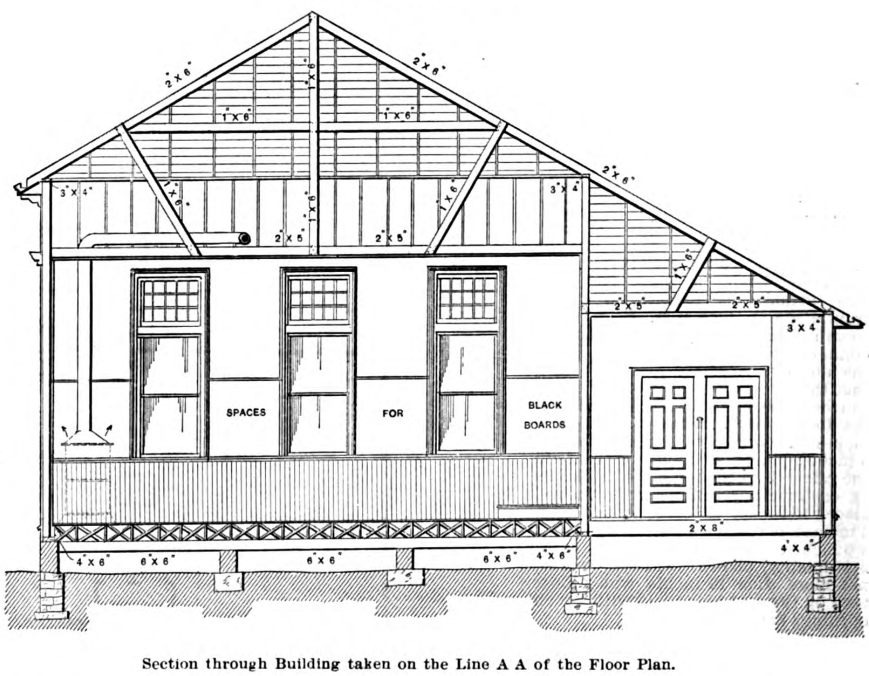
Stone work (excavating included), 535 square feet, at $0.16 per square foot	$85.60
Bricks, 8,500 (and labor), at $13.50 per 1,000	114.75
Plastering, 408 square yards, at $0.11 per square yard	44.88
Rough spruce, 6,000 feet, $18 per 1,000	108.00
Large windows (and labor), 2	80.00
Single windows (and labor), 8	84.00
Entrances (trim and labor), 3	70.00
Single doors (trim and labor), 6	60.00
Hemlock, 6,300 feet, at $16 per 1,000	100.80
Clapboards, 2,500 feet, at $28 per 1,000	70.00
Cedar shingles, 16,000, at $4 per 1,000	64.00
Yellow pine flooring, 1,900 feet, at $45 per 1,000	85.50
Lath (and labor), 6,800, at $4.25 per 1,000	28.90
North Carolina pine ceiling, 800 feet, at $35 per 1,000	28.00
Batten doors (trim and labor), 2	6.00
Batten swing doors (trim and labor), 2	6.00
Finishing cypress, 1,000 feet, at $45 per 1,000	45.00
Tin conductors	3.00
Painting	75.00
Hardware	40.00
Carpenter work	300.00
Total	$1,499.43



Section.



Side (Right) Elevation.

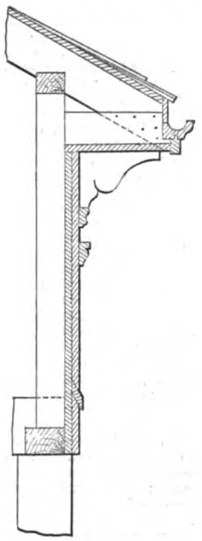


Section through Building taken on the Line A A of the Floor Plan.

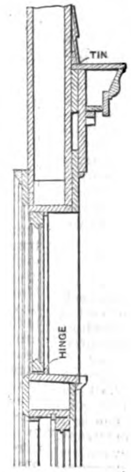
Third-Prize Design in School House Competition.—Elevation and Sections.—Scale, 1/8 Inch to the Foot.

An Elevated Dwelling.

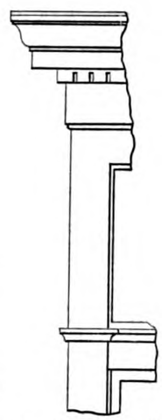
About 60 miles from the mouth of the Escondido is situated one of the most curious habitations in the world. It is a house built on the top of an enormous lignum vitæ tree, says the Philadelphia *Ledger*. It is the home of Capt. Henry Wildersen, a former Louisiana planter, who selected this remote and isolated habitation as his home several years ago. The tree is nearly 6 feet in diameter, and grows on a bluff overlooking the Rama River, a branch of the Escondido. At about 50 feet from the ground a platform about 30 feet square has been built, supported by diagonal braces, and this serves as the foundation of a rather pretty cottage painted white, with green shutters, and boasting a veranda in front and an observatory above the roof. The diagonal braces are boxed in, and in the inverted pyramid thus formed in the kitchen and storerooms. The upper story is nicely furnished. Access from the ground is gained by means of an elevator resembling a "dumb-waiter," so balanced that a person can easily raise himself by pulling on a rope.



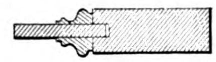
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



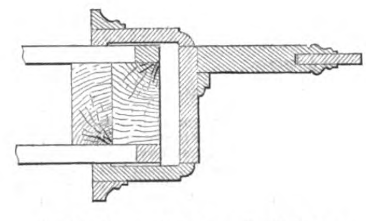
Section through Transom Window. —Scale, ½ inch to the Foot.



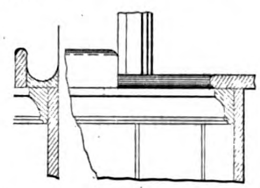
Part Elevation of Transom Window.—Scale, ½ Inch to the foot.



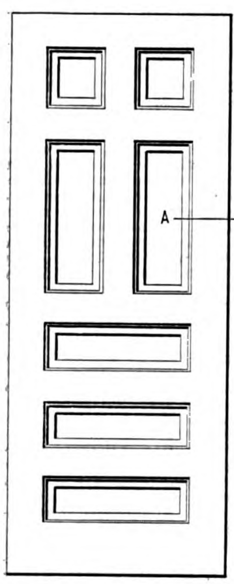
Section of Entrance Door taken on Line A A.—Scale, 1½ Inches to the Foot.



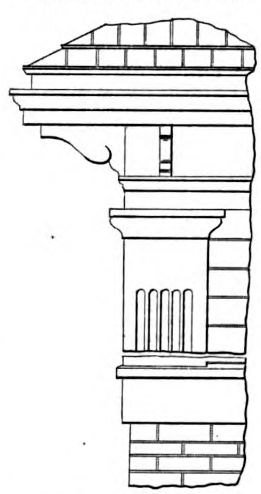
Section through B B.—Scale, 1½ Inches to the Foot.



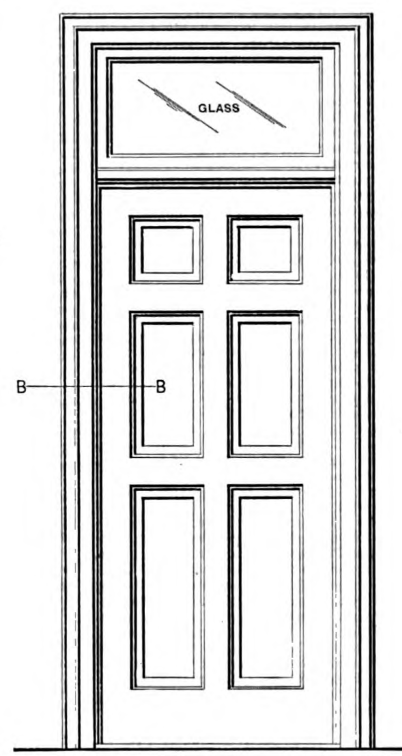
Detail of Chalk Molding and Window Stool. —Scale, 1½ Inches to the Foot.



Entrance Door.—Scale, ½ Inch to the Foot.



Detail of Corner Finish.—Scale, ½ Inch to the Foot.



Inside Door and Trim.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Third-Prize Design in School House Competition.

A PROPOSITION, which it seems was started by the Denver *Sun*, is likely to take a practical form. This is nothing else than the covering of the dome of the State Capitol with silver. The area of the dome is about 7000 square feet, and the contract has been let to provide a covering of copper. After copper sheets are cut and fitted, it is proposed to plate them to the extent of 2 ounces of silver per square foot. The proposition seems to have met with approval in all portions of the State, and several donations of silver have already been promised. In that dry climate the silver will probably retain its beauty for years.

A Large Flagstone.

The sidewalk immediately in front of the new house of C. P. Huntington, Fifty-seventh street and Fifth avenue, this city, is composed of one solid stone 22 feet long, 15 feet wide and 10 inches thick. It weighs 22 tons, and is the largest stone ever transported on a railway car. It required 16 horses to draw it from the West Fifty-second street pier to Mr. Huntington's house, and owing to the great weight, added to the softening effect of the intense heat of the sun upon the asphalt paving when the thermometer marked 100° in the shade, the car on which the massive stone was drawn cut through the asphalt to the concrete foundation and left a miniature ship canal in its wake through Fifty-seventh street. Although the car was adapted especially to the moving of large stones, it was only by constructing a temporary plank road that the enormous piece of rock could be transferred to its destination.

WHAT BUILDERS ARE DOING.

QUIETNESS throughout the building trades still continues, but there is apparently less depression than would be expected, considering the financial stringency which prevails. No very serious complaint is heard from the builders, although more work would be considered very acceptable in some localities. The workmen are either satisfied with their present situation or recognize the futility of making demands that would in any way be calculated to increase the cost of building. Such labor disturbances as are now in force are the result of past conditions. Comparatively speaking, the building trades seem to be in better condition than many of the mercantile pursuits.

Baltimore, Md.

In spite of the general financial depression, the building interests in Baltimore seem to be about up to the mark. There have been no disturbances between the workmen and employers that have been sufficiently serious to be worthy of note. Members of the National Association will regret to learn that Hugh Sisson, the first vice president, is seriously ill and his friends are exceedingly anxious over his condition.

The new home of the Builders' Exchange, at the northeast corner of Charles and Lexington streets, is to be a handsome white marble structure in keeping with the recent improvements in that neighborhood. The building will be erected by the Builders' Exchange Building Company, composed of members of the exchange, and its construction will commence immediately. It is intended to be a center for contractors, builders, material men and others interested in the building business of Baltimore.

The building will be 84 feet 4 inches on Charles street, 75 feet 6 inches on Lexington street and five stories high from the ground. The marble walls of the building now on the site will be used in the new building, but all the interior of the old structure will be torn out and remodeled for stores and offices. The brick portion on Lexington street will be torn down and rebuilt to correspond with the marble building on the corner and an additional story will be added. On the first floor there will be three or four stores and one office. The exchange will be on the second floor, where it will have one large room, 70 x 24 feet, with other rooms for the president, directors and secretary. Four other offices will be on this floor. The third, fourth and fifth floors will each be divided into 11 offices. The structure will be fitted up with all modern appliances and conveniences for the transaction of business, and the rooms will be commodious and well ventilated. It will be finished inside with hard wood, and will be heated by steam and lighted by gas and electricity. There will be area vaults under the pavements on Lexington and Charles streets, with lifts. The main entrance to the offices will be on Lexington street, the upper stories being reached by an elevator and the stairway.

Baldwin & Pennington are the architects, and S. H. & J. F. Adams contractors for the work. The Building Committee consists of Hugh Sisson, E. L. Bartlett, S B. Sexton, Jr., P. M. Womble, Jr., and Noble H. Creager.

At the annual meeting of the stockholders of the building company James A. Smyser, E. L. Bartlett, P. M. Womble, Jr.; S. B. Sexton, Jr.; J. L. Lawton, N. H. Creager, Hugh Sisson, B. F. Bennett and J. F. Adams were elected directors. The directors elected the following officers for the ensuing year: President, James A. Smyser; vice-president, Noble H. Creager; secretary, E. D. Miller; treasurer, B. F. Bennett.

Boston, Mass.

Everything in the building trades in Boston seems to be progressing as favorably as could be expected, most of the contractors are busy and there seems to be plenty of work on hand. The cornice workers have been making an effort to secure shorter days without reduction of wages. These men have been working ten hours a day for a number of years. They were informed early in the year by their employers that, if sufficient notice were given, a reduction in hours would be conceded without demur. With this promise in mind, the employers were, on March 1, notified that on and after August 1 their cornice workers would work but nine hours a day.

The men received for a ten-hour day from $2.75 to $3.25 per day, and in order that no wage reduction should result from the introduction of the shorter work day it was decided that a minimum rate of 30 cents per hour should be demanded for those receiving $2.75 per day, and that 5 per cent. increase be demanded for those receiving above that amount. Nearly all of the master cornice makers have already acceded to the demands. The carpenters have been endeavoring to secure an eight-hour day without corresponding reduction of pay, and the workmen claim that their efforts have been successful. It is stated by the workmen that the change will go into effect on November 1.

Buffalo, N. Y.

The Builders' Association Exchange of Buffalo is taking effective steps to correct one of the evil conditions which prevail—regarding the treatment of, and the method of soliciting, bids. A resolution recently passed is to the effect that any member of the exchange who fails to observe the rules laid down in the Code of Practice shall be brought before the organization on charges, and that in future the members of the exchange will refuse to estimate on work where bids are requested for the entire work and for separate portions at the same time. To further this end the architects have been requested, when writing specifications, either to call for bids upon the entire work or ask for separate bids from each of the different trades. This move will doubtless result in great benefit to the fraternity, and could be followed with profit by every similar organization in the country. Everything is quiet in the building trades, the strike of the 300 union plasterers, who have been out for the past 13 weeks for an advance of pay from $3 to $3.50 per day, having ended.

About three months ago all the union plasterers in the city demanded a raise of 50 cents a day in their wages. The demand was sent to the Masons Contractors' Association. The members of the association held a meeting and voted against the increase, saying that they had made contracts ahead, figuring at $3 for a day's wages, and they could not consistently grant the demand at that time, although admitting the men were earning $3.50 a day. Then the men struck. The Plasterers' Association grew tired of the struggle several weeks ago and offered to settle the strike by giving the men $3.25 a day. This offer was rejected by the men and they continued to hold out. The men recently decided they could not win and voted to go back to work. Most of them started to work at the old rate of wages, and the plasterers' business, which has been practically suspended since the strike began, is now on its feet.

Cincinnati, Ohio.

Cincinnati builders seem to be satisfied with the amount of work on hand, under existing circumstances, and no complaint is heard from either employers or workmen. The Builders' Exchange has named the following committee to represent them and act in connection with the Board of Trade and Transportation Committee on the financial situation: George F. Nieber, Archer Colter and Thad H. Curry.

Lowell, Mass.

The bricklayers' strike at Lowell continues to drag itself along with little prospect of settlement in the near future. Several times the employers and workmen have come together and a settlement had appeared likely to result, but each time they have split on some rock or other. The principal difficulty between the two is that the contractors desire to employ non-union men, and the union workmen refuse to work with any but members. There have been several features to this strike which have been presented in these columns, and the workmen's national union has been called into requisition to assist in securing a settlement. The striking workmen have been receiving a benefit of from $8 to $12 a week from their national treasury ever since the strike began. One of the features of this strike is that there are two men who are under fine to the International Union, and with whom the union bricklayers refuse to work. The employment of these men on a certain contract has resulted in a tie-up of work.

New York City.

After a remarkably quiet season in the building trades as regards labor disturbances, New York City is again in the midst of a strike which promises to be more or less general. For over a year the United Wood Carvers' Association has been fighting to retain the eight-hour work day, which first prevailed with them from 1886 until a year ago last April. At that time nearly all the contractors combined to increase the hours and for a time succeeded in doing so; but the union made so hard a fight that one after another the contractors gave in and conceded their workmen eight hours again. Certain of the larger contractors heretofore refused to return to the eight hours, and the present strike is an outgrowth of the effort to force these contractors to yield. Among the trades which have entered into sympathetic strikes to help the carvers are house painters, six unions; plasterers, two unions; laborers, two unions; carpenters, nine unions; steam fitters and helpers, two unions; paper hangers, one union; varnishers, two unions; electric wiremen, one union; wood carvers, one union; fresco painters and decorators, two unions; tin and sheet iron workers, one union; engineers, two unions; gilders, one union; marble cutters, polishers and setters, two unions; and a number of other trades not represented in the board. The Mechanics and Traders' Exchange is having demonstrated daily the wisdom of their move which changed the headquarters of the organization to its present location. The rooms are much more convenient and appropriate to the uses of the members than the old ones, and the result has proved the wisdom of the promoters of the change.

Omaha, Neb.

Everything is quiet among the Omaha builders and no complaint is heard from the workmen upon the subject of hours or wages.

The Board of Directors of the Builders and Traders' Exchange have elected A. J. Vierling of the firm of Paxton & Vierling president, to fill the vacancy which was caused by the death of Mr. Hussey. Mr. Vierling has been vice-president and acting president of the board for some time past.

J. W. Phelps of A. W. Phelps & Son was elected to the vacant vice-presidency, and J. F. Smith of Withnell & Smith succeeds Mr. Phelps as a member of the Board of Directors. Secretary Wedge has received from Washington plans and specifications for buildings to be erected at the Lower Brule Indian Agency in South Dakota, on which bids are invited by the Indian Bureau.

There are four or five large buildings to be erected, including a warehouse and schoolhouse.

Philadelphia, Pa.

On July 20 a special meeting of the Master Builders' Exchange of Philadelphia was held, to take action on the death of Col. Richard T. Auchmuty. Suitable resolutions were passed, expressing the keenest sorrow and eulogizing Colonel Auchmuty for his great and practical generosity in behalf of the youth of the country.

Colonel Auchmuty's philanthropy had enabled the exchange to place the Mechanical Trades Schools on a practical basis, and he was highly esteemed by the builders in consequence thereof. He guaranteed the schools $3000 for each of the first three years of their existence, which sums were duly paid, and greatly relieved the builders of the burden of their efforts to instruct boys in useful occupations. Colonel Auchmuty was an honorary member of the exchange, but such was his modesty that he would not permit a bust or photograph of himself to be hung upon the walls or placed among the archives of the organization.

St. Louis, Mo.

It is reported from St. Louis that building operations are not seriously affected by the stringency in the money market, and about the usual amount of work is being carried on. The carpenter contractors, it is expected, will follow the example of one of their number who has notified his workmen of a reduction of $2\frac{1}{2}$ cents per hour in their wages. This notification was followed by a strike by the workmen in this contractor's employ, and the Carpenters' Council is said to be making preparations for a strike or lockout.

The members of the Builders' Exchange held their quarterly meeting July 11.

The report of the treasurer, showing a balance on hand of $3456, was approved, as was also the report of W. J. Baker, chairman of the Arrangements Committee for the steamboat excursion, August 17, on the "Grand Republic."

The rule to suspend members of the Board of Directors who failed to attend three consecutive meetings without good cause was adopted.

The revision of the rules, as a whole, will be taken up at the October meeting.

Worcester, Mass.

Everything is quiet among the Worcester builders. The members of the Builders' Exchange held their fourth annual outing at Quinsigamond Park a few days ago. About 200 participated in the picnic, including a contingent of 70 from the Builders' Exchange of Providence. They arrived at the park about 10 o'clock. A ball game was immediately started between the Providence and the local exchange, resulting in a tie by a score of 11 to 11. The tug of war was the next thing on the programme, and the honors in this were captured by the local men.

The dinner bell then sounded and the party sat down to a palatable clambake.

The afternoon was spent by the men in kicking a foot ball around the field. There was no semblance to a regular game, but each man vied with the other in kicking the ball as far as possible. It seemed to be the object of each man to kick the ball in one corner of the field where a couple of whist games were in progress, and they succeeded in their purpose—that is, of breaking up the games.

J. G. Vaudreuil kept open house all day, and many of the members and their wives visited his cosy resort. Many of the ladies of the party enjoyed a sail around the lake in his steam yacht.

Dancing was indulged in during the day. The return was made to the city at 4 o'clock, and all adjourned to the Builders' Exchange rooms, where a lunch was served by Parker, the caterer. The assembly was addressed by Ira G. Hersey of Boston, president of the National Association of Builders. Representatives of the Providence Exchange also spoke and testified their appreciation of the hospitality of the local men.

Notes.

On July 20 the Master Builders' Association of Salem, Mass., dedicated their new rooms at 11 Central street, with a banquet and other fitting ceremonies. This organization, which was incorporated July 1, 1893, has been unusually wise in starting out correctly and upon such basis as practically insures its future success. The purchase of a building of its own at the start will place it in the most favorable light before Salem business men and will make a membership something to be desired by all contractors in that vicinity. The dedication was distinctly successful, and addresses were made by many prominent builders and others interested in the building trades. A large number of guests from neighboring cities were present, and the affair was a most enjoyable one in every respect.

It was stated recently in labor circles in Kansas City that a boycott had been declared against the new Ninth Street Theater because the contractor would not discharge about 30 non-union carpenters employed by him. There were two union men in his employ, and the local carpenters' union made a demand that he discharge the non-union men and employ only union men. He refused and a boycott was declared. The contractor, it is stated, thereupon threw up his contract. Secretary C. L. McDonald of the Builders and Traders' Exchange states that the custom of submitting plans to the exchange for estimate is growing. The last set which were received were for a building to be constructed at Leavenworth, Kan., to cost about $40,000.

It was thought about July 25 that the masons' strike which has been in force since last April in Springfield, Mass., was at an end. Many reasons have conduced to the belief that the strike could not be successful. The demand for eight hours was unseasonable, and public sentiment was against the move from the beginning. Foreseeing the stringent money market, real estate owners were glad to defer building operations, and their action reduced the demand for labor, and lack of employment elsewhere enabled the contractors to bring non-union men into the field. On July 27 the bricklayers and plasterers voted to give up the demand for an eight-hour day and to return to work at nine hours. The hod carriers' union, which struck in sympathy, will doubtless follow their example. The strike has been brewing ever since last fall, when the local masons' union, after the national body had refused to make a general demand for an eight-hour day, decided to do so on its own accord. Notice was sent to the contractors that the union would expect the reduction of hours April 1, and would strike if it were not made. The union, which has been formed since 1885, had always dictated its own terms to the contractors, and it was only shortly before April 1 that the latter decided to refuse the union's demand. According to the union's threat, its members struck April 1, the hod carriers' union also going out. The contractors immediately formed an association of their own, which included all the large firms in the city, and appealed to the citizens for their support in awarding contracts to only those men who should employ nine-hour workmen. A mass-meeting was held in the Board of Trade rooms early in April, when the contractors gave their side of the story, and ever since that time the public has favored the contractors, and nearly every large building which has been awarded in the city has been given to them. In the meantime the workmen offered to concede everything that the contractors desired if the latter would yield an eight-hour day.

The Building Laborers' Union of Meriden, Conn., has voted to declare off the strike which was begun on May 1. The demand in the beginning was for 25 cents an hour for all workmen, but later it was modified so that an increase in wages of 10 cents a day was asked.

The Master Builders' Exchange of Bridgeport, Conn., has caused the following notice to be posted on the buildings which its members are erecting: "This building is being erected by a member of the Builders' Exchange. Any person found trespassing or removing material from these premises will be prosecuted to the full extent of the law."

About the middle of July the bricklayers of Jersey City struck against working with non-union men. There is considerable feeling between the employers and workmen, which is the outgrowth of a former strike. The contractors say that they can get all the men they want, and are not seriously injured by the strike.

The mason contractors of South Bend, Ind., recently decided to make a general reduction of plasterers' wages from 33⅓ cents per hour to $2.25 per day, on account of the stringency of the times. The plasterers' union declined to accept the reduction and went out on strike. The workmen say that they have always treated their employers very fairly, and for two years have asked for no increase of wages or made other unnecessary demands.

The Builders' Exchange of Lincoln, Neb., is endeavoring to establish a standard of measurements for masonry, plastering, &c., which they will urge the city to adopt. If the city adopts it, the builders propose to ask the Legislature to fix the standard by law.

At Superior, Wis., a strike of bricklayers is in force as the result of a demand that wages be increased from 45 to 50 cents an hour. The contractors claim that they can secure all the non-union men they want to carry on the work.

The Newport, R. I., bricklayers have secured an eight-hour day without reduction in wages.

Reports from San Francisco, Cal., are to the effect that the prospects for the winter are much brighter, and several large building improvements are contemplated.

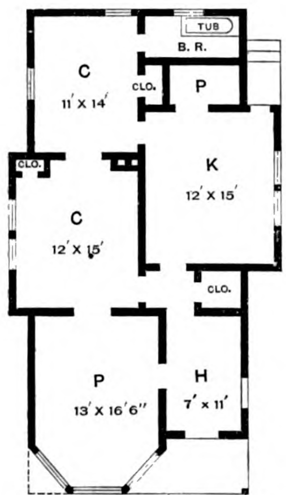
Chinese Architecture.

The domestic architecture of the Chinese will serve to explain much of that of their temples and public buildings, wherein we find the same frame work of wood first erected, and the whole structure bearing a considerable resemblance to their houses. And whether Confucian, Buddhist, Lama or Tauist temple—in short, in all their public buildings there is the same principle apparent throughout, although the ground plan may vary. It would appear that the Chinese look upon extent of area of more importance in denoting greatness than hight of structure, and thus we find their most remarkable temples, says an exchange, occupy much ground in the repetition of gateways, courtyards and attached buildings, while they have no great hight. The hight of the principal structure of the temple dedicated to the memory of Confucius at Shanghai is about 50 feet, and the area on which it stands is about 59 feet square. The formation of the roof is the most conspicuous part of it, being exceedingly large, and by being divided into an upper and lower portion it is perhaps intended to represent a roof rising out of or above a roof, and so implying great honor, just as we see in the Temples of the Moon and of Agriculture. The roof would present a very ponderous appearance were it not for a very ornamental, high and perforated band or ridge running along it. The ornamental margins of the gables give it a light and elegant appearance, especially in combination with the graceful upward curve of the projecting lower angles. It is this curve in the roofs of the temples and other buildings that forms a conspicuous feature in Chinese architecture. The interior of one temple building would almost suffice for all. There is no disguise of the beams and the rafters of the roof or of the pillars supporting them or of the manner of joining them together. The supporting pillars, like similar pillars in the common houses, rest on stone bases, and have horizontal beams mortised into them in a similar manner; in some cases the lower beams are not carried across the central space, but are wedged on the opposite side. These beams and pillars are usually painted red, this color being applied to all walls and interior decorations of places of worship. Another example of the use of red in connection with religion is that of the Hindoos, who have a custom of using a red powder or red-tinted fluid for sprinkling their clothes during the festival of the Hoolee pourja, and both may have their origin in the color of the blood of animals slain in sacrifice. White is a color indicative of sorrow, mourning or death, and is possibly derived from the color of snow, the garb of winter, when all nature appears to be dead, as it were; yellow being the color of the ripe corn and grass, is typical of the earth, the property of the Emperor, and hence it is the imperial color, denoting grandeur, power and state; blue also is an imperial color, it being the color of the sky or heaven, which can only be worshiped through the Emperor. The horizontal beams are occasionally painted in parts with a variety of light tints of other colors, a lozenge, angular or oval outlined spaces representing a landscape, a bird on a branch, or a well known blossoming plant. Sometimes connect beams are introduced to give additional strength to the frame work of the roof, and these are sometimes carved on their under side on scroll outline, which, like the decoration on the horizontal beams, relieves the heavy appearance they would otherwise present, or they are occasionally curved. A peculiarity of all Chinese pillars is this: there is no attempt at forming a capital, no matter how lofty or massive they may be.

CORRESPONDENCE.

Houses for Workingmen.

From MINERVA PARKER-NICHOLS, *Philadelphia.*—In the January issue for this year, page 11, is presented a floor plan of a house submitted by "A. J. E." of New Orleans, La. I wish to suggest an improvement on the one published and submit the inclosed. I think even a workingman would object to a house where the kitchen could only be reached through a chamber, or the bathroom through the kitchen.



Floor Plan of Workingman's House as Modified by Minerva Parker-Nichols.

The house was also, I think, lacking in closets. The arrangement which I show makes the chimney available for both chambers as well as the kitchen. I would also suggest roofing the front bay or porch under one ornamental gable, thus avoiding the cuts in the roof, which, I think, add more labor than beauty.

Shingling Hips without Weather Boards.

From W. B. W., *St. Johns, N. F.*—In answer to "A W. P.," whose inquiry relative to shingling hips without using weather boards appeared in an issue of the paper for last year, I send the following, which represents the practice in this section. In Fig. 1 the hip shingle is shown with the grain

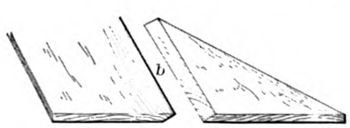


Fig. 1.—Hip Shingle, Showing Bevel.

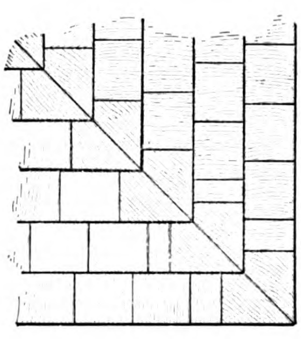


Fig. 2.—Appearance of Finished Roof.

Shingling Hips Without Weather Boards as Practiced in Newfoundland.

running parallel with the hip of the roof. It will be noticed that the shingle is cut on a bevel in such a way that the second one can be nailed down on it tightly as the work progresses. The letter *b* represents the upper side of the hip shingle, while the second one, or that at the left, is beveled on the underside to suit the hip shingle. Fig. 2 gives an idea of the appearance of the single hip when it is finished. I never use tin shingles, nor place felt underneath. I do not remember of a job executed in this manner giving out, and I have been at the trade something like 11 years. Neither have I heard of a hip shingled in this manner proving at fault until the whole roof needed repairing. The saddle boards, as shown in the May issue of the paper, appear to me to be out of place. The clean roof looks best. I would like to hear from some of the other readers of the paper concerning the method of shingling here shown. Split cedar shingles will last about 30 years if properly put on.

Hardwood Finish.

From R. C. S., *St. Louis, Mo.*—Will some one give me information with regard to hardwood finish, especially how to finish oak in natural and antique?

Note.—In reply to our correspondent it may be stated that there are various methods of finishing oak in the manner indicated. According to one authority a very clever imitation of general antique may be obtained by staining the filler with equal parts of Vandyke brown and charcoal, using about one part of the colored to four parts of the light. Another method of giving oak an antique appearance is to make use of hardwood with as full and open grain as possible, in order to secure a fine effect. After this has been sandpapered a priming is prepared made of one part of japan, one part raw linseed oil and one part rubbing varnish. Drop into ½ gallon of the liquid 1 pound of commercial corn starch and then add about ¼ pound of some good dry burnt Turkish umber. Apply to the job a good flowing coat of this priming. Let it stand until it is set and then take a broad putty knife and stick it into the grain, working the knife crosswise of it. Let it stand a little while and wipe with a rag, taking especial care to clean out all the corners and get the work into as good shape as possible as regards having the grain well filled. When perfectly dry give one coat of rubbing varnish prepared by adding to it ½ pound of starch to each gallon of varnish. This should be flowed on freely as a medium coat of rubbing varnish and should completely fill the wood. After this has been done the work of varnishing, rubbing and finishing can be executed in the usual manner.

To produce a natural oak finish the above method should be employed with the single exception of leaving out the burnt Turkish umber.

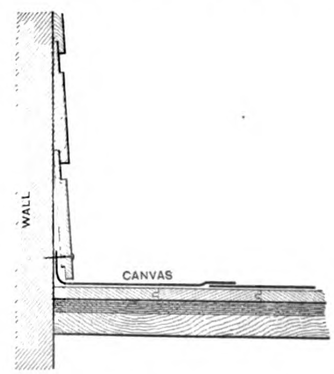
Another method of securing very pretty results in oak finish is to spread on the surface of the material a concentrated solution of permanganate of potash and permit it to remain until the desired shade is secured. A few experiments on a piece of wood will readily determine the proper proportions to be employed. When the shade wanted has been obtained, the wood is carefully washed with water, then dried, oiled and polished in the usual way.

Designs for Writing Desks and Secretaries.

From R.—Will some of the practical readers of the paper give me their ideas on writing desks and secretaries?

Leaky Porch Floors.

From W. S. G., *Sanel, Cal.*—I notice in a recent issue of the paper a letter



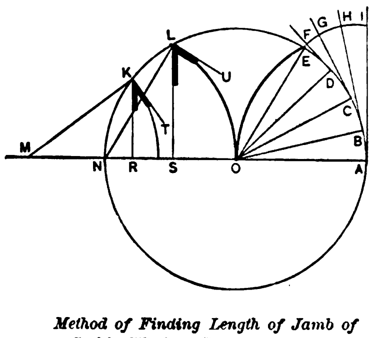
Sketch Showing Method of Treating Leaky Porch Floors Adopted by "W. S. G."

from "D.," Trenton, Tenn., asking for information about leaky porch floors. I will explain how I have successfully treated similar cases, and I suppose we have more wet weather to contend with in this part of the country than in any other. I take medium weight sail cloth, paint the under side of it, and raise the lower board on the wall next to the porch floor, as indicated in the sketch, which represents a section through the wall and porch floor. I turn the edge of the cloth up under the lower board, so that the water will not get in behind it. Then nail the board firmly to the wall. I next ascertain where the edge of that strip will be on the porch floor, and lay another strip down, tacking the first one over it, allowing 2 inches for the lap. The construction employed is shown in the sketch. A point which it is desirable to emphasize is that the lap should be well painted when the cloth is put down. After the work is well finished I take a sprinkler and dampen the cloth as nearly uniform as possible, so as to make all parts dry evenly. Just before it is thoroughly dry I give it a good coat of thin paint. The next coat of paint I thicken a little, while the third and last coat I make very thick. I have used this method both of the ways spoken of in the paper. I trust this will prove of some benefit to "D." in weighing it with other answers.

From E. A. V., *Plainfield, N. J.*—In answer to "D." of Trenton, whose inquiry appeared in a recent issue of the paper, I would say that if he will cover the floor with 16-ounce canvas, laid in paint, tacked down with ¾ inch carpet tacks, placed about ½ inch apart, and then given two coats of paint, he will have no further trouble with leaky roofs.

Gothic Window Frames.

From R. H. M., *Indianapolis, Ind.*—I send inclosed sketch in answer to "J. S. Z." of Morgantown, Ind., who asked in a recent issue with regard to Gothic window frames. In the first place, we will consider the method of finding the length of timber before bending.



Method of Finding Length of Jamb of Gothic Window Frame Suggested by "R. H. M."

The curve being part of a circle with known radius, draw the radii and tangent lines, as shown. These are perpendicular to or square with each other. I explain this and other points for the reason that all mechanics do not comprehend them. In my opinion it would be a great help to them to understand it as treated in geometry, trigonometry, or in the higher mathematics, as in this case. When these lines have been drawn set the dividers on D and with the chord or length D E draw the arc E F. Next set one leg of the dividers on C, and with C F as a radius describe the arc F G. Again, set one leg on B, and with B G as a radius describe the arc G H. Once more set the dividers at A, and with A H as radius describe the arc H I. The line represented by A I will be the length, practically; but theoretically the divisions A B, B C, C D, &c., would have to be very small in order to be absolutely correct. It is the same as unwinding a string from a cylinder. Every move away from the cylinder straightens it and forms a radius for a very small arc. The length of a curve, however, can be calculated. The distance from A to E, straight across, is the same as from A to O, or the radius and, of course, one-sixth of the distance around the circle. The length of the arc A B C D E is one-sixth of the circumference and easily found when the radius is known. The length of the curve K N could be found by knowing the angle K M R. I think, however, "J. S. Z." will find it a difficult matter to bend a piece of timber so that it will have any great strength. Usually these are made by sawing circular strips and nailing them together until the desired width is reached and placing veneer on the inside. This method is easier, more accurate and likely to give better results.

Now for the bevel to cut the stop. Draw a radius to the meeting point, as N L. Draw a perpendicular to the same point, as L U. The angle formed by this last line and the center line L S of the curve is the bevel sought. The same is shown in T K R, where the width is less than the radius, the center of the circle falling outside.

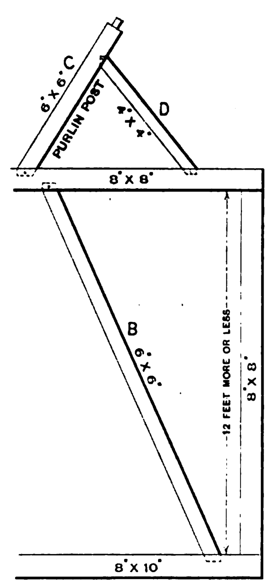
For any case, first draw the radius from the center of the describing circle to the meeting point of the curves. Next draw a perpendicular to this radius at the same point, and the angle formed by the last line and the center line of the curve gives the bevel to which to cut the stop before it is bent. The drawing only illustrates two cases. A rule ought to be made to serve any condition. I believe any bevel that is simply an acute or obtuse angle can be derived from a right-angled triangle—that is, if a bevel is wanted, there is to be found a right-angled triangle (which is the steel square or the plumb and level) in the conditions from which it may be obtained. If any of our fellow craftsmen press this matter I think I can give the proof. I am not speaking of circular work of any kind, but of straight or square work. I have often wondered to hear mechanics speaking of one-third or one-half pitch roofs. This may do as a matter of taste or architectural design, but to speak of it as a matter of mechanism is, I think, certainly very limited.

Articles on Proportion.

From H. R. C., *Juanita, Neb.*—Will not some one give the readers of *Carpentry and Building* a few articles on proportion? It is something that all mechanics should understand, and will prove very acceptable, especially to the younger ones. I have taken *Carpentry and Building* a number of years, and while almost every other subject has been treated, this one, which is among the most important, has been left untouched.

Forms of Braces.

From J. C. W., *Pine Hill, Pa.*—I send rough sketches of various forms of braces, concerning which I desire to be enlightened. I wish some of my brother chips would tell me how to obtain the lengths of shoulders, &c., of the braces illustrated. At B of Fig. 1 is a



Forms of Braces.—Fig. 1.—Sketch Showing Three Varieties.

brace running from a beam or tie to another, while A of Fig. 2 is very easy, as it is what we call a 3-foot run. We lay the square from 12 to 12 and run over three times, which gives the length. Now, in Fig. 1 the space between the ties is likely to vary according to the different sizes of buildings. At C of Fig. 1 is a purlin post, the slant or bevel of which it is easy to obtain, being the same as the pitch of the roof. What I want to know is the lengths in different sizes of buildings. At D of Fig. 1 is a brace somewhat different from all the others, as the bevel is more straight. If any of the readers can give me light on this subject I shall be very glad indeed to have them do so. I obtain the lengths, &c., by drafting, which is more or less troublesome. I would

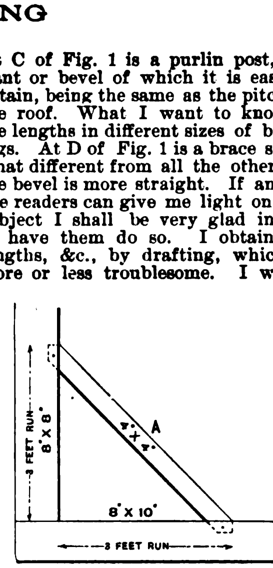


Fig. 2.—A "Three-Foot Run" Brace.

like to see sketches illustrating how to use the square, &c., without the necessity of employing figures, such as square root. It seems to me this can be done, especially on a brace like that shown at B in Fig. 1. Just how to apply the square, however, is an unsolved problem to me. These forms of braces are all used in barn framing in our section of the country and it is therefore very important to know how to obtain them in the least time and the shortest way.

Tin Shingles for Valleys.

From A. A. N., *Lafayette, Ind.*—In looking over the May number of *Carpentry and Building* I notice that "A. W. W.," shows a sketch indicating his method of shingling a valley. My preference in doing work of this kind is to employ a valley tin 14 inches wide, and lay the shingles as indicated on the side marked A of the sketch by the correspondent referred to. The shingles rest close to the tin, and of course the water which runs in the valley runs with the grain of the wood. A valley laid in this way is, in my estimation, straighter and looks much better than the old way shown on side marked B of the sketch submitted by "A. W. W." Work formed in that manner leaves a hole under the shingles the full length of the valley. The correspondent "A. W. W.," or any one else, could not make some of the bosses in this place believe that there was but one way to shingle valleys or hips. If "A. W. W." will lay a few shingles as indicated in the sketch he will see where the holes are.

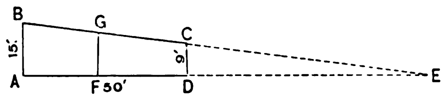
Dividing a Roof.

From O. L. W., *Dallas, Texas.*—I will offer the following solution to "C. A. J.'s" problem in the April issue, all of which I believe may be found in the arithmetic: We have in the roof a trapezoid whose area equals

$$\frac{15 + 9}{2} \times 50 = 600 \text{ feet.}$$

Produce the sides A D and B C until they meet at E; draw F G, dividing the roof into two equal parts of 300 feet each. Now, the roof tapers 6 feet in 50, or 1 foot in every 8⅓ feet in length, and to lose the 15 feet would have to be 15 times 8⅓, or 125 feet, from A to E. In the triangle A B C we have $\frac{15}{2} \times 125 = 937.5$ feet, and in the triangle F G E we have 937.5 less 300, or

637.5, but the two triangles are similar, therefore their areas are to each other as the square of their like dimensions, and we have 937.5 : 637.5 :: 125^2 is to (F E) or 937.5 : 637.5 :: 15625 : 10625. The square root of 10625 is 103.077, which is the distance F E; this taken from 125 leaves 21.923 for A F, and by dividing 103.923 by 8⅓ gives us 12.369 for



Plan of Dividing a Roof Suggested by "O L. W."

F G. I will add that the square root of $\frac{15^2 + 9^2}{2}$ is 12.369, the length of the line F G. Will some one tell us why this is so?

From A. H. H., *Kalamazoo, Mich.*—In answer to the request of "C. A. J." for a solution of his tin roof problem I offer the following simple demonstration: His roof being 50 feet long, 9 feet wide at one end and 15 feet wide at the other, there would be a difference in the two ends of 6 feet. This would be equal to a gradual decrease of 0.12 foot for every foot in length. How much longer would the roof have to be in order to come to a point? We find this by proportion to be 75 feet extra.

$75 + 50 = 125 \times 2 = 250$

$250^2 = 62,500.$

Now, the square of two times the extra length equals $75 \times 2 = 150$, which squared equals 22,500.

$62,500 - 22,500 = 40,000.$

$40,000 \div 2 = 20,000 + 22,500 = 42,500.$

$\sqrt{42,500} = 206.1552 \div 2 = 103.0776.$

$103.0776 - 75 = 28.0776$, which is the distance from the narrow end by which to obtain one-half area of the roof.

$28.0776 \times 0.12 = 3.369312$, which is the width of roof where they meet.

$50 - 28.0776 = 21.9224$, the length of roof from wide end to get one-half area of roof.

Lengths of Tank Hoops.

From G. B., *Greece, N. Y.*—In the February number of *Carpentry and Building* I find various methods of ascertaining the lengths of tank hoops, or, rather, the circumference of a circle, the diameter being given. All of these are contributed for the benefit of "E. B. G.," Ripley, N. Y. If he does not object, I will suppose he is not versed in the way of mathematics, and will therefore offer him my assistance in solving the many suggestions found on page 47 of the February number, all of which are supposed by their authors to be correct. In the first place, let us inspect the methods of "H. J. M." He says, multiply the diameter of the circle by 3 and add the distance from D to E. Suppose for example the diameter is 24 feet. The circumference would then be 75 feet 6 inches. Thus: $24 \times 3 = 72$ feet. Add the distance from D to E, which the correspondent says is 3 feet 6 inches, which gives the result as above. Let us prove this by taking the circumference of a circle whose diameter is unity, which is 3.1416 +, this being as nearly correct as men of science have ascertained up to the present day, and which is used by nearly all mathematicians. We find by multiplying the diameter 24 feet by 3.1416, that it equals 75.3984 feet for the circumference.

Next let us inspect the method of "W. H. L.," who says his way is to first find the diameter of the tank and then multiply by 3⅙. For example, suppose the tank is 18 feet in diameter. Multiply this by 3⅙ and we have 57 feet for the circumference. Let us prove this by multiplying the diameter 18 feet by 3.1416, as we did in the case of "H. J. M." We have a product of 56.5488 feet, which is equal to 56 feet 6$\frac{9}{16}$ inches.

Inspecting "H. M. N's" method, we find it correct except that he has made a mistake in multiplying 24×3.1416, obtaining for a product 72 feet 4.7808 inches. This is incorrect, as it should be 75 feet 4.7808 inches.

Inspecting now the method of "F. S. C.," we find that he advocates multiplying the diameter by 3⅐, and, furthermore, he gives as a result 75 feet 5⅐ inches. He also states that in order to more accurately find the circumference, multiply the diameter by 3.1459. I have no fault to find with this method, except that if 3⅐ is used as a multiplier the product would not be so nearly correct as when using either 3.1416 or 3.1459 as a multiplier. Suppose, for the sake of illustration, we multiply the diameter 24 feet by each multiplier, and see what we shall have for the product. Reduce the 3⅐ to the form of a decimal, and we have 3.1428 +. Comparing 3.1416 and 3.1439 as multipliers, we find the difference when using a diameter of 24 feet to be 0.00024. This difference is so slight that either 3.1416 or 3.1469 may be used as a multiplier without going far astray, and as being adapted for all mechanical purposes. Again, compare 3.1416, the circumference of a circle whose diameter is unity, with 3⅐, we find the difference to be 0.0288 feet, which for mechanical purposes may be called $\frac{5}{16}$ inch. By using 3⅐ as a multiplier, we have an error in this example of $\frac{5}{16}$ inch, but we may use 3⅐ as a multiplier for tank hooping purposes, as the result will be approximately correct. We must remember that iron takes up by bending, and this amount depends altogether on the size of the iron used for the hoops.

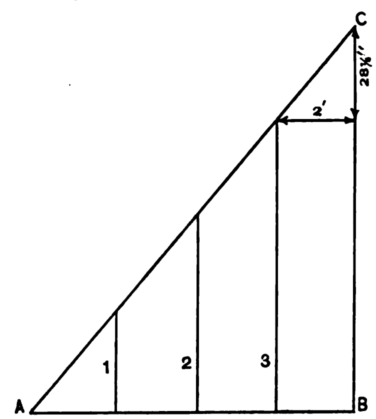
We will next suppose that "E. G. B." wishes to ascertain the circumference of a circle for other than tank hooping purposes. Then he should always use 3.1416 or 3.1459 as a multiplier, the difference in diameter of unity being 0.00001, which is too small for comparison. Referring to the letter of "H. J. M.," he says if the diameter is 24 feet the circumference will be 75 feet 6 inches. Now, I find it to be 75.3984, and reducing the decimal portion to inches we have practically 75 feet 4¾ inches. Now, 75 feet 6 inches minus 75 feet 4¾ inches leaves 1¼ inches. Supposing "H. J. M's" measurement from D to E be correct as he has given it, I do not think the method will give the circumference of a circle as he says it will. I find in this example that his circumference as given is 1¼ inches too large, which surely is not correct, as may be ascertained by other methods.

Referring to the letter of "W. H. L." and his 3⅙ plan, suppose we figure it out and see if it works on a circle whose diameter is 24 feet. Multiplying 24 by 3⅙ gives 76 feet as a circumference. Now, this reminds me that 75 feet 4¾ inches is more nearly correct, and subtracting this from 76 feet leaves 7¼ inches. If my friend "E. G. B." has used the method given by "W. H. L." to find the circumference, he will no doubt be surprised when he tries to hoop his tank. I imagine he did not have much trouble in driving down the bottom hoop, as its weight was sufficient to do that and save "E. G. B." the trouble.

Referring again to the February issue of the paper, we find "J. C. M.'s" method a good one to follow. All that it is necessary to do is to add to the circumference the amount the iron takes up by bending, and we have the hoops for tanks of any diameter desired. We also find by referring to the various letters presented in the February issue that we can ascertain the circumference of a circle of a given diameter by methods of "J. C. M.," Oregon; "W. H. S.," Massachusetts; "H. M. N.," Illinois; "T. H.," Minnesota, and "F. S. C.," New York City. We might, however, except the method given by "T. H.," which is to multiply the diameter by 22 and divide by 7. Also, the former method given by "F. C. L.," which is to multiply by 3⅐. The above mentioned methods referred to are not correct. Now, if my friend "E. G. B." of Ripley, N. Y., will inspect the methods given by the various correspondents in the February number, he will find circumferences of various lengths all computed from the same given diameter, which we will call 24 feet.

Laying Out Jack Rafters.

From W. W. S., *Placerville, Cal.*—I have been a reader of *Carpentry and Building* a few months, and I am very sorry I cannot say years, as one copy of the paper is worth the subscription, provided its columns be well studied. My attention has often been called to articles referring to jack rafters, and it seems to me that every mechanic has a different way of laying out and cutting them. I had never given the matter very much thought until I became a reader of the paper, as I never experienced great trouble in cutting jacks. I send a rough sketch and will endeavor to give what I think is a simple and correct method of laying out and cutting jack rafters, which may also prove of interest to readers in other sections of the country. Referring to the sketch inclosed, take half the width of the building, as from A to B, the length of the common rafter from B to C and the length of the hip from A to C. Strike the lines, as shown at 1, 2, 3, and measure them accurately. The result will be the length of each rafter, no matter what may be the pitch of the roof or the distance the rafters are apart.



Laying Out Jack Rafters as Followed by "W. W. S."

The Builders' Exchange

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National Association Literature.

All local secretaries should bear in mind that there is on file in the office of the National Secretary printed matter which deals with almost every knotty question in the building trades, from the standpoint of the builder. This material is readily accessible to all, and the National Secretary will gladly forward to any applicant printed matter on any subjects on which information is desired. By these means the local secretaries can supply their members with information which may not be easily obtainable elsewhere. The literature of the National Association deals only with the prevailing conditions as to the transaction of business, &c., and with their improvement; not with technical problems.

The Importance of Information.

To facilitate the work of the committees of the National Association, secretaries of the filial bodies should report every case that comes under their observation as being within the jurisdiction of any of these committees. Unusual workings of the lien law, suggestions for the improvement of the Uniform Contract, statistics that would seem to be desirable, &c., matters of all kinds that should come before the national body, all should be transmitted to the National Secretary to be by him given to the proper committees. Too much stress cannot be laid upon the importance of the cooperation of every filial body in matters of this kind, and every local secretary will greatly increase the efficiency of the National Association if he will forward to its secretary any and all information within his reach. These are means which tend, if properly used, to greatly increase the value of the organization.

Value of Membership.

In the report presented at the last convention by one of the filial bodies of the National Association of Builders, it was stated that the membership had suffered a decrease, the members withdrawing giving as a reason for their action that they could "see no money in it." This old question of individual benefit is constantly presenting itself and whenever it crops out among the members of a well established exchange it indicates that the purposes of such an organization are in no way comprehended by those who are looking for a membership "with money in it" in the sense that they would look for a contract having a specific money return in it. The trouble with these doubting Thomases is that they expect from the amount they have invested in the cost of membership a definite and distinct return in money which can be held in the palm of the hand and counted. In some undefined way they expect that membership in a builders' exchange will produce results similar to those which follow a successful business transaction, and that, simply because of their membership, they will be able to secure desirable contracts without the efforts which were formerly necessary. The statement referred to indicates plainly that those builders who could see no money in a membership have failed entirely to comprehend the purposes of the organization. They have failed to understand that the gradual and steady improvement which has taken place in the city where the exchange in question exists has been due entirely to the efforts of that organization. Greater uniformity in methods of transacting business have been established, greater harmony among the members of the fraternity has been secured, mutual protection has been secured through the establishment of equitable codes of practice and the whole tone of the trade generally has been elevated, and all these are distinctly attributable to the exchange and the efforts of the members to improve the customs and practices under which they transact their business. In many cases these results do not seem to be measurable to the eye of the man who seeks a specific pecuniary return for his membership; he receives the return, however, whether he perceives it or not, and if he could but comprehend the many benefits which the better facilities for transacting his business have conferred, he would consider himself amply repaid for the investment of both money and time. The improvements which inevitably transpire wherever a properly organized and conducted exchange exists are too frequently accepted as a matter of course, instead of being credited to the exchange as the direct result of its existence.

Ownership of Buildings.

It is a source of satisfaction to be able to state that in no case has the prediction and anticipation of the direct benefit to be gained by a builders' exchange in securing a building or permanent and desirable home of its own been overestimated. In every case where an exchange has come out before the public as an institution of sufficient standing and recognition of its own importance to warrant the purchase or erection of a building of its own, to be devoted exclusively to its own uses and those of its members, the result has demonstrated the wisdom of the move beyond any question. The public has become aware of the existence of the organization by means which command favorable opinion, and by its action the organization has assumed and has been granted a position on an equal plane with the other commercial bodies of the city, and to which by its character it is entitled. Every exchange which has secured a home of its own has thereby been enabled to make a comparison, which has demonstrated that the ownership of a building, and consequent increase of vitality in its membership, have brought about an increase of usefulness, of standing and of influence which almost no other move can effect. Every exchange which can possibly secure a building of its own should do so; it is sure to be a good financial investment aside from the benefit which will inevitably follow to the fraternity.

MAKING ROW BOATS OF SHEET METAL.

SEVERAL of our correspondents have recently made inquiry with regard to the construction of sheet-metal row boats or skiffs, and, in an endeavor to comply therewith, while at the same time offering to other readers who may be interested some practical information on the subject, we present the accompanying illustrations, with descriptive particulars.

Although for many of the details entering into the construction of the boat use is made of wood, this feature is not present to the extent that it would require the assistance of an expert shipwright, as the average carpenter is fully competent to do the work. For the seats, bulkheads and strips used to stiffen certain parts of the boat wood, as a matter of course, is the most suitable material.

In Fig. 1 A B C D represents the plan and E F G H the side view of a small skiff, 9 feet in length and 28 inches beam. The depth at each end is 17 inches, and amidships it is 14 inches. The bottom, across at its widest part, measures 22 inches, and in length it is 7 feet 9 inches, or 15 inches shorter than the extreme length of the gunwale from E to F of the plan. The outline of the curve for the bottom is shown by the line *a c b* of the plan. At one end of the boat is an air chamber or life compartment, J I B. The boat is to be provided with three seats, one in the middle and one at each end. The general measurements given before for this style of boat can be changed to suit the builder, but we would not advise making the extreme length longer than 16 feet, and in width not more than 40 inches. A boat built to the measurements shown by the plan and side view, Fig. 1, will have a capacity to carry two persons comfortably, with about 150 pounds additional weight for baggage, &c. To construct the boat, either of the two following methods may be used: One is to get out the sides and the bottom first, then joining the parts together, after which construct the frame work, &c. If this method is used the patterns for the sides can be developed by triangulation.

The other and simpler method is, first, to get out the frame work, then placing the iron for the sides against the same, mark off the outline of the parts required, and then allow for laps. These particulars noted, proceed to construct the frame work. Commence with the bottom frame, making it of either ¾-inch or 1-inch angle iron according to what use the boat is to be put. If the skiff is to be made to the measurements given in Fig. 1, ¾-inch angle iron will do. Make the frame to the exact outline *a c b* and *a d b* of the plan, Fig. 1, arranged in the manner shown by A and B of the sectional view, Fig. 2. The bottom curve of the frame is to conform to the bottom G H of the side view, Fig. 1. The two ends *a* and *b* can either be bolted or if convenient they can be welded together. Drill or punch the holes for rivets through the angle iron about 6 inches apart on each wing, staggering them on the two wings of the iron. Countersink every rivet hole on the side of the angle iron against which the shell or iron is to lay, so that when the rivets are drawn and headed up, the outside will finish flush. Next get out the three braces X, X′ and X″, shown in plan and side views Fig. 1. Two are required to hold the bulkhead J I in position and also to support the seat J I B. The other brace X″ is required to brace the boat, and is also used as a support for the seat at the other end.

The sectional view, Fig. 2, shows the shape of the braces. The brace X′ placed nearest the end B inside of the air chamber is to be made to form the circuit C D E and F shown in Fig. 2. The brace X″ is to form the circuit G H E F. The brace X placed in front of the bulkhead J I is a trifle larger than brace X′, and is also made solid. The part C to D is used to fasten the seat. The three braces X, X′ and X″ are each to be fitted to conform to the position demanded for them by the plan and side view, Fig. 1. They are to be made of ¾-inch angle iron.

Space the rivet holes about 2 inches apart on those sides of the braces in contact with the iron sides and bottom of the boat. Through each one of the three sides of brace X′ in contact with the wooden bulkhead J I, punch three holes and countersink them so that the wood J I can be fastened to the brace X′ by short screws. Through the top parts of braces X′ and X″ in contact with the seats drill three ¼-inch holes to allow of the seats being fastened to them by ¼-inch bolts.

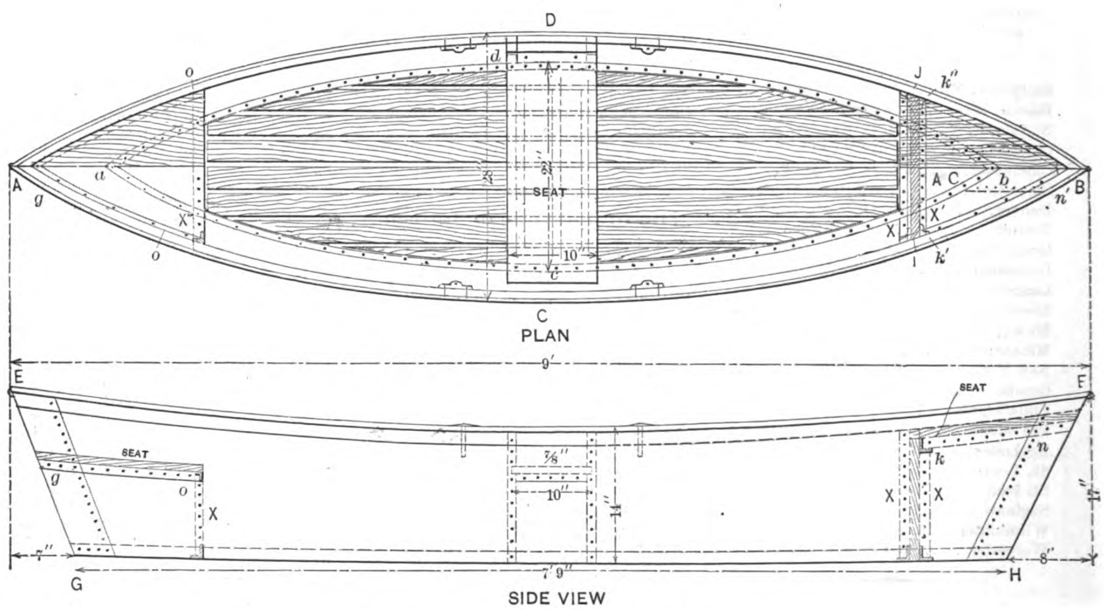


Fig. 1.—Plan and Side Elevation of a 9-foot Skiff.

Making Row Boats of Sheet Metal.

Then for the support of the seats from the braces X′ and X″ toward the ends A and B of the boat, make of ¾-inch angle iron the two supports *g o* and *k n* shown in the side view and plan, Fig. 1.

These supports are to be made solid and fitted from *o′ g′* to *o″* and *k′ n′* to *k″*, as shown in the plan, and are to be riveted to the sides on the inside of the boat. Space the rivet bolts about 3 inches apart and when punched countersink the holes on the outside so that the rivets by which the supports are fastened to the sides will finish flush.

The next part of the frame work to get out is the strips for the gunwale. If desired those used on the inside of the boat can be made of oak while the outer ones can be made of iron. Make the inner strips of ½ inch by 2 inch stuff, and the outer band of 1 inch half round iron.

Fig. 3 shows how the inner and outer bands are fastened together and also how the iron sides are lapped over the inner strip. First shape the two iron bands of the gunwale as demanded by the plan and side views, Fig. 1. To fasten the wooden and iron bands together use $\frac{3}{16}$-inch bolts. Space the holes for these bolts on the iron bands throughout their entire length about 6 inches apart. To fasten the ends of the iron bands together insert a small block of wood of the required shape between them, as shown in Fig. 4. Then fasten the ends together either by $\frac{1}{4}$-inch rivets of the required length or with bolts, as shown in Fig. 4. Next get out the four $\frac{1}{4}$ x $1\frac{1}{4}$ inch iron strips to be used for the supports for the center seat. How these are arranged is shown by the sectional and side views, Fig. 5, and the plan, Fig. 6, of the cuts. The section A shows the supports bolted to the bottom angle iron of the boat and also to the inner strip of the gunwale at the gunwale the proper distance apart. This done, hold a plate of iron against the angle iron at the bottom and against the inner side of the iron band of the gunwale. Mark off the outlines required for as large a pattern as it may be desired to make any single piece of the sides. Allow for all seams or laps. On the outline of the sides above the gunwale allow 1 inch of iron. This is to be turned over inner $\frac{1}{2}$-inch strip when this strip is placed in position. The bottom of the boat is made the same in shape as the outlines of the bottom angle iron demand, and cut out after the iron required for a double seam has been allowed. For a skiff of the dimensions given by the drawings in Fig. 1 the sides may be made of No. 26 gauge galvanized iron. Use 24 gauge iron for the bottom, using if possible a single piece. The sides and bottom may be joined together by a double seam. This will be as safe and as strong a joint in this position as a riveted joint would be, owing to the stiffness and protection provided for it by the bottom angle iron of the boat. Any cross seams occurring on the sides may be riveted. After all the parts have been made ready put the sides and bottom together, then solder and thoroughly soak each seam. For additional strength fit over each end, on the outside of the end joints where the sides come together, pieces of heavy galvanized sheet iron, as shown by the side view in Fig. 1. After these plates are placed in the positions desired close rivet them, as shown, then solder and soak the joints and rivets in a thorough manner. Now place the bottom angle iron frame (to which the four supports of the middle seat have been bolted) in position. The bottom frame must, as a matter of course, fit snug against the sides and the bottom of the shell.

If the frame at any point does not fit just right this fault must be remedied. This done, rivet the frame to the bottom and sides, have each rivet finish flush on the outside of the boat; then thoroughly solder and soak each rivet from the outside; then place, fit and rivet the braces X′ and X″ in their proper positions, as demanded, also the supports for the two end seats from the braces X′ and X″ toward the ends A and B of the boat. This done, solder the rivets on the outside of the shell.

Now prepare the wooden bulkhead J I for the air chamber. This should fit snug against the brace X′ and against the sides and bottom of the boat.

Fasten the bulkhead to the brace by short screws; then cover the inside parts of the sides, bottom and the bulkhead of the air chamber with a heavy coat of good paint. This done, cover the bulkhead J I on the outside of the air chamber with galvanized iron, and also the top from B to the bulkhead. Fasten these plates to the sides by riveting them and then solder and thoroughly soak each joint, &c., so that the air chamber will be perfectly air tight. The brace X may then be placed in position and the two end seats of the boat prepared, fitted and bolted in place. In the plan view, Fig. 1, but one half of each of the two end seats is shown in position by the shaded parts of the drawing. The other half of each seat has been left off to show the construction of the parts underneath the seats. The end seats may be made of some suitable hard wood, $\frac{3}{4}$ inch in thickness. For the center seat use $\frac{7}{8}$-inch or 1-inch stuff. This seat may also be placed in position and fitted in the manner demanded by the drawings, Figs. 1 and 5. This done, proceed to place the iron bands of the gunwale and also the two wood strips for the inner bands in position. As the sheer of this boat is but 4 inches, the 2 inch

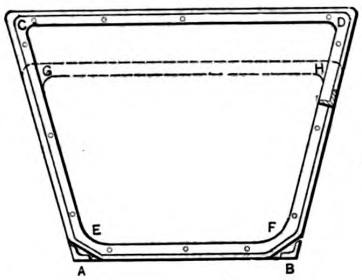


Fig. 2.—Cross Section, Showing Shape of Braces.

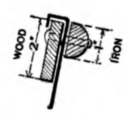


Fig. 3.—Section Showing Manner of Fastening Strips and Iron Band on Gunwale.

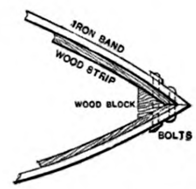


Fig. 4.—Fastenings of Gunwale Bands.

Fig. 7.—Method of Fastening Oarlock Fitting.

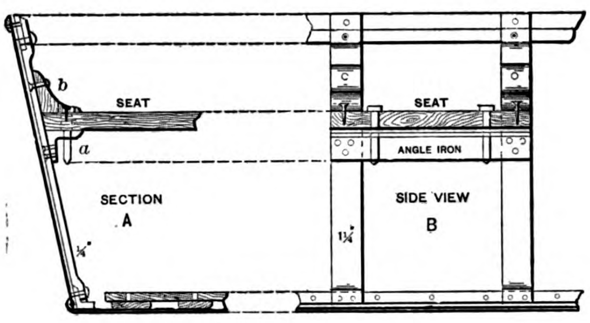


Fig. 5.—Section and Elevation of Middle Seat.

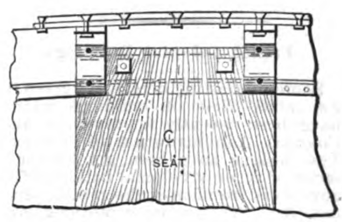


Fig. 6.—Plan View of Middle Seat.

Making Row Boats of Sheet Metal.

top. Underneath the seat is shown by *a* the end of a 2-inch angle iron through which a pin projects, used to fasten the seat to the same. A brace of wood is shown above the seat by *b*, this is shown bolted to the upright support and fastened to the seat by a wood screw. The side view B and the plan C show the described details so clearly that no further description of these parts is necessary.

After the entire frame work of the boat has been prepared and ready, set up and bolt the parts of the frame work together temporarily, in such a manner as to enable one to obtain the outlines of the patterns for the sides of the boat. To do this, bolt the braces X′ X″ to the bottom angle iron frame of the boat, also the four supports for the center seat. Then bolt in position the outer band of the gunwale by using the four center supports for this purpose. Then from some place near the ends A and B bolt a few strips of the strap iron of required length to hold the bottom angle iron and the iron band of the by ½-inch oak strips will readily bend to the regular curve without any previous preparation or steaming. The iron of the sides, as previously described, will project 1 inch above the strips and bands of the gunwale, after these have been fitted and bolted in the positions required. After this has been done turn the 1-inch projecting edge down and over the ½-inch inner strip. Do this neatly. Then nail the edge projecting down on the inner side with short wrought nails, spaced about 1 inch apart. Finish these edges as smoothly as possible.

The fittings, such as oars and special oar locks, required can be procured from any jobbing house handling boat hardware. Whatever style may be selected can readily be attached to the proper positions on the bands of the gunwale. Fig. 7 shows one method of fastening the fitting for an oarlock. To cover the bottom of the skiff use any desirable hard wood. Strips ½ inch thick by 3 inches wide will make a neat grating. Make the grating for the entire bottom of the boat in one piece by fastening the strips running lengthwise of the boat together with three cross pieces, one at each end and one in the middle under the center seat of the boat. So the center seat can be removed, the grating when made can readily be placed in position in the bottom of the boat. After this is in place fasten two strips on the grating at any suitable distance from the middle seat. These strips are to serve as foot rests for the person rowing the boat. After the entire iron and wood work about the skiff is finished, apply two coats of good paint to every part of the surface of the iron. The wood work can either be painted or finished in oil or varnished as desired by the builder.

French Colonial Buildings.

Some interesting details are given in *Le Génie Civil* of buildings which have been recently approved by the Colonial Administration of France. The designs have been got out for a series of types of colonial buildings for governors' residences, hospitals, prisons, &c. The special conditions governing the design are principally those of a want of skilled labor, and often of suitable material at the site of the buildings, the requirement for protection against tropical heat, and the rapid destruction of wood by insects, such as the white ant. The system of construction adopted is to make the main frame work of the building, carrying the roof, of iron, and to fill in between the columns with double walls of brick. The outer wall is 4¼ inches thick, and the inner 9 inches. The space between the walls is 20 inches, and is readily accessible, so as to prevent it from becoming a home for snakes and insects. It is open to the air at the top and bottom, so as to secure good ventilation. The roof is of corrugated iron, on iron rafters and principals, with an inner roof of plaster. The floors are on iron joists, and are made by setting tee bar secondary joists transversely to the main joists at 20 inches apart. Through the tee-bars are threaded a series of iron wires, forming a network of 4-inch squares. This network of iron wire is embedded in and binds together the concrete forming the floor itself. The partition walls stop short several feet below the ceiling for better ventilation. The rooms are 11 feet 6 inches to 13 feet in hight. Verandas about 10 feet wide are carried along both faces of the building. The buildings are raised 5 or 6 feet above the ground.

Influence of the Carpenter in Building Construction.

There is no class of workmen having such authentic influence on the building trade as the carpenter, and a building, while under construction, is absolutely under his control. The architect, the owner, the brick-mason, and all others, must advise with and submit their plans to the carpenter. Walls can only be built to a certain point when the carpenter must be consulted as to when he will complete the woodwork and permit the wall to be finished. From basement to roof the carpenter is advised with continuously, says a writer in a recent issue of the *Southern Lumberman*. On frame buildings the carpenter is a law unto himself, and according to his views the many frame cottages are built. Carpenters, more than any other of the building class, should be intelligent and fully informed in every detail of their work. A botch carpenter is a disgrace to the calling, and brings his fellow workmen into disfavor. Nothing is so prominent and lasting as botch wood work in a building. Employ competent carpenters or none.

NEW PUBLICATIONS.

STANDARD STEEL CONSTRUCTION. A Manual for Architects, Engineers and Contractors. Arranged by J. L. Larimer. 215 pages. Published by Jones & Laughlins, Limited. Price, $2.

This is a very interesting and valuable volume to all interested in steel construction. It is largely a catalogue of the special shapes manufactured by Jones & Laughlins, of which colored diagrams are given with all dimensions marked. In addition to this, however, there are a large number of tables and formulas of safe loads, safe spacing, &c., which are desirable in the same volume. Interesting notes are given on standard connection angles, built column sections, and connections for Larimer columns. Illustrations are presented of fire-proof floors, partitions, ceilings and roofs, giving general details of connections. Some 50 pages are devoted to tables of safe loads, proper spacing, &c., for beams, girders, angles, channels and tees, together with practical examples of the application of the tables. Tables of properties of beams, angles, tees, &c., are given, also tables of radii of gyration of equal and unequal-legged angles, also weights of steel of different sizes, weights of other substances, areas and circumferences of circles from $\frac{1}{16}$ to 100, logarithms of numbers from 10 to 100, natural sines, &c , from 0 to 90, squares and cubes, and square roots and cube roots from 1 to 1000, and some leading problems in mensuration. The book is of pocket size, handsomely bound in leather, with a flap, and has full gilt edges.

HENDRICKS' ARCHITECTS AND BUILDERS' GUIDE AND CONTRACTORS' DIRECTORY OF AMERICA. 648 pages, 7 x 10 inches in size. Bound in board covers with gilt side and back titles. Published by Samuel E. Hendricks Company. Price $5.

This work is specially adapted for the use of builders, contractors, manufacturers and dealers in all kinds of building supplies and embraces something over 170,000 names, addresses and business classifications. It is in effect a directory so arranged and classified as to cover in a convenient and useful manner every branch of building construction and the industries connected therewith. Among the lists of names contained within its covers may be noted those of architects, carpenters, builders, brick makers, producers of cement, manufacturers of building iron of all kinds; dumb waiters, hot-air furnaces, fireproof building materials; iron and steel roofing, ceiling, siding, &c.; various kinds of lathing; mantels of all sorts; grates, fenders, tile, &c.; mason and builders' materials; painting material; plumbers', gas and steam fitters' supplies; roofers' materials; steam and hot-water heating apparatus; skylights, sash, doors and blinds, varnishes, ventilators, ornamental iron and wire work, and sidewalk lights; together with the names of car builders, engine and boiler dealers, electric lighting companies, engineers, granite dealers and workers, steam and hot-water heating contractors and stone dealers. A feature of the volume is a carefully arranged index by which any particular branch of industry connected with the building trades may be easily and quickly found, while numerous sub-headings greatly facilitate reference. Scattered through the pages of the work are to be found the advertising cards of concerns engaged in lines of business connected with or closely allied to the building industry.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

OCTOBER, 1893.

Building in New York City.

Notwithstanding the financial stringency which has been such a conspicuous feature of the commercial world during the past few months, building operations in the metropolis have been of large proportions and have shown a handsome increase over corresponding periods of previous years. According to the report of Superintendent Brady of the Building Department, the number of new buildings projected during the first seven months of the present year was 1165, involving an outlay of $47,570,147, as compared with 1385 structures costing $41,243,922 in the same time last year. In the corresponding period of 1891 1187 buildings were erected at a total cost of $40,164,426. From these figures it will be seen that the average cost of the buildings to September 1 was $33,837 in 1891, as compared with $30,819 in 1892 and $48,000 in 1893. Glancing at the figures covering alterations to buildings up to September 1 of the present year, we find the number of structures to have been 1458, involving an expenditure of $6,034,296, as against 1491 buildings on which was paid out $4,854,407 during the seven months of last year.

A Compulsory Reform.

This country is approaching slowly, but surely, a period when present modes of living among those who sustain themselves by manual labor must undergo reform. The effort to imitate, as far as their means will allow, the dress and style of those possessing more ample means, will be abandoned from the sheer impossibility of maintaining it. The result will be complete relief from many burdens now carried with anxiety and toil, and a lighter, happier lot than now falls to the share of most people who gain their bread by sweat of brow. The struggle to follow the lead of fashion and to obliterate external indications of difference in wealth falls, by its very nature, wholly upon the poorer classes. In such a struggle they exhaust resources that could otherwise be husbanded for hard times like the present; and do what they may in such a struggle, there always remains the unpleasant consciousness of defeat. Before the working population of any land can emancipate themselves from the slavery of poverty they must first break the shackles of false and foolish pride, and recover that true pride which only renders them ambitious to rank first among those in their own station—pride of citizenship, pride of superiority in their chosen handicraft, pride in a manly independence as admirable in a peasant as it is in a king.

Rules and Requirements.

One of the most imperative needs of every organization is the rigid enforcement of all its rules and regulations. It is impossible to estimate the bad effect upon the members of permitting the rules of an organization to be neglected or infringed. When members become indifferent to any of the requirements of their organization it is time to investigate the matter, and to determine whether the fault lies in the requirement or in the member. Correction should be applied without delay to either, and the good of the whole conserved by preventing the existence of bad requirements, or laxity in conforming to the good ones. The purposes of an organization become meaningless when they are allowed to stand simply as examples of composition, and when the members cease to make practical application of the benefits for which these purposes were created. No sooner do the members neglect their duty to their organization and to themselves than the ill effects become apparent. The power of the organization becomes restricted; the benefit to the members of its existence begins to fail, and general disaster to its welfare is sure to follow. Membership is no longer a thing of value; members delay the payment of their dues; the financial standing becomes impaired, and general uselessness is the result. Every rule or regulation should be rigidly enforced, and the moral tone of the body kept up to the highest plane at all times. The organizations which have been most successful in this country are those to which it has been an honor to belong; and membership in which is a practical guarantee of the moral and financial standing of its members.

The World's Fair Buildings.

How to dispose of the World's Fair buildings in Jackson Park without paying for their removal is at the present time troubling the exposition management, and Director of Works Burnham has been ordered to estimate the salvage value of every iron girder and stick of timber in the buildings. It appears almost incredible that the main exhibit buildings alone, which, according to Auditor Ackerman's July monthly report, have cost $7,019,205, should be without value at the close of the exposition. At one time it was thought by the directors there would be a reasonable amount of salvage, but the estimates gradually dwindled to $1,000,000. That was low indeed, but some of the directors now say they will be lucky if they do not have to pay for the removal, including the gift of the material of the $7,000,000 group of structures. The Administration Building, for instance, has cost $463,212, and now it is estimated that it would be worth the donation of the entire building and a fee of $10,000 in addition to remove it and leave the ground in the condition stipulated by the South Park Commissioners, from whom Jackson Park was leased. Manufactures Building cost $1,172,431. Its stupendous iron trusses, 250 feet high, do not seem to be in demand. Agricultural Building represents $659,234, but nobody wants it. The same is true of other structures, for not a single offer to purchase has yet been tendered. The same conditions existed, however, at the close of the Centennial. There was no immediate demand for the structural material, but the contractors who were able to purchase it and hold it found opportunities to work it off at a good profit. Centennial buildings were reproduced in whole or in part in widely scattered sections of the country.

Fire Losses.

The record of fire losses in the United States for the first seven months of the present year points to a very serious condition of things in this field. Fires are shown to be increasing at an abnormal rate, despite the increased efficiency of the means taken for fighting them. It is an open secret that many, even among the strongest fire insurance corporations, are having a hard struggle for existence, and their profits are dwindling while risks increase. The rapid advance in values of property destroyed by fires is demonstrated in the official returns. During the past three years the annual loss has risen from $109,000,000 in 1890 to $152,000,000 in 1892, while the accounts for the seven months of the current year indicate that 1893 will in its turn surpass all previous records, barring the fatal year of the great Chicago fire. Each week brings with it the tale of some great conflagration. A short time ago it was in Fargo, then in Long Island City, and later came reports of a $2,000,000 blaze in Minneapolis. Indeed, the story has become such a familiar one to American citizens that, except to those directly interested, the fire news in the morning paper has become a weariness to the flesh in its constant reiteration. But, nevertheless, the menace to the prosperity of the country is a serious one, and one that deserves the grave attention of all thinking men.

Some Causes and Preventives.

What is the cause of this rapid increase in destruction by fire? The published opinions of a number of fire underwriters and other authorities on insurance, as expressed of late in the daily press, give two main causes, which are very interesting ones. According to them, the increase in fire losses is attributable to incendiarism, induced by the present financial stringency, and also to the increasing use of electricity in trolley, telephone and electric light and power wires. It is recorded that the latter agent has been directly responsible for the destruction of property during late years at a rapidly increasing rate. Statistics show that in 1885 the value of property destoyed by what is termed "electric fire" was only $250,000. In 1891 the amount had grown to $1,300,000. and in 1892 the cases footed up the large sum of $3,000,000. Besides these cases there were a number of fires put down to "unknown" causes, the origin of which was more than likely due to electricity. Most of these cases, too, were of a preventable nature, by the use of better insulation and greater precaution and care generally in the introduction and maintenance of the electric agent in buildings.

Home Fire Brigades.

Another very simple precaution, also, might have prevented the destruction of much valuable property in manufacturing establishments and stores—namely, the drilling of a portion of the employees as a fire brigade. The advantage of this plan was signally demonstrated lately in a fire in Chicago, when a great store was seriously threatened. The fire was, however, successfully held back by the firm's own brigade, which consisted of a captain and four men to each of the seven floors of the building. The store had been, happily, equipped with all the necessary apparatus for fighting a fire and the men had been drilled every week in its use. Consequently, when the emergency came, they were found capable of saving the property. This system is followed in several large establishments in and near the city of New York, but its application might with advantage be much more widely extended, and it should be worth while for insurance companies to give more encouragement, by lower rates, to the establishment of similar home fire brigades in all places where large risks and valuable property are involved

The Carnegie Building.

Probably one of the finest buildings, when it is completed, of which the city of Pittsburgh can boast, is that now in process of erection on Fifth avenue for the wife of the late Thomas Carnegie. The structure, which has now risen to more than half its intended hight, stands on Fifth avenue and Relief alley. It is of steel frame construction, and when finished will be 13 stories in hight on Fifth avenue and 14 on Relief alley. We understand that the frame work of the entire building will be completed before the stone and brick work is commenced. The first story will be 17 feet 2 inches in hight at the upper side of the building and 23 feet 2 inches in hight on the lower side. All the others will be 13 feet 2 inches except the twelfth and thirteenth, which will be 16 and 14 feet respectively. The material employed for the walls will be stone and terra cotta, with the interior finished in oak and brass and the floors of marble and mosaic. It will be furnished throughout with all the modern appliances of a first-class office building and will be an ornament to the city. The Carnegie Company will occupy the first seven floors of the structure, while the other apartments will be rented for office purposes.

The Arch in Construction.

The word "arch," derived from the Latin *arcus*, a bow, has been defined to be a concave structure raised upon a mold called the centering, in the form of the arc of a curve, serving as the inward support of some superstructure, also as a part of a circle less than a semicircle; as a hollow building raised upon a mold in the form of a semicircle; as a contracted vault, and as an artful disposition of stones generally in a bow-like form, by which the weight produces a mutual pressure and abutment, so that they not only support each other and perform the office of an entire lintel, but may be extended to a great width and made to carry the most enormous weights, says a writer in a foreign exchange. There being no word in the Greek language meaning an arch, it is inferred that the object was unknown, although it has been said that the pediment of the Greeks suggested the arch, and it has been found in the Temple of the Sun, at Athens, and of Apollo, at Dydamus, concealed in the walls, covering the necessary openings, perhaps similar to discharging arches as now used by the moderns. In sacred history the arch is first mentioned in Ezekiel, chapter 40, verse 16, in his description of the Temple. "There were narrow windows to the little chambers, and to their posts within the gate, round about, and likewise to the arches, and windows were round about inwards, and upon each post were palm trees." B. C. 574. The bridge over the Euphrates, at Babylon, Herodotus expressly says, was built on stone piers bound with lead, and lintel or squared beams of timber. The tunnels also at Babylon, mentioned by Diodorus Siculus, were probably covered in the same way. Visconti, on the authority of Plutarch, assigns the invention to Alexander himself, who lived B.C. 323, or about a century after Herodotus; Dr. Pococke thinks the Egyptians were unacquainted with the arch, although Belzoni found Egyptian arches at Thebes and one at Gouinon, leading to the valley of Beban el Malook, and Diodorus Siculus, in describing one of the celebrated buildings of Egypt, takes particular notice that it was tipped with one stone; Sir John Chardin, in describing the subterranean passages at Tohelminar, does not in any way allude to the arch, a circumstance he would not have omitted if it had been the case. One tomb is said to be arch roofed, but it is in solid rock.

FIRST USE OF ARCH.

The Romans have the merit of being the first to introduce the arch into general use. The earliest on record is the conduit at Tusculum, near Rome, 16 feet wide and 30 feet high. The second, the theater of Marcellus, at Rome, built in the time of Julius Cæsar, where semicircular arches are found, and it may with truth be said a genuine arch did not exist prior to the time of the Romans. The arch was not known in Greece, and there is doubt of its being used at Babylon, or Assyria, or in Rome, earlier than the time of Cæsar, B.C. 50. In the quotation given from Ezekiel probably the true arch is meant, as the impost was the earliest ornament in arches of stone, and that, too, with leaves resembling those of the palm. This would place the invention nearly 500 years previous to the time of Cæsar. Again, the absence of any remains is a great obstacle to the latter conclusion, so that we must be content to allow the merit to the Romans of bringing the arch into general use, but the extent of its application was reserved for modern times, as Waterloo, London, Gloucester and Chester bridges amply testify.

FORMS OF ARCHES.

There are the following forms of arches in use; the date of their introduction is almost as uncertain as the origin of the arch itself: Tudor arch, called after the name of the reigning family; arched dome, which arose in Etruria; semi, or Roman, in exclusive use until the twelfth century; horseshoe, or Moorish, more than a semicircle, found in East Morgan, a building of the Anglo-Normans; elliptic, first found in the tower of the Deanery of Lincoln, 1500; inverted arch, found in Cathedral of Wells and Salisbury; centenarian, or arch of equilibration; scheme or skene, or imperfect arch, less than semicircle; hyperbola, and parabolic, from sections of a cone; trochoid, or cycloid, invented by Descartes, 1615; epicycloid, formed by motion of a point in a paddle-wheel of a steamboat, a combination of circular and progressive motions. There are twenty-two varieties, drawn from four, six and eight centers. Straight arch, or plat band, with joints converging to a common center; examples are in Lincoln Cathedral and Greenwich Hospital. Vaulting or groins, the latter arises from the intersection of the former, about the fourteenth century. Rampant or flying arch, used to connect buttress and pinnacles with the main building.

PROPORTIONS OF PARTS.

The proportion of parts has generally been estimated in parts of the span or chord, and one-fifteenth, one twenty-second, up to one thirty-fourth, has been stated as the proper depth for the voussoirs at the crown or apex—the thickness of abutment one-sixth of the span, and of the piers one-sixth. The rise or versed sine should not in any case be less than one-quarter of the chord. When the hight of the piers exceeds the rise of the arch, an addition of one-fifth (if their size be estimated by the previous standard) is made to their thickness, and when the span of the arch exceeds 50 feet it is usual to increase the voussoir as the abutment or skewback is approached. The success that attended Brunel's bold experiment of the Maidenhead Bridge, carried into successful execution amid the sneers and jibes of his compeers, in the application of brick to a span for which no stone save granite was considered competent, augured favorably for the use of arches of brick to an extent never before contemplated, especially where high banks offer the additional inducement to try the effect, there being then no approaches to make. The Maidenhead Bridge was turned in half-brick rings in cement, 5 feet 3 inches in depth at the crown and 7 feet 1½ inches at the springing; the two main arches were elliptic, and 128 feet span, with a rise only of 24 feet 3 inches; the land arches 21 feet and 28 feet span, there being six of the latter on one side and two of the former on the other. The immense mass of 7 feet in depth of brick in the arch was the true source of security.

RESIDENCE OF MR. C. P. ALLEN, AT KNOXVILLE, TENN.

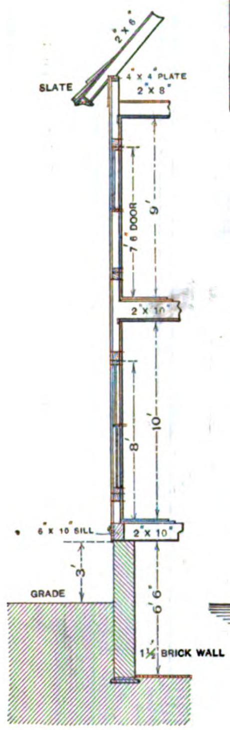
GEORGE F. BARBER & CO., ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, OCTOBER, 1893.

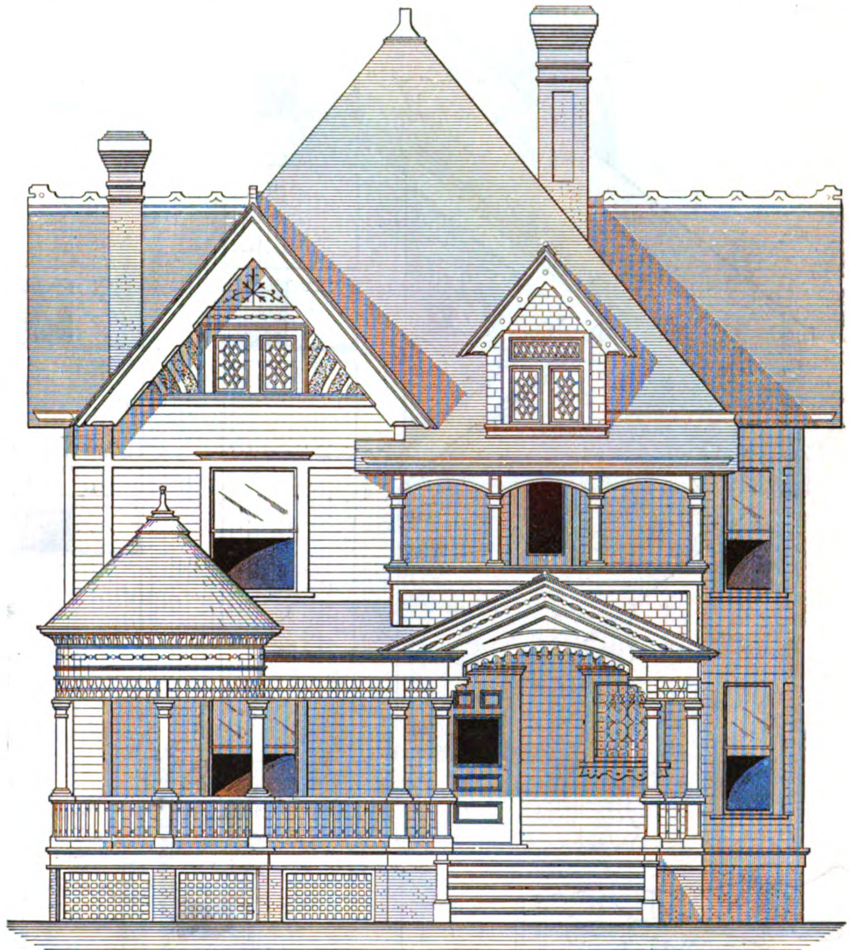
A SOUTHERN RESIDENCE.

THE DRAWINGS illustrating a Southern residence which we present in this issue are likely to prove interesting to those of our readers who have been making inquiries with regard to the arrangement of dwellings adapted for erection in the section of country indicated. The residence here shown was built a short time ago for Mr. C. P. Allen of Knoxville, Tenn., from plans prepared by architects George F. Barber & Co. of that city. The floor plans show an arrangement of rooms to meet special kitchen through a good-sized pantry and a rear hall. The kitchen is so placed as to be entirely cut off from the front portion of the house, and the second floor can be reached from it by means of the rear stairs. The kitchen is arranged with a view to economizing space and is provided with the modern fixtures. The pantry, between the kitchen and the dining room, is 6½ x 10 feet in size, well lighted and fitted with the usual equipment. The china cupboard opening into the dining room affords ample space for the

The house of Mr. Allen, represented in general view by means of our supplement plate, is located on a center lot and the side elevations are therefore more or less plain, the principal ornamentation being found at the front. A veranda extends across the entire front and is of heavy and substantial construction, while the balcony at the second floor adds variety to the dwelling. The foundations of the house are of brick, the exterior walls sheeted and papered, while the roof is covered with shingles. The in-



Section.



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

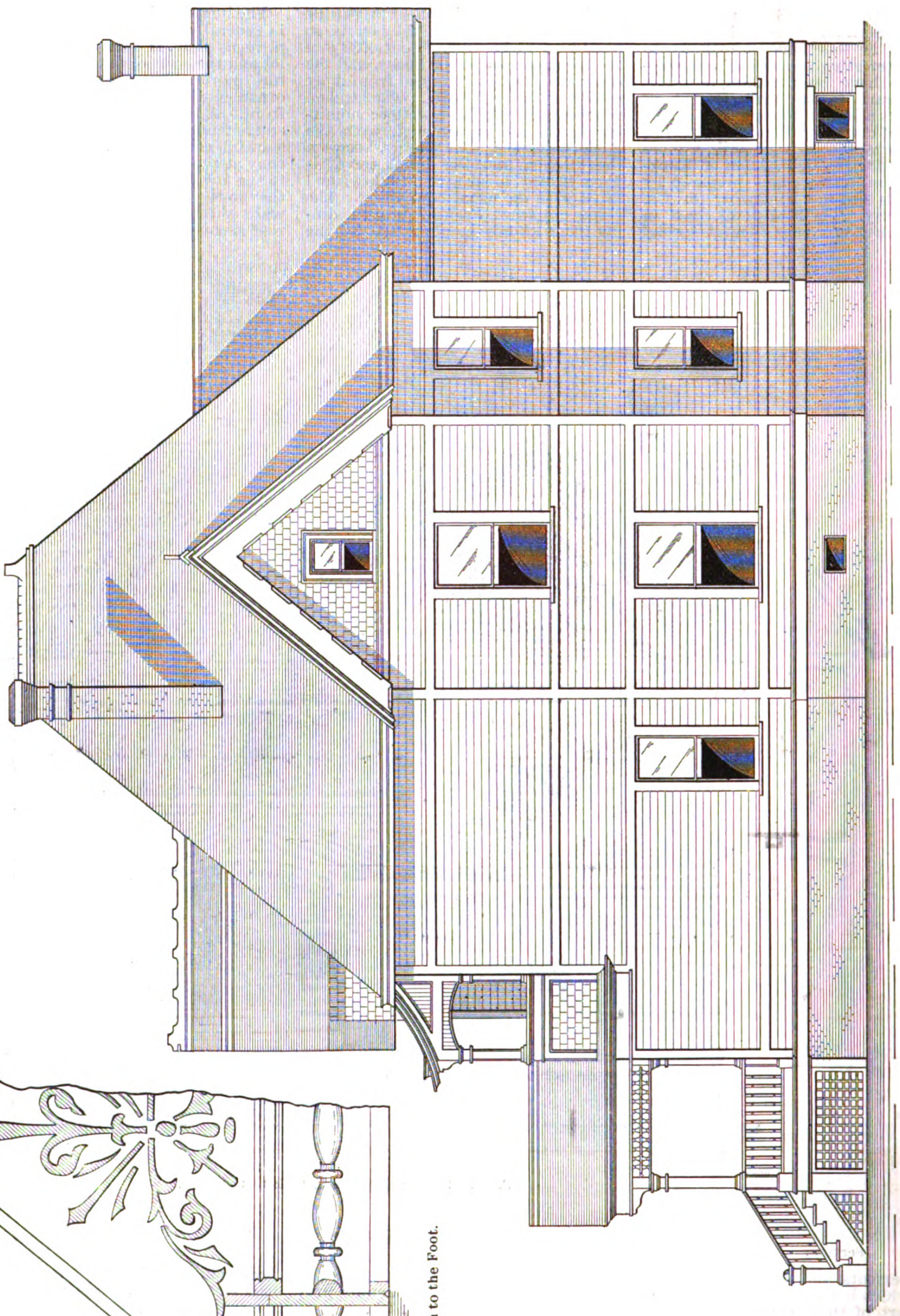
A Southern Residence.—George F. Barber & Co., Architects, Knoxville, Tenn.

requirements, and indicate many features which invite interesting study on the part of those connected with the building trades. Provision is made on the first floor for four commodious apartments, not including the reception hall, which is as large as some of the other rooms in the house. It will be seen that there are two halls, and that the front door may be reached from the kitchen without the necessity of passing through any of the principal rooms on that floor. At the left of the reception hall, as one enters the house, is the parlor, which communicates with the sitting room beyond by means of sliding doors. The dining room is across the hall or corridor from the sitting room, and communicates with the purpose, the construction being clearly indicated by means of the details presented in connection herewith.

On the second floor of the house are three large sleeping rooms, a bathroom and directly over the kitchen a servants' room. Each chamber has opening from it a commodious wardrobe or closet, while the arrangement of the bathroom involves a feature which cannot fail to be appreciated by those who consider details of convenience. The position of the rear stairs is such that the servants can pass from the kitchen to their room on the second floor without the necessity of entering the front portion of the house or even the corridor extending through its center.

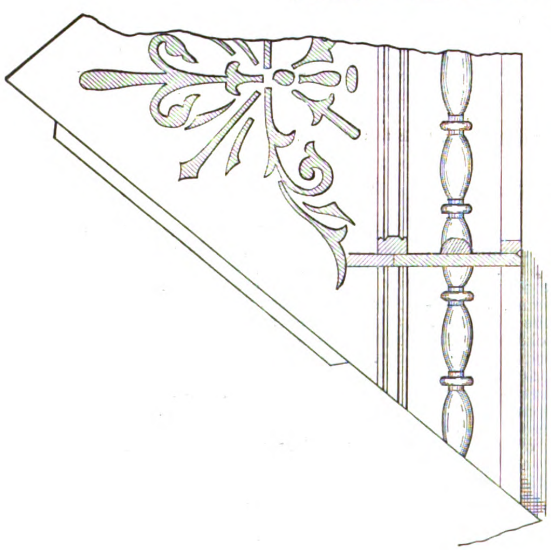
terior finish of the first floor is in natural Georgia pine, while the rooms of the second floor are painted. The cost of the house here shown, including mantels, grates and hearths, was $3400, although the author states that this figure will vary according to the locality. The same set of floor plans was used for a brick-veneer residence for a gentleman in Dover, N. J., the cost in that case being about $5000.

THE old Hammond House at Marblehead, Mass., which contained spruce timber over 200 years old, has recently been demolished. This timber was purchased by violin makers at a high price for use in making their instruments.

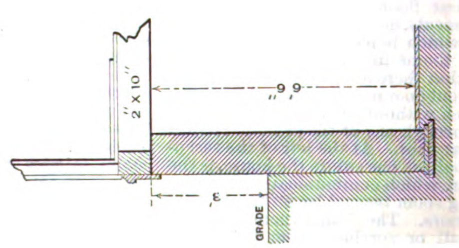


Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

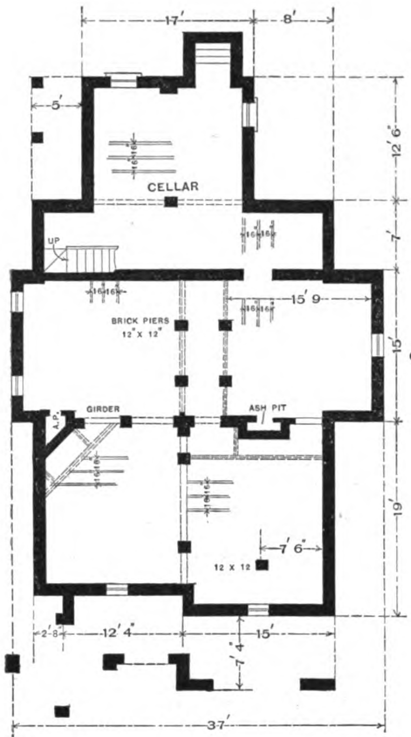
A Southern Residence.—Elevation and Miscellaneous Details.



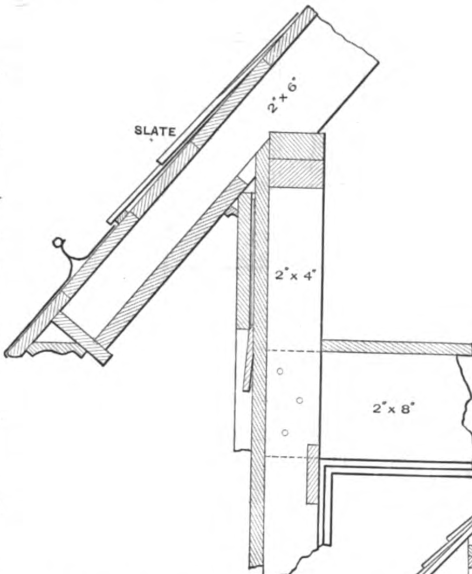
Gable Finish.—Scale, 1 Inch to the Foot.



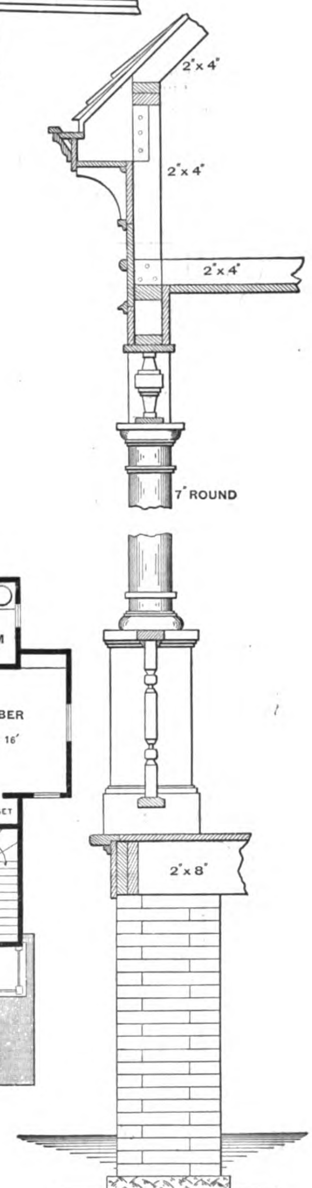
Section of Cellar Wall.—Scale 1/4 Inch to the Foot.

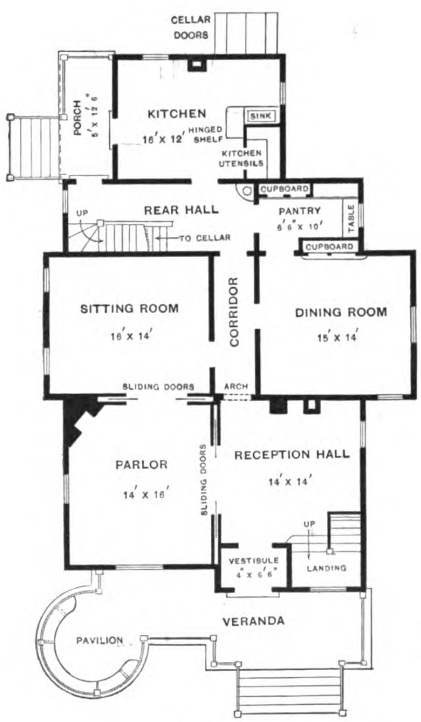


Foundation.- Scale, 1-16 Inch to the Foot.

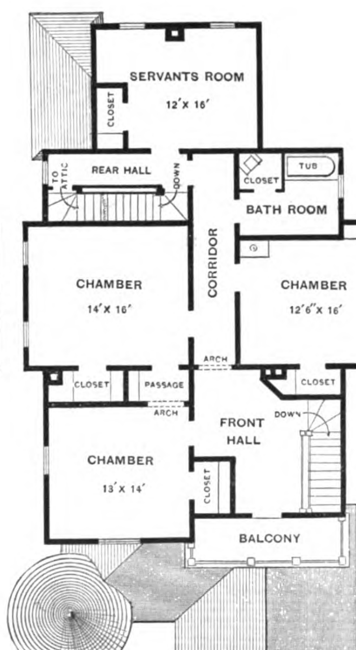


Detail of Main Cornice.—Scale, 1 Inch to the Foot.





First Floor.

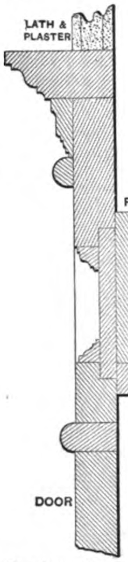


Second Floor.

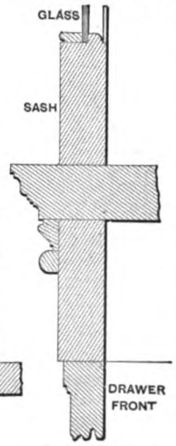
Scale, 1-16 Inch to the Foot.

A Southern Residence.—Plans and Miscellaneous Details.

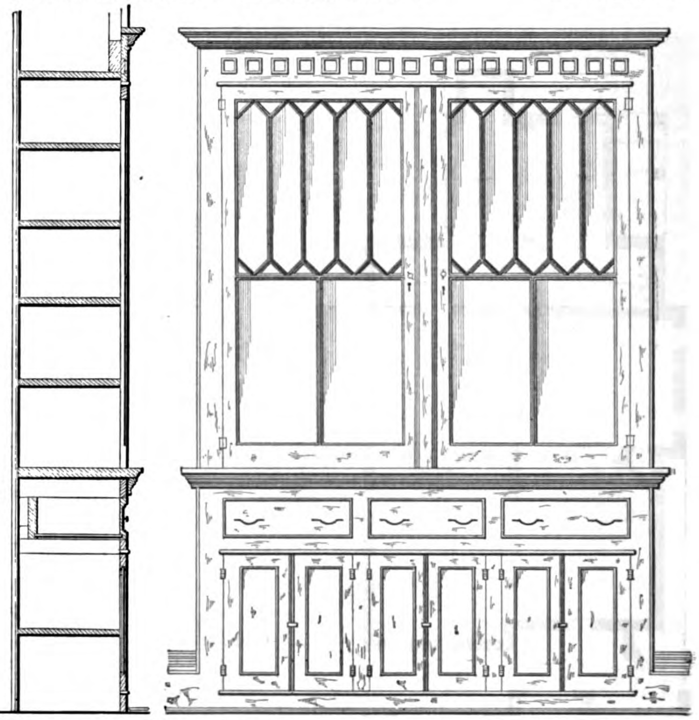
Section Through Veranda Pavilion.—Scale, ½ Inch to the Foot.



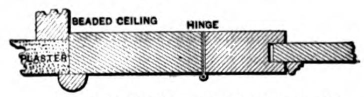
Cornice above Glass Doors in China Cupboard.—Scale, 3 In. to the Foot.



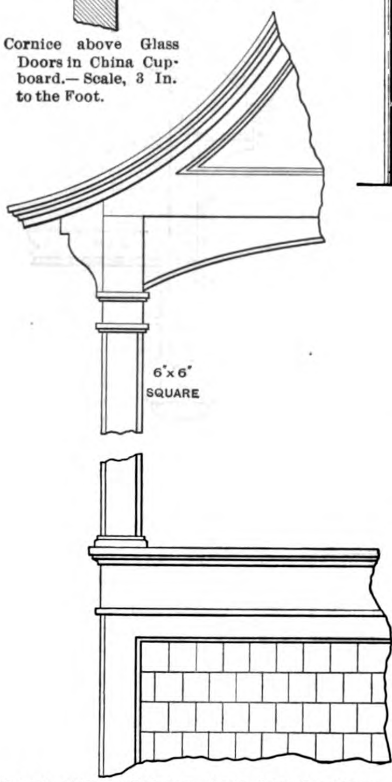
Section through Counter Shelf of Cupboard.—Scale, 3 Inches to the Foot.



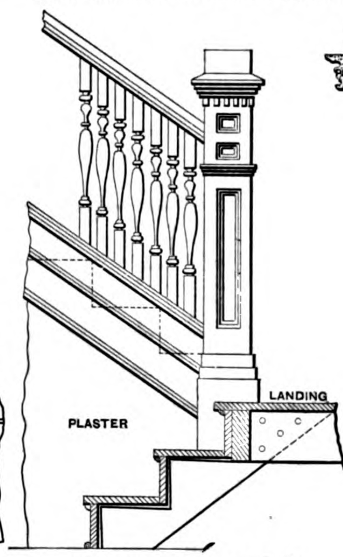
Section and Front Elevation of China Cupboard.—Scale, ½ Inch to the Foot.



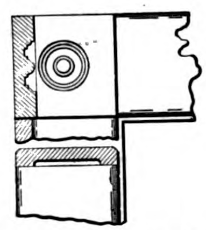
Section of Doors Under Drawers in China Cupboard.—Scale, 2 Inches to the Foot.



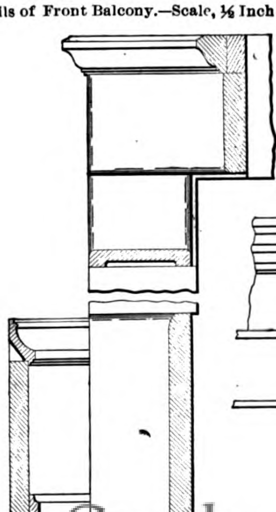
Details of Front Balcony.—Scale, ½ Inch to Foot.



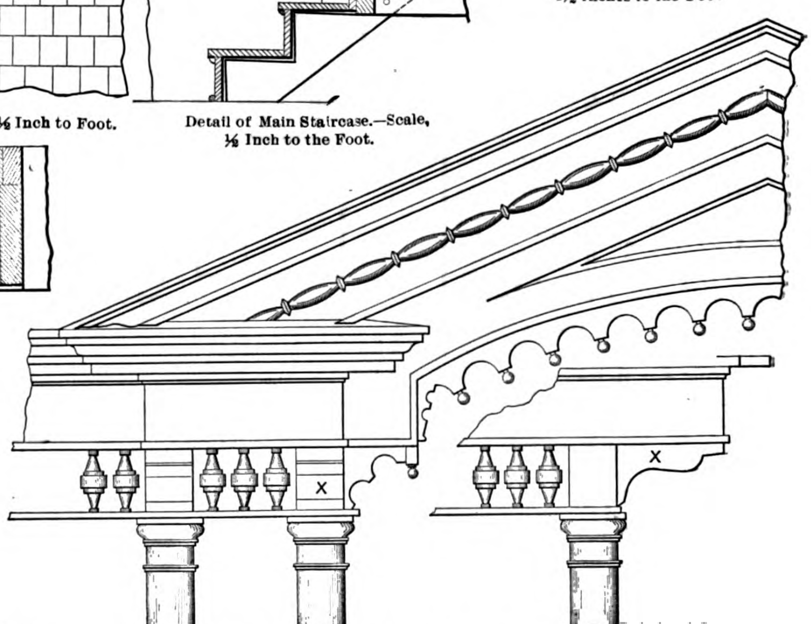
Detail of Main Staircase.—Scale, ½ Inch to the Foot.



Details of Second-Story Casing.—Scale 1½ Inches to the Foot



Details of First-Story Casing, Base and Plinth Block.—Scale, 1½ Inches to the Foot



Details of Veranda Gable.—Scale, ½ Inch to the Foot.

Miscellaneous Details of a Southern Residence.

Circular Windows.

Circular windows, says a writer in an exchange, were employed abroad wherever a window of the ordinary form would become of too low and broad a proportion. The term "marigold" has been applied to those circular windows in which radiating mullions prevail and "rose" to those in which no such lines are found. The preference given to the latter may be traced to the feeling for subordination of the classes of form. A general form of the third class should not be filled up with details of the second. The finest rose windows, perhaps, are at St. Ouen (Rouen) and the immense ones at Beauvais, in which, however, there is not enough subordination of different classes of mullions. The finest of the radiating sort are at Strasburg, Westminster, and the south front of Amiens, where a pleasing variety is produced by the lines radiating from points a little distant from the center, so as to give alternately a few radiating and a few parallel mullions. The figure called pentalpha is very common in French circular window tracery; and they followed the example of flowers in founding their division chiefly on the numbers 3 and 5, those divisible by 4 being comparatively rare. The term "wheel," applied indiscriminately to all round windows, would be better restricted to those called in France "roses tournantes," which differ from ordinary roses in having the similar sectors of the pattern not alternately reversed but all turned the same way, which gives the idea of rotation. There are many varieties of them, though none contain more than six or eight panels, there being none above the smallest scale, probably from a feeling of the instability given by their rotary expression. Hence the use of a large and complex one as a principal and central feature must be considered as very questionable taste.

Effects of Sea Water on Cement Mortars.

According to some experiments recently made in France, and quoted in the last issued volume of the "Transactions" of the Institution of Civil Engineers, it is shown that mortars immersed in sea water increase in weight—first rapidly, afterward more slowly. When exposed to the air the weight first diminishes, then gradually increases. In some experiments with cubes of neat cement, the sides of which measured 2.756 inches, the increase of weight was found to be 6 per cent. after two years' immersion in sea water. With smaller masses, such as briquettes for testing the tensile strength, the augmentation in the same time was about 10 per cent. The weight increases in salt water to a greater extent than in fresh. The proportion of water retained in a mortar after drying was found not to be proportional to the percentage of cement, but was also influenced by the nature of the sand. The quantity of water used in gauging also affected the amount retained. From recent experiments made by M. Teret to ascertain the action of sea water upon cement mortar, it appears that in two stalagmitic excrescences which were formed on the surface of concrete immersed in the sea, the percentage of magnesia was about 30. A number of experiments were undertaken to throw light upon the variation of permeability in one and the same mortar, the action of the infiltrating liquid, the influence of the nature of the aggregate, of the proportion of cement, the composition of the sand and various other points. A number of tensile tests were made with mortars composed of a great variety of substances mixed with cement. The highest result was obtained after the lapse of one year, with a variety of marble.

The Fallacy of Expediency.

BY W. H. SAYWARD.

One of the most difficult features which must be overcome before perfect unity of action can be secured by an organization is that which is shown by the member who acts only from motives of expediency. It is almost impossible to compute the amount of injury which this spirit can produce upon the natural and inherent capabilities for benefit which exist in every organization. Expediency prompts the short-sighted to urge extreme action for the purpose of securing instant effect and for the purpose of quieting any disturbance which may seem injurious to an individual or a fraternity. As evidenced by the individual member of an organization, it may be seen in the man who, in dealing with others, always advocates the immediate settlement of any disturbance or difference which affects him unfavorably upon a basis satisfactory to himself, regardless cf the equity of his position or the rights of others. His position is not a difficult one to fix, for he may be safely predicted as being opposed to everything which would disadvantageously — for him—change existing conditions or customs. His position is more or less unstable, for his motives being devoid of principle and being primarily actuated by expediency, he is compelled to shift about with every change of circumstance in order to be on the safe side. Circumstances are likely to change frequently with him, for temporary settlement is his greatest desire; permanent adjustment of all relationships upon equitable principles being foreign to his nature.

INCREASING OPPOSITION.

In actual practice, as observed in a builders' exchange, this spirit manifests itself in increasing opposition to everything that tends to the improvement of the customs which surround the fraternity, provided such measures as may be necessary are likely to entail extra work, or in any such actions by individuals as might, in any degree, jeopardize their relations with their patrons or customers. For example, any action advocated by the exchange which might be likely to antagonize an architect would meet the hearty disapproval of the expediency man, regardless of the ultimate good promised by the measure. In treating with differences between employers and workmen he is sure to advocate measures for immediate settlement upon a basis which will protect his rights, regardless of the equity of the situation; and his rights are based upon previously existing conditions, without reference to the justice or equality to others of those conditions. All efforts of his fellow-members to bring about in time of peace, when the relations between employers and workmen are harmonious, a better and permanent condition of affairs between the two, are to him overtures to the workmen which seem unnecessary because of the absence of disturbance, which is the only cause for action that he recognizes.

The tendency of such a member to employ measures of expediency rather than those which are intrinsically right and lasting in their operation indicates that he cannot be in sympathy with the latter form of action, and hence must be opposed to its application to the affairs of the organization of which he is a member. The careful study of the situation by others gives them no title to management or direction, in his eyes, for their conclusions are beyond his comprehension, and therefore, to him, impractical. An unpleasant phase of his treatment of the action of the student of the situation is his unreasoning opposition to wise and far-reaching measures, which rarely approaches intelligent criticism and generally expends itself in efforts at the obstruction of something which appears valueless and visionary to him. In the administration of the affairs of the exchange the purposeless efforts of expediency become again apparent by short-sighted, makeshift opposition to carefully prepared and permanently effective plans for the general welfare.

DEALING WITH OPPOSITION.

In seeking to maintain the organization upon a high plane, and to enforce its rules and requirements, the members are hampered by the thoughtless ones who are inclined to let these matters take care of themselves, and whose actions would, if permitted to dominate, soon reduce the purposes of the organization to mere announcements, without value or significance. It is next to impossible to find a body of men in any trade or profession who are associated together for the purpose of securing unity of action in which this element is not encountered to a greater or less extent, and the only way in which it can be successfully dealt with is to compel the persons who entertain the opinion that expediency is better than principle, that temporary makeshifts are better than permanent settlement, to express their ideas in open meeting where the same can be considered and debated by all concerned. Nothing can so effectually settle the wisdom of an opinion as the scrutiny and consideration of it by those who are affected by its expression. It is the duty of those who have the welfare of their organization at heart to bring under discussion the statements which have been made in criticism of measures which have been adopted and recommended for practical application. By this means unreasoning opposition, from whatever cause, is checked and the members are taught the necessity of substantiating their statements, besides the benefit to the organization which must accrue from the careful consideration of its action and the motives and principles by which it is actuated.

A SIMPLE mechanical contrivance is being adopted by English builders by which window sash may be given two movements, the one upward or downward, and the other inward. Practically, only one action is required to effect the change from an ordinary sash to a casement window. By dropping a catch at one side of the sash the cord is secured, the window frame being released from the sash and slipping into pivot hinges, when it can be opened as a casement and keys itself in so doing; when closing, the sash again engages with the cord, which runs in a groove in the pulley slide and serves as one of the guides to keep it in its place when working up and down as a sash. In this arrangement the beading which is generally used to guide and separate the sashes, is entirely dispensed with, the sash being guided by suitable tongues working in grooves on the right or hinge side. On the left side the sash, when closed for use as a lifting window, engages with a metal block attached to the end of the weight cord, which serves to guide it on the frame, the sash being also so arranged that it cannot possibly come off the hinges except when closed.

"WEAVING-SHED" DESIGN FOR SHOP CONSTRUCTION.

THE WORK that the builder is called upon to perform in the practice of his trade varies in such a marked degree that every form of building construction is of interest and value to him. While it is possible the greater portion of his labor has been in connection with frame buildings, he is desirous of keeping abreast of the times concerning the use of iron and steel in the erection of structures intended for manufacturing and business purposes, whether in the large cities of the country or in the smaller towns and villages, where the requirements are on a less elaborate scale. The practical carpenter and builder will, therefore, very likely find much that is interesting and instructive in the description and illustrations presented herewith of a machine shop, constructed according to what is known as the "weaving-shed plan" The subject forms the basis of a paper read before a recent meeting of the American Society of Mechanical Engineers by Prof. John E. Sweet of Syracuse, N. Y., and in it he describes the design of his own works, at the same time pointing out the advantages resulting from such construction.

In many respects, he says, the "weaving-shed" plan—that is, a one-story structure in sections, separately roofed, with the north sloping side of glass—has advantages. As to ventilation, in its simplest form it may be inferior, but the ventilation is easily controlled when the problem is once fairly attacked.

Common and fashionable as is the salt block construction—that is, a central high section with a gallery on either side—this form, when used in a shop so small that one foreman has control of all the machinery, has this disadvantage, that he has to "see saw" across from side to side, worming his way through the erecting section, whereas with the erecting floor at one side the machine tools are concentrated. With a small shop, too, the climbing up and down stairs is not only a nuisance, but absolutely costly. Things can be moved in an elevator very cheaply, but carting, loading, unloading, and carting again, spoils the economy. It is doubtful if there is any saving in two or more storied shops, except in real estate, and when as much ground has to be left idle to get light as is covered by buildings, then the saving in real estate is small, unless the buildings are more than two stories in hight.

ADVANTAGES OF ONE-STORY STRUCTURES.

The advantage of the one-story weaving shed roof plan is that the building can be extended to any length in either direction, and to any width in one direction, without interference with light, with advantage in heating, and with the advantage of having everything on one floor, and that floor a solid one. The trouble apprehended from ice, snow and water has no foundation in fact, and, if dealt with in the way described later, need not give one a moment's anxiety.

While there is getting to be some really genuine permanent foundation building done in this country, it is mostly confined to the larger commercial cities, and has not as yet found its way into the workshops or small towns.

The principles are easy to understand. If the earth throughout the entire structure has equal sustaining power, then the area of the foundation under the different parts should be in proportion to their loads, and the center of the foundation should be directly under the center of pressure. Or, to emphasize the ideas, it is just as detrimental to put too much foundation under the light parts of a building as too little under a heavy one, and worse to have a load rest on one side of a wide foundation than on the center of a too narrow one.

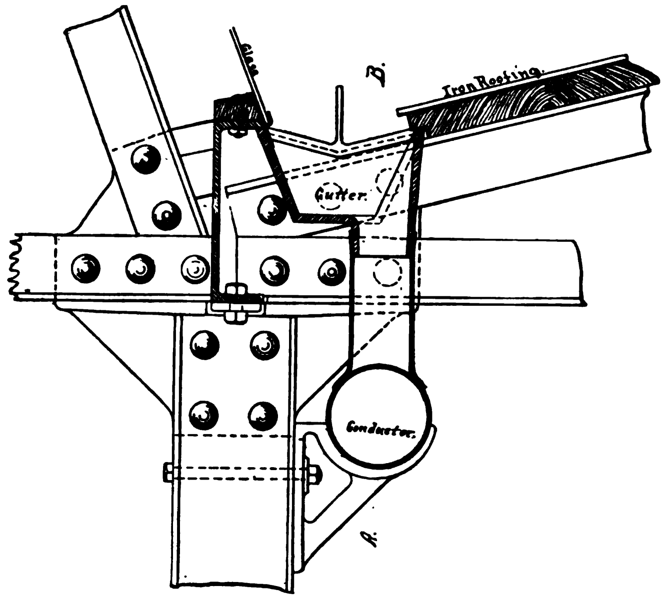


Fig. 1.—Cast-Iron Gutter

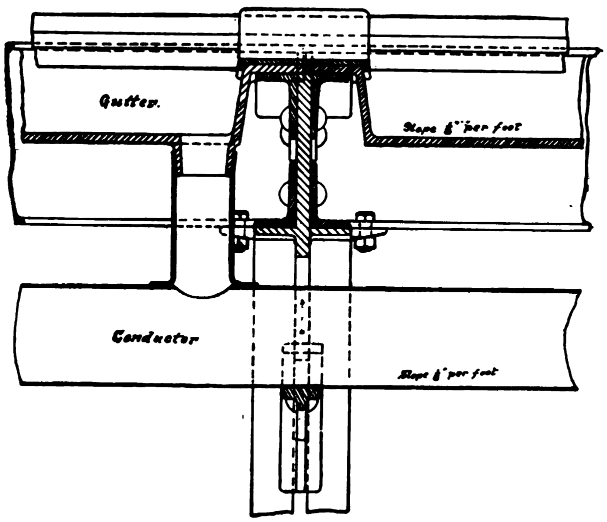


Fig. 2.—Section of Cast-Iron Gutter, taken on A B of Previous Figure.

"Weaving-Shed" Design for Shop Construction.

In the locality where the writer resides it is as impossible to get these simple rules into builders' heads as it is impossible to get them executed, or a decent brick wall built. The foundations stand when built directly at variance with right, and brick walls stay up when they ought to tumble over, seeming to depend more on force of habit than the strength of the mortar.

FLOORS.

Machine-shop floors are a problem, and while those made of dirt, like some of the French ones, seem to last the longest, they are hardly satisfactory; neither are the English brick floors. The following, used in the works of the Straight Line Engine Company, is believed to be better than most of the floors heretofore constructed. The earth was excavated to a depth of 27 inches below the floor line, and rolled with a heavy roller, the soft places filled, and again rolled and leveled. Building stones of the cheapest sort—that is, stone too poor for foundation walls—were dumped on the ground, and men set to sorting the largest pieces and closely packing them on the ground; a strip of 2 or 3 feet of this work was kept in advance of the other filling, so as to insure its solid character. Upon this was a layer of the smaller stone, then broken stone, coarse gravel, fine gravel, and, lastly, sand. There is no other possible way in which each grade can be made to retain its place except by reversing the process and putting the larger above the smaller. If mixed indiscriminately, the fine will work to the bottom and the coarse come to the top. By following the plan given a solid foundation is secured, upon which is placed nothing but 2-inch hemlock plank running one way, with a 1-inch planed and jointed, but not matched, floor running the other way. The advantage of the thin top is that when there is a hole worn through it is but 1 inch deep at the most, and the plain strips of uniform width make it easy to repair. This makes a floor on which anything can be set any

where, except the largest of the machine tools requiring separate foundations.

ENGLISH PRACTICE.

Some accounts of the English practice give 16 feet as the width of spans or bays, but in the works above mentioned 32 feet is used, 8 feet being the unit upon which the building is constructed. In a more extended plant 10 or 12 feet would be proper. The posts are 8 feet or 16 feet between centers, and all the roof trusses 8 feet. The roof is simply 1¼ inch pine plank, 16 feet long, planed and matched, planed side down, nailed to thin strips of basswood riveted between the two angle irons which form the rafters, covered with ribbed, not corrugated, iron; and the flat roof over the traveling crane section is the same, except the gravel roof.

In the construction of the posts and roof, by making each member of two pieces ⅜ or ½ inch apart, between which bolts can be passed, a convenient means is at hand to fasten anything anywhere.

The iron structure is more expensive than wood, but lighter, exempt from fire, and, with the provision for bolt attachment above referred to, more convenient.

The trusses are strong enough to hold 3 or 4 tons besides the roof, so that any pieces of machinery or work which are liable to be handled can be raised by tackle attached to the trusses in whatever part of the place they may be.

The question of snow, which seems to be the bugbear to every one first thinking of the weaving-shed roof, is one requiring hardly a second thought. Making the gutter of cast iron, as shown in Figs. 1 and 2, or any convenient shape, and putting it inside the building, with the heating pipes adjacent, is all which is required. Keeping the gutters clean is all there is to it, and snow and ice will thaw sooner in cast iron than on the wood planking when the heat comes from the lower side.

Eight feet between centers would seem to be too near together for posts, but by making benches 12 feet long, supported by two posts, leaving 4-foot spaces between the ends of the benches, the apparent objection vanishes where the bays are as wide as 32 feet.

In a building for large work, with 10 feet between trusses, the bays could easily be 40 or more feet, with 8 feet of glass on the northern slope.

ROOF CONSTRUCTION.

The geometry of the roof is very simple: simply dividing the lower chord in four equal parts, and the rafter into four equal parts, and joining the points with the struts and braces, as shown in Fig. 3 of the engravings. While economy of material would dictate iron of different section and weight, to save bother we used all alike, and as the accidental loads are unknown quantities placed in unknown positions, perhaps that was as well as applied high science.

In Fig. 4 is shown a cross section of the shop, looking west, while Fig. 5 represents a section through the office and engine room.

In the weaving-shed system of lighting the annual cost for repairs of broken glass is practically *nil*, and in this connection the writer volunteers to say that he believes an erroneous idea is pretty universally prevalent in regard to the most economical size for lights of glass for shop lighting. The theory is that the small size lights for various reasons are the most economical. But after a long observation the evidence to me is conclusive that the larger the lights the less the cost for repairs. Large lights stand far more punishment, and the workmen have some respect for a light of glass which costs a dollar, but none whatever for 10 x 15 glass. Whether these are the reasons or not, the fact remains that where in one part of our works the annual breakage of 10 x 15 glass does not fall below 100, there is another part where the large lights were equally exposed, and there was but a single light broken in two years.

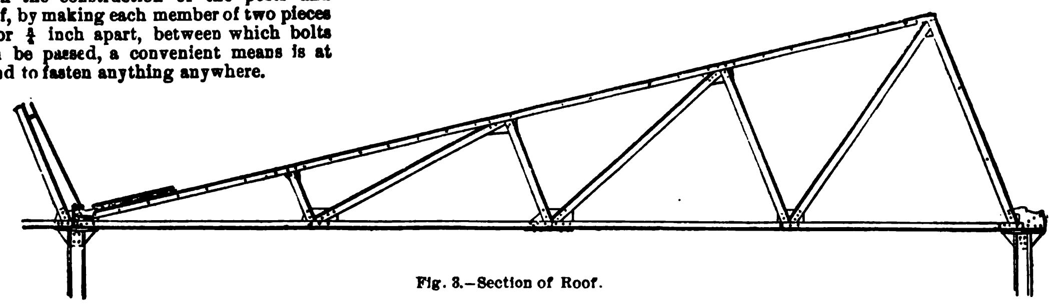


Fig. 3.—Section of Roof.

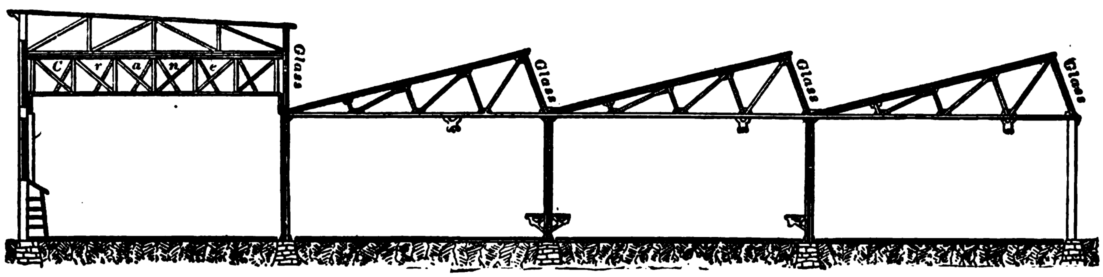


Fig. 4—Cross Section, Looking West.

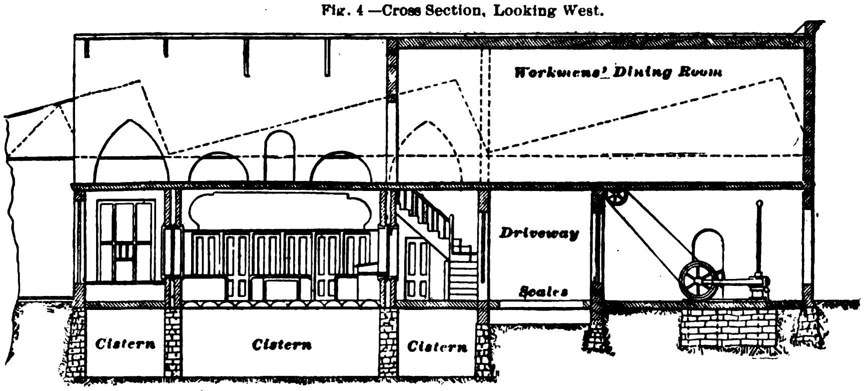


Fig. 5.—Section through Office and Engine Room.

"*Weaving-Shed*" *Design for Shop Construction.*

In the works mentioned the main office is a fire-proof vault in effect. Drawings, books and valuable papers are thus protected by simply closing the fire-proof doors, which are self closing, in case of fire, if neglected. For small works this is better than a separate building, as it concentrates the supervision. Low partitions, or simply a railing, separate the pattern shop from testing floor and main shop, instead of closed rooms, with a great advantage. It leaves the whole place subject to observation, and the men work nearer ten hours a day when paid for ten hours, and are just as happy at night as if two hours out of the ten had been spent in visiting.

WHAT BUILDERS ARE DOING.

REPORTS from builders throughout the country have been very meager during the past month, and such reports as have been received show that the financial stringency has seriously affected the building interests generally. Localities which have been most affected are those in which operations for the season were delayed, or in which business was quiet at the beginning of the year. In cities where large contracts were begun early in the season the bad effect has been least apparent, for in the majority of such cases these contracts have been sufficient to keep a fair percentage of the contractors and workmen employed. The remainder of the season will probably prove to be the most unfavorable part of the present financial depression, so far as builders and their employees are concerned. Already the number of men out of employment is very large, and the withdrawal of many large contracts from the market will cause the last end of the season to be more quiet than it has been during the past few months. The money market is becoming easier, and the prospect of continued financial depression is growing steadily less. General business is becoming more active, and confidence is stronger than it was a month ago. The large cotton, woolen and iron factories are starting up again, and the renewal of general business activity is likely to affect the building trades, although the present is a bad season of the year for the commencement of much new work. From such indications as are apparent, the depression has been felt by the builders about equally all over the country, there being apparently no locality that has not been affected to a greater or less degree. In the majority of the cities the workmen have maintained the regular wage scales and have done all in their power to urge municipal authorities to provide all possible employment for mechanics. In some of the larger cities the improvement in the money market is expected to work immediate benefit to the building trades.

Boston, Mass.

The majority of the contractors in Boston are busy, in spite of the effect of the condition of the money market. A large amount of work was undertaken in the spring, when the financial interests were more nearly normal, and practically none of it has been abandoned. A large amount of jobbing and alterations has been in the market, and the building trades of the city have felt but little comparative effect from the unusual condition of affairs. A number of large operations which were projected during the summer have been withdrawn from the market, but there has been sufficient work, which was begun last year or early in the season, to keep the majority of the builders and their men busy. The Master Builders' Association is at work making preparations for entertaining the delegates to the eighth annual convention of the National Association of Builders; the general committee having been appointed and a formal beginning made upon the work necessary to insure the success of the meeting.

Buffalo, N. Y.

The Buffalo builders have felt no serious effect from the money stringency as yet, and the amount of work projected at the beginning of the season has been ample to occupy the majority of the contractors throughout the season. For the past month but little new work has been let, and appearances indicate that the fall and winter will be quiet. The workmen have felt the effect of the panic only in a remote degree, as about the usual number have been employed, and there has been no change in wages since the beginning of the year. The annual outing of the Builders' Exchange, which occurred recently, was, in every respect, a most enjoyable affair. The programme included a trip down the river on the steamer "Matt Wagner" and consort. A fine lunch was spread on the trip, to which the members and their guests did full justice. At Navy Island, where the afternoon was spent, a chowder was served, and baseball, football, and other athletic sports were in order. The members entered heartily into the spirit of the occasion, and all seemed to thoroughly enjoy themselves.

Chicago, Ill.

The amount of building in Chicago has fallen off to such a degree from that which was being carried on early in the season that the number of workmen out of employment is so great as to cause serious concern for the future. It is estimated that more than one half of the carpenters of the city are now idle, and the result of this condition is that wages have fallen off to such an extent that it is stated that certain carpenters are working for as low as 15 cents per hour. It is impossible to determine the exact situation, as the Carpenters' Union has been making strenuous efforts to keep the wages up to the full scale, and where lower wages have been accepted the cases are isolated and of minor importance.

Strenuous efforts are being made by workmen in all branches of the building trades to secure employment and to prevent being reduced to actual want. It is predicted that the present oppressed condition of both labor and material will result in increased building operations, it being expected that capital will take advantage of the cheapness of both to prosecute such enterprises as were projected before the present stringency began.

Detroit, Mich.

The building business is generally quiet in Detroit at present, and the builders attribute lack of work to the condition of the money market throughout the country. Many buildings which were contemplated have been withdrawn from the market, and others which had been already started early in the season have been temporarily abandoned and further work postponed until things are easier. There has been no material change in the prices of builders' supplies, and there has been no change in wages or hours of labor. This is readily accounted for by the fact that there has been comparatively little market for either. The prospect at present is much more promising than it has been for some time past, and indications seem to warrant the feeling that increased activity may be expected this fall. In any event there is no question but that the normal condition of affairs will be resumed in the spring.

Indianapolis, Ind.

Reports from Indianapolis show that the building interests have suffered materially on account of the money stringency. Some of the leading contractors, however, have done fully as much work this year, up to the present time, as was done during the same period last year. The total amount of building throughout the city and vicinity, as near as can be ascertained, is about 25 per cent. below the amount done in 1892. At the present time there is no indication that the condition will change for the better this season. There are comparatively few new contracts to be let this fall. It is estimated that there are 40 per cent. of the men in the different building trades out of employment; and while there has been no reduction in wages, there is a feeling among the contractors that should wages be reduced, parties who contemplate building might be encouraged to take advantage of the situation, and thus give employment to a large number of men who would otherwise be out of work. All visitors to the Grand Army encampment, estimated to have been 250,000, were cordially received, and so far as their treatment at the hands of the citizens was concerned, they could observe no indication that Indianapolis had ever heard of a tight money market.

Lowell, Mass.

The strike of bricklayers is still unsettled and the workmen still declare that they will not yield and that the majority of their members are now at work. The effect of the financial stringency upon the building interests in Lowell is difficult to determine on account of the effect the strike has had upon everything connected with building. At present the majority of the contractors are busy; but there are no large contracts in the market, and no prospect of any being projected in the near future. The effect of the strike has been such as to prevent new undertakings in the building business, and unless a feeling of greater security is established at once the building interests of Lowell will be seriously affected for the balance of the year.

The Master Builders' Exchange has been put to the necessity of enforcing its rules and regulations with relation to the employment of union men. An agreement was made early in the season, before the strike of the bricklayers was begun, to employ none but non-union men, and a certain member has been brought before the organization on charges, accused of breaking the spirit if not the letter of this agreement. A hearing was given the member in question and the case discussed at considerable length. The charges, however, were not specificially sustained, although the general impression among the members was that the rules had been infringed upon. There is a manifest necessity for a rigid enforcement of all rules adopted by an exchange, in order that they may represent something more than mere sentiment, and such examples as this should be followed by every organization within which such contingencies arise.

Milwaukee, Wis.

The effect of the financial crisis has been more or less severe upon the building interests of Milwaukee. All classes of business have suffered to a greater or less degree, and the builders among the number. The condition of the banks has been such as to place the money market of the city in an exceedingly precarious condition, the result of which has been to practically stagnate all business operations which require the investment of any considerable sum of money; building, therefore, has been seriously affected. Money that could be used for constructive purposes and the payment of wages to skilled labor is tied up in suspended banks. The city's money is practically in the same condition and the result is that a large percentage of mechanics and laborers in the city and neighborhood are idle. Several large municipal contracts are at a standstill owing to the condition of the funds at the disposal of the city. Contracting masons are paying from 35 to 40 cents per hour for skilled labor, where wages formerly paid were from 40 to 50 cents an hour. Common labor is paid from 18 to 20 cents per hour, where formerly wages were from 22 to 25 cents. The prospect at present is rather for further decrease than for an increase in the near future. This same condition practically exists throughout all branches of the building business and may be summed up as a reduction of from 10 to 20 per cent. in wages and half-time work.

Philadelphia, Pa.

The effect of the present stringency has made itself apparent in the building interests of Philadelphia in an appreciable falling off in the volume of business as compared with that of previous years. Builders find considerable difficulty in making collections. The opinion is expressed by some of the members of the fraternity that the building interests have not as yet felt the full effect of the stringency, because sufficient work was projected at the beginning of the season to carry most of the contractors through the year. It would be impossible to estimate the amount of work that has been effected by the present condition of the money market. So far as can be observed the number of men employed and wages paid has not been affected to any great extent, though it is anticipated that there will be a falling off later in the season in the number of men employed. Wages will, in all probability, remain undisturbed.

Providence, R. I.

Reports from Providence show that the builders have not been seriously affected, and that about the ordinary volume of work has prevailed throughout the season. All work under contract has moved along without stoppage or delay, although the effect of the stringency has been apparent in the difficulty the contractors have experienced in obtaining sufficient currency with which to pay their workmen. A few contracts have been withdrawn from the market; but, as compared with the whole volume of business, they are of slight importance. The wages of masons have been slightly reduced; but all other mechanics are working at the old wage scale, and there is no indication that it will be changed. At the present time, so far as can be determined from appearances, the building business is in a normal condition and contractors are all busy. Several large contracts are now in prospect and a fair business for the fall months is expected.

Rochester, N. Y.

In spite of the stringency in the money market the volume of work being carried on by the builders of Rochester is about up to the mark. The buildings under construction are so varied in their nature, including brick and stone business structures, residences, &c., that most of the workmen in all branches of the trade are furnished employment. Reports from the Builders' Exchange show that organization to be in a good condition and the majority of the members busy.

San Francisco, Cal.

At a special meeting of the Builders' Exchange of San Francisco the limit of membership was increased from 200 to 300. Fifty new members were elected, making the present membership 213, with 22 applicants under consideration. The Builders' Association has amalgamated with the exchange and will close its quarters at 17 City Hall avenue. The 90 members of the association will join the exchange, but the former organization will preserve its identity. This is a move which is bound to result in great benefit to the building interests of the city. While these two organizations have always been in harmony, the division of interest and action has tended to limit the unity which is so necessary to the establishment of the purposes of an exchange. This action is bound to result to the benefit of the whole fraternity,

St. Louis, Mo.

The flattering prospects of the early season, for the St. Louis builders, have not been fulfilled. During the past few months the effect of the financial condition of the country has been depressing upon the building business of the city. Work on many of the buildings in course of construction has been stopped, and few new ones begun. Money has been exceedingly tight, and contractors have found considerable difficulty in securing sufficient currency for their needs. At the present time the prospect is a little brighter, but it is not expected that the total of business which will be undertaken this fall will be up to the usual amount. It is estimated that about one-third of the usual number of men employed at this season are now at work, although wages have remained practically undisturbed. It is reported from the Builders' Exchange that the majority of the members have been busy throughout the year, and very few have been seriously embarrassed by the financial stringency. The builders are looking forward to next year as a prosperous one, and if the amount of work now projected is carried out they will not be disappointed.

The excursion—which was planned by the Builders' Exchange to take place while the last issue of this journal was in the hands of the printers—proved to be a huge, unqualified success. The members and their friends spent the day on the river, on the steamer "Grand Republic," which is one of the largest and most palatial craft that has ever been built for river service, and which has figured in the history and romance of the Mississippi, and every one was loud in praise of the management of the affair from beginning to end. Several stops were made and athletic sports were engaged in. A banquet was served and music and dancing were in order on board the steamer. The members of the exchange were lavish in their provisions for entertainment and a large number of guests were present. The occasion was a memorable one in many respects, and the exchange is to be congratulated upon its successful handling of so large an affair.

St. Paul, Minn.

The building business in St. Paul is very quiet. At present very few large operations are being carried on, and it has been estimated that not more than 25 per cent. of the usual amount of work is being done. The total amount of work in the market is insufficient to supply all the contractors, and the result is that many are at present engaged in jobbing and repair work who were formerly in the habit of doing general contracting only. Builders have suffered equally with those in other branches of business in securing ready money with which to carry on operations, and the condition among the banks has added to the difficulty of carrying on building. The effect of the quietness in the building trades has forced workmen to seek employment from farmers, and the harvest fields are full of workmen who belong in the building trades. The condition is a more or less serious one owing to the large number out of employment, hence without income, and this condition is so widespread that the effect is felt to some degree in every avenue of trade. The builders are hoping that business will pick up a little before winter, but the season seems to be too far advanced for a general revival of trade this fall. The rate of wages has remained undisturbed and prices of materials have not changed.

Notes.

The Builders and Traders' Exchange of Duluth is making strenuous efforts to secure employment for the workmen in the building trades. A series of resolutions have been addressed to the School Board asking that body to continue the work of erecting certain proposed new school buildings, both as a matter of economy and as a means of giving employment to workmen in the building trades.

It was reported in a daily paper that the Builders' Exchange of Cincinnati has had the pleasant experience of being robbed of $1700. It is stated that the thief stepped up to the safe while the members were seeking to discover who he was, helped himself to the package containing the money, and made his escape.

The Builders' Exchange of Springfield has resumed its regular meetings, and in future its members will meet every two weeks. Applications for membership continue to be presented, and the exchange is in good financial condition.

The bricklayers of Houston, Texas, have been having trouble with their employers because of an alleged attempt on the part of the contractors to compel the workmen to work ten hours at a nine-hour scale. Employers and workmen held a meeting to consider the matter, which resulted in work being resumed under the old conditions. The utmost moderation marked the movements of the men in all their relations with the employers, and it is stated that not a harsh word was heard on either side.

Ventilated Roofs and Floors.

A late number of one of our foreign exchanges says that W. B. Gwyther of the Indian Public Works Department has devised a new form of ventilated roofing and floors suitable for tropical climates. The object of the invention is not only to prevent the penetration of heat through the roof or damp through the floors, but also to provide a means of carrying away heated and vitiated air from inside. The method consists in the use of hollow tubes of earthenware; in the case of flat terraced roofs these are employed as a substitute for ordinary flat tiles which support the roof concrete. The tubes are laid closely side by side, and where they meet, end to end, a cross flue to secure more perfect ventilation is formed by the use of half pipes. The ends of these flues, when feasible, should be provided with iron gratings for the ingress and egress of air; the ends of the hollow tubes where they rest on the wall should open into a longitudinal flue made in the wall. Where lateral openings or gratings cannot be arranged vertical openings through the roof, covered with bent pipes, may be resorted to as an alternative. To draw away the vitiated air from below, perforations in the under side of the tube have been devised. The efficacy of these openings in removing air from the upper part of the rooms rests on the fact that heated air moves upward, and, after passing through the small apertures, will be carried off through the tubes and cross flues, within which a movement of air will always be going on. In the case of floors the prevention of damp can be effected very thoroughly by the doubly ventilated space. The system is being used in the New School of Art building, in Chowringhee, Calcutta, where, it is hoped, some records will be taken next hot weather to show the effect of this special construction.

Construction of Office Buildings.

In the construction of mercantile buildings, particularly those for retail trade, it is the interest of the public, not of the merchants, which should be considered, says the *American Architect and Building News*. The merchant's interest often is to put up the cheapest possible building that will hold his goods, insure everything heavily, get in as many customers as can be squeezed into the space, and wash his hands of all responsibility for their safety. The interest of the public, on the other hand—an interest, moreover, which, as the records of the Department of Buildings testify, has to be defended by imperious orders and constant vigilance—is to be enabled, so far as the law provides, to transact its business in the more popular and attractive stores with reasonable safety. It must be confessed that the law provides very little protection, and at present the breaking out of a fire in many of the most frequented stores in any of our principal cities would mean inevitable death or mutilation to a very large number of people, so that it seems to us that the protests of merchants on such topics have little claim to be regarded. There is no reason why people who derive incomes of many hundred thousand dollars a year from retail trade should not be compelled to make sure that their customers can, in case of accident, get out of their stores alive. If a large, unbroken floor area is necessary to their sort of business, they may have it without limit, under the present law, by building with incombustible materials; and if they prefer to build with combustible materials and put the money so saved into their own pockets, there should be no hesitation in compelling them to do so in accordance with the well-known rules of reasonable protection against fire.

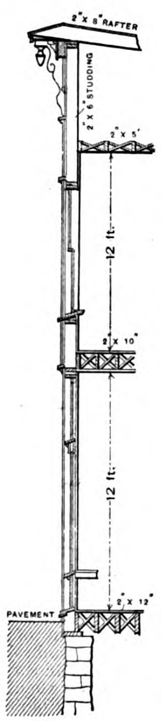
An old fire place which was built in the west wall of the restored apse of Trinity College Church in Jeffrey street, Edinburgh, on its re-erection in 1877, has a curious history, says one of the London journals. In digging out the foundations of the church the workmen came upon two carved capitals of an old fire place, evidently belonging to an old princely mansion situated in or near Chamber's Close, and the architect ordered these pillars to be built in the west wall of the apse as the jambs or pillars of the fire place erected there. It has now been ascertained that these stone pillars were part of the fire place of one of the leading apartments in an old mansion which formerly existed in this close, which bore the name of John Hope cut over the doorway of the turnpike stair, with a coat of arms below. This house is supposed to have been the mansion of John de Hope, the founder of the noble family of Hopetoun, who came from France in the retinue of Magdalen de Valois.

Design for a Store Front.

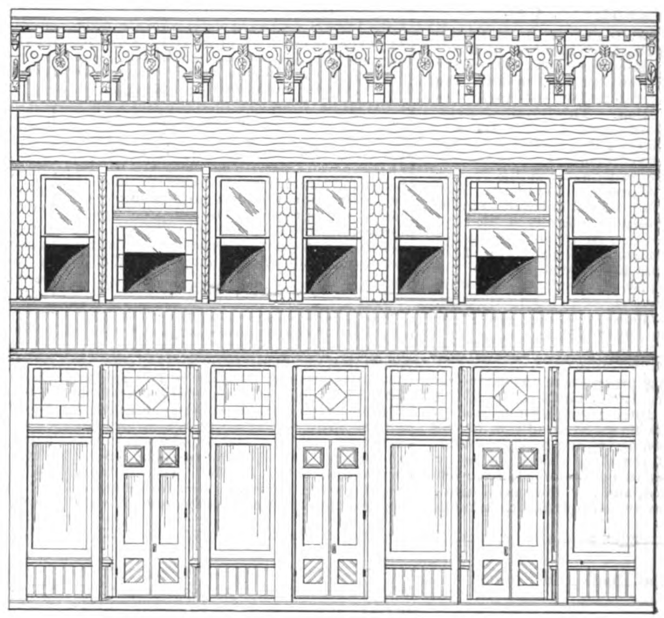
The design which we present herewith covers the front of a two-story building intended to be constructed of wood throughout except for a strip of sheet aluminum running along that portion which extends below the grade line and the stamped zinc ornaments used on the cornice. The author of the design is Alva Cole of Royalton, Ohio, and in his specification he states that the frame is to be built of 2 x 6 inch pieces, spiked together with 4-inch nails in the style known as balloon frame. At the sides of the storeroom entrance are to be angular solid posts, as indicated in the details. The beaded ceiling is to be ⅞ inch thick, dressed on both sides, and the shingles are to be of red cedar, dimension size, with octagon base The wavy siding just below the cornice is to be cut from the ordinary style of ½-inch beveled clapboards. The floors in the recessed entrance are to slope outward, with a fall of 1 inch between the doors and the sidewalk line. All doors and sash of the first story are to be 1¾ inches thick, fitted in frames made of 1¾-inch dressed lumber. The second-story window frames are to have jambs 1¼ inches thick. All sash are to be 1⅜ inches except the lower sash in each of the two landscape windows, which are to be 1¾ inches thick. The transom and marginal sash are to be glazed with muffled or Venetian glass of assorted colors. Each door is to be hung on three loose-pin butts 4½ x 4½. The entire store front is to be painted three coats with white lead and linseed oil, trimmed throughout in three colors. The author states that the front can be executed in his section of the country for about $200.

Filling for Joints in Shrunken Floors.

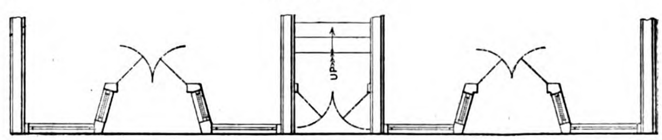
A correspondent in one of the London trade journals communicates a reply to an inquiry which appeared in its columns with regard to the manner of filling joints of a shrunken floor, which the owner would not allow to be taken up and relaid, and to which there was objection to "slipping" with glued wood strips. The correspondent states that some years ago under similar circumstances he made use of the following plan: He thoroughly soaked newspapers in a paste made of 1 pound of flour, 3 quarts of water and a tablespoonful of alum, thoroughly boiled and mixed. The final mixture was about as thick as putty and hardened like *papier-maché*. He also added to small quantities of the paper putty, as it was used, a little plaster of paris. He suggests, as another plan for the purpose, to veneer the floor with batten widths cut ¼ or $\frac{3}{16}$ inch in thickness and well seasoned and dried.



Section.



Front Elevation.



Plan View.

Design for a Store Front.—Alva Cole, Architect, Royalton, Ohio.—Scale, ⅛ Inch to the Foot.

NEW PUBLICATIONS.

How to Frame a House; or, Balloon and Roof Framing. By Owen B. Maginnis. Over 30 pages of letterpress; illustrated with numerous engravings. Bound in paper covers. Published by the author. Price, $1.

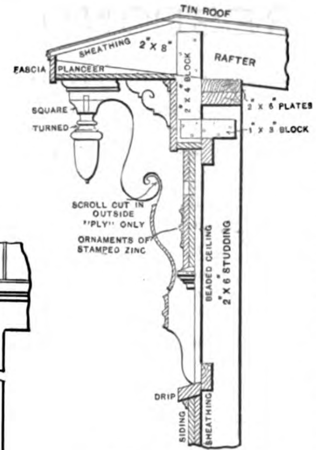
The above treatise is by an author who has contributed several works on subjects of interest to carpenters and builders, and is also more or less familiar to the readers of this journal through articles by him which have appeared from time to time in its columns. "How to Frame a House" is, as its title indicates, a treatise on the methods of laying out framing and raising timber houses on the balloon principle, together with a complete and easily comprehended system of roof framing. The first part is divided into six chapters, the first five of which tell how to get out the timber for the various parts, while the sixth describes the manner of raising the frame. The second part is also divided into six chapters, the first referring to simple roofs, the second to hip and valley roofs, the third to roofs of irregular plan, the fourth to pyramidal roofs, the fifth to hexagonal roofs, while the last relates to conical or circular roofs.

Turkish Wooden Houses.

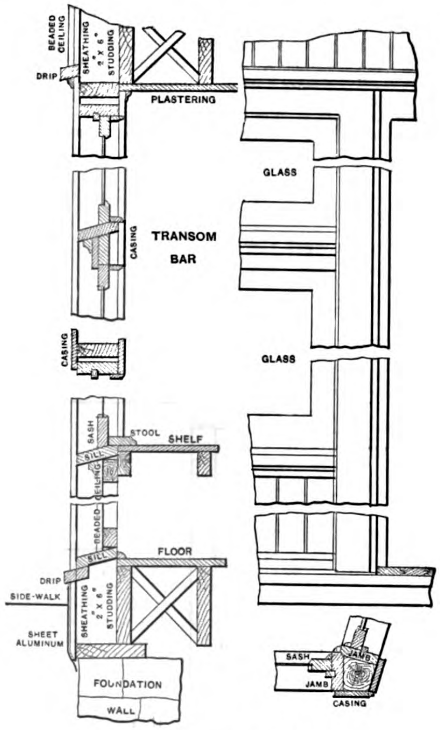
The houses in Constantinople are commonly of wood, writes a correspondent of the *Illustrated Carpenter and Builder*. The best of them, of ample dimensions, gaily painted, are pleasing to the eye, and all of them, however poor, are, from their form, invariably picturesque. Even the most splendid of the palaces of the Sultan is of the same destructible material. The preference is given to wood by the Turks not on account of economy, but from the persuasion that it is more wholesome than stone, and also, it is said, from a feeling of humility, it being considered by them presumptuous to dwell in buildings like their mosques, made, as it were, for eternity, and keeping no measure with the frailty of the occupants.

The idea of the unwholesomeness of stone buildings is not, perhaps, without foundation in such a climate. The stone houses in Galata, built by the Genoese, with walls of extraordinary thickness, are of bad repute. Unless the rooms are kept warm in winter they must be damp in the spring and early summer; so long as the walls are cold on the occurrence of a southerly wind they will act as refrigerators and occasion a precipitation of moisture from the humid warm air.

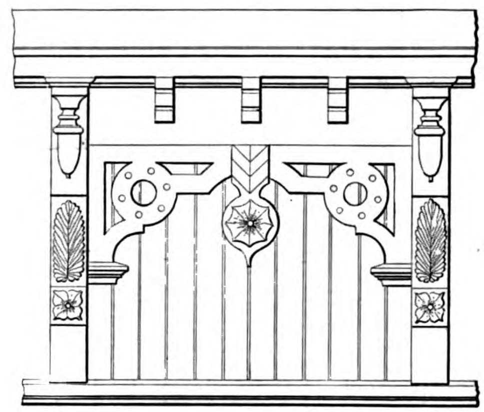
The thin walls of wood, on the contrary, conform more to the temperature of the atmosphere. None of the sitting rooms of the houses have fixed fire places or chimneys; they are heated in winter chiefly by a charcoal fire contained in the open mangal. The mode of warming the rooms is also suitable to the manner in which they are constructed. The crevices in the wooden work allow of a certain admixture of common air and escape of carbonic acid gas sufficient to prevent any dangerous accumulation of the gas, so that the rooms are easily warmed and kept warm and dry without risk of life. Were the doors and windows of a Turkish room suddenly made air tight and the fissures in the wood work closed, there being no chimneys to give vent to the fixed air, half the population of Constantinople might be suffocated any winter night between the hours of sunset and sunrise.



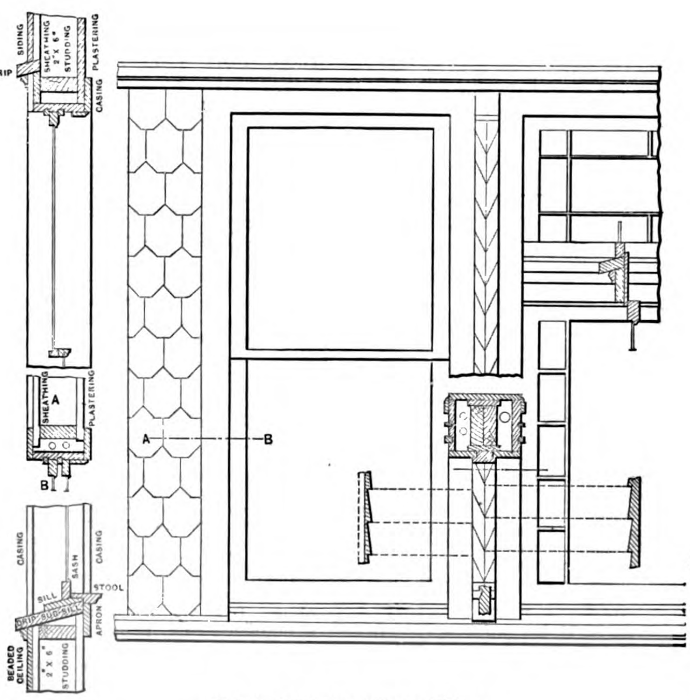
Details of Main Cornice.



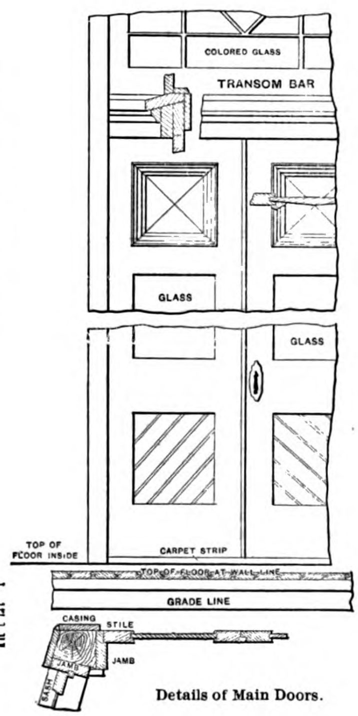
Details of Windows at First Story.



Partial Elevation of Main Cornice.



Details of Windows at Second Story.



Details of Main Doors.

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

CORRESPONDENCE.

Plan of Roof.

From M. E. G., *St. Anthony, Idaho.*—Will some of the readers of *Carpentry and Building* give me a plan of a roof for a store building 30 x 50 feet, with flat tin roof sloping to the rear? The roof is to be without support in the center, as the upper floor is to be used for a dancing hall.

Cellar Construction.

From W. C. W., *Buffalo, N. Y.*—I read with interest the article in the December number on the construction of a cellar by F. T. Camp. In the sketches sent herewith I have what I consider a few additions and improvements to suggest. Fig. 1 shows a footing course of stone in order to insure a solid foundation, and also a brick veneer finish above the grade with water table. In Figs. 2 and 3 is illustrated the method of reducing the size and sweep of the water table if objectionable by framing joists 3 inches beyond the face of the plate. The studding are framed in and securely spiked to the joist.

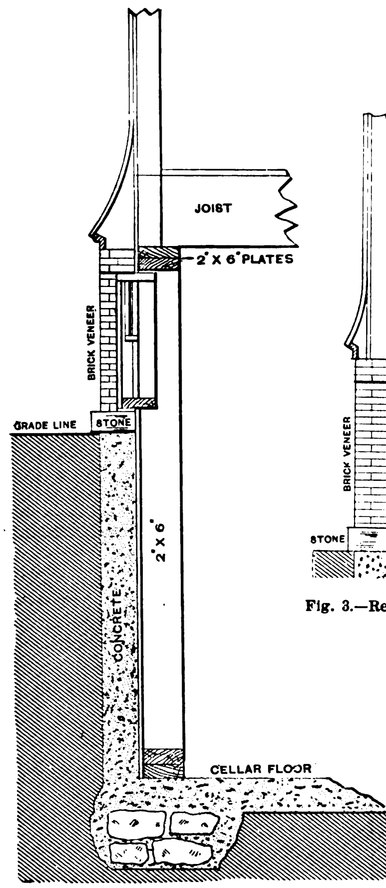


Fig. 1.—Section Showing Stone Footing Course, and Brick Veneer Finish above Grade Line.—Scale, ½ Inch to the Foot.

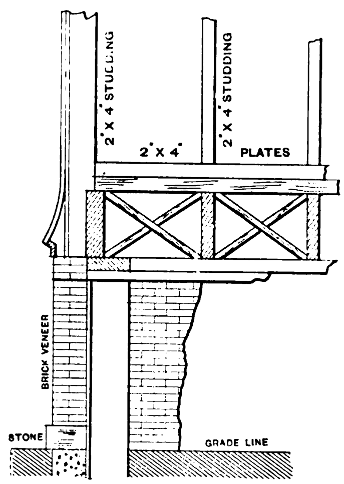


Fig. 3.—Rear View of Fig. 2.—Scale, ½ Inch to the Foot.

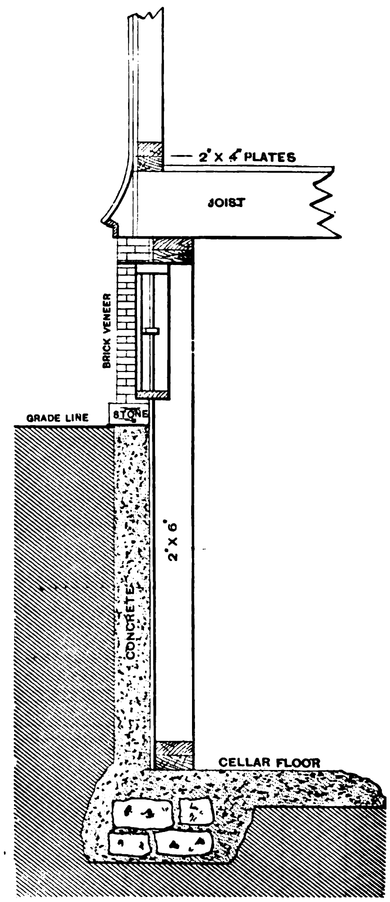


Fig. 2.—Section, showing how Size and Sweep of Water Table may be Reduced.—Scale, ½ Inch to the Foot.

Method of Cellar Construction Suggested by "W. C. W.," Buffalo, N. Y.

Taking the Wind out of Timber.

From A. B. L., *Arcadia, Wis.*—I have been a reader of *Carpentry and Building* for some time and consider it an excellent journal. I have failed, so far, to contribute anything to its columns, but will now make an attempt. In answer to "H. P. F.," Lapel, Ind., whose inquiry was published in the May issue, I give my method of taking wind out of timber before laying off. I first select the two best sides of my timber for the working sides and then draw a pencil mark square across, a few inches from each end. I place a square at each end on one of the marks, letting the tongues hang down as a plumb to keep the blades on edge. If the blades are parallel with each other then the timber is all right and out of wind; if, on the other hand, they are not parallel, plane off one end or the other until they are parallel. Make the outside of the timber square with this one and it is ready to lay off. Draw a pencil mark square across at each end where it is planed off, and these will be what are known as the plumb spots.

From E. M. L., *Indiana, Pa.*—In reply to "H. P. F.," Lapel, Ind., who asked in the May number of the paper how to take the wind out of timber before laying out, permit me to offer the following: My plan is to take an iron-faced plane and with it make a stile groove across one end of the timber. In this groove, on edge, I lay the blade of the square; then go to the other end and cut a similar groove, in which place another square. By sighting over the top of one square it can be ascertained if it lines with the square at the opposite end. If it does, the timber is out of wind.

If it does not, it will be necessary to cut the groove deep enough at one side, so that the squares will line. The grooves, however, should be cut as shallow as possible. After the timber is out of wind, which is done on the face side, turn up the face edge and cut similar grooves until the squares fit. Then strike lines from which to work.

Roof Truss.

From J. C. W., *Pine Hill, Pa.*—As I have been a careful reader of *Carpentry and Building* and obtained a great deal of information from it, I send herewith a drawing of a roof trust, which may interest some of my brother chips. Last year I sent a drawing of a one-sided roof, about which I desired some information, and which was published in the June number of the paper. A correspondent who has replied to this inquiry, namely "J. A. G.," Nampa, Idaho, presents a plan which I like very well, although I think it would be rather expensive.

Shortly after my letter of inquiry appeared in the columns of *Carpentry and Building* I received a letter, no doubt from a subscriber of the paper, in which he sent me the sketch which I inclose. I like this very well, and think it will answer my purpose, especially as it is a cheap one. Now, why the correspondent did not send the drawing to *Carpentry and Building* so that the other readers might see it

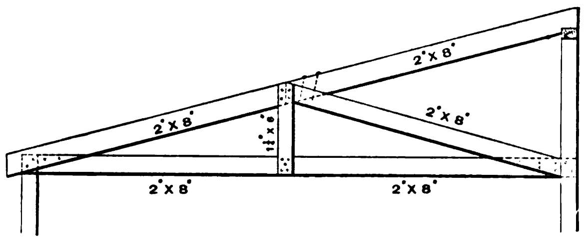


Diagram of Roof Truss Contributed by " J. C. W."

I am at a loss to understand. The letter comes to me addressed " J. C. W." I am at a loss to know where to address him, as he signs only his name, omitting post office, county and State. I desire, however, to thank the correspondent through the columns of the paper for his trouble. The only reason I can see why he sent the matter to me instead of to the paper is because of the fact that some of the correspondents seem to jump on one another whenever they see a good opportunity. Now, I desire to say that, in my estimation, this is very wrong. We are not all college graduates, but people doing work as best we can and as the locality and material will permit. It is perfectly right to let our brother chips know of these things, but it seems to me that some people want to show their smartness, and this, I think, keeps back many would-be correspondents. If we see something that can be bettered we can always bring it out in such shape as not to scare off others. I notice occasionally a correspondent starts out something in this style: " As I have not seen any one giving an answer to so and so, &c." I think this looks as if some one else should start off and then we would jump on him. We should all try to be first to answer a question, if we know how. If not, we should not interfere with those who do try.

Note.—The suggestion of our correspondent is a good one, and we trust all our practical readers will try and be first in answering such inquiries as may be presented in the correspondence department, and in which they, as well as many others, are likely to find interest and value. We hope no one will be discouraged from writing through fear of friendly criticism of methods of doing work which may be advocated, but that all will see the wisdom of contributing as many letters on topics of trade interest as their time and opportunity will permit.

Notching Hip and Valley Rafters.

From L. L. H., *Sullivan, Ind.*—Replying to " E. G. W.," Elgin, Ill., I send the inclosed sketch, Fig. 1, which I trust is sufficiently plain to need very little explanation. The rock on which the correspondent goes to pieces is the very common one of supposing the top of the plate to be the base of the rafter. The base of the rafter is a horizontal line through the intersection of the plumb line of the wall and the pitch line of the top of the rafters, both common and principal. The notch for the plate may be readily located on all rafters by measuring down any given distance, taking care to measure plumb with the wall on the common and principal rafters alike from the side intersection of plumb and pitch lines. Referring to the sketch, the dotted lines x and y, drawn on the bottom projection of the common rafter horizontally through the same part of the principal rafter, will locate the bottom cut of the projecting portion of the principal rafter. With kind wishes for *Carpentry and Building*, which, in my opinion, has done more in the past ten or dozen years to abolish the rule of the thumb and cut-and-try rules than all other papers combined.

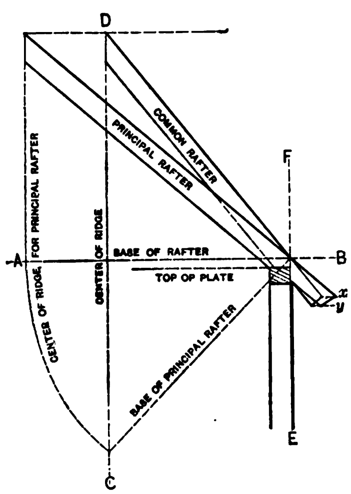
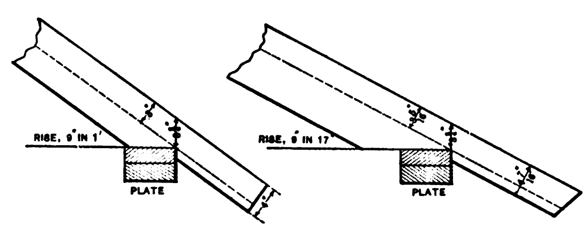


Fig. 1.—Diagram Submitted by " L L. H."



Figs. 2 and 3.—Sketches Accompanying Letter from " A. L. N."

Notching Hip and Valley Rafters—Diagrams Showing Methods of Various Correspondents.

From A. L. N., *Paterson, N. J.*—In the March issue of *Carpentry and Building* " E. G. W.," Elgin, Ill., asks how deep to cut the notch in a hip or valley rafter so it will line with the common rafter for the roof boards. I send herewith a sketch which I think will explain the matter. The drawing is for a roof of 9 inches rise, both pitches the same, but it makes no difference what the pitch of the roof is. The distance measured plumb from the level cut to the center of the face of the hip or valley must be the same as the distance measured plumb from the level cut to the face of the common rafter. This is shown in Figs. 2 and 3, which are very simple and need no further explanation.

Note.—We also have an answer of a similar nature from " S. McC.," Price's Branch, Mo.

Proportioning Hot-Air Pipes to Indirect Surface.

From D. M., *Bridgeport, Conn.*—Having occasion to bid on an indirect hot-water heating plant, which I lost, I give my experience in trying to find a rule for determining the size of flues to carry the warm air from the box coils to the registers. I went to two large cities where numerous manufacturers of hot-water apparatus had salesrooms, and I stopped in not less than 80 different places asking, after a preliminary chat, the question: " How many square inches of flue area should be allowed for each square foot of indirect hot-water surface?" As a result of my many queries I should adopt 1⅓ square inches of flue area for every foot of heating surface. If there were 50 square feet of heating surface I would make the flue 6 x 13 inches, or, if possible, 10 inches in diameter. The general idea for the cold-air supply was to make it 25 per cent. less in area than the heating flue. By some who answered my question I was told that ⅓ inch was enough, others said ⅔, more said 1 inch, but the more experienced and reliable agreed on 1¼ and 1⅓ square inches, and I have since seen several jobs working very nicely on the 1⅓ inch basis, so I would not use a smaller proportion. I found a great many who did not favor indirect hot water for the entire job and were opposed to it on the first floor. They favored the fresh air which indirect heating furnished, and the use of some direct surface in the same rooms, but said that the great majority either could not stand the extra cost or simply would not.

Preventing Tin Roofs from Rusting.

From A. & N., *Waterloo, N. Y.*—What is the best thing to do to prevent tin roofs from rusting on the under side? We are aware that painting the tin before it is laid is considered a good preventive, but is there not a better and more effectual way? Is it a good plan to lay sheathing that is impervious to moisture under tin?

Answer.—It must be evident that the rusting of tin roofs on the under side is caused by the moisture from below condensing on the under side of the tin. This condensation is liable to take place when the warm air below is charged with moisture and the external air is at a low temperature. By painting the under side of the tin it is protected from the moisture, providing the entire surface of the tin is covered with paint. By placing a water-proof paper between the roof boards and tin, it is probable that much of the moisture will be prevented from reaching the tin. Another method that might be suggested, and one that has been found effectual under various conditions, is to ventilate the space between ceiling and roof, thus allowing the moisture to escape.

Arrangement of a Hennery.

From F. A., *Topeka, Kan.*—In reply to "R. R.," Wheeling, W. Va., I send an end elevation, Fig. 1, and a floor plan, Fig. 2, of a hennery, the arrangement of which may prove interesting. It is 36 x 72 feet in size and contains seven rooms, as may be seen from an inspection of the floor plan represented in Fig. 2. No. 1 is intended for feed and incubators; No. 2 for young chickens, which, at the expiration of two weeks may be removed to No. 3 and from there to No. 4. By the time they are old enough to leave the latter room they are ready for the market. No. 5 represents the nest house, No. 6 the roosting house and No. 7 is intended for breaking up setters. The house is so constructed that it may be readily cleaned and all fowls watered and fed without going out of doors.

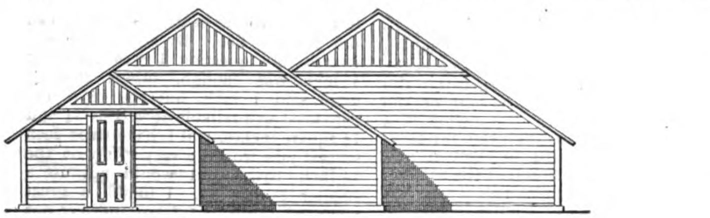


Fig. 1.—Front or End Elevation.

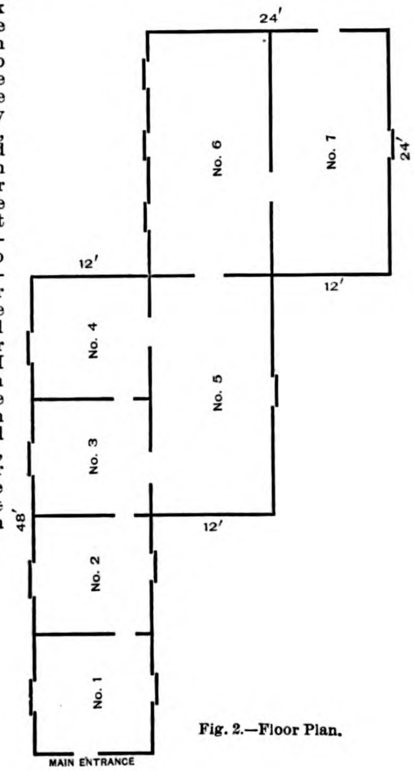


Fig. 2.—Floor Plan.

Arrangement of a Hennery Recommended by "F. A."

The partitions between Nos. 2 and 3 and 3 and 4 are of 2-inch mesh wire. All other partitions are of ⅞ inch stock boards. The walls are 5 feet high, sheeted, papered and sided. In Nos. 1, 2, 3 and 4 there is a floor. The roof of the building is shingle.

Area of a Circular or Elliptical Roof.

From D. L. W., *Madalin, N. Y.*—How is the area of a roof to be obtained that is either circular or elliptical in shape?

Answer—The area of a circle can be obtained by the use of any of the following rules:

Multiply the circumference by one-half the radius; or, by one-fourth the diameter.

Square the circumference (that is, multiply the circumference by itself), and divide by 12.56.

To obtain the circumference, use any of the following rules:

Multiply the diameter by 22 and divide by 7.

Or, multiply the diameter by 3.1416.

To obtain the area of a circle from the diameter, square the diameter and multiply by the decimal 0.7854.

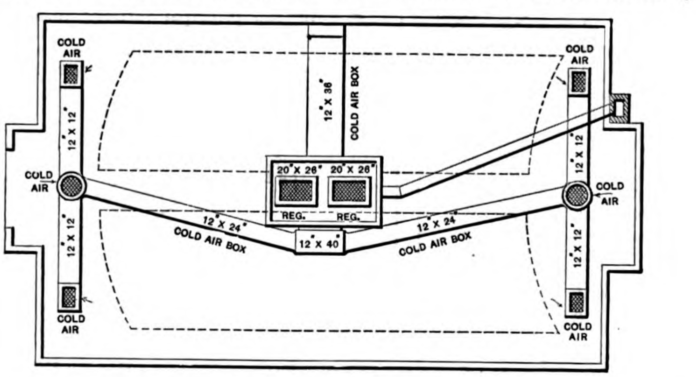
To obtain the area of a circle from the radius, square the radius and multiply by 3.1416.

To obtain the area of an ellipse, multiply the product of the two diameters by the decimal 0.7854. Thus, supposing an elliptical roof to measure 5 x 8 feet, the operation would be performed as follows: $5 \times 8 = 40$, and $40 \times 0.7854 = 31.416$, or $31\frac{1}{2}$ square feet in the roof.

Warming a Church.

From E. E. DUNNING, *Milwaukee, Wis.*—I was somewhat interested in the letter and plan from "W. D." of Oxford, N. S., published in the June issue of the paper, in relation to a furnace that had been set up in a church, which did not work satisfactorily, and how to remedy the difficulty, also the answer, and as I am sure that there is a much better way to arrange this furnace for heating the building, I will give you my ideas of the matter. In the first place, it is necessary that the furnace should have a good draft, as no furnace can work without a good chimney. If the chimney is large enough and not too large (about 8 x 16 is best for this size of wood furnace), and of the same size from top to bottom, without any openings, and up as high as the highest point of the building, there will be no trouble with the draft, although a chimney on the inside of the building is better than one on the outside, for if it is on the outside it is subject to more cold and will take longer to warm up. Taking it for granted that the chimney is all right, I should remove the tin hot-air pipes from the building and place in the center aisle directly over the furnace, as shown in plan, two 20 x 26 warm-air registers and borders, with an opening of the same size, made of brick, from the hot-air chamber up to the registers. I would then use the two warm-air registers in each end of the building for cold air, in connection with the present cold-air registers, by running a 12 x 12 box from each of these two registers into one box directly under the present cold-air registers and a 12 x 24 box along the ceiling from this point to from the outside, 12 x 36, constructed double, the same as circulating box, and with a tight-fitting damper near the outside opening, so that no air can come in from the outside when the air is being drawn from the church, and *vice versa*, as it is necessary that one of these dampers shall be closed when the other is open.

This method is not only much more effectual than the one recommended by



Warming a Church.—Plan View Showing the Registers Directly Over the Furnace.

the side of the furnace, making such a box from both ends of the building, and connect it in one 12 x 40 box, and run down to the cold-air chamber under the furnace.

In building a box of this kind it is necessary, in order to work successfully, that it be as near air tight as possible, and it should be built of dry matched fencing, double, with building paper between. There should be a damper in that portion of the box near the furnace, which damper should be as near air tight as possible when closed. Then build a cold-air box your answer, but has another qualification of being cheaper. As far as heating the church is concerned, this method I consider equal to any other, although, as far as perfect ventilation is concerned, better results would be obtained by building a new chimney about 4 feet square area inside, for the cold air, with a tile flue in the center for smoke, discharging the impure air into this ventilating flue. But as I am recommending a cure for a furnace instead of setting one in new, I have simply explained what is best to do under the circumstances.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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J. E. Shover............Indianapolis, Ind.

Notice to Secretaries.

The local secretaries are requested to begin formulating and preparing suggestions for consideration at the coming convention. Every need of the builders in their vicinity should be noted down and every custom which should be improved, as well as any plans for the benefit of the fraternity, should be forwarded to the National Secretary to be put in shape for presentation to the convention.

Revision of Constitution.

Secretaries of filial bodies are requested to forward to the National Secretary as soon as possible any and all suggestions which may facilitate the work of the Committee on Revision of the Constitution. It is desirable that all possible suggestions for the improvement of the constitution should be received by the committee, and it would be an advantageous plan to secure the expression from individual members if the local secretaries would issue a circular to their members requesting suggestions on this subject. It is important that this subject should be taken up at once in order that the committee may have ample time to act before the convention.

Hugh Sisson.

In the death of the late Hugh Sisson on August 31 at his home in Baltimore the builders of that city and of the country generally lost one of their most honored members. The National Association of Builders lost its first vice-president and the Builders' Exchange of Baltimore its president and one of the most active promoters of its welfare. Universal regret was expressed throughout the city of his home, by all who knew him, and suitable resolutions of respect to his memory and mourning his loss were passed by various organizations and corporations of which he was a member.

Rev. J. W. Duffey, who officiated at the last ceremonies, thus summarized the character of Mr. Sisson: "Though unostentatious and shrinking from notoriety, he was public spirited and enterprising. To no small extent, without designing to do so, he wove himself into the interests of the community. Manifestly he could have held more prominent places than he did, but he shrank from publicity. His chief study was to be honest and true and to do the fair thing between man and man. Although blessed with financial prosperity he never forgot the breadwinner. He was ever the friend of the poor, and the gentleness and tenderness of which he was the very embodiment came out most conspicuously in his home life."

AT A MEETING OF THE BUILDERS' EXCHANGE, HELD SEPTEMBER 1, THE FOLLOWING MEMORIAL AND RESOLUTIONS WERE ADOPTED :

Whereas, Our late president and fellow-member, Hugh Sisson, Sr., has passed from this sphere of usefulness to his well-earned reward, we desire to express the loss sustained by this exchange. No man ever lived a more honorable career in this community. His heart was generous and his hand ever ready to succor the needy. His wide experience made him a valued counselor to all who appealed to him.

Be it resolved, That we extend our sympathy to his family in their hour of affliction, and that the accompanying memorial be spread upon the records of this exchange and published in the daily papers, over the signatures of the president and secretary:

MEMORIAL.

We meet together to-night to perform a last sad duty. Our former friend and president of this exchange, Hugh Sisson, Sr., has been called from a career full of labor and well-merited success to the reward due a well-spent life. His personal qualities were such as to endear him to a wide circle of friends. No young man in business ever asked his help in vain. His boundless charity, unceasing energy, clearness of judgment and undaunted courage early made him prominent in business. No man ever lived through such a long business career with more unflinching honesty and a higher sense of honor. His word once pledged required no bond, and when success blessed effort it was with no stinted hand he shared his blessings.

We, who knew him well, cherish his memory and will ever keep it green.

As president of this exchange he never spared his time or money to make it a power in this community, and to his wise judgment much of its present usefulness may be attributed.

In his home life only those so placed as to meet him there could appreciate its beauty.

To his family in their bereavement we extend our sympathy and believe that, while he has withdrawn from their present life, he will ever dwell in their hearts. Their best heritage is the record of his fearless, honorable manliness.

NOBLE H. CREAGER, President.
BALTIMORE, September 1, 1893.

The National Association of Builders was represented at the obsequies by its president, Ira G. Hersey, and its secretary, William H. Sayward.

The Uniform Contract.

Indications from various sources point to the fact that the manner of adoption and recommendation of the use of the Uniform Contract by the American Institute of Architects and the National Association of Builders is not generally understood among either architects or builders. The architects are apparently the less well informed of the two, which is doubtless due to the fact that the use of the form has not been urged upon its members by the American Institute with the same persistence that has been displayed by the National Association of Builders.

A recent example of the lack of comprehension of the situation is indicated by the opinion of an architect practicing in a prominent New England city, who questioned the authenticity of the revised form of the Uniform Contract, and stated that the revision had "rendered the form unfit for contract purposes." This case is a slightly exaggerated example of others of a similar character. All action with regard to the Uniform Contract has been taken by regularly appointed committees from the two organizations mentioned, acting in conjunction, with full power to create and amend a Uniform Contract, which should be adopted and recommended for use by the organizations in question. The first joint committee included representatives from the then existing Western Association of Architects, but this organization having become absorbed into the American Institute of Architects, the present sponsors for the contract are the American Institute and the National Association of Builders, the two representative bodies in the United States. It was deemed necessary that the joint committee should be given full power, for the reason that if each sub-committee were compelled to report back to its parent body before final action on the contract could be taken, the differences of opinion on the part of individual members of the two organizations would occasion such lengthy discussion, and so many amendments and recommendations, that united action would have been practically impossible. Each organization, therefore, selected a committee composed of its most able members, to which was delegated full power to prepare a Uniform Contract for adoption and to amend the same whenever amendment should be considered necessary. The form originally prepared by the first joint committee and adopted by the two parent bodies existed without revision for about five years, none of the changes to the form submitted during that time being considered sufficiently important to warrant a revision. In October, 1892, the joint committee met for the purpose of considering all the suggestions for the improvement of the form which had been presented since its adoption, and so make such changes in it as experience in its use indicated as advisable. The result of this meeting was a careful and thorough revision of the form which has made its wording more simple and direct; shorter by five hundred words; and generally improved it over the original form. One feature of the new form which has caused some comment is that the words "contractor" and "owner" are printed in the singular without space for the addition of the plural; but the form definitely states that whatever is the style of name of the contractor or owner, whether an individual, a company, or neuter, for the purposes of the contract they shall be termed "contractor" or "owner." In printing the word "architects" in the plural, it was deemed easier to draw a pen through the s where the singular was needed than to write the letter where the plural was required.

The Uniform Contract as revised by the joint committee was adopted and recommended for use by the National Association of Builders at its last convention, as was stated in these columns at the time; and the official action of the American Institute of Architects is indicated by the adoption, at its recent convention, of the report of its Committee on Uniform Contract, which is as follows:

"Your Committee on Uniform Contract begs leave to report that the last meeting of the joint committee of the American Institute of Architects and of the National Association of Builders was held in the office of Messrs. Adler & Sullivan (Chicago), October 19, 1892.

"At that time numerous communications were read in which suggestions were made as to changes in the form. In accordance therewith several important changes were made. The form was considerably shortened—about 500 words having been eliminated. The paragraphs were rearranged, grouping the requirements of either party by themselves, and in both cases the singular number being substituted for the plural. Attention was called to the omission of the clause referring to the penalty for non-completion of work at the specified time. So many conflicting views were presented regarding this portion of the form that it was deemed best to omit it, leaving it to the judgment of the parties in interest to draft such a clause as they should agree upon.

"Your committee suggests that, for the information of the institute, the secretary be requested to cause to be printed such information as will be of value, in circular form, and mail from time to time to each member. This circular to contain information not only as to the revision of the form, but the name of publishers, price, &c."

Damage by Rebuilding.

The rebuilding of adjoining premises is attended with many risks, says a writer in one of the English architectural papers, and building owners are frequently called upon to defend actions in the courts brought by adjoining owners for alleged injuries caused by the operation. In London this is of very frequent recurrence; in fact, litigious neighbors, and those who take some pleasure to make exactions, are ever on the alert in discovering real or imaginary grievances, such as cracked walls and ceilings, loss of trade or rent. There is cause, too, for some anxiety. In many old neighborhoods the party walls between houses are in a very dilapidated state. They have been tampered with, cut into, and rebuilt time after time; old fire-place jambs have been cut off on the ground floor to make room for shops, corbels of stone or brick, or girder, have been inserted, and various apertures have been made in the walls on one or both sides; the consequence of all this has been to impair the bond and coherence of the wall, and to render it extremely rotten. Many of these alterations have been made before the present Metropolitan Buildings act came into force or its provisions were duly enforced, the consequence of which is that builders who undertake contracts for rebuilding premises are often face to face with a difficulty involving risks for which they are ill-prepared. Many old houses literally hang upon their neighbors, so that when the front, back and cross walls are taken down, the old and perforated party wall lurches over, the adjoining premises sink, and ugly fractures, if nothing more serious, are made in the walls and ceilings.

PRECAUTIONS.

Precautions are scantily taken in many of these cases; shores are not introduced early enough, or cannot be put in to save the adjoining wall. In taking down the front and cross internal walls, it is necessary in old buildings which lean over to insert struts or shores as the work proceeds, and the upper supports are of more value than the lower ones. In pulling down the walls great care ought to be exercised. In the absence of the builder or his foreman, the walls are often demolished without any safeguard whatever; the laborers employed are often unskilled in building, and set to work at knocking down without discretion or observing the requirements of the adjoining property. The system of strutting and shoring ought to be carefully thought of before the work of demolition begins. Then a good plan is to plumb the walls of the adjoining property before the pulling down commences, and note carefully during the progress of work the divergence from the vertical, so as to take due steps to meet any contingency. The slap-dash mode of going to work is encouraged. Last week we recorded an action brought before the Lord Chief Justice in the Queen's Bench Division by an owner of a house at Walworth against the owner of adjacent house and the builder for taking down the walls, floors and partitions of his house without notice, and without proper care and precautions by shoring to secure the party wall between it and the plaintiff's house, by which neglect the plaintiff's house became unsafe, and had to be taken down and rebuilt, by which he lost rent and incurred expenses. The party wall was dangerous; the defendants pleaded that notice had been given, under the acts 1855 and 1869, that the wall was dangerous, and the defendants pulled it down and rebuilt it. Evidence proved that there was some cause for action, for cracks had appeared, the walls had to be repaired, and the plaintiff lost a tenant in consequence of exposure during rebuilding. Judgment was given for plaintiff, without costs.

DANGER TO PARTY WALLS.

In this instance floors and partitions were removed, and these operations are always attended with danger to the party walls. The floors act as struts to the walls, and the removal of joists or girders inevitably weakens the party walls. The taking down of partitions is also precarious for the same reason. The law imposes rights and obligations on building and adjoining owners. The former can make good or repair any party structure that is defective; he can pull down and rebuild it if necessary; he can pull down any partition of brick or timber that divides the buildings; he has a right to cut into any party structure upon condition of making good the same; to cut away footing, chimney breasts, jambs, or flues projecting from any party wall, in order to erect an external wall against such party wall, upon condition of making good any damage occasioned to the adjoining owner; a right to cut away such parts of walls of his neighbor if they overhang his own ground, under the same conditions. The adjoining owner can require the building owner to do certain things—to build certain jambs, breasts or flues, piers or recesses for his convenience. Then it is required that a building owner shall give three months' notice to the adjoining owner before exercising any of his rights, except in the case of dangerous structures. Other rules are to be found as to the exercise of these rights, the mode of serving notices, differences and costs; yet in spite of these regulations disputes are continually arising between parties, and actions are taken before the superior courts. It is a pity these differences cannot be settled in the manner laid down in sub-section 7 of the 85th section, if not by agreement.

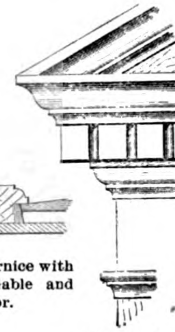
REBUILDING OLD STRUCTURES.

Less care also is exercised in rebuilding old premises than there should be. If architects engaged in rebuilding were to examine the adjoining premises before preparing their specifications, and make provisions for shoring before pulling down was commenced, the responsibilities of building owners would be diminished. As a matter of fact, the demolition is regarded as a trivial matter; risks are not calculated for, and the adjoining owner is often overlooked altogether. On the builder is often thrown all the responsibility in the matter; he has to give all notices, and is expected to make good any defects or injury to any party structure which he has to deal with, and, therefore, he ought to estimate any risks likely to be incurred. Sometimes the duties are very onerous; the adjoining structure may be in a dangerous condition, only requiring the removal of a wall or two to cause a collapse of a portion of the adjoining building, or this may be caused by any excavation too near the party wall of the adjoining premises, or by underpinning operations. In the Metropolis the rebuilding of old street structures is certainly a touchy matter, demanding more patience and investigation than it generally receives; nor must it be forgotten that building owners look to their architects and builders to protect them from actions for damage.

Combination Buffet and Bookcase.

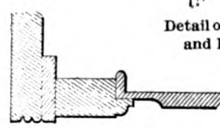
A very neat article of furniture, designed more especially for use in the dining room of a dwelling, is presented

Detail of Side Cornice with Section of Gable and Cupboard Door.



Detail of Cornice and Frieze.

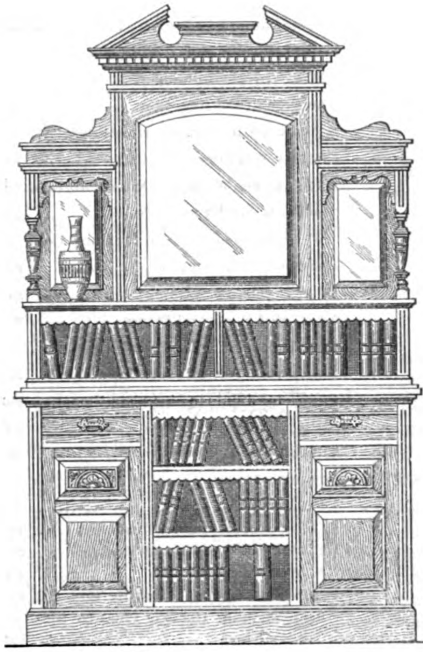
Enlarged View of Column at Corner of Recess.



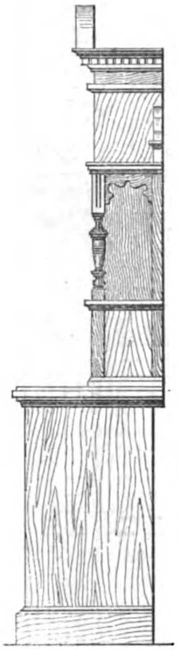
Section Through Door Frame.

Section of Top and Bed Moulding.

Section Through Front Edge of Shelves.

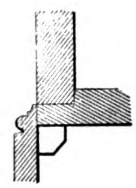


Front Elevation.



End View.

Carving in Upper Panels of Doors.



Section Through Base.

Combination Buffet and Bookcase.—Elevations.—Scale, ½ Inch to the Foot.—Details, ⅜ Full Size.

in the illustrations here given. They represent elevations and details of a combination bookcase and buffet so arranged that its use for one purpose does not interfere with its employment for the other. The idea of providing a place for books in an article of furniture of this kind is that the dining room is frequently employed as a sitting room, in which there is not space for a separate bookcase. The engravings, which are reproduced from a late issue of one of our English contemporaries, show the top of the buffet to be 5 feet long, 1 foot 10 inches deep and 3 feet 2 inches high from the floor. On each side beneath the top is a drawer and a small cupboard. In the right-hand cupboard, at the bottom, is placed a drawer 6 inches deep divided into compartments intended for bottles to be placed in an upright position. In the other cupboard a shelf midway of the hight is sufficient for most purposes. The center of the under part of the combination article of furniture has two movable shelves with leather falls or trimming at each of the three spaces intended to be used for books. In the upper part, the entire length of the top is used for books, and in the center above this is a cupboard with a silvered bevel glass in the door. At each side of the center cupboard are little recesses with a mirror, the whole arrangement being such that the small shelves or brackets can be utilized for such purposes as circumstances may require. The engravings so clearly indicate the general construction of the buffet that any skillful carpenter can execute the work during his leisure hours. The author of the design here presented suggests that walnut or mahogany be used for the purpose, and that if mahogany is employed very pretty effects will be produced by staining it a very dark color and polishing.

Hollow Brick Walls for Buildings.

In discussing the proper method of constructing hollow walls, J. S. Crary, Sr., points out in a recent issue of the *Clay Worker*, that "for common small dwellings where only 8½-inch thick walls are to be put up, the best and cheapest way is to set inside two or three courses of brick on edge, then bind to outside course flat, with a "header." Every fourth and fifth header should be a bat, so that a free circulation of air can be had, from bottom to top of the wall. Fine grates of iron or clay, about 4 x 12 inches, should be set in the base or washboard, on the floor, so that the foul air in the room will pass into the hollow of the wall. If the room be properly ventilated, the temperature in the hollow space in the wall will always be high enough to cause a draft.

No furring is needed for lath, as no lath are used. The plastering is put on the brick and is never damp from dampness in the outside wall. If the walls are well built in this way, they are as strong as if solid. Door and window jambs should be returned solid, and a 4-inch pilaster on the inside gives strength, beauty and utility to the wall. The pilasters may be carried up from the foundation, if the doors and windows are regularly spaced, one above the other.

Building Ordinances of Berlin.

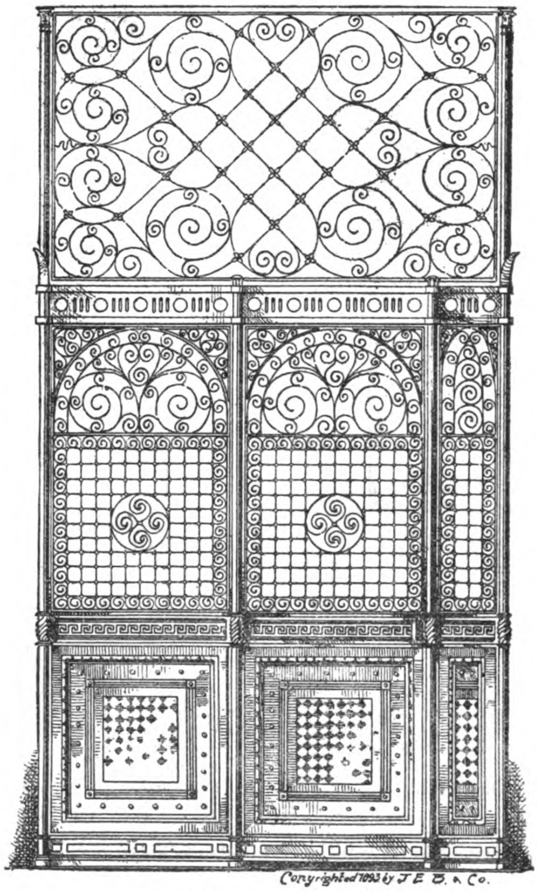
The European correspondent of a Baltimore journal, writing from Berlin, gives some particulars relating to the building regulations of that city which show that a military discipline, characteristically German, exists in the municipal government of the metropolis of the Fatherland. He expresses himself as follows: "Berlin is the best managed city in the world, and its city fathers regulate the style of the buildings which shall be put up. You can't build a dog kennel without showing a design of it at the City Hall, and no man can put up a sign-board on his own house until he has shown a diagram of it and has gotten the permission of the government. You can't put down a

pavement in front of your house without a permit; and the government watches your building and insists that you make your walls just so thick, while the ceilings must be of a given hight and the fronts must be of a uniform pattern. In building the house you are not allowed to litter the street with your brick and mortar, and all the materials must be kept inside the lot. You have to fence off the street while the building is going on, and when your house has reached the hight of the second story you must build a roof over the sidewalk to prevent the bricks or mortar falling on those passing below. The building is done much better than with us, and much more economically. Nearly all the mortar is mixed at one place, there being a mortar company which sells the material ready mixed to the builders and carries it about in iron wagons and delivers it just where it is needed. This Berlin establishment is paying dividends of 25 per cent. on its capital, and it sells mortar, like coal, at so much per wagon load or per ton." In regard to the latter subject, the writer was evidently unaware that a similar system of mortar supply was already in operation in this country, having been introduced in the city of Philadelphia last year with the best results.

WORKMEN about to build a brick pier for a new building in Lewiston, Maine, dug down 4 feet into the ground and came upon a large flat stone. It pleased them to discover what they believed would be a fine foundation for their pier, and they went to work building upon it. They built the pier to a hight of 12 feet, and then were astonished to see it sink into the earth. Investigation showed that their flat foundation stone covered the top of an old well 30 feet deep.

Design for Elevator Front.

The increasing use of elevators intended for carrying passengers in office and other buildings has caused makers of these goods to give more and more attention to their construction and beauty of design, until at the present day the variety is such as to meet about every conceivable requirement. Manufacturers, however, are all the time adding to their assortment, and the firm of J. E. Bolles & Co. of Detroit, Mich., who make a specialty of elevator inclosures and metal cabs, have just introduced several new patterns in this line which are both unique and handsome, as may be inferred from the view of the elevator front presented herewith. The firm are now putting up fronts and introducing metal cars in the new Bearinger Block, Saginaw, Mich., and have recently shipped elevator inclosures to Tacoma, New Orleans, and the city of Washington, besides metal cars to Atlanta, Georgia.



New Design for Elevator Front.

SAWDUST building bricks, a German invention, are thus described: **The sawdust is dried and screened, to remove the coarser particles, and is then mixed with cement, lime and sand in the following proportions: One part cement, 2 parts lime, 5 parts sharp sand, and 2 parts sawdust. The sawdust is first mixed dry with the cement and sand. The final mixture is pressed into blocks, which are said to be cheap and useful. There is as much lime, and more than twice as much sand as sawdust in them.**

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

NOVEMBER, 1893.

Closing Month of the Fair.

As we go to press with this issue the World's Fair is winding up its career in a blaze of glory. As Chicago suprised the world with the grandeur of its exposition buildings, and as the magnificence of the display in its entirety far surpassed anything previously accomplished in the same line, so has the attendance outrun all expectations, and in that respect another phenomenal triumph has been scored. High water mark was struck on the 9th of October, known as "Chicago Day," when the total attendance was 761,942 including those admitted on passes, or 716,881 paid admissions. Several days in the same week the paid attendance ran above 250,000 and on two days it was over 300,000. The total paid attendance for the week, including Sunday, the 8th, was 2,131,719. This far outnumbers the attendance in any similar period at any previous international or any other kind of exposition, or, in fact, any other kind of gathering of which there is any authentic record. A figure is thus set for the future that will be very difficult to exceed, and it is safe to say that for years to come any very great gathering of people will be compared with this stupendous occurrence in Chicago on the 9th of October, 1893.

Chicago's Boast.

The attendance at the exposition for the week named is another notable matter. The figures are staggering: but Chicago boasts not alone of this achievement in attendance. To the surprise of many shrewd business men, who had not looked for such success, the exposition managers signalized Chicago Day by paying off the floating debt and the mortgage on the gate receipts, thus leaving the enterprise free of all obligations to any persons but the stockholders, who may now reasonably expect a dividend in due season. The check drawn on this memorable occasion for the payment of the trustee of the several classes of creditors called for $1,565,310.76. Thus has Chicago gloriously redeemed the obligations incurred when she assumed the task of building a World's Fair. Chicago's business men started out to prepare for a finer, bigger and more successful enterprise than the world had ever seen in this line. The verdict of the jury of the nations of the earth who have seen it is that it is unquestionably bigger and undoubtedly finer, and now it is assuredly more successful.

Trade Schools in America.

Professor Ripper, principal of the Sheffield Technical School, England, has lately returned home from Chicago, where he visited the World's Fair. While in the United States Professor Ripper paid special attention to the condition of trade education in this country, and he is reported as having accumulated a large amount of information in connection with this subject, which he intends turning to account in the improvement of similar work in England. As Professor Ripper is one of the leading authorities on manual education in England, it is gratifying to find that he expressed himself on his return home as having been much impressed with the methods and appliances in use in the manual training schools of this country and with the enthusiasm for technical education which he found to exist here. The schools, he says, were generally well equipped and under the charge of men of considerable ability. Among the most notable institutions of this class which he visited was the New York Trades School, which appears to have impressed him very favorably.

Peculiar Methods.

A rather unique method of settling a strike recently occurred in this city. A certain marble cutters' union entered a grievance, in the general Board of Walking Delegates, against the use of non-union cut marble on a certain job and a general strike was ordered. The marble cutters, carpenters, plasterers, painters and stair builders quit work in a body. Several days after the strike was declared the walking delegate representing the marble cutters' union reported to the board that the architect had transferred the contract to another, and had ordered union cut marble used in place of the obnoxious material. The board thereupon declared the strike off, which in this case was slightly anomalous, for the condition of the contractor against whom the strike was instituted was worse than during its existence, as the job was taken entirely out of his hands. Had there been an Arbitration Committee established between the marble contractors and the marble workers' union such a case as the one cited could not have arisen, because there would have been an agreement between the employers and the workmen which would have covered the ground. Had the original contractor insisted upon the use of the Uniform Contract he could not have been deprived of his job in such an apparently cavalier manner, for that instrument provides that "abandonment of the work by the employees, through no default of the contractor," shall not work a forfeiture of the contract. Under the Uniform Contract, also, it would have been impossible for the architect to have added the words "union cut" to the specifications for marble after the contract was let.

San Francisco Midwinter Fair.

Preparations are going on apace for the great Midwinter Fair to be held in San Francisco the coming winter. Five buildings are being erected in Golden Gate Park for the accommodation of the exhibits. The main building is to be 450 x 200 feet on the ground, and the Palace of Mechanical Arts will cover an area 275 x 75 feet. It is now expected that all the buildings will be finished by January 1. It is reported that intending exhibitors have applied for space in such large numbers that the management is already confronted with a serious difficulty in the provision of sufficient accommodation to satisfy all the applicants. That the fair will be a success is taken for granted, and it seems that the city of San Francisco is determined to make every effort to that end. The arrangements of the management are being made on an elaborate scale, and enough money has been subscribed to guarantee their being carried out.

Electrical Tower.

One of the features of novelty at the fair will be an electrical tower 266 feet high, and having on the outside frame work over 8000 incandescent lights of different colors. While the prime object of the tower will be for lighting purposes, it will also be used as a band stand and will have an elevator, which will run up to a hight of 200 feet. There are four Moorish pavilions, 60 feet high, which will flank the open space. The base of the tower, or first gallery, 80 feet from the ground, will be divided into four chambers, two for the bands and two for seats for visitors. This gallery will be 30 feet square and will have a seating capacity of 200. Three other galleries will extend beyond the first. The second floor will be 140 feet high and will afford room for 150 people, while the third will be 210 feet high. The topmost gallery will extend up to within 6 feet of the pinnacle, or 260 feet. On the extreme top of the tower will rest an enormous gold ball, bearing the emblem of the State, a massive California bear. In addition to this feature will be many others of wide interest, and it is probable that many travelers from the East will turn their steps toward the Pacific Coast this winter.

Elevator Regulations Abroad.

It would appear from some of the foreign architectural journals that the regulations lately issued by the German authorities touching the question of elevators, or lifts, as they are pleased to designate them in European countries, are regarded as rather strict, although by no means extreme, if the risks are taken into consideration. The new rules, after treating of the position of the elevator shafts and their isolation, refer to the construction, brakes and safety gearing, as well as to the speed at which the elevators are allowed to run, the weights to be carried and the tests to which they are to be subjected at regular intervals by certain officials of the board of works. It seems that in Berlin there have occurred a large number of accidents through the faulty construction or mismanagement of elevators, as well as the spread of fire by means of elevator shafts, with the result that the Government has issued the regulations referred to. The limit of speed is fixed at 5 feet per second, a rate to which residents of some of the larger cities in this country would, no doubt, take exception. Especially would this be the case if their offices were on the upper floors of 10 or 15 story structures and their business compelled them to make a number of trips each day. The time consumed in going up and down in a slowly moving elevator would certainly cause strong protests to be made, and if the landlord desired to keep his tenants he would probably have to increase the speed to more than that named in the regulations issued by the authorities at Berlin.

New York Trades School.

The thirteenth annual session of the New York Trades School was inaugurated on Monday evening, October 16. The evening classes in plumbing, bricklaying, carpentry, house and fresco painting, blacksmithing and stone cutting on that day commenced their respective courses of instruction, the number in each department being as follows: Plumbing, 115; bricklaying, 32; carpentry, 41; house painting, 15; fresco painting, 17; blacksmithing, 21; and stone cutting, 4. The evening class in plastering will not begin work until December 11. This attendance is fully up to the average of recent years and speaks well for the sustained popularity of the school, which has now attained to such prominence as to be the model for similar institutions throughout the country. The present season of work opens under the shadow of a great loss which has fallen upon the institution since the classes were last in active session. The honored founder and active manager of the school has been removed by death, and his wise and invaluable personal influence and efforts are no longer at its service. Happily Colonel Auchmuty left his cherished enterprise on so firm a basis, and its machinery in such a complete state of efficiency, that it is not likely to languish now, even though his guiding hand has been removed. Colonel Auchmuty's co-workers in the school have been thoroughly imbued with his enthusiasm in the work and with the ideas formulated in the now celebrated "Auchmuty system," under which it is conducted; and they will undoubtedly be competent to carry on the good work successfully on the old lines.

Early English Moldings.

The exquisite skill, taste and patient labor invariably evinced in the working of early English moldings are truly admirable, says a foreign exchange. The ingenuity that was never at a loss in any difficulty of finish or constructive irregularity, and the minuteness with which even the most concealed and darkened parts were executed, are circumstances of much interest, and show a love for the art above the sordid considerations of minimum cost. The deepest hollows are all as cleanly and perfectly cut as the most prominent and conspicuous details; and in the village church as much so as in the most glorious cathedral. An early English doorway is often a wonderful piece of art, however little it may attract the attention of ordinary observers. It is most pleasing to notice the long trains of dog-tooth lurking in the dark furrow of a label or channeled recess; to see the end of some inconvenient member got rid of by throwing a flower across the point where it suddenly stops or dies into the wall; to admire the floriated boss and the foliaged capital intruding their luxuriance upon the moldings and hollows, as if they had overgrown their original and proper limits. How beautifully, too, the knots of pierced and hanging leaves extend like some petrified garland or bower of filigree work round the arch, dividing the plainer moldings into groups, and almost imparting life and vegetation to the very stones. There are abundance of doorways of this style which exhibit the most delightful varieties in their forms and groupings; always, yet never, the same. Some examples occur at Bolton and Furness abbeys, whose arch moldings extend 5 or 6 feet in width. The west fronts of several of our cathedrals have early English doorways of amazing magnificence. The entrance doorway of the chapter house at Lichfield is a very fine example of the molding of this style. But almost every cathedral and every ruined abbey will supply good specimens.

The T-Girders Used by the Romans.

In discussing the use of iron on a large scale by the Romans, Mr. Gardner writes to the *Saturday Review:* From Pompeii we might infer the total absence of constructive iron work in Roman architecture, yet Professor Aitchison claims that in the Baths of Caracalla a large ceiling was supported on iron girders." This fact might be stated less doubtfully than these words would imply, since some tons of broken iron T-girders were found a few years ago during the excavation of the great cella soliaris of the Thermæ of Caracalla. These girders had been cased in bronze, and they were arranged so as to form square panels, which were filled in with concrete decorated with mosaic and delicate stucco relief, all colored and gilt, thus forming a strong and richly decorated flat ceiling, with a span of enormous width.

A Modern Factory Building.

The building in course of erection for the Diamond Machine Company of Providence, R.I., is in many respects the finest edifice of the kind in that city. The land upon which it stands has a frontage of 450 feet on Atwells avenue, a depth of 350 feet on Kingsley avenue, bounded on the north and east by the Woonasquatucket River, leaving ample and sufficient accommodation to erect further buildings of this class when they are required. The building is 205 feet long and 60 feet wide, setting back 12 feet from the street line. It is built of brick and granite, with foundation stone of the very heaviest material. The foundation walls are 4 feet thick, and the granite underpinning 23 inches deep and 8 inches wide. The brick wall on the first floor is 24 inches, that on the second 20 inches, and that on the third 16 inches. Hight of stories, 14 feet from top of floor to top of next floor. The floor beams are of 10 x 16 Georgia hard pine, covered with 4-inch spruce plank, upon which is a top floor of 1-inch maple, tongued and grooved. There is no basement under the building, the space being filled with coarse gravel, made thoroughly compact by wetting down with water, then concreted on top and carrying 4-inch spruce planks with 1-inch maple on top.

The windows are 11 feet high, 5 feet wide, arched and arranged with transom at the top to secure good ventilation. The 10 x 16 floor beams, placed 9 feet between centers, are supported on the lower and upper floor by posts 10 inches in diameter, the latter turned round and bored through the center to prevent checking. The posts are supported on granite underpinnings 4 feet square, which rest upon foundation walls extending 11 feet below the floor. There are three sets of double doors for machinery and two end doors for the operatives, one on each floor at the rear of the building. The machinery doors are 11 feet high, 7½ feet wide, 3 inches thick and paneled. The building has a gravel roof five ply, first three ply of the best Beaver brand and a wash on top of that, covered with Oyster Bay white gravel.

There are two lines of shafting on each floor with elevators for hoisting purposes. The factory is to be lighted by electricity. The power is supplied from a separate building of brick and granite, erected upon their land (40 x 50), where engine, boiler and blacksmith shop are contained. A 75 horse-power engine with 100 horse-power boiler is to be used. It is designed by the builders to secure a strong rigid building with strength sufficient to meet every requirement in the business, perfectly lighted and ventilated, protected from fire by all modern improvements. Their office is to be located at the east end of the building on the lower floor. No attempt in this or any other part of the building to secure ornamental work of any kind has been made.

AT the recent opening of the Armour Institute, Chicago, there were 1200 applications, but it was decided to admit only 500 students at the start. This institute will be to Chicago what the Cooper, Pratt and Drexel institutes are to the cities in which they are located, and the many applications made for admission show the appreciation of Mr. Armour's contribution to the intellectual culture of Chicago.

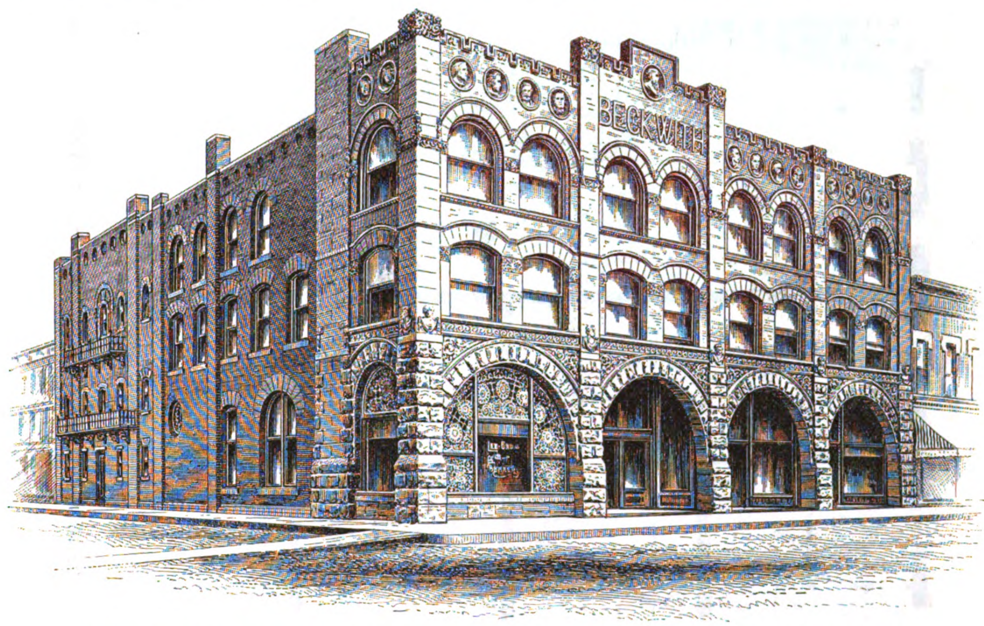
BECKWITH MEMORIAL THEATER.

ONE of the most attractive structures in Dowagiac, Mich., is the theater building erected last year to the memory of the late Philo D. Beckwith of that place, who conceived the idea of what is known as the round oak stove, with which, no doubt, the homes of many of our readers living in the northwestern sections of the country are made comfortable during the long winter months of the year. Mr. Beckwith was a great lover of the modern theater and the legitimate drama, believing the latter to be an educator both of the rich and the poor, and it was largely to this fact that the erection to his memory of the handsome building which we this month illustrate was due.

The structure covers an area 85 x 100 feet in size and is three stories in hight. The front portion of the building is occupied on the ground floor with stores and the offices of a banking concern, while the rear portion is devoted to what may be termed the theater proper. On the second floor are business offices while the third story is used for an assembly hall with ante-rooms, &c. The material used in the construction is Lake Superior red sandstone, with side and rear walls of brick. The front is divided into four arches, each of 20 feet span, the dividing piers being of rock faced sandstone. The front is beautifully carved and embellished with medallion portraits of noted personages in poetry, art and literature. On each pier is the portrait of a noted woman, while just below the parapet, which is embellished with carved cherubs, are portraits of Beethoven, Chopin, Rossini, Wagner, Verdi, Liszt, Voltaire, Victor Hugo, Goethe, Shakespeare, Ralph Waldo Emerson, Walt Whitman, Ingersoll and Paine. Upon the bay, directly over the main entrance to the theater, is a large medallion portrait of Mr. Beckwith, beneath which is his name carved in large letters.

The supplement plate this month shows the front of the theater building and several views of the interior. In the upper left hand corner is a picture of the stage as it appears looking from the auditorium. In the upper right hand corner is a view of one of the tier of boxes, while the picture at the bottom represents the drop curtain. The illustrations given upon this and the following pages show the arrangement of the first and third floors of the building, with the entrance to the theater and other features of interest clearly indicated. Entering the auditorium it is seen that the proscenium is square instead of arched, being 26 feet wide and 20 feet high. The stage is 50 feet in width and 38 feet deep, with an upper and lower box on each side.

The architect of the theater, W. E. Brown, with offices in the Pullman Building, Chicago, has been connected with theatrical work for the last 25 years, and in designing the Beckwith theater he brought to bear an unusual amount of experience and theatrical knowledge. Although the structure has a seating capacity for only 750 people, it is in richness and fine decorative effect far beyond the requirements of a small town. The theater, however, was erected as a memorial to Mr. Beckwith, and an unusual amount of money was expended in carrying out this purpose. Some of the carved portraits with which the front of the building is embellished were made from life by sculptors of eminence. In every way, however, except in richness of decoration and expensiveness of material, the theater is especially well adapted for small cities and towns. Electric lighting is used in the building, and the heating and ventilation have received specially careful treatment. Indirect steam heating is employed, and the arrangements for heating in winter serve directly for accomplishing ventilation in the summer. All drafts from the stage when the curtain rises are said to have been obviated. The arrangement of the seats are such as to avoid the old horseshoe form, every seat being brought in full view of the stage, while the acoustic properties are wholly satisfactory. This also enables horizontal lines to be carried out through the design, adding much to the decorative effect of the interior. This is something of a novelty in the West in theater construction, and the form employed is claimed by the architect to be the best adapted to a theater, irrespective of its size. The general finish of the interior is very rich and in colorings and drapery perfect harmony has been secured.



General View of Beckwith Memorial Theater at Dowagiac, Mich.—W. E. Brown, Architect, Chicago, Ill.

Planning a Heating System.

Of the many thousands of people who erect houses during each year, but a small percentage stop to consider the elements that enter into the plan for economically warming the structure or the different phases of the installation of the apparatus that is to be used.

Not many even stop to think what a wide difference there is in the conductivity of different materials as to heat and cold. Nor do they ever give the suggestion of how the wind is to strike the building, or what the effects of such a wind may have on the atmosphere in the rooms a single thought.

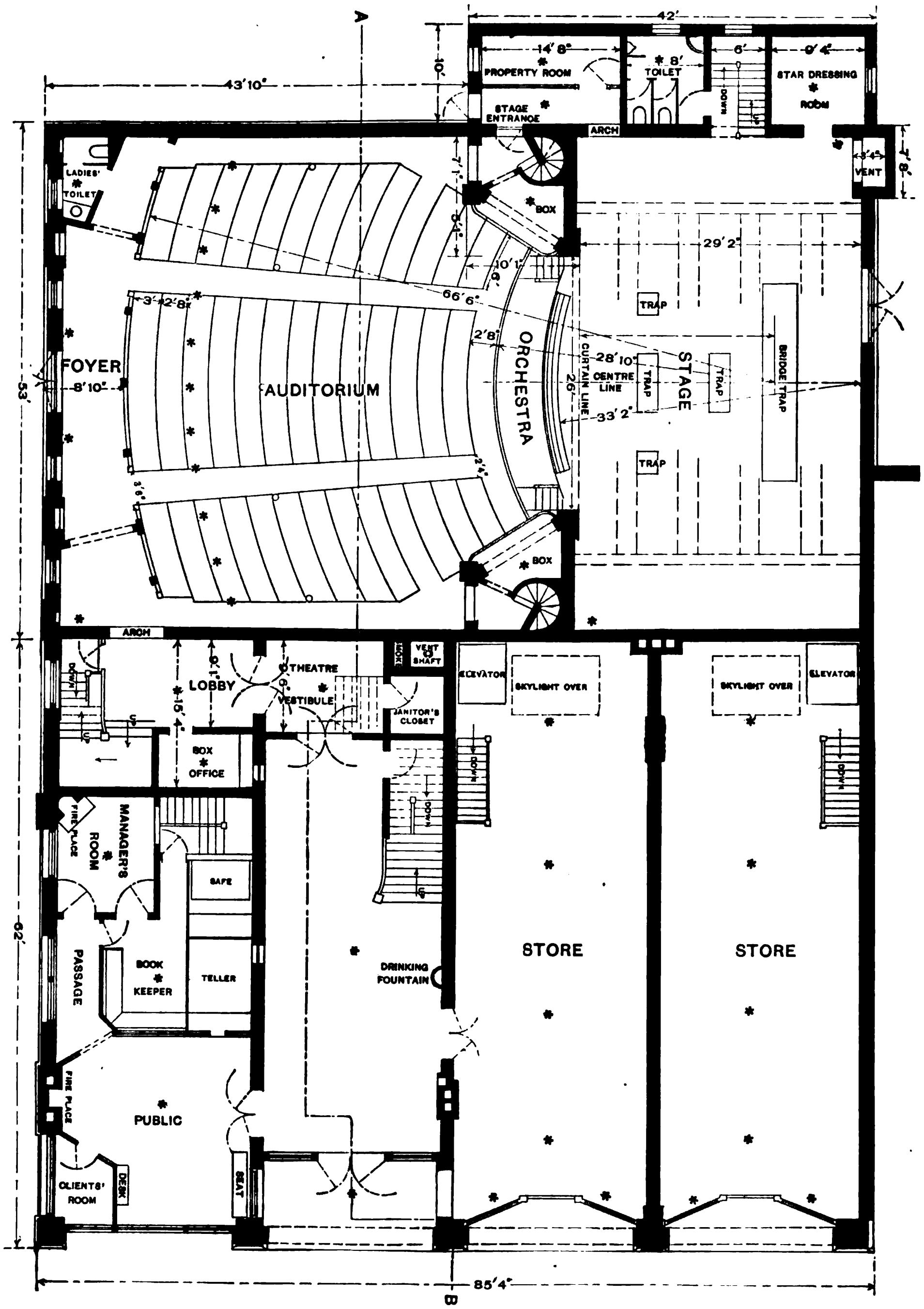
One of the greatest, if not *the* greatest, natural force in existence for the carrying off of heat is wind, and when we know something of the effects of wind in cooling buildings we learn to consider it more carefully and plan more thoughfully for the admission of light. For instance, in experiments with glass houses, says an exchange, a room heated to 70° with the outside temperature at zero, in still weather the inside temperature will be lowered 20° in 5 minutes and 45 seconds; with the wind blowing 3 miles an hour the same result will be attained in 2 minutes and 35 seconds. When, however, this wind reaches a velocity of 27 miles an hour, the time required to lower the temperature 20° is only 48 seconds. Now it will be readily seen of what vast importance is the consideration of this one element alone, especially when we remember that there is hardly a day passes during the cold weather in our climate where the velocity of the wind does not reach and many times go beyond the latter figure.

DEGREE OF HEAT REQUIRED.

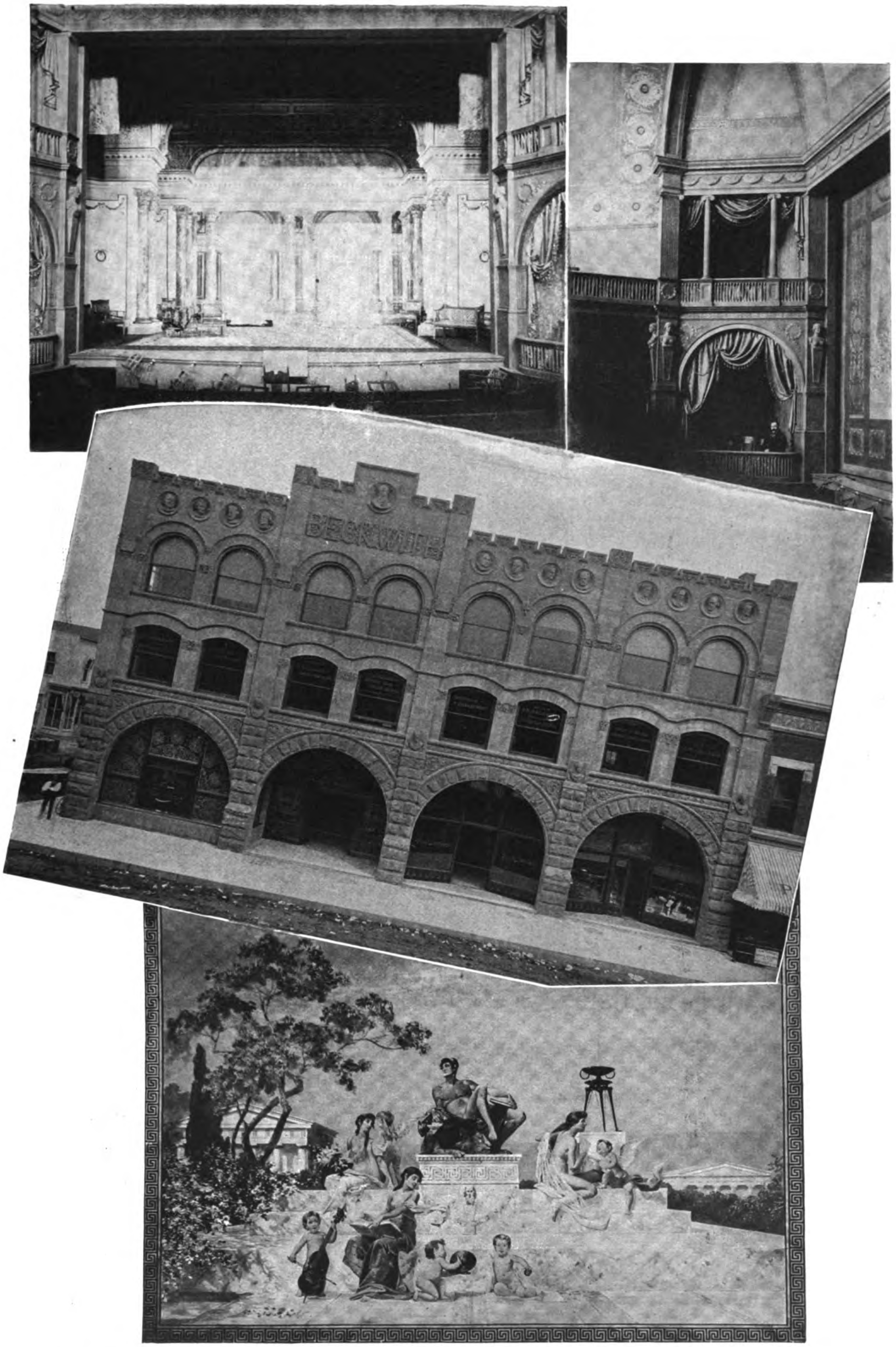
The materials entering into the construction of a building all have a known conducting power, and had we time and space could give the ascertained conducting power in elaborate tabular form. It is not the intent of this short article to go into details, but in a few instances give the reader some points of vital importance provided he intends to build.

The manner in which a building is put together determines largely how much of a plant will be required to heat it comfortably. If built in a loose manner, so that, as the saying is, you "can throw a cat through the crevices," no heating engineer, however expert a calculator he may be, could tell to a certainty how much heat would be required; for oftimes a building of this construction will require many times more heat than one well built.

People often remark that were they able they would build a brick house, believing that such a house would be much warmer than a frame one. But, on the contrary, experiment has shown that a frame building lathed and plastered inside, and covered outside with paper felt, sheathed and clapboarded, will lose 75 per cent. less heat than a brick one of the same thickness of wall. There is a loss of about 25 per cent. more heat without the paper felt than with. There is another thing that people do not often think of in the construction of buildings, and that is the amount of glass that is used in the building of the structure. More window service than just enough to properly light a room is a constant expense in cold weather, and the expense is no inconsiderable amount when the time extends over a period of years. The comparative loss of heat between a square foot of glass and a square foot of 12-inch brick wall is as 1 to 6; that is, a square foot of glass will lose as much



Beckwith Memorial Theater.—Main Floor Plan.—Scale, 1-16 Inch to the Foot.



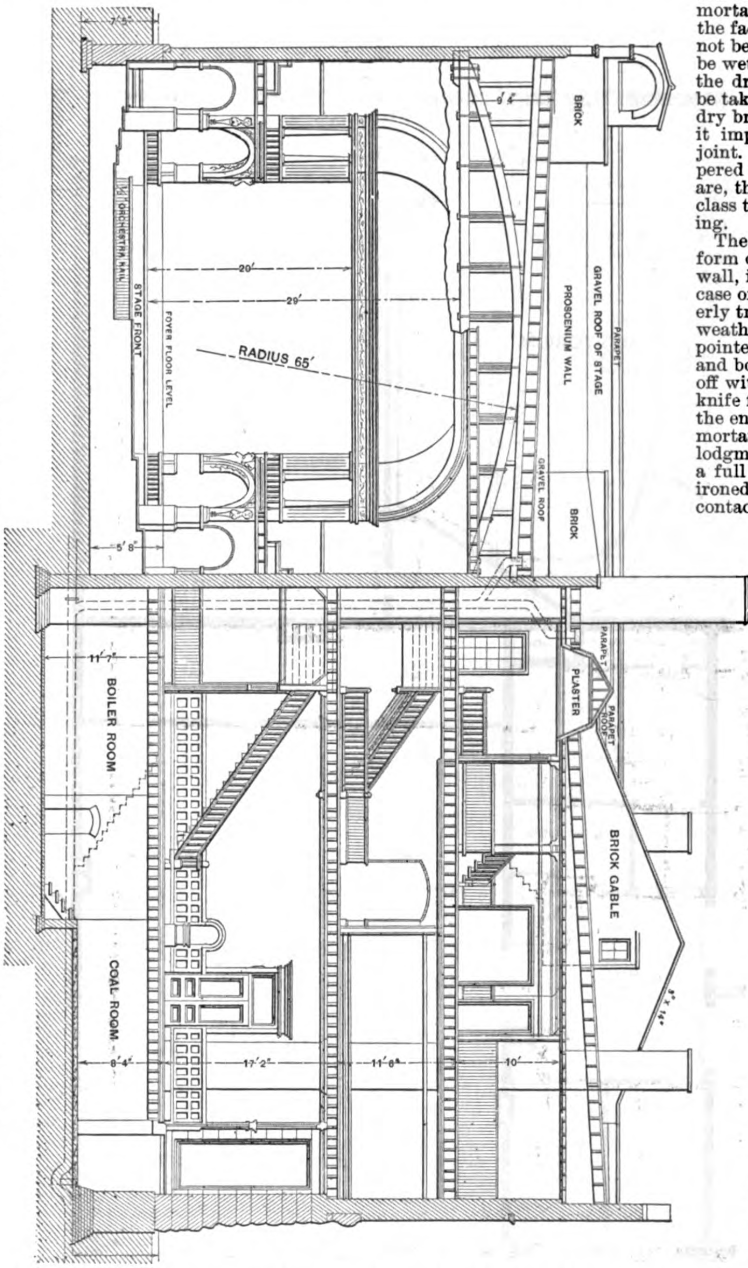
EXTERIOR AND INTERIOR VIEWS OF THE BECKWITH MEMORIAL THEATER, AT DOWAGIAC, MICH.

W. E. BROWN, ARCHITECT, CHICAGO, ILL.

heat as 6 square feet of 12-inch brick wall. Not many people consider the advantages to be obtained by the use of what is termed the double sash. Careful experiments show that when fitted with this kind of sash 75 per cent. less heat is lost than with the single window.

PLANT NECESSARY.

Now it will be seen that to successfully install a heating plant much care



Beckwith Memorial Theater.—Longitudinal Section taken on the Line A B of the Main Floor Plan.—Scale, 1-16 Inch to the Foot.

must be used and a great amount of estimating must be done for each foot of wall, its kind and style of construction; each foot of glass and the different styles and sizes of doors must all have their conducting properties ascertained. When this is accurately and carefully done, it is comparatively an easy matter to say what kind and how extensive a plant must be erected to heat the building most efficiently and economically.

In closing we would say, do not jump at the conclusions of some one else. Parties will tell you that if you find the cubic contents of your various rooms and divide this by a given amount it will show you pretty conclusively that such and such a plant is required, but in view of the few statements we have made in this article it will readily be seen that such cannot be true. If one contemplates building he should go with his plans and specifications to some engineer who makes a business of this class of work and get him to estimate from his knowledge of the materials to be used what and how much to purchase. It will be money in his pocket, even if he has to pay a round sum for such information.

IT IS STATED that ordinary brick boiled in tar for about 12 hours, or until they are saturated with it, are increased about 30 per cent. in weight, are much harder than common ones, and unaffected by frosts and acids as well as perfectly water proof. They form an excellent flooring for workshops or storerooms, particularly in chemical establishments.

Joints in Brick Work.

In discussing the subject of bricks and the manner of constructing good joints in connection therewith, one of our foreign exchanges states that good mortar must be employed for laying the face bricks, else a good joint will not be produced. The face bricks must be wetted before laying them during the dry months, or the moisture will be taken up from the mortar by the dry bricks to such a degree as to make it impossible to properly strike the joint. The face bricks cannot be tampered with by color or copperas, and are, therefore, likely to be of a better class than for work intended for pointing.

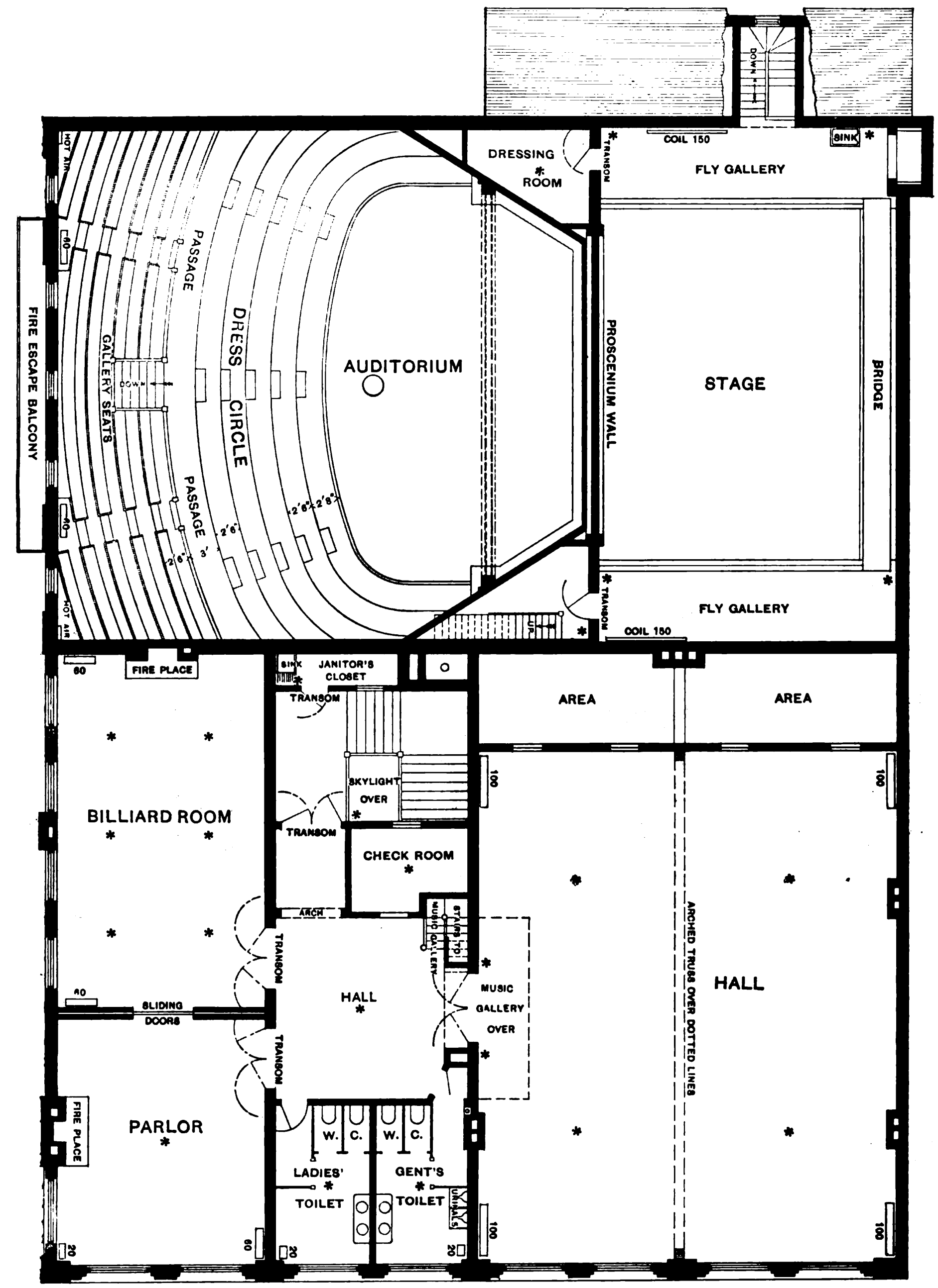
The joints are more durable, as they form one body with the mortar of the wall, instead of a veneering, as in the case of pointing. The joints, if properly trowel-struck and cut, exclude the weather more effectually than if pointed, for the reason that the top and bottom edges in pointing are cut off with a "Frenchman" (*i. e.*, a table-knife filed to a point and turned up at the end). This tool often cuts into the mortar joint, leaving ragged edges and lodgments for the weather, instead of a full joint, with clean cut top edge, ironed to a degree of smoothness by contact with the underside of the brick trowel in its passage along the joint in the act of cutting off the top edge. A building in which the joints are struck and cut during erection always attracts a better class of workmen than a building carried up rough for pointing, the building thereby benefiting by the employment of additionally skilled workmen.

FINISH OF JOINTS.

There is no class of work in the trade upon which the skilled bricklayer prides himself so much as upon the finish of his trowel-struck and cut joint, and though it may seem incredible to the uninitiated, there are numbers of men who have followed for years the calling of the bricklayers who are unable to strike and cut a joint possessed of the distinguishing characteristics of first-class work.

There are some examples of good brick work in London which might with safety be cited in specifications as the standard and quality of work required. A plan which recommends itself is to build a sample piece of face brick work in the early stages of the job as a standard of work below which the contractor shall not go—a practice very largely followed by engineers, and not confined to brick work only.

Though the practical bricklayer will in nearly every instance declare in favor of the flat-struck joint because of the facility it affords him of hiding some of the inherent and acquired defects of the bricks (defects of shape, and of damage by transit), yet there is much to be said in recommendation of the weathered joint now in vogue; and in two pieces of work executed at the same time, all conditions being equal, there is no doubt that the weathered joint would be found the more durable of the two, on account of its sheltered position with respect to the face of the building. The top edge of the weathered joint should be struck well back—not less than ¼ inch—and the bottom ragged edge removed, the joint slightly overlapping the top edge of the course below. If the joint is cut above the top edge of the course below the joint is likely to form an arrestment for the weather and defeat the object of the weathered joint. Where this form of joint is used it should be borne in mind that a large proportion of our bricks ordinarily used for facings are not only pervious to moisture, but are active inductors of it, by reason of their porous structure and consequent capillary attractiveness. With bricks of this kind the weathered joint is of little or no use, for the rain, though falling free of the mortar joint in its passage down the wall, will be imbibed by the brick courses between joint and joint, until the wall be well charged with moisture. In weathered-struck joint intended to be first-class work the bricks should be sorted out to a regular thickness by trying each brick to a gauge. The necessity of this arises from the fact that the top edges of the bricks when building are laid or adjusted to the level of the brick line, drawn from end to end of the wall, and any difference in the thickness of the bricks are, therefore, unavoidably driven into the mortar bed joint of the course below, and is made very apparent by striking or weathering the upper portion of the joint from ¼ to ⅜ inch back from the face of the wall. The flat-struck joint, from its comparatively exposed position, is susceptible to injury and to apparent obliteration by sooty deposits in our large manufacturing towns, losing the interest and units of measurement, which the joints, more than anything else, impart to a piece of work; while the weathered joints, with their play of light and shade, always remain distinctive features, or indices of construction.



Beckwith Memorial Theater.—Third Floor Plan.—Scale, 1-16 Inch to the Foot.

TUCK POINTING.

Tuck-pointing has done more to bring brick work into disrepute than any one thing connected with the trade manual of the bricklayer. Introduced about the middle of the present century as an imitation of gauged brick work, its chief use has become to cloak up the most inferior work (labor and material), situate mainly in suburban districts. The introduction of this branch of the bricklayer's trade came to him as one of those compensating reliefs at a period when the reign of the stuccoed front, with every circumstance of monotony and ugliness connected therewith, had made his work uninteresting and wearisome; but the prevalent healthy feeling actuating our architects to-day is fast relegating it to the limbo of shams—at least in its application to exterior facings.

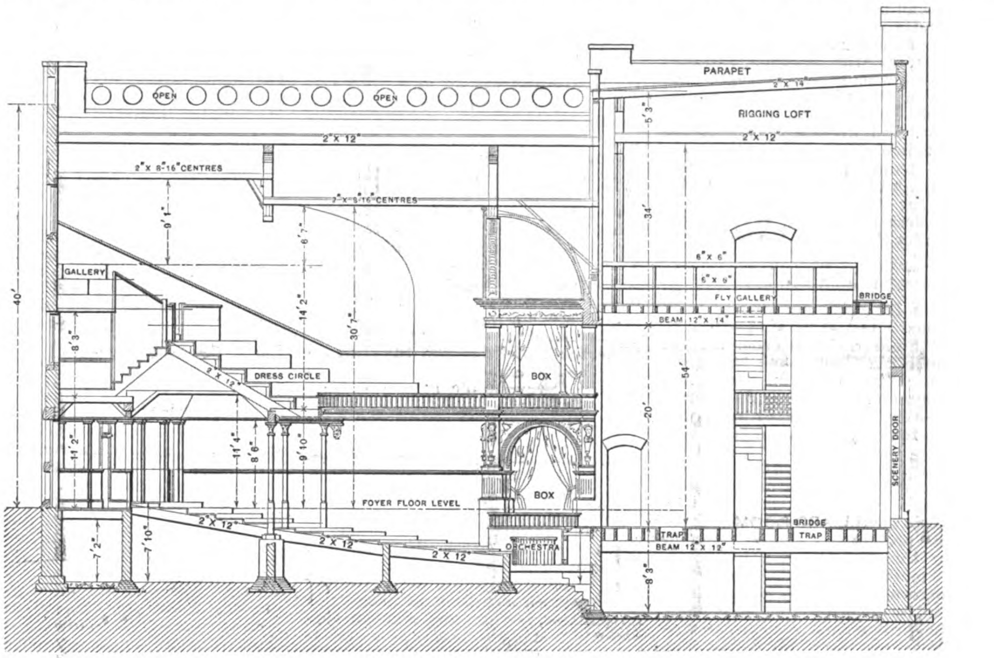
A *résumé* of the mode of working will set forth better than in any other way the reasons of objections to this joint. In brick work intended for tuck-pointing the joints are raked out during erection, and at some future period, when completing the works, are again filled in with mortar assimilated in color to that of the wall by the admixture of earthy pigments—viz., Venetian red, Spanish brown, yellow ochre, &c., depending upon the color required to be produced.

The joints filled in with mortar are rubbed down with a piece of soft brick of the same color as the brick work, or with a piece of sacking, flush with the general surface of the wall face. The whole surface rubbed down is then coated with color of the same objectionable earthy base, and approximating as nearly as obtainable to a brick color; in the case of stock work or malm work, green copperas only need be used as the coloring medium. The white putty joint is then applied, by means of a jointer, to the mortar joint previously rubbed down and colored, the putty joint consisting of water slaked or putty lime and silver sand, slightly projecting from the wall face.

The earthy colors used in the stopping mortar are destructive of its setting and indurating properties; and the liquid color or wash applied to the rubbed-down face prior to putting on the putty joint interposes a separating medium between the putty joint and the filling in or stopping mortar, interfering with the firm and proper adhesion of the two. It is true that the alum or copperas used in the liquid color may, after it has crystallized, assist the adhesion of the two joints.

LIFE OF TUCK POINTING.

The above enumerated causes, combined with the fact that the putty joint stands out from the wall, however slightly, subject to the solvent action of rain and the destructive action of frost, easily account for the short life of tuck pointing in exposed situations. When tuck pointing was first introduced, it was customary to make an incision along the middle of the filled-in joint, which was done by running the point of a fairly large sized nail along the top edge of a rule held in the position to be subsequently occupied by the putty joint. In this way a key or clinging for the putty joint was obtained, but which is now seldom or never done. Another objection to tuck pointing, and generally to the application of color to brick work, is that a true brick color and face cannot be obtained by this process, nor by any other known process; for no matter how closely bricks are sorted for uniformity of color, there are sure to be inequalities of tint and blend, constituting much of the beauty of good brick facings, an effect which cannot be obtained or imitated by the application of color. This characteristic is more apparent in "picked" London stocks than in any other class of bricks, the high, dark brown tints of which are due to the presence of iron in the clay and intense firing, a sure indication of a good stock brick. A knowledge of the character of the clay of brick-making districts will sometimes assist in the choice of a brickmaker. Loose sandy clays, requiring a large proportion of chalk in their composition, produce bricks of a color approaching to that of a malm, but of a light specific gravity and porous structure, while the purer class, consisting chiefly of alumina, with little or no uncombined silica, require less chalk, producing bricks of a harder and more enduring character. Still, it is surprising how some of the softer kinds of stock bricks and malm bricks, when made from good clays well tempered and thoroughly fired, will harden by exposure, and form a skin upon their outer faces, which can be removed only with difficulty. Stock bricks of this kind, though soft, are of a close, firm texture—a section of the brick, when broken, showing that the clay has been thoroughly pugged and well driven into the brick mold in the making. For engineering works and heavy structures stocks of the harder kind are necessary. These, when broken in two, should present vitrified sections right through the length and thickness of the brick. These kinds of bricks are generally found in the heart of the brick clamp, or toward the leeward side of the clamp, in which places the heat has been greatest. A clamp of bricks often indicates the direction of wind and weather during the time of its burning, the "place" and softer bricks being found on the weather side. There is no kind of brick in the London market which, for durability and general all-round purposes of construction, bears a better character and record than the much used London stock. For exterior work it seems capable of withstanding the varying vicissitudes of all weathers with no appreciable effect. For interior work, where plastered, it affords a better clinging surface than any other kind of brick; is capable of resisting enormous crushing weights (when thoroughly vitrified); and when built with well-wetted bricks thoroughly flushed up will knit together, acquiring a degree of toughness to an extent which no other kind of bricks seem capable of acquiring when built together. The attribute of toughness seems in some cases to be overlooked when scientifically testing the strength of material. The attribute of toughness in stock brick work presents itself in old foundations during their structural alteration or removal more than in any other part of a building.



Beckwith Memorial Theater.—Vertical Cross Section through Auditorium and Stage.—Scale, 1-16 Inch to the Foot.

MANY old houses in Holland have a special door which is never opened save on two occasions—in the event of a marriage or a death in the family. The bride and groom enter by this door and it is then nailed or barred up until a death occurs. It is then opened and the body is removed by this exit.

Manual Training Schools.

At the dedication of the Louisville School of Manual Training, which occurred a short time since in the city named, Prof. C. M. Woodward delivered an address, in the course of which he reviewed at some length the subject of manual training. In the course of his remarks a number of points were touched upon in a way to interest a large number of our readers, and we therefore present copious extracts in this connection. He said that the occasion was one which seemed to demand an exposition of the principles involved in the manual training movement, and he considered it proper, therefore, to speak of the history and character of manual training. In describing its evolution he said:

Manual training, as an educational factor, owed its existence to a wide-spread conviction that the education of the schools had been dealing too exclusively with the abstract and the remote, and not enough with the concrete and the present. The thought product of the school was too dim and uncertain, and the knowledge gained had no sufficient bearing upon the matters of daily life. Consequently the pupil lacked mental vigor and clearness, and his school experience was deficient in practical elements. Manual training embodies pre-eminently the modern idea of substituting things for words, observation for printed description, and personal experience for the recorded experience of others.

ENGINEERING SCHOOLS.

Schools for civil engineering were established some 50 years ago to train men to build the railroads, bridges and canals that increasing traffic demanded. With the steam engine and its application, not only to commerce, but to every field of labor, came the demand for mechanical engineering. Similarly with the development of electricity, electrical engineering has sprung forth in full stature as a new profession.

All these branches of engineering require as preliminary studies a knowledge of the theory and use of tools, and the methods of precise and scientific construction. This requirement was met by incorporating shop work into the professional courses, as was first done at the Polytechnic, at Worcester, Mass.; at the Massachusetts Institute of Technology, in Boston; at the State University of Illinois, at Washington University in St. Louis, and at other places in a less marked degree. Then came the thought that tool work and drawing should be classed among the preparatory branches with elementary science and mathematics. With this thought came an effort to reduce the teaching of the theory and use of tools to a science. Let me illustrate the evolution of our methods by analogy. There must have been a time when, with a view to economy and better instruction, some one, reflecting upon the various calculations of the accountant, the builder and the financier, discovered that all numerical operations came under four heads—viz., addition, subtraction, multiplication and division. The suggestion was then made that it would save time to teach those fundamental rules carefully and well before attempting to teach their application. Children could be taught to multiply and divide rapidly while too young to appreciate exchange, taxes and mensuration.

In precisely the same way, after ages of failure to comprehend the problem, the fundamental rules of tool work have been discovered and arranged in logical order suited to class or individual instruction. It is now seen that old systems of apprenticeship, by which one mastered the use of certain tools and acquired a knowledge of a certain trade, was wasteful and narrow to the last degree. Much time and many opportunities for broad culture were thrown away, and only a narrow and one-sided training was secured. To be sure, tools have improved and multiplied and the stock of materials has increased; nevertheless, the fundamental principles once recognized are readily applied.

MANUAL TRAINING.

In manual training, pure and simple, only tools and methods of use are taught. The shop exercises are almost as abstract as in "long division." A mortise and tenon joint typifies nearly everything in joinery—the tenon may be single, double or multiple; it may be plain or dovetailed, or without a pin or wedge. The joint may be blind or open, rectangular or oblique. In its construction, one may use the plane, the try-square, the bevel, the gauge, the saw, the bit, the chisel, the mallet, the knife, the vise, the bench hook; and it may be put together with paint or glue. However, before an elaborate joint can be properly undertaken, the theory and use of each tool, and how it can be put in order and kept so, should be carefully taught and learned by abundant practice. Beyond a few examples, possibly a single example, of synthetic construction for the sake of illustrating the application of general principles, the manual training school need not go. Similar statements can be made in reference to wood turning, wood carving, forging, tempering, molding, pattern making, metal fitting, &c. Almost the only thing a student should be able to show at the end of his training is the discipline, the knowledge and the clear insight he has gained. If he is able to make a merchantable article of any sort—a bureau, a horseshoe, a chisel or a dynamo when he is through school—well and good; there can be no objection, but there would be serious objection to his stopping his studies at school for the purpose of making such articles.

It thus appears that the graduate of the manual training school has acquired no trade, though he is familiar with the underlying principles of many trades; he has earned no money, he has earned no business, he has not even an adequate notion of the practical and educational value of his experienced skill. These latter things are not the fruit of schooling; they come from subsequent experience. As the trained gymnast, has developed every muscle, co-ordinate physical actions, and learned to use his judgment and maintain his self control at all times and in all positions, with no definite idea of how such training will serve him in life, so the broadly and rationally trained user of tools does not know in what emergency he will call to his aid the skill and training he has gained here. Both he and the world have yet to rise to a proper appreciation of the trained intelligence which quickly comprehends the thought of a new mechanical appliance and the force of new conditions. It should now be clear that in every craft, whether lower or higher, there are certain foundation principles, mental and physical, which underlie actual practice, and that it is the province of the manual training school to furnish opportunity for the mastery of these foundation principles, and that its claim to be a school for general education permits it to go no further. Finally, in a single phrase, manual training is that department of general education whereby one acquires the mastery of tools and materials.

HISTORICAL SKETCH.

About the year 1868 Victor Della Vos, Director of the Imperial Technical School of St. Petersburg, published a report giving for the first time the correct method of tool instruction. In his school three years were spent in training, and three years in actual technical work. His method, which was that of separating instruction from construction, was not made known in this country until the Philadelphia Exposition of 1876. The credit of calling attention to the Russian educational exhibit is due to president John D. Runkle of the Massachusetts Institute of Technology, who made a full report of their method of tool instruction to his Board of Trustees that year. In 1877 President Runkle opened shops for instruction in tool work, on the Russian plan, in the institute. Soon after the School of Mechanic Arts was opened as a sub-department of the institute for the instruction of mechanics not less than 15 years old. It had a two-year course of study, including drawing and English studies. The attendance at the school was never large. It was discontinued two or three years ago.

Meanwhile shop work for the sole purpose of instruction had been introduced into the Polytechnic School of Washington University, St. Louis, as early as 1874. In 1877 three shops were fitted for the complete round of tool work, and classes from preparatory schools were admitted. On the strength of that experience a distinct and separate preparatory school, known as the St. Louis Manual Training School, was opened September 6, 1880. The course of instruction covered three years, and was very broad and general. This school is now in its thirteenth year, with 300 students under the charge of a director and 14 assistants The immediate and acknowledged success of the St. Louis school led to the establishment of the Chicago Manual Training School by the Commercial Club of that city. The school was opened February 4, 1884. The school has upward of 300 pupils, all seats being occupied. Baltimore opened its Manual Training School March 5, 1884, as a part of the public school system. Including some classes below ordinary high school grade, its enrollment is upward of 500. Manual training was introduced into the High School of Toledo, in Ohio, in December, 1884, and during the following year the Scott Manual Training School was built in connection with the high school building. Under joint management the school is open to both boys and girls as a part of the public school system. Manual training was introduced into the College (high school) of the City of New York, in 1884. The Miller "Manual Labor" School, now very nearly a school for manual training, was established at Crozet, Albermarle county, Va., early in the 80's.

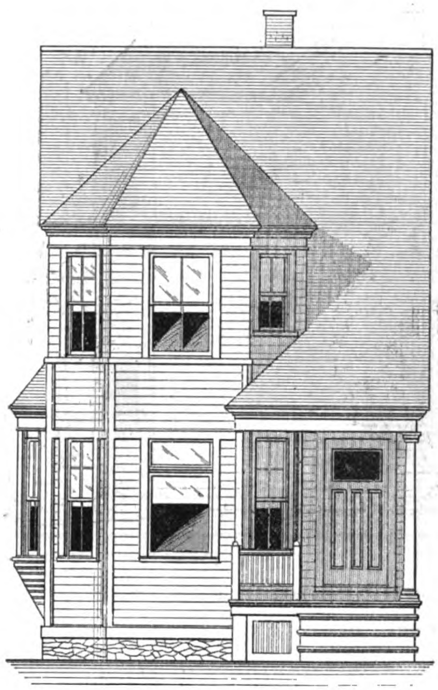
Philadelphia opened its Central Manual Training High School in 1885. The school was soon filled to its utmost, and a second one was opened by the School Board. The last report shows that these schools are crowded with a total enrollment of 576 pupils. The Cincinnati Technical School (really a school for manual training) was opened by a corporation in 1886. Following these schools the growth of manual training has been rapid, and the interest is still increasing. It is impossible to give even an approximate list of the schools established either independently or in connection with existing high schools. Nearly every State agricultural and mechanical college has a manual training department of about the high school grade, conspicuously those of Kansas, Indiana, Pennsylvania, Texas, Arkansas, Mississippi, North Carolina and Ohio.

Cottage for a Twenty-five Foot Lot.

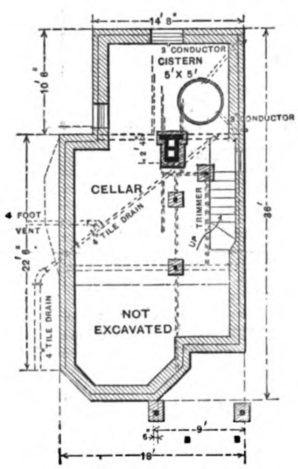
The cottage which we illustrate herewith has been designed for erection upon a plot of ground 25 feet in width, and is adapted for the city or suburbs, as circumstances may demand. It is of neat exterior, and the rooms upon the two floors are arranged with a view to economy of space, while affording convenient accommodations. The cellar, it will be noted from an inspection of the plans, does not extend under the entire building, but its excavation is sufficient to give all the room necessary. In the rear portion beneath the kitchen is a cistern having a capacity of about 25 barrels, from which water may be drawn for domestic purposes.

Ascending to the first floor of the house, we find three rooms and a hall, the latter being entered directly from the porch. The parlor and dining room are connected by a broad opening, which may be closed with *portières* in such a way as to produce a pretty effect. In the dining room is a bay window provided with a seat, which may be utilized if desired as a stand for growing plants. The kitchen occupies the rear, but can be reached directly from the front hall—a feature of arrangement which avoids the necessity of passing through any of the principal rooms to reach the front door.

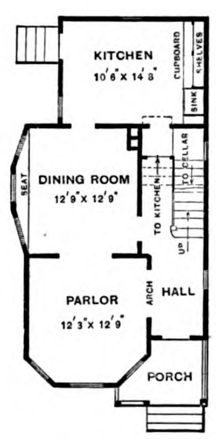
Upon the second floor are three sleeping rooms with ample closets, while in the attic is a good-sized store room. The architect of the cottage, John R. Church of Rochester, N. Y., states that the building can be erected in his section of the country for about $1000, the figure varying in different localities and according to the style of finish employed.



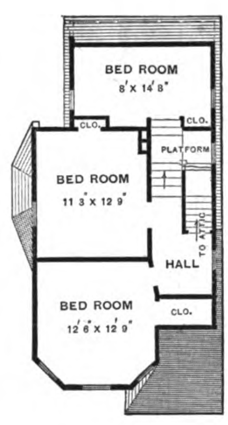
Front Elevation.



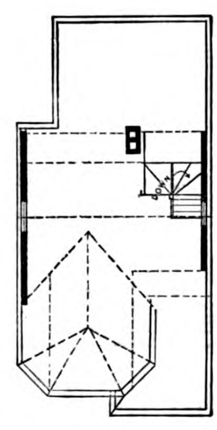
Foundation.



First Floor.



Second Floor.



Attic.

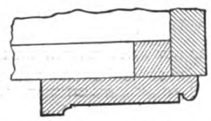
Cottage for a 25-foot Lot.—John R. Church, Architect, Rochester, N. Y.—Elevations.—Scale, ⅛ Inch to the Foot.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

A DISCOVERY for hanging paper on damp walls is being put to a practical test in Germany. It is said to consist of coating a lining paper on one side with a solution of shellac spirit, of somewhat greater consistency than the ordinary French polish, and then hanging it with the side thus treated to the damp wall. The paper hanging is then performed in the usual manner with paste. Any other resin that is equally soluble in spirits may be used in place of the shellac. According to the representations, this process is found equally effective in preventing the penetration of dampness.

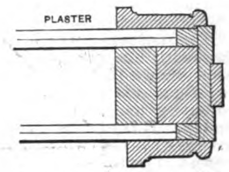
The Antwerp Exhibition.

Of the making of exhibitions, as of books, there seems to be no end in these days. Extensive preparations are now being made for the great International Exposition to be held in Antwerp next year. It will cover an area of about 200 acres in the new quarter of the city, near the River Scheldt and the new docks. The main buildings are to occupy 120,000 square yards, and will have sections devoted to industrial and commercial exhibits, including machinery and electrical appliances. A concert hall to be constructed will cover 6000 square yards. The principal idea in the exhibition is to afford Europeans an opportunity of inspecting some of the exhibits which have already been displayed at the Chicago World's Fair, and numbers of exhibitors in that enterprise have consented to transfer their products to Antwerp for the purpose at the close of the Columbian Fair. Foreign governments have been officially advised of the project by Belgium, and have been invited to appoint commissioners to represent them. All inventions, patents, drawings, models and trade-marks exhibited will be placed under the immediate protection of the Belgian Government, and all rights in respect of them will be secured. Goods arriving from foreign countries by the Belgian State railways will be returned carriage free over the same lines, and most of the regular lines of steamers will take exhibits at reduced rates of freight. The exhibition will be opened on May 5, 1894, and promises to be as great a success as the one held before in Antwerp. Many of the features of the Chicago Fair are to be reproduced, including a "Midway Plaisance," but the Ferris Wheel will be conspicuous by its absence.

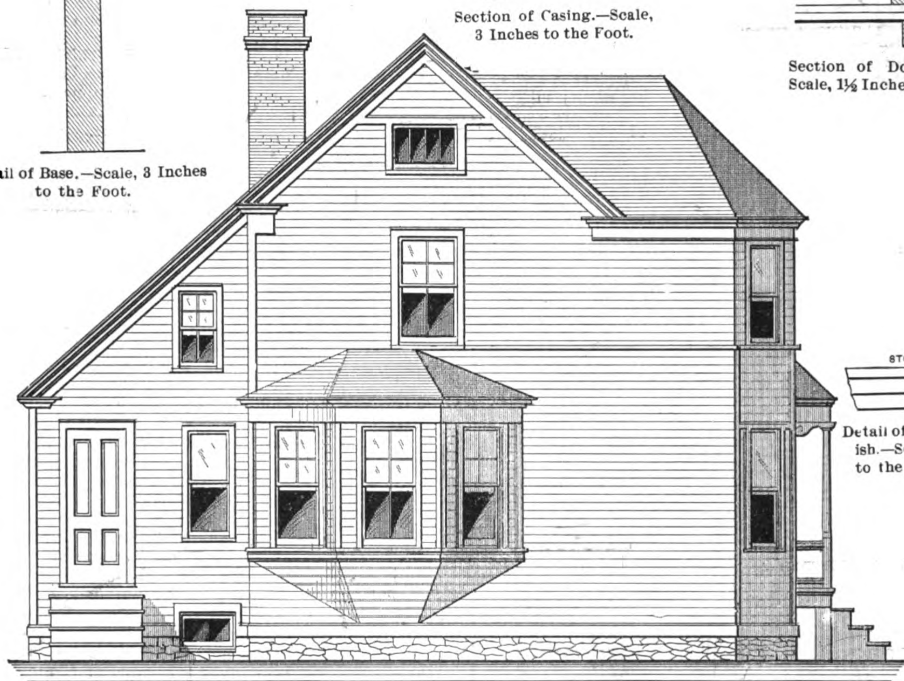
Detail of Base.—Scale, 3 Inches to the Foot.

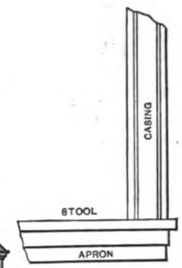


Section of Casing.—Scale, 3 Inches to the Foot.



Section of Door Frame.—Scale, 1½ Inches to the Foot.



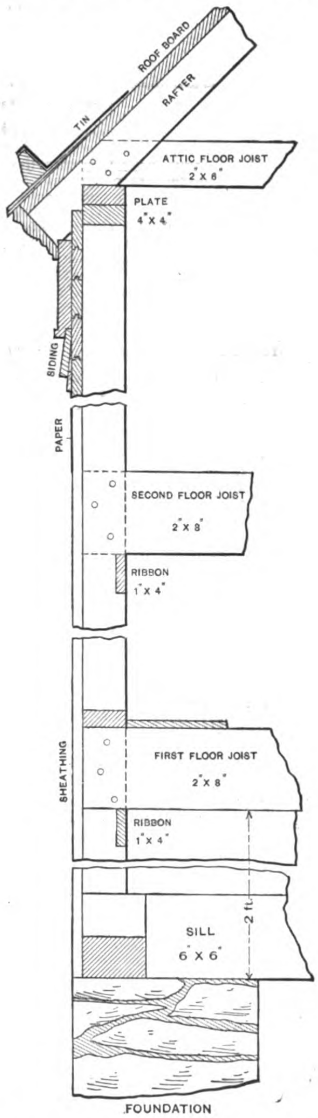


Detail of Window Finish.—Scale, ¾ Inch to the Foot.

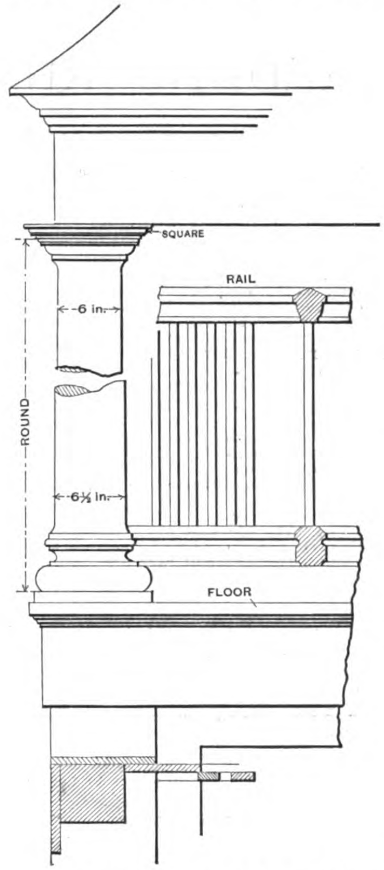
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

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

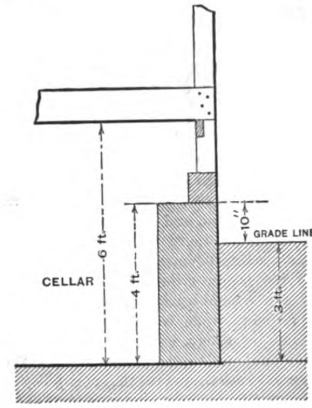
Cottage for a 25-foot Lot.—Elevations and Miscellaneous Details.



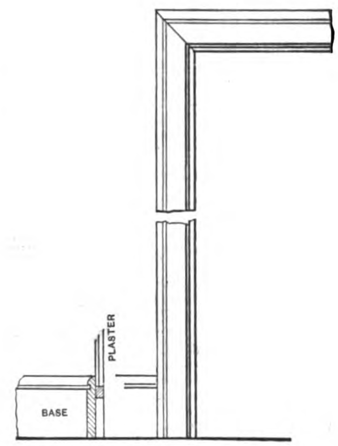
Detail of Main Cornice and Section through Frame.—Scale, ¾ Inch to the Foot.



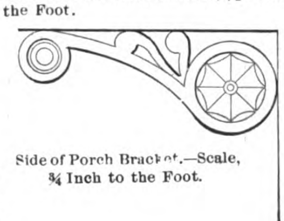
Details of Porch.—Scale, ¾ Inch to the Foot.



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

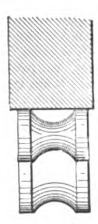


Details of Door Finish.—Scale, ¾ Inch to the Foot.

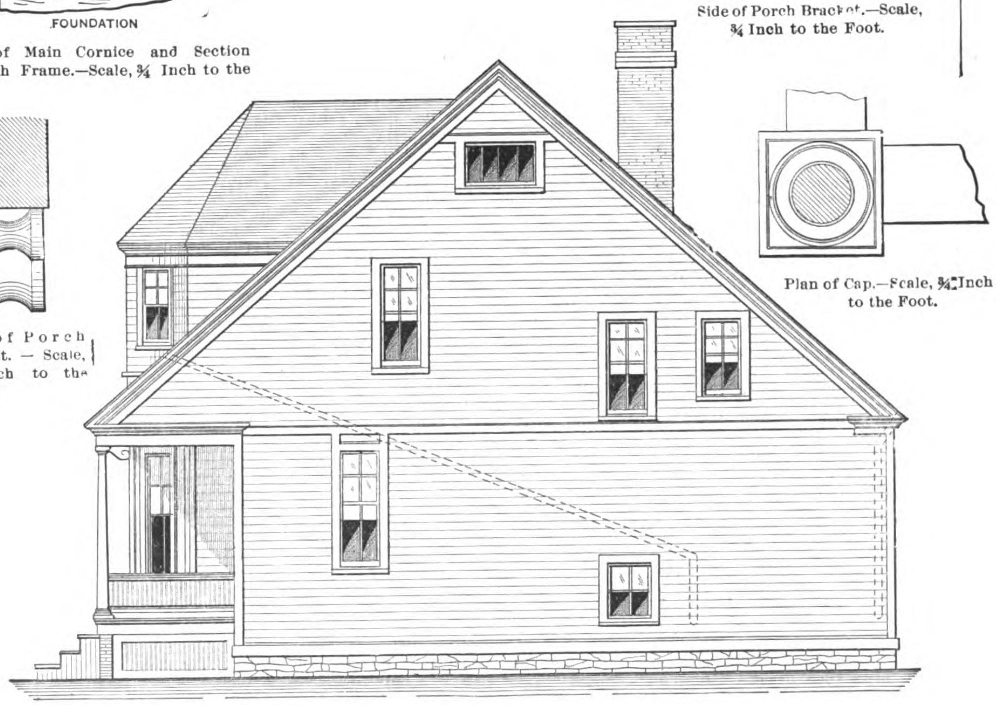


Side of Porch Bracket.—Scale, ¾ Inch to the Foot.

Plan of Cap.—Scale, ¾ Inch to the Foot.



Face of Porch Bracket. — Scale, ¾ Inch to the Foot.



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

Cottage for a 25 foot Lot.—Elevation and Miscellaneous Details

WHAT BUILDERS ARE DOING.

THE CONTINUED LACK of activity in the building trade seems to prevail with more or less serious effects all over the country. The far West seems to suffer the most, and so far as can at present be discerned there is little prospect of immediate improvement. Business is quiet in all the larger cities, and in them the need of employment appears more pressing, because when trade is dull workmen flock to the large centers, hoping to find work. The reluctance of capital to invest as yet in new operations makes the possibility of a resumption of the average amount of work before spring seem small, and augurs ill for the coming winter. The question of providing employment for the workmen in the building trades has been and is being considered by the authorities of many of the larger cities, Milwaukee, for example, responding nobly to an appeal from its painters. Builders generally throughout the East are hopeful that the present state of business will improve before winter sets in, arguing that capital is likely to take advantage of the depressed state of affairs for obvious reasons.

Atlanta, Ga.

The builders of Atlanta, Ga., have recently organized under the name of the Builders and Traders' Exchange. The objects of the new exchange are set forth as follows:

1. To make membership in the association a reasonable assurance to the public of the skill, honesty and responsibility of its members, by requiring that those admitted to membership shall have established an honorable reputation on the three fundamental points above named, and making a continuance of membership depend upon fair dealing between members and the public.

2. To offer members and the public opportunity for the consideration of all cases of improper practice and the securing redress therefor so far as the parties concerned submit to the mediation of the association.

3. To provide methods and means whereby members may avail themselves of the greater power of combined effort through the association acting as an authoritative body, in demanding and securing just and honorable dealing from the public whom they serve.

4. To secure uniformity of action among the individuals forming the association upon the general principles herein set forth and upon such other principles as may be decided upon from time to time as the best for the good of all concerned.

The following officers and Board of Management have been elected: M. F. Amorous, president, general manager Atlanta Lumber Company; J. W. English, Jr., vice-president, general manager Chattahoochee Brick Company; V. H. Kriegshaber, secretary; N. Ittner, treasurer.

Board of Management—C. C. Bradt of Miles & Bradt; M. Benjamin, general manager Atlanta Machine Works; W. H. George; A. V. Gude of Gude & Walker; J. L. Mell of Wingate & Mell; G. P. Gomez.

Over 30 members have already been enrolled, and handsome rooms have been fitted up in the old Capitol Building. This is not the first attempt of this nature that has been made in Atlanta, but the movement bears the impress of success, and a practically beneficial organization will doubtless be the result. On October 8 a house warming was held, at which a lunch was served, and a most enjoyable event it proved.

Baltimore, Md.

It appears from the statement of E. D. Miller, secretary of the Builders' Exchange, that the builders of Baltimore have felt less disturbance from the recent financial crisis than has been experienced by the builders of other cities generally. There have been no failures among the members and none have been seriously embarrassed. All have felt the tightness of the money market, more or less, and as a consequence have been more than usually careful in making collections. The banks of the city have stood by the builders, and have aided them to the fullest extent; currency for pay rolls was always provided the contractors without additional cost, even when at a premium. No work of any importance has been stopped, and the prospect for fall and winter work is all that could be expected. There has been no reduction in the scale of wages paid, and about the usual number of mechanics have been employed during the year. Taking everything into consideration, the Baltimore builders feel that their city has passed through the financial stringency remarkably well, and that the prospect for the coming season is equal to that of any of the other cities of like importance.

Chicago, Ill.

The members of the Builders and Traders' Exchange of Chicago took an active part in the festivities of Chicago day (October 9) at the World's Fair. Souvenir tickets for the entire membership were secured and the members and their friends left the exchange at nine o'clock in the morning in Columbian coaches, each drawn by six horses. The exchange was represented in the civic procession by an elaborate float commemorating the Chicago fire. A large number of guests from outside cities were invited and the affair was most enjoyable to all its participants. The committee having the matter in charge were: C. W. Gindele, president of the exchange, who acted as chairman; Edward Kirk, Jr., John Griffith, Daniel Freeman and Alexander Gibson. It was calculated that four persons would accompany each member. The number of workmen out of employment in Chicago does not seem to decrease materially and the unions are making strenuous efforts to secure work for their members by seeking to persuade the city authorities to undertake new work.

Cincinnati, Ohio.

It seems to be the opinion among Cincinnati builders that the financial stringency has had a disastrous effect upon their business and upon those connected directly or indirectly with it. There have been very few failures, but the volume of business has fallen off more than half during the season, and the prospect for the remainder of the fall is still uncertain. The prospect, as indicated by the number of building permits issued during the past 90 days, is not very flattering for immediate improvement. The builders generally, however, feel certain that the coming season will witness a revival of business to its normal tone. The Builders' Exchange is in good condition financially and numerically, and is steadily gaining ground among the fraternity.

Denver, Col.

The builders of Denver have felt for some time past the effect of a decline in nearly all branches of the business, and the recent disturbed condition of the money market has resulted in an almost total cessation of work. There is very little new work in the market, and work has been entirely suspended on several important contracts under construction. Such operations as are now being carried on are progressing very slowly and there is little prospect of improvement in the immediate future. There are many mechanics in all branches of the trade out of employment and those who are fortunate enough to be at work are probably receiving less than the usual wages. The unions are endeavoring to keep the wages up to the regular scale, and where less amounts are paid it is done without interference. It is thought that the men are working for from 20 to 33⅓ per cent. less wages than usual.

Lowell, Mass.

The building interests of Lowell are still disturbed by the masons' strike, and there seems to be little prospect of a settlement this fall. It is reported that, under a sort of compromise, the masons' union was to permit 20 or 30 of its members to go to work for a non-union contractor, but when the arrangements had been completed it was found that the contractor had engaged non-union men. The union is much exercised over the affair, and the feeling of bitterness between its members and the contractors is increased.

Milwaukee, Wis.

The condition among the builders of Milwaukee has not materially improved since the report of last month, and the contractors are generally of the opinion that the prospect for immediate improvement is not very bright. The members of the Builders and Traders' Exchange are in a more or less apathetic condition, and all are complaining of lack of work and the difficulty of making collections. The painters have made the following manly appeal to the city authorities, which has met with prompt response, the County Insane Asylum being ordered painted inside and out:

APPEALS TO CITY AND COUNTY.

We, the Painter' Union No. 159 of Milwaukee, herewith transmit to your honorable body for consideration the following preamble and resolution adopted in our union, to wit:

Whereas, The house painters' trade has to suffer most whenever a crisis is forced upon the country; and

Whereas, The present crisis is particularly hard on most of the painters, who, if they do not work in summer, certainly have no chance for winter work; and

Whereas, Now these few months have been demoralized by a shortage in work so that they cannot even earn a meager subsistence during that time which ought to be a time of plenty; and

Whereas, If such is the condition in a time when work should be plentiful, with fall and winter rapidly approaching, no fuel, no provisions and no clothing laid in for the winter when the wind blows fiercely and homes are destitute of all that makes homes desirable, think of the situation and let that fan the spark of philanthropy and arouse a feeling of action in regard to authorizing work to be done, so as to give people work instead of charity; and

Whereas, We, the Painters' Union No. 159 of Milwaukee, have opened an office in the basement of 369 Sixth street, two doors north of Chestnut street, where we register all painters, whether union or non-union men, and assign them to work according to their needs, so as to provide for the most needy at all times first; and

Whereas, If you give us work you will keep some of our craft off the poor list, who, on the other hand, would have to be supported out of the poor fund. This will be a saving to the county, as you will receive a return for your money which otherwise would be sunk.

We therefore petition your honorable body to provide work for the painters by having work done in the county institutions, which has been delayed again and again, such as the County Insane Asylum and other institutes. We sincerely hope that your honorable body will see the necessity of prompt action in the premises and authorize work to be done before it is too late to do any work.

Minneapolis, Minn.

The early season promised the builders of Minneapolis a busy and prosperous year, the prospects at that time being better than for several years past. About June 1 the stringency in the money market began to be felt and many projected buildings were abandoned before the excavations were completed; work was stopped or other contracts in all stages of completion. There are many residences throughout the city upon which work has been discontinued. It is estimated that not more than one-half the buildings begun this season will be completed before next year. Just at present everything is flat. There has been no reduction of wages during the hard times, although a majority of the workmen cannot find employment. The difficulty of procuring money with which to carry on operations has caused some of the largest contractors during the past three months to refuse to bid; others have carried on work as far as possible on their own capital. The sash, door and blind factories are employing less than two-thirds of their usual number of men.

New York City, N. Y.

Careful inquiry among the builders and dealers in building materials of New York City develops the fact that the outlook for the remainder of the fall and the winter season is not promising. It is the opinion of the most careful and conservative of the contractors that there will be an unusual lack of activity in the building trades from this time on until the beginning of the season of 1894. The majority of important jobs now under way are rapidly nearing completion, and there is comparatively little new work of any magnitude contemplated. The architects complain of the times being dull and lack of work in their department of building is evidenced by the large number of draftsmen out of employment. The effect of the tight money market has been most severely felt by the class known as speculative builders, who, failing to secure necessary loans and unable to dispose of their buildings, have been forced to the wall. The failure of these builders has seriously affected some of the best known dealers in building material in the city. The regular contractors have experienced less trouble and their difficulty has been mostly in securing money with which to pay their men. This latter condition only existed during the scare, and is now past. About as good an example as can be given of the decrease in building operations during the past season is a statement of the building permits issued for a period extending from the week of July 7 to the week ending September 10. The falling off in New York City and Brooklyn as compared with a like period in 1892 is about $5,500,000. In New York the difference has not been quite as great as in Brooklyn, the decrease in the number of buildings in the former being about 38 per cent. and in the estimated cost about 24 per per cent. The plasterers struck early in October because of a difference with the employers over the allowance of a half-day's work on Saturday. In the beginning of the season it was agreed between the employers and the workmen that the men should work only a half day on Saturday during July, August and September, and if the experiment proved satisfactory the Saturday half day was to be adopted for the entire season beginning June 1, 1894. On the first Saturday in October the workmen broke their agreement and refused to work a full day, and the employers insisted upon either a full day's work or none—that is, five days in the week. The men would not accept and struck; after being out about ten days the employers yielded and the workmen resumed work at five and a half days per week, paid by the hour. During the summer the plasterers' union joined the Central Labor Union, thus wiping out all agreements with the employers and preventing any meeting between the two except through the Central Labor Union. There have been no other labor troubles of importance.

Omaha, Neb.

The present condition of affairs among the Omaha builders is more promising than it has been for some months past. The total amount of work done in the city up to October 1 was about 50 per cent. below the average; and the falling off was attributed to the condition in financial circles. Work on several contracts, which had been stopped earlier in the season, has recently been resumed, and several large jobs will, it is expected, be placed in the market very soon. During the depression of the past six months there has been no change in wages, the full scale being paid wherever work was being carried on. There have been no disturbances caused by differences between employers, and no strikes or other troubles are likely to occur in the near future. The Builders and Traders' Exchange is in good condition, although the members complain of the difficulty of making collections and lack of work. Plans for Government work are still being received for estimate at the exchange, and the members are thus provided with the means to figure work of this character with as little inconvenience to themselves as possible. This is one of the many advantages conferred by an exchange upon its members.

Philadelphia, Pa.

The steady and effectual progress that has been made by the Master Builders' Exchange of Philadelphia is one of the best possible indications of the benefit which the builders of that city have derived from the existence of such an organization. The progress made by the exchange exhibits in a relative degree the progress of the members who compose it, and the means for benefit which the organization has afforded are indicated in the following extract from an article on the subject which appeared recently in the Philadelphia *Record:*

The true gauge of the sphere of usefulness of an organization is the practical good which it accomplishes. The Builders' Exchange of the city of Philadelphia is certainly a notable example of this aphorism, for in reviewing its brief history of only seven years, the imprint of its work stands forth so boldly from every branch of the building trades, and its influence for good has been so manifest and far reaching, that it becomes a matter of actual wonder that the various building interests did not long before organize such a useful institution as it has proven to be, to serve as a medium through which to express their opinions, to exchange thoughts on building subjects, to combine in defense of their interests, and to foster business and social relations. The annual dues are but $50 and for this small sum every member practically secures an office in the heart of the city, to which he has access during all business hours, and where he can have his mail directed if he so desires; he will find there all the trade journals in any way relating to building matters, maps and books of reference, the popular magazines and the daily papers of this and other cities. On the bulletin boards he will see posted copies of all the proposals for building work advertised. He can make appointments to meet whomsoever he will, and is sure of a comfortable and commodious place to receive them. He has at his command stationery for correspondence, lavatory, local and long distance telephone, telegraph and messenger service convenient for his use. He can meet on the floor of the exchange contractors, sub-contractors, and material men who are intrusted with at least 75 per cent. of all the building contracts given out, and who are furnishing the same proportion of the building materials used within a radius of 20 miles from the Philadelphia City Hall.

In addition to the mechanical trade schools and the permanent exhibit of building materials, which is the finest in existence, the exchange has established an excellent *café* in its building and under its supervision, which is an important factor in strengthening the social phase of the organization. A full description of the exchange, its work and methods is printed in the proceedings of the fifth national convention of the National Association of Builders, a copy of which will be forwarded upon application to the National Secretary, whose address appears on the Builders' Exchange page of this journal.

A rich portfolio of handsomely embossed morocco, containing the resolutions adopted at a special meeting of the corporate members of the Master Builders' Exchange of Philadelphia, in memory of the late Colonel Richard T. Auchmuty of New York, was exhibited a few days ago on the floor of the exchange. It was designed after an idea of Secretary Harkness, who was delegated to prepare the testimonial for the committee, which consisted of John S. Stevens, George Watson, Charles Gillingham and William Harkness. The beautiful memento will be sent to the widow of Colonel Auchmuty.

Rochester, N. Y.

The masons and bricklayers of Rochester have been having a controversy with the sewer contractors on the subject of wages, hours and working rules. The men want 45 cents per hour, with 20 cents extra for overtime and a level price for all workmen; they also want none but union men employed. They have also made the unique demand that bricklayers shall lay 1800 brick per day and no more, no matter what the capacity of a workman may be. The employers are opposed to a fixed number of hours and prefer to pay by the hour without restrictions as to time. They also prefer to employ capable men without reference to whether they are union men or not; and considering the manner in which bricks are required to be laid by the sewer commissioners the contractors think 1800 bricks per day is rather small. The employers say that they prefer to pay a workman what he is worth, and object to paying a level price for all bricklayers. Both sides appear to be firm in their positions, and there seems to be a possibility that it will be difficult to effect a settlement.

Since writing the foregoing the difference between the bricklayers and the sewer contractors has been adjusted. The contractors have conceded nine hours at 45 cents per hour, and will employ none but union men. The matter of payment for overtime work has not yet been settled, but will probably be an extra 20 cents per hour. The contractors claim that the restriction of the workmen to 1800 brick per day is unfair, it being maintained that an average bricklayer should lay at least 2500 brick on the character of work involved. Men who lay more than 1800 brick per day will probably receive extra pay.

San Francisco, Cal.

The financial depression is assigned by the builders of San Francisco as the cause of the drop in building operations to less than half the usual volume. The amount of money being invested in real estate improvements is at present comparatively small, and there is but little reason to hope that a change for the better will take place this fall. Wages have remained at the regular scale, but there are a large number of workmen out of employment.

The union carpenters on October 9 made a request of the Builders' Association for an eight-hour day on work connected with the Midwinter Fair. The association promptly made the following reply:

BUILDERS' ASSOCIATION.

To the Executive Committee, California Midwinter International Exposition:

GENTLEMEN.—At a regular meeting of the Builders' Association of California, held this day, a communication was received from the Executive Committee of the organized carpenters of San Francisco, informing this body of the action of contractors in compelling men to work ten and eleven hours a day instead of eight hours, as has formerly been the custom. In view of the fact that there is a large number of idle men in this city desirous of obtaining work, and that the fair was started with the intention of helping the workingmen, who have subscribed liberally to make it a success, this association, by a resolution passed, would respectfully ask the Midwinter Fair Commissioners to have inserted in the contracts a condition that all labor should be done on the basis of eight hours; also, that they use all endeavors in their power to induce the contractors now having contracts to conform to the eight-hour custom. Respectfully yours,

BUILDERS' ASSOCIATION.

The carpenters immediately placed the response of the Builders' Association in the hands of the commissioners of the fair and an eight-hour day is expected as the result.

Scranton, Pa.

The condition of the building interests in Scranton is about up to the mark, although the amount of new work begun is 15 per cent. less up to the present time than it was for a corresponding time in 1892. The amount of repair work this year has been unusually large, which has brought the total amount of work done about up to the average. No serious effect has been felt by the builders on account of the stringency other than the difficulty of making collections. Comparatively few workmen are idle, and the wages have remained undisturbed. The greatest activity in the building season in Scranton begins about October 1, and from present appearances the coming year will be well up to its predecessors. Plans are now being prepared for several large buildings, including a station for the D. & H. R. R., to cost $150,000, a new armory, several expensive school buildings and a number of fine residences. The new Builders' Exchange is in excellent condition and is steadily making its influence felt among the builders of the city.

St. Louis, Mo.

The building business still remains unusually quiet in St. Louis, with little immediate prospect of picking up. There are many workmen out of employment in the city, and the stone cutters are complaining that certain contractors are discriminating against the local workmen in favor of men from Chicago and elsewhere. An appeal was made to the *Post-Dispatch* to investigate the matter, which resulted in the statement by one of the contractors in question that there was no intentional discrimination against home workmen, and that cases where workmen from out of the city had been employed were very few.

Worcester, Mass.

The builders of Worcester have been feeling the effect of the general condition of the money market in the very perceptible falling off of the volume of business as compared with that of the past few years. The amount of work at present under construction is considerably below the mark, and the amount of building in prospect is not large. There are a large number of workmen, masons, carpenters, tenders, &c., out of employment, and contractors are constantly receiving applications for work. Such mechanics as are employed are being paid the regular wages in nearly all cases. Many of the contractors have taken contracts outside of the city, and all have felt the money stringency in the difficulty of making collections and the general quietness of the trade.

Notes.

Organizations have existed for many years in Philadelphia among the master mechanics of the most important of the building trades, such as the Carpenters' Company, formed in colonial days, long before the Revolutionary War, and owning at that critical epoch in our country's history the hall which it still holds, and which has become sacred to the heart of every true American from the fact that within its walls the first Continental Congress assembled in 1774; the Bricklayers' Company, which celebrated the centennial anniversary of its organization in 1890; the Master Plasterers' Company, formed as long ago as 1804, and the Master Painters' Association, more than 50 years old.

The builders of Delaware, Ohio, are seeking to establish a Builders' Exchange. Mr. B. P. Williams is one of the most active in the movement, which promises success.

CORRESPONDENCE.

Core Box Plane.

From R. A. F., *New London, Conn.* —Having saved myself much labor and executed work that was correct to a hair's breadth with my core box plane, I send this description, with sketches of it, so that others may be benefited by its use. All planes of this kind that I have ever seen were made by the owners, and I have never heard of any being for sale at any tool dealer's. For making an accurate box and doing it quickly for round cores for foundry use, whether they be straight or taper, it will be hard to beat this plan. A box for making round cores is generally made in two parts, each part being hollowed out to a half circle its entire length, and the hollowing out of this space by a gauge and sand paper, using a templet to test its trueness, is a tedious task for a very careful workman. With a core box plane as illustrated in Fig. 1 an ordinary workman can make a true core box in a few minutes. It works on the principle that no angle but a right angle can rest its point on any part of the arc of a semicircle and at the same time touch both ends of the arc. The construction of the plane is simple and any one needing such a tool can readily make it. Take two pieces of hard wood 1 inch thick, 6 inches wide and 8 inches long; fasten them securely together to form a perfect right angle or square. On the inside fasten another piece of wood, 1 inch square, for strength and to give more material where the cutter comes through. The cutter need not be over ¼-inch wide, sharpened only on the end like a chisel and not square, but slanting, so the point on the side when set will come in the point of the angle of the plane. The mortise in the plane, to receive the cutter and the wedge, should be so located that the cutter will cut all on one side and so that the point of the cutter will always come right to the point of the angle of the plane. From this description and the illustration I think no difficulty will be found in making the tool.

To make a core box with it, having trued up the material, take a marking gauge and lay out, in the middle of the wood, a space as wide as the diameter of the core you wish, as shown in Fig. 2, the dotted lines showing the semicircle desired, or if a taper core is wanted lay off the diameter at each end and draw the lines from one end to the other. Sink these lines in deep enough to allow a chisel to cut a gutter to start the plane on each side, as shown in Fig. 3. Now, with a gouge rough out the material in the center, as in Fig. 4, and start in with the plane. As the cutter does most of its work on the point and is narrow, the gouge may have to be used again as the work progresses. By holding the plane so that the blind side of it presses against the side of the gutter, as it is pushed forward it will cut toward the center of the semicircle it forms, as it cuts down, as shown in Fig. 5. After cutting out one half it will be necessary to reverse the material and begin again on the other side. The other half of the core box is made in the same way and if the plane is sharp and only a very thin shaving cut each time it will require very little sandpapering to smooth it up ready to receive the pins when the core box is completed.

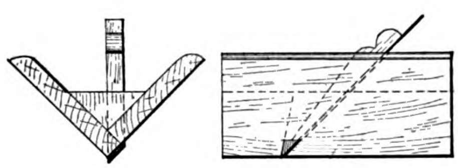


Fig. 1.—End and Side View of Core Bore Box Plane.

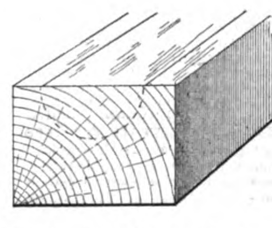


Fig. 2.—Laying Out Core Box.

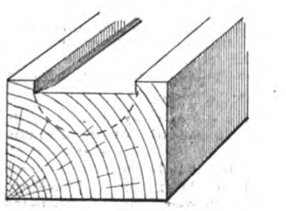


Fig. 3.—Core Box Ready for Roughing Out in Center.

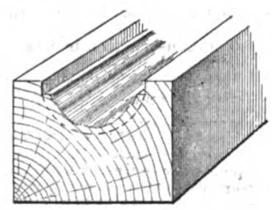


Fig. 4.—Core Box with Center Roughed Out.

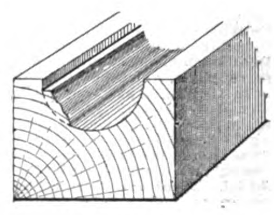


Fig. 5.—Core Box After Plane Has Been Used on One Side.

Core Box Plane.—Engravings Made from Sketches Furnished by "R. A. F."

Interpretation of Specifications.

From C. R. F., *Albion, Pa.*—I am putting up a building in accordance with detailed drawings and specifications and desire to ask the readers one or two questions in regard thereto. In the first place, I desire to know whether I am compelled to put up conductor pipes from the cornices to the ground when the drawings do not show any conductor pipes, and when the specification reads as follows:

"The roof to be covered with a good quality sawed hemlock shingles; the veranda to be roofed with tin, with gutter and down spouts."

The drawings show the gutters on the roof, but no conductor pipe. The roof of the house is to have eave troughs, but I have nothing to do with putting them in place.

Another point I would like to know about is this: Must I paint the porch roofs when the specification reads as follows:

"Paint the outside of the house with linseed oil and white lead, three coats, to be tinted if the owner desires, using not more than three different colors on the outside of the house."

This is all that is said about outside painting. In the first place, oil and lead do not constitute roof paint, and I have used three colors on the woodwork outside.

I shall be glad to have the practical readers of the paper express their views touching these questions.

Winding Stairs.

From B. G., *Williamsport, Pa.*—I am a young man learning the carpenter's trade, and I would like very much to have some of the practical readers tell me how to lay out and put in winding stairs. I would like the explanation to cover the correct method, presented in a simple and easy style.

Shingling Above Circular-Top Windows.

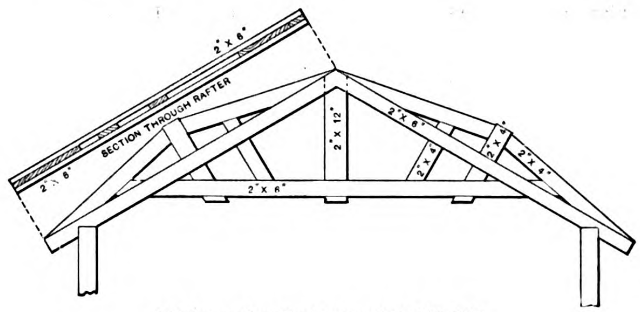
From J. C. M., *Oregon, Ill.*—In answer to "A. H." of A-Town, Pa., who asks in the December issue of the paper about shingling circular-top windows, as indicated in his sketch, I would say the best method, according to my judgment, to make a weather-tight job and have it look well at the same time, is to cut out a board for each opening, with all the circular courses in one board, and carve them to look as the sketch presented by "A. H." I would then nail tin on the top edges and let it extend well out on the building, so there will be no danger of leaking between the shingles where they come against the circular boards. I consider this question brings up something of a new study, and I shall be very glad, indeed, to see a number of opinions from practical readers.

"Carpentry and Building" Supplement Plates.

From P. U., *Salem, Ohio.*—In the May number of *Carpentry and Building*, "T. B." of Headingly, Manitoba, asks what others do with the supplement plates and says he has framed a number of them. I think my way of disposing of them a great improvement over his method. As soon as I have read the December issue, I take each year's numbers to a bindery and have them bound with the supplement plates in their proper position. I now have nine volumes of the paper and they are a source of constant reference, as I am in active building business all the time. Bound in a substantial manner the volumes are always handy and convenient, and it is easy to find just what I want.

Self-Supporting Roof.

From J. W., *Hueneme, Cal.*—I send herewith a sketch of a self-supporting roof in answer to the inquiry of "J. W.," Fort Snelling, Minn., which appeared in the March issue of the paper. As I have thoroughly tested the merits of this construction I have no hesitation in recommending it to the favorable notice of other workmen. As will be seen from an inspection of the drawings, the rafters are formed of a pair of trusses, tied together by a collar beam. If there is not too much snow in the section of country in which the correspondent lives 2 x 4 yellow pine will be sufficiently strong to carry the weights required. Otherwise I would suggest 2 x 6. In this climate the roof can be made safely of 1 x 6, or 2 x 4. A casual glance at the principle involved in the rafter construction will convince any one of its adaptability to the task required. I am now erecting one of the largest hay barns in this county and am trussing the posts on the same principle as that employed in the rafters here illustrated. The posts are 36 feet high made of 2 x 6. The plan is original and was first employed by me about four years ago. If "J. H's," building is to be covered with corrugated iron, I suggest he place each pair of rafters about 6 feet apart and sheet with 2 x 3 edgewise.



Self-Supporting Roof, as made by "J. W."

Georgia Pine Casings and White Pine Doors.

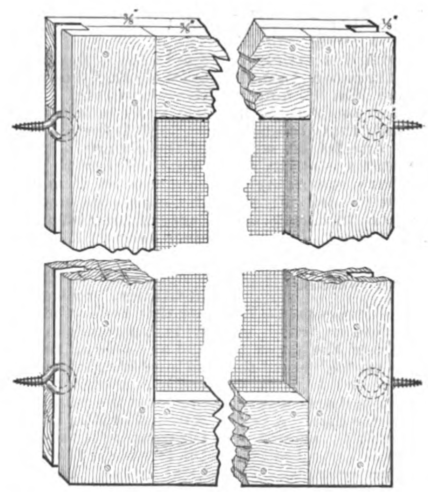
From E. M. L., *Indiana, Pa.*—In the May number of the paper "S. C. M.," Leaf River, Ill., asks why it is that houses which have Georgia pine casings always use white pine doors. I wou'd say that all houses are not thus finished, as the mills in this place make a number of yellow pine doors. I have just completed a $5000 house which has yellow pine doors and they are beauties. Probably the reason they are not more generally employed is that they draw or warp from the unequal heat of the rooms between which they are placed. Where the building is heated uniformly yellow pine is as good as white pine, in my estimation.

Information Wanted of "Ich Dien."

From R. E. J., *Cadiz, Ohio.*—I have been much interested in the floor plans and elevations of the two cheap country houses submitted by "Ich Dien" of Providence, R. I., and published in the issue of *Carpentry and Building* for August, 1892. I have carefully read what the author has to say about these designs, but I fail to find anything relative to the cost, and I shall be glad to have "Ich Dien" enlighten me upon this point.

Window Screens and Outside Blinds.

From F. C., *Allegan, Mich.*—Last fall I noticed an inquiry for a window screen that would not interfere with the opening and closing of windows and blinds. I send a rough sketch of a screen which I think will answer the purpose very nicely. The stuff should be one-half the thickness of the screen, say 3/8 inch. One corner of the pieces intended for the sides should be rabbeted out 1/2 x 1/16 inch. The frames are made of two sets of pieces so cut that the sides of one set are the full length of the screen, while the short end pieces are half those of the sides. The other set is cut with the end pieces long and the side pieces short. The construction is clearly indicated in the sketch, which shows the sides and ends arranged as described. It is better to make over a form by first putting on one set of pieces, then nail on the screen, after which put on the other set or frame. The corners will appear to be halved together, and the screen placed between the two sets of pieces. The screen is held in place by small screw eyes turned into stops, there being one at each corner. If wanted on the outside, the screw eyes can be turned into the blind stops. In all cases the screen should be high enough to reach the lower rail of the top sash. The screen may be adjusted to cover the opening of the upper or lower sash, as desired.



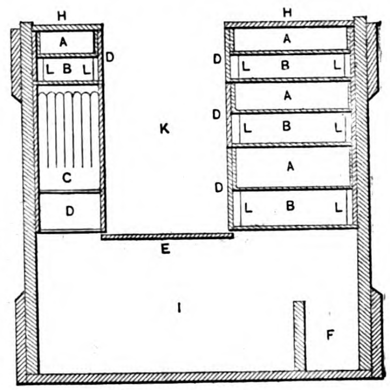
Window Screen for Use with Outside Blinds, as Suggested by "F. C."

Eave Trough for Pitch Roof.

From C. W. C. *Brandon, Vt.*—Will some reader of the paper kindly furnish a detailed drawing of an eave gutter for a pitch roof suitable for a $4000 barn, which is to be erected in this place?

Tool Chest Construction.

From N. E. O'C., *Porter's Mills, Wis.*—I have read with pleasure what "F. E. B.," Concord, N. H., has to say about tool chest construction in the January issue of *Carpentry and Building*. His plan as illustrated is good, although very old as to the main features. I prefer less drawers and deeper ones having trays fitted in them, which makes one equal to two shallow ones without trays. It is less trouble to take out a drawer and set it on top of the drawers already opened, or in some other convenient part of the chest, in order to find what is wanted under the tray, than it is to open the drawers to get at tools in the one underneath. Besides, deeper drawers run better and are less liable to get cornerways and stick. The modern tool chest is fitted with deep drawers and trays. The partition crosswise of the drawers runs up flush with the top, and in each corner of the drawer, long enough to give sufficient room underneath the tray



Section Through Tool Chest Made by "N. E. O'C."

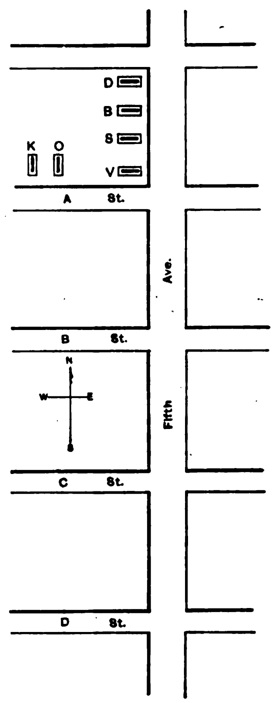
for it to rest on, are glued ½ inch blocks. Two holes are bored in each end of the tray so as to insert the fingers in removing it. A sliding shelf is placed on a line just beneath the rear drawers, which will slide under them when the tools in the bottom of the chest are wanted. This sliding shelf makes the chest a two-story affair. Its purpose is to hold, when pulled out to the front, such planes and other tools as are commonly used on a bench, yet are too bulky to go in the drawers. It should be wide enough to admit of placing jack, fore and jointer planes side by side. Of course the owner will put any tools on it as best suits his convenience. I suggest it as a good place to stow away when the bell rings the New England regulation carpenter's uniform—a green jacket and pair of apron overalls. The drawer above the saw till should contain a level and should be fitted for it. One partition is all that is necessary in the bottom of the chest, placed under the rear drawers and far enough from the side to admit hollows and rounds, rabbet, molding planes, &c., standing on end and edgewise to the partition. It should be wide enough to reach nearly to the wedge of the planes, say 5 inches high and 4 inches from the side. I inclose a sketch showing a section through the chest, which will perhaps clear up some of the fog with which the above is surrounded. Referring to the drawing, which is to a scale of 1 inch to the foot, A A A A represent trays; B B B B space under the trays; C saw rack; D drawer; E sliding shelf; F rack for hollows and rounds, &c.; H H sliding covers for the drawers; I space for heavy tools and those least used; K for bench planes, oil stone and can, uniform, &c., and L L L L are ½ inch square corner pieces for the purpose of holding up the trays. It will be noticed that the trays of the chest project ¼ inch above the sliding covers, making a place for the steel square on top of the covers.

Arch Stones in Spiral Arches.

From D F., *Philadelphia, Pa.*—I would like to ask "J. A. F." of McKinney, Texas, for additional information regarding the working of arch stones in spiral arches. I should be glad to have him furnish a diagram, showing how to obtain the twist of a voussoir of any length, as I fail to fully comprehend the method illustrated in Fig. 4 of the sketches accompanying his article in the August issue of the paper. I should also be glad to have him tell how to find the twist rule for handrail, as he seems to understand that business. Let us have more articles on stone work, with illustrations, so that the stone cutters may have something to talk about. I have copied all the masonry problems to an inch scale, and find them very instructive.

A Chimney Problem.

From X. Y. & Z., *Washington.*—We have a problem before us which we would like the readers of the paper to help us solve. The sketch shows the location of the streets and D, B, S, V, O and K represent six cottages of seven rooms each besides the hall. A very steep grade runs up Fifth avenue, so that B, C and D streets are all higher than the roofs of the cottages. The prevailing winds are from the southwest. The houses are all exactly alike in plan, each having a chimney in the middle of the house that has two openings in different rooms on both the first and second floors. The chimneys are 8½ inches square, clean and smoothly plastered inside and run clear down to the ground, but have no clean-out openings and have been built three and a half years. At all of the houses wood is used for fuel, generally pine, tamarack and fir. Houses D and O have "burned out" their chimneys three times each this year, and for the past four months have taken down their stove pipes every 30 days and cleaned them to avoid more fires. Each time considerable soot has accumulated, even in 30 days. At D and O what is called a Todd stove is being used, while at all of the other cottages direct draft wood-burning stoves are used. The pipes in these two houses show a hard, shiny deposit under the soot proper that looks as if moisture from some source had baked on. The soot cannot be scraped out clean, but only down to this deposit, which is not found in the pipes of the other houses. Only at D



A Chimney Problem, as Presented by "X. Y. & Z." of Washington.

and O have fires occurred, though all of the other houses have run their stoves as strong. At O but one pipe has been connected with the chimney, while at D there have been two. All of the chimneys have a strong draft. What we want to learn is why do the chimneys at D and O burn out while the others do not, and what is the cause of their burning out three times since January 1, and what remedy can be applied?

Note.—The chimney, though an old institution, occasionally acts in a manner that baffles those who have had a wide experience in connection with it, and as a rule all remedies tend toward an improvement in the draft. It is generally conceded that an accumulation of soot is the result of a sluggish or obstructed draft. In the case in question the conditions are so nearly alike that the trouble is probably due to a purely local cause. There is seemingly no good reason why the two houses stated should be affected by outside conditions which do not affect the others. While a claim is made for a "strong" draft, the symptoms suggest a different state of affairs. The condensation noted would not occur in the pipe if a strong draft carried the vapors, arising from combustion, rapidly out of the top of the chimney, and the same is true regarding the soot that is now deposited. The Todd stove is sometimes made with a diving flue, which cools the products of combustion before they reach the chimney, so they have less buoyancy for rising than would be true of a direct draft stove. As there are other openings into the chimney they may be sufficiently open to partially supply the draft of the chimney, when the smoke would be left largely to dispose of itself, which it does in condensation and soot. Even though the chimney is supposed to be perfect throughout, a reduction in size where it passes some timber or a similar contraction may be found on search. An accumulation of broken bricks or other unexpected obstruction has often been found the cause of a deposit of soot.

Some Timely Suggestions.

From C. E. S., *Tacoma, Wash.*—I am much pleased with *Carpentry and Building*. and desire to say that one of the recent numbers contains one of the best articles on the subject of roof framing I have ever seen. The author is I. P. Hicks, and I would ask why he does not give his method for finding the side bevels of hips and valleys to fit the ridge in roofs where two pitches meet? I would also like to see a series of articles on mechanical drawing and the orders and styles of architecture. The subject of painting might be discussed with profit to many of us. I should also like to see some illustrations of octagon, hexagon or other polygonal roof framing showing the methods of obtaining the lengths, bevels, &c., of all rafters for a roof, of straight rafters, and also of curves.

Specification for Doors.

From O. G. C., *Grand Junction, Col.*—I would like to ask the readers of the paper what they think of the following specification for doors for a school and assembly room:

"All doors to be 1¾ inches thick, square framed. Panels to be raised and molded on both sides."

While I see no chance for argument, the contractor wants to fill the specification with an ogee door, while I claim I am entitled to a molded door.

Labor in South Africa

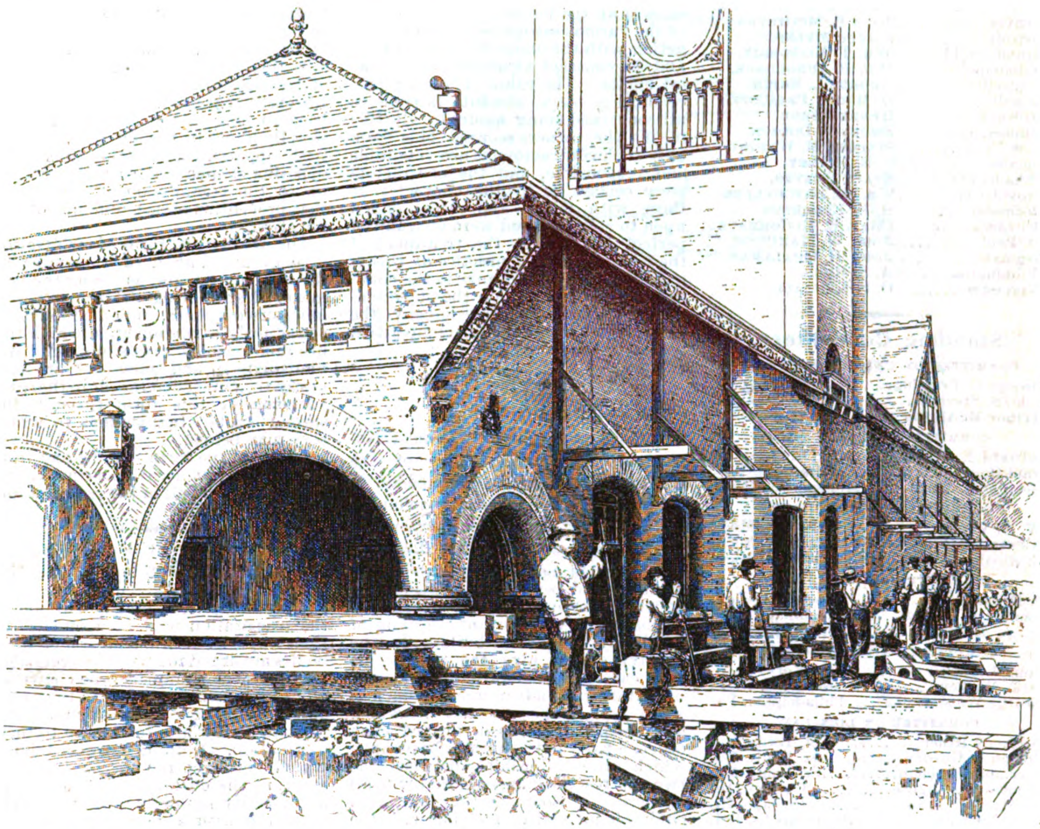
The editor of the Johannesburg *Sentinel*, in the Transvaal, publishes the following abstract of the condition of the labor market in that region, which gives anything but encouragement to those contemplating emigration to South Africa:

"Carpenters, no demand; masons, bricklayers and plasterers, no demand; fitters, overstocked; engine drivers, badly overstocked; blacksmiths, no demand; miners, overstocked; house decorators, painters, &c., badly overstocked; printers, badly overstocked; wagon builders, &c., overstocked; tailors, overstocked (owing to colored tailors); bakers, overstocked; shop assistants, badly overstocked; clerks, terrible; dressmakers, overstocked; teachers, poorly paid; good white domestic servants, plenty of room; waiters, overstocked; cab drivers, mostly colored."

The scale of wages, although much above the ruling rates in Europe and America, are, however, counterbalanced by the excessive cost of living. The rent of a three-room cottage is given as from $35 to $40 a month, and good table board at $8 to $10 a week. All food articles, except beef and mutton, cost three or four times their value in England, clothing more than twice as much, and other necessaries of life in proportion.

Moving a Brick Railroad Station.

A very interesting piece of work in the way of moving intact a large building has just been completed in the upper section of New York City. The structure moved was the brick railroad station at Mott Haven on the line of the New York Central & Hudson River Railroad, the building being raised from its original foundations and carried back a distance of 50 feet. In order to give our readers some idea of the magnitude of the undertaking it may be stated that the extreme length of the brick structure is 185 feet, with an average depth of about 35 feet. Midway of the front is a tower 19 x 19 feet and having a hight of 80 feet, the weight being 500 tons, while the estimated weight of the whole structure is given as 1700 tons. The building was first placed upon solid blocking, the timber employed being 14 x 14 Georgia pine, and the job requiring about 100,000 feet. Instead of moving the building by windlass power, as is so familiar in connection with frame structures, the brick station was pushed to its new foundations on skids or ways, consisting of a frame work of heavy timbers. The ways were thoroughly lubricated so as to reduce friction to a minimum, and then the building was pushed along on them by means of jack screws placed at intervals along the front of the building. Fourteen screws and 19 men were employed for the purpose, it being necessary to use two men in operating each of the screws at the base of the tower, this being the heaviest part of the building. The abutments against which the jack screws rested were heavy timbers secured to the sliding skids by means of heavy chains. The opposite end of the screw worked in a hollow log which pressed against the timbers upon which the building was supported. In moving the building the men took their places at the screws, as shown in the general view which we present herewith, and at a given signal by the foreman each screw was given a quarter turn. This was continued until the screws abutting upon the timbers had been run out to practically their full length, when the chained pieces were moved forward and again made fast, this operation being continued until the building had been forced the 50 feet. The work was done in four and a half days by the well-known firm of house movers, B. C. Miller & Son of Brooklyn, N. Y. This is said to be the largest brick structure ever moved in the manner indicated and was a complete success in every particular, there being scarcely a perceptible crack in any part of the building. It may be interesting to remark in this connection that it was Messrs. Miller & Son who moved the Brighton Beach Hotel, at Coney Island, a distance of 500 feet inland. This building was 400 feet long and 210 feet deep, ranging from three to four stories in hight in different portions of the structure. There were also five large towers, six and seven stories in hight, the entire building weighing in the neighborhood of 5000 tons. This structure, however, was moved by placing it upon 112 railroad cars running on 24 tracks and drawn by means of locomotives.



General View, Showing Method by which the Brick Railroad Station at Mott Haven, N. Y., was Moved Back Fifty Feet.

THE MOST STRIKING and oddly shaped building in Germantown, says the Philadelphia *Record*, is now being constructed by George Hearst, contractor, for H. K. Cummings, on West Tulpehocken street, which will cost fully $30,000. It is a mixture of Colonial, Spanish and Italian styles of architecture, and is being built principally of Eastern pressed brick, with limestone trimmings. The most striking feature is the second story balcony, extending from the dwelling a distance of 27 feet over the *porte cochère*. Other balconies, supported by colonial pillars, adorn the front of the building, which is 112 feet front. The roof is Spanish tiled. Mahogany and quartered oak are being used in the interior finish. A large stable, in the rear of the structure, of similar style of architecture, is being finished. Mr. Cummings expects to eat his Christmas dinner in his new home.

Repairing Old Ceilings

A plastered ceiling that is very loose and almost about to fall may sometimes be saved by the following method, says a writer in one of our English contemporaries: Form of two or three pieces of scantling and ordinary laths a frame long enough to cover the defective part. Hold this against the ceiling by means of two uprights, and gently press back the loose plaster against the underside of the joists, supporting the lower portions of the uprights by means of wedges. Now take some ordinary wrought nails, and file slots into their heads so that they may be driven home by means of a screw driver. Use a sharp screw driver, and press each nail gently through the plaster into the joist, giving each a twist when it has entered the wood. If this is done carefully the plaster will not be disturbed, but will be held perfectly when the frame work is taken away. A little plaster of paris for filling up the holes will give a very good job. For safety the ceiling is best papered before being whitened.

The Builders' Exchange

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Desirable Method of Competition.

One of the best examples ever given of the practical benefit of a builders' exchange to its members occurred in the Master Builders' Association of Boston recently. The Union Brewing Company, being desirous of erecting new buildings, caused the necessary plans to be drawn, and in order to secure the fairest possible method of competition appealed to the Master Builders' Association for aid in the matter. The association assumed entire charge of the competition and the following notice was issued to all its members:

ESTIMATES WANTED.

Plans and specifications for brewery buildings for the Union Brewing Company have been deposited with this association for estimating. They can be seen any day from 9 a.m. to 3 p.m. in the corporation room. Estimates in one lump sum for whole job are to be placed in the hands of the secretary of this association on or before Wednesday, October 11, at 3 o'clock, p.m., at which time the bidding will close. The estimates will be opened in the presence of the secretary, and the work will be awarded to the lowest bidder, provided the lowest estimate does not exceed the sum the company propose to expend.

Wm. H. Sayward, secretary M.B.A.

Upon the day appointed the bids were deposited in a sealed box in the rooms of the association, and at the hour specified for the opening of the bids the seals were broken by the secretary of the association in the presence of all the bidders. The amounts of the various estimates were read, together with the name of the estimator, and the contract awarded to the lowest bidder. The value of such a proceeding is plain, absolute fairness to all concerned being assured. By this means the owners secured bids from only such contractors as are reputable and responsible, and the contractors were certain as to the character of those with whom they were called upon to compete, and were guaranteed perfect fairness in the treatment of their bids. Such a practice as this is possible to every exchange in the country, and by its adoption the objectionable features which accompany the present lack of method in competition would be overcome.

Bulletin No. 2.

The following bulletin, issued November 1 from the office of the National Secretary, is commended to the members of all local exchanges and others for careful consideration.

To the Members of All Filial Bodies:

The urgent need of equitable, harmonious and permanent relationships between employers and workmen is one of the most important questions of the hour, and every builder in the country should give the matter his most careful consideration. The great importance and advantage of securing, when both employers and workmen are amicably disposed toward each other, a fixed and honorable basis upon which all relationships between the two can rest must appeal forcibly to all concerned. Some recognized and equitable method of treating with the differences which are continually arising is a necessity; for these differences must be treated with, and the advantage of a mutually recognized method of treatment over the present chaotic condition is self evident. It is equally self evident that the only proper time for formulating methods for mutual government in adjusting points at issue between the two, and which formulation requires the joint action of both sides, is when the atmosphere is free from disturbance. There is no case on record where permanent and equitable relationships have been established between employers and workmen in the building trades as the outgrowth of a strike or lockout—that is, where force was an element, the stronger dictating the terms of settlement and the weaker capitulating.

The preventive method, or "form of arbitration," adopted and advocated by the National Association of Builders, presents the best form yet produced for securing joint action between employers and workmen. It is just and equitable, and possesses the recommendation of never having failed to accomplish the desired end wherever it has been adopted. Since its adoption at the fifth convention in New York City this form of arbitration has been tested, and in every case has proven the wisdom of its framers. Specific cases of its use have been frequently shown in the columns of *Carpentry and Building*, and have been presented by the National Secretary as examples of the benefit which has unfailingly followed its use. The neglect of employers to investigate thoroughly and adopt this form of arbitration, which is the only fair, square recognition of the whole bearing of the labor problem, the only true, logical, scientific way of approach and method of treatment of the question, is to be sincerely regretted. Employers have been so long in the habit of keeping stolidly along in the old ruts, waiting with apparent unconsciousness until opposing elements have been wrought up to the commission of overt acts, that prevention seems difficult of application.

The use of this form of arbitration is again urged upon each member of the filial exchanges as being the best means of preventing the occurrence of labor disturbances, and of establishing a practical foundation upon which future relationships may stand solid and undisturbed; and members are earnestly recommended to secure the early adoption of this form through the special trade organizations to which they may belong.

Copies of the form can be had from the national or local secretaries, and it is printed in full in the report of the fifth convention.

To Members of Filial Bodies.

The various committees of the National Association are desirous of receiving suggestions which will aid in the preparation and completeness of their reports. All members of filial bodies are urged to forward suggestions to the proper committee, the chairman of which is mentioned first in the roster on this page, or to the National Secretary, to be by him forwarded to their destination. Nothing however trivial, which needs correction or improvement, in the customs which obtain in any locality is unimportant; and the greater the assistance rendered the committees by the individual members of the local exchanges the more important the result of the coming convention will be.

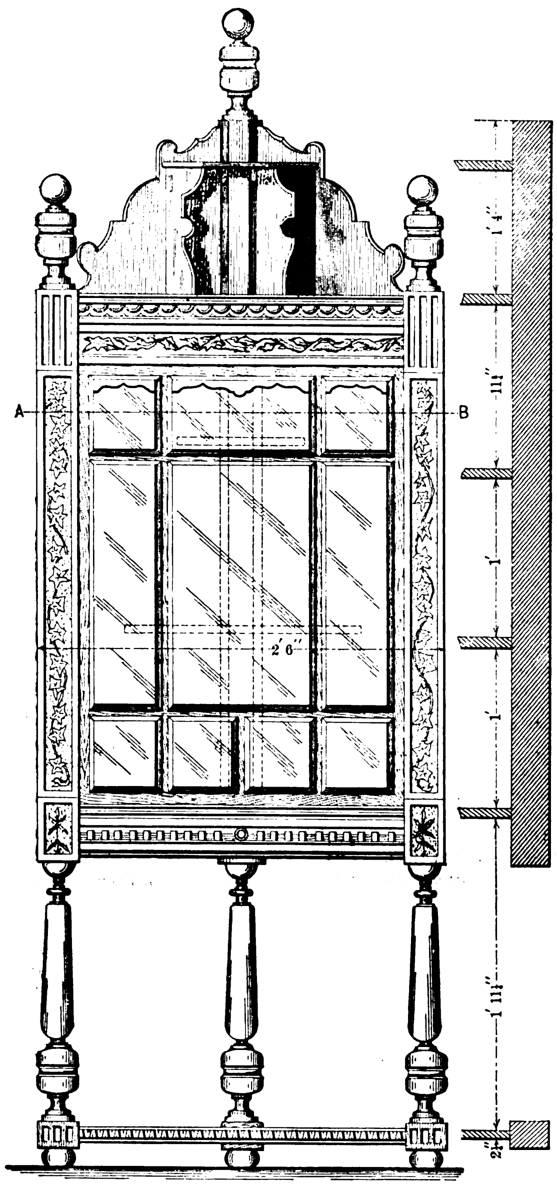
The Uniform Contract.

The use of the Uniform Contract is steadily increasing all over the country, but the greatest recent gain seems to be in localities in which the recommendation of the National Association, contained in Bulletin No. 1, from the Secretary's office, regarding the issuance of special cards to the architects, has been complied with.

The value of the use of the contract to every builder is being demonstrated by its increased use, and the fraternity in general is profiting by the use of a form which is universally recognized as standard, and with which both builders and architects are becoming more and more familiar. Members of the local exchanges should insist upon the use of the form, and should sign no other.

Design for a Cabinet.

The drawings which are presented herewith illustrate in elevation and section a cabinet in which many of our young readers may be interested. Mechanics are often called upon to execute work of this kind and the design which is given herewith may afford them some suggestions. The drawings with the dimensions are of such a nature as to make the arrangement of parts clearly understood without extended description. In Fig. 1, which represents the front elevation and section, the hight of the shelves is given, while in Fig. 2 is shown a plan view taken on the line A B of the elevation. Fig. 3 is a section of the bottom shelf, while Fig. 4 is a view taken on the line C D of the plan. In Fig. 5 is clearly indi-



Elevation and Section.—Scale, 1 Inch to the Foot.

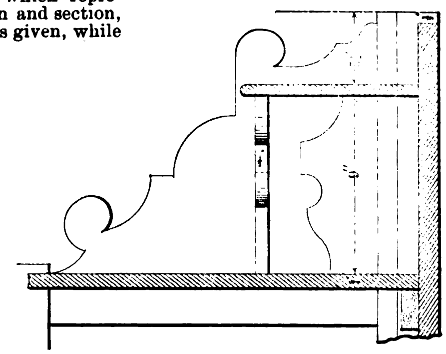


Fig. 4.—Section Through C D of Fig. 2.—Scale, 1½ Inches to the Foot.

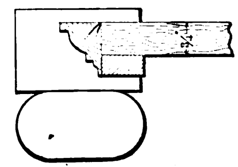


Fig. 3.—Section of Bottom Shelf.—Scale, 3 Inches to the Foot.

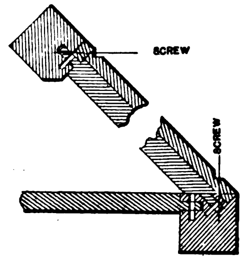


Fig. 5.—Section Through Side and Upright.—Scale, 1½ Inches to the Foot.

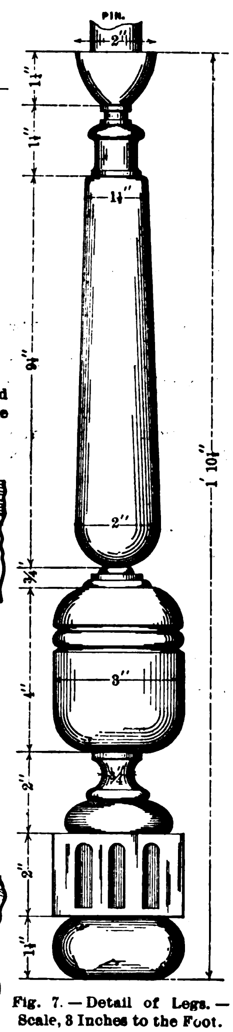
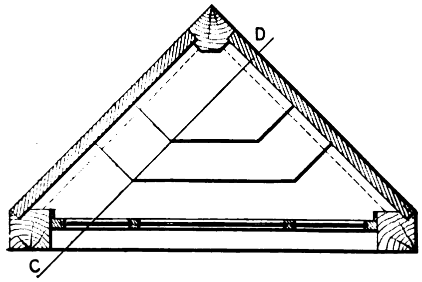


Fig. 7.—Detail of Legs.—Scale, 3 Inches to the Foot.



Plan View Taken on Line A B of the Elevation.—Scale, 1 Inch to the Foot.

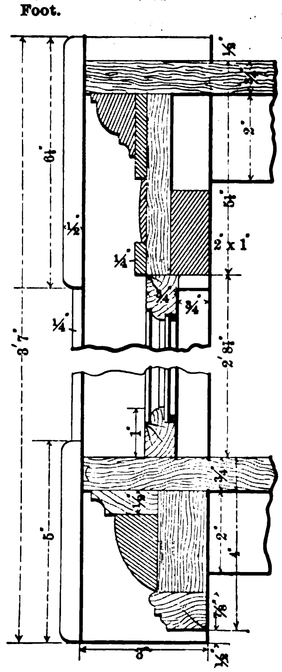


Fig. 6.—Section of Cornice.—Scale, 3 Inches to the Foot.

Design for a Cabinet.—Elevation and Miscellaneous Details.

cated the manner in which the sides and uprights are joined, while Fig. 6 gives a section of the cornice. Perhaps the most difficult part of the work in constructing this cabinet is the mortising and rabbeting of the front uprights, a section through which is given in Fig. 5. The rabbets in the rear upright are stopped ½ inch from the top. Pins are turned on the legs and finials to fit into the holes made for them in the uprights. A detail of one of the legs is shown in Fig. 7. The shelf above the cupboard is the same shape and size as the top one inside. All the flutes are ⅜ inch wide.

Principles in Organization

W. H. SAYWARD.

The adoption of a constitution and by-laws by an exchange constitutes the principles upon which the organization is to stand and the rules under which these principles shall be practically applied to the affairs of each one of its members. It is frequently a difficult matter to secure a formal complaint against such members as have broken the rules of an exchange, because of the reluctance of the other members to become individually responsible for the instigation of the prosecution of a fellow member. In other words, members seem to be reluctant to demand the protection of their individual rights at the hands of the organization, forgetting, in the meantime, that that which menaces an individual menaces the whole. The member who refuses or neglects to act in support of the rules of government to which he has subscribed commits an offense against his organization equal to that committed against its members by the individual who has transgressed its rules. Supporting the rules of an organization consists of something more than mere conformity to them ; conscious allowance of their infringement, without effort for their protection, is virtually announcing belief in their fallacy. The member who knowingly permits another member to infringe upon the rules of an exchange abrogates his own rights in the matter, and thereby permits the rights of all others to be assailed, and, at the same time, allows the tone and standard of the whole organization to be lowered without protest. The principles involved, and upon which the organization rests, should be sustained at all times without fear or favor, otherwise they become but empty phrases of no benefit to any one. Whenever a breach of rules or transgression of the laws of an exchange occurs the case should be thoroughly investigated and the offense, if any, should be rigorously dealt with. "Self preservation is the first law of nature" is an axiom which applies to an organization as well as to an individual.

Test of Fire-Resisting Materials.

A rather curious and instructive experiment was carried out in Berlin not very long ago, some account of which may prove interesting to our readers. An old building, which was to be removed to make way for new constructions, was secured, and a competitive test of fire-resisting materials instituted. Of course it was impracticable to rebuild the house with real fire proof construction, but in Germany, as here, there are many manufacturers of materials for building fire proof partitions, or for protecting ordinary wooden construction against fire, and the architects and fire engineers who instituted the test thought, with justice, that a thorough trial of these was of great importance, and that the opportunity of making it should not be neglected. In order to make the test conform as closely as possible to the conditions likely to be met with in practice, the different rooms were fitted up in various ways. Several were left as simple living rooms, with such furniture as would be found in ordinary dwellings ; one was fitted up as a furniture manufactory, another as a drug store, a third as a molding mill, a fourth as a storage room for furniture and two others as petroleum stores. The rooms were then assigned to the manufacturers who wished to compete for them to protect according to their systems. In order to make the test as comprehensive as possible, however, the manufacturers were required to protect various pieces of iron work by their own systems, and in some cases, where there was a doubt as to the capacity of the fire-proofing material for enduring a sudden shock, heavy weights of iron were supported above them by light wooden frames, so that on the burning of the frames the weights would fall. Arrangements were made for extinguishing the fires both by hydrant streams and hose from a steam fire engine, so as to test the resistance of the various materials to sudden cooling and to the violent impact of the engine stream, and, with the scientific thoroughness characteristic of the Germans, a set of pieces of different substances, made for the purpose and fusible at known temperatures, was placed in each room, so that the temperature produced by the fire would be registered.

JURY OF EXPERTS.

A jury of experts was appointed, and a large company of architects, fire engineers, builders and scientific men was invited to witness the test. As this lasted several days, the rooms being separately set afire and extinguished, a restaurant in the neighborhood was engaged for the use of the guests, and there the manufacturers displayed drawings and models of their systems, while the preliminary discourse, by the veteran Herr Stude, the Director of the Berlin fire service, was given, and the decisions of the jury announced, in the same place. According to the admirable description in the *Deutsche Bauzeitung*, from which we can only borrow the most important particulars, says the *American Architect and Building News*, it appears that the fire was first set in an upper chamber, which had been treated by an exhibitor from Breslau, a carpenter named Schubert. The novel portion of Herr Schubert's construction consisted in plastering on a network of square wooden rods, interwoven with wire. Plastering in Germany is usually done on reeds, instead of wooden lath, so that the Schubert construction was particularly interesting to the company, and, as his square laths were set with the edge toward the front, he secured a good key, besides protecting a larger part of the surface of the laths than is usual with wooden lathing. In the room tested this sort of lathing was applied in various ways. The old walls and the underside of the rafters were covered with it, and plastered ; a partition was made of two thicknesses of it, the laths of the two thicknesses crossing, and plastered on both sides ; another partition was made of two thicknesses, but on studding, and the space between filled with slag, and a floor was laid with it and covered with cement, the ceiling under being lathed in the same way, and plastered, while a deafening of earth, in the ordinary German manner, was put between the beams. After the fire was extinguished it was found that, although the temperature, as shown by the fusible standards, had exceeded 1000° C., which is about the melting point of cast iron, the plastering on the Schubert laths showed only unimportant cracks. Where the laths were exposed in these places they were charred, but the mortar at the back of the charred laths was uninjured. The floor of cement on lath was in good condition, and water tight. Besides this construction, however, Herr Schubert showed other devices of a less simple and sensible sort. Among these was a door, consisting of a single sheet of magnesite, applied on a double layer of jute fabric. This door, although it was very small, being only 2 feet wide and less than 6 feet high, had warped under the heat so as to allow the fire to pass through the opening into the next room and patches of the magnesite had scaled off. He had also treated the wooden stairs by soaking them for two weeks with brine and then covering them with asbestos linoleum, a process which the *Deutsche Bauzeitung* calls an "excuse for protection, very disproportionate to the object sought," while it describes the appearance of the staircase as "anything but pleasing."

ONE OF THE MATERIALS TESTED.

The next exhibitor showed a material which reminds one strongly of the so-called "fire proof" materials to which the attention of architects here is frequently called. This substance was a linen canvas, made "fire proof" by impregnation with some mineral salt, and water proof by painting, and represented to be desirable for protecting wood work, covering roofs and laying over floors. According to the report of the jury, who watched its behavior, this valuable material "immediately blazed up" as soon as it was touched by the fire, and, so far as they could see, it presented "no noticeable resistance to fire," although they thought it possible that, being freshly painted, it might not have done so well in this instance as it would under more favorable circumstances. Next to the linen canvas fire proofing came a system of covering with plates of cement-concrete, which was applied to walls, ceilings and floors in one of the rooms, as well as to iron beams; while a partition was built up through the middle of the house, consisting of two thicknesses of it, with an air space between. Although the heat in the room exceeded 1000°, the cement plates resisted admirably. Here and there the cement was slightly cracked, but the wood and iron under it was perfectly protected, the iron beams showing no loss of strength in testing subsequently The report of the jury pronounced this system, known in Germany as "Boklen's construction" to be "thoroughly fire proof," so far as the results of the test showed.

Deterioration of Zinc Work in Australia

R. Gordon Hyndman, in a paper read a short time ago before the Royal Victorian Institute of Architects, in Melbourne, made the following observations in regard to the use of zinc for roofing and other architectural purposes in Australia: During the last few years in Melbourne the use of zinc has largely increased, both for ornamental purposes and, more commonly, for flashing. There are likely soon to be complaints as to the failure of this very useful but somewhat uncertain metal. It has been discovered on the Continent that where zinc work comes in contact with brick work the zinc pits and rapidly oxidizes and becomes brittle. Chemical tests show that the brick work itself contained 1.14 per cent. of soluble salts quite capable of producing these results, and that their action was stimulated by moisture. In other places zinc used for roofing and ornamental purposes has been found to deteriorate rapidly, especially in large cities, where coal is burned containing a percentage of sulphur.

MASONRY AND STONE CUTTING.*

APPLICATION OF DESCRIPTIVE GEOMETRY TO GOTHIC VAULTING.

ALL the problems studied up to the present time belong to the Renaissance architecture, and before considering the application of geometrical methods to Gothic work it is desirable that we should clearly appreciate the essential difference which exists between classic and Gothic vaulting. With that view the reader will allow me to explain the origin and growth of these two styles of vaulting.

Those who can study Choisy's "Art de Bâtir chez les Romains et chez les Byzantins" will get a luminous description of the art of constructing vaults in ancient times. This is a work based on original research to which I must refer.

What distinguishes the Romans among the people of the world is their exceptional power of organization. It is to that gift that they owed not only their conquests, but the retaining under their sway of the countries they had acquired by force of arms. This organizing power showed itself in everything the Romans undertook. It showed itself in the caste organization of the Roman state, with its different grades of citizens, each having its special function in the common weal, and also in the various checks by which the excesses of each caste were kept in proper limits. That the Roman army owed its power entirely to clever organization and absolute discipline has already been stated. In the law the Romans are head and shoulders above all people past or present. The moderns are therein but little children lisping the lessons they have learnt from the Romans. In architecture the Roman organizing power is as conspicuous as in everything else. It shows itself both in plan and in structure. He who wishes to learn to plan public buildings properly cannot too much study Roman examples. They are the alpha and the omega of that art.

In dealing with construction, the Romans took an administrative point of view. In most of their possessions they had at their command a large amount of unskilled labor, and the problem which they had to solve was to carry out structures of all kinds and in all parts of the world by means of unskilled labor guided by a few officers or foremen. To this end no kind of construction is better suited than concrete. Some trained carpenters come from Rome, put up the shell or mold which barbarians fill with concrete. The head engineer and his assistants set out the carefully prepared plan on the ground, give the carpenters the lines of their centerings, and the laborers fill up the concrete beds systematically to order. Everything is forethought, precision, and nothing is left to individual initiative. It is as perfect an organization as that of an army, and the work of the laborer is about as intellectual as the goose step which exercises Tommy Atkins' mind in our days.

We moderns who have to pay for labor, when we build in concrete we pitch it out of a wheelbarrow, or at best with a shovel. The first is inapplicable to the construction of walls above ground, because the pitching of the concrete in large quantities would exercise a lateral pressure on the timber centerings and cause the walls to bulge. The second system has that drawback to a lesser degree, but does not insure so perfect a result as the Roman way.

Roman walls are actually built in horizontal courses of small rubble stones, the size of which was limited by law by having to pass through a 2-inch ring. Thus all lateral pressure was avoided. The vaults also were formed of horizontal courses of the same work. The building when completed was a mere cast, just as much so as a plaster statue.

But this cast contained hidden in its mass an element of life from which sprang, I believe, the scheme of our Gothic vaults.

Some of the Roman vaults have a span of over 75 feet, and no timber framing that one could practically put up would be able to support the enormous weight of the concrete crus- while the vault was in course of construction. The Romans overcame that difficulty in the following way:

Suppose they are building a barrel vault. Up to A of Fig. 247 their horizontal courses of masonry exercise practically no pressure on the centering. Above this level they certainly would. Here the Roman calls to his aid a few skilled bricklayers and makes them throw over the centering a series of burnt brick rings. These rings are rather peculiar. You see four or five courses of bricks such as we would lay them ourselves, then a large tile is intercalated, and the same feature appears again at more or less regular intervals. The whole thing is slovenly constructed, as if done in a violent hurry. In truth these rings of brick were never to be seen, not more than the iron rods that stiffen the legs and arms of a clay model. These rings were mere stiffeners to receive the pressure of the concrete while the vault was being filled in, but once the vault was finished and completely set, the purpose of the brick rings had come to an end. The tiles, Fig. 251, intercalated in the brick arches are mere flanges to bind the arches more completely to the concrete crust while in its still more or less fluent state.

When, instead of a barrel vault, the Roman built cross vaults, Fig. 248—that is, a barrel vault intersected by transepts—he began by constructing the centering for the main barrel vault, and on the top of that he placed the centerings of the intersecting vaults, just as one would fix a timber dormer window on a roof. In his structure the Roman considered only the shape he intended to give to the surface of the vaults; as to the intersections, they would be what the construction gave.

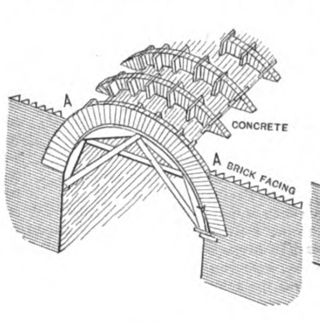


Fig. 247.

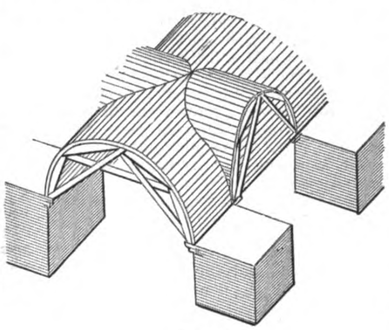
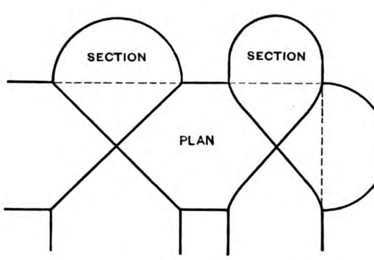


Fig. 248.



Figs. 249 and 250

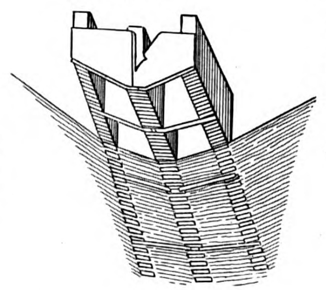


Fig. 252.


Fig. 251

Masonry and Stone Cutting.—Figs. 247 to 252 Inclusive.

When the two vaults had equal spans, Fig. 249, both were usually semicircular barrel vaults springing from the same levels, and their intersection would be contained in a vertical plane, therefore be straight on plan.

If one of the vaults was narrower than the other, Fig. 250, it was also made semicircular, but its springing was lifted up until the crowns of the two vaults were on the same level. In that case the plan of the groin formed by the intersection of the vaults would be a serpentine line. Also with cross vaults, the Roman used brick rings while the vault was in course of construction. The centerings were made to follow the groin and were constructed of three parallel rings of brick connected by tiles, as shown in Fig. 252. The usual cross rings were also used.

The Byzantine Greek builders erected later on similar cross vaults in brick and stone without the use of ribs, but I do not think the Oriental methods of construction affected in any way the system of construction which was adopted in the Western parts of Europe.

In Gaul and the Rhenish provinces

*Continued from page 142, May issue.

after the fall of the Roman Empire the Roman building traditions were preserved, but the circumstances had changed. Instead of hordes of slaves or legionaries to fill in concrete masses of masonry, there were but few workmen. It may be even that the secrets of preparation of the Roman cement had been forgotten. In most places stone had to be used instead of bricks. The successors of the Roman workmen adopted, therefore, the simple device of building their centerings in stone instead of brick, and in forming the vault surfaces on the top of these centerings. From this moment, cross ribs and diagonal ribs become exposed to the view. They are the essential features of the structure, to which regular geometrical forms are given, such as circles or arcs of circles. The surfaces of the vaults have to suit themselves as best they can to fit these ribs. They are usually irregular surfaces possessing no definite geometrical formation. This, according to Sir Gilbert Scott, is Gothic architecture. The pointed arch is a mere detail not at all essential to the style. Of course all the ribs were built in vertical planes. . . . .

Roman architecture was the result of the Roman processes of construction. Gothic architecture was the outcome of the brains of practical workmen. Every feature therein had been invented for a practical purpose, most often to save labor. The Rennaissance master ignored all that. He prescribed Roman form as a matter of taste, and he had that form executed with means which were not suited to that purpose. Hence arise all the difficult problems of geometry relative to intersections of surfaces which we have met in our former articles on masonry and stone cutting.

With Gothic architecture these difficulties are not to be met, and the applications of geometry are reserved to a few points which we shall examine hereafter.

New Publications.

Hydraulic Cement. By Fred. P. Spalding, Assistant Professor of Civil Engineering, Cornell University, Ithaca, N. Y. 108 pages, 5 x 7 inches in size. Bound in cloth covers, with gilt side title. Published by Andrus & Church. Price, $1.

This little work consists of a series of notes on the use of hydraulic cement, and is designed to be employed as a text book in a short course of instruction, as well as to serve the purpose of a handbook in the laboratory. In the first three chapters an attempt has been made to give a brief statement of the general properties and characteristics of hydraulic cement, as well as its behavior under the more common contingencies of use. There is also presented a discussion of the various tests which may be applied to hydraulic cement, including both the ordinary tests of practice and the more elaborate ones which have been proposed or which are in use in the larger experimental laboratories. The fourth chapter is devoted to a selected list of recent literature bearing on the subject, and intended to aid students engaged in original or independent research.

Manual training is about to be introduced into the public schools of Brooklyn, a sum of $10,000 having been appropriated to this object by the Board of Education. This will defray the expenses of the first experiment in this direction, which will be in the shape of a manual school to be established in the Boys' High School, where the rudimentary principles of several trades will be taught to lads recommended by the principals of the schools.

The Evolution of the Nail.

The first nails produced in the United States were made by hand, and Fisher Ames of Massachusetts, in a speech made before Congress in 1789, when it was proposed to put a duty of a cent a pound upon all imported spikes, nails, tacks and brads, in order to foster the home product, said of this industry: "It has become common for the country people in Massachusetts to erect small forges in their chimney corners, and in winter and on evenings when little other work can be done, great quantities of nails are made, even by children. These people take the rod iron of the merchant and return him the nails; and in consequence of this easy mode of barter, the manufacture is prodigiously great. This business might be prosecuted in a similar manner in every State exerting equal industry."

In August, 1797, Samuel Briggs of Philadelphia, in connection with his son, is said to have received the first patent for a nail making machine ever issued by the United States, but as at about the same time several inventions for manufacturing nails were made by various persons in different parts of the country, it is still a somewhat disputed point to whom the credit of absolute priority is due.

In 1817 the device known as the Blanchard machine, an invention of Thomas Blanchard and others of Boston, was successfully demonstrated in practical use, and the patent sold to a company for the comparatively small sum of $5000. This Blanchard machine was intended particularly for small nails, brads and tacks, and is the basis of the inventions which are in use to-day.

It is a curious contrast presented by the contemplation of a family engaged at odd hours in their home laboriously shaping nails by hand a century ago and the product of a single day of any one of the many nail and tack factories in States which were then an unknown wilderness, or inhabited by wild animals and wilder Indians.

Fifty millions of small nails and tacks is the daily output of several of these factories, weighing in the aggregate a dozen tons or more, and distributed in all the markets of the world. A single machine is capable of cutting and heading over 15,000 tacks an hour, and shoe nails are cut at the rate of 2000 a minute.

It is not many years since it was the custom in many wholesale houses to keep the boys employed in idle moments picking up and straightening out stray nails which had been removed from packing cases. The wire nail, which in its present form is a comparatively recent invention, has from its convenience and lesser cost so completely superseded the finishing nail and patent cut brad that there is little demand for these one time favorites.

Built-In Furniture

A suggestion in regard to house building is offered by the *Decorator and Furnisher*, which has many points in its favor; in fact, in many respects is being now adopted in modern buildings. It is that "of having a great deal of the movable furniture used in modern interiors as a part of the construction of the house itself," and remarks that "civilization is at present being weighted down with a vast quantity of household furnishings which are moved about from one house to another, with an unnecessary expenditure of energy, worry of mind and expense. A great part of the furniture of the house which is usually looked upon as movable is not so of necessity."

The importance of built-in furniture is very largely appreciated by architects and owners. There is more and more a tendency to furnish the house with convenient interior fittings in keeping with the general finish. Wardrobes, hat stands, refrigerators, sideboards and various other hitherto movable pieces are now being built in to correspond with the other wood finish. This feature can, however, be carried further, says *Architecture and Building*, and thus reduce very materially the amount of movable furniture. Such a course generally adopted would doubtless interfere materially with the May Day emoluments of the truckmen, but would certainly conduce to the peace of mind of the householder on occasions of removal.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

DECEMBER, 1893.

A Trade School for Boston.

The decision of the trustees of the fund left by Benjamin Franklin to the City of Boston, over 100 years ago, to devote the entire sum to the erection and establishment of a trade school in that city is a matter for congratulation. The money was bequeathed by the distinguished testator to be applied to "the encouragement of young mechanics." The trustees have thus acted wisely in voting its appropriation to the purposes of a trade school, which shall bear the honored name of Franklin, as being the object best calculated to carry out the presumed wishes and intentions of that great man. The announcement is made that the school will be entirely independent of the public schools of the city, which is also a wise decision. As we have constantly maintained, the extension of the trade school movement in the larger centers of population in the United States is a great and growing necessity. No object is more worthy of the support and encouragement of those interested in the welfare and progress of American youths and in the elevation of the manual trades than the widespread adoption of such means of trade training and instruction.

Success of Trade Schools.

Wherever the trade or manual training school has been tried—provided its organization and conduct have been intrusted to the hands of capable and intelligent persons—it has been an unqualified success. Its advantages have been quickly appreciated by the class for whose benefit it has been designed; and employers of labor, many of whom were at first inclined to throw cold water on the idea, are daily becoming more and more awake to the fact that these institutions are a source from which they can draw their best supply of thoroughly prepared help. The successful careers of so many graduates from the trade schools of New York, Philadelphia and Brooklyn are the best advertisements those institutions can desire. These men act as missionaries in the different parts of the continent in which their lots are cast, and by their testimony to the benefits they have obtained are arousing an interest in the subject of better trade training in many quarters which will, doubtless, develop in time into action. So it has been in Boston, where the success of the New York and Pratt Institute trade schools has admittedly stimulated the Franklin trustees to devote their trust funds to a similar purpose. As the fund amounts to nearly half a million dollars the trustees will be able to start the new school under exceptionally favorable conditions.

Lessons of the Fair.

It is interesting and to some extent amusing to read what various writers have to say regarding the results of the World's Columbian Exposition. The magnitude of that enterprise in its every aspect has been an incentive to grandiloquent speech whenever the topic has come up for discussion. It has inspired lofty utterances from those gifted in that way, and a whole tribe of followers has sprung up who vie with each other in attributing to the fair almost revolutionary influences in the arts and sciences. A curious feature about this whole performance is that the most fervid prophecies regarding the influences of certain classes of exhibits are made by people who have no practical knowledge on the subject which they assume to discuss, and about which they philosophize in airy abstractions. There is no doubt that in the matter of architecture American taste has been greatly cultivated by the beauty and originality displayed in the exposition buildings and many of the State and foreign buildings. The effect of this may be seen in the future, although it is questionable whether the severe plainness of the large structures now becoming such a conspicuous feature of our leading cities is not much better suited to this utilitarian era than the florid creations of ages long past.

What It Taught.

In the matter of exhibits, however, conclusions are not so easily drawn. Never before was such a magnificent array of productions of every character brought together. While in some lines the very best was shown, this was not the case in every line. Many famous manufacturers whose reputations are world wide were wholly unrepresented, while their competitors shone in their absence with inferior goods. How, then, in these lines, some of which have been singled out for special praise, could the progress of the art be specifically noted and a pace set for the world to follow hereafter? It was a great show, and Chicago has won imperishable glory for the grand scale on which it was projected and the triumphant success with which the details were worked out. A great many people were given an opportunity to see more than they could have hoped to see if they were to live to the age of Methuselah with every facility for travel in their power. Perhaps invention has been stimulated and imaginative faculties have thus been quickened in a way that will be felt potently by this nation and the world in the years to come. But the fair nevertheless was a commercial enterprise, expected to be of practical benefit to the locality in which it was held, and all other considerations and influences, charming as they may be, are but secondary and subsidiary. In the light of the heroic struggle forced on the business men of Chicago to make their great enterprise a success, and in view of the narrow escape from serious dangers which might have financially wrecked them, the real lesson of the fair is that other projectors of World's Fairs must not base them on such a prodigious scale.

Another Apartment Hotel.

The west side of the city is soon to boast of another fire proof family hotel which in many ways will be an ornament to that section of the metropolis known as Sherman square. An eight-story structure somewhat similar in architectural style to the Hotel Waldorf, although much smaller in size, will rise on a plot of ground fronting about 106 feet on the Boulevard and 205 feet on Seventy-second street. The building itself, which has been planned by Architect Andrew Craig, will front 96 feet on the Boulevard and 155 feet on the street, the position being such as to give plenty of air and light on all four sides. The structure will be of iron and steel, with fire proof walls, floors and partitions. The first story front will be of brown stone and the others of brick; the trim will be of hard wood, and the appointments throughout will be in keeping with a first-class hotel. There will be two large elevators, one intended for carrying passengers and the other for freight. There will be something like 230 rooms above the first floor, with 98 baths, the divisions being 84 suites of apartments, consisting of parlor, bedroom and bathroom, and 63 single rooms, with two baths on each floor. The main entrance of the building will be on Seventy-second street and will be through a portico 16 feet wide, leading to a hall of the same width, on opposite sides of which will be the main office and the elevators and staircases. Work upon the foundations is already in progress and construction will be pushed forward as rapidly as circumstances will permit.

Raising Large Buildings.

It is not unusual for a frame structure to be raised by means of jack screws for the purpose of adding another story to its hight, but it is seldom that this kind of work is undertaken in connection with massive stone and brick buildings. When such an event occurs it attracts attention on the part of members of the building trades in whatever section of the country they may be located, and a few particulars respecting the lifting of a six-story stone and brick business block covering an area of 80 x 100 feet is likely to prove entertaining. The building is located on Monroe street in the city of Chicago, and in order to put in another floor it was decided to lift the structure bodily a distance of 14 feet. That this was something of an undertaking may be gathered from the fact that the weight of the building above and including the main floor was 5720 tons. To do the work 1800 3-inch jack screws were employed, to operate which there were 132 laborers, each having charge of from eight to twelve screws. At a given signal each screw was given, with an iron bar 4 feet long, a one-quarter turn, and as the pitch of the screws was ⅝ inch, each one-quarter turn raised the structure 3/16 inch, or at the rate of about 3 inches an hour. When the screws had been turned from their blocks 12 inches new supports in the shape of blocking of 6 x 6 timber was put in. The screws were then slackened until the load rested upon the blocking, when they were reset for another turn. During the progress of the lifting of the building careful records were taken and frequent measurements made to ascertain whether or not the building was being elevated perpendicularly from the point from which it started. In case any workman neglected to give a proper turn to the 12 screws under his charge the result was at once shown by these measurements. The system also insured the exact vertical raising of the building, assuming, of course, that it started from a level surface. As soon as the structure was raised 14 feet and 8 inches, which was the intended hight, the work of putting in steel columns, girders and masonry for the ground story was commenced, and when completed the building was lowered to its new support.

The Lyons Exhibition.

The main building for the international exhibition to be held next year at Lyons, France, will be a remarkable structure. From a description given in *Le Génie Civil* it appears that the building will consist of two practically distinct parts, a central dome like structure and a circular gallery running entirely round it. The dome will be 361 feet in diameter and formed by 16 parabolic half arches. These will be hinged at the bottom and each connected at the top to a circular crown. Each arch will act independently of the others. The roofs of the surrounding gallery will be carried by a peculiar form of a cantilever truss. The total weight of each main arch is stated to be 30.8 tons, and each roof truss of the galleries weighs 44 tons. The total weight of the iron work in the building will be about 2500 tons, and the area covered 9.4 acres, a trifle more than the annex to the Transportation Building at the Columbian Exposition.

Ingenious Hoisting Device.

In constructing the building intended for the New York Life Insurance Company, at Monroe and La Salle streets, Chicago, an ingenious traveler was put in service for handling the stone necessary for the walls. The building is of the steel skeleton construction, 12 stories high. Both streets on which the structure fronts have a heavy carriage and street car traffic, which rendered the ordinary breast derrick too much of an obstruction. Many of the pieces of stone weighed several tons. The arrangement adopted for carrying the stone is thus described by the *Engineering Record:*

At the level of the fourth floor 12 x 12 inch timbers were laid on the steel floor beams and allowed to project over the sidewalk beyond the building line. On the cantilever ends of these timbers was laid a 12 x 12 inch track stringer running the length of the building. The ends of the cantilever beams on the inside of the building were firmly lashed to the steel floor beams by wire ropes. A 2 x 4 inch oak guide rail was spiked on the center of the track stringer, and its top was protected by a piece of 4 x ⅛ inch strap iron Another strap of the same size was screwed on top of the track stringer on the side nearest the street.

To keep the traveler vertical, and to permit of easy longitudinal travel when the road was pushed inside the building line, vertical rollers bearing against the side of the track stringers were used. Hoisting was effected by ordinary blocks and tackle. One block was fastened to the traveler and the fall line carried around a snatch block at the level of the sidewalk and thence to an ordinary hand crab. Longitudinal travel was easily effected from the sidewalk by an inch rope tied about the middle of its length to the top strap of the traveler, the ends passing around snatch blocks attached to the corner columns at opposite ends of the building, and from there to the ground.

Two somewhat similar but simpler travelers were used on the long Monroe street front. They had but one roller each. The channel frame was dispensed with, and the roller axle pin passed through the suspender strap, which was made of 1 x 6 inch instead of 1 x 9 inch metal. These two travelers were used together for setting long lintels and separately for setting the piers and mullions.

Heraldry on Buildings.

A writer in one of our English contemporaries, in discussing the subject indicated by the title above, says:

Avoid, if possible, the putting up anywhere of mere crests. A crest is more a personal cognizance than anything else, and does not necessarily denote to what family a man belongs. We frequently find the various cadets of a family bearing very different crests. It is the coat of arms which is the most important feature in an achievement, and to it, therefore, prominence must be given. If space is limited, for instance, a coat of arms of reasonable size, without anything else, is much better than a small and crowded design which includes crest, helmet and mantling. If a crest is introduced the helmet and mantling should be given also. The crest must, of course, be on a wreath, and the wreath should not be, as in too many cases it is, detached from the helmet and put high above it. On the contrary, it should be placed round the upper part of the helmet, its proper place in a knight's equipment. It should not, therefore, be straight, but slightly curved to suit the roundness of the helmet. The mantling was originally, in all probability, a sort of *puggree* or veil made to protect the helmet and neck of the wearer from the rays of the sun. Now, however, it has become an ornamental scroll, often flowing down from the helmet round the sides of the shield. When treated with discrimination and taste the mantling is a great effect to the beauty of an achievement, but when badly managed it is very much the reverse. The lines should all be free and flowing, and the different sides, though giving the effect of a perfect balance, should not be in detail the same. Some of the earlier German mantlings are well worth study. There is always a certain amount of difficulty in getting supporters to look animated and as if they were really supporting the shield. Apart from the general treatment of their bodies, one great reason for this lack of *verve* is that they are generally represented as executing a difficult feat of balancing on the top of a series of twisted gas brackets, which extend below the shield. Now this is all absolutely and utterly false, and has a ridiculous effect. Supporters should always stand on a solid base, but it seems to have passed the art of any heraldic artist to design a very suitable standing place for them.

Durability of Indian Timber.

Since 1881 the durability of 39 different Indian timbers has been under test at the Forest School in Dehra, says a recent issue of *Invention.* Perpendicular posts, half under ground, were used, and one by one the softer and weaker woods disappeared under the attack of rot and white ants until a short time ago only three of the timbers remained sound. These were Himalayan cypress, teak and anjan, which had been exposed ten, nine and seven years respectively.

Expansion of Girders.

A writer on strains in girders in the *Engineering Record*, referring to the amount of movement of iron girders due to expansion and contraction under extreme variations of temperature, observes that for iron and steel the coefficient or rate of expansion is nearly 1 inch for 100° of heat (F.) for every 100 feet in length. Thus a girder 60 feet in length will expand $\frac{6}{10}$ inch for 100° increase of temperature, and contract the same amount for 100° decrease of temperature; or a girder 75 feet long will vary $\frac{75}{100}$ inch, or ¾ inch, for a variation of 100°. He says: "In order to provide for all contingencies it is the general practice to allow for a variation of 150° F., or a movement equal to 1½ inches for every 100 feet in length." A girder 60 feet long will therefore require to have an allowance for movement in the moving end equal to $\frac{9}{10}$ inch or 1 inch, the other end being fixed. It is only necessary to put the rollers under one end of the girder, so that the movement of the girder may be at that end only.

A WEALTHY Chicago woman is said to contemplate the construction in Janesville, Wis., of a row of flats in which the deserving poor of that town may live rent free. The buildings are intended as a memorial to the father of the owner.

RESIDENCE OF L. F. DOMMERICH, ESQ., AT MAITLAND, FLORIDA.

F. J. KENNARD, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1893.

For Elevations, Plans and Details See Pages 289-293.

HOUSE AT MAITLAND, FLORIDA.

WE have pleasure in presenting to our readers this month illustrations of a residence which, while perhaps more elaborate and costly than many would require, contains much that is of interest and value to carpenters and builders generally. The house was built not long ago at Maitland, Orange County, Fla., for Mr. L. F. Dommerich of New York City, from drawings prepared by Architect F. J. Kennard of Orlando, Fla. The building occupies a beautiful location overlooking Lake Minnehaha and the owner's orange grove, which is said to be one of the finest in the State.

Our supplement plates give an idea of the general appearance of the house and also a view in one of the halls looking toward the main stairway. The arrow on the floor plan indicates the position of the camera in taking the latter picture.

The house was built for a winter residence, but as it is to be occasionally occupied during the summer months, it was necessary to consider the plan with special regard to keeping it cool in hot weather. The method adopted was simple, yet very effective. For the purpose of taking advantage of every breeze, an entrance hall was placed at each side of the building, connecting with a large square central hall. In cold weather it is intended to hang *portières* in the archways connecting the outer halls with the inner one. Above the central hall is a well hole surrounded by a balustrade and transforming the second floor hall into what may be termed a gallery. Above this well hole, in the ceiling of the second floor, is a skylight of stained leaded glass 10 feet square, in the center of which is an ornamental ventilating grating, which can be opened and closed at will. The skylight is connected with a large lantern light or cupola in the center of the building by a shaft 10 feet square, running through the attic and roof. This shaft is painted white on the inside, and serves the double purpose of conveying light to the center of the house and of a ventilator. Above the windows in the cupola are louvered ventilators, and when the grating in the skylight is opened there is a constant upward current of air which keeps the house cool in the hottest weather.

The materials used in the construction of the building are local brick for piers in the cellar and chimneys, yellow pine for the framing, siding and inside finish, and cypress shingles for the roof and some parts of the walls. The facing bricks are of a reddish gray color laid in red mortar. The house is plastered throughout with Adamant wall plaster, with sand finish, all walls being tinted. The floors are double, the upper one being laid in narrow widths, hand dressed, and finished with elastic floor finish.

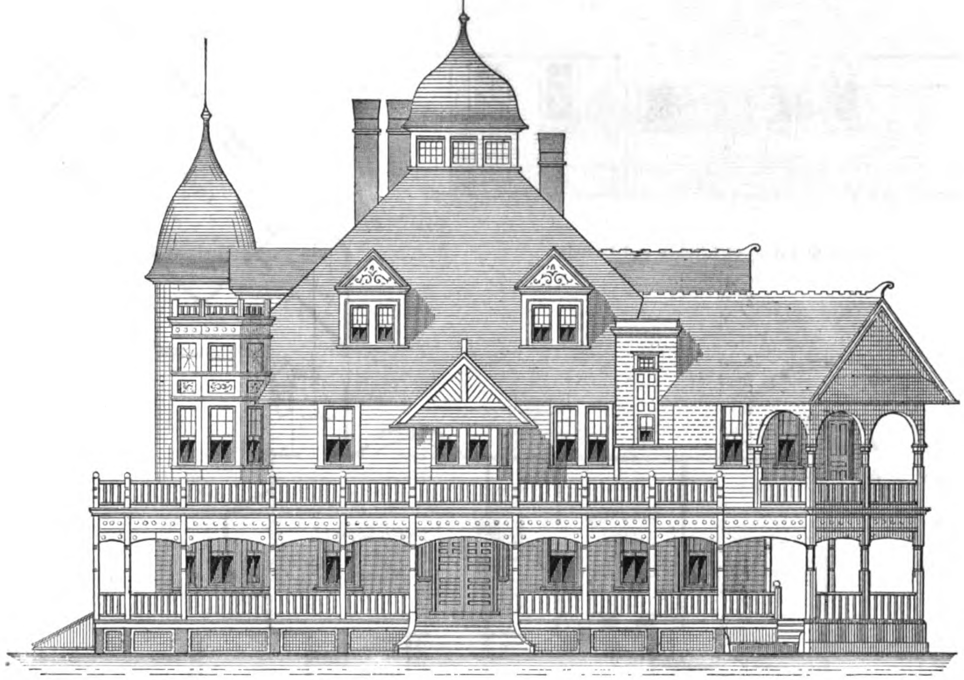
All fire places have hearths and facings of plain buff tiles. The mantels and sideboards are of yellow pine, curled pine and orange. The opening between the dining room lobby and the staircase is filled with ornamental lattice work.

The roof shingles are stained with Cabot's red stain and the upright shingles on the walls, &c., are stained brown. The body of the house is painted sage green, the trimmings and blinds dark green, the sash white and the porch a reddish brown.

The two principal entrances, as may be seen from the illustrations, are on the south and west sides. These are each provided with double doors, the upper portions being glazed with stained and leaded glass. The doors are divided horizontally in the center, forming what are known as "Dutch" doors. They also have side lights and transoms glazed with stained glass.

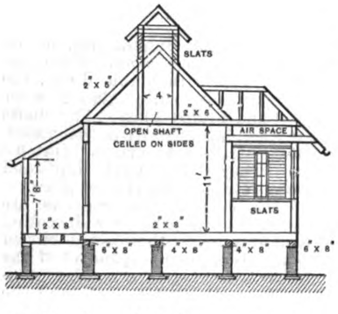
All the halls and the staircase are wainscoted with paneled wainscoting in yellow pine, with selected curled pine panels, and the spandrel of the staircase is treated in a similar manner. The ceilings of the halls and the dining room are paneled with plaster panels and molded wood ribs. The cornices are also of wood. All other principal rooms have plaster molded cornices and center pieces.

All the seats shown on the floor plans have paneled fronts and hinged tops, making them available as lockers. The floor plans, of which only two are given, as the third floor is used largely for storage show the general arrangement of the rooms, so that it is unnecessary to refer to them further than to say that the kitchen and other offices are placed diagonally with the main house, so as to offer as little obstruction as possible to the view from the north and east sides. The larder is placed on the northwest side of the kitchen building for the purpose of peotecting it from the sun as much as possible. It has a double roof, and is open to the external air on three sides, having louvered ventilators protected by screen wire. The kitchen and laundry are each ventilated by means of central shafts running through the roof and having louvered sides protected on the inside with screen wire. The engravings show the front eleva-



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

House at Maitland, Florida.—F. J. Kennard, Architect, Orlando, Fla.



Section through Kitchen and Laundry.

tion and cross section of the kitchen and laundry.

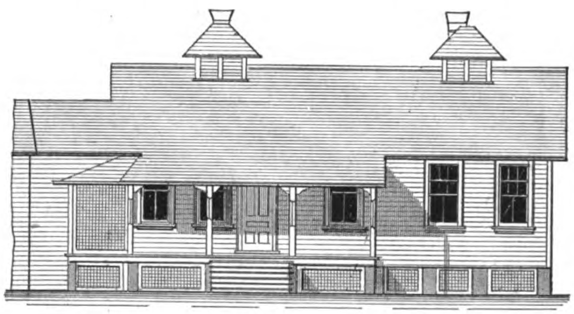
The windows and the door on the principal staircase are glazed with stained leaded glass, the circular window containing the owner's crest. All stained glass is by the Tiffany Company.

The dwelling is fully equipped with electric bells, speaking tubes, gas and hot and cold water. The plumbing is first class open work, and the doors and windows are fitted with wire screens.

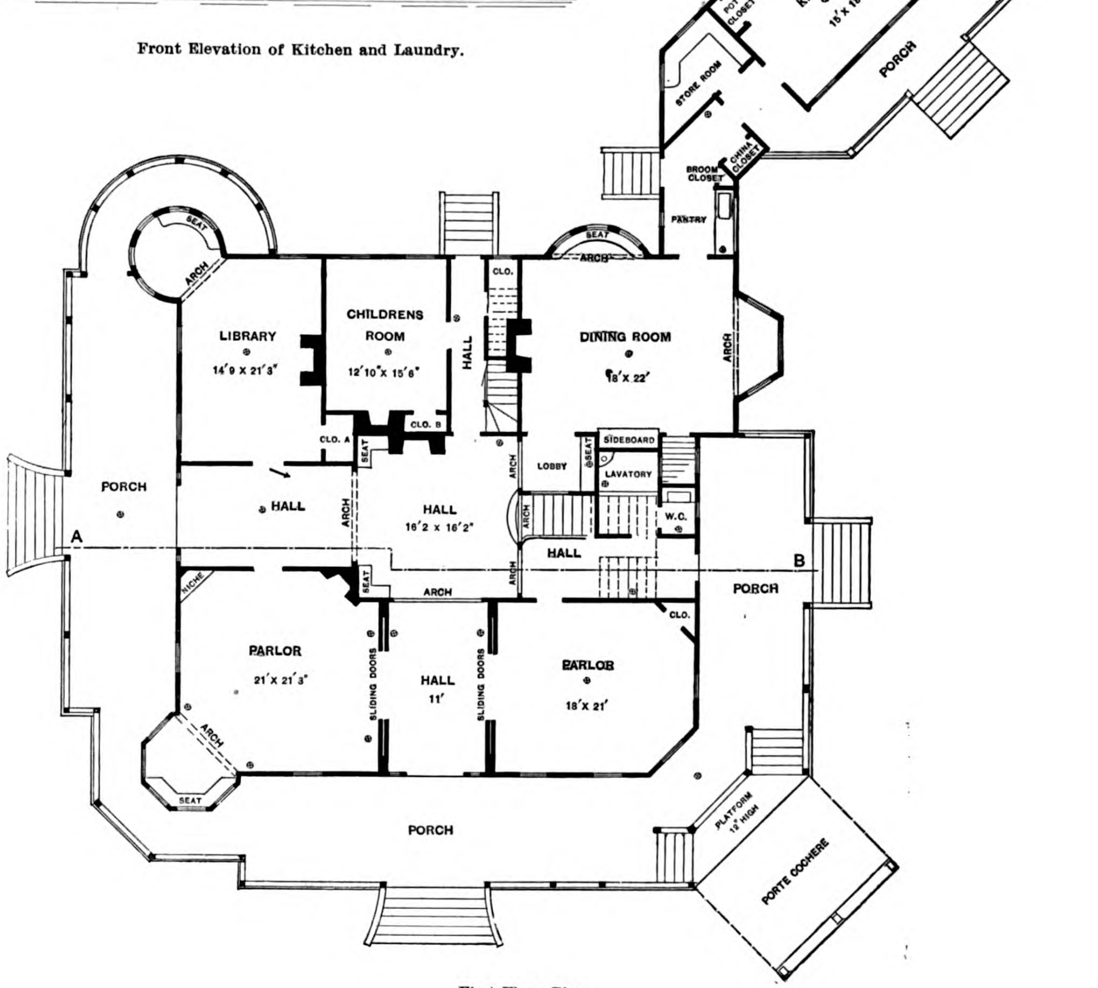
A free class in architectural and mechanical drawing, under the charge of two instructors, has lately been started at the Senior Evening School, 58 Fifty-second street, New York. Students of architecture, machinists, stone cutters, carpenters and persons working at trades in general who desire to avail themselves of this opportunity can apply on any school evening between 7 and 9 o'clock.

Roman Construction in Brick and Stone.

The Romans at a very early period adopted two distinct methods of construction, which they were accustomed to combine in their buildings—the construction with squared and fitted stones, and that with rubble or brick. The former was employed by them only as a thick facing composed of large blocks laid together without



Front Elevation of Kitchen and Laundry.



First Floor Plan.

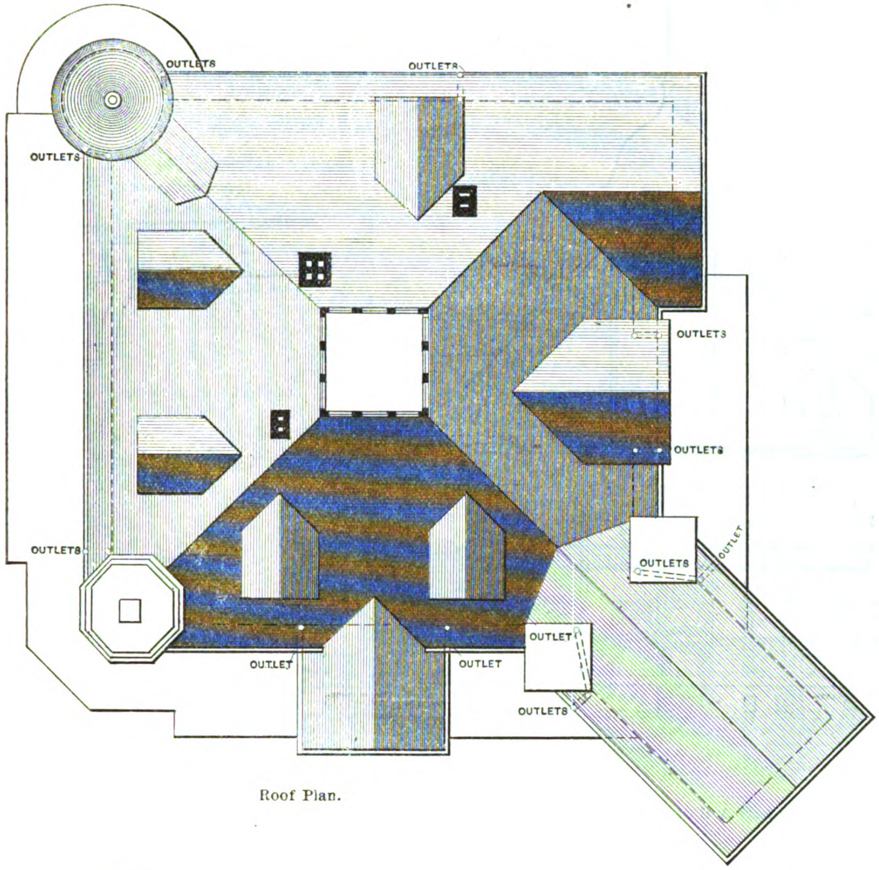
House at Maitland, Florida.—Main Floor Plan and Elevations.—Scale, 1-16 Inch to the Foot.

VIEW IN MAIN HALL OF MR. DOMMERICH'S RESIDENCE AT MAITLAND, FLORIDA.

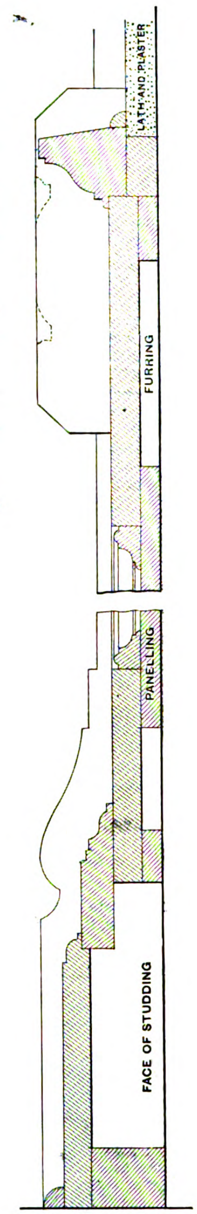
F. J. KENNARD, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1898.

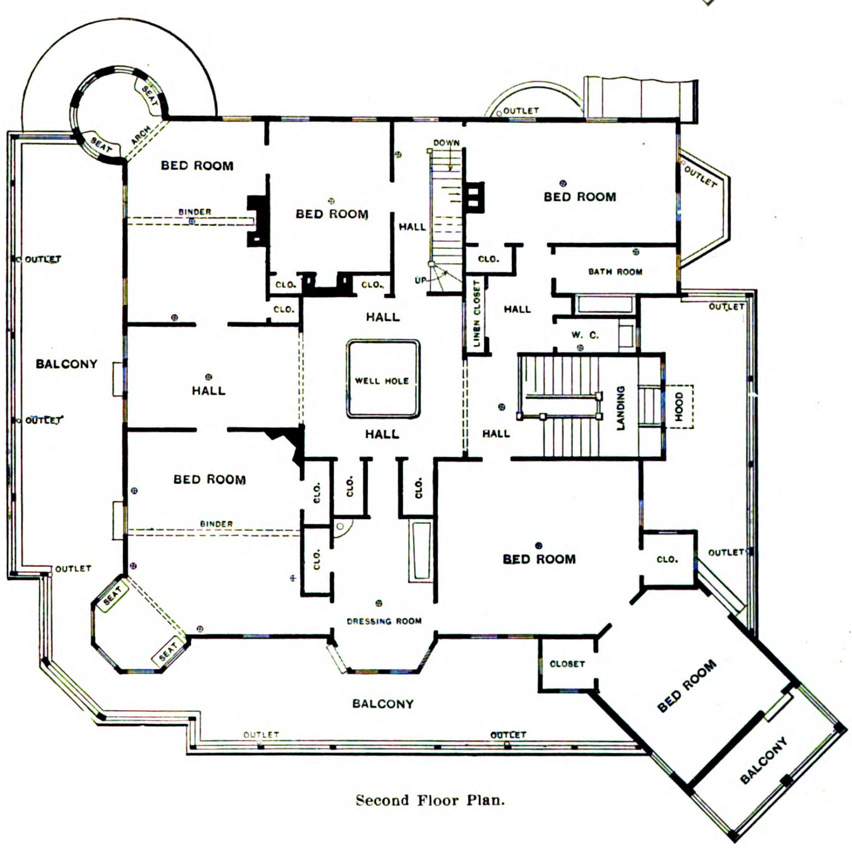
For Elevations, Plans and Details See Pages 289-293.



Roof Plan.

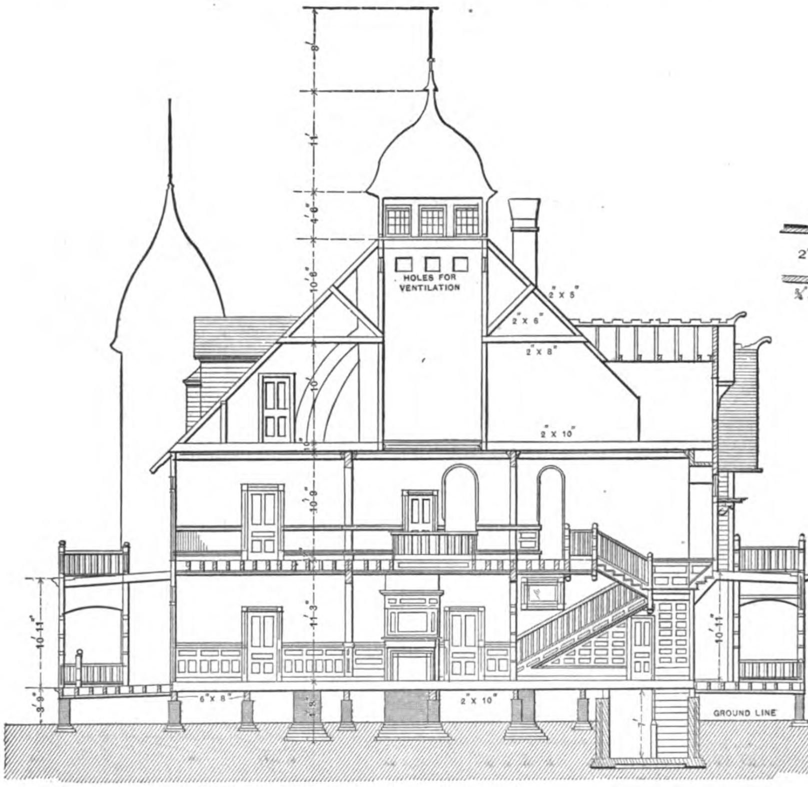


Details of Paneled Wainscoting.

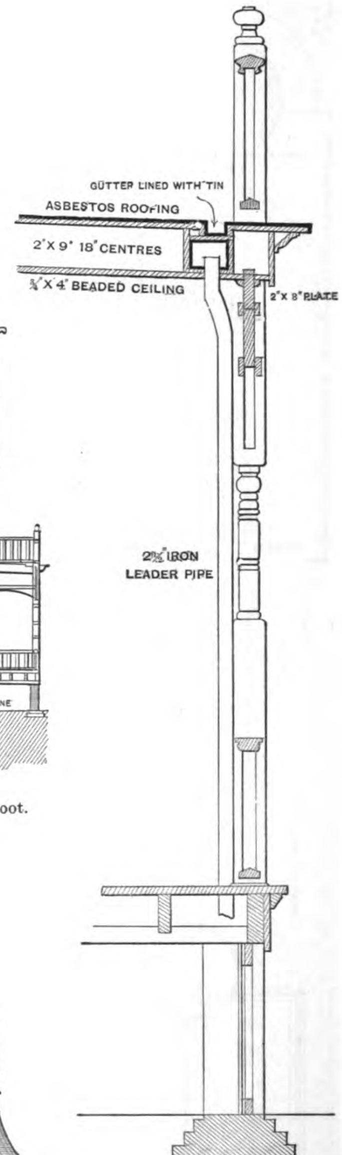


Second Floor Plan.

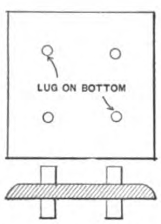
House at Maitland, Florida.—Plans.—Scale, 1-16 Inch to the Foot.—Details.—Scale, 3 Inches to the Foot.



Section through House Taken on Line A B of Main Floor Plan.—Scale, 1-16 Inch to the Foot.



Details of Porch.—Scale, ⅜ Inch to the Foot.



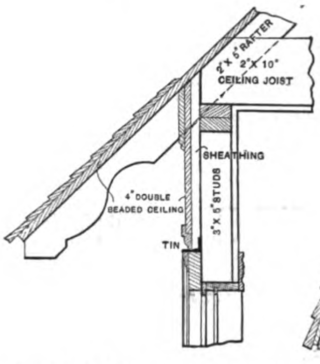
Cast Iron Plate at the Feet of Porch Posts.—Scale, 1½ Inches to the Foot.

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

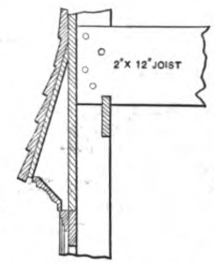
House at Maitland, Florida.—Elevations and Miscellaneous Details.

mortar, united by gudgeons and cramps of metal or even of wood, behind which they threw masses of small stones or gravel imbedded in an excellent mortar. The vaults were made of principal arches or ribs of cut stones or of bricks, with a filling of concrete. This construction imposed on Roman architects plans peculiarly their own, composed of massive piers as points of support for the springing of their vaults. In these constructions there were no walls, properly speaking, but isolated points of resistance, connected together by certain walls or screens, comparatively light, as they had no weight to support. The arrangements of plan necessarily resulting from this principle were admirably adapted to vast edifices containing numerous apartments for various uses, as, for instance, halls surrounded by an agglomeration of smaller rooms or chambers of different form, size and hight, with passages, staircases, &c.

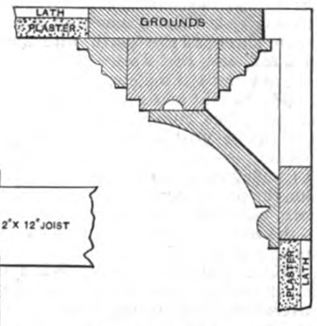
ACCORDING to one of the London architectual papers the new spire for the historical cathedral of Bern is nearly completed, after having been in the hands of the architect, Professor Beyer of Ulm, since 1889, and costing the enthusiastic subscribers to the building fund about £14,000 ($70,000). The committee of the "Münster-bau-Verein," in whose hands all questions of renovation and completion rest, has lately published its annual record of progress on the works, and, according to this report, as soon as the spire is finished the whole of the building is to be thoroughly overhauled and repaired, the proposed extra outlay for these improvements being estimated at £20,000 (about $100,000). This sum will, however, only cover the cost of such work as must be necessarily done if the building is to be preserved; a complete restoration, with an improvement of the immediate surroundings, requiring another £40,000 (about $200,000). That a comparatively small town like Bern should voluntarily subscribe so much for the spire and nec-



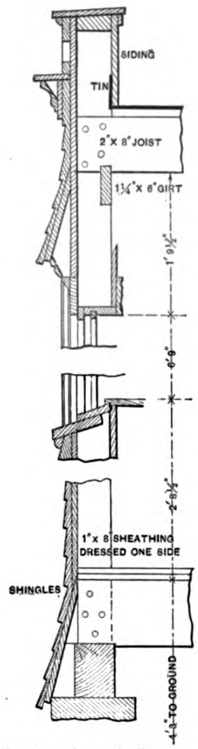
Details of Main Cornice.—Scale, ½ Inch to the Foot.



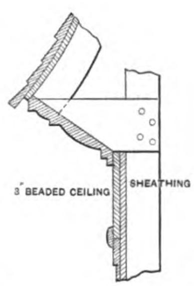
Finish Over First Floor Windows of Tower.—Scale, ½ Inch to the Foot.



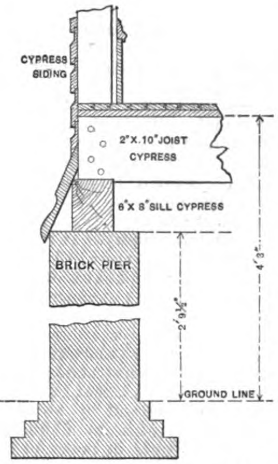
Details of Ceiling Rib and Cornice.—Scale, 3 Inches to the Foot.



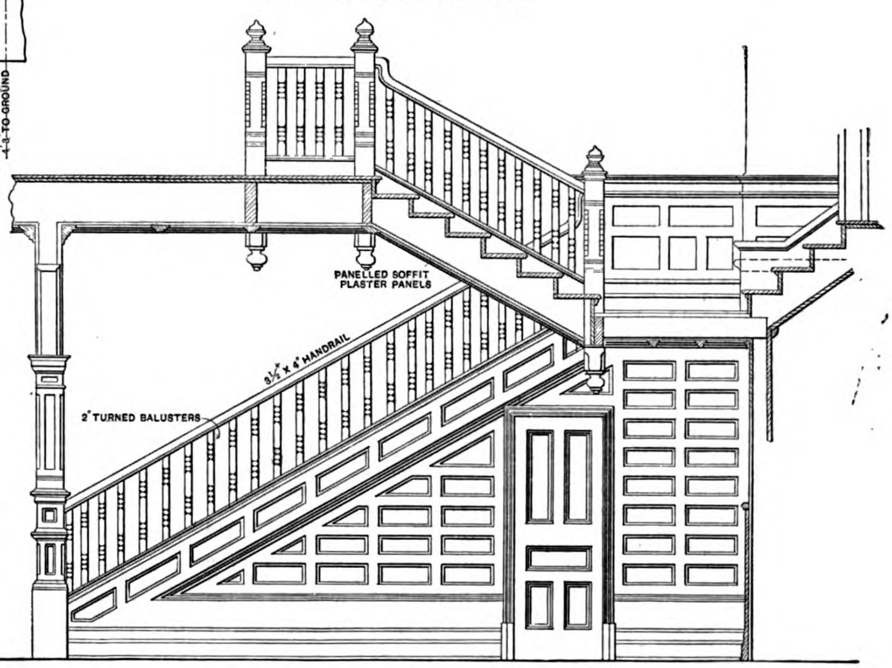
Section through Bay Windows.—Scale, ½ Inch to the Foot.



Details of Tower Cornice.—Scale, ½ Inch to the Foot.



Section through Foundations and First Floor.—Scale, ½ Inch to the Foot.



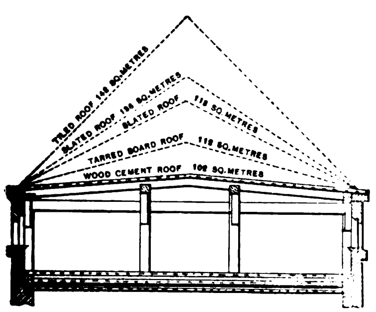
Elevation of Main Staircase.—Scale, ¼ Inch to the Foot.

House at Maitland, Florida.—Miscellaneous Details of Construction.

essary repairs is so creditable to them that they might well spare the doubtful luxury of a restoration.

Wood-Cement Roof.

In the accompanying illustration is presented a section of a building showing various roofing methods and their superficial contents in comparison with what is known as Haeusler's wood-cement roof, the latter being a new form of covering which has gained the approval of the authorities and other competent persons in Germany. It has also been frequently employed in Austria, Russia, Holland, Belgium, and especially in France. The rafters are placed in a nearly horizontal position, with a pitch of about $1\frac{1}{8}$ inches, or at the most 3 inches, for every $39\frac{3}{8}$ inches of length, and are constructed in the same manner as any other framing of joist. The free length of the rafters varies from 6 feet $6\frac{3}{4}$ inches to 19 feet $8\frac{1}{4}$ inches, and they are placed at distances apart varying from $11\frac{3}{4}$ to $28\frac{3}{8}$ inches. Upon these match line boards are nailed, the surface of which is level and perfectly free from projecting edges and nail heads. Before the first layer of roofing paper is put down, the roof boarding



Wood-Cement Roof.

is, by means of a sieve, well covered with fine sand to a thickness of about $\frac{1}{8}$ inch, the object being to isolate the wood-cement roofing from the roof boarding, so that there will be plenty of room for the wood to shrink or warp, in case it is inclined so to do.

The roofing paper is specially manufactured for the purpose of the toughest materials, and is made in rolls varying from $16\frac{1}{2}$ to $24\frac{3}{4}$ feet in length and from $52\frac{1}{2}$ to 60 inches in width. The first layer of this paper is unrolled upon the sand from one edge of the roof to the other, across the ridge, in such a way that one roll overlaps the other about 2 inches and is fastened at the gutter edge with short but broad-headed nails. The makers state that neither the bottom side of the first layer of paper nor the part overlapping should be covered with wood cement. The second layer of paper is then put down, and, for the purpose of stronger adhesion, a roll is used which is cut lengthwise into halves, so as to protect joints in the first layer. The latter is then finely and evenly covered to the width of the sheet to be put down with heated wood cement. This is applied by means of a long-haired soft brush, fixed at right angles to a long handle, and then, while a second workman unrolls the paper upon the cement covered surface of the first layer, it is brushed down upon the latter by means of the hands, so as to avoid air holes. The adjoining roll of paper overlaps the first by about 2 inches, and in this way the whole of the second layer is completed. The third layer is then commenced with a whole sheet and the fourth with a half of a roll, and the work continued in this way until completed. In order to produce a still better adherence of the various layers, either $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ or whole rolls can be used, as may be most convenient. As soon as the second layer of the roofing paper has been placed in position the projecting sheets of tin, gravel curb, curb plate, &c., should be fixed to the roof by means of nails varying from $\frac{3}{4}$ inch to $1\frac{1}{8}$ inches in length and provided with flat heads. When the fourth layer of roofing paper has been covered with hot roofing cement, somewhat thicker than the previous ones, it is thickly strewn with coal dross or pounded slag by means of a sieve, and then covered in turn with a layer of fine sand varying from $\frac{3}{8}$ inch to $\frac{3}{4}$ inch in thickness. After this a layer of coarse gravel is put on and the whole leveled and rolled down. Provision is made for ventilation under the roof boarding, so as to prevent the wood work from becoming damp and decayed. The walls are protected against dampness by first carefully leveling them and providing them with an isolating layer of sand.

One advantage of the wood-cement roof, so it is claimed, is that it can be used as a bleaching or drying ground, flower garden, open-air restaurant, playground for children, or for any agreeable, useful or profitable purpose, as it admits of constant use without sustaining injury. It is also stated that the temperature below a wood-cement roof with a layer of gravel or a plot of grass is in summer and winter more uniform than under any other roof. Disturbing noises caused by high winds, heavy rains or snowfalls are also avoided. The construction of the roof is said to be such that rain water can easily be drained off by arranging the slope of the roof in the middle and collecting the water in tanks for domestic or industrial purposes, or it may be carried off by means of conductor pipes of ordinary construction. This form of roof is, we understand, being introduced into England, and trials which have been made with it are said to have proven very satisfactory.

The Franklin Trade School.

Benjamin Franklin, in his will, gave the citizens of Boston, Mass., in 1791, the sum of £1000, which he directed to be loaned in small sums at 5 per cent. interest to young married artificers of good character, under the age of 25, who had faithfully served an apprenticeship in that city. Dr. Franklin estimated that the £1000 would increase in 100 years to £131,000, and then the managers of the fund were to lay out in some public work £100,000, the balance continuing on interest for another 100 years. The whole sum will then revert to the people of the city of Boston and the State of Massachusetts. The trustees under the will are the Selectmen (now the Board of Aldermen), united with the ministers of the oldest Episcopal, Congregational and Presbyterian churches in Boston.

The 100 years having expired, a meeting of the Franklin trustees was held on November 10, to decide on the appropriation of the available money, amounting to some $415,000. Out of 27 suggestions for its disposition, it was finally decided by vote that the whole amount should be devoted to the purposes of one object, and that object the establishment of a trade school, pure and simple. It was further agreed that the school is to be an independent one, unconnected with the public schools, and that it shall bear the name of the famous donor. This disposition of the fund seems particularly fitting and in harmony with the desire of Dr. Franklin, and the action of the trustees has met with general approval. It is proposed to combine in this school the experience of similar undertakings in the country, and an effort will be made to establish the institution on such lines as will secure the greatest possible benefit to "the young mechanic." It is thought that the New York Trades School, founded and maintained by the late Col. Richard T. Auchmuty, will be the example which will have the greatest weight with the trustees of the Franklin school. Those who are most prominently connected with the educational interests of Boston are wholly in accord with the proposed school, and have commended the movement as certain to fill a need that the city has long felt. The first steps toward the erection of a building for the schools was taken on November 10, at a meeting of the City Architect, President of School Board, Corporation Counsel and the trustees of the fund. In his last annual report to the trustees the treasurer made the following statement of the condition of the fund February 1, 1893:

Amount of fund February 1, 1892..	$398,841.51
Interest accrued during the year..	15,958.02
Amount February 1, 1893....	$414,799.53

This amount consists of:

Deposits in Massachusetts Hospital Life Insurance Company	$411,100.88
Deposits in Suffolk Savings Bank..	3,489.02
Cash...	.13
Balance of bonds, for loans..... ...	210.00
Total.......	$414,799.53

Mason Builders' Association.

The Mason Builders' Association of this city held on October 20 a regular meeting at the Building Trades Club, at which a movement was inaugurated looking to the reduction of the cost of building by lowering prices and wages. The result of the meeting was the adoption of the following preamble and resolutions:

Whereas, The present financial depression spreading through all the trades and commercial industries in this city and vicinity, and, in fact, throughout the whole nation, has to a large extent frightened capital, or the people with the money to invest, to such an extent that production is necessarily curtailed and many thousand wage earners thrown out of employment, with a prospect of continuing so for some time before confidence is restored; and

Whereas, Our trade, which up to this time has been one of the least depressed, as we are, through long contracts, generally the last to feel the depression, still it is always our experience to be the last to recover or revive, which, though it delays, only postpones our loss;

Now, therefore, be it resolved, That it is the sense of this meeting that this association begin now to take such steps as in its judgment is best to invite capital to continue in our channel of trade, as being the best and only investment that insures a safe and reliable outlay. To further the end desired—namely, the continuation of capital in our channel of trade—it is, in the opinion of this meeting, advisable that employers and employees both should meet the issue by voluntarily reducing prices and wages at least 10 per cent.

The circulation of such a voluntary action on the part of those interested would certainly attract attention, and would exert a powerful influence for the benefit of all.

Be it further resolved, That a copy of this resolution be sent to each kindred body of employers of this city, and also to each of the bricklayers' and hod carriers' unions that are at this time affiliated with this body, with a view to bringing about a conference toward the carrying out of the sense and spirit of these resolutions.

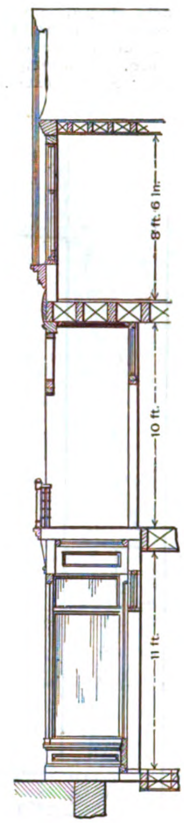
Design of Front for Store and Dwelling.

The many readers of the paper who have lately inquired for designs of fronts of buildings suitable for erection in the smaller cities and towns, and especially those who have asked for something arranged with stores below and living apartments above, are likely to be interested in the drawings which are given upon this and the following pages. It will be noticed that there is presented, in addition to the front elevation and section, the plan of the front for each of the three stories of which the structure is composed. The miscellaneous details indicate constructive features which are of interest in this general connection. The author of the design is John O'Connor of 50 Tweddle Building, Albany, N. Y.

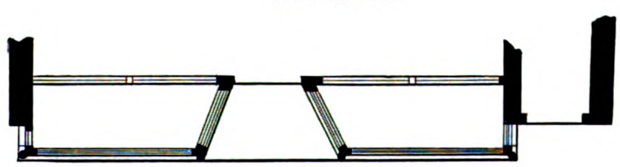
In his estimate of the material required and the cost he gives the following particulars:

Three brick piers—1080 bricks—at $15 per thousand	$16.20
30 feet door sill and water table on front	36.00
1000 feet of framing timber	25.00
1000 feet of sheeting boards	20.00

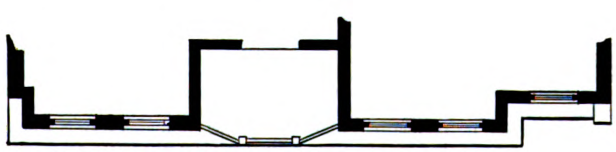
Front Elevation.



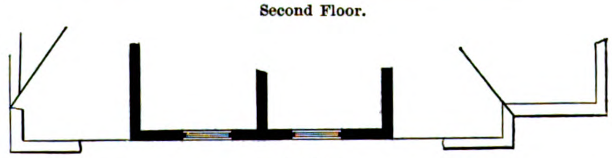
Section.



First Floor.



Second Floor.



Third Floor.

Design of Front for Store and Dwelling.—John O'Connor, Architect, Albany, N. Y.—Scale, 1/8 Inch to the Foot.

One square of shingles	8.00
500 feet clapboards and ceiling boards	20.00
30 feet store cornice, at $2.50	75.00
30 feet main cornice, at $3.50	105.00
46 feet gable and attic window cornice, at $1.25	51.50
Railing of the second story	10.00
Store front, ready for the glass	125.00
Three doors complete and casings	45.00
Seven windows	84.00
Painting	125.00
Total	$745.70

The author states that in the above estimate no account is taken of the side walls, nor of the floors or roof, but covers simply the front of the structure.

Cairene Houses.

The foundation walls, to the hight of the first floor, are cased externally, and often internally, with the soft calcareous stone of the neighboring mountain. The surface of the stone, when newly cut, is of a light yellowish hue, but its color soon darkens. The alternate courses of the front are sometimes colored red and white, particularly in large houses, as is the case with most mosques. The superstructure, the front of which generally projects about 2 feet, and is supported by corbels or piers, is of brick and often plastered. The bricks are burnt, and of a dull red color. The mortar is generally of mud in the proportion of one-half, with a fourth part of lime, and the remaining part of the ashes of straw and rubbish. Hence the unplastered walls of brick are of a dirty color, as if the bricks were unburnt. The roof is flat and covered with a coat of plaster.

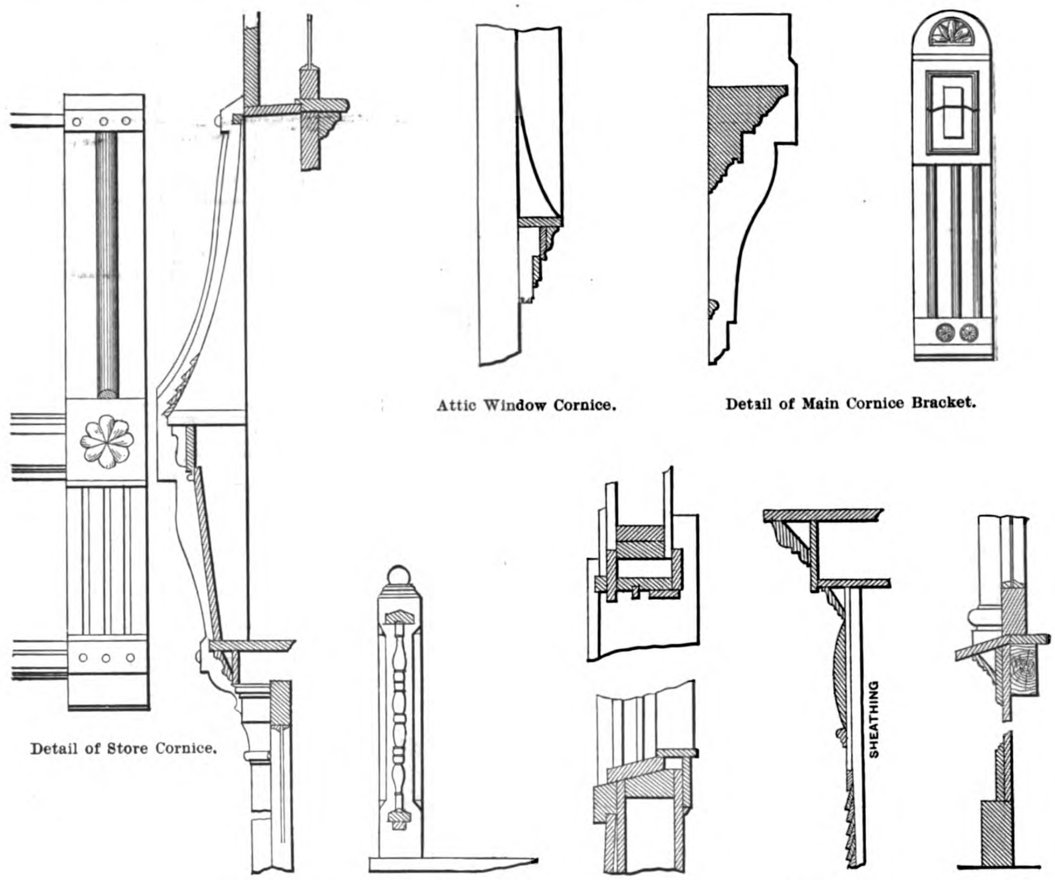
The door of a private house in Cairo is often ornamented; the compartment in which is the inscription, and the other similarly shaped compartments, are painted red, bordered with white; the rest of the surface of the door is painted green. The inscription, "He" (*i. e.*, God) "is the excellent Creator, the everlasting," is seen on many doors, but is far from being general; it is usually painted in black or white characters. Few doors but those of large houses are painted. They generally have an iron knocker and a wooden lock, and there is usually a mounting stone by the side.

WINDOWS.

The ground floor apartments next the street have small wooden grated windows placed sufficiently high to render it impossible for any person passing by in the street, even on horseback, to see through them. The windows of the upper apartments generally project 1½ feet or more, and are mostly formed of turned wooden lattice work, which is so close that it shuts out much of the light and sun and screens the inmates of the house from the view of persons without, while at the same time it admits the air. They are generally of unpainted wood, but some few are partially painted red and green and some are entirely painted. A window of this kind is called a "róshan," or more commonly, a "meshrebuyeh," which latter word has another application, which will be mentioned below. Sometimes a window of the kind above described has a little meshrebuyeh, which somewhat resembles a róshan in miniature, projecting from the front or from each side. In this, in order to be exposed to a current of air, are placed porous earthen bottles, which are used for cooling water by evaporation. Hence the name of "meshrebuyeh," which signifies "a place for drink" or "for drinking." The projecting window has a flat one of lattice work or a grating of wood or of colored glass immediately above it. This upper window, if of lattice work, is often of a more fanciful construction than the other, exhibiting a representation of a basin with a ewer above it, or the figure of a lion, or the name of Allah, or the words "God is my hope," &c. Some projecting windows are wholly constructed of boards and a few have frames of glass in the sides. In the better houses also the windows of lattice work are now generally furnished with frames of glass in the inside, which in the winter are wholly closed, for a penetrating cold is felt in Egypt when the thermometer is below 60° F. The windows of inferior houses are mostly of a different kind, being even with the exterior surface of the wall. The upper part is of wooden lattice work or grating, and the lower closed by hanging shutters, but many of these have a little meshrebuyeh for the water bottles projecting from the lower part.

HIGHT OF HOUSES.

The houses in general are two or three stories high, and almost every house that is sufficiently large incloses an open, unpaved court, called a "hósh," which is entered by a passage that is constructed with one or two turnings, for the purpose of preventing passengers in the street from seeing into it. In this passage, just within the door, there is a long stone seat, called "mastab'ah," built against the back or side wall, for the porter and other servants. In the court is a well of slightly brackish water, which filters through the soil from the Nile, and on its most shaded sides are commonly two water jars which are daily replenished with water of the Nile brought from the river in skins. The principal apartments look into the court, and their exterior walls (those which are of brick) are plastered and whitewashed. There are several doors, which are entered from the court. One of these is called "bab elharum" (the door of the harem); it is the entrance of the stairs which lead to the apartments appropriated exclusively to the women and their master and his children.



Detail of Store Cornice. Attic Window Cornice. Detail of Main Cornice Bracket. Balcony Post and Rail. Detail of Window Frames. Detail of Main Cornice. Detail of Store Front Window Casing.

Miscellaneous Details of Front for Store and Dwelling.—Scale, ¾ Inch to the Foot.

WHAT BUILDERS ARE DOING.

IT is apparent by the reports from various parts of the country that the building business generally is very quiet, though there is probably no widespread distress. The lack of work at this end of the season is likely to cause considerable apprehension for the winter, but the recuperative powers of the larger cities, particularly in the West, where the greatest amount of suffering seems likely, is such that it is hoped that the winter will be less severe than the present indications seem to indicate. The number of idle mechanics is at present much greater than it has been at this season for many years past and many are inclined to view the immediate future with serious misgivings. On the other hand, it is predicted that the present depression in wages and labor will result in bringing capital into investment in order that it may avail itself of the present cheapness of the cost of construction. The greatest depression seems to exist between the great lakes and the mountains, although in the extreme West some localities are in a bad condition. Throughout the Middle Atlantic States and the extreme East the situation seems to be easier.

Boston, Mass.

The amount of building at present being carried on in Boston, while below the average for this season of the year, is sufficient to keep the majority of the contractors and workmen busy. Very little complaint is heard of lack of work, and the prospect for the winter is fair. The carpenters, under an agreement with the employers, are working eight hours per day. The change from nine hours occurred shortly after November 1, and will continue until March 1 in any event, and possibly eight hours will be adopted at that time as permanent. The men are now working for the same wages per hour as formerly, and the gain in time is a reduction in wages by an hour's pay per day. It is expected that on March 1 next a readjustment will be made, and the pay per hour will either be increased or the men will go back to the old arrangement. The amount of business on hand at that time will determine what the change will be. It is stated that the "inside" men employed in the shops prefer to work nine hours rather than lose an hour's pay. The disposition of the fund left by Benjamin Franklin "for the benefit of young mechanics," by the Board of Aldermen, who are trustees under the will, has recently been made, and in a way that seems peculiarly in harmony with the wishes of the giver. It has been decided to establish a trade school on the same general lines as those now existing in New York City and in Philadelphia. The work on the project is to be begun at once. The members of the Master Builders' Association are hard at work perfecting the details for the reception and entertainment of the delegates to the coming convention.

Baltimore, Md.

The building interests in Baltimore are reported in good condition, the amount of work on hand being about up to the mark. The Builders' Exchange is in excellent condition, and the progress of the plan to secure a building of its own is steady and sure. The Mayor was notified recently by the secretary of the stonemasons' union that the International Union had resolved to increase the day wages of stonemasons from $4 to $4.50 on all corporation work and all work hereafter to be contracted for. The Mayor said the increase of 50 cents a day might require additional appropriations. No decision has yet been reached in the matter.

Chicago, Ill.

Reports from Chicago indicate that the building interests are, comparatively speaking, quiet, and that the immediate future does not hold much prospect of improvement. The Builders and Traders' Exchange closed its doors on Manhattan Day at the World's Fair in honor of the visitors from New York City. The condition among the workmen in the building trades remains unchanged. The unions are making strenuous efforts to secure city improvements in order that as many as possible of the idle workmen may be given employment.

Cincinnati, Ohio.

The Cincinnati builders are having less to do this fall than they have had during the same period for several years past. The amount of work on hand is unusually small and there is but little new work of any importance in the market. The Builders' Exchange still continues in its normal condition of progress, although the quietness in the building business has caused a lack of interest to spring up in attendance of the members. The following, taken from the *Commercial Gazette*, is a portion of a letter sent to a leading member of the exchange by Wm. H. Sayward, secretary of the National Association of Builders, and illustrates the recommendations of that body in regard to setting up satisfactory and mutually beneficial conditions with the workmen:

I am very sorry that the various filial bodies do not more effectually put into operation the method of arbitration recommended by the National Association. It is discouraging, particularly in view of the fact that in every case where it has been established there has been no disturbance of the work in that trade, and in view of the fact that the most aggravating strikes have occurred in those trades and those places where the employers have sneered at the National Association's plan. I feel that this plan, upon which so much time and thought have been expended by the National Association, is the only fair and square recognition of the whole bearing of the labor problem, is the only true, logical, scientific way of approach and method of treatment, and it is, therefore, discouraging after all the effort which has been put into the work to find that the employers refuse to investigate, keep stolidly along in the old ruts, waiting with apparent unconsciousness until the opposing elements have been wrought up to the doing of some outrageous thing, and then blindly striking out at random, hoping to deal some annihilating blow to those organizations, which skillfully dodge their frantic efforts. Why is it that employers cannot see that our system follows purely in the line of that old and incontrovertible adage: An ounce of prevention is worth a pound of cure?

I suppose that some one must keep dinging the truth of our position continually in the ears of the employers, and as long as I am secretary it is my duty to keep at the task and not get discouraged, and so I say again to the Cincinnati Exchange through you, as one of its leading members, take this matter up over and over again, urge it upon your special trade organizations, and let us have at the next meeting of the National Association the gratifying report that in some one trade at least the plan of prevention framed, approved and recommended by the central body has been set in operation, and the first steps thus taken to secure peaceful, regular and systematic solution of the labor problem in Cincinnati.

Cleveland, Ohio.

Business is reported as quiet in Cleveland. The relationship between employers and workmen is free from disturbance and seems to promise well for the future. The Builders' Exchange is in excellent financial condition and is taking steps to increase the interest of the members in the work it has undertaken. The amount of building being carried on at present is less than it was at this time last year.

Lowell, Mass.

Trouble has again broken out in Lowell between the bricklayers and their employers. The union workmen have been on a strike since early in the season, the various phases of which have been given in these columns. It was thought that an adjustment of affairs had been reached last month which would prevent further trouble, but a new cause for disturbance has recently transpired. On November 9 the bricklayers' union held a lively meeting for the purpose of discussing the new grievance. A tacit agreement had been made between the employers and the union officials that all union men would refuse to work on private or corporate construction unless employed by a member of the Master Builders' Exchange. As the strike has been declared off the workmen were allowed to secure labor wherever possible and accepted the offer of the Hamilton authorities to work ten hours for nine hours' pay on their new mill.

The members of the Builders' Exchange objected to this, claiming a breach of faith by the union in allowing the men to secure work on the Hamilton direct and in allowing the men to work ten hours a day. They say this is a great injustice to them, as it enables the Hamilton company to take work from the members of the exchange. Considerable discussion was had over the matter by the union men at the meeting, some declaring in favor of calling the men off from the work and discharging them if they did not comply. The majority, however, were in favor of allowing the men to remain, as if they did not do the work scab labor would be procured and the men suffer thereby.

General Secretary Thomas O'Dea of the International Bricklayers' Union sent a letter, which was read in the meeting, offering his regrets at the declaring of a suspension of the strike. He volunteered the assurance that further aid would be granted after the annual convention at Omaha in January. The condition of affairs is still unsettled.

Lynn, Mass.

The building interests of Lynn are very quiet, there being little or no work of any importance at present done. The outlook for new work before next spring is very poor. At a recent meeting of the carpenters' union, P. S. Curry, the secretary of the Master Builders' Association, was one of the guests of the evening, and made an address on pertinent topics.

He took up the subject of arbitration as advocated by the National Association of Builders, and stated as his opinion that it will bring about a good feeling between the employer and employee, and put a stop forever to strikes and lockouts. He also reviewed the history of the hours of labor from the standpoints of the employer and employee, and thought that the eight-hour law would be a final settlement of the question, and that there would not be much opposition to it by the employers of Massachusetts.

Milwaukee, Wis.

The building business in Milwaukee is very quiet, and a large number of workmen are out of employment. No building of any magnitude is now being carried on, and there is little in sight for the immediate future. The situation looks gloomy for the winter, and the calls for charity are already double that which ordinarily prevails at this season of the year.

The Relief Committee of the Painters and Decorators' Union No. 159 has thus far succeeded in furnishing employment to about 40 men. The committee was compelled to abandon its original plan of furnishing men by the day and making contracts with parties for painting jobs. Twenty men have recently been put to work on the County Hospital. Superintendent Wilkins of the Asylum for the Chronic Insane has not yet given the order for repainting of that institution, because the Board of Supervisors has not yet made an appropriation for the purpose. Only a small fraction of the unemployed painters have thus far succeeded in getting work. Quite a number of firms and private citizens have left orders for odd jobs with the committee, through whose instrumentality the men are put to work.

The members of the Builders and Traders' Exchange are endeavoring to secure a better form of proposal under which all bids for work can be submitted. A conference has been held with the architects and a form adopted by the committee having the matter in charge. The final ratification and adoption by the exchange will take place later, after which the form will be put into general use. One of the principal features of the new form is that: "Where the architect, owner or agent demands a bond from the contractor, the contractor shall be entitled to a bond from the architect, owner or agent for the prompt payment of the sums named in the contract, and for the faithful performance of such conditions and terms as may be set forth in said contract."

At the last regular meeting of the exchange Manager Konrad reported that the permission given by the Exchange to the Museum and Library boards to exhibit their plans in the store part of the building had been accepted, and the plans of architects competing for the new library building will be exhibited in the exchange building.

New York City.

The condition of the building trades in New York City continues quiet in nearly all branches. The steam fitters and electric wiremen are reported as being fairly busy, but the other trades are feeling the depression seriously, it being stated that there are in the carpenter trade alone over 2000 men idle. Shortly before November 1 a general strike was ordered on the Postal Telegraph and Mutual Reserve Fund buildings, which promised for a time to prove a serious affair, but the matter was quickly adjusted and the strike declared at an end. There is said to be trouble among the unions in the city which is the result of an old split in the Board of Delegates that caused the establishment of a new opposition board called the Little Board. The trade is made to suffer by the feud, which shows itself in strikes ordered by one board on jobs where members of unions belonging to the other board are employed. The Mason Builders' Association on October 20 passed resolutions, printed elsewhere, as being calculated, in the opinion of the members, to bring about an early resumption of the normal amount of work.

The project by the members of the Mechanics and Traders' Exchange and the Building Trades Club to secure a centrally located property and erect a building which shall be a home for the building fraternity of New York City, under the name of the Building Trades Exchange, is being constantly agitated. The latest step is the issuance of a neat little book containing several blank pages for the date of subscription, name and address of the subscriber under the following head: "We whose names are hereunto subscribed do hereby severally agree to become members of the 'Building Trades Exchange' to be incorporated upon the general plan expressed in the prospectus of the committee of the Building Trades Club, dated July 1, 1893, and we respectively subscribe the sum of $1000 for our certificates of membership in such exchange, and agree with the Provisional Committee whose names are apended to such prospectus and with each other to severally pay in said sum when called for as provided in said prospectus." The prospectus was described in these columns at the time of its issuance.

Omaha, Neb.

It is reported from Omaha that the builders are feeling more encouraged over the outlook than they have for some time past, nothwithstanding the end of the season is rapidly approaching. Work on such jobs as were abandoned during the panic has been resumed, and it is the general feeling among both architects and builders that a renewal of the former volume may be looked for in the spring, if not before. The members of the Builders and Traders' Exchange have held their own, there having been no failures among them, and while there are only signs of improvement in the condition of business visible at present, they are not discouraged with the prospect. The exchange has stood the financial straits well and is in good condition, with a number of applications for membership awaiting action. Such new contracts as are now being let improves the condition of the workmen by furnishing more employment, although the supply of work is inadequate to the demands. There are a number of large operations under way for spring.

Philadelphia, Pa.

The building business in Philadelphia is about on a par with that of the other great Eastern cities, a lesser amount of work than usual at this season being on hand. The Master Builders' Exchange is doing excellent work in stirring up its members to greater appreciation of the benefits which will follow closer application of the methods advocated by the organization for the improvement of existing conditions. Renewed attention is also being given to the trade schools under the patronage of the exchange. At a meeting of the special committee of the exchange appointed to revise the by-laws, held October 25, many propositions looking to the advancement of the exchange were discussed at great length, the session lasting until nearly midnight.

At a meeting on the 24th the chief topic of discussion was the welfare of the Mechanical Trade Schools. George Watson, the president of these schools, and the man upon whom falls the responsibility of keeping up the interest in them, told of the great progress that had been made in the work, and declared that it required a great deal of exertion to hold the schools up to the high standard they had attained, but that he was determined that they should not go backward. He said the chief difficulty was in raising the necessary funds to keep the schools going, but that thus far all that had been needed had been raised. Mr. Watson urged the completion of an endowment fund of $10,000. He said that he had already raised $5500 for the purpose. President Albertson of the exchange; ex-Presidents John S. Stevens and Stacy Reeves, and Messrs. Chas. Gillingham, John Atkinson, Samuel Hart and Wm. S. Irvine also made addresses in favor of encouraging the schools. Mr. Irvine suggested that the Legislature should make the appropriation for the purpose.

Captain Thomas C. Wilson, assistant in the State Bureau of Industrial Statistics, has been assigned to make a special and exhaustive investigation into the apprenticeship system as practiced in the United States. He will be invited to visit the Mechanical Trade Schools, and the officers of the exchange will make every effort to aid him in his labors so far as Philadelphia is concerned.

San Francisco, Cal.

The union carpenters of San Francisco are making strenuous efforts to secure the adoption of an eight-hour day on all work done on the buildings of the Midwinter Fair. The object claimed is the distribution of the work among a greater number of workmen and the following, from the *Call*, gives a good idea of the manner in which the carpenters are proceeding:

BUILDING TRADES' HEADQUARTERS.
To the Midwinter Fair Commissioners.—

GENTLEMEN: Our committee which was appointed to ask your assistance in persuading the contractors now engaged on the Midwinter Fair buildings, and working their men 10 and 11 hours per day, to reduce the hours to the legally recognized eight-hour work day, has made a report to us that is very unsatisfactory. It was unable to give us any information as to your intentions.

We regard that report as more in the nature of a narrative of a controversy had with the contractors than of any conference had with you, and would request some statement from you that can be submitted to the organizations interested.

We would also lay stress upon the point that an eight-hour clause ought to be inserted in all contracts to be let by you or under your supervision, and request that you decline to allow any buildings to be let unless such a clause be incorporated.

We send this by our duly authorized committee, who will wait your reply and be at your service to answer any questions. Yours respectfully,

EXECUTIVE COMMITTEE ORGANIZED CARPENTERS.

BUILDING TRADES' HEADQUARTERS.
To the Builders' Association.

GENTLEMEN: We respectfully submit the following for your consideration:

Owing to the fact that the buildings on the Midwinter Fair grounds have been let without any eight-hour clause in the contracts, the contractors, with one exception have taken advantage of that fact and have lengthened the hours of labor per day to an unreasonable extent.

We recognize that the competition of contractors bidding upon the eight-hour basis against others who contemplate employing workmen 10 and 11 hours per day is not fair. We also know that the Builders' Association has in the past been favorably disposed toward the eight-hour work day, as your actions have demonstrated, and, therefore, believing that your members use the eight-hour day as the basis upon which to estimate the item of labor, we feel that you will agree with us that your interests are jeopardized as well as ours.

Accordingly, we would ask your support in our present efforts to reduce the hours of labor on the Midwinter Fair buildings and to bring about the insertion of an eight-hour clause in all future contracts there.

In Colonel Andrews' statement to us he said that contractors would not bid on propositions containing an eight-hour clause, but our committee elicited the fact from him that no attempt had ever been made to secure such bids and that at no time had any eight-hour clause been inserted in the contracts.

This statement coming to us from an official of the exposition carries weight, and we believe that a clause pertaining to the number of hours ought to be inserted in all contracts, to the end that no one bidder should have an advantage over the others.

We send this to you by a committee duly authorized, asking that you give it your immediate attention and the committee will await your reply. Yours respectfully,

EXECUTIVE COMMITTEE ORGANIZED CARPENTERS.

The building business in the city still continues very quiet, and the number of men out of work is larger. There seems to be little prospect of immediate improvement.

Scranton, Pa.

Building is reported as being in a fair condition in Scranton, with several large contracts in prospect. The Builders' Exchange held its first banquet on the evening of October 25 at one of the leading hotels. The affair was a most delightful one in every respect, and proved most enjoyable to all. The tables were most tastefully decorated and an excellent orchestra added to the pleasure of the occasion. About 50 members and guests were present, and the toasts were ably handled. The exchange is deserving of great credit for the complete success of the event.

Notes.

It is stated by the Washington *Post* that the American Federation of Labor and the Knights of Labor are taking steps to form an international union which shall bring all labor organizations under one management.

Master builders of Fall River report business to be picking up. Outdoor work is beginning to become a little more plentiful, owing to the fine weather, which is tempting many property owners to take advantage of it and have repairs done that were delayed on account of the stoppages in the mills. If the weather holds good it is expected that business will be good till Christmas.

The Mason Builders' Association held a banquet on November 15, at which the members and their friends enjoyed a delightful evening.

The Committee on Public Instruction of the city of Fall River, Mass., which has the awarding of contracts for school buildings, is in hot water over an alleged discrimination in favor of a bidder, whose estimate for a given contract was not the lowest. It is stated that one of the committee received a money consideration for his vote in awarding the contract in question. A definite code of practice in awarding contracts and the treatment of bids should be established and maintained in every city in the country.

Ex-Governor Chas. R. Ingersoll of Connecticut, to whom a controversy between union and non-union workmen, as to the legality of the decision of the School Committee of New Haven compelling the employment of union workmen only, has decided in favor of the non-union men. In Governor Ingersoll's opinion such action on the part of the Board of Education was entirely illegal and untenable. Two reasons, as follows, are given in support of his opinion: The first, that there was no mention in the call for the meeting which could justify the action. The other, that the vote was decidedly an instance of class legislation, and consequently cannot be sustained in law. There is no question but that the Board of Education will abide by Mr. Ingersoll's decision, and will give out the contracts for the new school buildings without any regard for any person or class.

The Master Painters' Association of the State of Pennsylvania has decided to hold its annual convention at York on January 9, 10 and 11 next. An interesting feature of the convention will be an effort to interest the organized journeymen painters in the work of the Master Painters' Association. Invitations will be extended to them to send representatives to take part in a discussion of topics of mutual interest. This is the first time such an effort has been made, and it is hoped it will lead to a better feeling between the masters and the men.

Some time since the balcony of a yacht club house in Chelsea, Mass., collapsed during a band concert and several persons were killed. Justice Hart, before whom the inquest, as to the cause of the disaster, was held, gave as a verdict that the cause lay with the contractors who built the building. In closing, he said: "From the weight and character of the evidence given at the inquest, the court can reach but one conclusion. If the balcony had been properly built it would have been entirely adequate to sustain any possible weight or strain that could have been put upon it, and this serious calamity would never have occurred. Either the contractors had no special training or knowledge of the mechanical principles involved in the erection of buildings, nor any comprehension of the risks comprised in a faulty construction of work of that character, or having knowledge and comprehension they were legally and morally bound to do their work in a manner which would insure absolute safety of each and every person having occasion to go upon the premises. This they wretchedly failed to do, and are therefore, in the opinion of the court, alone responsible for the cause of the accident and the fatalities and injuries resulting therefrom."

CORRESPONDENCE.

Tool Chest Construction.

From M. E. O'C., *Porter's Mills, Wis.* —I wish to call attention to several misprints in the article on tool chest construction, as published in the November issue of the paper. I am made to say that "it is less trouble to take out a drawer and set it on top of the drawers already open," &c., whereas it should read "take out the tray," &c. Again, the article reads, "It will be noticed that the trays of the chest project ¼ inch," &c. It should be, "that the sides of the chest project." I omitted one point in my description, and that is, that the bottom drawers, front and rear, next above the sliding shelf, should be deep enough, so that the saw rack C and the rear drawer next above the first mentioned rear drawer will slide over the planes when on the sliding shelf. By this arrangement all the drawers, as well as saw rack, can be opened without disturbing the planes.

Criticism of Roof Truss.

From A. H., *Sac City, Iowa.*—In reply to "C. W. B." of South Denver, Col., who asked for criticism of roof truss, submitted in the May number of the paper, permit me to say that I consider it very weak. I built a church in this place last year with a roof truss similar to that indicated in Fig. 1 of the sketches, and I now notice that the sides of the building are springing outward and the ridge settling down, while at the time of building the plates were sprung in 2 inches each. In this case the trusses were placed 16 inches on centers. I am now fully convinced that this is not the kind of roof for a country where soft wood is used for building purposes. I think that for small churches a roof constructed as shown in Fig. 2, with trusses placed every 6 feet, would be stronger, and, at the same time, could be put up just as cheap.

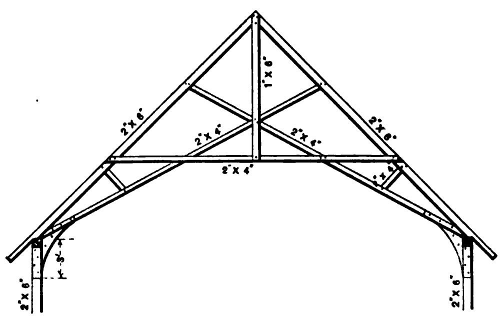


Fig. 1.—Construction Employed by "A. H." in Church Roof.

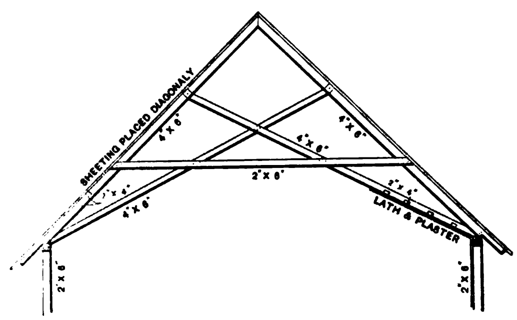


Fig. 2.—Truss Recommended by "A. H." for Small Churches.

Criticism of Roof Truss.—Sketches Submitted by "A. H." of Sac City, Iowa.

Area of Roof.

From H. F. M., *Frankford, Pa.*—Will *Carpentry and Building* kindly inform me of the shortest method for obtaining the number of square feet in a roof when inches are involved in the measurements? My way is to reduce feet to inches, multiply, and divide by 144. This is a laborious process, and consumes considerable time when a number of roofs are to be estimated.

Answer.—A convenient method for obtaining the area of a square or rectangular surface is by the use of the duodecimal system, which is the same as the decimal, only 12 units are used in the place of 10. By the use of this system dimensions in feet and inches can be added, subtracted or multiplied, as may be desired, the scale always being 12. The foot is taken as the unit, and can be indicated by ft. or the sign °. The foot being divided into 12 equal parts, one of these parts is called an inch or prime, and marked ′. The inch or prime being divided into 12 equal parts, one of these parts is called a second, and marked ″. The second being divided in a similar manner into 12 equal parts, each part is called a third, and marked ‴. From the above we can form a table of values, which is as follows:

12‴ (thirds) = 1″ (second) or $\frac{1}{144}$ inch.
12″ (seconds) = 1′ (prime) or inch.
12′ (primes) = 1° (degree) or foot.

The marks ′, ″, ‴, which are used to denote the fractional parts of a foot, are called indices. The operation of multiplication by the use of duodecimals is performed as follows: The multiplier is to be written under the multiplicand so that units of similar value shall be under each other. Beginning with the lowest order of units in each, multiply each term of the multiplicand by each term of the multiplier. Each product is to be reduced to higher denominations (by dividing by 12) and written in its proper place. The sum of the partial products will be the product required. To determine under which division two sets of figures come when multiplied together, it is only necessary to add the indices. Thus 1° × 1′ = 1′, 1′ × 1′ = 1″, 1′ × 1″ = 1‴, &c.

Supposing we have a gutter 56 feet and 9 inches long by 14 inches (or 1 foot 2 inches) wide, and we wish to obtain the number of square feet in same. The operation would be performed as follows:

$$\begin{array}{rrr} 56^\circ & 9' & \\ 1^\circ & 2' & \\ \hline 9^\circ & 5' & 6'' \\ 56^\circ & 9' & \\ \hline 66^\circ & 2' & 6'' \end{array}$$

In the above example the multiplier is written under the multiplicand so that units of similar value shall be under each other. Now to perform the above example, 2′ × 9′ = 18″, and 18″ divided by 12 (to reduce to next higher denomination) = 1′ 6″; we put down the 6″ and carry 1′; 2 × 56° = 112′ and + 1 = 113′; 12 goes into 113 9 times and 5 over, so we put down the 9° and 5′ in their proper places.

The next operation is to multiply 56° 9′ by 1°: 9′ × 1° = 9′, which is put under the 5′; 56° × 1° = 56°, which is put under the 9°. By addition we find the sum of the partial products to be 66° 2′ 6″.

Wind Mill Construction.

From W. H. A., *Pennsylvania.*—Will some of the readers of *Carpentry and Building* please send for publication details and specifications of towering for wind mills?

Window Details.

From G. I. W., *Brooklyn, N. Y.*—Will some reader of *Carpentry and Building* send for publication in the columns of the Correspondence Department a detail of a window in a frame cottage?

Note.—We think if our correspondent will examine some of the previous issues of the paper he will find among the many details presented those which will prove of interest and value. The question, however, is one which admits of a variety of treatment, and we trust our readers who are so inclined will take it upon themselves to submit drawings.

Wood Turning.

From J. F. W., *Danville, Pa.*—Will some of the many readers of *Carpentry and Building* discuss the question of wood turning in its various phases, giving special attention to the turning of handles of all kinds, as well as straight turning?

Greenhouse Construction.

From JOSEPH H., *Duluth, Minn.*—Will some one please give for publication in the columns of the Correspondence department plans and details of a small greenhouse measuring about 10 x 15 feet, exclusive of the boiler house? I should also be glad to have a full description of the method of construction employed. I have never built a greenhouse and want to erect a small one. In answering I hope the correspondent will give the probable cost of a greenhouse of the size named.

Note.—Our correspondent may be able to obtain some valuble suggestions from the drawings and description of a greenhouse published in our issue for June, 1892. The question raised is one likely to interest very many of our readers, and we trust those who have had experience in this particular kind of work will come forward with drawings and descriptive matter.

Pitch of Window and Door Sills.

From McD., *Mount Morris, Ill.*—In reply to the correspondent who made inquiry about the pitch of door and window sills, I would say that 1 inch in 6 inches is about right for a window sill and ⅜ inch in 6 inches for a door sill.

Solutions of an Interesting Problem.

From J. H. L., *Council Bluffs, Iowa.*—Referring to the interesting problem presented in the July number by "O. L. W.," Dallas, Texas, I offer the following solution: Referring to the sketch, Fig. 1, the distance A to B bears to the distance A C or C B the proportion of 17 to 12. This would divide the distance 25 feet into parts equal to the sum of 17 + 17 + 12, making 46, and 17 of these parts will equal the distance A to B. Dividing 25 feet by 46 and multiplying by 17 gives as a result 9.239 feet, or 9 feet 2⅞ inches. This is exact to within less than $\frac{1}{100}$ inch.

Note.—A solution of the problem very similar to that presented above has also been furnished by "W. B. H." of Glassboro, N. J.

From E. A. V., *Salt Lake City, Utah.* Referring to the problem of "O. L. W.," Dallas, Texas, it is obvious that from the data which he presents it cannot be done mathematically. By three trials I have obtained the following, in which the error is immaterial where A C of Fig. 2 is less than 1000 feet. Referring to the diagram, the angles C B D and D B C being equal, and B C D equal to 90°, the other angles must each equal 45°, the sine of which is 0.70711. Now, 1 ÷ 0.70711 = 1.41427 = ratio of side B C to B D, or for every foot measured on B C we have 1.41427 feet on B D. With this to judge by, I took for the side B C 6.5 feet, and obtained for B D 9.19234, which I found on dividing A B by 2 to be too small by 0.058 foot. Observing the ratio of B C to B D, I finally made the distance B C = 6.530126 + 0.7071 = 9.2349 = B D = half A B, as shown by (25 = A C) − (6.530126 = B C) = (18.46975 = A B) ÷ 2 = 9.2349 = half A B = B D. Dividing 25 by 6.530126, we have 3.82841, a constant, which, if A C be divided, whatever distance it may be, will give the length of the side B D, which equals half A B when the angle C B D = 45° and B C = B D × 0.70711.

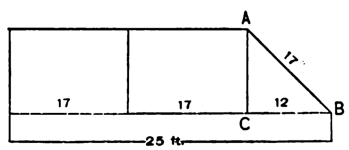


Fig. 1.—Solution Contributed by "J. H. L."

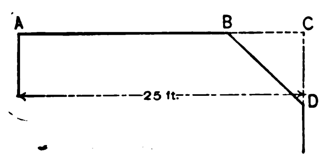


Fig. 2.—Diagram Accompanying Letter from "E. A. V."

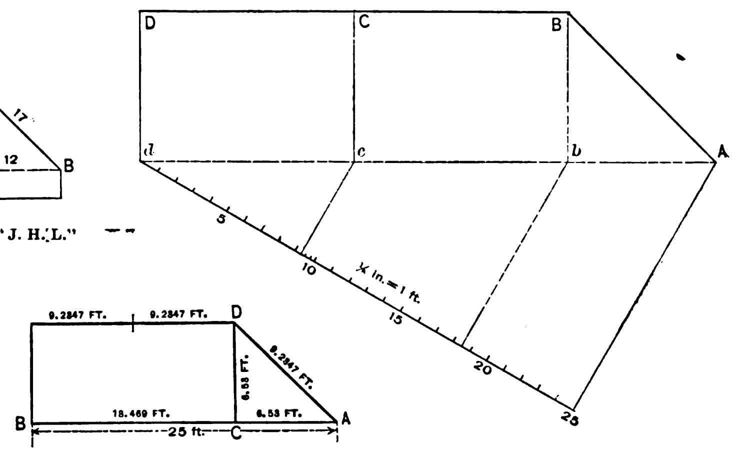


Fig. 3.—Plan Proposed by "G. H."

Fig. 4.—Method Recommended by "N. D."

Diagrams Illustrating Various Solutions of an Interesting Problem.

From N. D., *Portland, Ore.*—I send the following answer to the problem of "O. L. W.:" Referring to the sketch, Fig. 4, draw the line A B in an angle of 45° and of any length. From B draw the horizontal line B C D, twice as long as the line A B. Now draw a horizontal line from A to *d* and drop perpendiculars from B C D until they intersect this line at the points *b c d*. The distance A *d* equals 25 feet. It now remains to strike a scale for the line A *d*, which is done by drawing a line from *d* obliquely and space off upon it 25 feet. This may be done either with the dividers or by means of a scale. Connect the point representing 25 feet with A by an oblique line. Parallel to this line draw other lines from *b* and *c*, and their intersections with the scale line will show the distances required.

From G. H., *Narrowsburg, N. Y.*—In reply to the article in the July number of the paper entitled "An Interesting Problem," and submitted by "O. L. W.," I send the following: As he requests equal angles to the corner of his building, this would make the corner an octagon. Now, in an octagon the base A C of the triangle A C D is to the side A D as 1 is to 1.4142. Now, let the distance A C equal 1 and C B equal two times 1.4142, or 2.8284. Dividing the line A B in the above proportion gives the distances, as shown in the diagram, Fig. 3.

Note.—We have a solution giving a similar result to that shown in Fig. 3 from "R. A. L." of Hamilton, Ontario.

Hop House Construction.

From J. R., *Gervais, Ore.*—Hop house building is brisk here at the present time, and I wish some of the readers of the paper would tell me how to construct a good working hop house. It seems to me that good ones are very scarce in this part of the country. I would like to see plans of some of the Eastern hop houses presented in the Correspondence Department of the paper.

Common Sense in Architecture.

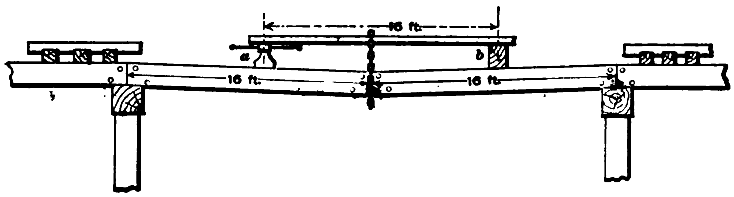
From GAMMA, *New York City.*—A good deal has been said and written about the artistic side of architecture as a profession; but there has been too little said and done about it considered as a practical art, having bearing on two branches—ethics and mechanics. The architect, before he is an artist (or rather before he pays any attention to the artistic side of the question), should consider the uses to which his building is to be put, and plan it to fit the purposes, the people and the surroundings. If it is to be a dwelling, it should be built to live in and not to look at; every room and passage should be so proportioned in itself as to be suitable for the purposes to which it is to be applied. Thus a bedroom requires to be different in dimensions, proportions, position and communication from a library or a dining room, and so on. It would seem at first blush unnecessary to say this, but I can find 100 houses in as many hours in which this first principle is ignored; and in which rooms are of impracticable size, shape and place, and are either almost inaccessible, or are so accessible as to be unfit for the purpose. Thus a bedroom which can be reached only from another is too inaccessible; one that is a thoroughfare through which to attain some other room is too accessible. How many so-called architects can lay their hands on their hearts and say that they have not committed either one of these two architectural sins?

The habits of the people who are to live in a house should be known to the architect, that he may know whether to plan a billiard room, or a music room, or an art gallery; whether to devote spare space to parlors in which to receive the guests of an afternoon or an evening, or to bedrooms in which to lodge visitors who come to stay for weeks at a time.

There are dozens of points like these that are practically unconsidered by the architect, who is more anxious to make for himself a name as an artist than to build up a reputation as a common-sense house planner.

Those who plan churches do no better. They get up about the same sort of thing for a Baptist as for a Roman Catholic congregation; and perhaps in both it is impossible to see or hear those people and those things which should be seen and heard.

Considered as a student of human nature and of the conditions of human existence, the average architect, artist though he may be, is a dismal failure; but when we come to consider him as constructor he is by far worse. He knows little or nothing about the strength of materials and very often none too much about the cost of work ing them up. He will plan one building in soft freestone, that is cheap to carve, and make it so plain that it makes your face ache to look at it, and



Problems in Bridge Carpentry.—Fig. 1.—Method of Repairing Bridge from which One Bent has been Removed.

right in the same block he will get up a granite structure that is fairly wormy with fine detailed carving that will use up more labor than would pay for about half the cost of the rest of the walls. He will get up specifications and bills of material calling for odd sizes of lumber and odd shapes of bricks that run the cost of construction up from 5 to 20 per cent. He will be so afraid of the extra cost of a few inches of head room that he will skin 4 inches off the hight of every ceiling in a building, and then he will waste more money in the extra number of joists required to support the weight than the extra walls and plastering would have cost—totally ignorant of the fact that (other things being equal) a joist 12 inches deep is two and a quarter times as strong as an 8-inch joist of the same thickness. He will stick his joists into holes in the walls so that if they burn through in time of fire, or if a supporting post gives way, the wall will be pried over. He will put a lead roof covering on a steep pitch and leave it to those who come after him to find out that its expansion under heat and its inability to contract up hill by cold will make it gradually crawl off the roof. He will run up a 22-story building in a quicksand district with one edge of the building on a rock ledge and the other on the sand, and then proceed to put an artesian well down right alongside of the foundations on the quicksand edge—and then he will wonder why the building goes out of plumb. Because he don't know enough to construct a truss roof, he will fill the upper floor of a building with huge posts, when he could hang it from the roof and give a wide, unbroken, clear space on the floor. He will make a chimney flue 48 x 12 inches to prevent the chimney breast sticking out into the room; he will put his boiler room down in a sub-cellar with no place to get coal in or ashes out, and will give a small, short stack which is overtopped by neighboring buildings; and then he will wonder why enough steam cannot be raised to heat the building or run the machinery.

Now, if the average architect would only try to be a seeker after common sense before he is an artist he would be of much more use in the community; what he got up would be more fitting, and thus could properly be made more artistic.

Problems in Bridge Carpentry.

From L. H. H., *Sullivan, Ind.*—In looking over various issues of *Carpentry and Building* during the past few years I have seen nothing relating to railroad or bridge carpentry. Either railroad men do not read or write or else the editor does not consider that branch of the business worthy of consideration in the columns of the paper. Trusting that one of the first two reasons is to blame for the long silence on the subject, I will submit a problem which may be of interest. In Fig. 1 of the sketches is represented a bridge from which one bent has been washed out, leaving the timbers hanging by the packing blocks. It is desired to raise them into a level position in order to put in a new bent. To do this a block was placed in the center of one of the chords, as at *b*, and a common screw jack set in the center of the other chord at *a*. On these was placed a 16-foot stick, and a chain passed from the center of the stick down under the swinging

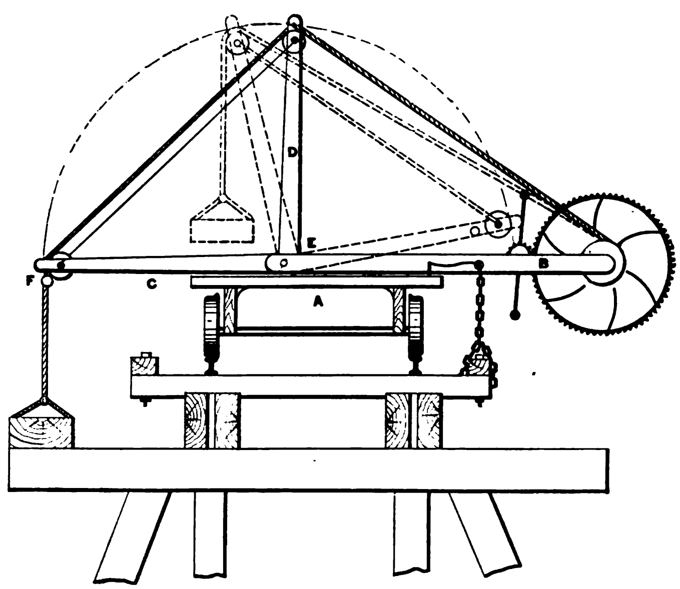


Fig. 2.—Scheme for Taking Out and Replacing Old Chords in a Bridge.

ends of the chords, as shown. By running out the jack *a* it was proposed to raise the chords to their proper position for the purpose of putting in the new bent. The question is, Will the chords raise or will they not?

The second sketch, Fig. 2, shows a contrivance for taking out old chords and putting in new ones. It is desired to construct a derrick car so that a few men can pick up or lay down a heavy stick in the shortest possible time. Fig. 2 may be taken as representing a cross section of a railroad trestle, A being a common push car; B a portable frame, at one end of which is rigged an ordinary winch, and at the other ends are swung arms C and D in such a way as to oscillate on the axis E. These arms are braced solid at right angles with each other and fitted with a sheave at the outer end. Suppose now it is desired to pick up an old stick from the cap. The line is rigged just as shown with a stop knot at F. As the rope winds up the arms C and D describe the circle indicated by the dotted line until the timber comes plumb over the car, as indicated. At this point the arm is hooked to the frame of the winch and the timber lowered to the car. In order to transfer a stick of timber from the car to the cap the operation just described is simply reversed. The question which I desire to raise is, Will it be any harder to lift the load in the manner indicated than to raise the same weight with the same winch over an ordinary shear pole and single sheave?

Brick Veneered Buildings.

From S. F. B., *Wellington, Ohio.*—I would like to say to "D. A. K.," Pawtucket, R. I., whose letter was published in the August issue of the paper, that I would not use brick veneer as it is generally employed. In this section the studding is set up, and when the brick is going on one side the lath is going on the other. The result is the nails are loosened and might as well be left out altogether. Another thing, the mason will use just as little mortar as possible, thus leaving a great many air holes at the ends of the brick. Siding paper, matched sheeting and lath and plaster will make a much warmer house, in my opinion, than brick veneer, while the frame house can be trimmed up and made to look like a home. If I must have brick I would go it straight and fur and lath; I would not mix the two.

From M. D. S., *Pittsburgh, Pa.*—In the August number of *Carpentry and Building* I notice an inqury with regard to veneered brick houses, and also an answer by "D. A. K." If I may be allowed the space I will give some notes from my own experience in this line of building. Ten years ago I erected a large farm house in the southern part of Jefferson County, Pa., veneered with a 4-inch brick wall, which stands to-day without any show of cracks from frost or settling. The foundation was cut stone with rubble work under grade and finished with belt course. The frame was of 2 x 5 inch hemlock, sized and set in 6 inches all around from the margin of the stone work. It was sheeted on the outside with 1 inch pine boards, this allowing for 1 inch of space between the brick and the sheeting. The brick were laid from an outside scaffold and anchored with 20d nails, driven to the center and close upon every fifth course. This can be done best by the use of a 6-inch steel punch, thus keeping the head of the nail close to the brick without breaking the bond. Chip from the under side of the brick in the course next above the anchor, so as to bring to a proper bed. The sills of the first story were stone, while those in the second story and attic were of wood painted to imitate stone.

The durability of the veneered house depends mainly on three conditions, which are: 1, good and substantial foundation; 2, well seasoned lumber in the frame, and, 3, faithfulness of execution in construction.

It has been demonstrated by experience that in veneered work it is necessary to lay the brick on a full bed of mortar; to have equal bed on back and not on front alone, as in laying pressed brick. This is obvious, as without equal beds the tendency would be to press out or give unnecessary tension on anchors and so make the whole work less secure.

In his article "F. T. S." remarks that the brick may be laid against the sheeting, but I think it better to allow 1 inch between, as it not only provides an extra air space between the brick and the wood, which aids in preventing the frost or moisture from penetrating, while adding to the comfort of the house, but as brick are not always of one width, it is an advantage to the workmen in manipulation.

From McD., *Mount Morris, Ill.*—In reply to "A. W." of Frankfort, whose inquiry with regard to veneering buildings with brick appeared in *Carpentry and Building* for June, I would say that when I first started at the carpenter's trade some houses were veneered on four sides and some on three sides. Good stone foundations were employed and the buildings are to-day in good shape, although they were put up before the war. Some of them are located in the State of Pennsylvania and in this town there are now three buildings with brick veneering. They are balloon style of framing, boarded up on the outside and well nailed on. The boards are covered with building paper, and then the brick work is put up. The sills employed are 6 x 8 and the studding 2 x 6.

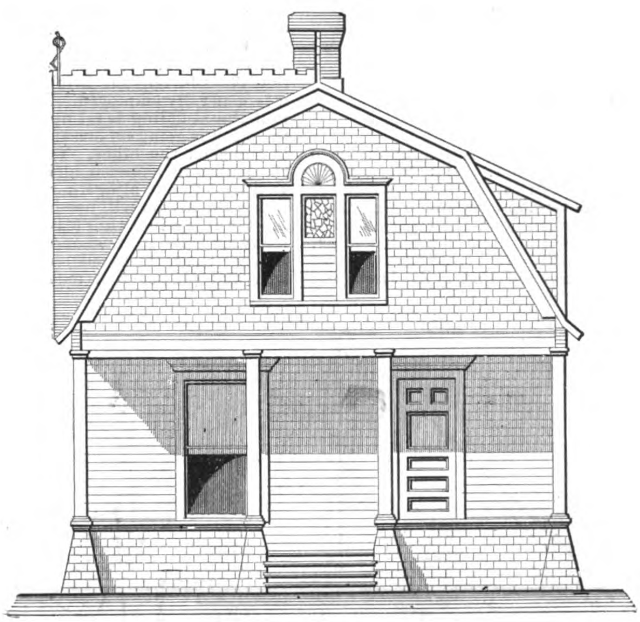
French Roofs.

From G. G., *Alberton, Prince Edward Island.*—I would like very much to have some reader of *Carpentry and Building* give me a good sketch of a French roof; also detail of a luthern window.

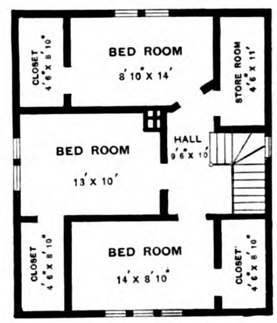
Note.—If our correspondent has files of the paper for some years back, he will find among the various issues more or less attention given to the subject of French roofs, together with designs of the same. We shall be glad, however, to have our readers living in sections where French roofs are now considered the proper style of covering for a building, to furnish sketches in answer to the request of our correspondent.

A Cheap House.

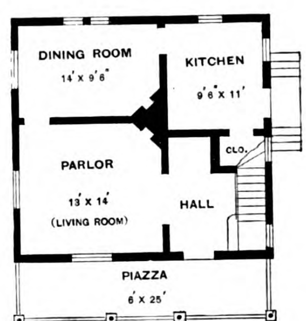
From E. E. McKibban, *Brunswick, Ga.*—I send tracings of a six-room cottage, the cost of which is about $850, thinking the study may be of interest to some of the readers who are looking for cheap houses. The cottage is designed to be set on cedar posts, with shingled belt course running to the ground. The frame is light, and finish plain, as may be seen from the elevations. A feature of the kitchen is the brick work chimney coming on a level with the plastering, so the range can be set against the wall, thus economizing room. It will be seen that there is no door connecting the kitchen with the hall, it being intended to have a base burner in the jog or recess for the purpose of heating the second floor as well as the hall and parlor. The studding and rafters employed are 2 x 4 inches, the floor joists 2 x 10 inches, and the porch joist 2 x 8 inches. The sheeting used is 7/8 inch, laid diagonally. The hight of the first story is 9 feet 6 inches and the second story 8 feet 6 inches. The trim of the first story is plain pine, with corner plinth blocks, reeded casing and base. The finish is in hard oil. The second story has beveled casing and wood work painted.



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



Second Floor.



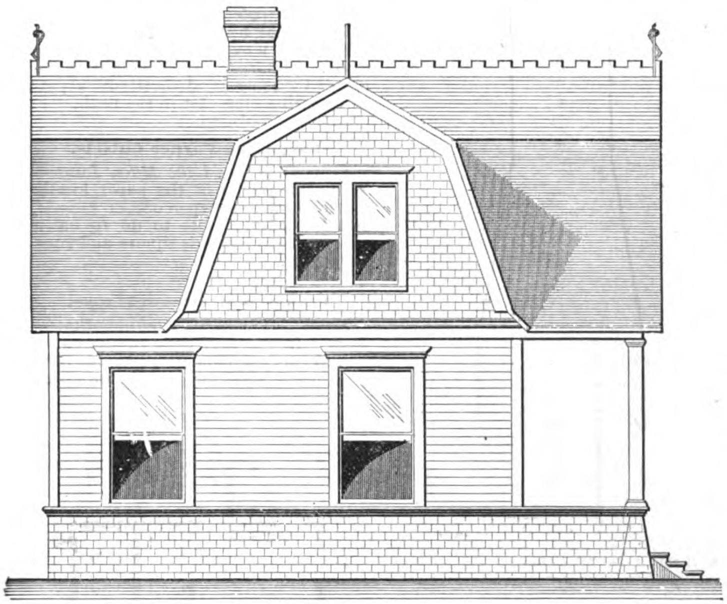
First Floor.

Scale, 1 16 Inch to the Foot.

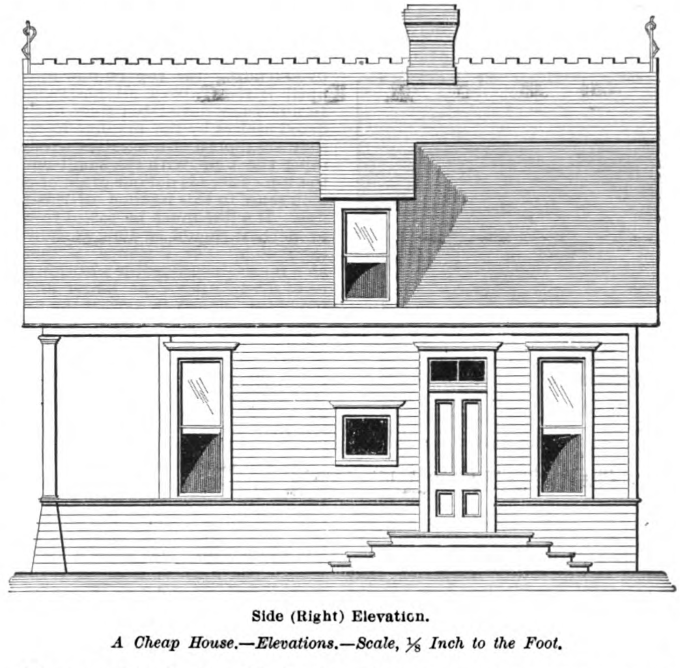
A Cheap House.—E. E. McKibban, Architect, Brunswick, Ga.

Ink Eraser for Draftsmen.

From J. W. G., *Ravena, Ohio.*—I am a reader of *Carpentry and Building*, and consider it has been of great assistance to me in the study of architecture. I think I have discovered something which will be of interest to readers of the paper, especially the draftsmen, and that is, a means of erasing ink from drawings, whether it be on tracing cloth or paper. I have found from experience that a piece of broken glass, slightly curved, is far more satisfactory than all the erasing knives in existence. Of course, some pieces of glass are not very sharp, but if the sharpest pieces are used they will answer the purpose very nicely without injuring the drawings in the least. Another thing, the ink will not blot when redrawn. I have found this means of erasing to prove satisfactory in every way.



Side (Left) Elevation.



Side (Right) Elevation.

A Cheap House.—Elevations.—Scale, ⅛ Inch to the Foot.

Painting Metal Roofs.

From A. A., *Brooklyn, N. Y.*—I wish to be informed regarding the painting of metal roofs. I once thought it a proper time to paint them with good linseed oil paint as soon as they were finished, but other people claim that the roofs should be a little rusty before applying the paint.

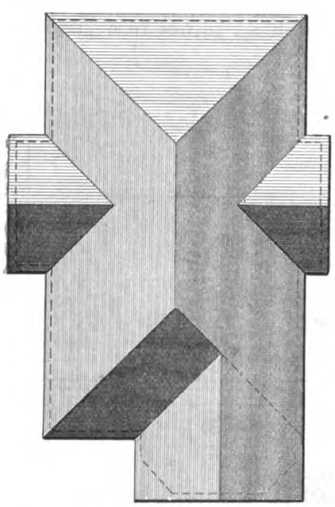
Answer.—The following article from the *Painter's Magazine* has a bearing upon the subject, and while it relates only to the painting of iron surfaces, will be of interest: "The point of prime importance is the actual condition of the surface when ready to receive the first coat. Upon this point rests the success or non-success of subsequent applications, for if not in proper condition no paint will prove permanently preservative. Now, the best state is that where there has been formed upon the surface of the iron a film of black oxide which has been, while hot, thoroughly permeated by and incorporated with a resinous or tarry covering. This covering insures perfect success, and its thickness may be increased from time to time by additional coats of paint. If, however, a layer of hydrated oxide (ordinary rust) be once allowed to form the successive coats of paint will fall off, their separation from the iron being merely a question of time. During the time, also, the rust has been spreading under the paint. An instance of this may be seen after outdoor work has been in place for some time. Usually all the riveting is done before the final painting is begun, each rivet head in the meantime being exposed to a damp atmosphere, the paint begins to peel off the rivet heads long before it leaves the adjacent plates, and when this occurs nothing but thorough scraping will give the paint a chance to adhere again. So slight are the differences of manipulation which determine whether a given piece of work shall or shall not rust away that they may all be found in the different methods pursued now and formerly. Taking the case of a piece of ornamental iron work, which in so many instances has come down to us in unimpaired beauty and condition, it would now probably be forged in detail in one part of a factory, drilled, filed and fitted in another, and when completely finished, be painted in three coats of best oil paint. Formerly the smith who forged the work punched the necessary holes at the same time, fitted his various pieces together as he went on, completing each piece as he proceeded, doing all the work with his hammer, and to quote an old work of directions to good smiths, brushing his work over with linseed oil and suspending it for some time over a strongly smoking wood fire. This will give at once a sort of elastic enamel coat, perfectly adherent and calculated to preserve the iron to the utmost. Of course iron work to-day is not made to undergo any such preparatory process, and the consequence is that we find it very difficult to produce good results in painting on iron surfaces."

From the above article we can infer that an iron surface should not be left exposed to the weather until rust has formed, as once started this action is liable to continue, even though paint has been applied. Regarding the time that should elapse (if any) after a tin roof is laid before it is painted, much would depend upon circumstances. If the tin is covered with palm oil to such an extent as to render the paint liable to peel off, the roof can be left exposed to the weather until the oil has been washed off. Some roofers recommend that as soon as the roof is finished the surface should be washed with benzine or an alkali, thus removing all traces of palm oil or other grease. Another method recommended is to sprinkle sand over the tin and then sweep it off with a broom. In localities where coal is largely used for fuel, or near the sea coast, the surface of tin exposed to the weather is soon corroded, and when the cheaper grades of roofing plates are used the surface soon becomes covered with rust. It must be evident that the better qualities of plates, or those having a heavy coating, would withstand the atmospheric effects for a longer time. It is conceded by most painters and roofers that the surface of a tin roof should be free from grease and rosin before painting, and, a clean surface being obtained, the sooner the paint is applied the better.

Regarding the kind of paint to be used on a roof, the following from *Painting and Painting Materials* may be found useful: "The value of a paint is its oil, and economy consists in purchasing good oil—the best and purest to be obtained. Adulterations should be advantageous in some cases, but it should be done for a purpose. On roofs, 15 to 20 per cent. of fish oil will be an advantage, and on bridges, which are not so frequently repainted, probably a little cotton-seed oil will do no injury. The principle of adulteration is very simple; the more 'elastic' the first coat the more durable, but the greater tendency to crack the second coat. The weather coat should always be the more 'elastic' (containing more non-drying oil); but a man of judgment will discriminate. The most elastic (in the true sense) of all oils is boiled oil; but it is too thick, and needs mixing with raw oil or with turpentine. A priming of such oil thoroughly dried will stick if red lead be added and not put on too thick. A little boiled thoroughly mixed with raw oil increases its elasticity, but probably increases the chances that the paint will wrinkle, pit and crawl a little; although if care be taken in the mixing and using any such effect should be so small as to be imperceptible. There is this strong reason for using more or less boiled oil—that the pigment, at least lead pigment, will more thoroughly unite with and harden the oil, as boiled oil is partly composed of free linseed-oil acid, and we shall thus get more hard soap. At the same time we thus get a harder oil. We always get with the boiled a certain quantity of oil rubber, produced by the boiling, and which, so long as it remains, gives the oil a rubber-like elasticity."

Framing a Roof.

From M. & W., *Waynesboro, Pa.*—We inclose plan for framing the roof of the dwelling about which "A. E.

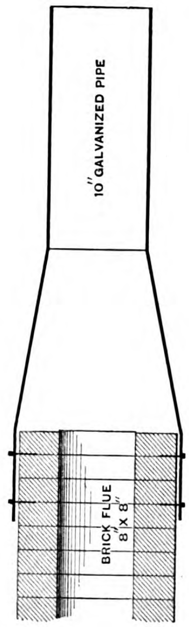


Roof Plan Submitted by "M. & W."

E." of Deer Creek, Ill., inquires in the June issue of *Carpentry and Building.* The drawing so clearly indicates the manner in which the work is done that an extended description does not appear to be necessary.

Chimney Flues.

From CÆSAR, *Louisville, Ky.*—My methods of testing a flue are governed by certain rules that are arbitrary, and if they are not properly understood the operator will be in the dark the greater part of his time. The knowledge of chimneys is acquired only by long years of observation and experience. It is a difficult matter, however, to write up this subject intelligently, for circumstances do and will govern all cases, and the operator must be governed by them. In testing a flue I first remove the smoke pipe from bottom of flue and fill the flue with paper and burn it. This will give the average strength of the flue. Next observe the surroundings of top of flue. A flue may be ever so good and still its usefulness be destroyed by an overhanging tree or overtopped by the comb of roof or adjacent buildings. If the latter trouble is present it must be remedied by extending the top of flue upward until it rises above all obstructions. In nine cases out of ten flues are rendered useless by the manner in which they are topped out, as it is wrong to taper the pipe with the small end on the top. There is not one grain of common sense in this method of raising a flue. If a flue must be raised to work properly it should be done as shown in the sketch. For instance, if there is an 8-inch square flue, the addition must be at least 25 per cent. larger and extend high enough to correct the flue to which it is attached. There is no room for an argument on this question, for it will prove itself every time it is tried by giving perfect satisfaction. If the flue is flat it must be corrected by a reservoir at the bottom of flue. Another point is this: the operator must be governed by the amount of work expected from the flue. For instance, the same result must not be expected from a furnace as would be secured from a stove. Supposing there is a flue 6 x 6, inside measure, which has worked all right with a stove attached, but must be used for furnace; what must be done if it cannot be torn down and rebuilt? It can be increased in capacity by velocity from 50 to 100 per cent. by compelling the heated air and gases that travel 1 foot within a given time to travel 2 feet within the same time. I know that I will raise a storm about my ears by the following: I have no patience with the theory of ascending and descending currents of air in a flue at the same time. My experience is that when there is a descending current in a flue there will be smoke in the house. To work a flue properly a vacuum must be created within the flue and this vacuum must be filled by the air and gases that are forced directly through the fire, and it must have no other openings between outlet collar on furnace and top of the flue. Flues that had sufficient area and hight have often proved worthless, but by using a weight and rope as many as six brick have been driven out of them that had been dropped by the builder and lodged in such a way as to leave a partial draft. The best shaped weight is obtained by using an ale bottle as a pattern, with a ring cast in the neck.



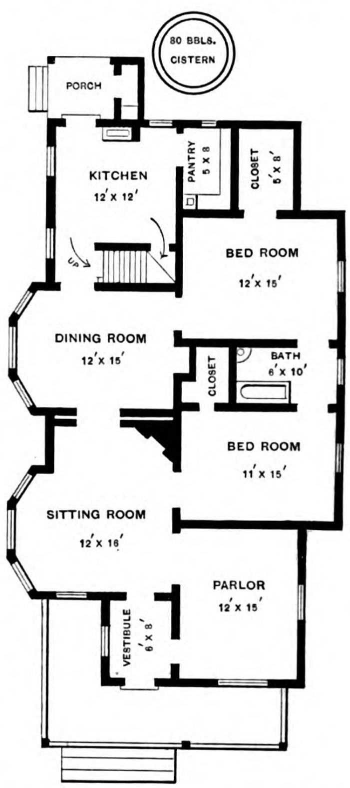
Sectional View of Chimney Top Accompanying Letter from "Cæsar."

Sharpening Corner Chisels.

From O. N. G., *Lake Mills, Iowa.*—Will some reader of the paper kindly tell me how to sharpen corner chisels, as I find it impossible to do it on a grindstone unless it is square and runs very true?

Plan of a Six-Room House.

From HAWKEYE, *Marshalltown, Iowa.*—In the May issue of the paper "J. W. R." of Vandalia, Ill., requests some one to send for publication a plan



Floor Plan Submitted by "Hawkeye" in Answer to Request of "J. W. R."

of a six-room cottage. In answer to his inquiry I submit a floor plan which may be about what he requires. Now, in turn, I would ask some of the practical readers to furnish elevations for the same in the Queen Anne style, as I do not know what the correct thing is in that line.

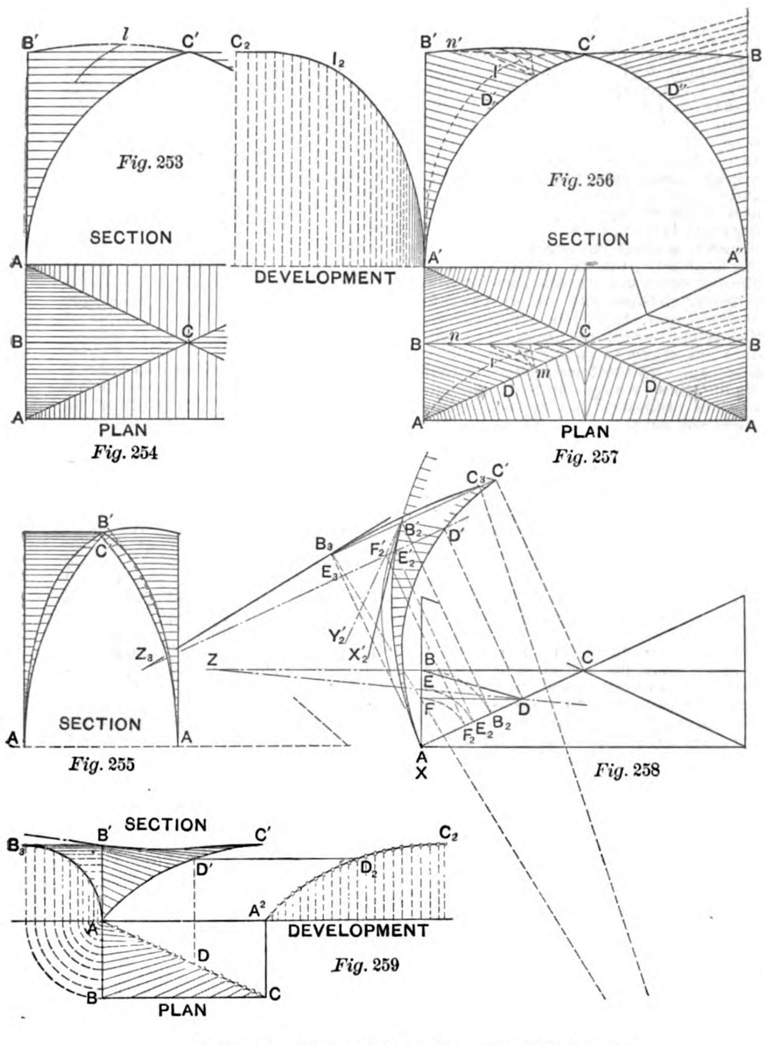
Note.—The request of this correspondent opens the way for the practical readers of artistic inclinations to show their taste in the direction named. The floor plan is of such outline as to permit of a great variety of treatment in the way of elevations, and we hope the responses will be numerous.

MASONRY AND STONE CUTTING.*

RIDGE CURVES IN GOTHIC VAULTS.

ALL students of Gothic architecture know that the English way of laying the courses of stones which form the cells of the vaults between the ribs differs from the way practiced in France.

In France the ribs on each side of the cell—that is, the wall and diagonal ribs—are divided in an equal number of parts set out by cutting both ribs with horizontal planes, as shown in Figs. 253, 254 and 255. The courses of stone which form the cell straight lines. But the practice of the French masons was to use a board the edge of which was slightly curved. The curve used by the master mason in restoring the cathedral of Laon has a rise of 3 inches for every 100-inch span. In that case the ridge is curved. This is shown by the dotted line in B′ C′, Fig. 253, and by the curved ridge on the right hand side of Fig. 255. To find these curves set off the rises of the mid points of the bed joints normal to the wall rib, Fig. 255, then draw on both sections a curve through these points. This will give the point *l*



Masonry and Stone Cutting.—Figs. 253 to 259 Inclusive.

are made to correspond with these divisions, and they lie in horizontal beds as in an ordinary barrel vault. In filling in the cells no centering is needed. The masons simply place a board on edge from the division of the wall rib A B to the corresponding division on the diagonal rib A C, then fill in the course along that board. This operation is repeated for every course until the ridge B C is reached. If the board used for centering were straight, then the bed joints and the ridge would be where this curve meets the ridge plane. Other intermediary curves may be drawn by the same method, and a sufficient number of points may be thus obtained to draw the exact curve of the ridge.

In England, instead of dividing the wall and diagonal ribs in an equal number of parts, the masons divided them in parts of equal length. In Figs. 256 and 257 the wall rib A B has 24 of these parts, and the diagonal rib A C has 31. The bed joints of the stone courses forming the cell are made to run between the respective divisions of the wall and diagonal ribs.

If the courses of stone be laid with a straight edge board as centering, then the surface of the cell may be defined as a skew surface formed of two halves. The lower half is guided by the wall and diagonal rib, the last course of this lower half ending at the apex B of the wall rib and the division D of the diagonal rib. From this line B D begins the upper half of the cell, which is guided by the ridge B C on the one hand, and the upper portion D C of the diagonal rib on the other hand.

Now the question arises: As the ridge is a guiding line of the second half of the skew surface, can it be straight? Or can it have any curve we like to give it? Or is the exact form of that ridge determined by some geometrical law?

As a question of appearance, it is indispensable that the upper half of the cell should follow the lower half as one continuous surface. The two halves should show, therefore, neither valley nor arris at their junction.

The readers will remember we had to deal with exactly a similar problem when constructing the Marseilles back vaulting to a circular headed doorway. The construction rested on the following property of skew surfaces:

When two skew surfaces have a generator in common, they are continuous all along that generator, if in any three points of that generator both surfaces have the same tangent planes.

Let us consider bed joint B D where the two halves of the cell meet. In D on the diagonal rib, the plane which contains the line B D and the tangent to the diagonal rib in D is tangent to both surfaces. Now, in B the plane tangent to the lower half of the cell contains the line B D and the tangent to the wall rib in B. As this plane must also be tangent to the upper half of the cell, it must, therefore, contain the tangent to the ridge line. This determines the form of the ridge line where it ends in B, for it must be a curve tangent in B to the intersection of the vertical plane of the ridge with the plane tangent to the lower half of the cell.

It will be remembered that the generation of a skew surface is always determined by three conditions. In the lower half of the cell these three conditions are: 1, That the generator shall touch the rib wall; 2, that it shall touch the diagonal rib; 3, that the generators shall pass through divisions of equal length on the wall and diagonal ribs. In the upper half we have not yet laid down what shall be the third condition which is to determine the position of the generators or coursing joints.

You may take as third guiding line of the generators the curve A I C, Fig. 257, A′ I′ C′, Fig. 256, drawn on the surface of the vault. From A′ to I′ the curve is determined by its intersection with the generators, and we develop it from A′ to I_2. The next portion from I_2 to C_2 we draw as we like as long as it follows on with the curve below.

To determine the position of a coursing line, we produce from a division *m* on the diagonal rib a cone sweeping the guiding curve A I C, then find the intersection of that cone with the vertical plane of the ridge. The point *n* where that intersection cuts the curve of the ridge is the other end of the coursing joint *m n*.

In Fig. 258 the diagram shows how to delineate the curve of the ridge. Take the plane of the diagonal rib A C as elevation plane. Draw the elevation A C′ of the diagonal rib. Swing the wall rib round its foot, A, so as to

*Continued from page 285, November issue.

bring it in the plane of the diagonal rib, then draw its elevation, A B'₂. Divide A B'₂ in as many parts as you require courses of stone to the cell; take the length of the division and carry it on the diagonal rib A C' as many times as it was contained in the wall rib. This will give the point D' on the elevation of the diagonal rib and D on the plan. The highest course will therefore be the line B D on plan.

Now draw the tangent B'₂ X'₂ to the apex of the wall rib. The plane tangent to the lower half of the cell contains the tangent B X and the coursing joint B D. If we cut this plane by a horizontal plane at the level of D we get E D, the horizontal section of the plane. In doing this we must remember to swing back the wall rib to its original position after having found the point (E_2 E'_2). Prolong D E until it cuts in Z the ridge line B C produced. Take E_2 Z_2, equal to B Z, and B_2 Z_2 will be the intersection of the tangent plane with vertical plane of the ridge; it will be the line to which the ridge curve must be tangent in B. In Fig. 256 we have drawn the ridge curve as an arc of circle from B' to C'; whereas on the other side from C' to B'' we have drawn it as the intersection of the surface produced by prolonging the wall rib upward, and continuing for the upper part of the cell the same construction as for the lower cell.

In Fig. 259 the English plowshare construction of the courses is applied to a vault, the wall rib of which is semicircular, and we see that then the ridge is tangent to B D, and necessarily dips down as in the Byzantine cross vaults. Now this proves that there must be a given curve of wall rib, with which the ridge would be a straight line. In Fig. 258 let F D be the plan of the horizontal section of the tangent plane to the lower half of the cell in B. Then B'₂ Y'₂ will be the tangent to the wall rib. We must, therefore, alter the shape of our wall rib to the dotted line A B'₂, tangent to B'₂ Y'₂.

Wrought-Iron Chimneys.

Several specimens of this particular application of wrought iron to the purposes of construction have been erected in England, says a writer in the *Building News*, and of these shall be given a short account. For reasons to be subsequently stated, they are not viewed here with any very great favor by the authorities having the control of the building of such structures, although they are frequently used in France, Russia and America, to the exclusion of the older brick type. It would not be expected that the wrought-iron competitor would at once spring up to the full hight, or anything even approaching to it, of its predecessors, assuming the hight to be the standard dimensions by which the magnitude and importance of chimney stacks are gauged. In order to show the relative merits of brick and wrought-iron chimneys so far as their relative hights are concerned, we must briefly advert to a few of the highest brick chimneys as yet erected. The Townsend chimney shaft at Port Dundas, Glasgow, is usually credited as the highest chimney in the world. It has a total hight of 468 feet, a diameter at the base of 32 feet, and at the top of 13½ feet, and weighs about 8000 tons. Next in size comes the St. Rollox shaft, also situated at Glasgow, with a hight of 456 feet, a diameter at the base of 50 feet, and at the top of 13 feet. A shaft at Mechernich, near Cologne, runs these two examples pretty closely, being 440 feet in hight. The base of this structure is square, with sides 39 feet in length, and the shaft circular, with a diameter at top of 11½ feet. It weighs about 5500 tons. At the base the Townsend chimney has a thickness of seven bricks, and of one and a-half at the top. For the St. Rollox chimney, the corresponding dimensions are 2 feet 7½ inches and 1 foot 2 inches. In both instances the batter is straight.

TALLEST WROUGHT-IRON CHIMNEY.

France claims to have the highest wrought-iron chimney yet built, and puts its hight at 284 feet, conceding 276 feet to one in England at Darwen, in Lancaster, and 214 feet to another in America. Creusot is the site of the French *sans-pareil*, which can also boast of a couple more of the same class of erections. One of these is 196 feet in hight, with a diameter at base of 10 feet and 4 feet 4 inches at top. Like all structures of this lofty type, it is composed of a series of ring of wrought-iron plates, breaking joints in a vertical direction, and strongly and closely riveted together, with lap joints, very much like ordinary boiler work. The thickness of the ring plates varies from 0.094 to 0.438 inch. Its neighbor rises 276 feet into the air and is similarly constructed, the thickness of the wrought-iron plates varying from ¼ to ½ inch.

If we assume, in accordance with the usual rule, that the diameter of a circular brick shaft at its base should range from one-tenth to one-twelfth of its hight, it will be evident from the examples quoted that the rule does not apply to shafts of wrought iron, the proportions being nearly double these ratios. In both descriptions of chimneys the fire-brick lining is not supposed to add any extra strength to the building, and it is not included in the thickness of the brick work necessary for the stability of the structure. At the same time, it probably does augment the *vis inertiæ* of the chimney, of whichever material it may be built, and would thus assist in maintaining it in some degree against the wind pressure.

WIND PRESSURE.

This latter force is one which a chimney shaft has a great deal to fear from. It is usually considered, for all practical purposes, to exercise a uniform pressure at all degrees of elevation, and to act in a horizontal direction. The maximum pressure of the wind has been variously stated, and engineers and architects are by no means agreed upon the amount which should be allowed for, not only in the case of chimney shafts, but of other constructions, such as roofs, bridges, and large exposed walls or surfaces generally. The American engineers in many instances consider 50 pounds per square foot sufficient; but 56 pounds is about the maximum adopted by English engineers, although some maintain that as much as 80 pounds should be provided for. To estimate the amount of actual wind pressure against a chimney shaft we have Rankine's rule, which is to the effect that the total pressure of the wind against a circular or ordinary factory chimney is equal to half the total pressure against a diametral plane of the chimney. One advantage, and a very important one also, of the substitution of wrought iron for the older material is in the great diminution of pressure upon the unit of the foundation area, owing to the comparatively small weight of the iron superstructure. Most iron shafts are erected upon stone or brick bases or pedestals, although there are instances in which these latter have been dispensed with. A mean of six examples of large brick chimneys gives a pressure of 6 tons per square foot of foundation area, the maximum amounting to 8½ and the minimum to 3¾ tons. Where the ground is bad or yielding, a wrought-iron chimney might be safely erected when it would be very dangerous, or involve an excessive expenditure, to construct one of brick. It must at the same time be borne in mind that the base of an iron shaft is, relatively to its weight, not in the same proportion as the base of a brick shaft would be to it. In other words, if the weight is diminished, so also is the surface of the foundation, and it would be, theoretically, quite possible to design an iron shaft which would exercise the same pressure per unit of foundation area as a brick one of the same hight. Practical considerations, however, prevent this equalization of the two bearing pressures.

EFFECTS OF CLIMATE.

In the State of Ohio there is an iron chimney 195 feet in hight, which was riveted up *in situ* by successive plates, and has stood remarkably well ever since it was built. One of 160 feet hight, among others, was put up in Russia, and after being riveted together on the spot, was raised by legs and pulleys to the perpendicular, and successfully planted on its pedestal. At the base the diameter was 9 feet 7 inches and 7 feet at the top, and the thickness of the plates 0.375 to 0.187 inch. A damp climate like our own is said to be not so favorable to the durability of a wrought-iron chimney shaft as a drier one such as prevails in some of the other countries where they have been employed. If, however, they are properly protected, either by painting or other means, there is no reason why they should not be as durable as other examples of large iron constructions. It is possible that the heat traversing the interior may be a factor against which paint would fail to act as a protector to the material. We mentioned at the commencement of our article that the local authorities do not look favorably upon the erection of wrought-iron chimney shafts. This follows from the fact that there are few rules or regulations to guide them, and that consequently they know very little about their design and construction. We are acquainted with a case in which the plans and drawings were carefully prepared for a wrought-iron chimney in London; but the consent of the local authorities could not be obtained, and the scheme had to be abandoned, as the promoters were unwilling to commence the erection of the structure, and so force the matter to an issue one way or the other. With the example of the Eiffel Tower before us, there is not the slightest doubt but that iron chimneys can be securely built of a much greater hight than those to which we have drawn attention. The rapidity with which an iron shaft can be built, as well as the constancy of the work, compared with one of brick, is another advantage on the side of the metallic edifice. No stoppage is necessary in frosty weather, and while the foundations are being got in, and the pedestal constructed, if there should be one, the shaft itself can be riveted up at the same time. Iron shafts, moreover, are not affected by the numerous contingencies continually occurring to the brick specimens. There are few of the latter class which have not been "cut," in order to bring them back to the plumb, or as nearly as possible, for it is doubtful if there is a single brick chimney in the world the axis of which does not deviate in many instances very much from the perpendicular. It is said an ordinary stock brick will stand a temperature of 620° F. Wrought iron will stand this and a great deal more.

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The National Association.

The need of unity of purpose where an end common to many persons is desired has long been recognized. The futility of many persons working individually, and often apparently at cross purposes, for the accomplishment of the same end is admitted; and out of the recognition of these conditions organization has grown. The purpose of organization is to prevent individuals seeking to accomplish a common end from being compelled to work out their own salvation without aid or counsel from those similarly situated, and with the almost inevitable result of wide differences of method, diverse practices and consequent confusion. Organization prevents the spasmodic action by individuals and provides the means for action which represents the serious and deliberate judgment of the majority of those concerned. The joining together of many individuals with a common purpose gives power and directness to effort that would be impossible from the action of an equal number of individuals acting in the same direction, but without concert. The National Association of Builders bears the same relationship to the whole country that the local organization does to the community in which it exists. It seeks to secure concerted action by communities, exactly as the local body seeks to secure concerted action on the part of individuals. Organizations are members of the national body, just as individuals are members of the local body, and the methods of procedure are identical in each. The underlying motive of action by the national body is the securing of reforms for the whole fraternity, precisely as the local organization does in matters affecting its own community, upon the comprehensive plan of joining together as many organizations as possible for the triple purpose of obtaining the wisest judgment, the greatest strength and the most complete unity of action.

To Secretaries.

The facilities afforded by the National Association for benefit to the individual members of the local bodies might be utilized in the direction of assisting contractors to secure skilled workmen in time of need. If any member of your exchange is in need of skilled workmen, foremen, clerks of works, &c., such needs should be made known to the National Secretary, who, through the operation of his office, is in constant possession of information regarding valuable men who desire to make a change or who are in search of employment.

Uniform Form of Proposal.

The members of the Builders and Traders' Exchange of Milwaukee have been for some time at work striving to secure the adoption of a standard form of proposal through joint action with the architects. The matter has been persistently urged by the builders, and several meetings have been held by the exchange Committee on Ways and Means and a delegation from the architects, with the following result, which represents the action of the committee and which only requires the ratification of the exchange before it will be formally adopted:

FORM OF PROPOSAL ADOPTED BY THE BUILDERS AND TRADERS' EXCHANGE.

Milwaukee, Wis......... .189..

NOTICE.

THIS BID IS GIVEN UPON THE FOLLOWING EXPRESS CONDITIONS, VIZ:

1. All bids are to be made known upon the awarding of contract or within five (5) days of the opening of the bids.
2. It is expressly agreed by the bidder that he will make contract for the price named in his bid within ten (10) days from the specified time set for receiving bids.
3. Where the owner or agent demands a bond from the contractor, the contractor shall be entitled to a bond from the owner or agent for the prompt payment of the sums named in the contract, and for the faithful performance of such other conditions and terms as may be set forth in said contract.
4. The contractor shall be entitled to 5 per cent. on all materials furnished by the architect, owner or agent upon which materials the undersigned has bid and contracted for.

To .... *Architects:*

The undersigned propose to furnish all the material and to perform all the labor required for the..................*work of a*.................. *to be built for Mr*.......................... *in accordance with the plans and specifications for the sum of*

..............................*Dollars* (*$*........)
..............................*Dollars* (*$*........)
..............................*Dollars* (*$*........)

Remarks ....
....
....
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Name..................................
Address..............................

The "McNeil Case."

The publicity given to the builders of the country by the National Association of the case of McNeil *vs.* Boston Chamber of Commerce, in which McNeil brought suit to recover damages for failure to secure a contract, he being the lowest bidder, has proved of great value to the fraternity. The National Secretary has been frequently appealed to for the details of the case and has had occasion to forward the documents in relation thereto to builders who have been placed in a similar situation to that of McNeil. The latest request comes from a contractor in Minneapolis, who was the lowest bidder on certain work connected with a public building in a prominent Western city, and who failed to secure the contract for some unknown reason. On the precedent established by the "McNeil" case, he proposes to bring an action for damages. The value of the prosecution of the "McNeil" case to the fraternity is great, and is an indication of what can be accomplished by the local exchanges, for this case was carried on under the advice and support of the Boston Exchange.

Good Advice.

The advice contained in the following report of a portion of a discussion on one of the most important features of exchange work, which occurred recently in the Philadelphia Exchange, will be of value to all organizations of a similar character in the country. The point at issue was that the general contractors who were members of the exchange did not make any effort to secure sub-bids from the members of the exchange. In the discussion John Stevens said that the remedy was in the hands of the builders themselves, and that the general contractors alone could bring about the desired change, but not without some sacrifice. He suggested that the general contractors invite none but members of the exchange to submit bids for sub-contracts. This, he said, would bring every sub-contractor in the city into the organization, thus more than doubling the membership of the exchange at a stroke. This done, he thought it would be well to have all bids for general contracts opened on the floor of the exchange, as has been the custom at Buffalo for some years, thus insuring to the general contractors a fair open competition, in which none but members of the exchange would be interested.

The Uniform Contract.

The Mechanics and Traders' Exchange of New York City have issued a neat card bearing the following references to the Uniform Contract—on one side: "Your interests will be best protected by using the Uniform Contract form as prepared by a joint committee of the National Association of Builders and the American Institute of Architects"—on the other side: "Copies of the Uniform Contract can be obtained at the rooms of Mechanics and Traders' Exchange, 289 Fourth avenue. Every builder about to sign a contract should remember that his position as one of the contracting parties entitles him to as much choice in form of contract used as the owner or his agent, the architect; indeed, his responsibility is so great that he cannot afford to ignore this point, and he should insist upon the use of this form, which has been prepared, approved and recommended for general use by the highest recognized authority."

The card is about the size of a No. 5 envelope and is in convenient shape to send to each member of the exchange. The other filial bodies would do well to follow the example of the New York Exchange in this matter.

PLAIN AND ORNAMENTAL BRICK WORK.

An interesting article on the subject of plain and ornamental brick work appeared in a late issue of one of our English exchanges and as the writer, Mr. A. Brett, covers a number of points which are constantly cropping up in the experience of those young in the art of bricklaying, we present copious extracts herewith, reproducing the sketches accompanying the article. Among other things the writer says:

Bricks have been used from a very early period in the history of man. Their average size in this country is a trifle less than 9 inches long, 4½ inches wide and 2 inches thick. Their uniformity in size enables architects to describe the thickness of walls by the number of bricks extending across it. Thus: Half brick, one brick, brick and a half, two brick, and so on.

as in Fig. 1—viz., by placing bricks over each other as shown—it is evident that none of the bricks receive any other support than is afforded by those immediately under them. Thus A is supported by B, C, D, E and F only.

Now in Fig. 2, by the simple arrangement of "breaking joint," we get the brick A supported by B C; these by D E F, and so on over the whole extent of wall. In this illustration all the bricks are laid with their length parallel to the front of the wall and are called "stretchers."

When bricks are laid so that their ends are toward the surface, as in Fig. 3, they are called headers. Referring to the previous diagram, Fig. 2, it will be seen that the wall would be "a half-brick thick" one; and that even if we were to build one three times as thick on the same system neither

will be seen why the wall is called "brick and a half." B is the plan of the second course and the alternate courses above it; C is the end of such a wall.

Another kind of bond in very general use is that called Flemish bond. This consists of headers and stretchers laid alternately in the same course. Fig. 6 illustrates a wall of this description one brick thick, and Fig. 7 a wall of the same bond one and a half brick thick. It must be taken as a rule that a brick should never be cut, if by any skill on the part of the workman it can be laid whole; for when a brick is cut an extra joint is created in a structure from which oftentimes a great difficulty arises from the great number of joints. Fig. 8 shows plans of the same wall, built so as to avoid the half bricks without interfering

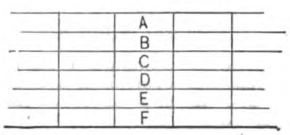

Fig. 1.—Bricks Placed one Above the Other.

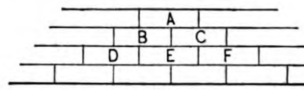

Fig. 2.—Bricks Arranged so as to Break Joints.

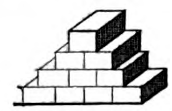

Fig. 3.—Laid as "Headers."

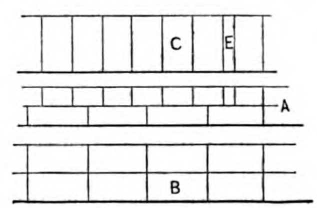

Fig. 4.—Elevation and Plan Views of Wall Built in English Bond.

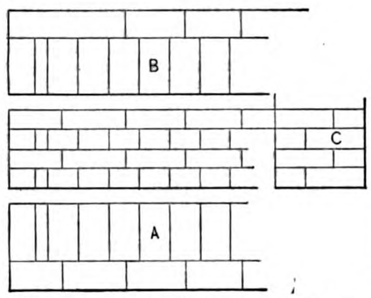

Fig. 5.—Elevation and Plan Views of a Wall a Brick and a-Half Thick.

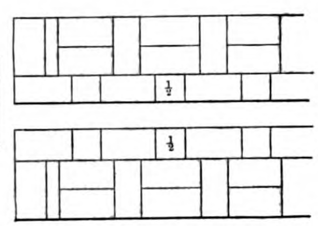

Fig. 7.—Wall in Flemish Bond, One and a-Half Brick Thick.

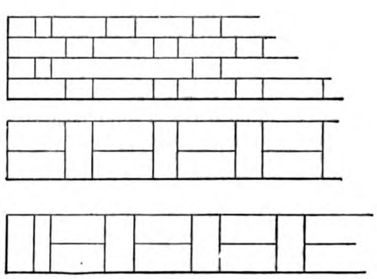

Fig. 6.—Wall Built in Flemish Bond.

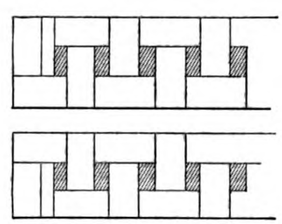

Fig 8.—Plan of Wall Shown in Fig. 7 but arranged so as to avoid the use of Half Bricks.

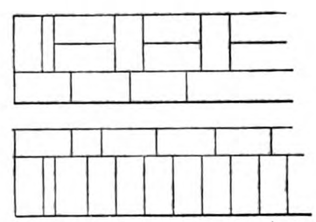

Fig. 9.—Plan Views of First and Second Courses in a Wall the Front of which is in Flemish and the Rear in English Bond.

Plain and Ornamental Brick Work.

It is important that walls should be kept perfectly vertical, and it must be remembered that if a wall at the bottom is in the slightest degree "out" the evil will still increase, the top will gather beyond the foundation and consequently collapse. But this is not all. The wall must be kept "plumb," which does not necessarily mean upright, but a straight surface. Thus, a wall may be slanting, as against a bank, or the side of a chimney shaft, which tapers toward the top; but in whatever position it may be it must be kept plumb, and the plumb rule may not only be used for this purpose, but to keep the vertical joints regularly over each other. This is termed "keeping the perpends."

Next in importance is the subject of bonding. By bond is meant the method of combining the bricks that each individual may be supported by as many others as possible. Suppose an attempt were made to build a wall

would have any connection with the other, and thus the front might fall outward or the middle one sink; for neither would give any support to the other, not being in any way bonded to each other. Combinations of headers and stretchers have been devised by which the wall is so bonded as to become one compact structure. Fig. 4 illustrates a wall of one brick thickness, built in what is called English bond. It will be seen that one course consists entirely of headers and the other entirely of stretchers. A shows elevation, B the lower and C the upper course, E the "closer," to give the proper bond.

Fig. 5 illustrates a 14-inch, or brick and a half wall. The elevation is the same as in the last; for, of course, the thickness of a wall is not visible on its surface. The plans, however, show how the bonds are arranged. A shows the plan of the first course and all alternate courses above it. In this it

with the strength of the bond. This, however, leaves an open space on each side of the header in the thickness of the wall, which may be filled up with a bat or left open.

Fig. 9 shows plans of first and second courses of a wall in which the front is built in Flemish and the back in English bond. This is considered a good wall, but still possesses the disadvantage of half bricks.

And thus it will be seen that in the one course the front line of bricks, and in the other the back line, is totally unattached to the rest; while in Fig. 8 the headers penetrate two-thirds into the thickness of the wall.

In brick walls the foundations are formed by commencing the lower course wider than the intended thickness of the wall. These projecting edges, as shown in Fig. 10, are called "footings." In placing the footings care must be taken to throw the joints as far back within the surface of the wall as possible. Excepting in walls of one brick thickness no course of footings should project more than a quarter-brick beyond the one above it.

Having shown by the foregoing sketches the various methods of bonding brick work I will now illustrate a few quoins and stops to same, which can be used either for door and window jambs, or at external angles of main walls. The examples given in Figs. 11 to 17 make a very effective appearance.

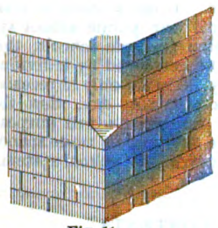

Fig. 11.

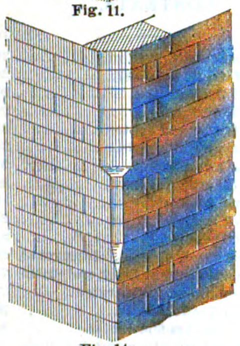

Fig. 14.

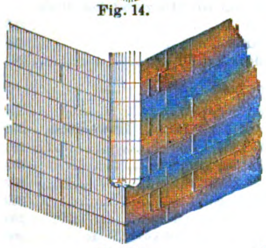

Fig. 15.

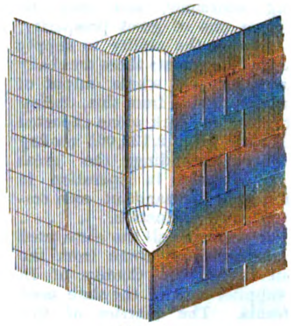

Fig. 12.

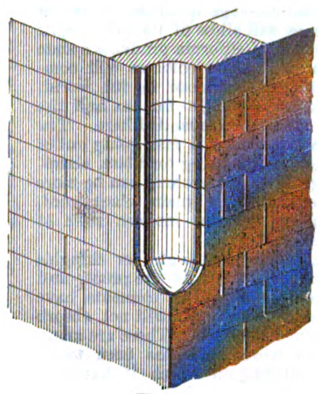

Fig. 16

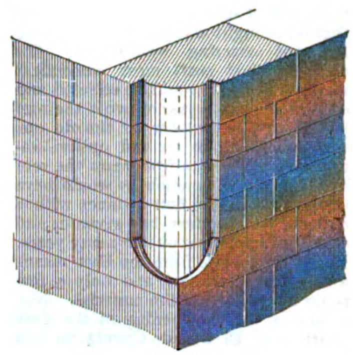

Fig. 13.

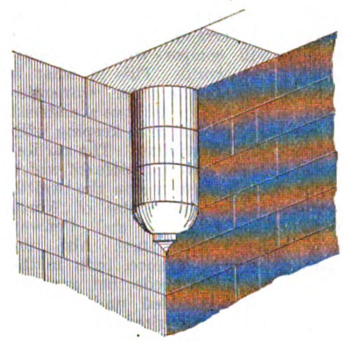

Fig. 17.

Figs. 11 to 17, Inclusive.—Illustrations showing various Examples of Quoins and Stops.

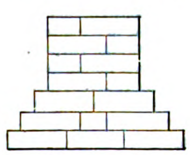

Fig. 10.—Foundation Showing "Footings."

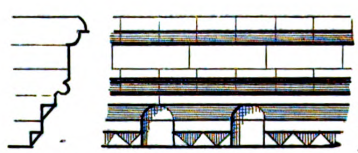

Fig. 18.—An Example of Brick Cornice.

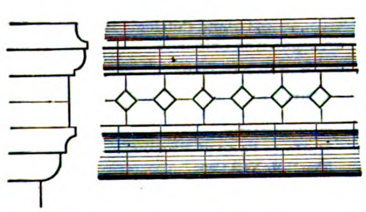

Fig 19.—Design for Brick Parapet.

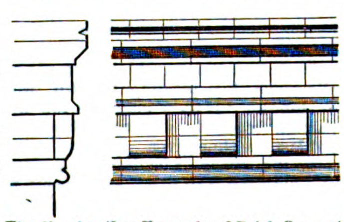

Fig. 20.—Another Example of Brick Parapet.

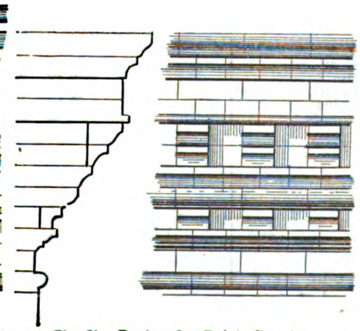

Fig. 21.—Design for Brick Cornice.

Plain and Ornamental Brick Work.

Although in these days of keen competition brick cornices for outside ornament are almost out of the question, still in some few cases they can be utilized with great improvement to the building, and the sketches, Figs. 18 to 21 inclusive, may be of service to many readers of the paper who are bricklayers, and to such my advice is, where the opportunity presents itself introduce, if possible, good work that is pleasing to the eye and worthy of its name.

The brick cornices are given as examples of modern treatment in this popular material, for, as stated elsewhere, brick work is now more largely used than ever. The cut brick, or molded face brick, is of great utility in making up fascias, cornices or parapets, and the examples given are fair specimens of designs of this class.

A SERIES of experiments on the strength of arches was lately undertaken by the Austrian Society of Engineers and Architects, with the object of determining the relative suitability of brick and concrete for floors which were to sustain heavy loads. All the arches were of a uniform span of 13.3 feet, and, except in one case, the rise was 15¾ inches. It was found that the breaking load for a brick arch 6 inches thick was equal to 321½ pounds per square inch. A concrete arch 4 inches thick was ascertained to be of more than double that strength, as the load was 737⅓ pounds per square inch. A concrete arch only 2⅜ inches thick, with iron rods along the intrados, was equal to 839 pounds to the inch. When steel joists, 3⅛ inches deep, bent to the curve, were imbedded in a concrete arch of the same depth, and with a rise of 11 inches, a breaking weight of 3360 pounds per square inch was required. The experiment also demonstrated that the joists divided the floor into a sort of compartments, and the injury to the floor was restricted to the part which was contiguous to the breaking load.

Roofing Slate in California.

The fact that there is a growing demand on the Pacific Coast for slate roofing cannot be questioned, says the *California Architect and Building News* in a recent issue. In view of this it is but fair that we present at this time a few facts concerning a material which in the Eastern States, as well as Europe, is used almost exclusively for covering roofs. Our earliest building on this coast was of such a temporary character that no thought was given to how long the roof covering would last. The cheapest (first cost) most convenient material at hand would be selected and on it went. In a year or two if the roof leaked on went another, or the old one was patched up to try and outlive another winter. In a few years the roof had cost twice as much as would have covered it in the first instance with a material that nature has given us and which will not wear out for many years. Yet to bring slate from the East meant a very expensive roof, and only a few could afford to use the material. Not so to-day, for the opening of the slate quarries of El Dorado County, in this State, has put the material within the reach of every one. Again we have entered a new era in the building line. Our architects are being called upon to design structures composed of steel, iron, brick, terra cotta and stone, and such as will compare with any buildings in the world. This is what is causing a demand for slate. Our architects, if allowed, will have a material on the roof that will be in keeping with the rest of the building. The earliest use of slate for covering roofs (of which we have any record) was in the twelfth century. The old castles of North Wales at Carnarvon and Conway were covered with slate. Also the castle at Augers, France, built in the vicinity of the slate beds that are now being largely quarried underground. When Edward I visited the copper mines of Drwysyeold, in North Wales, he stayed at a house in Nantlle roofed with slate. On the mountain slopes of North Wales on several of the slate ranges are traces of old workers, and the tracks along which they carried the slate on their own backs, or the backs of their horses, are still discernible and form part of many a mountain path. In an ode written by a Welsh poet in the year 1570 we find the first mention of the Penrhyn quarries. The bard Sion Tudor asked the Dean of Bangor for a load of slate from the Caehier quarry. The Aberllefeni quarry is as ancient, for an old timbered house is said to have been covered with slates from the quarry in the days of Queen Elizabeth. About the same time the slates from the De la Bole quarries, in Cornwall, had attained considerable repute. Carew writing in 1602, describes them as "in substance thinee, in color faire, in waight light, in lasting strong, and generally carrieth so good regard as (besides the supply for home) great store is yearly conveyed by shipping both to other parts of this realm, and also beyond the sea into Britaine and "Netherlands." Speaking of the same quarry in 1758, Borlaise writes that for its lightness and enduring of weather it is generally preferred to any slates in Great Britain. He describes the great quarry as in his time 300 yards long, 100 yards wide, 80 yards deep. It is evident from the size of the quarry that a considerable quantity of slates had at that date been extracted from it.

The growth of the slate trade in Europe within the last 25 years has been something enormous, and may be spoken of as one of great prosperity, limited only by the ability to supply the demand. Merchants there are ready to contract for the whole output of good quarries. Aside from this, during the year 1892 New York alone exported to the British Isles 2,122,065 roofing slates; notwithstanding the great number of quarries in operation in Wales and the thousands of men employed in the production. . . . Until a few years ago all the slate used on the Pacific Coast come from the East, but to-day the County of El Dorado supplies most of the slate used in California. The quarries of this county seem to be the only deposit in the State that could be used for roofing, as the material for this purpose must have good cleveage qualities, or rather be such as will allow of its being split into sheets. California produces a slate of such quality and color as will compare with any produced in the world, and it can be bought for one-half the cost of Eastern slate landed here. The fancy colored slate is fast going out of use, the demand being for black slates, and rightly so, for nothing can be more handsome than a plain black roof, particularly for our modern style of architecture.

A roof strong enough for shingles will hold slate. It is fire proof, and when laid properly the elements have no apparent effect. It will not absorb water nor hold snow. There are many instances where slate has been taken from a building on which it has been for 75 to 100 years and relaid on another.

Assuming the life of the various kinds of roofing to be as described in the following table, it will be seen that while the first cost of slate is somewhat greater than other materials, it has a very great advantage at the outcome:

Material.	Original cost per square or 10 x 10 feet.	Life.	Avergage cost per annum.
Slate	\$10.50 to \$11.00	100 years.	10 5-100 or 10 10-100 cents.
Tin	8.50 to 9.00	15 years.	56⅔ or more cents.
Corrugated Iron	8.00 to 8.50	10 years.	80 or more cents.
Shingles	4.00 to 5.00	12 years.	33⅓ or more cents.
Boards	2.00 to 2.50	8 years.	25 or more cents.

In above estimates we have made no allowance for painting the tin, iron or shingles. If these materials are not painted regularly and well, they will not last the time given.

To the owner or landlord no portion of a building is so great an expense to keep in repair as the roof, nor so great an annoyance to a tenant as a leaky one. Slate is always sold by the square, which is 10 x 10 feet, or 100 superficial feet. Let us have more slate roofs on this coast and the result will be that we shall have fewer fires, cooler houses in summer, warmer in winter, and last but not least, less expense for repairs.

A TRADE SCHOOL connected with the Church of St. Augustine, Boston, was opened a few weeks ago by Bishop Lawrence of Massachusetts. The school is intended for the instruction of American boys in various crafts in order to fit them to enter the field of skilled labor advantageously. In the course of his address at the opening Bishop Lawrence said: "This school is to sustain in this democratic country the dignity of labor. No man, however rich, has a right to live without labor. This school is also to emphasize the fact that just as much brains are needed to make a good carpenter as a good business man. It takes brains to make a box. Until our public school system is adapted to trade schools, they have got to be developed by individual philanthropy. It is not only in teaching how to make boxes, &c., that this school will achieve its full purpose, but to prove the need of trade schools as a part of our public school system."

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DATE DUE

CIRCULATES FOR THREE DAYS			

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