CARPENTRY AND BUILDING

VOL. XVI.—1894.

NEW YORK:
DAVID WILLIAMS,
96-102 READE STREET.

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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.

JANUARY, 1894.

Builders' Convention.

The eighth convention of the National Association of Builders, which will mark the close of the seventh year of its existence, will be held in Boston beginning on the second Tuesday of February. The preliminary work of organization has been done in Boston and the coming convention is looked forward to as the return of the association to the place of its birth. It is proposed to make the meeting an unusually interesting one in many respects. The programme will include features which will tend to make the convention one of peculiar value to the delegates and visitors in bringing out the benefit to the fraternity of the experience of builders all over the country. An address will be delivered by Carroll D. Wright, chief of the Bureau of Labor Statistics, and one of the best informed men in the country on the subject of the relations between employers and workmen. The Master Builders' Association of Boston proposes to make several departures in the manner of entertaining the visitors to the Hub, and has extended an invitation to all delegates to previous conventions to be present, whether or not the organizations to which they belong are now represented in the national body. An invitation has also been extended to all new exchanges with which the National Association of Builders has held correspondence to send representatives, to whom will be offered all the courtesies given to the regular delegates. It is expected that the meeting will prove a most important and beneficial one and fittingly mark the start of the association on another cycle of action.

Foresight Better Than Hindsight.

It is encouraging to perceive in current discussions of the subject of ventilation an emphatic demand for the preparation of plans for ventilation and heating prior to the commencement of the construction of buildings. It has been shown that a large part of the expense often attending the securing of good and sufficient ventilation is due to want of consideration of this question at the proper time; that is to say, at the time the rudimentary scheme of a building is being worked out. The chosen system of means and appliances for heating and ventilation should always be decided upon, incorporated in and form part of the perfected general plans. When this is done, the cost of a sufficient supply, as compared with a largely deficient one, will not be so great as many have been led to suppose.

General Application.

The force of the above remarks equally applies to plans for heating apparatus for dwellings and other buildings wherein no special system of ventilation, other than afforded by grates, &c., is intended. The whole category of extra charges that so frequently come in with bills for heating work is properly to be laid at the door of architects who neglect to consider the requirements for heating in drawing their plans; or who, if they do consider the matter, do so without such a practical knowledge of the heating business as enables them to properly plan a heating apparatus, and without the always easily obtained aid of a competent adviser. There is no good reason assignable why a building should not be designed with full reference to its being properly heated and ventilated any more than that windows should be omitted from plans and left to be put in by the builder, during construction, according to his own judgment. But this is exactly what is done, in the majority of cases, with heating apparatus for dwellings. The building is first planned, and, as a general thing, almost completed before the heating engineer is called for consultation and requested to make plans upon hard and fast lines necessitated by the architect's plans; and when some utter impracticability is encountered an alteration, attended with extra cost, is the result. Such was recently the case in the heating of a large dry goods store, in which a workroom that required to be heated was found inaccessible for the purpose except by an objectionable position of risers, where they would be not only in the way of incoming customers, but greatly mar the effect of the desired display of goods. To remove this impracticability an extra cost of about $500 was entailed. To have avoided the introduction of such an impracticability under the advice of a competent heating engineer and to have secured a better job of heating work than was ever possible under the obstacles introduced would not have cost over $50.

Workingmen's Exposition.

It is proposed to hold a Workingmen's International Exposition in Milan, Italy, this year, which, if carried out on the broad lines contemplated by the promoters, with the co-operation of the Government, should yield valuable results. The exhibits are to be divided into three general classes, namely: Works, which will include products of individual workers, small industries, household work, products of co-operative societies, &c.; provisions, which will embrace the work of societies for mutual aid and improvement, institutions, models, studies and material for showing how workingmen live, dress, &c., in various countries, as well as hygiene and bibliography in relation to workmen; and instruction, in which class will be displayed all matter relating to industrial schools and professional schools for different trades and callings. If sufficiently representative in its exhibits, such an exposition would be eminently instructive and useful.

Progress of Organization.

The builders of the country have demonstrated during the past year their belief in the value of organization; for in spite of the depressing business conditions everywhere, the builders have maintained such organizations as were in existence at the beginning of the year, and have formed new associations in many cities where none previously existed. The filial bodies of the National Association of Builders have steadily pursued their way toward better business methods and more friendly relations between employers and workmen. As the purpose of the body becomes better known its influence widens and the builders in the smaller cities take up the methods found so beneficial in the larger communities.

Desire for Organization.

The desire for organization is extending all over the country, and builders are now enabled, through the existence of the national body, to establish new exchanges upon such lines as will warrant success. The experimental period in the form of organization best adapted to the needs of the builders—the exchange—has gone by, and success is practically assured to every body of builders which takes up the question of improvement of the practices which govern the transaction of their business on the lines suggested by the association. The better organization of the employers throughout the country is making itself felt in the relationship between employers and workmen. The troubles between the two are growing steadily less, and more easily adjusted when they do occur. The fact that a consensus of opinion can now be obtained from both sides causes greater care to be exercised by each in taking action which affects the other. The employers are more just in the position which they assume toward the workmen, as the result of greater study of the relations between the two, and the workmen are aware that they now have a fraternity to meet instead of an individual, as was formerly the case. The benefit of organization is apparent wherever it exists in such form as to insure equitable and fair treatment of all subjects within its jurisdiction.

Caring for the Unemployed.

A good deal of serious thought is being given to the very grave question of how to take care of the unemployed during the present winter. In every community there are many men who are initiating measures looking toward relief. Naturally, the different boards of trade are taking the matter into their hands. While, of course, local circumstances must govern the action of such bodies, it would seem that some interchange of opinions ought to take place between their representatives. A good many very important questions of common interest might be very profitably discussed. Delegates of the boards of trade of the great divisions of the country should assemble at such convenient points as Philadelphia, Chicago, Denver and Nashville to exchange estimates of the magnitude of the misfortunes which they must soon alleviate, and discuss the best and safest methods of reducing distress among the worthy to a minimum. It needs only the invitation of a few leading chambers of commerce or boards of trade to bring about such gatherings, which might do so much good.

Collapse of Buildings.

A writer, in discussing the collapse of buildings, states that the structures may be designed with the strictest propriety and fall down, nevertheless, in course of erection from defective workmanship or improper materials; or, with the most effective workmanship and the best and fittest materials, from being deprived of certain artificial aids before effects, which time alone will produce, have been attained; or from being carried on in such manner as to expose the work to rain and wind or other atmospheric influences, without due regard to the assistance which one part ought to have from another, or from other parts. Many sewers have fallen in and tunnels have failed from insufficient ramming or punning of the ground above and behind the structure; from the use of mortar as a setting material either so moist as to yield to the pressure to which it may be exposed upon striking the centers, or so dry and friable as not to adhere to the bricks. Many arches and vaults have fallen upon the removal of the centering before even properly compounded mortar had set, and very many walls have fallen under the action of the wind or from undue pressure by scaffolds, ladders or other matters, which would not have fallen if the return walls with which they may have been intended to be connected in the structure had been built up with them. Add, however, to the contingencies which may occasion the failure of well designed structures, the consequences of bad structural arrangements, of unskillful workmanship and of undue aiming at cheapness, and further and extensive sources of danger appear; since the use of foreign aids, such as bond timber, straps and bolts, struts and shores, furnishes the precarious but only means of holding together and keeping buildings erected under such circumstances from becoming ruinous even before they are finished. Moreover, buildings may have been built securely, and yet be rendered dangerous by ill contrived, ill directed, unskillful or careless operations in affecting alterations in the building itself, or in, or in connection with, adjoining or neighboring buildings.

Inadequate Ventilation of Offices.

In an able article contributed to the Philadelphia *Record*, Dr. F. A. Adams touches on the question whether the large increase of steam heated office buildings, in which the great majority of rooms have no adequate means for renewal of the air to be warmed, does not, in large measure, account for the prevalence of pneumonia among those employed in such offices. Many of these buildings, Dr. Adams remarks, are admirably constructed to keep out air, whether cold or hot, this very perfection contributing to their insalubrity. In these hermetically sealed office rooms that abound in business buildings the steam heats the atmosphere to a delightfully comfortable degree, the occupant breathes and rebreathes the air during zero days when an open window cannot be endured, the effect being to silently undermine his powers of resistance, so that when he goes forth, exchanging such tropical air for the keen breeze of unrestricted nature, it happens that, through some subtle change in his system which has robbed his lungs of their power of resistance, their capacity to endure the onset or transition is gone, and the subtle poison of unrenewed air does its deadly work in the form of pneumonia.

The Fair Buildings Will Stand.

The World's Fair buildings at Chicago will not be torn down and removed as summarily as has been expected. The exposition authorities have made an agreement with the Park Commissioners, controlling Jackson Park, in which the fair was located, by which the latter release the former from all obligation to restore the park to its original condition. The exposition directory will pay the Park Commissioners $200,000 for the release and relinquish possession of the park on January 1. State buildings are, of course, not included in the transfer of property to the Park Commissioners, but all the great and small structures erected by the Exposition Company are transferred, including the Administration Building, Machinery Hall, Mines and Mining Building, the Terminal Depot, the Electricity, Liberal Arts, and Agriculture buildings; the peristyle and its annexes of the Casino and Music Hall, forming the great court of honor, which in architectural effect has never been equaled; the Transportation, Horticulture, Fisheries and Anthropological buildings; the Art Gallery, the Convent of La Rabida, the Shoe and Leather Building, Stock Pavilion, barns, band stands and pagodas. If any salvage is realized from the sale of material in these buildings in the course of time it will now inure to the benefit of the Park Commissioners. They can take plenty of time for this work and can await a more propitious period in which to offer the several structures for sale. When the fair buildings were in process of erection the exposition management intimated that a good round sum would be realized from salvage, but that hope was abandoned long since, and it was deemed inevitable that heavy loss would be incurred if the buildings were torn down during the coming year and the park restored to its old condition. In the contract just made there is a stipulation that the city of Chicago may be permitted to remove the Manufactures and Liberal Arts Building, if arrangements are made for its re-erection elsewhere.

New Publications.

INIGO JONES AND WREN; OR, THE RISE AND DECLINE OF MODERN ARCHITECTURE IN ENGLAND. By W. J. Loftie. Size, 7¾ x 10 inches; 284 pages. Illustrated with numerous engravings. Bound in board covers, with gilt side title. Published by Macmillan & Co. Price, $4.50.

This work, as its title indicates, describes in an interesting manner the rise and decline of modern architecture in England. The author is not an architect, and he says that the book is not written for architects, but is offered in the hope that it may reach some of those by whom architects are employed. The matter is treated in eight chapters, the first of which is largely introductory in its character, while the second touches upon the decay of Gothic architecture. The third discusses Elizabethan architecture and the fourth the beginnings of Palladian. The fifth and sixth chapters are devoted to the lives of Inigo Jones and Sir Christopher Wren, reference being made to some of the more notable works with which they were identified. The seventh chapter relates to Wren's churches, while the last chapter of the book mentions the successors of Wren. The author states that the illustrations are made largely from plates published during the golden age of English Palladian, supplemented by photographs, "especially of those charming buildings of the transitional period, which are to be found in the west country, and where the bath stone forms such a ready vehicle for the expression of poetry in stone."

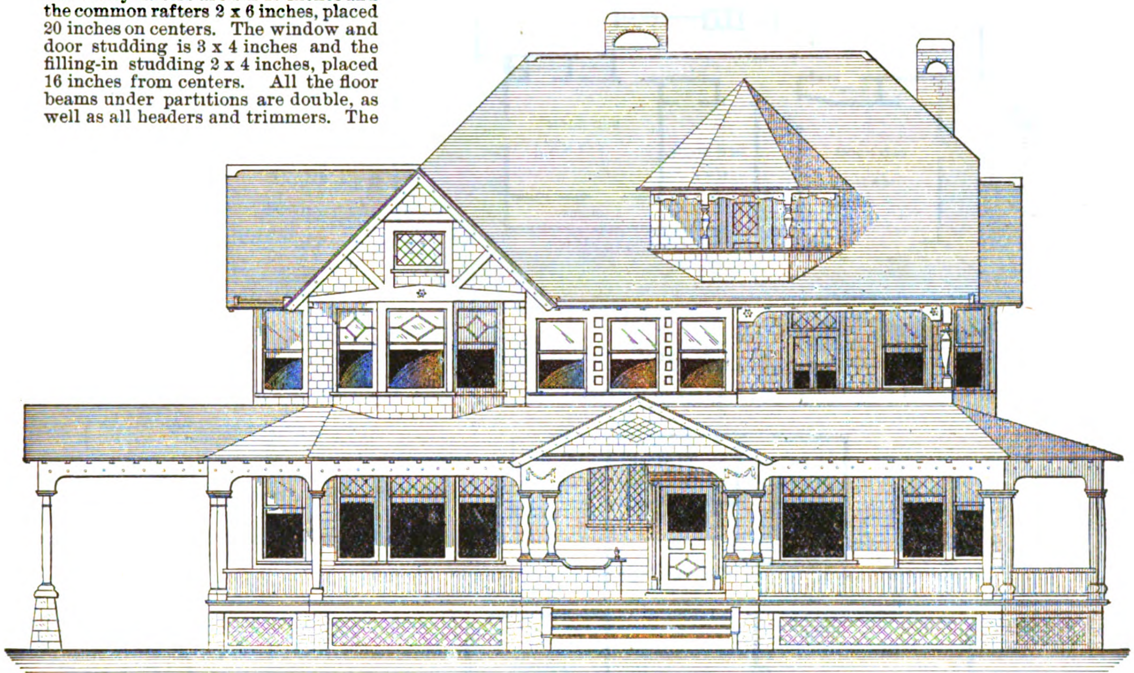
SUBURBAN AND COUNTRY HOMES. Size 9¼ x 12 inches. Illustrated with 44 plates. Bound in paper covers and published by William T. Comstock. Price $1.

This interesting and well arranged volume contains designs of houses of moderate cost, contributed by various architects, as well as a chapter entitled "Suggestions on House Building," by A. W. Cobb, and an article describing "How to Plumb a Suburban House," by L. D. Hosford. This book, which was reviewed in our columns not long since, was originally issued in cloth binding at $3 per copy, but is now offered in paper covers for the sum of $1. The printing and execution are the same as in the original work, the only change being in the points named.

THE President of the Board of Education of Boston, in a recent address, congratulated his fellow citizens upon the fact that Boston has her system of public schools and kindergartens, and lately her public school of manual training; but what is now urgently needed, he said, is a school of practical training in the trades, such as the Pratt Institute of Brooklyn, the New York Trade School and other similar institutions furnish. Boston has now the most favorable opportunity for supplying this deficiency, if the trustees of the Franklin Fund adhere to their decision to use that fund in establishing a trade school for the benefit of the young mechanics of the Hub.

HOUSE AT SOMERVILLE, N. J.

THE BUILDING which we illustrate in general view on our supplement plate and in detail by means of the engravings presented upon this and the following pages is the residence of Mr. James Brown, Jr., erected a short time ago at Somerville, N. J., from plans drawn by Jacques Vanderbeek, architect, of that place. From the specification of the author, we learn that the girders employed are 6 x 8 inches, the sills and posts 4 x 8 inches, purlins, interior tie beams and plates 4 x 6 inches, first and second tier floor beams 2 x 10 inches and third tier floor beams 2 x 8 inches, all placed 16 inches from centers and all bridged with 2 x 3 inch stuff. The hip and valley rafters are 2 x 10 inches and the common rafters 2 x 6 inches, placed 20 inches on centers. The window and door studding is 3 x 4 inches and the filling-in studding 2 x 4 inches, placed 16 inches from centers. All the floor beams under partitions are double, as well as all headers and trimmers. The foundations are of stone to the grade line, above which brick is employed. The exterior from sills to plates as well as the gables are sheeted with tongued and grooved hemlock put on diagonally and covered with building paper. The first story to the belt course is covered with 6-inch siding, while the second story has 18 inch pine shingles with square butts and the gables 6 x 18 inch pine shingles. The gutters formed on the roof are lined with the best quality tin. The roof is covered with surfaced hemlock boards, on which are laid 6 x 18 inch sawed cypress shingles. The piazza roof is treated in the same way.



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

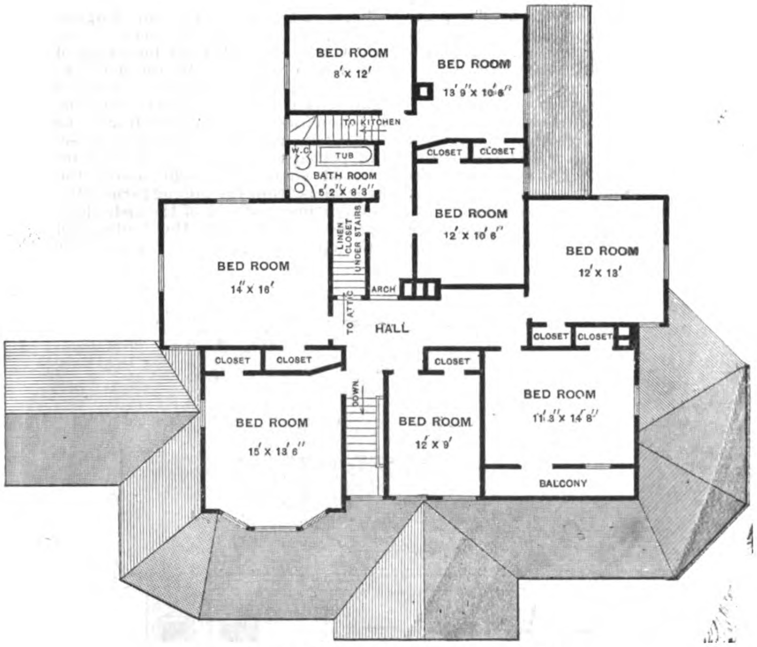
House at Somerville, N. J.—Jacques Vanderbeek, Architect.

With regard to the interior, the architect states that double floors are employed throughout the house. The first floor is of tongued and grooved hemlock, put on diagonally, upon which, in the parlor and library, is a top flooring of clear white pine, while in the hall and dining room quartered oak is used, and in the kitchen and pantries Georgia pine 2½ x ⅞ inches. The flooring of the second story and attic is of white pine 1 x 4½ inches. The bathroom is supplied with open work fixtures, with nickel pipe and trimmings, while the wood work is of cherry. The parlor and library are trimmed in yellow poplar, the hall and dining room are paneled with quartered oak, while the trim of the kitchen and pantries is Georgia pine. The trim of the second floor is pine, natural finish. The main stairway is finished in quartered oak. The hardware employed is antique bronze.

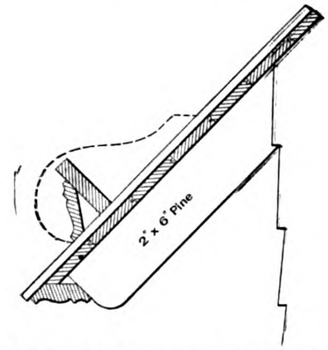
The arrangement of the rooms upon the principal floors of the house is readily understood from an inspection of the floor plans, which we present in this connection. It will be seen that upon the main floor is a commodious hall, out of which opens four rooms, there being two upon each side. Directly in the rear is the kitchen, communicating with the dining room through a conveniently placed pantry. The latter is supplied with a butler's sink and hot and cold water. The hall has a tile mantel, while the dining room has a large oak mantel with tile hearth and face. The parlor and library are also fitted with mantels of the same finish as the rooms, with plate glass mantel mirrors made from special designs. The hall is lighted at the front with an art glass window on the platform of the stairs, constituting an attractive feature. The house is lighted by electricity and is fitted with electric bells. The plumbing is complete in every particular and the heating is by steam. The house cost about $8000, and the contract was executed by James B. Brown of Somerville, N. J.

Round Vaults.

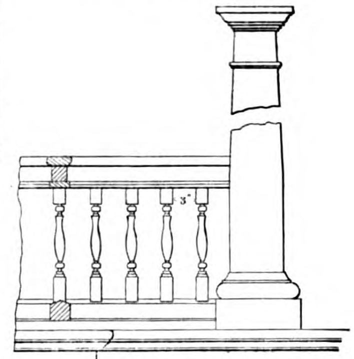
At the first dawn of Gothic science, when the numerous and disastrous fires among sacred edifices led to the attempt (first perhaps in the Rhine valley) to vault them with stone, a mixture of the Roman and Eastern methods seems first to have been tried, and some curious combinations of this kind are still to be seen in the old churches of Cologne and its neighborhood. The superiority of the Roman system, however, soon led to its exclusive adoption, says an English writer, and it is to be seen in the crypts and aisles of many buildings of our own country, as in those of the naves at Durham and Ely and the transepts at Ely and Winchester, but in extending this kind of ceiling to the central avenue many difficulties arose, not perhaps so much from the increased span and hight above the ground as from the oblong form of the compartments (those of the aisles having been square), for the builders of this age very properly rejected the doubly curved groins of Diocletian's Baths, which, indeed, would have been quite impracticable over a plan differing considerably from a square. Various expedients were resorted to, and the only successful one for vaulting the clerestory with round arches alone was by making its compartments square and letting each correspond to two compartments of the side aisle. This is the mode adopted at the three great Romanesque cathedrals of Worms, Maintz and Speyer (in the last of which the diagonal or groin span is more than 60 feet), and in the two great abbeys founded by William I and his queen at Caen, and it seems to have been intended, but never executed, in the nave of Durham. We have no example, however, in England of a nave with round arched vaulting, if we except the small massive chapel in the White Tower of London, which is a simple vault without groins, and is not a clerestory, but inclosed between upper aisles, so that there is no difficulty as regards its abutments. But the various attempts to overcome these difficulties would hardly fail to lead, first to the mixture of pointed vaults with round ones, as in the Rhenish churches, and then to the ex-



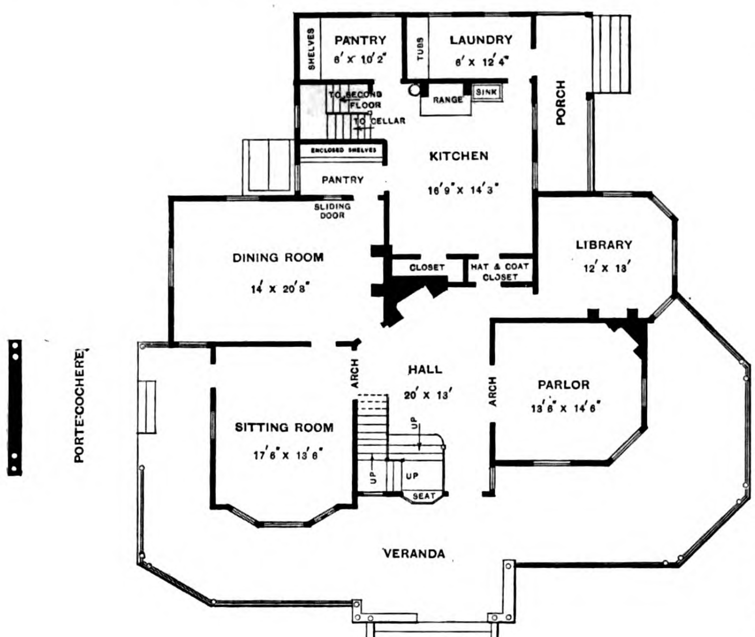
Second Floor Plan.—Scale, 1-16 Inch to the Foot.



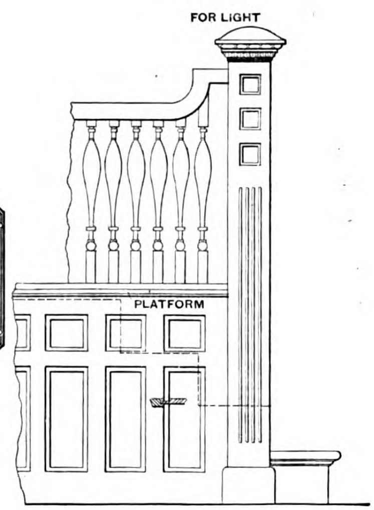
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Column and Rail of Veranda.—Scale, ½ Inch to the Foot.



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



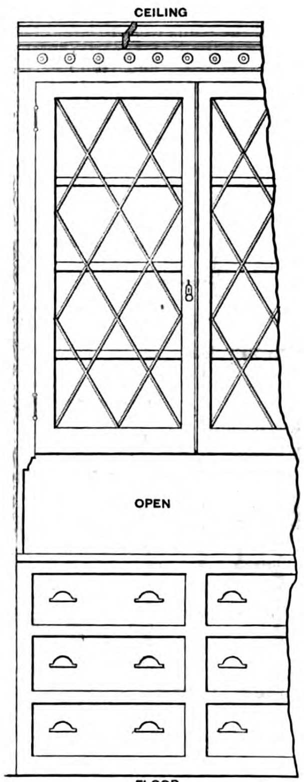
Details of Main Stairs.—Scale, ½ Inch to Foot.

House at Somerville, N. J.—Floor Plans and Miscellaneous Details.

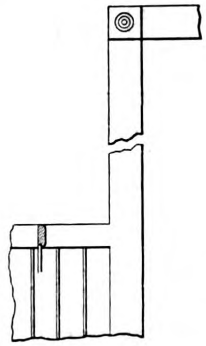
clusive use of the pointed form. Without detailing the various modes in which this might happen, and did happen, as appears from the various interesting expedients seen in those buildings, we may observe that, as the chief practical difficulties attached themselves to the upper and horizontal portions of the round vaults, nothing could be more natural (in an age unfettered by pedantic admiration of classical precedents) than to get rid of these difficult and hazardous parts of the work by beginning each foot of the arch as if it were meant for an arch of wider span, so that the two curves might meet before attaining the horizontality which was dreaded in the crown of the round vaulting.

Numbers of Screws.

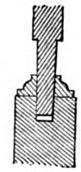
The numbers by which screws are known designate the numbers of the screw gauge to which the sizes of the screws correspond. It would appear that screws were first made in the various sizes and then a screw gauge made as a standard, and wire used in the manufacture of screws drawn to conform to this standard gauge. The screw gauge bears no relation to the wire gauge, as in the case of screws the largest number designates the largest wire, while in the wire gauge the largest number represents the smallest size wire.



Partial Elevation of Pantry Shelves. —Scale, ½ Inch to the Foot.

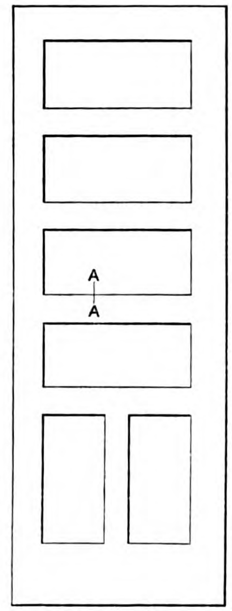


Detail of Kitchen Trim.—Scale, ½ Inch to Foot.

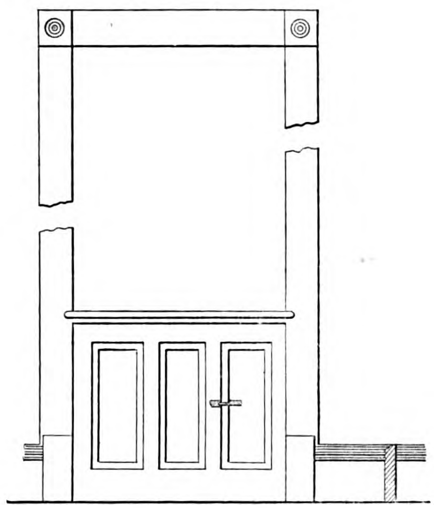


Section of Door at A A.—Scale, 3 Inches to Foot.

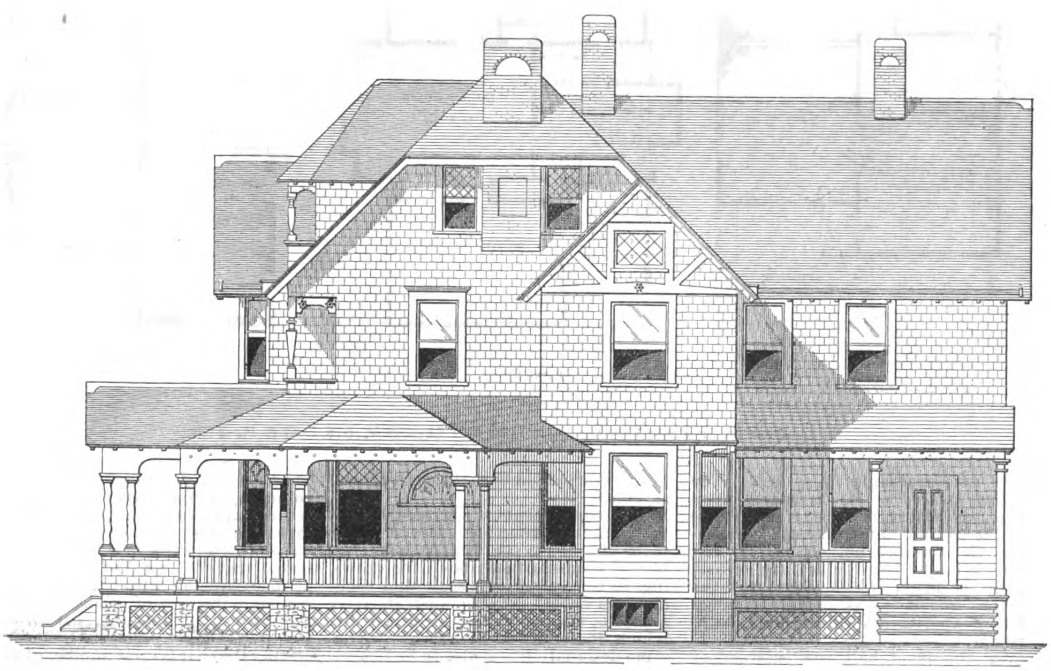
Section of Trim.—Scale, 3 Inches to the Foot.



Elevation of First Floor Doors.—Scale, ½ Inch to the Foot.



Detail of Panel Back and Trim.—Scale, ½ Inch to the Foot.



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

House at Somerville, N. J.—Side Elevation and Miscellaneous Details.

COMPETITION IN FLOOR PLANS.

THE subject of the twenty-fourth competition, as announced in a previous issue of the paper, covered floor plans for an eight-room, two-story detached house, adapted for erection in a suburban or country town, on a lot having a frontage not exceeding 33⅓ feet. The rooms were to be arranged upon the two floors in a way to utilize to the best advantage the space available, the number not to include any which might be provided in the basement or attic. In the sense used the term "rooms" was meant to cover living apartments rather than bathrooms, closets or halls. Where, however, the front hall was enlarged or expanded so as to be serviceable as a reception or sitting room, it was to be counted as a room and not as a hall. This condition also applied to the second floor, where the hall is oftentimes so arranged as regards size and appointments that it is utilized as a room. It was also stipulated that "such halls and closets as may be necessary for the convenience of the occupants of the house be provided in proper connection with the eight rooms specified."

The requirements of the competition included the first and second floor plans of a house containing the number of rooms named above, the drawings to be to a uniform scale and each and every sheet bearing upon its face a motto, *nom de plume* or device by which it could be identified. The same designation was also to be placed upon a sealed envelope containing the real name and address of the competitor.

In reaching a decision it was stated that all the plans were to be submitted to a committee of experts appointed for the purpose, and from the entire number ten or more sets were to be selected, consisting of those regarded by the committee as the most meritorious. The number selected was then to be engraved and published in the columns of the paper, so that each reader might have the opportunity of expressing his preference as to which was entitled to the first prize. It was stated that the award of prizes would be in accordance with the votes of the readers, the set of plans receiving the largest number of votes being awarded the first prize, $50; the set receiving the next largest number of votes to be given the second prize, $30; and the set receiving the third largest number to secure the third prize, $20.

The number entering the contest

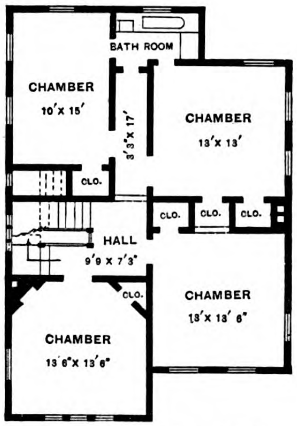


Fig. 1.—Second Floor. (No 11)

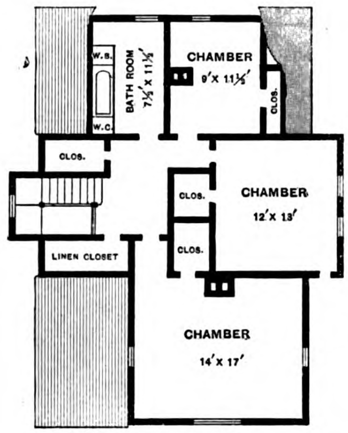


Fig. 3.—Second Floor. (No. 63.)

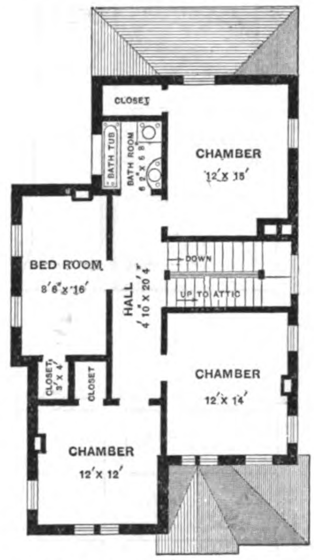


Fig. 5.—Second Floor. (No. 94.)

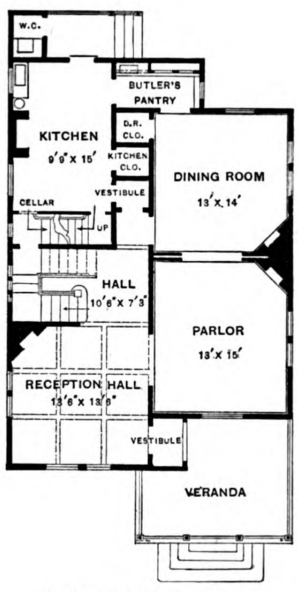


Fig. 2.—First Floor. (No. 11.)

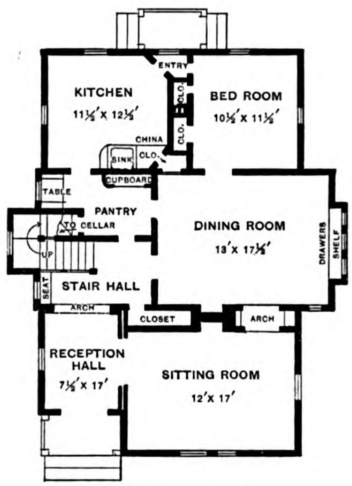


Fig. 4.—First Floor. (No. 63.)

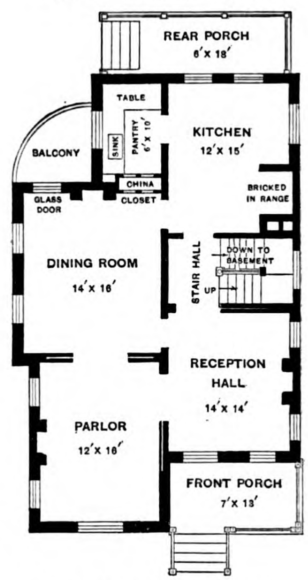


Fig. 6.—First Floor. (No. 94.)

Competition in Floor Plans.—Nos. 11, 63 *and* 94.*—Scale,* 1-16 *Inch to the Foot.*

has been large, and the committee to whom was intrusted the drawings was called upon to examine nearly 150 sets of plans. These were carefully considered in view of the conditions governing the contest, and 12 sets of floor being entitled to consideration. In one instance a competitor, submitting ten sets of floor plans, destroyed his chances for a prize by writing upon the paper which bound the drawings together his name and address. In present a ballot designed for voting in this competition. It will be noticed that each set of plans is numbered, this, however, having no other significance than an indication of the order in which the drawings were received

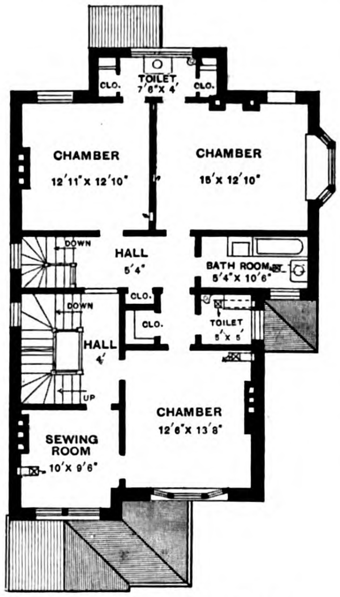


Fig. 7.—Second Floor. (No. 46.)

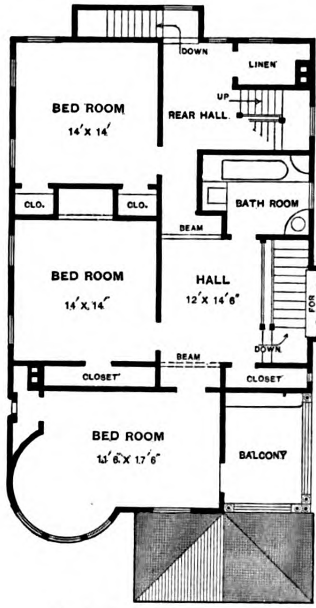


Fig. 9.—Second Floor. (No. 5.)

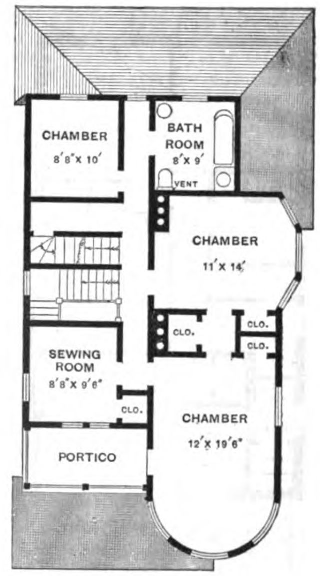


Fig. 11.—Second Floor. (No. 48.)

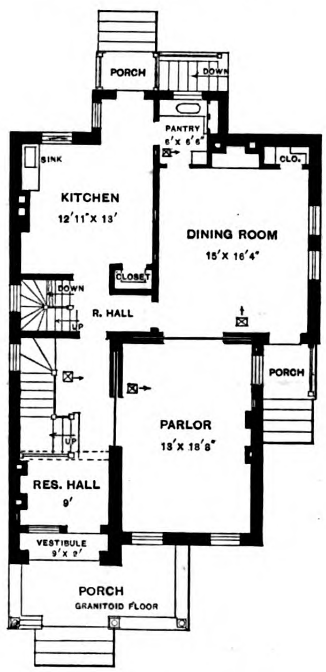


Fig. 8.—First Floor. (No. 46.)

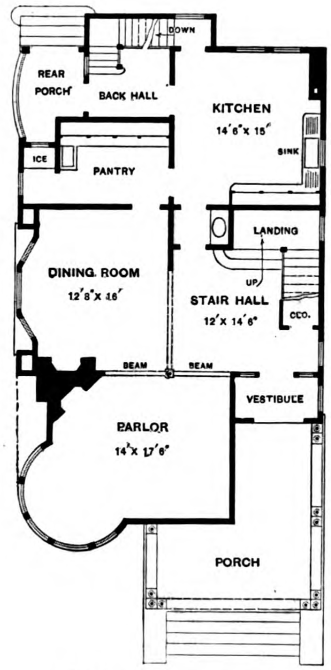


Fig. 10.—First Floor. (No. 5.)

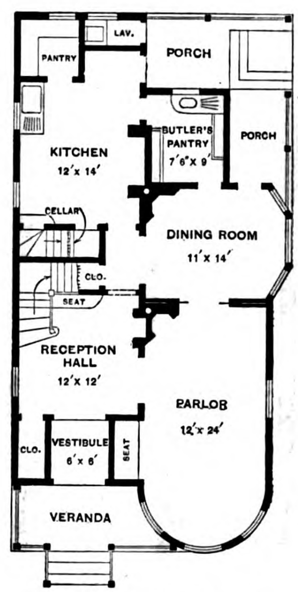


Fig. 12.—First Floor. (No. 48.)

Competition in Floor Plans.—Nos. 46, 5, and 48.—Scale, 1-16 Inch to the Foot.

plans selected, these being presented in this issue for the consideration of our readers. Although the conditions of the competition were distinctly stated, the contestants failed, in several instances, to comply therewith and the drawings submitted by them were consequently thrown out by the committee as not other cases nine rooms were provided, where the conditions expressly stipulated eight. Something like 15 per cent. of the total number of plans submitted were thrown out by reason of non-compliance with the requirements of the competition.

Among our advertising pages we at this office. Each reader of the paper is invited to fill out the blank ballot with his name and address, and indicate by number the set of plans which, in his estimation, is entitled to the first prize. These ballots in order to be counted in the decision must reach us not later than Monday, January 22, and no vote will be counted unless it be upon the published blank. As the set of plans receiving the largest number of votes will be awarded the first prize, it will be unnecessary for our readers to designate their preferences for second and third prizes, as the set of plans receiving next to the highest number of votes will be given the second prize, and the next largest number will decide the question of the third prize.

We trust that all our readers will carefully study the plans as published, and after making up their minds which set is entitled to the first prize, cut out the ballot and mail to the address given on the blank.

NOTHING so expeditious has ever been effected in the way of building, says a London contemporary, as the erection in eight days of the new Fountain Temporary Hospital by the chairman and managers of the metropolitan asylum district on a bit of

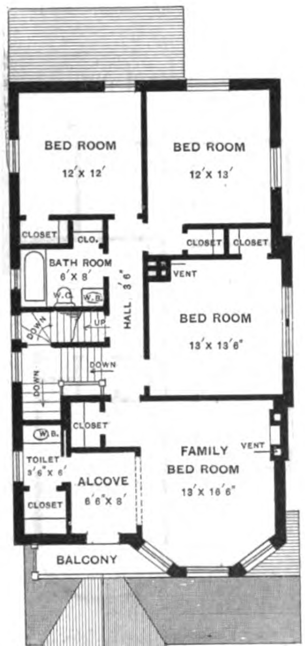


Fig. 13.—Second Floor. (No. 2.)

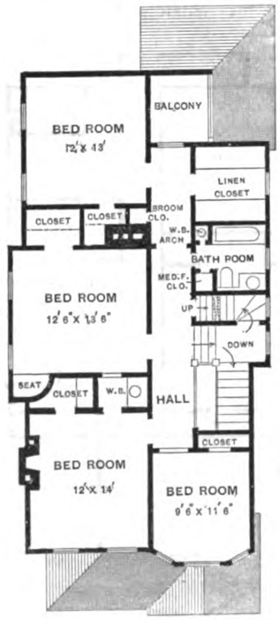


Fig 15.—Second Floor. (No. 78.)

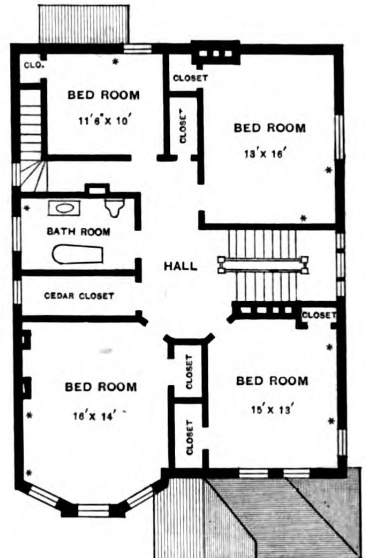


Fig. 17.—Second Floor. (No. 65.)

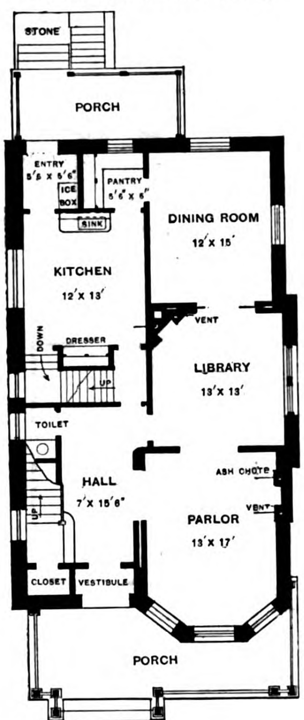


Fig. 14.—First Floor. (No. 2.)

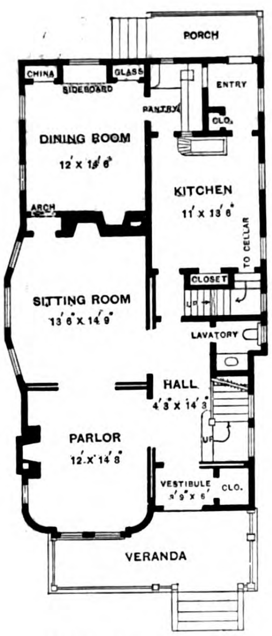


Fig. 16.—First Floor. (No. 78.)

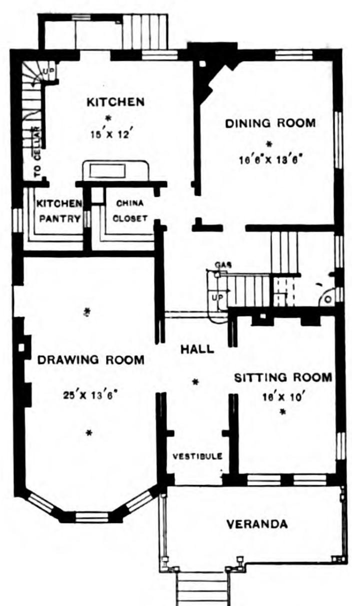


Fig. 18.—First Floor. (No. 65.)

Competition in Floor Plans.—Nos. 2, 78 and 65.—Scale, 1-16 Inch to the Foot.

waste ground at Lower Tooting—with wards all complete, beds for 400 patients, every hygienic and sanitary appliance, corridors, kitchens and consulting rooms. This hot haste was to enable the authorities to cope with the ever increasing number of fever cases that are crowding in upon them. The hospital is, we understand, already quite full. This important building, so rapidly erected, is by no means a small one. Accommodation, apart from that for the 400 patients aforesaid, is provided for 40 "charge" nurses, 50 assistant nurses and 76 female servants. The architect of this record breaking building is T. W. Aldwinckle.

ONE of the most unique rectory houses in England is that of St. Margaret, Lothbury, which, according to the *Surveyor*, has been building for some little time, and is now nearly completed. When the Church of St. Olave, Old Jewry, was pulled down, the tower and a part of the west wall were left standing, and in course of time they were built up into a modern-looking dwelling. The tower windows were filled in with ordinay casements, and the little glebe land in front was partly built upon by red brick offices. But St. Olave's has been turned into a rectory house, not a warehouse, and the office buildings on the glebe land contain a parish room for the better working of St. Margaret, Lothbury, to which St. Olave parish is now united. Canon Ingram, who will occupy the rectory as soon as it is completed, has taken a very wise course in insisting on the retention of the tower. Not only, he explains, is it a piece of Wren's work and a feature in this part of the city whose loss the parishoners would lament, but its existence as an integral part of the house will forever stamp the building as an ecclesiastical residence and prevent its consignment at any future time to commercial purposes, as no bishop would consent to such a desecration.

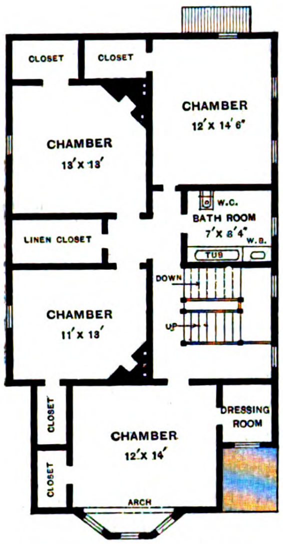


Fig. 19.—Second Floor. (No. 66.)

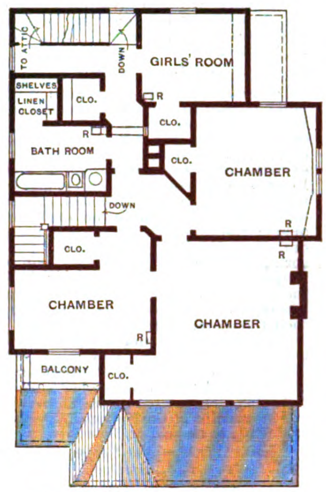


Fig. 21.—Second Floor. (No. 83)

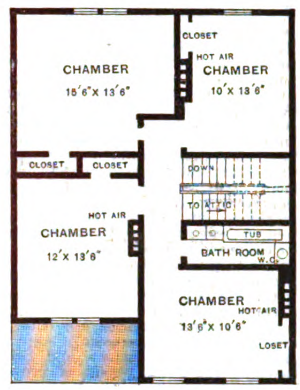


Fig. 23.—Second Floor. (No. 38.)

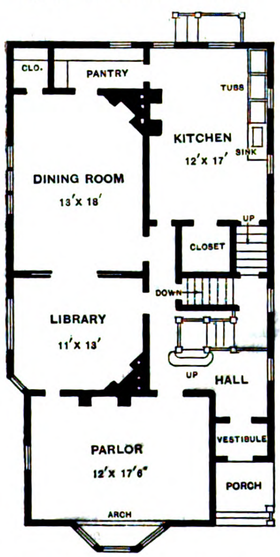


Fig. 20.—First Floor. (No. 66.)

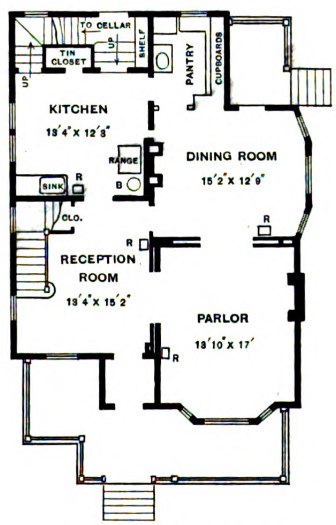


Fig. 22—First Floor. (No. 83.)

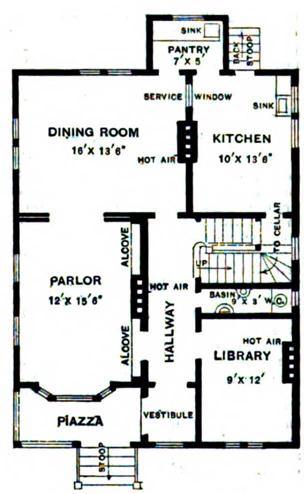


Fig. 24.—First Floor. (No. 38.)

Competition in Floor Plans.—Nos. 66, 83 and 38.—Scale, 1-16 Inch to the Foot.

Roof Coverings.

In the interior of Ceylon the natives finish walls and roofs with a paste of slaked lime, gluten and alum, which glazes and is so durable that specimens three centuries old are now to be seen. On the Malabar coast the flat bamboo roofs are covered with a mixture of cow dung, straw and clay. This is a poor conductor of heat, and not only withstands the heavy rains to a remarkable degree, but keeps the huts cool in hot weather. In Sumatra the native women braid a coarse cloth of palm leaves for the edge and top of the roofs. Sharks' skins form the roofs of fishermen's houses in the Andaman Islands. The Malays of Malacca, Sumatra and Java have a roofing of attaps, pieces of palm leaf wicker work, about 3 x 2 feet in size and 1 inch thick, which are laid like shingles and are practically waterproof. The Arabs of the East Indies make a durable roof paint of slacked lime, blood and cement. Europeans sometimes use old sails—made proof against water, mold and insects by paraffine and corrosive sublimate—for temporary roofs.

WHAT BUILDERS ARE DOING.

TAKING 20 of the most prominent cities of the country, located in widely separate districts, as reflecting the condition of the building trades in the vicinities in which they are situated, the general state of the trade may be considered as greatly depressed. The extreme East seems to feel the adverse condition less than it is felt in the middle States, which in turn show less serious effects than are felt in the States lying west of the Mississippi. The disastrous season which has been experienced by the builders is almost universally attributed to the financial stringency, it being the statement in nearly all of the cities mentioned that much work was either withdrawn entirely from the market or suspended for an indefinite term because of the uncertainty of money and the reluctance of capital to enter into building operations while things were in such a chaotic state. There are at present slight grounds for the belief that the early spring will see a resumption of the normal amount of building, although the wonderful power of our American cities to recuperate from the most unfavorable conditions must be taken into account on the other side of the question. The past year has been remarkably free from labor disturbances, although many employers are inclined to ascribe this condition to the fact that the many idle workmen throughout the country prevented those who were fortunate enough to be employed from striking for concessions, which they would have done under other circumstances. This reasoning is not altogether correct, for while it may be granted certain weight, the true reason is that the employers and workmen are both better represented in the character of their organizations than ever before, and both are learning the great benefit of prevention and arbitration over the strike and lockout. Wages have been kept surprisingly near the regular scales during the depression of the past year, and the fact should elicit great credit for the employers of the country from the fact that they could have been depressed with less trouble from the unions at this time than would have been the case if there were fewer workmen willing to work for any amount that would provide a living. Municipal authorities in nearly all the large cities are striving to lighten the condition of the workingman by introducing improvements for the purpose of giving employment to the idle.

Boston, Mass.

The builders of Boston and New England generally have all felt the effect of the depression in financial quarters to a greater or less degree, and the depression of the latter half of the past building season is entirely ascribed to the stringency in money. The total of work done in Boston last year fell fully one-third below the average, and the prospects for the opening of the season show little indication of improvement. It is estimated that at least one-third of the work which was projected at the commencement of last season was either postponed or abandoned, manufacturers and others being reluctant to build while the uncertainty in monetary circles continued. There has been no trouble of any importance with the workmen during the year, such disturbances as occurred being too small to cause serious injury to work in hand. The arbitration agreement (the form advocated by the National Association of Builders) between the Mason Builders' Association and the Bricklayers', Stone Masons and Building Laborers' Unions has remained in effective and satisfactory operation throughout the year and continues to prove itself fully adequate to the needs of the situation. The carpenters, through a conference with the employers, have arranged for an eight-hour day, to continue in force until spring, when the matter of hours will again come up for final adjustment for the season. The Master Builders' Association is in excellent condition, and has recently added desirable improvements to its building, in addition to a general renovation. The members are busily engaged in preparing for the entertainment of the delegates to the eighth convention of the National Association, which will occur in February, beginning on the second Tuesday. The annual meeting occurred on December 20, at which the report of the secretary and treasurer was read, showing the organization to be in most excellent condition, the increase of the surplus during the year being over $13,000 after appraising the fixtures and furniture at 50 per cent. of the value considered at the close of the previous year, and taking into account such improvements as have been made in the building. The total surplus stands at about $51,200. The following officers were elected for the ensuing year: For president, E. Noyes Whitcomb; for vice-president, C. Everett Clark; for secretary and treasurer, William H. Sayward; for trustees for three years, Ottomar Wallburg, S. Fred Hicks; for trustee for one year to fill unexpired term of C. Everett Clark, William H. Mitchell.

Baltimore, Md.

The generally depressed condition of the building business throughout the country seems to have been little felt by the builders of Baltimore. The total of work done equals, if it does not slightly exceed, the average of the three or four preceding years. Relationships between employers and workmen are of the most pleasant and friendly nature, and there were no disturbances among the workmen of any importance during the year. The outlook for the spring is fair; but there is no new work projected which will be commenced before the opening of the season. As fast as work is completed the contractors are reducing their forces, which has thrown many men out of employment, and will probably continue to do so until the new work begins. The regular meeting of the Builders' Exchange was held on December 5, and the following were elected to attend the eighth annual meeting of the National Association, in Boston, to be held on February 13:

Delegate at Large,
E. L. Bartlett.

Delegates.	Alternates.
John Trainor,	H. H. Duker,
E. D. Miller,	Israel Griffith,
A. J. Denson.	Isaac S. Philbert.

The exchange elected to suggest the name of Noble H. Creager to the National Association as a successor to the late Hugh Sisson as first vice-president. E. L. Bartlett was elected to fill Mr. Creager's place as National Director on the latter's election to the vice presidency. The delegates to the convention were instructed to invite the National Association to hold its ninth convention in Baltimore. A resolution was adopted asking the commissioners of the new custom house to specify that only Maryland material be used in the construction of the building. The exchange is in excellent condition, and expects to send a full delegation to the coming National Convention in Boston.

Buffalo, N. Y.

Building interests in Buffalo are reported very dull and with little new work in prospect. The total building for the year just ended fell one-fifth at least below the amount done during 1892. Relations between employers and workmen are quiet at present, and promise to remain so. Early in the past season the plasterers struck for $3.50 for a nine hour day, which was an increase of 50 cents per day; but after staying out for 13 weeks they returned to work at the old rate and hours. During the summer the stone cutters struck for a weekly payment of wages, the pay day selected being Saturday. The employers refused to hold any conference with men who were not in their employ, and after continuing the strike for some time the men made application for their old places and were taken back. The employers then entertained the request of the workmen, and a weekly pay day was established, although, to oblige the employers, the day fixed upon was Monday instead of Saturday; the closing of all banks in the city at noon on Saturday making it inconvenient on that day.

The Builders' Association Exchange is in excellent condition, although the dull times makes everything quiet. At the last quarterly meeting the following nominations were made for officers for 1894, the election to take place on January 15, at the annual meeting:

First ticket: President, Henry Schaefer; vice-president, Charles Geiger; treasurer, Harry C. Parsons; secretary, J. C. Almendinger. Arbitration Committee: A. A. Berrick, John Feist and William Savage. Delegates to the National Convention: Wm. D. Collingwood (delegate at large), M. J. Byrne, Geo. W. Carter, John A. Wolsley. Second ticket: President, George Duchscher; vice-president, George W. Maltby; treasurer, George W. Carter; secretary, J. C. Almendinger. Arbitration Committee: E. M. Hager, Geo W. Carter, A. P. Kehr. Delegates to the National Convention: Alfred Lyth (delegate at large), E. M. Hager, Geo. W. Maltby, John W. Henrich.

Cleveland, Ohio.

The builders of Cleveland have made no very serious complaints regarding the condition of business during the past year. The amount of building done is less than it has been for several years past, but there has been enough work on hand to keep both the contractors and workmen fairly busy. The Builders' Exchange is in excellent condition and is taking steps to bring about a more active interest in its affairs by its members and the builders generally. At the annual meeting of the exchange, held on Monday, November 20, the following directors were elected for the ensuing year: E. H. Towson, W. H. Fry, J. A. Raugh, A. McAllister, R. H. Jenks, John Grant, G. G. Griese, George E. Heidenriech and E. W. Palmer, Jr. On the 23d of November the new board organized by electing E. H. Towson president; John Grant, vice-president; G. G. Griese, secretary; E. W. Palmer, Jr., treasurer, and A. L. Bonesteel, assistant secretary. The exchange is in a healthy condition financially and has great activity among its members, which embrace some of the most substantial contractors and material men of the city. A committee of eight has been appointed by the exchange to take into consideration the best means for securing active interest on the part of every member of the organization, and to prepare some plan which will insure the compliance of all members with the rules and regulations of the exchange. It is proposed to extend an invitation to all eligible builders in the city to become members. It is also proposed to give a series of interesting lectures on the building trades, and other entertainments during the winter, the first one of the series having taken place on Monday evening, December 4, after which a lunch was served.

Detroit, Mich.

The builders of Detroit were busy when the money stringency was first felt and were compelled to suspend operations until money grew easier. Late in the season nearly all of the jobs which were under way when the hard times stopped them have been resumed, and it is thought that were money easier now there would be more work on hand than there is at present. A few new jobs are being figured on now, and the outlook for spring is very good. No labor troubles have been felt during the year, and there is no indication that there will be this season.

Lowell, Mass.

The total amount of building in Lowell for the past year is about 50 per cent. below the average of the two or three preceding years. A few of the contractors are busy at present, but the majority have nothing on hand and there is little prospect of any considerable amount of new work being begun before next season. The cause of the present depressed condition of the building business is the uncertainty in the money market, and the reluctance of capital to engage in new ventures. In addition to the unsettled state of finances the builders were considerably hampered during the summer by a prolonged strike of bricklayers that began in May and lasted until October, when it was declared off by the union, without gain to the workmen. Everything is quiet in all branches of the trade, and there are so many idle men in the city that, should the strike be revived, there would be no difficulty in securing all the workmen required. There has been no trouble in any of the other branches of the business during the past year. The Master Builders' Exchange has passed through its first experience in disciplining one of its members, and it is the general opinion that the result has been beneficial to the organization. An effort is at present being made to establish larger direct benefits from the Exchange by giving greater preference to members where work is to be done or material bought and by establishing recognized methods of competition.

Milwaukee, Wis.

The following letter from P. L. Peterson, secretary of the Builders and Traders' Exchange of Milwaukee, to the secretary of the National Association of Builders, written at the close of the year, shows the condition of affairs among the builders of that city as it exists at present.

The building industry of the city of Milwaukee so far this year, although hampered by a financial stringency of almost unexampled severity, has been sufficiently active to show that the outskirts of the city are maintaining a substantial and healthy growth. A few large and attractive buildings have been erected in the business center. Some are at present in the course of construction, viz:

A city hall, when completed, at a probable cost of $700,000.

A federal building for the use of the Government at an estimated cost of $2,000,000.

St. Paul's Church, at a probable cost of $150,000.

An almshouse at a cost of $210,000, and a few other smaller structures. Building, outside of those enumerated, is at a standstill.

From present appearances it will be a winter of idleness for the contractors. Permits issued for the first ten months of 1892 represent nearly or quite 2137 houses, the value of which is estimated at upward of $4,572,593. The permits for 1893 for the same period amounted to 1916 houses at an estimated value of $3,862,824, showing a decrease of nearly 23 per cent., as compared with the previous year. In order to give employment and relieve suffering and distress, the city has been bonding itself to the full limit provided by the charter, in paving streets, fixing gutters and alleys, building of viaducts and in various other ways pushing public improvements. Some are necessary, while others are being done to give employment to idle worsmen. In the face of all these exertions on behalf of the city thousands are out of employment and seeking alms at the hands of the charitable.

The year will fall short of expectations formed at the beginning of the season, but results in the way of many beautiful homes, attractive business blocks, imposing churches and well paved streets, will demonstrate that this city is keeping pace with other cities. No labor disturbances have occurred this year. The condition of affairs between employers and workmen has been amicable. A great many reductions in wages have been accepted without a murmur. The existing circumstances are in a measure due to such peaceful submission on the part of the workmen. "A half loaf is better than no bread." This city has, in the past six months, undergone a panic in finances which threatened serious consequences. Bank after bank collapsed and many substantial business houses were compelled to close their doors for want of financial aid from these institutions. Money that was needed in the transaction of business was tied up, and no aid could be had from the surviving banks. Confidence has so far been restored again that a more healthy outlook, is apparent, and in due course of time business will move along with the old time vigor and the past sad experience will pass into oblivion.

The Builders and Traders' Exchange has passed through the year in good condition, although some of the members have been seriously affected by the condition of the money market. The new home of the exchange, finished early in last year, has proved an attraction to the members which has materially aided in keeping the exchange up to its present standard, and helped the organization to take its proper place among the other commercial bodies of the city.

Minneapolis, Minn.

The condition of the building business in Minneapolis is at present very poor. The amount of business done in 1893 was more than 50 per cent. below that of the preceding year. There were no strikes or other labor troubles last year, although wages have fallen from 10 to 25 per cent. below the regular scale. The cut of lumber was very much below the average, and nearly all the mills were shut down 30 days before the season closed. It is expected that there will be an unusually large number of idle workmen in the city until spring, as the lumbermen will put in only about half as many logs as usual this winter, and will therefore require less men than under ordinary circumstances. The Builders' Exchange is in good condition, and the members are looking forward to an improvement in business as soon as the building season opens.

New York City.

The effect of the financial depression upon the building interests of New York City is exceedingly difficult of computation, although approximate figures show that the decrease in the amount of work done in 1893 from that done in the preceding year is in the vicinity of 25 per cent. At present business is quiet and the indications for the spring are not yet sufficiently sure to warrant a very hopeful outlook. The number of workmen in the city who are out of employment is very large, and with the finishing of the outside work on such contracts as are now being carried on the number will increase. There were no large strikes last year, the labor troubles being confined to individual employers and their workmen, and in no way affecting business generally. The most serious, and which threatened for a time to involve the whole trade, was the plasterers' strike for a half day on Saturday, which was described in these columns at the time. Efforts are being made to bring about the reconciliation of the two boards of walking delegates which practically control all the unions in the city, and which have been at cross purposes for some time past.

The Mechanics and Traders' Exchange is in good condition, and the wisdom of the move from the old location in Vesey street to their new and much more desirable quarters at 289 Fourth avenue has been fully demonstrated. From the secretary, Stephen M. Wright, information is received that the employers in the building trades are much better organized than ever before. Efficient organizations of employers now exist in the following branches of the building trade: Cabinet workers, plumbers, building material dealers, bluestone dealers, electrical workers, plasterers, granite manufacturers, iron workers, freestone cutters, marble workers, mason builders, carpenters, stair builders, steam and hot water fitters, painters and decorators, slate and metal roofers, tile and mantel workers and in the United Building Trades. There are other organizations besides these connected with the building trades of the city, and the majority of these have been in existence for some years, but they are all generally in better condition now than ever before.

Omaha, Neb.

The building interests in Omaha are in a very quiet condition, and there seems to be little prospect of any improvement before spring. Such large contracts as are still unfinished will soon be completed, and little new work will be undertaken before next April. The cause of the present condition of affairs is ascribed to the general financial situation throughout the country, and it is thought that the increase of building operations in the spring will be largely dependent upon an easier money market. Last April a contract for a large hotel was let to one of the members of the Builders and Traders' Exchange, and the work was carried forward with satisfactory rapidity until the financial stringency caused the owner to suspend operations. The owner, it is said, now desires to cancel his contract and have the plans refigured. It is thought by the builders that this is a plan to take advantage of the present depressed condition of material and labor for the benefit of the owner and to the detriment of the contractor. The character of the work that was done during the past season is best indicated by the fact that while the total of building permits for 1892 was 1356, and for 1893 it was 1327—a very small decrease—the difference in the estimated cost shows a decrease for last year of over $2,000,000; the amount for 1892 being $3,500,000. There were no labor disturbances during the year, and there is no indication that there will be this year. The large number of idle workmen in the city has had a tendency to depress wages to a slight extent, although an effort has been made to maintain the regular scale. The Builders and Traders' Exchange has held its own through the unfavorable conditions of the past year, and looks forward to an increase in the range of its operations and its membership as soon as business shall resume its normal tone.

Philadelphia, Pa.

The condition of the building business in Philadelphia at the close of the year is reported quiet, the amount of general work on hand at that time being small. Several large contracts are being carried on at present, notably the Bourse, Harrison buildings, Lorraine apartment houses, Pennsylvania Railroad offices, Central High School building, &c., which provide employment for a large number of workmen. The total amount of work done in the city during the year is generally conceded to be less than that of the preceding year, the decrease being variously estimated at from 5 to 25 per cent. The condition of affairs between employers and workmen is undisturbed, depression in business and scarcity of work having doubtless prevented the workmen from making arbitrary demands. There were few labor troubles during the year, and there is little likelihood that any will develop in the immediate future. The business prospects for the coming season are not very promising. Very little new work is at present projected, and for that which is offered the competition is so keen that prices are below the line of reasonable profit for the builder.

The Master Builders' Exchange had a prosperous year, and is constantly improving every opportunity to make membership a thing of value and to increase its influence and importance in the community. On November 15 a reception and entertainment was given to members and invited guests. The entire Exchange Building was beautified throughout with floral decorations and brilliantly illuminated.

The reception was tendered to invited guests only, admission being obtained by card, and an excellent opportunity was afforded the large number of visitors to examine all the latest and best materials and devices for building, as shown in the exhibition department on the first floor. The Mechanical Trade School in the basement was also in full operation, the boys being seen at work at all the trades which are taught in the school.

An orchestra stationed on one of the upper floors discoursed music throughout the evening. A souvenir of original and unique design, containing the musical programme of the evening, was presented to each guest at the entrance.

At a meeting of the members of the exchange, December 7, nominations were made for directors and also for delegates and alternates to attend the next national convention. Out of the list seven directors and 12 delegates and alternates will be elected at the January meeting. Those nominated for directors were Michael Magee, John Atkinson, Charles G. Welter, James Johnson, Andrew J. Slack, A. G. Buvinger, J. S. Thorn, John Byrd, Joseph E. Brown, William N. Read, F. F. Myhlertz, John L. Longstreth. For delegates and alternates the nominees are: F. W. Harris, George Watson, John S. Stevens, William Harkness, James Hastings, F. F. Black, W. S. P. Shields, Peter Gray, R. C. Ballinger, F. A. Ballinger, C. G. Welter, A. G. Buvinger, James C. Taylor, David H. Watts, Albert Reeves, Andrew J. Slack, Samuel Hart, Joseph E. Pennock, George F. Payne.

Portland, Maine.

The building interests of Portland have suffered greatly during the past year, there having been less work done than for many years past. Work in the city proper has been restricted to a very few new buildings, although the amount of repairing and remodeling has been fairly large. Such dwelling houses as have been put up have been for the most part frame structures, and with few exceptions have been erected outside the city. The employers and workmen have had no differences which caused any hindrance to such work as was in progress, and wages have been but little disturbed. The prospects for spring operations indicate a better condition of affairs, although there is comparatively little new work yet planned.

Providence, R. I.

The outlook in the building trades at the beginning of the past year was unusually bright in Providence, and work continued brisk until the panic in the money market made itself felt, when work was delayed and wages slightly reduced. Such jobs as were then in hand have been nearly all completed and the workmen discharged. As a result there are many men out of employment, even more than is usually the case at this season of the year. There were no labor disturbances in the building trades during the year, and the relations between employers and workmen continued amicable throughout. The total of building done as compared with former years is appreciably less, and the outlook indicates that there will be but little work for several months. The Builders and Traders' Exchange have had a prosperous year in spite of generally unfavorable conditions, and is in good condition both numerically and financially.

Saginaw, Mich.

The builders of Saginaw have been kept fairly busy during the past season rebuilding the portion of the city which was swept away by fire in May last. Sixty blocks, almost wholly composed of residences, were wiped out at that time, and over half a million of dollars has already been expended in restoring the homes that were destroyed. The general depression has been felt by the builders, however, for competition has been excessively keen and prices for material, particularly lumber, have advanced with the demand, and contracts have been taken at such excessively low figures that there has been little, if any, margin of profit. In the business portion of the city there has been little or no building done, all work being confined to the burned district. Knowledge of the fire and the rebuilding of the burned territory drew large numbers of workmen to the city, which has resulted in there being a great many out of employment. Wages were kept at the regular scale in spite of the excess of supply of workmen over the demand. No labor troubles of any kind occurred during the year, and nothing indicates that the present amicable relations between employers and workmen will be disturbed in the near future.

The Builders' Exchange has not met regularly during the past year and is at present suffering from lack of active interest on the part of its members, and from lack of conformity to its rules and regulations. The latter condition has operated to the detriment of the exchange, both in the matter of new applicants for admission and lack of interest on the part of those who would have the exchange a benefit to the fraternity.

St. Louis, Mo.

The building interests of St. Louis were in excellent condition at the beginning of last season and continued active until the cold wave of financial depression made itself felt. About July 1 business activity began to decline and from that time until the closing of the season everything was very quiet. Some projected contracts were withdrawn from the market and work was suspended on others. The number of idle workmen in the city was unusually large and will continue to increase until the commencement of new work in the spring. Wages have been kept up to the standard in most cases, and there have been no labor troubles of any importance The builders are looking forward to a good season this year, as present indications point to a renewal of the usual activity in the building trades. The Builders' Exchange is in good condition and is steadily growing into wider recognition as one of the important commercial bodies of the city. The Board of Directors held its regular meeting on December 4 and voted, among other things, to fix the sum for annual dues at $25, the same as heretofore.

St. Paul, Minn.

The builders of St. Paul have had less work on hand during the past year than they have had for over 20 years, and this depressed condition in conjunction with the present season, when all outside work is abandoned, brings the building business almost to a standstill. The number of idle workmen is large, but not as great as might be expected, for many left for the vast harvest fields of the Dakotas during the summer and thence scattered to other cities. There have been no strikes in the building trades during the year, and such wages as were paid were up to the usual scale. The Builders' Exchange has had a trying experience ever since it was changed from the usual form which exists in the other cities to a membership composed of special trade organizations, and a complete reorganization under the old plan is contemplated. The members believe that the exchange will rapidly recover its strength and will resume its former importance among the business institutions of the city. The indications point to a great improvement in business over that of the past year, as soon as spring opens.

Waco, Texas.

The builders of Waco have occasion to feel well satisfied with the condition of business in their city during the past year. The total of work done fell slightly below that of the preceding year, but the decrease was not great enough to cause serious trouble. No strikes or lockouts occurred, and wages remained at the normal scale throughout the season. The relationship between employers and workmen is friendly, and there are no indications of any change. Nine hours is the prevailing day's work in all branches of the building trade. The present outlook for the coming season is good, a number of large contracts, including an opera house to cost $100,000, being projected. The new Builders' Exchange is steadily gaining in membership and is already recognized as one of the institutions of the city. The general financial depression has been felt in Waco, but not seriously; no banks were disturbed, and the difficulty in making collections was about the worst feature of its effect upon the building interests of the city.

Worcester, Mass.

The builders of Worcester seem to have had an average season in the year just ended, and are congratulating themselves that work was so well under way before the scarcity of money made itself felt that no jobs of any importance were abandoned or suspended. Those in the building trades who felt the financial stringency most were the speculative builders who were depending upon the banks or money lenders for capital to carry on their work. Some contracts of this character were postponed, but they were not sufficiently important to affect the general trade to any serious extent. The whole volume of business, however, will fall short of that of the preceding year, and the number of unemployed workmen has been greater than usual. Wages have been maintained at the regular scale throughout the year, and the only decrease is in the total amount paid to workmen. No strikes or lock outs of any importance occurred. The Builders' Exchange has passed through the year in good condition, and the members are taking increased interest in the purposes for which it exists. Monthly meetings are now being held, at which some topic of general interest is discussed and an address delivered on some subject connected with building. At the last meeting the subject under discussion was "A Builders' Exchange as Advocated by the National Association of Builders, and the Duty of Members." The address was on the subject of architecture, and was made by C. W. Fisher. At the next meeting an essay will be read by William E. Coffey on the subject of "Special Trade Associations." A collation is served at these meetings, and the general feeling of fraternity and fellowship among the builders is greatly increased thereby. George Bouchard, for many years past secretary of the exchange, resigned his office during the past month, and Charles C. Brown was elected as his successor.

Law in the Building Trades.

Limitation of Action for Extras Under Building Contract.

Where a written building contract provides that extras shall be paid for at such rates as shall be agreed upon by the parties, the amount due for such extras is an amount due under a written contract, though the price was a verbal agreement, and the statute of limitation as to written contracts applies to it.—Wilkinson *vs.* Johnston, Supreme Court of Texas, 18 S. W. Rep., 746.

Architects' Liability for Leaving Out Arch.

Where it was alleged, in an action against architects for breach of a contract to furnish good and sufficient plans and specifications for a theater, that the plans were defective, in that they did not require a blind arch which should have been constructed in the brick work of the wall over the proscenium arch, and the necessity for the blind arch depended upon whether the spring of the proscenium arch was sufficient to enable it to maintain the weight unaided, evidence that the proscenium arch was too flat for such purpose was admissible though defects therein were not alleged. The evidence showing beyond question that the proscenium arch collapsed beneath the weight of the superincumbent wall—a result which of itself demonstrated its insufficiency—and the verdict of the jury implying that this result would have been obviated by the interposition of the blind arch—the architects were chargeable with a violation of their contract in failing to include such an arch in their plans and specifications. A deviation from the plans and specifications which had no effect whatever to produce the loss complained of could have no effect upon the right to recover for such loss.—Lake *vs.* McElfatrick. Supreme Court of New York, 19 N. Y. Sup., 494.

Effect Upon Liens of Giving False Receipt.

A material man is not estopped from seeking to foreclose his liens for materials furnished by him to the contractor by reason of his giving a false receipt for the amount due him, to enable the contractor to obtain a payment from the owner, where the owner has paid out no money, and suffered no loss on account of such receipt.—Washburn *vs.* Kahler, Supreme Court of California, 31 Pac. Rep., 741.

Enforcement of Mechanics' Liens.

The seller of a certain building agreed with the purchaser to remove and completely rebuild it upon a lot belonging to the latter. The seller then contracted with a builder to furnish all materials needed, and to perform the necessary labor in accordance with the terms of his agreement with the purchaser. The builder failed to complete the reconstruction of the building as agreed upon, and also allowed lien claims to be filed against the property for materials furnished to him for use in rebuilding. In an action to foreclose the liens a mortgage given by the purchaser to secure the payment of his note to the seller for the amount agreed upon as the price of the completed building was secondary to the liens of the material men, and as between the purchaser and the seller the latter was liable to the former for the failure of the builder to complete the contract.—Bassett *vs.* Menage, Supreme Court of Minnesota, 53 N. W. Rep., 1064.

Materials Sold to Contractor.

When materials are supplied under an ordinary sale on credit to a contractor, and upon his credit only, no lien is acquired, although the contractor subsequently uses them, or a part thereof, in building a house or improvement for another party.—Wagner *vs.* Darby, Supreme Court of Kansas, 30 Pac. Rep., 475.

Substantial Compliance with Contract.

In an action to foreclose a mechanic's lien entered on a contract to do mason work, plaintiff may introduce as witness experts in the trade, to show that mason work does not include "plastering and whitewashing." Where a contract for mason work to be done on a building by plaintiff provided that a certain payment should be made when the mason work was completed, and that plaintiff was delayed in his work on account of the delay of the work of another independent contractor, which had to be done first, and plaintiff used all diligence in going on with the work after it was possible for him to do so, and went prepared to finish the job, when he was ordered off by the owner, who had put other men on the work, it was a substantial compliance, and entitled plaintiff to his payment.—Highton *vs.* Dessan, Common Pleas of New York, 19 N. Y. Supp., 395.

PLUMBING IN A NEW YORK TENEMENT HOUSE.

THE enforcement of the plumbing regulations of New York City with an impartiality that secures to the occupant of the east side tenement the same protection from sewer gases as that enjoyed by residents in the fashionable quarters has always been claimed by the Health Department and the claim conceded by those who have had opportunities of forming an opinion on the subject. If any difference exists between the plumbing work in the two classes of dwellings it is due to the use of a more expensive quality of sanitary appliance with a more elaborate arrangement of material, but the application of scientific theories marks the one as well as the other in the exclusion of sewer air.

The illustrations which we present in this issue show the arrangement of the pipes and fixtures in an average New York tenement of what is known inside the rear wall answers the double purpose.

A similar drain pipe arrangement is made for the front area, the 3-inch pipe being carried inside the front wall, trapped and connected with the house drain on the house side of the running or front wall trap.

The house drain receives at front and rear the 3 inch waste pipe from the sets of apartments on the several front and rear floors of the building. These cellar connections are made with one-eighth bends at foot of rising lines and through Y-connections on house drain.

The soil pipe connects with the house drain about midway in the cellar, just inside the light court. There is an air shaft, size 3 x 3 feet, provided for the water closets, and in this air shaft the soil pipe, which is 5 inches in diameter, and the vent pipe (3 inches) are run. Two water closets on each washout or syphon of the former, with its brass or nickel plated flush pipe and its copper lined and cabinet trimmed cistern, does not more effectively remove the contents of the bowl and seal the trap than the flush rim hopper of the latter, with its iron cistern and 1¼-inch flush pipe.

The care of the fixtures subsequent to their being placed in position has, however, much to do with after results, and in this respect the plumbing in the average tenement is at a disadvantage.

Penny Applied to Nails.

Two explanations are current in regard to the use of the term "penny" as a designation of the size of nails. The one which is very generally adopted is as follows: That the word penny is a corruption of pound. Thus, a 4d nail

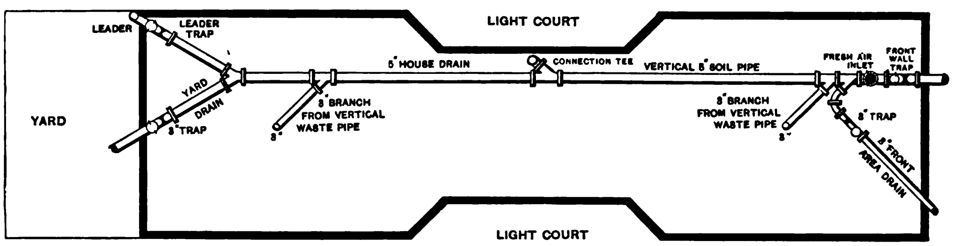


Fig. 1.—Cellar Plan, Showing House Drain and Connections.

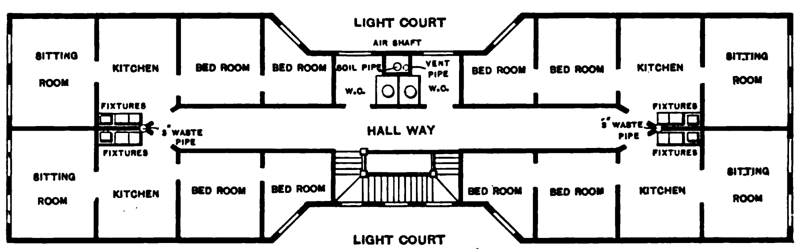


Fig. 2.—Plan of Floor of Tenement.

Plumbing in a New York Tenement House.—Diagrams Showing Cellar and Floor Plans.

as the "cold water class"—that is, where there is no range boiler nor hot water circulation

Fig. 1 shows a ground or cellar plan of the house drain and connections of rising lines therewith. The house drain is 5 inches in diameter, and extends backward in the cellar to receive the roof and yard drainage, the former through the 5-inch leader, the latter through the 3-inch drain pipe. The leader is generally of galvanized iron to within about 5 or 6 feet of the ground, where it is formed by a length of cast iron pipe of same diameter, which is carried through the house wall into the cellar by means of a ⅛ bend, where it is trapped and connected with the house drain. The 3-inch yard drain takes in the surface drainage of the 10-foot space required by law at rear of every tenement and lodging house and discharges through a 3-inch running trap into the house drain inside rear wall, as shown.

Sometimes a bend with a 3-inch opening is used on the leader, in which case the yard drain is connected therewith, by which means the use of the 3-inch trap is obviated, as the leader floor discharge through this 5-inch soil pipe. The rising lines, therefore, in the building are one 5-inch soil pipe and one 3-inch vent pipe for the water closets, and two 3-inch waste pipes and two 2-inch vent pipes for the sinks and washtubs of the front and rear apartments respectively.

Fig. 2 shows the arrangement of the fixtures on each of the floors. In the two sets of apartments, to be found front and rear, the tubs and sinks for use in each set are placed in position on either side of the dividing partition. A double Y-branch opening is set in the 3-inch waste pipe, into which the wastes from both sets of fixtures discharge, the traps of each being properly vented, in accordance with sanitary practice.

The setting of the water closets is as closely looked after in the tenements of the poor as in the homes of the rich. The enameled iron full S-trap, if set above the floor, must be calked into the iron hub, as no other connection is allowed.

The flushing facilities are the same throughout, whether in the mansion or the tenement, and the expensive was one of such a size that 1000 of them weighed 4 pounds. It may be remarked that originally the term "100" when applied to nails was six score, or 120, consequently the 1000 was 1200. Another explanation is based on the fact that cut nails are comparatively of recent date, having been first made in this country, and were introduced in England as late as 1846. Formerly all nails were forged, and the price for forging 1000 1½-inch nails was 4 pence, or as the term is now used, 4d; the price for forging 1000 2-inch or 6d nails was 6 pence and so on. As a reason why small nails could be forged so cheaply it is stated that children often did the work.

Bastard Files.

The origin of the term "bastard" as applied to files is generally explained in this way: The rough file was first made, then the second cut. A demand for a file between the two was afterward developed, which being out of the regular line was termed bastard.

CORRESPONDENCE.

One-story Flat Roof House.

From L. J. C., *Long Island City, L. I.* —Will some of the many readers of the paper kindly contribute for my benefit plans of a one-story flat roof house having six or eight rooms?

Design of a Sideboard.

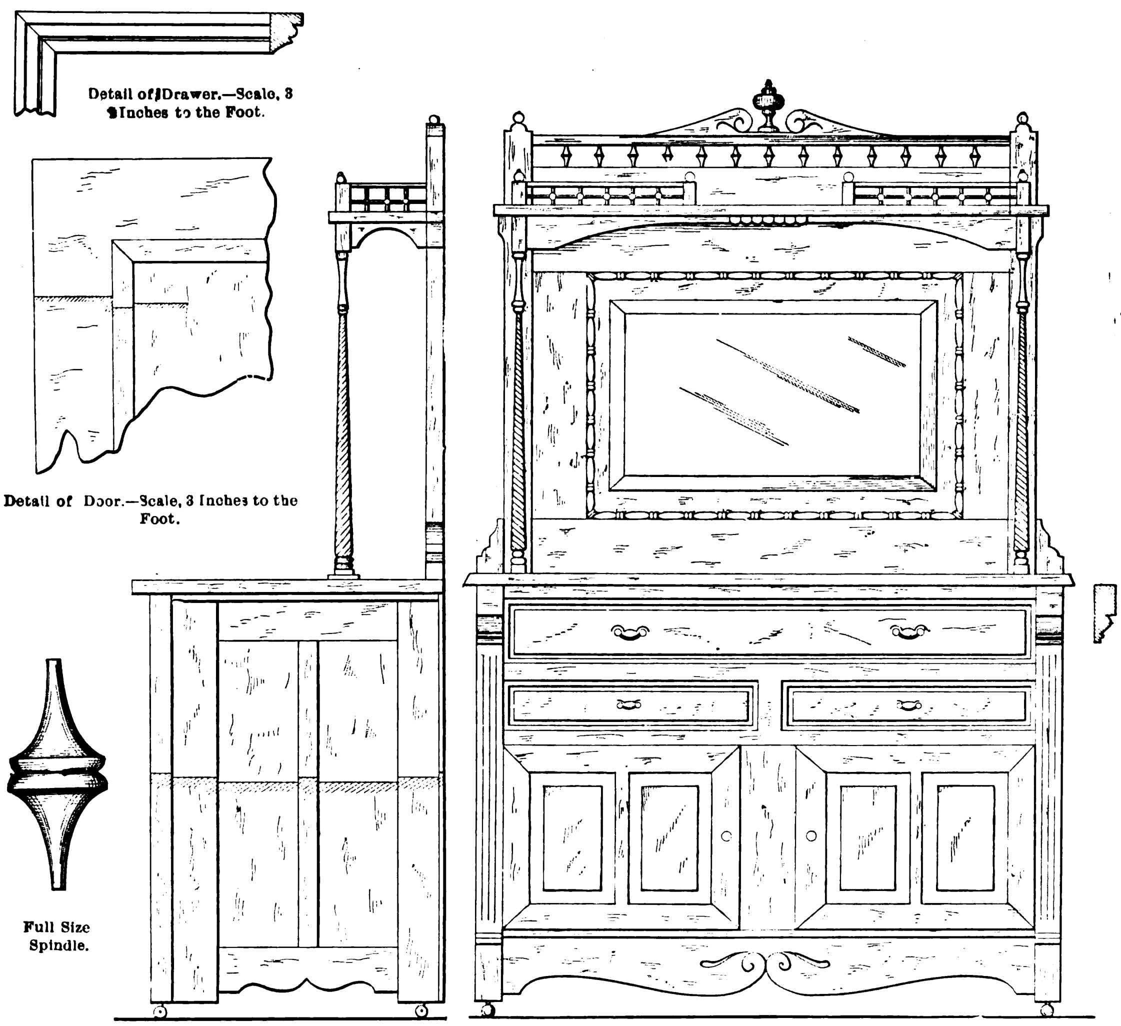
From A. M., *Maplewood, Pa.*—In the April issue of *Carpentry and Building*, "L. J. F.," Chartley, Mass., asks for month, and I am inclined to think that my brother chips fail to carefully read the different numbers of the paper as they get them.

Strengthening a Floor.

From W. B. B., *Ansonia, Conn.*—Will some of the readers of *Carpentry and Building* kindly tell me the best way of strengthening a second floor, which has a good deal of spring in the moisture in the joints. I use ⅞ inch stuff from 3 to 5 inches wide, which makes a very satisfactory floor. I nail both edges and use pitch and paint. I put down a floor of this kind 13 years ago, and though it has never been roofed or painted, it is good to-day.

Riley's System of Handrailing.

From A. W. W., *Sudbury, Ontario.*—In answer to "W. G. P's" question in



End Elevation.

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

Design of a Sideboard.—Contributed by "A. M." of Maplewood, Pa.

a design of a sideboard. I send drawings of one which are self explanatory, and will, I trust, prove of assistance to the correspondent.

Problem in Groined Ceilings.

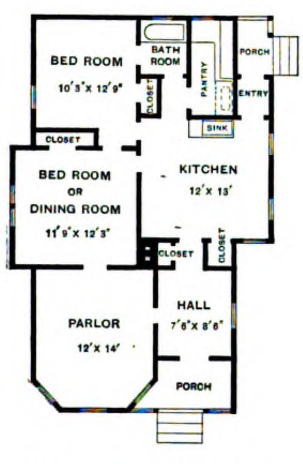
From D. F., *Philadelphia, Pa.*—If "R. S. N.," Minneapolis, Minn., whose letter appears in the August issue of *Carpentry and Building*, will take the trouble to look up the articles furnished by I. P. Hicks on angle ribs, or those in the May number, he will find just what he needs. This question is asked and answered almost every center? The room is 14 feet square, the joists are 2 x 8 oak, 16 inches from centers and bridged.

Laying Porch Floors.

From S. F. B., *Wellington, Ohio.*—Referring to the letter of "H. H. R.," Seaville, N. H., which appeared in the August issue, I would say I like the herring bone idea, and will add that I lay no matched floors unless a customer insists upon it. I find that a matched floor, whether the joints are painted or not, soon rusts out by reason of the the May issue of *Carpentry and Building* regarding the system of handrailing presented in the issue for November, 1887, by "J. A." of Utica, N. Y. I will say that the diagrams given by "J. A." are taken from a very old work on handrailing. I can cheerfully say, however, that its age does not in the least impair its usefulness when contrasted with present publications on the subject of stairs and handrailing, as it is very simple and a knowledge of it is easily acquired. I think for beginners, especially, the present systems are too complicated. In the old system referred to no unnecessary lines are given—everything being very plain. The volume at present in my possession is bound in cloth with red covers and measures 9 x 11½ inches. The work contains 14 full page plates, all of which are on the left, while the text pages are on the right. The descriptive particulars are full, so that there is no necessity of turning over the leaves in referring from the text to the plates. There are blank pages between the text and cuts all through the book. The diagram contributed by "J. A." of Utica is to be found in this work by turning to Plate 8. For the information of "W. G. P." I will state that the title page reads as follows: "The Workman's Sure Guide. Being a system of handrailing for which the volume obtained a first class prize at the Wakefield Industrial and Fine Arts Exhibition. By Joseph Riley, Leeds. Third edition. Entered at Stationers' Hall, 1872."

Floor Plan of Workingman's House.

From J. P. KINGSTON, *Worcester, Mass.*—In looking over the September issue of *Carpentry and Building* my attention was drawn to the floor plan of a house for workingmen, and as that shown was given as an improvement on the one published in the January issue, I turned to that to see what it was like. Upon examination I found objections to both plans, one in particular being that the rear door opens out of the kitchen. Another objection is, there is no way of heating the parlor. As far as closets are concerned the plan in the September issue is a great improvement, but as concerns the bathroom there is no improvement, and I think it worse than the

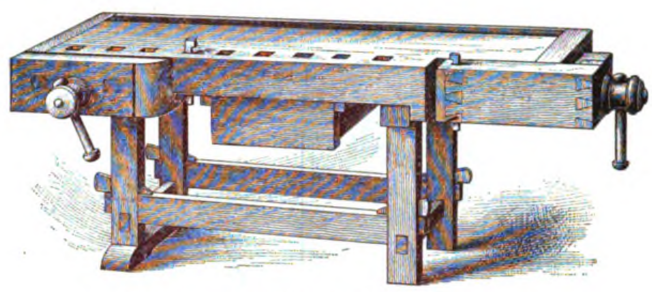


Floor Plan of Workingman's House.

arrangement shown in the plan published in the January number. Now, it seems to me it would be pretty cold taking a bath in the winter time in this bathroom and it would be a big mistake to be obliged to carry hot water from the stove through the bedroom to the bathtub, which, necessarily, must be done unless there is a hot water boiler. I send a plan which I think an improvement on both of those published. It is possible that no one in this vicinity wants a house planned as indicated, but, on the other hand, it may be of use to the correspondent originally making the inquiry. It will be seen that I have placed the chimney so that it can be used from the kitchen, parlor and dining room, while the position of the closets will, I think, please almost any one. The bathroom can be reached from the bedroom or the kitchen and heated from the latter. There is also a good sized pantry with a place for a refrigerator. The sink is convenient to the stove, dining room and pantry. There is a small entry or hall between the kitchen and the rear porch, which cannot fail to be appreciated in both hot and cold weather.

Carpenters' Work Bench.

From ENGLISH.—Some of the readers of the paper have lately asked for benches adapted for use by carpenters, cabinet makers, joiners, &c. I submit a sketch of one which may prove inter-



Carpenters' Work Bench, as Described by "English."

esting. It is made of well seasoned beech and fitted with two screws, two iron stops and a drawer. The parts are all well made, giving a substantial and rigid article. The general construction is so clearly indicated in the sketch that a detailed description does not appear necessary.

Colonial Cottage.

From W. I. H., *Brooklyn, N. Y.*—Will some reader of this paper submit the drawings for a moderate cost six-room cottage in the colonial style of architecture?

Learning a Trade.

From A. W., *Madison, Wis.*—If the Editor will permit, I would like to express my opinion on a subject discussed in the January (1893) number by "W. B. V." of Newark, N. J., and in the June issue of the paper by "F. A. D.," Oakland, Cal. The correspondent signing himself "W. B. V." of Newark is in favor of giving the American boy preference. I say give no boy preference. If you engage from one to ten apprentice boys do not ask them what country they came from, but give them an impartial trial, regardless of religion or nationality. The best boy will go to the front. Further on the correspondent says: "Force these foreigners back where they belong." I believe in forcing them where they belong, but they do not all belong "back." If a boy becomes a man and he is able to work himself to the front, give him your hand and help him up, no matter what may be the country in which he was born. If a boy sold peanuts and newspapers, or blackened boots, what difference does it make? If he is able to work himself up to be President of the United States or Governor of any State in the Union, let him do so. You have the same equal chance, "W. B. V.," although perhaps not the ability, but why should those who have suffer for it? America is a grand, free country, don't you know.

Now, I would like to say a few words in reply to the letter of "F. A. D." of Oakland, Cal., which appeared in the June number. I feel very sorry for him, but I cannot believe it is quite so difficult in this country to learn a trade as he would like us to believe, I feel—in fact, positively know—that this country is unsurpassed by any other in the advantages offered in securing a complete education in any line a boy or man desires to pursue. The universities and trade schools are unequaled. I came to this country about 13 years ago from Germany. It was impossible for me there to learn a trade, because financial circumstances would not allow. When I came to this country it seemed impossible the first year, so I worked in a brick yard. There were about 20 men engaged there, all nations being represented, the writer and another chap being the only two "greenies." After a year we parted. One of the men employed was an American and the last I heard from him was as principal of a high school in a Western city. Another has a grocery store in this city, and another a clothing store in a lively little town close by. I learned the carpenters' trade and enjoy it. The "greeny" who worked with me I noticed some days ago standing on a corner trying to paint the sidewalk with tobacco juice, and judging by the clothes he wore he was not in good standing. Further on in his letter "F. A. D." says: "Germans, Swedes, &c., after carrying the hod in their own country come out here as bricklayers." If I were a master mason I certainly should take exception to that, because a master mason will see as soon as a man takes hold of a brick or trowel whether he is a mason or not. I know it does not take long to find out whether a man who calls himself a carpenter is a mechanic or not. I could furnish several examples to this effect, but I am afraid my letter is too long now. I would advise any and all young men, if, after serving two years in an architect's office, they get notice that their services are no longer required, not to blame the other boys for it, even if they are English or German.

From W. B. VAN H., *Newark, N. J.*—I was very much interested in the letter of "F. A. D.," Oakland, Cal., published in the June issue of the paper. He certainly has had a very hard time. Now, a German will stick to a German and a Jew will stick to a Jew, so I am at a loss to understand why Americans will not stick to Americans, as they should. I will say, without fear of contradiction, that American boys in 99 cases out of 100 are fully 100 per cent. more intelligent than the foreigners whom the employers continue to hire for the sake of saving a paltry dollar or so a week—mere mechanical slaves. If "F. A. D." cannot learn his trade in Oakland he should remember that there are thousands of other cities in finitely better than Oakland, judging from the account which he gives. I only hope that some true American in Oakland will see the account of "F. A. D.'s" difficulties and give him a decent show.

Self Supporting Roof.

From J. N. H., *New Orleans, La.*—Answering the inquiry of "J. H.," Fort Snelling, in the March number of *Carpentry and Building*, I submit herewith a design for a roof truss which will probably meet his requirements. The truss members are calculated to carry a roof load of 50 pounds per square foot, in addition to the weight of the truss itself, which is about 2000 pounds. This I consider sufficient for Minnesota winds and snows, as well as any kind of covering "J. H." may desire. Fig. 1 of the sketches represents a general view of the truss, while Figs. 2, 3, 4 and 5 show various details of construction. Ordinarily the bottom chords of such a truss as here shown would be of iron rods, but the present construction is based on the supposition that wooden members, as shown, can be procured cheaper in "J. H.'s" section of the country than the iron rods and necessary castings for post connections. Should it not be convenient to procure the chords in single lengths I would suggest splicing, as indicated in Fig. 6 of the illustrations. The overhang of the rafters at the eaves is in keeping with the suggestion given in "J. H.'s" sketch of the cross section through the building. I think a prettier finish, especially if a gutter is required, is that shown in Fig. 7. But this point, as also the material to be used in covering the roof, I leave to the good judgment of "J. H."

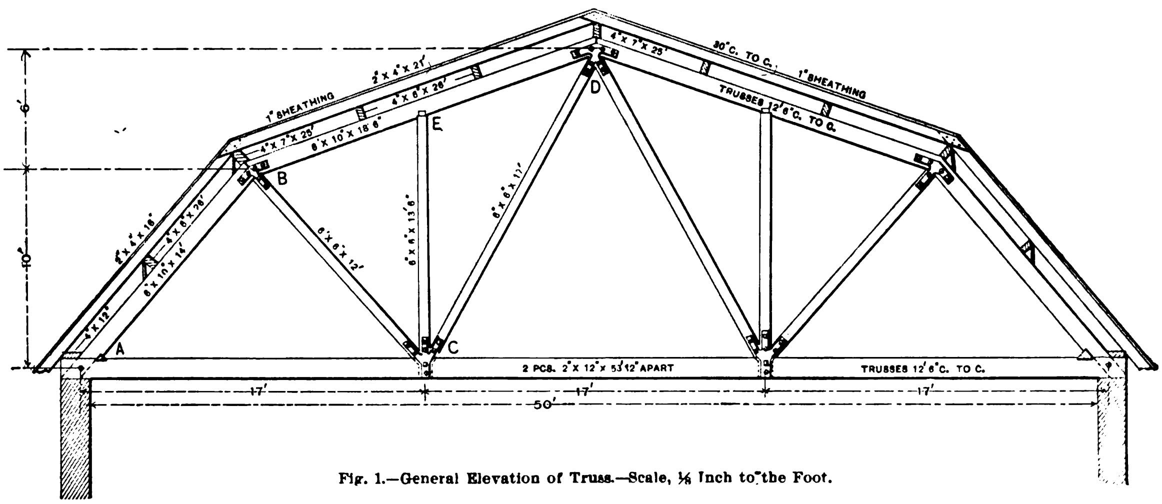


Fig. 1.—General Elevation of Truss.—Scale, ⅛ Inch to the Foot.

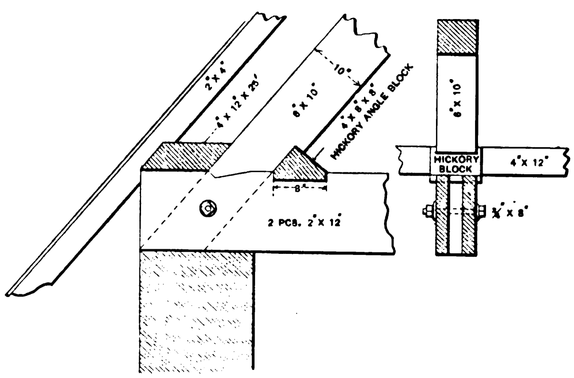


Fig. 2.—Details at A of Previous Figure.—Scale, ¼ Inch to the Foot.

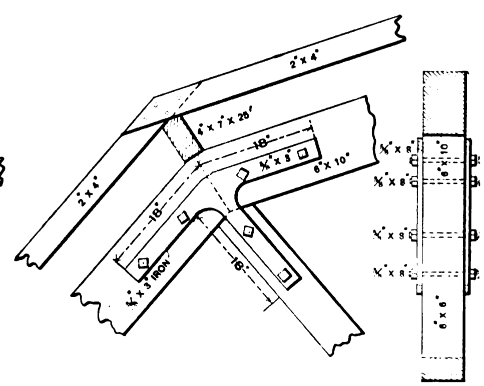


Fig. 3.—Details at B of Fig. 1.—Scale, ¼ Inch to the Foot.

Self Supporting Roof.—Method of Construction Suggested by "J. N. H."

Designs for Store Shelving, Counters, &c.

From J. G. L., *North Yakima, Wash.*—Will some of my brother chips please send for publication, drawings for shelving, counters, drawers and sliding sash, such as are used in fitting up a hardware store? I have been a reader of *Carpentry and Building* for over three years, but have never seen any drawings of this kind.

Design for Masonic or Odd Fellows' Hall.

From E. G. M., *St. Johns, Newfoundland.*—I would like to have some of the readers of the paper furnish a sketch or plan of a hall suitable for a Masonic or Odd Fellows' lodge. The building should cover a ground space of 40 x 60 feet, and be two stories in hight, the basement being arranged for keeper's apartments. The cost should not exceed $6000 or $7000 and the material employed should be wood. The hall or lodge room, with anterooms, should occupy the first floor.

Plans for a Six-Room House.

From M. J. W., *Abington, Ind.*—I wish the many readers of the paper would give me plans for a six-room house, one and a half stories in hight. In the February issue of the paper for 1886, page 23, there is a first floor plan arranged according to my idea. On the second floor, however, I want two bedrooms instead of three, as the plan shows; and still I want a T-shaped structure with three gables, with shed roof over bedroom and part of kitchen. I do not, however, want the shed as shown on the plan referred to, yet the shape of the rooms should be the same. I want it so arranged that a person can reach the kitchen, dining room and sitting room from the hall, and also the two sleeping rooms on the second floor. I want the sitting room and dining room each 15 feet square, the kitchen 12 x 15 feet and the bedroom 9 or 12 x 15. The second floor bedrooms should be 12 x 15 feet. I want the storeroom closet the same as shown on the plan in the February issue for 1886; also the back porch and front veranda. I want a bay window at the kitchen, but none at the sitting or dining room. I want the flue in the center portion of the house. My object in making this request is that I am told by those who profess to know that it is impossible to build a one and a half story house with two rooms on the second floor, using as a basis the first floor plan to which I have referred. I would also like to see a front and side elevation. I omitted to state that there should be an entrance to the cellar from the kitchen. I should like very much to have my fellow subscribers work out this problem.

"J. S. Z.'s" Cheap Country House.

From A. A., *Hillsdale, Mich.*—I would like to ask "J. S. Z.," Morganton, N. C., whether in the design for a cheap country house published in *Carpentry and Building* for August there should be a door connecting the dining room with the kitchen. If not, why not? and what is the convenience resulting from its omission? I would also like to ask why there are no cupboards or pantry? In a general way, I like the design very well, with the exceptions above noted.

Cold Storage Buildings.

From A. G. M., *Beaver Dam, Wis.*—I have been a subscriber of *Carpentry and Building* for five years and am well pleased with it. In this part of the country we are building a number of cold storage houses on a small scale, but they do not prove a success. I wish some of the practical readers would give, through the columns of the paper, the inside plan of a cold storage house, as I think the matter would be of benefit and interest to a good many readers of the paper.

Combination Writing Desk and Bookcase.

From P. O. N., *Stramsburg, Neb.*—I would like to ask through the columns of *Carpentry and Building* for a sketch of a writing desk and bookcase combined.

Note.—Our correspondent may be interested in the design of a combination writing desk and bookcase which was presented in the issue of the paper for November, 1891. The request that he makes, however, is likely to interest others as well, and we trust any one who has been called upon to execute such work will come forward with drawings and descriptive particulars.

Finishing Furniture.

From J. C. W., *Pine Hill, Pa.*—I have gained a great deal of information from *Carpentry and Building*, and copied some of the designs presented, especially those relating to furniture, &c., but after I have completed the work it is necessary to varnish the articles. What I desire to ask is how to paint or polish furniture, giving a hardwood finish? Out in this section we can build neat furniture, but when it comes to the part of finishing we are left, so to speak. The furniture does not look like city made. I turn out a great deal in hardwood, but am not able to give it the desired polish. Will some of the readers kindly tell me how to use pumice and rotten stone; also how to varnish, stating the number of coats? When we varnish the work looks streaky and spotted.

Framing a Gothic Window.

From A. L., *North Port, Ala.*—In looking over the number of *Carpentry and Building* for May, 1893, I noticed where "C. M. C." of Oakland, Cal., is trying to explain the method of obtaining the length of Gothic window jambs. I wish the brother would try again, as it seems to me he has the thing somewhat confused. He says: "Let E F equal E D and draw the line from F to G." Now, I would like to know how the length E D is determined, and also how to find the angle at which to draw F G, and so on all through the diagram. I trust I shall be able to see more light soon.

Striking a Spiral Arch.

From J. A. F., *McKinney, Texas.*—In reply to "D. F.," Philadelphia, who asks how to obtain the twist of a voussoir of any length, I refer him to Fig. 8 of my article published in the August issue for 1893. The bevel at A will give the twist from the center of the crown to the springing plane, and the intervening bevels the intervening lengths. Working to the center from both ends will give the bevels for any length. Twisting handrailing is similar to the principle involved in the voussoir. The diagram referred to is so plain that I think it cannot fail to be satisfactory.

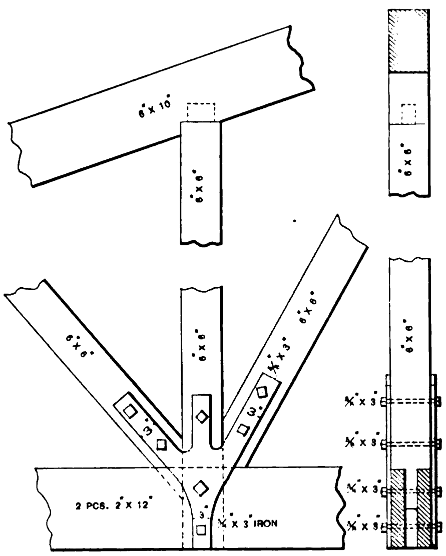


Fig. 4.—Details at C of Fig. 1.—Scale, ⅛ Inch to the Foot.

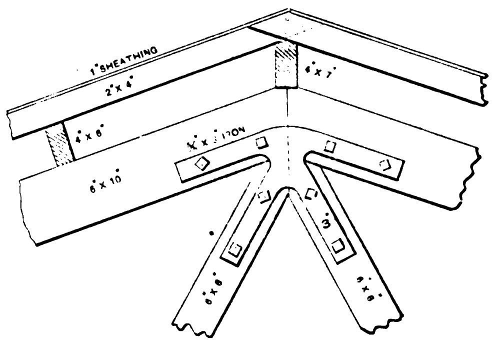


Fig. 5.—Details at D.—Scale, ⅛ Inch to the Foot.

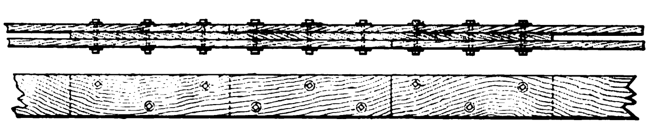


Fig. 6.—Chord Splice.—Scale, ¼ Inch to the Foot.

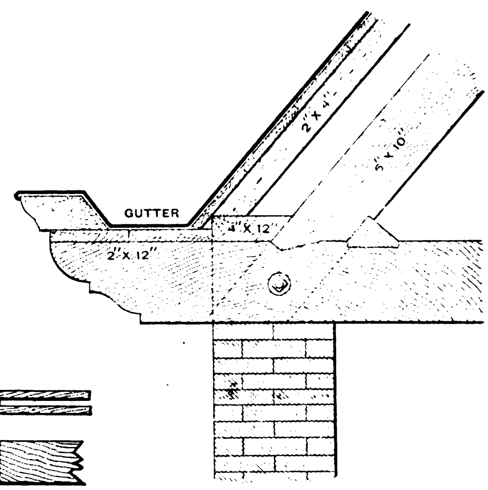


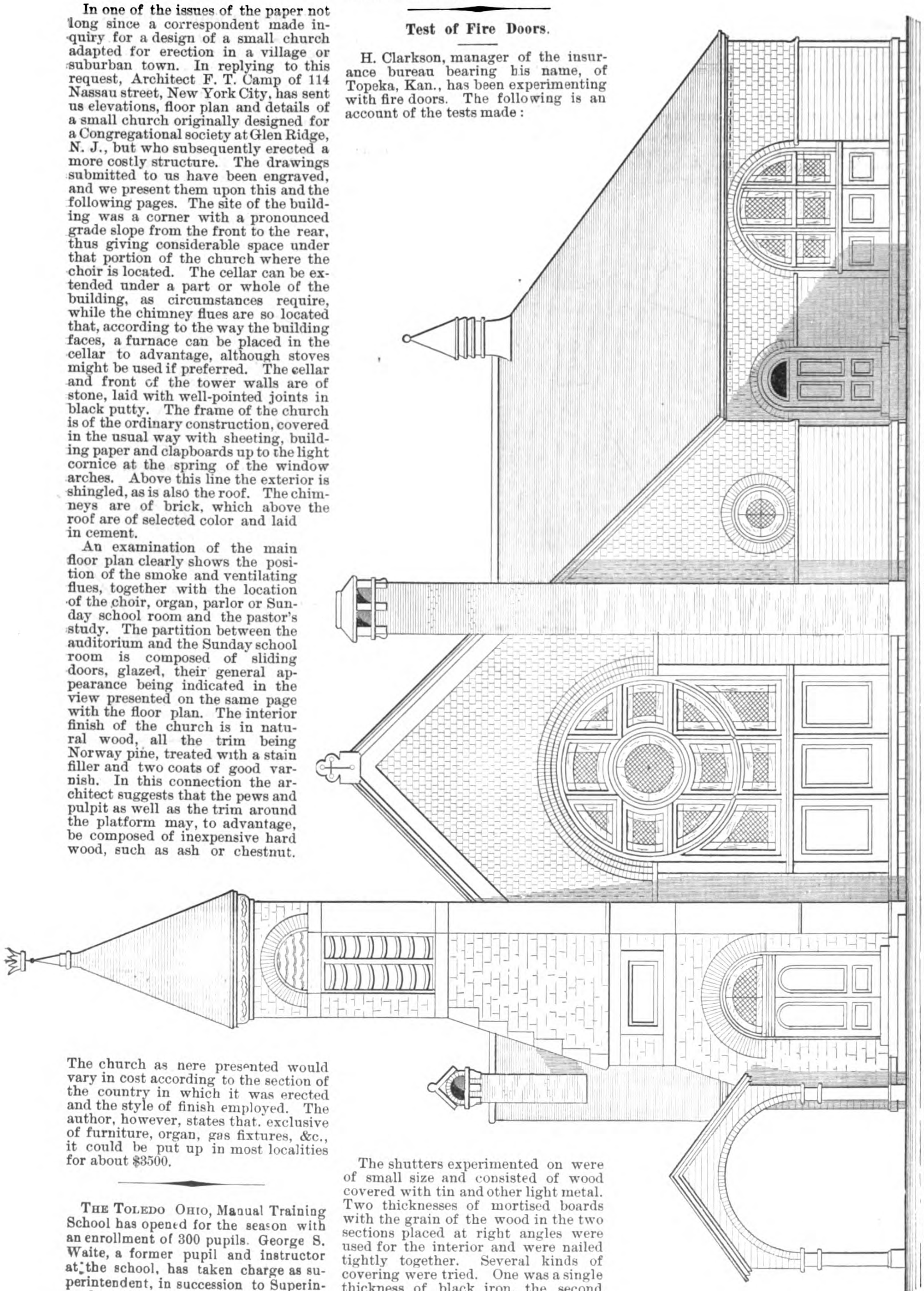
Fig. 7.—Section through Cornice and Gutter.—Scale, ⅛ Inch to the Foot.

Self Supporting Roof.—Method of Construction Suggested by "J. N. H."

Design for a Church.

In one of the issues of the paper not long since a correspondent made inquiry for a design of a small church adapted for erection in a village or suburban town. In replying to this request, Architect F. T. Camp of 114 Nassau street, New York City, has sent us elevations, floor plan and details of a small church originally designed for a Congregational society at Glen Ridge, N. J., but who subsequently erected a more costly structure. The drawings submitted to us have been engraved, and we present them upon this and the following pages. The site of the building was a corner with a pronounced grade slope from the front to the rear, thus giving considerable space under that portion of the church where the choir is located. The cellar can be extended under a part or whole of the building, as circumstances require, while the chimney flues are so located that, according to the way the building faces, a furnace can be placed in the cellar to advantage, although stoves might be used if preferred. The cellar and front of the tower walls are of stone, laid with well-pointed joints in black putty. The frame of the church is of the ordinary construction, covered in the usual way with sheeting, building paper and clapboards up to the light cornice at the spring of the window arches. Above this line the exterior is shingled, as is also the roof. The chimneys are of brick, which above the roof are of selected color and laid in cement.

An examination of the main floor plan clearly shows the position of the smoke and ventilating flues, together with the location of the choir, organ, parlor or Sunday school room and the pastor's study. The partition between the auditorium and the Sunday school room is composed of sliding doors, glazed, their general appearance being indicated in the view presented on the same page with the floor plan. The interior finish of the church is in natural wood, all the trim being Norway pine, treated with a stain filler and two coats of good varnish. In this connection the architect suggests that the pews and pulpit as well as the trim around the platform may, to advantage, be composed of inexpensive hard wood, such as ash or chestnut.



Design for a Church.—F. T. Camp, Architect, New York.—Front Elevation.—Scale, 1/8 Inch to the Foot.

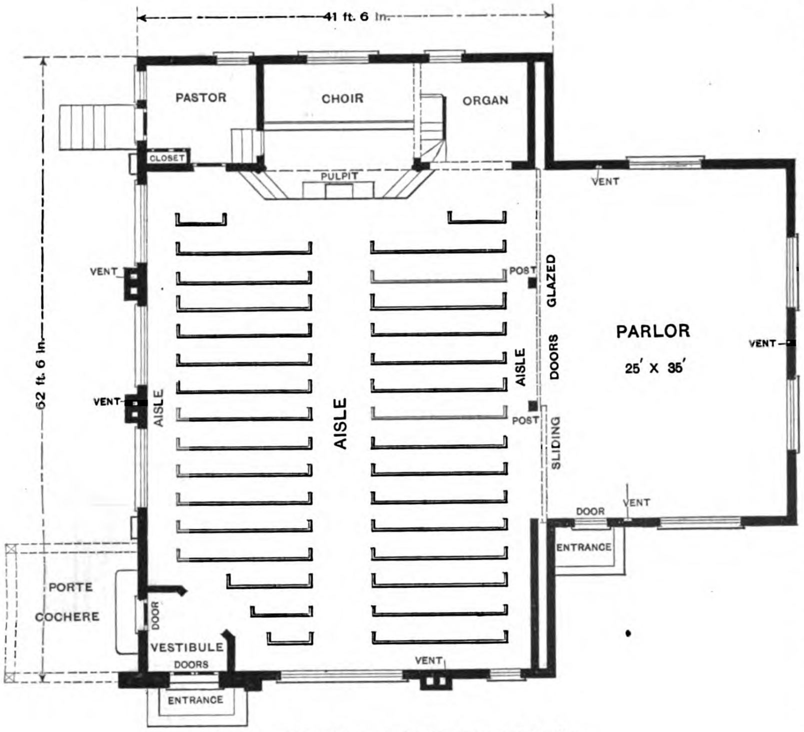
The church as nere presented would vary in cost according to the section of the country in which it was erected and the style of finish employed. The author, however, states that. exclusive of furniture, organ, gas fixtures, &c., it could be put up in most localities for about $3500.

THE TOLEDO OHIO, Manual Training School has opened for the season with an enrollment of 300 pupils. George S. Waite, a former pupil and instructor at the school, has taken charge as superintendent, in succession to Superintendent Mills, resigned. **Mr. Waite is said to be an enthusiastic advocate of manual training, to which he has devoted close study.**

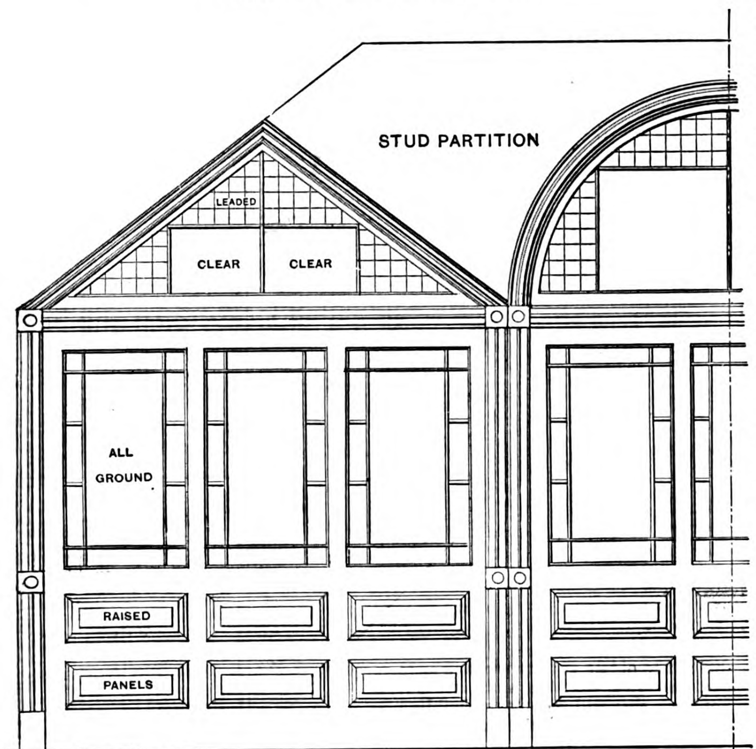
Test of Fire Doors.

H. Clarkson, manager of the insurance bureau bearing his name, of Topeka, Kan., has been experimenting with fire doors. The following is an account of the tests made :

The shutters experimented on were of small size and consisted of wood covered with tin and other light metal. Two thicknesses of mortised boards with the grain of the wood in the two sections placed at right angles were used for the interior and were nailed tightly together. Several kinds of covering were tried. One was a single thickness of black iron, the second **two thicknesses of galvanized iron, the third one thickness of tin, the fourth**



Floor Plan of Auditorium and Parlor.



Partition Between Auditorium and Parlor.

Design for a Church.—Floor Plan.—Scale, 1-16 Inch to the Foot.—Sectional View.—Scale, ¼ Inch to the Foot.

two thicknesses of tin, the fifth two thicknesses of tin lined with asbestos, and the sixth a single thickness of tin lined with asbestos.

The outer coverings were all made air tight and the nail heads covered. The sample shutters were put into an improvised furnace and subjected to a heat of 1600° for 45 minutes with very good results. All of the samples came out in good shape except one in which a layer of metal was placed between the wooden layers inside. The edges and corners of the others were in perfect form and were not warped out of shape. The wood inside was turned to perfect charcoal, but as it could get no air did not burn up.

The heat to which the samples were subjected is hotter than shutters would receive on a building, for there it would only be on one side.

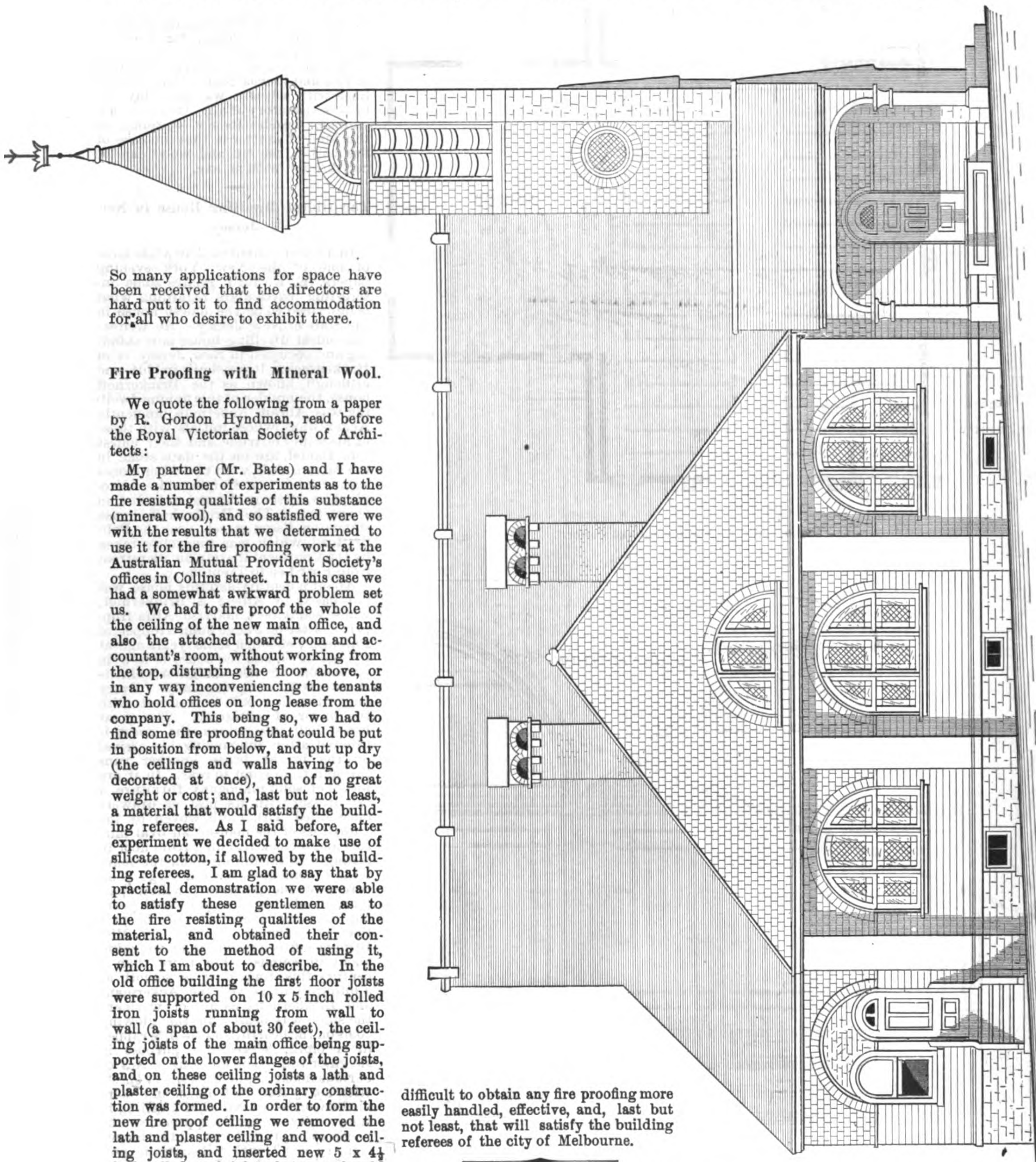
The samples were afterward sawed in two and it was found that the tin lined with asbestos was probably the most satisfactory of all. One great advantage, besides its not warping, in this kind of shutter is that in case of fire within, the tin and wood can be cut through with an axe.

The Oldest Dwelling House in New Jersey.

In a letter contributed to a late issue of one of the New York evening papers, E. K. Bird relates some interesting particulars regarding what is described to be the oldest house in the State of New Jersey. He writes: The oldest dwelling house now standing and occupied in New Jersey is in Hackensack. It was built in 1704, and although known as the Brinkerhoff house, the builder of this unique dwelling was Abram Ackerman (anciently Acker-Man), whose initials with those of his wife Gertrude and their eldest son, Daniel, are on the date stone in the eastern wall, with two other stones engraved in undecipherable hieroglyphics, by some claimed to be Indian characters. The Brinkerhoff house stands on Essex street, near the Polifly Road, which was the route taken by the Continental army on its retreat from Fort Lee to Trenton.

About a century ago this house was purchased by Albert A. Brinkerhoff, whose son Albert married Altia Hopper, a sister of Judge John Hopper of Paterson; she died some years ago at the age of 83, and the house is now in possession of her daughter, Hattie Brinkerhoff, a maiden lady. Every one of the 15 rooms is fragrant with the flavor of antiquity. The great broad hall into which the guest is ushered after announcing his arrival on the bright brass knocker runs through from front to rear. In it are pieces of solid mahogany furniture, a tall dresser with its nest of drawers once filled with cloth woven by the "mistress of the manse," an oval mirror, and a clock reaching from floor to ceiling. In the dining room the mantel is ornamented with a large soup tureen of the genuine "willow pattern," flanked by blue plates 250 years old. A curious memento of the past that is jealously guarded by Miss Brinkerhoff is a round stone weighing about 10 pounds. For more than a century this stone, now as smooth as a billiard ball, served the Ackermans and Brinkerhoffs as a foot warmer; the stone was heated in the glowing coals on the hearth, and then, wrapped in a cloth, served its purpose in sleigh or bed. The building is full of curious nooks, odd corners, oak chests with heavy iron fastenings, and commodious closets. No other dwelling in the vicinity so nearly approaches the poet's conception of "the old fashioned country seat" with "its antique portico." The poplars alone are wanting to complete the picture; but poplars do not live long in Bergen County, as Judge William Walter Phelps has demonstrated by faithful experiment on his Teaneck estate.

CALIFORNIA'S MIDWINTER FAIR gives promise of being a highly successful venture. Twenty-five nations have appointed commissioners and will be represented by important exhibits, and many of the most striking objects from the Chicago World's Fair are being transferred to Golden Gate Park. So many applications for space have been received that the directors are hard put to it to find accommodation for all who desire to exhibit there.



Design for a Church.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

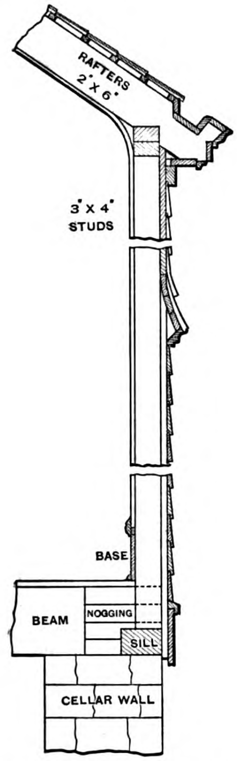
Fire Proofing with Mineral Wool.

We quote the following from a paper by R. Gordon Hyndman, read before the Royal Victorian Society of Architects:

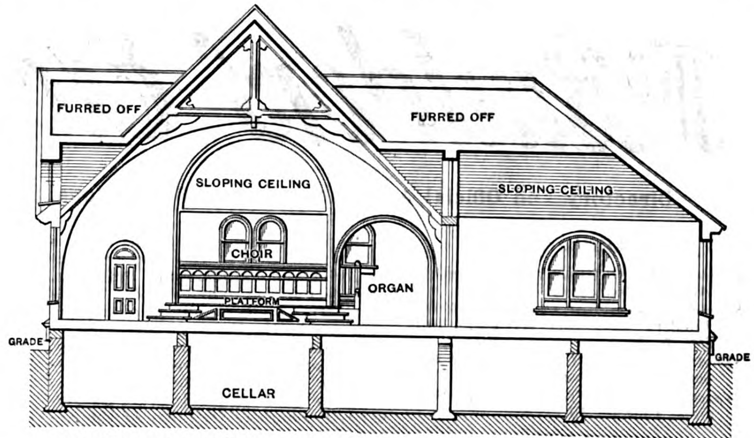
My partner (Mr. Bates) and I have made a number of experiments as to the fire resisting qualities of this substance (mineral wool), and so satisfied were we with the results that we determined to use it for the fire proofing work at the Australian Mutual Provident Society's offices in Collins street. In this case we had a somewhat awkward problem set us. We had to fire proof the whole of the ceiling of the new main office, and also the attached board room and accountant's room, without working from the top, disturbing the floor above, or in any way inconveniencing the tenants who hold offices on long lease from the company. This being so, we had to find some fire proofing that could be put in position from below, and put up dry (the ceilings and walls having to be decorated at once), and of no great weight or cost; and, last but not least, a material that would satisfy the building referees. As I said before, after experiment we decided to make use of silicate cotton, if allowed by the building referees. I am glad to say that by practical demonstration we were able to satisfy these gentlemen as to the fire resisting qualities of the material, and obtained their consent to the method of using it, which I am about to describe. In the old office building the first floor joists were supported on 10 x 5 inch rolled iron joists running from wall to wall (a span of about 30 feet), the ceiling joists of the main office being supported on the lower flanges of the joists, and on these ceiling joists a lath and plaster ceiling of the ordinary construction was formed. In order to form the new fire proof ceiling we removed the lath and plaster ceiling and wood ceiling joists, and inserted new 5 x 4½ inch rolled steel joists between the old 10 x 5 inch rolled iron joists, and carried the whole on a new set of girders, and then on the lower flanges below the iron and steel joists we placed buckled boiler plate, 3-16 inch, and in the space thus formed inserted a packing of the silicate cotton. The new ornamental ceiling below is formed of fibrous plaster. I do not for a moment suppose that as a fire resisting floor this iron and silicate cotton construction can compete with iron and coke concrete, or iron and terra cotta, as to effectiveness or price in ordinary cases; but I feel sure that, given conditions such as we had, you will find it difficult to obtain any fire proofing more easily handled, effective, and, last but not least, that will satisfy the building referees of the city of Melbourne.

BUILDINGS which architects plan for their clients are generally more practical than those which they plan for themselves or which they arrange in an ideal spirit, says a writer in an exchange. Floor plans which an architect makes in his office during the earlier years of his practice, when business is not pressing, are rarely as good as those which are developed with the assistance of a client. Especially is this true when the client is a little stubborn. Oftentimes the architect thinks he is unreasonable—that he is asking for the impossible—but, generally speaking, if he only insists he gets what he wants. Nothing pays so well as making your architect work—insisting on what you want.

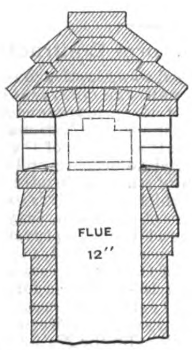
AN excellent way of painting furniture is to rub down the paint, and every coat of varnish or lacquer, as is done in carriage painting. The result is a beautifully smoothed polished surface, admirably adapted for drawing room furniture; it can then be gilded.



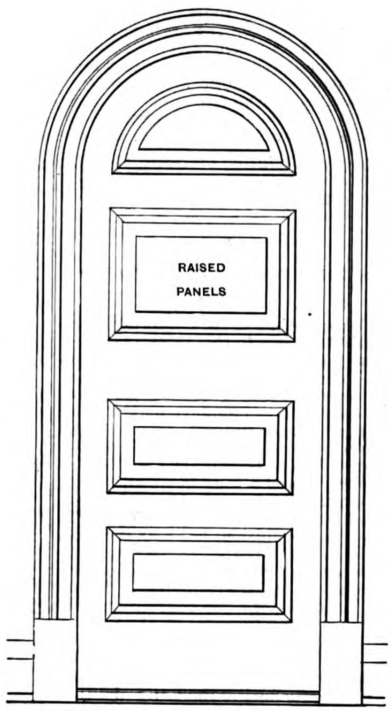
Section Through Wall.—Scale, ½ Inch to the Foot.



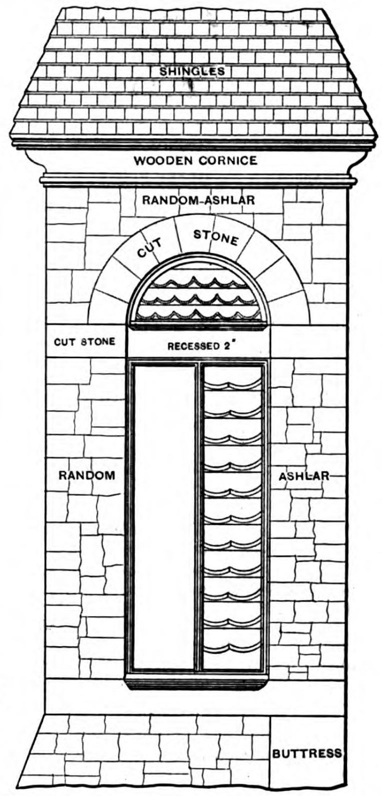
Cross Section through Auditorium and Church Parlor.—Scale, 1-16 Inch to the Foot.



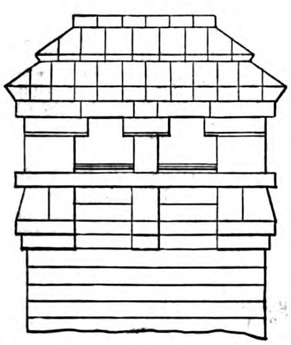
Section Through Chimney.—Scale, ½ Inch to the Foot.



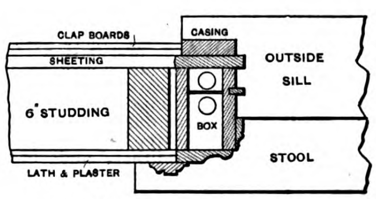
Detail of Doors and Trim.—Scale, ½ Inch to the Foot.



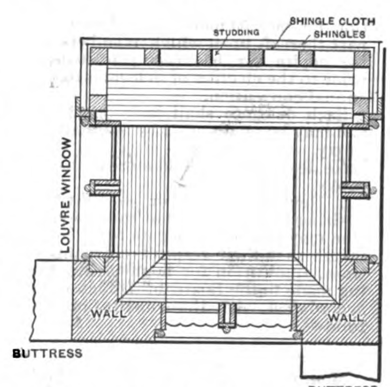
Elevation of Tower.—Scale, ¼ Inch to the Foot.



Chimney Top.—Scale, ½ Inch to the Foot.



Section through Window Frame.—Scale, 1 Inch to the Foot.



Plan of Tower at Bell Deck.—Scale, ¼ Inch to the Foot.

Miscellaneous Details of Church, Showing Constructive Features.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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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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Wilmington..... ... A. S. REED.
Worcester .... O. S. KENDALL.

The Eighth Convention.

CIRCULAR NO. 1.

The following is the first circular of the series relative to the coming convention to be issued from the office of the secretary.

To all Filial Bodies of The National Association of Builders:

The eighth annual convention will take place at Boston, Mass., beginning Tuesday, February 13, 1894.

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, upon which membership per capita tax has been paid 30 days prior to the election of delegates to the annual convention.

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

No delegate shall hold more than one proxy.

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 the delegates. These credentials must be upon the blank provided for the purpose by the National Association, and certified by the national secretary, a copy of which accompanies this notice.

Issued by order of the

EXECUTIVE COMMITTEE.

W. H. SAYWARD, Secretary.

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

Entertainment at Conventions.

The question of the entertainment of the delegates to the annual conventions has been the subject of more or less consideration by the National Association for several years past, and the consensus of opinion seems to show that a greater subordination of the entertainment features offered the delegates would be an act of wisdom. The warm and earnest hospitality with which the delegates have always been entertained must always exist, as a foregone conclusion, but many reasons point to the need of greater equality between the business of the convention and the entertainment. While the business of the convention has never yet been impeded by the various forms of entertainment that have been offered, it is the impression in the minds of many that too great importance is attached to the latter and that the work done at the conventions has suffered by comparison with the hospitality of the entertainers. Another considerable feature of the question is the expense attached to the entertainment of a convention on the scale that has existed in the past. Many of the smaller exchanges would be deterred from asking for a convention on the ground of expense alone, if the past lavishness in entertainment were maintained. Considering that the purpose of the conventions is first business and then social, great care should be exercised to adjust the two elements in their proper relationships to each other. It is exceedingly difficult to restrain the eagerness of the hosts to give their guests a "good time," and yet it is imperatively necessary to prevent possible ground for the feeling, by any one, that the "good time" is the primary object of the meeting.

It seems peculiarly fitting that the first step in this direction should be taken by the Boston Exchange. The National Association being born, as it were, in the Boston Exchange, it is particularly appropriate that a new mark should be set in such matters as need readjustment by this organization. Another reason why the Boston Exchange is unusually well fitted to be the first to act in this matter is because of its financial condition; it holds in its treasury at present sufficient funds to enable it to entertain the delegates and others attending the eighth convention much more lavishly than would in any case be wise, without asking the members individually for a single dollar. It is the purpose of the Boston Exchange to avoid large special entertainment features, such as have characterized the former conventions, and which have resulted in the individual delegate or visitor being lost sight of, and to arrange its offering of hospitality in such a way that greater social intercourse will be had and a more widespread feeling of personal acquaintanceship and fraternity among the delegates will result. Such preparations as are being made for entertainment will combine the experience of the past conventions and other large gatherings, and seem to promise very favorably for the end in view—*i. e.*, the establishment of the entertainment at conventions upon a basis which shall in no degree restrict the expression of hospitality, but which will in reality increase it, and which will place it in its proper relation to the business of the meeting, as well as in a form that will enable the expense attached to future entertainment to be materially reduced.

The Uniform Contract.

It is proposed to make the consideration of the uniform contract one of the features of the programme of the eighth convention of the National Association, and all members of the filial bodies are urged to prepare and place in the hands of their delegates such suggestions which from their experience in the use of the form, they consider would tend to its improvement. This discussion is intended to bring out the value of the form as evidenced by its use, and to secure the formulation of carefully considered suggestions to the committee on uniform contract; for action by the National Association can only be recommendatory, owing to the fact that the committee having the form in charge is part of a joint committee established by the American Institute of Architects and the National Association of Builders, and this joint committee only has power to amend or alter the contract.

Careful and immediate attention to this matter is urged upon every member of the filial bodies to the end that the discussion of the subject may be as thorough as possible.

To Members of Filial Bodies.

The work of the various committees of the National Association would be greatly facilitated if members of the local exchanges would present for consideration any suggestions that their experience may bring out as worthy of discussion. All the members of the filial bodies are earnestly urged to send to the National Secretary descriptions of practices and customs that need improvement, together with any suggestions thereupon, that they may be given to the proper committee or presented to the convention for action.

DOMESTIC ELECTRICAL WORK.*

By W. A. W.

SIMPLE BELL CIRCUIT.

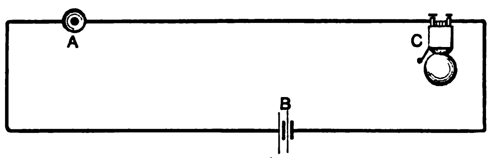
In writing on electrical work there will no doubt be those who, without giving the matter a second thought, will say, "What do we care about electrical work? That is entirely out of our line of business; we don't get paid for doing such work as that." But suppose we look at the matter in another light. Suppose we strive to gain all the knowledge we can, and apply it to our business, don't you believe we would stand a much better show of getting paid for something we are actually doing than something we have never attempted?

There are a great many towns and cities where there are no regular electricians who do this kind of work, and consequently no one could complain that you were encroaching on their calling, and even if you did, "self preservation is the first law of nature," and we might just as well look the matter square in the face.

The subject of domestic electrical work may appear to some as too intricate a thing for them ever to master, because electricity has for years been shrouded in a sort of mystery, but after once taking it up you will find it to be a comparatively simple thing, and the lay out a circuit in the shop, as shown in Fig. 1; it will give a better idea of the workings of an electric bell than any explanation can give.

A is the push button, B the battery and C the bell. Start from push button and connect a wire to each of the contact points, cutting the insulation from the ends of the wire for this purpose. Now run one of the wires to the bell and the other to the battery and connect with one of the connecting points on each. Connect another wire to opposite pole on battery and run direct to bell, connecting there with the other point. Press the button and the bell will do the rest. Do all the work on this general plan.

The next step is to go into actual work, and, as we are working from the bottom up, we will select an easy job, that of a new house in course of erection. Suppose Mr. A is building a house and you have succeeded in making clear to him the advantages of an electric over any other kind of bell (if you have he certainly has ordered one). The time to do the wiring for this job is when the house is boarded up and the partition studding set (before any lathing is done). Start in at the door where the push button is located.



Domestic Electrical Work.—Fig. 1.—Experimental Circuit in Shop.

writer will endeavor to avoid all technical expressions and use the simplest terms and explanations in his efforts to awaken interest in this kind of work.

In the first place, get the proper tools to do the work with. These will cost but a trifle and consist of the following: A good corner brace (not ratchet, they are too slow), several sizes of small bits, one 12 and one 24 inch twist point bell hangers, gimlet about ⅜-inch hole, combination handle with set of small tools, rat tail file, small screw driver, flat chisel for taking up floors, medium sized hammer, keyhole saw, about 20 feet of flat steel spring wire for fishing purposes, 10 inches of No. 19 double jack chain, double pointed tacks, and an assortment of insulated wire, prices and descriptions of which will be found in any electrical house goods catalogue.

Next procure supplies, which consist for ordinary bell work of 8-inch bells, No. 18 annunciator wire, a roll of rubber tape, push buttons and open circuit batteries. A technical description of batteries is here unnecessary, as we buy them all complete and ready to set up. They are composed of a rod of zinc (negative pole) and a cylinder or strips of carbon or porous cup filled with this material (positive pole), and 5 ounces of sal ammoniac dissolved (preferably) in soft water. The writer, however, prefers a battery having a large carbon surface without the porous cup. The direction of the current cuts no figure in this kind of work, so all you have to do is to connect the opposite ends of the circuit to the opposite poles of the battery and the circuit is complete. On receiving the supplies, if you are a novice, it is well to Bore a ½-inch hole through the door casing, about 30 inches up from door sill and at such an angle that the bit will come out behind the lath. Now from the cellar bore a hole that will bring the bit out behind the lath. Next locate the battery, which should be placed in the basement, unless it is excessively wet, in which case any other location, not too dry, may be selected. Where 12-inch joist are used all that is necessary is to nail a piece of board across two of them and set the battery on it.

The bell should be located so that it can be heard in any part of the house, and is usually fastened to a door casing. Bore a hole through the floor between the studding, drive a tenpenny nail where bell is to be fastened, allowing a foot or so of slack wire at the end by wrapping it about the nail. Run one wire from this point down through the hole previously bored through the floor into the basement, thence to door where the push button is located. Drive a nail beside the hole where push is to go and wrap about the same amount of slack wire around it that you did at the bell. Run a wire from push button to where the battery is placed, and do the same thing from the bell. The wiring for this job is now done and all that remains when the house is finished is to put up the bell, battery and push button. In putting up the bell do not cut off the slack ends of wire, but straighten them out smooth and wrap them like a spiral spring around a lead pencil. Bare the ends of the wire about ¾ inch and scrape clean and connect with binding posts on bell. This leaves all the slack wire for future emergencies and looks much better than a straight wire connection.

At the push button the wire cannot be coiled as at the bell, therefore simply bare the ends of the wire and scrape clean. Make the connection and push the slack wire back into the hole and fasten up the push. Prepare the battery according to the directions that will be found on each bell. To get a good clear ring out of the bell use two cells of the battery for an ordinary house circuit. Connect the wire from the push to the zinc we will say, though either will do. Coil up a short piece of wire and connect one end to the carbon of the same cell, the other end to the zinc of next cell, and connect the wire from the bell to the carbon of the last cell. The job is now complete and the bell should ring sharp and clear.

(*To be continued.*)

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Hot Air Heating.

In discussing the subject of hot-air heating, and the growing interest that has been taken in the matter by architects, a writer well informed upon all phases of the heating question says:

Some one once asked when the training of a child should begin, and the reply of the sage was: "One hundred years before the child is born." Possibly the training of an architect should begin at the remote period indicated if he is to properly fill his important position, but as that is impossible it is pleasing to note that at the present time in some of our modern universities there are classes in architecture who are giving attention not only to the construction of buildings, but also to the heating of the same by the modern systems. The interest in this branch of their work was recently shown by the class in architecture of the University of Illinois, at Champaign, by inviting one of Chicago's leading architects to address them on the subject. The lecture, an illustrated one, was received by the class with marked attention, and has been recently published and excited no little interest. While treating of all kinds of modern heating in an intelligent manner, that portion devoted to the consideration of furnace heat deserves much praise, as it is rarely that hot-air heating is so ably discussed.

Much has been written and said on hot-water and steam heating, and it is not difficult to place one's hands upon valuable data on these modes of heating, but until very recently it was next to impossible to find anything definite or practical on hot-air heating. There was much theory but few facts to be found in print, and this has had an important bearing on the future of the hot-air furnace, for the architect, not finding anything printed in defense of the much maligned hot-air furnace, has joined hands with the steam and water men in abusing it, and in consequence many clients who looked with favor upon furnace heat were induced to use other systems.

The influence of the architect is usually sufficient to compel the use of such appliances as he may specify, and it is but natural that the client who has placed himself in an architect's hands should follow his advice, for does not the architect know everything about building? He certainly should, according to the ideas of many clients. He should be posted upon the merits of all the different materials that enter into the construction of a building, and should be able to tell at a glance the size, weight and brand of tin plate in a furnace pipe whenever he sees it.

Contractors who do business with architects know the limitations of the knowledge of the latter, and know that with the different things on an architect's mind he cannot be an absolute master of the details of all branches of the building trades, but knowing his influence they should persistently bring the merits of hot air heating to his attention, and work for his co-operation in advancing the future of the hot-air furnace. He can do not a little to increase the sales of furnaces, and would advocate hot-air heating did he know its advantages in many cases over any other system in use.

INTERESTING THE CONTRACTOR OR BUILDER.

In many places the carpenter combines in himself the profession of architect and builder, and not only furnishes the plans and specifications, but undertakes the entire contract for the structure, and hence is an important factor in discussing the furnace business. In fact, in most towns it would pay the furnaceman to keep on intimate terms with the personage referred to, and not allow an opportunity to pass of putting in a word in advocacy of the hot-air furnace. By instilling certain fundamental truths about hot-air heating into the mind of Mr. Builder he is gradually awakened to the importance of having improved heating in houses which he plans and erects, and he will soon be talking furnace to his clients, with the usual result, an increase in the furnace business.

It is through the country architect, contractor and builder (combined) that we must accomplish an object for which the furnaceman has long striven, and that is the incorporation into the plans and specifications of every house of adequate provisions for the heating, which shall include in the carpenter's contract the proper channels for the concealed pipes and also for the registers and boxes. The practical builder must surely see the necessity for this, as much better and more economical building will result than if the channels are cut after all partitions have been set. I have spoken of this in another place, and have written various articles on the subject at different times with the hope that dealers would take up this matter with the architects and builders, and effect the much desired improvement, and have reason to believe that an improvement will result.

STOCK PLANS FOR HOUSES.

In conversation with contractors and builders I find that the great majority of them use stock plans for their houses, making such alterations as their customers may desire, and it has occurred to me that dealers could advance their interests by making estimates for builders of the cost of heating the most popular of these stock houses, which builders could have at their hands when talking to their clients. These estimates would be approximate, of course, but with a full line of furnaces, such as are now made by a number of concerns, the dealer could make his estimates elastic enough to cover both the cheaper and better grades of furnaces, with a variety of finishes in the registers and other materials used.

The average builder is a progressive fellow and does not wish to move along in the same groove year after year, and if his attention is directed to hot air heating and its adaptability to the modern home or building I incline to think that he will show a disposition to investigate the subject closely, and dealers will do well to place all possible information in his hands and aid him to the best of their ability. Hot air is the heat for the average dwelling, store, church or schoolhouse, and the dealer should state this fact in no uncertain tones, and especially when the advocates of other forms of heating are pushing their wares so vigorously.

A Moorish Pavilion

A handsome pavilion of the Moorish style of architecture has been built on the shores of Great Salt Lake, 12 miles west of Salt Lake City, Utah, it being designed as a bathing resort for the inhabitants and visitors of the place named. Owing to the shallowness of the water it was necessary to locate the buildings some 4000 feet from the shore, to which they are connected by a pile bridge over which the trains run, landing passengers directly at the pavilion. The building is of steel, resting on piles of cedar driven 8 feet into the bottom of the lake, and which are rendered secure by the solidifying action of the sulphate of soda, into which they were driven. The building is a two story structure, the first story being occupied by a lunch room about 143 x 251 feet in size, while the second story is designed for a dancing hall to accommodate about 1000 couples. This hall is about 118 x 251 feet in size, surrounded by a wide passage for spectators. The bath houses, of which there are 620 in number, are located in curved wings branching out from the sides of the main building lakeward. The baths are to be 9 feet above the water, and are supplied with fresh water pumped from artesian wells on the shore. The total length of the building with wings is 1114 feet and total width 225 feet. The entire resort is lighted by electricity, furnished by its own plant. The structure was built by Salt Lake capital and workmen, operations being started February 1 and completed a short while ago. The cost was $200,000, R. Kletting of Salt Lake City being the architect.

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JACQUES VANDERBEEK, Architect.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

FEBRUARY, 1894.

Boston's New Music Hall.

If the music hall which it is proposed to erect in the near future in the city of Boston is constructed according to the model recently exhibited the Hub will be able to boast a structure of which it may well be proud. It was designed by an architect who not long ago visited Europe and inspected the music halls of the Continent with a view to incorporating their best features in the plan. In its architecture it will resemble the music halls of Vienna and Leipsic, which are generally regarded as among the most elegant of the present time. The stage, semicircular in form, will measure 72 feet in width and 30 feet in depth at the end, rising in concentric steps from the front. It will be inclosed by a segmental arch and half dome, and beyond this the proscenium arch is not flat, but opens like the mouth of a trumpet. The seats are arranged so that the view of the stage from each is unobstructed. The striking feature of the architectural plan is the "ambulatory," a corridor which follows the curves of the rising seats, passing under them and terminating in two lobbies on either side nearly opposite the extremities of the stage. All the stairways from entrances, exits, closets, cloak and smoking rooms, &c., connect with this corridor, which when completed will be ornamented with statuary. The actual seating capacity of the house is said to be 2500, and the hall will be ready for public performances some time next year.

Heating by Electricity.

If electric heating ever comes into general use, of which there is at present no immediate prospect, notwithstanding in special applications it has been successful, the predictions of those who have enthusiastically portrayed its possible advantages over other systems may even in that case lack fulfillment. It is true that many of the exacting problems which now confront heating engineers in the use of warm air, hot water and steam as a vehicle for the transfer of heat will no longer need consideration, but analagous problems will be presented, and some new ones will be met with that perhaps will give as much trouble or more than the old ones; while many of the old ones will remain almost in their present form, being independent of the medium employed for conveyance of heat from a generator to any part of a building.

Ventilation.

No matter what system of heating may be employed the problems in ventilation which must be considered in connection with it will remain unaltered. For instance, an electric resistance coil may supplant the steam or hot water radiator now in use for indirect heating; but in any form the new appliance may assume the problem of getting the requisite quantity of air to and through it, and thence conveying the warm air into the space to be warmed and ventilated, will remain in all essentials what it is now, requiring the same special attention for each case, in order that all the conditions favoring or resisting flow of air for such particular case be taken into account and provided for. If the electric heating of buildings ever becomes a widely used system, the present problems relating to size, pitch and support of pipes in hot water and steam heating will not come in, but other and new problems related to the size of conductors and their safe employment will take their place, while the old ones concerned with amount of heating surface necessary for any building, and the proper distribution of the surface to secure desired effects, will not be materially altered. Heating and ventilating will, therefore, continue to be a special branch of engineering, just as they are at present. Electric engineering will be divided up into distinct branches, in the same way that steam engineering now is, and the same process of specializing that has separated marine engineering, locomotive engineering and steam heating from the design and manufacture of stationary steam engines, will inevitably differentiate the manufacture and erection of electrical appliances into separate departments. Only through such a separation can continued progress in the arts be expected, as is proved by the history of the last few decades.

The Builders' Convention.

The coming convention of the National Association of Builders promises to be one of the most important in the history of the organization. The programme presented elsewhere gives an indication of the volume and character of the work which will be performed, and establishes the fact that the convention must result in great benefit to its constituent bodies and to builders generally. It is the purpose of the organization which will entertain the delegates and visitors to the convention to so adjust its entertainment that it shall be subordinate to the business of the meeting and shall in no wise be permitted to interfere with the fullest attendance at the various sessions. Every precaution has been taken to insure each delegate having an escort during his stay in the convention city, and every effort will be made to have the visitors as well as the regular delegates attend first to the business of the convention, and then to sight seeing and recreation. A new plan has been adopted whereby the reports from filial bodies may receive more than usual consideration before they are presented for discussion. All reports of this character will be printed and distributed on the first day of the meeting, and discussion thereupon will come on the second day, thus giving ample opportunity for every delegate to carefully examine the report from the other filial bodies in the organization before participating in the discussion. The consideration of the Uniform Contract is brought forward for the purpose of establishing in the minds of the builders of the country the benefit that the document has conferred upon members of the fraternity, whether or not they are connected with the exchanges which belong to the national body.

Colonel Wright's Address.

On the afternoon of the second day, Hon. Carroll D. Wright, United States Commissioner of the Department of Labor, will deliver an address on the "Relations of Employer and Workman." There is no man in the country, perhaps, who is more familiar with this subject than Colonel Wright, and his address will doubtless prove a valuable addition to the work of the National Association of Builders in this particular. The discussion based upon Colonel Wright's address looking to the improvement of the permanent "Form of Arbitration" will do much toward establishing in the minds of the employers and workmen of the country the singleness of purpose of the national body, and of the non-partisan spirit in which it has been the custom to handle this subject. The welfare of the workman is quite as important to the national organization as is that of his employer, for without satisfactory relations between the two the condition of the latter is in constant jeopardy.

Leakage of Air.

The porosity of walls and the vast amount of leakage around door and window frames are seldom appreciated by those who talk of stagnant air. Experiments with ordinary windows have made evident a leakage of eight cubic feet per minute while the passage of air through apparently tight walls has been frequently shown by experiment. In one instance a room supplied with hot air from an ordinary hot air furnace was tightly closed. The fire place was stopped up, windows were packed with rubber molding and the door shut. The wood work was shellaced and the brick work oiled. A measurement of the air volume entering showed that it was nearly equal to that when the doors were open. If the air entered it was obvious that it must escape somewhere. A second experiment was made after five coats of paint had been put on the walls and ceiling and three coats on the floor. Still the air entered through the register in large quantities, in fact its volume was only 20 per cent. less than in the former case. Such wholesale leakage readily explains the cause of low temperatures in exposed rooms on windy days, for the outside air pressure exceeds that within and the cold air actually leaks through the walls. Surprise is sometimes expressed that in many instances no vent flues are provided when the blower system is installed. This is particularly true of manufactories, offices and stores. Nevertheless, a volume of air sufficient to change the entire cubic contents once in 10 to 12 minutes is frequently supplied in such buildings and escapes only through walls and crevices.

Geology and Building.

If we look to the early history of the most ancient nations we find that the art of building has attended the first advance of civilization, and the use of worked stone has succeeded to caves in rocks and the rude wicker or earth work of their common and early structures, but the conversion of stone to the increasing artificial wants of society was necessarily consequent on the advance of the mechanical arts before it could be shaped and applied. How interesting are the first though rude efforts displaying practical geology, says the London *Architect*. The bold and noble monuments of the early ages show the natural vigor of the human mind untutored in the mechanical skill and art of later times. The stupendous monolithal structures and those early sepulchral monuments known as cromlechs, cairns and moats, which abound throughout Western Europe, were doubtless the work of a people who, taking nature for their guide, by prodigious labor raised and put together, and frequently conveyed to great distances for the erection of their monuments, the immense stones which, detached from their native beds, were distributed over the surface of the country. Most of those stones are of the primary and crystalline class of rocks, which from their hardness have resisted the violence of that disturbing power which removed them from their mass and afford us a good knowledge of their enduring quality. Moreover, the originality and boldness of their application resulted from minds familiar with nature's works and untaught in the arts which, in after ages, accomplished by skill and the use of smaller sized materials what the early ages unskilled in building could alone express by the magnitude of the stones. Let us consider the more advanced history of the principal nations of the earth, and we shall find that geology has received great consideration. The architects and sculptors of Greece and Rome knew the qualities of their materials, and if we may judge from ancient writers and existing remains, gave considerable attention to them, abounding as those countries did in good materials. In the writings of Vitruvius on Roman architecture the most particular rules are laid down with regard to the selection and use of building stones and the cements employed with them. How important are the results of their influence on society. If Egypt, Greece and Rome had had their principal structures of a perishable material, what would we not have lost? What interest would we now feel in those countries, or how could we have derived the great advantages which have flowed from them? Good materials and a right knowledge in using them have, however, produced a different result; and again, what do not those countries owe to the durability of their structures, conceived as they have been in a noble spirit? Without them Rome of the present day would be unvisited by the countless thousands whose wealth now enriches her; without her buildings the classic shores of Greece would gain less of European sympathy; nor would the dusky inhabitants of Egypt occupy such interesting ground but from the remains of the stupendous and imperishable monuments of her past history. Our own kingdom also possesses proud memorials in the enduring monuments of the Middle Ages. These indelible landmarks of his early home the traveler finds deeply implanted in his mind, and it is difficult for us to estimate their effect on society in the attachment they cause to our laws and institutions. Nor do those venerated and bold structures fail to excite a powerful feeling in the inhabitants of the New World, who, though born in a distant land, contemplate with pride and fervent admiration the works of their progenitors. But the edifices of centuries past, many of which, even in their dismantled state, have withstood the destructive violence of the elements, will yet outlive very many of the most costly structures of the present day, and until a very recent period so comparatively few were the buildings calculated to endure to any distant period that future ages, judging by our public structures, will look upon the people of the present time as a degenerate race, and in the erections of centuries back will contemplate the finest and most durable monuments of architectural skill.

Horizontal and Perpendicular Effects.

It is curious how differently we are impressed by expansion in the horizontal and expansion in the perpendicular plane, says an exchange. Take a section of Holland spread out horizontally before the eye, 4 or 5 miles in length and 1 or 2 in breadth, and it is but a flat, unimpressive plain. But elevate this small, unimpressive parallelogram of land to an angle of 60° with the horizon, and it becomes the most sublime of natural objects; it surpasses Mont Blanc—it is the side of Chimborazo. Set it on edge and it would overwhelm the beholder with its sublimity. It would be the Himalaya Mountains cut down from their dizziest peak to the level of the ocean —a precipice so sublime that the mind would shrink in terror from its very recollection. Now, why does this section of land, which would be but a small portion of the extent of flat plain under the eye, at once from any little elevation, such as a dike or a church tower in this country, pass from the unimpressive through the beautiful, the grand, to the utmost sublime, by mathematical steps, one may say, and according to its angle of elevation? The only solution of this fact in the sublimity of natural objects is that terror is not, as has been assumed by Burke and our greatest philosophers, the cause of the impression of sublimity in the human mind. Terror must be the effect of the sublime, not its cause, source or principle. In this supposed instance of the sublime in nature, power is evidently the cause of that impression— the intuitive mental perception that great unknown power has been exerted to produce this sublime object. It is the feeling or impression of this vast power which produces that feeling of terror allied with and considered the cause, although in fact only the effect, of the sublime. This impression of power received from any great and rare deviation from the usual makes the perpendicular more sublime than the horizontal, the Gothic cathedral than the Grecian temple, the mountain than the plain, the cataract than the lake, the storm than the calm. Unusual vastness, such as the great extent of flat country seen from any of the church towers in Holland, is also an expression of power and is not without its grandeur; but it never reaches the sublime, because the mind, accustomed to the sight of extension developed horizontally, perceives not the principle of power in it at once. This sentiment of power may possibly have something to do even with our impression of the beautiful in natural objects. The waved line—Hogarth's line of beauty—is agreeable, and the angular, broken or jagged line the contrary, because the one expresses a continuity of power in its formation, the other a disturbance or break in the action of the forming power. The latter would reach the sublime if the disturbance or break were on a great scale, indicating vastness of power.

Influence of Italian Architecture.

In the fifteenth century such was the reverence of men for the revived works of ancient literature and science that the profession of the Italians that they had restored ancient classical architecture on the precepts of an architect of the Augustan age was sufficient to open the way for them all over civilized Europe. In the course of that and the following century Italian architecture, says a writer in the *Architect*, was adopted and Italian architects employed in France, Spain, Germany, Great Britain and their respective dependencies, and now in the nineteenth century Vitruvius and Palladio are as predominant on the shores of the Baltic as on those of the Mediterranean Sea, though in this country and in some parts of the Continent their influence is considerably diminished since the time of Inigo Jones and Claude Perrault. The Cinquecento was later in gaining a footing here than on the Continent, in consequence of the existence of a beautiful national style of architecture, which our ancestors do not appear to have been induced to resign to the barbarian innovators of the South as readily as the interjacent nations were to give up theirs, for which indeed the reason exists in the greater attractions of ours and the consequent greater difficulty of inducing the nation to part with it. The French, though they received the Vitruvian architecture from the Italians, were patriotic enough, as soon as they had acquired its principles, to confine the practice of it almost entirely to native architects, in whose hands it assumed a different character from that which it possessed in Italy and became what may be called the French style of Cinquecento. Its ecclesiastical structures are less faulty than are those of the corresponding period in Italy, but its secular edifices are far inferior to those of that country. The grand palatial style, which is exemplified in the Farnese Palace in Rome, never found its way into France.

A SUBURBAN RESIDENCE.

A COMMODIOUS and conveniently arranged dwelling, suitable for erection upon a suburban lot, is that presented this month by means of the accompanying illustrations and our supplemental plate. The house was built something like a year ago for the Hon. A. W. Kimmell, from drawings made by E. M. Lockard, architect, of Indiana, Pa. The dwelling, it will be seen, contains ten rooms, and possesses features of arrangement which cannot fail to interest a large class among the readers of this journal. A wide hall runs nearly through the house, giving communication from the kitchen without the necessity of passing a lavatory fitted with basin and closet. From the architect's specification we learn that the building has a cellar extending under the whole area and 6½ feet deep in the clear. It is walled with flat quarry stone and is finished above grade with rock faced ashlar in courses. The cellar contains storage, vegetable, laundry and furnace rooms. The sills of the house are of oak 6 x 10 inches, the balance of the framing lumber being No. 1 hemlock. The first and second floor joists are 2 x 10 inches, the attic joists 2 x 8 inches, all set 16 inches on centers; the studding 2 x 4 x 20, also 16 inches on centers and doubled at all angles and openings.

The interior of the house is floored with poplar, having 2 x 2½ inch face. The hall, parlor, library and dining room are finished with red oak, natural state, the effect being produced by varnishing and then rubbing down with pumice stone and water. The balance of the interior finish, including the doors, is of selected North Carolina white pine in the natural color. The sliding blinds throughout the house are in woods to match the other wood work. The parlor has a slate mantel with tile hearth and is fitted for natural gas. The dining room has a wood mantel with mirror, tile hearth and facings, while the library has a

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

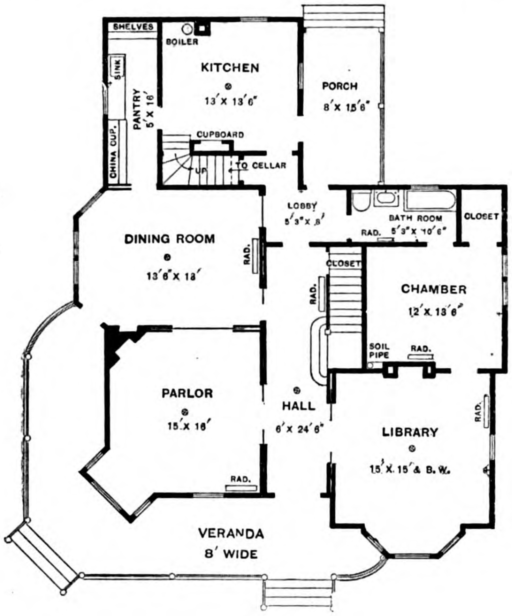
A Suburban Residence.—E. M. Lockard, Architect, Indiana, Penn.

through any of the principal rooms on the main floor. At the left of the hall are parlor and dining room, the latter communicating with the kitchen through a conveniently arranged pantry of good size. A feature which will commend itself to a great many is found in the sleeping room on the main floor communicating with the library at the front and the bathroom in the rear. The bathroom is also accessible from the lobby, just in the rear of the main hall. On the second floor are five sleeping rooms of large size, each provided with a commodious closet, while one chamber has opening from it a dressing room. Upon this floor is also

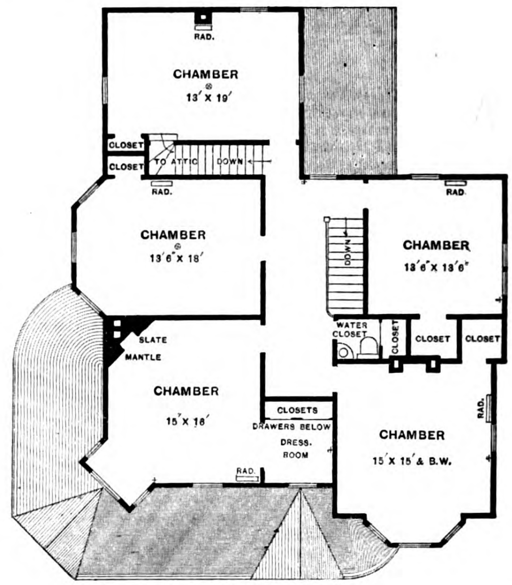
The valley rafters are 3 x 7 inches and the main rafters 2 x 6 inches, set 16 inches on centers. The first story is 10 feet in the clear and the second 9 feet. The entire building is sheeted with hemlock flooring, laid tight and covered with Empire sheeting paper, over which is placed clear yellow poplar siding. The gables are shingled as indicated in the drawings. The roof is covered with 18-inch black Bangor slate, laid with 3-inch cover. The ridge crestings are of galvanized iron. The exterior of the house is painted with three coats of lead and oil in a light olive shade with dark green trimmings.

slate mantel and tile hearth. It will be seen from an inspection of the floor plans that there is a slate mantel in one of the front sleeping rooms, while the other has a wood mantel and tile hearth, all fitted for using natural gas as a fuel. The bathroom is complete in its fittings, and has hot and cold water.

In addition to the grates above referred to, the house is fitted with a steam heating plant, the Florida boiler using natural gas as fuel. The house is finished in a first class manner throughout, and cost completed, we are informed, a little less than $5000.



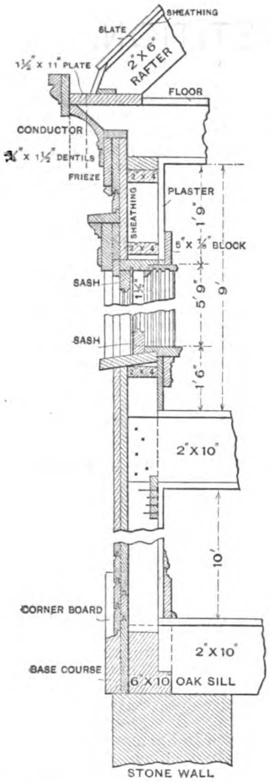
First Floor.



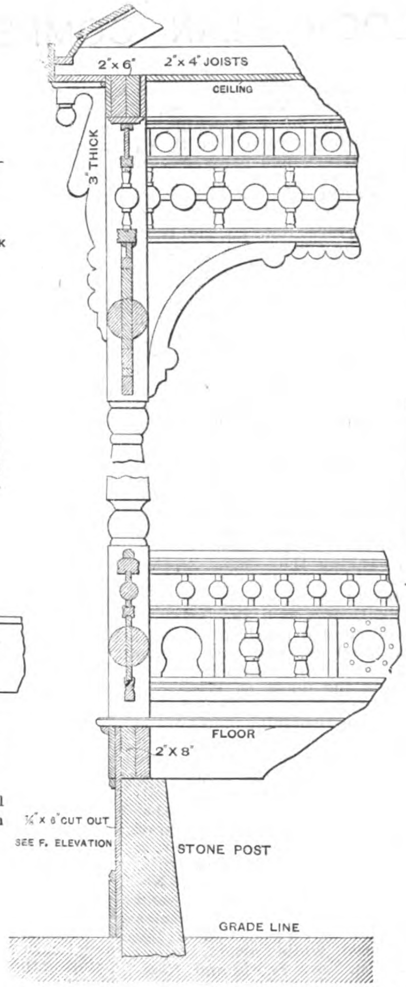
Second Floor.

Side (Left) Elevation.

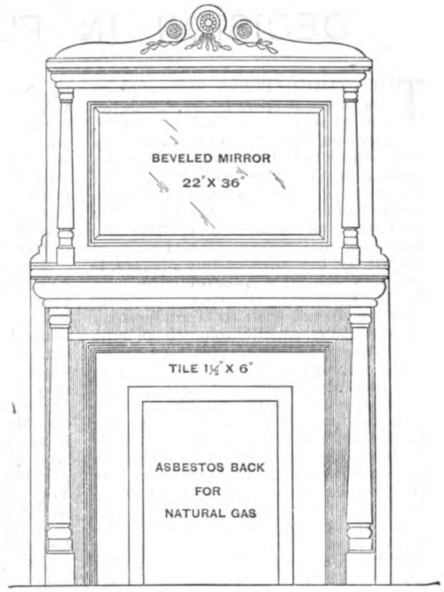
A Suburban Residence.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Elevation.—Scale, ⅛ Inch to the Foot.



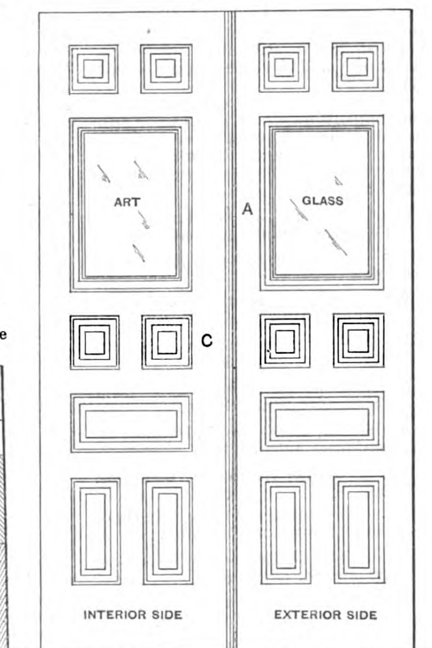
Section through Main Wall and Cornice.—Scale, ½ Inch to the Foot.



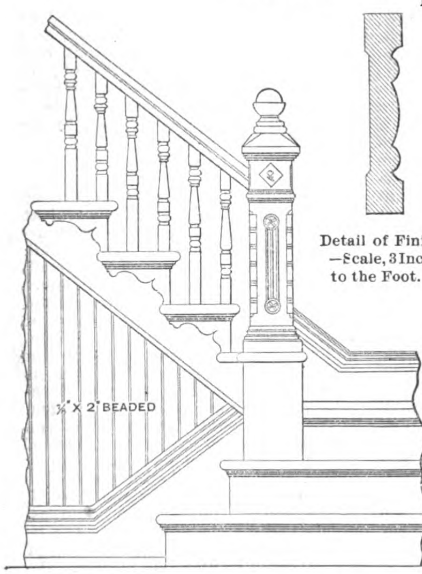
Detail of Porch and Cornice.—Scale, ½ Inch to the Foot.



Dining Room Mantel.—Scale, ½ Inch to the Foot.



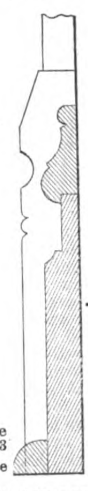
Detail of Front Doors.—Scale, ½ Inch to the Foot.



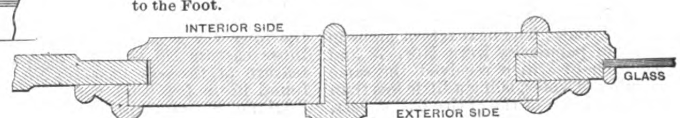
Detail of Main Stairs.—Scale, ½ Inch to the Foot.

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

Section of Inside Doors.—Scale, 3 Inches to the Foot.



Detail of Base and Plinth Block.—Scale, 3 Inches to the Foot.



Section through Doors at A and C.—Scale, 3 Inches to the Foot.

Miscellaneous Details of a Suburban Residence.

DECISION IN FLOOR PLAN COMPETITION.

THE COMPETITION in floor plans for an eight-room house, the decision in which is announced below, has been one of the most interesting ever conducted under the auspices of a trade journal. The voting has been of the most spirited character and the number of ballots cast largely in excess of those in any similar competition we have ever undertaken. The result, as shown by the votes of our readers, is one of which the winners of prizes may be justly proud, although in saying this we do not wish to be understood as reflecting at all upon those who were unsuccessful competitors. The plans submitted in this competition and presented in our last issue were of such a satisfactory character that, judging from the resulting votes and the letters received, there was considerable difficulty on the part of readers in deciding which particular set was the best, and therefore entitled to the first prize.

An accurate count of the ballots received up to the close of business on Monday, January 22, shows the first prize of $50 to be awarded to the set of plans designated as No. 2 and contributed by Frank J. Grodavent, No. 514 Equitable Building, Denver, Col.; the second prize of $30 to the set of plans known as No. 83 and submitted by F. E. Skeel of East End, Ohio, and the third prize of $20 to the set of plans marked No. 5, submitted by Oscar Knox of No. 821 Greene avenue, Brooklyn, N. Y.

The following is a complete list of the competitors whose plans were published in the January issue of the paper, together with the numbers by which the various sets were designated:

No. 2.—Frank J. Grodavent, 514 Equitable Building, Denver, Col.

No. 83.—F. E. Skeel, East End, Ohio.

No. 5.—Oscar Knox, 821 Greene avenue, Brooklyn, N. Y.

No. 78.—John P. Kingston, 518 Main street, Worcester, Mass.

No. 65.—J. E. Olmsted, 97 Bay street, Hamilton, Ontario.

No. 66.—J. A. O'Connor, 50 Tweedle Building, Albany, N. Y.

No. 94.—Silas W. Smith, Durango, Col.

No. 48.—George E. Gilbey, 824 Bank street, New London, Conn.

No. 46.—F. G. Lempe, 4427 Lavadie avenue, St. Louis, Mo.

No. 11.—Charles Schaefer, Jr., 1573 Avenue A, New York City.

No. 63.—E. A. Payne, Carthage, Ill.

No. 38.—William MacDonald, Stapleton, Staten Island, N. Y.

Of the entire vote cast, No. 2, the winner of the first prize, received 15⅜ per cent. The contest for second and third places was very sharp and spirited and the votes cast for the winners of these prizes fell very little behind those for No. 2. The percentage of the entire vote received by No. 83 was a little less than 13$\frac{7}{10}$, while that of the vote cast for No. 5, which received the third prize, was a trifle over 13[illegible] per cent. The next sets of plans in order of popularity were Nos. 78 and 65, each of which received the same number of votes, being a little less than 11¾ per cent. of the entire ballot cast. No. 66 was next in order, receiving a trifle more than 10[illegible] per cent., followed by No. 94, which had a little more than 7½ per cent. The eighth set of plans in the order of their popularity was No. 48, which received exactly 4¾ per cent., after which came No. 46 with 4[illegible] per cent.; then No. 11 with nearly 2[illegible] per cent.; No. 63 with a trifle over 2½ per cent., while No. 38 received a little more than 1⅝ per cent. of the entire number of votes cast.

A study of the tally sheet made up from the ballots cast presents some interesting features. It shows that the bulk of the votes came from three well defined geographical sections of the country—namely, the New England States, the Middle States, and what may be termed the Central Western States, embracing Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa and Missouri. The New England States furnished very nearly 12[illegible] per cent. of the total vote, while New York, New Jersey and Pennsylvania, combined, contributed nearly 33 per cent., the vote of New York counting for a little over 20 per cent. of this amount. Taking the central section above referred to, we find that the vote aggregated a trifle over 33½ per cent. of the total, of which the State of Illinois contributed nearly 7 per cent., and Ohio nearly 6½ per cent. Michigan and Iowa each furnished 4.16 per cent., while the quota of Wisconsin and Missouri was each 3.35 per cent. The vote in the remaining States of the West was very scattering, owing, in part, no doubt, to the short time our readers had to study the plans after receiving the January issue and mailing the ballot in season to reach us before the close of business on the 22d of the month. There was, however, a creditable showing from California, Washington, Oregon, Colorado, Nebraska, Wyoming, Utah, Idaho and the Dakotas. The Southern States contributed nearly 8 per cent. of the total vote cast, while Canada, including Manitoba, Nova Scotia and Newfoundland, contributed 5[illegible] per cent.

The set of plans receiving the first prize was, according to the votes cast for it, most popular in New Jersey, that State furnishing nearly 12¾ per cent. New York, New Jersey, Pennsylvania and Maryland combined furnished 30$\frac{1}{10}$ per cent. and the New England States a little over 9 per cent. In the Western section No. 2 was most popular in Illinois, that State contributing a trifle over 9 per cent. of the votes cast for it. Concerning the drawings awarded the second prize it is interesting to note that No. 83 was most popular in the Empire State, which furnished nearly 16⅜ per cent., while Ohio comes next with 14$\frac{1}{10}$ per cent. The New England States contributed 4[illegible] per cent., New York, New Jersey and Pennsylvania together furnished 24½ per cent. and the central Western section, covering the States enumerated above, supplied nearly 45 per cent. of the vote which was cast for No. 83. Turning now to No. 5, we find that it was equally popular in several sections of the country. New England, New York and Pennsylvania each contributed a little over 14½ per cent. of the total vote cast for it, while the central section supplied a trifle more than 27 per cent. Canada was well represented in the votes for No. 83, and also among those cast for No. 65. An interesting feature of the vote cast for No. 78 is found in the fact that while the New England States contributed 35$\frac{7}{10}$ per cent., a little more than 23[illegible] per cent. of this came from the State of Massachusetts. Still another striking feature of the balloting is found in connection with No. 66, which was most popular in New York State, a little over 71 per cent. of the vote cast for it being contributed by readers in the city of Albany.

As stated in our last issue, there were received in this competition something like 150 sets of plans, many of which possess features of interest and merit and are deserving of more than passing notice. Many of the contestants asked for a criticism of their efforts, and it is possible that in a future number we may present for the consideration of our readers additional sets of plans submitted in the Twenty-fourth Competition.

Painting Interior Wood Work.

Some people seem to think that as soon as wood is used inside a house there arises a deadly sin against the proprieties if it be painted, and hence all interior wood work should be finished in its natural color and grain. How can they reconcile the uncompromising hardness and coldness with which an unstained or unpainted piece of oak or white pine will obtrude itself into any scheme of decoration consisting of soft, warm colors. Says *Furniture and Decoration*: It were far better to stain the wood in harmony with the general decorative effect—not to imitate some other wood, be it understood, but to get the desirable color for harmony with its surroundings. But really there can be no objection to good honest paint in soft, flat color, or in brilliant and polished china gloss if it be desired. If it be honest to paint the outside of our dwellings in colors to please us, what harm can there be in choosing such colors as may be agreeable for our inside finish, and boldly painting the wood work to suit our decorative scheme? This idea is gaining ground, and the era of varnish finish is almost ended, or at least the time when varnish alone was considered to convey a title to respectability, and when painted interior wood work was supposed to be a sure indication of poverty and social inferiority, for now even the richest and most favored socially dare to paint their wood work, if it suits them best to do so.

ACCORDING to a recent report of the United States Consul-General at Rome, it is only necessary to distill asphaltic rock to obtain petroleum, which confirms the opinion of a French scientist, M. Coquand, to the effect that asphalt is petroleum in a solid state, which, rising in the form of vapor from the depths of the earth, had instilled itself into the fissures of calcareous rock. Asphaltic rock is chiefly found in the district of Syracuse, near Ragusa, known as Renazza, or the pitch country, where there is a tableland of great extent, the stone of which is sawn and used for chimney pieces, door posts and stair cases. The stone is very easily cut and carved, but where it contains too much asphalt it gums the saw, and has to be sweated or exposed to heat to rid it of the excess of bituminous matter. Belonging to the miocene formation, this rock is in immense heaps in the midst of molasse, which tends to prove that the petroleum was deposited in it at the very moment that the rock was formed.

SHARPENING A CORNER CHISEL.

By JAMES FRANCIS.

A CORRESPONDENT inquired in a recent issue how best to sharpen a corner chisel, but he did not state what kind of a corner chisel he was using. There are several kinds and many sizes of each kind. Perhaps the most common is the one shown in Fig. 1. This really is a framing chisel. and is built correspondingly strong. It should be ground as shown in the engraving, with the corner at A showing the same width of line that the body of 90°, is made at an angle of 60°, or it will cut three-cornered, so to speak. This is a very handy tool, but should be properly classed among the carving tools, and it is not made in the heavy framing variety. It is well to have two of these tools exactly alike save that one is ground on the outside while the other, like Fig. 3, is ground from the inside. If you intend to have only one of these tools (60°) grind it from the outside, by all means. Even then it is quite a trick true, kept wet, and run at a rather slow speed.

When a man who has not learned this lesson attempts to grind the corner chisel shown in Fig. 1, he usually picks out the sharpest corner on the grindstone, and soon makes the chisel look something like Fig. 5. The stone, of course, does not come to a sharp corner or point, so it leaves a space at C, and as the stone, especially the corners thereof, usually wobbles more or less, the bevels are cut away, leav-

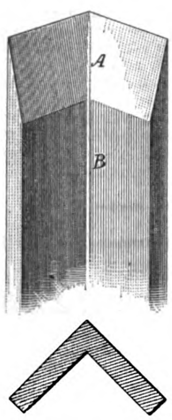


Fig. 1.—Elevation and Plan View of a Corner or Framing Chisel.

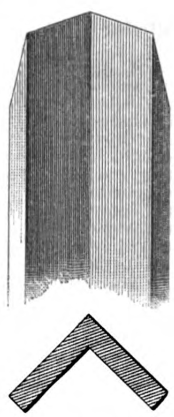


Fig. 2.—Views of Another form of Corner Chisel.

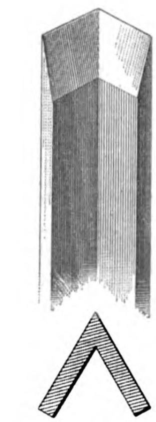


Fig. 3.—Still Another Style of Corner Chisel.

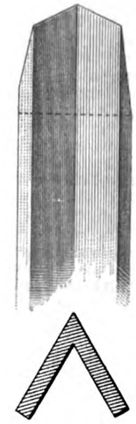


Fig. 4.—Tool Ground with One Bevel Longer than the Other.

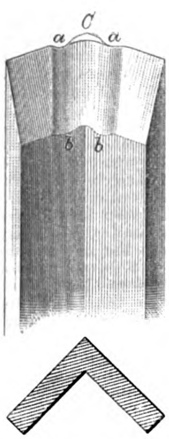


Fig. 5.—Appearance of Chisel Shown in Fig. 1 when Ground by an Inexperienced Hand.

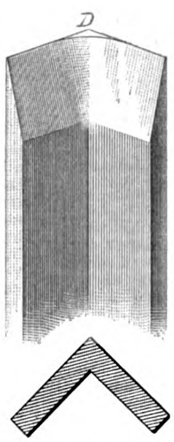


Fig. 6.—Chisel with Corner Almost Taken Out.

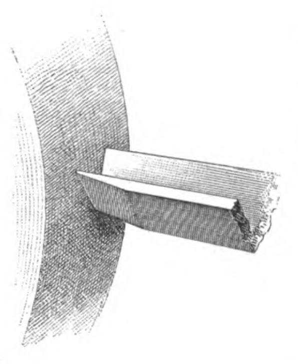


Fig. 7.—Grinding Down the End of Chisel to Make it True

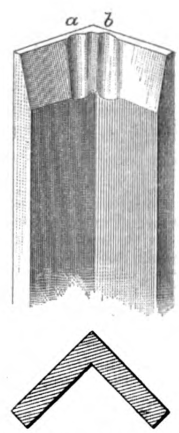


Fig. 8.—Appearance of Chisel Shown in Fig. 5 After the End Has Been Ground Down.

Sharpening a Corner Chisel.—Illustrations Accompanying Article by James Francis.

the chisel shows at B. This is usually from $\frac{2}{100}$ to $\frac{3}{100}$ inch. But how to make this line is the point to be learned.

Another form of corner chisel is shown in Fig. 2. It is made exactly like Fig. 1, except that it is ground on the outside instead of the inside and can, therefore, be easily sharpened on an ordinary grindstone. In grinding this, as with all other chisels, care should be taken to make all bevels clean and true, with one straight sweep of the beveled side, so that all "monkey faces" and "cat's eyes" shall be avoided.

Fig. 3 shows another form of corner chisel. This, instead of being square, to grind this tool nicely. The bevels are so long and the sides so thin that unless great care is taken one side will be cut away more than the other, leaving a thing which looks something like Fig. 4. A tool in this condition is nearly worthless, and should be reground at once, before even an attempt is made to use it.

The same thing sometimes happens when grinding Fig. 2 chisel, but here, as the angle is greater and the metal in the chisel thicker, there is less chance of cutting away one side more than the other. For grinding this tool, and especially for grinding the one shown by Fig. 4, the stone should be very ing them as at *a a* and *b b*. A tool ground this way is worse than useless.

Even with great care and a start in the best possible condition, the corner cannot be taken quite out, and the chisel will look like Fig. 6—well ground, but not ground right. There is some metal at D which ought not to be there.

Whenever a tool is ground off so as to look like either Fig. 4 or Fig. 5, it should at once be presented endwise to the stone, as shown in Fig. 7, till the end of the tool is again made true, as in Fig. 8. The end grinding need only be carried far enough to make a clean edge on the outside of the chisel, therefore the grinding can be stopped when that edge is made whole, as shown. The notches *a* and *b* show where the former grinding has gouged out the bevel of the tool.

As to the proper grinding of an inside corner chisel, it is necessary to prepare a special grinder and then to keep the grinder for that purpose alone. A common grindstone may be used, but an emery wheel is better. Such a wheel can be run in any lathe or put on the arbor of any grinder. The wood working shop nowadays that does not have its emery grinder is so far behind the times that it will not be considered in this article, except to say that it is a good place to get away from at once.

Procure a wheel from 5 to 6, or even 8 inches, in diameter, and then get one of the black diamond stone dressers that are in the market.

A stone (emery wheel) can be shaped or trued up in an ordinary iron working lathe by making as hard as possible a tool with a very small cutting point, then running the emery wheel very slow and turning in the usual manner, but a black diamond is much better, for the wheel can be dressed while it is running at its usual speed, and without removing it from the arbor where it is to run while working.

Fig. 9 shows the proper section to which the wheel should be dressed. It is a little less than 90°, so that

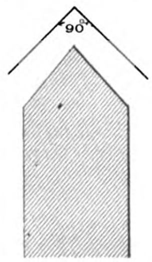


Fig. 9.—Section to Which the Emery Wheel Should be Dressed for Proper Grinding.

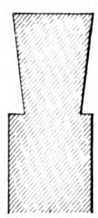


Fig. 10.—Section of Wheel Showing Two Corners for Grinding.

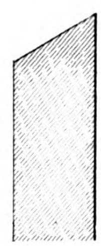


Fig. 11.—Form of Tool Sometimes Provided on Grinding Arbor.

Sharpening a Corner Chisel.—Illustrations Accompanying Article by James Francis.

the wheel will not cut on both sides at once. Perhaps the best way for a man to learn about this is to try grinding both sides at once, and then he will quickly find out why that method does not work very well. The wheel shown by Fig. 10 has the advantage of presenting two corners and will therefore require dressing only half as often as Fig. 9, but it will need twice as much, and Fig. 9 does not require the shifting of the tool in order to grind the other side thereof.

Sometimes a tool like that shown by Fig. 11 is already provided on the grinding arbor. This wheel may and can be used, but the man who does so will wish that he had been born before corner chisels were invented.

The one great point is to keep the corner of the wheel very sharp and true. It is well, therefore, to do most of the grinding on another wheel, say like Fig. 10, which has not so much attention paid to the condition of its corners; then the little bit of metal shown at *d*, Fig. 6, can be taken off and the bevel cleaned up with wheel No. 9. This saves lots of wheel dressing, for the sharp corner wears off very fast.

This point is a vital one when chisels shown by Fig. 3 are to be ground. This requires a stone with a section some less than 60°, and such a corner would wear off very quickly were it put to heavy work.

For setting an edge on the corner chisel after it has been ground a special slip is needed. If one of the required section cannot be purchased, it can be quickly shaped by grinding on the side of a large emery wheel. The slips, like the grinders, should be made with a section having a less number of degrees than the chisels to be treated.

In all operations, both of grinding and edge setting, let the process be a slow and easy one, that the temper be not drawn or the edge broken. It is very thin and delicate and will not stand hard usage. The corner chisel must also always be tempered rather soft, so it will not break. True, the edge will not hold as long, but the greatest danger of using this tool—that of breaking off the corners—will be largely avoided.

Proportion in Architecture

If we ask what are beautiful proportions, we shall be told "just" ones; when, if not satisfied with such elucidation, we return to the charge and inquire what are just proportions, we shall, perhaps, be further enlightened by being assured that they are those which are harmonious and conduce to beauty. For the human figure and other animal forms there are standards of normal proportions, fixed by Nature herself. But in architecture there is no immutable standard of proportion for any one style, says the *London Architect*, much less one applicable to all styles alike. In the Greek orders we find the very extremes of proportion—such as could not be exceeded either way without falling into deformity and disproportion — in the Pæstum Doric, and the slender, comparatively too slender, Corinthian. Yet, utterly dissimilar as they are, all the orders may be said to be admirably proportioned in themselves, which, however, instead of at all simplifying the matter, only renders the subject of proportion the more abstruse and perplexing. The very best proportions are only relatively good, for differently applied they might be far from pleasing, or even be absurd—at the utmost, only average proportions, suitable for general guidance and for ordinary cases; and so far from being abided by, such average may frequently be greatly exceeded with the happiest effect. What, for instance, is loftiness but an unusual degree of hight in comparison with breadth, or hight exceeding the usual relative proportion which it bears to width? To attempt to fix invariable proportions by rule is worse than nugatory, since it is positively mischievous, and detracts from the privileges of art, rendering that a merely mechanical process which ought to be determined very differently. After all, it is the eye which judges of proportions; therefore, surely the eye of the architect—supposing him to be at all worthy of such name—ought to be able to decide what are pleasing proportions quite as well as that of other people. And so that they be pleasing, it matters not at all how much they deviate from ordinary routine and its rules. Undue stress is laid upon proportion because it is generally spoken of as if it were all-sufficient in itself alone, and capable of insuring excellence, whereas it is only one element of beauty in design. Besides which the term itself is usually understood in only a very limited meaning, namely, with reference to that mechanical species of it which concerns itself with merely parts and individual members or features, without that higher artistic one being included in the idea of it which, regulating the whole of a composition, stamps it to the eye at once as a captivating *ensemble*, all whose parts are in perfect keeping. That kind of proportion is quite beyond the reach of rules. Those who cannot find out for themselves how to produce it must dispense with it, trusting that it will never be missed by those who are content with proportion in pieces and bits—by hairbreadth measures of columns and moldings.

Building Ordinances of Berlin.

The correspondent of a Baltimore journal, writing from Berlin, gives the following: "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 signboard on his own house until he has shown a diagram of it and has got 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 in 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. The 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."

A PHILADELPHIA workingmen's home will, it is said, be built upon the estate of Emperor William of Germany, after plans furnished by architect William T. B. Roberts of the Quaker City. An architect and engineer belonging to the German corps examined the model house at Chicago, and, upon returning to Germany, submitted a detailed description of the dwelling to the head of his department, who brought it to the attention of Emperor William, who directed that the necessary plans be secured and that a house be built after them on his estate. Our readers will recall that the plans of the house referred to were presented in *Carpentry and Building* for December, 1892.

WHAT BUILDERS ARE DOING.

BUILDING INTERESTS throughout the country are in a very quiet condition even for this season of the year. Very little indication of the future is yet seen either one way or the other, and the feeling of waiting for whatever may turn out is so strong, that it is at present impossible to predict with any degree of accuracy what the season may bring forth. It is a good sign that builders generally are hopeful and inclined to expect that the beginning of the regular building season will see an improved state of affairs. Everything seems quiet among the workmen, and no disturbance of any importance was reported during January.

Baltimore, Md.

The building interests of Baltimore are in a fairly satisfactory condition and the promise for the approaching season is good. The Builders' Exchange is in excellent condition and the members report everything quiet among the workmen. It is expected that about 50 persons will attend the convention of the National Association which will be held in Boston, beginning on the 13th inst., and lasting through the 16th.

Boston, Mass.

The prospects for the coming building season are considerably below the mark, but it is expected that considerable new work will be opened for competition before the commencement of the season. The Master Builders' Association is busy making preparations for the national convention and is perfecting the final details of the method of caring for their guests at that time. At the annual meeting of the association it was voted that a committee of five be appointed by the president to make investigation and secure accurate information in regard to the unemployed men who are usually employed by members of the association. This committee is to find out whether any and what men are in circumstances needing assistance and to report as soon as possible to the association, with recommendations as to what may be done to relieve distress and provide or apportion work, to the end that systematic and effective methods may be adopted as far as its usual contingent of workmen are concerned to meet existing conditions among them.

The programme of the national convention, together with other references to it, appear on the Builders' Exchange page of this issue.

Cincinnati, Ohio.

There are some indications that the spring will see a livening up of the building trades in Cincinnati. Those who build houses for speculation have abandoned all intention of putting up any new structures till the money market comes to a definite settlement, but there are people who build for their own accommodation and these are tired of waiting. There are many inquiries about places among the architects and several are at work on *bona fide* contracts, though few of the prospective builders can be known till their contracts are let.

Several large residences are projected, but as yet there are few indications of building in the business portion of the city. The Builders' Exchange has elected the following delegates to attend the national convention in Boston: Delegate at large, L. B. Hancock; delegates, H. E. Holtzinger, J. Milton Blair, Geo. W. Nieber; alternates, George B. McMiller, John Theobold, Jacob Freund. A large number of members will attend the meeting with the delegates as visitors.

Chicago, Ill.

The following delegates and alternates have been elected to attend the national convention from the Builders and Traders' Exchange of Chicago: Delegate at large, John Rawle; delegates, Chas. W. Gindele, George Tapper, J. G. McCarthy, W. H. Mortimer, R. S Haldeman, Wm. Grace, B W. May, Samuel I. Pope, C. W. Damsier, E. S. Moss, Louis Berg and Wm. Henry; alternates. W. H. Iliff, J. C. McFarland, Murdoch Campbell, D. G. Plimister, Griffith Hunter, Daniel Freeman, M. B. Madden, J. C. McMahon, James Bloomfield, H. Mueller, J. C. Deacon, John Griffiths. The building trades are reported as being very quiet at present.

Cleveland, Ohio.

The Builders' Exchange of Cleveland has elected the following members to attend the national convention in Boston: Delegate at large, Arthur McAllister; delegates, R. H. Jenks, George E. Heidenreich, G. G. Griese; alternates, J. A. Reaugh, C. C. Dewstoe, E. E. Robbins. It is expected that a number of other members will attend the convention as visitors.

Detroit, Mich.

The Builders and Traders' Exchange of Detroit has elected the following officers: President, James Meathe; vice-president, Charles H. Little; secretary, Joseph Myles; treasurer, George Hanley; directors, Martin Scholl, Jr., Robert Teakle, Conrad Clippert, W. J. Burton and Robert Robertson; superintendent, Benjamin F. Guiney; delegates to the convention of the National Association of Builders, Martin Scholl, Jr., and Richard Helson; alternates, George D. Nutt and Henry Spitzley; delegate-at-large, A. Chapoton, Jr. A life size crayon portrait of the late Ira A. Topping was presented to the exchange by the Board of Directors and the superintendent. The rooms will hereafter be open to members every Friday evening.

Business remains about as it was at the beginning of the year, and the season is not sufficiently advanced to predict the condition of affairs among the builders at the opening of the season.

Denver, Col.

The building business of Denver, which was practically destroyed by the panic, shows signs of picking up. General business shows an upward tendency, which is attributed to the excellent results which have followed the efforts of gold seekers. Large numbers of miners and idle workmen, thrown out of work by the panic, have taken to prospecting for gold and to reopening abandoned mines. Excellent returns are thus obtained, partly because of improved methods of reducing ore and partly because of new properties of value being continually discovered.

The Master Builders' Association has suffered so greatly from the general depression that it has been deemed necessary to reorganize upon a plan which will perpetuate its existence for three years without expense to the members The money in the treasury will be made to provide for the expenses for the time mentioned.

Indianapolis, Ind.

New Year's Day was selected as being peculiarly fitting for the opening of the new quarters of the Builders' Exchange of Indianapolis. By 10 o'clock a.m. over 200 contractors and builders of the city had gathered at the new rooms on Ohio street in the old library building. Justus C. Adams, the second president of the organization, presided as master of ceremonies. In a short speech he welcomed those present to the hospitalities of the exchange and then introduced the president, George W. Stanley, who read an historical address relating to the Builders' Association.

In April, 1886, the contractors met at the court house and selected Conrad Bender temporary chairman and William P. Jungclaus secretary. The secretary communicated with the St. Louis and Cincinnati exchanges, receiving much information. A visit to Cincinnati by a committee of seven, in response to an urgent invitation, also gave impetus to the formation of the Indianapolis exchange. Articles of incorporation were issued May 12, 1885, with 24 charter members, and on May 19 John A. Buchanan was elected president, John Martin first vice-president, and B. F. Hetherington second vice-president, and a constitution and by-laws were adopted. The last meeting held at the court house was on May 26, at which a board of directors was elected. The next meeting was held June 9, 1886, at the permanent headquarters at 31 South Pennsylvania street. At the first meeting of the Board of Directors William P. Jungclaus was elected permanent secretary and George O. Eldrig treasurer.

The exchange had only 24 members at the start, which has steadily increased until now almost every contractor, builder and firm that deals in builders' supplies is enrolled on its membership. Mayor Denny, Secretary Smith of the Board of Trade, R. O. Hawkins, E. B. Martindale and Controller Trusler, who were present, were called upon and made remarks. The "Bald-Headed Glee Club" and W. P. Jungclaus furnished the music for the occasion. Lunch was served in one room and punch in another, and a general good time was had. The new quarters offer many advantages over the old rooms, and the change will, without doubt, prove a beneficial one to the organization. The new address is 35 East Ohio street. Delegates to the national convention were elected on January 12, and it is expected that about 20 persons in all will attend the meeting.

The business prospects for the coming season are fairly good.

Kansas City, Mo.

The Builders and Traders' Exchange of Kansas City, on December 20, elected the following directors for the ensuing year: W. A Kelly, A. A. White, John T. Seddon, W. W. Taylor, W. S. Halliwell, W. A. Wilson, A. Sutermeister, A. O. Smith and W. B. Hill.

On the evening of the 20th an informal reception was held at which the directors were installed into office and the reports of the secretary and treasurer were presented. The latter showed the exchange to be gaining in membership and to be in good financial condition.

After several addresses Secretary McDonald announced that a "pink tea" was waiting in another room, and the members adjourned to partake of a lunch and discuss a bowl of punch.

The Builders and Traders' Exchange began its existence very inauspiciously on April 9, 1886, Charles L. McDonald, its present secretary, being the founder. B. F. Swain was the first president. The growth of the institution has been phenomenal. On July 1, 1890, the magnificent building, the present home of the exchange, at the northwest corner of Seventh and Central streets, was completed at a cost of $190,000. The present membership includes over 200 of the leading builders and manufacturers of building material in the city.

At the directors' meeting on December 29, the following officers were elected for the coming year: W. A. Kelly, president; A. A. White, vice-president; Jerome Twichell, treasurer; C. L. McDonald, secretary. The following were chosen as the Committee on Admissions: J. H. Swearingen, F. J. Shinnick, W. A. Bovard, Jacob Welch, Joseph Gastl, William Harmon, J. A. Tipton, A. F. Roddy, J. A. Ritzler. The Committee on Rooms will consist of A. O. Smith, W. B. Hill and J. T. Sedden. This is Mr. Kelly's third consecutive term as president of the exchange.

Lowell, Mass.

The Lowell bricklayers state that their strike, which was in force during nearly the whole of the past season, and which was declared off about two months ago for lack of financial support by the International Union, will be resumed in the near future. The secretary of the union was a delegate to the recent convention of bricklayers' unions in Omaha, and it was his purpose to make an appeal for renewed financial support. Business is reported as being very quiet in the building trades, with but little new work in sight for the opening of the season. The Master Builders' Exchange is in good condition, and has elected the following delegation to attend the National Convention: Delegate at large, D. Moody Prescott; delegates, Chas. P. Conant and Patrick Coulon; alternates, L. F. Kittredge, C. F. Varnum and C. H. Burt.

Lynn, Mass.

The Master Builders' Association of Lynn held its fifth annual meeting and banquet on January 2. The following officers were unanimously elected for the ensuing year: President, Frank G. Kelley; vice-president, Benjamin H. Davidson; secretary, Capt. P. S. Curry; treasurer, Fred. Stocker; board of directors, James Burns, James Heath and William A. Sperine.

The treasurer's report showed that the association was free from debt and had $175 in the treasury with which to start the new year.

The banquet followed immediately after the business meeting and was attended by about 60 members and friends, including several prominent citizens as guests. Secretary Curry acted as toastmaster and President Kelley sat at the head of the table. The toasts were happily responded to and a thoroughly good time was enjoyed by all.

Milwaukee, Wis.

The building interests of Milwaukee present no better prospects for the immediate future than they did last month, although builders are expecting an improvement when the season is fairly opened. The Builders and Traders' Exchange has filed an amendment to its charter increasing its capital from $60,000 to $70,000.

The annual meeting of the stockholders was held January 8, and the following Board of Directors was elected: T. R. Bentley, C. F. Kindt, Paul Riesen, Philip Gross, John Langenbacker, C. G. Forster, J. J. Quinn, C. Chase, R. G. Wagner, L. Bierbach, L. J. Mueller. The secretary's report was referred to an Auditing Committee of three, with instructions to report at the next meeting. At the close of the meeting the Board of Directors elected the following officers: President, T. R. Bentley; secretary, C. G. Forster; treasurer, Philip Gross. No action was taken in the matter of issuing additional stock.

New York City.

Builders report business in New York City as being quiet, with comparatively little disturbance from the workmen. The spring is expected to liven things up and the opening of the season, it is expected, will find the business in fairly good condition. A bill of the New York District Executive Committee of the United Order of American Carpenters and Joiners, Building Constructors' District Assembly 253, Knights of Labor, has been introduced in the Senate by Mr. Sullivan and in the Assembly by Mr. Roche.

It proposes to amend chapter 385 of the laws of 1870, entitled "An Act to Regulate the Hours of Labor of Mechanics, Workingmen and Laborers in the Employ of the State or Otherwise Employed on Public Works." The proposed new law will apply to all mechanics, workingmen and laborers now or hereafter employed by the State or any municipal corporation therein, through its agents or officers, or in the employ of persons contracting with the State or such corporation for performance of public works. All such mechanics, workingmen and laborers so employed shall receive not less than the standard wages established by the *bona fide* labor organizations of the respective trades or callings in which such mechanics, workingmen and laborers are employed in each locality where the work upon which they are employed is in progress. In all such employment preference shall be given to citizens of this State over unnaturalized persons. All contracts are hereafter to contain all these provisions.

The bill, the carpenters' union officials say, has received the approval of Mayor Gilroy, Richard Croker, William Brookfield, Civil Justice Roesch and Police Justice Martin. Mayor Gilroy and the Park Commissioners have proposed some changes in the law for the benefit of the unions, which have been agreed to. The Republicans in the Legislature last year defeated a similar bill, claiming it was unconstitutional.

The Commissioner of Immigration has recommended the payment of $3 50 per day to carpenters employed in his department.

Stephen M. Wright, secretary of the Mechanics and Traders' Exchange, has recently addressed a circular letter to all the organizations of employing builders in the city, recommending the adoption of the form of arbitration between employers and workmen advocated by the National Association of Builders, and inclosing a copy of the same. His effort has already borne fruit. The Electrical Contractors' Association is considering the advisability of placing the plan in operation. Others are likely to follow. Mr. Wright has recently compiled and issued a Hand Book of the exchange, which is one of the most attractive editions of its kind ever published. It contains an architects' directory of New York City and Brooklyn. The regulations of the Building Department and the Building Loans of the City of New York, officers and regulations of the Department of Public Works, list of employers' associations connected with the building trades, by-laws, officers, members, &c., of the Mechanics and Traders' Exchange, and the constitution, declaration of principles, form of arbitration, Uniform Contract, &c., of the National Association of Builders. The book is beautifully bound, with gilt edges, and will be a valuable addition to any technical library.

Notwithstanding the depressed condition of affairs, the financial support pledged to the project of erecting a building to be a home for the building trades has reached the $100,000 point, and the committee having the matter in charge have issued a prospectus of the conditions under which the project will be put into effect, and including an estimate of the pecuniary aspect of the plan. It is proposed to issue certificates of membership in the contemplated exchange (not exceeding 400), at $1000 each, to be limited exclusively to persons actually pursuing a business connected or identified with the construction or finishing of a building, such certificates to participate *pro rata* in the entire net profits arising from the investment and be subject to redemption at an annually fixed value by the organization upon the death of a member or his retiring from business.

The financial statement is as follows:

INCOME.		
From rent of offices..........	$123,000	
From rent of exhibit space...	30,000	
From rent of basement, Exchange and club floors...	10,000	
		$163,000
EXPENDITURES.		
Interest on bond and mortgage, $600,000 at 4 per cent..	$24,000	
Operating expenses	35,000	
Taxes, water and incidentals.	25,000	
Allowing annual dividend of 5 per cent. on 400 certificates	20,000	
		104 000
Balance.....		$59,000

This leaves a net profit of nearly $60,000 per annum to be applied either to increasing the dividend on certificates or liquidating the mortgage. Subscribers will be soon called together to effect a permanent organization by the election of officers and trustees, adoption of by-laws, &c. No money will be called for until a sufficient sum is subscribed to purchase the site, at which time the body will be incorporated under the statutes of the State.

The Provisional Committee which has had the matter in charge is as follows:

John J. Tucker, Chairman.
Stephen M. Wright, Secretary.
Isaac A. Hopper, Treasurer.

Andrew J. Campbell,	Geo. Moore Smith,
Augustus Meyers,	Henry A. Maurer,
John J. Roberts,	James B. Mulry,
Clarence W. Gaylor,	Jacob S. Browne,
Thomas F. Byrne,	Charles A. Cowen,
Edwin Outwater,	Warren A. Conover,
Alonzo E. Conover,	John L. Hamilton.

Omaha, Neb.

The annual meeting of the Builders and Traders' Exchange was held on January 2, with President Vierling in the chair.

The reports of the officers showed that the exchange has prospered during the year, despite the financial depression, and that the finances were in the best condition since the beginning of the organization.

The result of the election for the ensuing year was as follows: President, Richard Smith; vice-president, J. W. Phelps; treasurer, J. W. Percival. Directors for two years: C. W. Hull, Henry Curtis, W. M. Dodge. Director for one year: J. F. Smith. Delegates to the National Association: A. J. Vierling and Richard Smith. Hold-over directors: D. Shane and W. C. Bullard.

The secretary's report showed the exchange to be in excellent condition in spite of the severe strain of the past season. The organization is making an earnest effort to maintain itself upon a plane equal to that occupied by other commercial bodies of the city and with distinct success. The only labor trouble of the past year was settled by arbitration, and the relationships between employers and workmen is at present harmonious.

At the directors' meeting, immediately following the annual meeting of the exchange, Secretary Wedge was reappointed for the ensuing year.

Philadelphia, Pa.

The condition of affairs in the building trades of Philadelphia remains practically unchanged, the amount of work being carried on at present being less than the usual amount at this season of the year. The plasterers have accepted a reduction of 5 cents per hour, making their wages 40 cents per hour, the same as they were at the beginning of 1893. Wages in other branches of the trade have not been disturbed.

The Master Builders' Exchange has elected the following delegates and alternates to the national convention in Boston: Delegate at large, Stacy Reeves; delegates, Franklin M. Harris, George Watson, John S. Stevens, William Harkness, James E. Hastings and F. Ballinger. The alternates elected were W. S. P. Shields, R. E. Ballinger, A. G. Buvenger, James C. Taylor, Ralph Peverley and John N. Gill. It is expected that about 50 visitors in all will accompany the delegates to Boston.

Through the instrumentality of George Watson, chairman of the exchange Trade School Committee, an endowment fund for the trade schools of $10,000 has been nearly completed, and it is hoped that the fund may be increased in the near future. The schools are in a most excellent condition and warrant every effort that is made in their behalf.

Portland, Maine.

At the annual meeting of the Portland Builders' Exchange, January 2, the following officers were elected:

President, C. B. Howatt; vice-president, Henry Jones; secretary, Charles E. Snow; treasurer, James Miller; delegate at large, Wm. H. Scott; delegate, J. H. O'Neill.

The delegate and delegate at large are to attend the National Builders' Association convention, to be held at Boston.

After the business meeting the party sat down to an excellent supper, about 35 members being present.

Providence, R. I.

The Builders and Traders' Exchange of Providence held its annual meeting and dinner on December 27 and elected the following officers for the ensuing year: President, Richard Hayward; first vice-president, W. W. Batchelder; second vice-president, Spencer B. Hopkins; treasurer, James D. Hudson; secretary, Wm. F. Cady. Executive Committee: J. J. Mahoney for one year; John W. Furlong, William Gilbane, Theodore A. Perry, Frederick E. Shaw and J. W. Nolan for two years. National director: W. W. Batchelder. Delegates to national convention: John T. McGuire, M. Goldrick. Alternates: H. T. Cate, T. B. Ross.

The report of the secretary showed the exchange to be in excellent condition, with a balance in the treasury and an increase in the membership during the past year. At the close of the business meeting the members adjourned to the annual dinner, at which all enjoyed a pleasant evening. There were many toasts and responses, and the feeling of fraternity among the members received additional strength through the occasion.

Scranton, Pa.

The Builders' Exchange of Scranton held its annual meeting January 8 and elected the following officers for the ensuing year: John W. Howarth, president; John Colligan and Charles N. Lord, vice-presidents; James Collins, recording secretary; William R. Williams, reading secretary; Thomas E. Lyddon, treasurer. George W. Finn, W. R. Williams, Peter Stipp, John Colligan, Henry Gunster, John Briegel, Board of Directors. D. P. Thomas, George D. Brown, Conrad Schroeder, Thomas E. Lyddon, John Nelson, H. C. Hinman, H. A. Kaufhold, Committee on Appeals. Conrad Schroeder, delegate to the National Association convention. George D. Brown, delegate at large to the National Association convention.

A copy of the Uniform Contract has been received by the Scranton Exchange, and John Colligan, Charles N. Lord and Henry Gunster were appointed a committee to examine the contract and report at the next meeting. Many other matters concerning the improvement of buildings and the health and safety of the public were considered before the meeting dispersed.

St. Louis, Mo.

On January 9 the Builders' Exchange of St. Louis held its annual meeting. Patrick Mulcahy and Henry Fuerbach were elected to represent the exchange at the National Board of Trade which met at Washington, D. C., January 23.

Thomas J. Ward, Charles B. McCormick, Anthony Ittner, Thomas J. Kirby and William J. Baker were chosen as representatives to the National Association of Builders, meeting in Boston February 13. The nominations for officers for the coming year were as follows:

President: Jeremiah Sheehan and James J. Fitzgibbon.

For vice-presidents (two to be elected): John W. O'Connell, Wm. Hartman, Adam Bauer and Patrick Kirby.

Directors (six to be elected): Stephen O'Connor, John Ratchford, William J. Baker, Anthony Ittner, James Kearney, Philip C. Ring, Patrick Rohn, C. C. Jackson, Michael Lane, Bryan Brady and Theodore Welge.

Luke McLaughlin, C. S. Ittner and J. P. McKellegett were appointed by the president as judges of election.

The report of the Committee on Revision of Laws was made, recommending several changes. According to rules, this was passed over until the meeting in April.

The following is the report of the secretary:

Balance in treasury December 1, 1892	$1,597.73
Received from dues and initiations	6,785.00
Rent of offices	1,920 00
Interest account	140.00
Electrical Exchange rents, &c	35.80
Total	$12,478 53
Expenses for 1893	7,319.39
Balance in treasury	$5,159.14

Members admitted during 1893, 51; members dropped out, 36. Total membership, 256.

Worcester, Mass.

At the regular monthly meeting of the Builders' Exchange of Worcester, held late in December, a committee was appointed to consider the matter of entertaining delegates from the national convention in Boston. W. E. Coffey read a paper on "How to Benefit the Exchange." The matter of a 'change hour was very strongly advocated by Mr. Coffey. He also spoke highly of trade schools and of lectures, essays, &c., upon subjects of interest to builders.

Notes.

Toledo carpenters want eight hours. The painters and their employers are having trouble over wage scale and working rules.

The Builders' Exchange of New Haven held its annual banquet on January 5. The organization was shown to have a good balance in the treasury and to have increased its membership during the past year to 93.

The Builders' Association of California has elected the following officers: President, Stephen Doyle; recording secretary, William Chatham; financial secretary, M. C. Lynch; treasurer, C. E. Dunshee; executive committee, A. Jackson, S. H. Kent, J. R. Wilcox, George Reichley, J. T. Hays, E. C. Wordin, R. Currie.

The Builders' Exchange of Norfolk, Va., has elected the following officers: Charles H. Plummer, president; Joseph Edmonds, Sr., vice president; J. T. Blick, secretary; L. T. Blick, treasurer; L. T. Blick, P. F. McGuire, Joseph Edmonds, Sr., A. F. Holmes and J. Herbert Williams, trustees.

The Builders' Exchange of Wheeling, W. Va., held their annual election on January 6, and the following officers were elected for the ensuing year: President, James McAdams; vice-president, Joseph A. Bodley; second vice-president, Joseph W. Biery; secretary, C. Ed. Scheuerlein; treasurer, Jacob Morris.

Board of directors: W. A. Wilson, C. Murray, Herman Hess, J. H. Rosenburg, A. C. Fisher, B. Klieves, J. E. Clator, L. Hartong, James McAdams, C. P. Hamilton, John M. Emmerth, George W. Lutz.

Committee on appeals: B. F. Caldwell, James McAdams, G. W. Lutz, John W. Beltz, E. M. Holliday, Alex. Kemple, J. H. Rosenburg, William A. Wilson, William Hare, Louis Harttong.

All outstanding bills were ordered paid, and $50 was appropriated for the Citizens' Relief Committee.

A resolution of thanks to the retiring president was adopted, and Mr. Wilson made a fitting acknowledgment.

The election of officers of the Builders' Exchange of Pittsburgh for 1894 resulted as follows: Adam Wilson, president; W. R. Stoughton and W. T. Powell, vice-presidents; H. R. Rose, secretary; T. J. Hamilton, treasurer; W. T. Powell, Samuel Francies, George S. Fulmer, S. C. Martin, board of directors. There was a tie between Charles E. Pope and W. R. Stoughton for member of the Board of Directors, one of whom will be chosen by the exchange. F. Lingenfelser, A. Rasner, Alex. Hall, J. F. Bruggeman and J. J. Kennedy were elected Committee on Appeals.

The following officers of the Master Builders' Association of Salem, Mass., have been chosen: President, B. A. Touret; vice-president, T. G. Pinnock; secretary, C. H. Osborne; treasurer, E. H. Morse; directors, B. F. Hill, C. B. Balcomb, V. F. Wheeler, T. Gorman and B. A. Touret.

At a meeting of the Newark, N. J., Builders and Traders' Exchange, at 23 Clinton street, held late in December, the following officers were elected for the ensuing year: George S. Clark, president; George H. Kingsland, vice-president; Albert C. Courter, treasurer; William W. Schouler, secretary; board of managers, James H. Van Houten, J. W. Dey, Henry Dickson, Thomas Boyle, Joshua Higbie, H. M. Doremus and James E. Maguire; inspectors, Horace P. Cook, E. Axtell and Peter Boyle.

The Master Builders' Association of Fitchburg, Mass., has elected these officers for 1894: President, W. C. Carter; vice-president, Ira Caswell; secretary and treasurer, J. S. Starr; trustees, for one year, A. Wellington, H. B. Dyer; two years, F. A. McCauliff, H. E. Jennison; three years, George Buckley, J. D. Littlehale.

The National Association of Builders has had occasion to respond to several requests from the new University of Chicago for information regarding form of arbitration, rules for apprenticeship, &c.

The builders of Reading, Pa., are agitating the subject of establishing a builders' exchange. E. F. Keever is one of the foremost in the movement.

The Builders & Traders' Exchange of St. Joseph, Mo., is considering the advisability of rejoining the National Association. The organization has passed through a period of lack of interest upon the part of the members, and is now on the up-hill path.

The builders of Lincoln, Neb., are endeavoring to form a builders' exchange. Among the builders who favor the movement are C. F. Barris and W. H. Tyler. An effort of this kind was made some time ago, but without success.

Builders of Knoxville, Tenn., complain that competition and the methods by which it is conducted are such that there is no profit in the business for any one, employer or workman. An effort was made some time ago to form an organization composed of general contractors only, but the effort failed and the present condition is worse than before. A movement is on foot to establish a builders' exchange on such lines as will secure the co-operation of all the builders of the city for better methods and more harmonious action.

The new builders' exchange at Jackson, Mich., is reported as being in good condition, having successfully overcome all the obstacles which beset its path at the time of its formation.

The Boycott in Pennsylvania.

The following from the Philadelphia *Evening Star* of January 2 is an interesting description of the facts in the case mentioned:

The Supreme Court this morning handed down an opinion, deciding a question of great importance in labor circles in this State. In a word, the decision was that when trade associations boycott contractors and dealers who encourage strikers and concede to their demands, and when such associations extend such a boycott among other disinterested dealers, such a boycott is legal.

The opinion in the case was delivered by Justice Dean, is voluminous, being fourteen type-written pages in length, and goes to the foundation of the common law regarding the relations of labor and capital. The case was that of George M. Cote against Hugh Murphy and others, being an appeal from Common Pleas Court No. 2 of Allegheny county, and the decision reverses the judgment of the lower court.

The defendants were members of the Planing Mill Association of Allegheny County and the Builders' Exchange of Pittsburgh, and the different parties forming this association were in the business of contracting, building and furnishing building materials of all kinds. On May 1, 1891, a strike was instituted among the carpenters, masons and bricklayers in the building trades, bringing about a stoppage of building in Pittsburgh to a large extent.

The men demanded the same wages, with eight hours' work a day, as they had received for working nine hours a day. The employers refused the demand and the strike ensued. The plaintiff was a dealer in building materials, and not a member of either association. Some of the contractors conceded the strikers' demands and sought materials to go on with their building from whatever persons they could.

This would have resulted in giving the strikers employment and a great advantage, conceding them victory over the associations and permitting them to earn money toward contributing to the support of the unemployed strikers. The plaintiff and six other dealers refused to join the two associations in boycotting these contractors who had conceded the strikers' demands.

The associations then declared war against these dealers, refused to sell them material and used their efforts to prevent other wholesale dealers from selling them materials. It was alleged that owing to the efforts of the defendants Mr. Cote, the plaintiff, failed to purchase lumber of wholesale dealers in Cleveland and Dubois.

The plaintiff brought suit against the defendants, averring it was unlawful and successful conspiracy to injure him in his business and to interfere with the course of trade by refusing themselves to sell him material and preventing others from doing so by threats and intimidation.

Under the instructions of the lower court, upon the evidence, the jury rendered a verdict in favor of the plaintiff for $2500, which the court reduced to $1500. Judgment was entered and the defendants took this appeal to the Supreme Court, which reversed the verdict.

Seasoning Oak.

Oak is one of the timbers that requires extra care in seasoning, as its sap ferments and heats more quickly than the sap of any other wood. The logs, remarks an exchange, should be sawed as quickly as possible after being cut, or at least after warm weather sets in. It has been noticed that the sap exudes to a considerable extent after the planks are sawed, and that it dries, forming a gummy surface, which to a considerable extent prevents the action of the air upon the interior sap. To overcome this, experiments have been made by putting the planks into swinging crates and sinking them in running water so that they are entirely submerged. After they have been in the water two days they are removed and stood upon end under a shed, where they are well protected from the sun and rain, and where there is a good circulation. In this position they dry without warping, and much more quickly than when piled up in the customary manner, and when seasoned the color is uniform.

THE strongest timber, says a writer in an exchange, is known as "bilan," or Borneo ironwood, whose breaking strain is 1.52 times that of English oak. It is a hard, durable wood of a dark brown color, turning to a deep red when seasoned and becoming as black as ebony on long exposure. It resists the teredo—the dreaded timber-destroyer of the salt water—and the white ant, and is almost indestructible. It also has the property of neither swelling nor shrinking under any degree of dryness or humidity. Its weight is 60 pounds per square foot, lignum vitæ being 83 pounds, boxwood 80 pounds, ebony 4 pounds and African 62 pounds.

CORRESPONDENCE.

Cypress Finish.

From R. A., *Billings, Mo.*—I would like some carpenter who has had experience in using cypress for outside finish to tell the readers of the paper what success, if any, has attended this kind of work.

A Good Ink Eraser.

From S. P. G., *San Antonio, Texas.*—If "J. W. G." of Ravenna, Ohio, will try a piece of No. 0 sandpaper, half worn, he will find it a better ink eraser than broken glass or erasing knives.

Cutting Hip and Valley Rafters.

From I. P. H., *Omaha, Neb.*—It is with much pleasure that I send a reply to "E. G. W.'s" question in roof framing, which appeared in the March issue of *Carpentry and Building.* I believe "E. G. W." is right in stating that he has never seen this point illustrated. I have been a constant reader of several trade journals for many years and so far as I know this question is new, and I for one am glad to see new questions come up for consideration.

Referring to Fig. 1, which shows the elevation of a common rafter and a dotted lines show plainly that all hights on the common rafter and the hip or valley are made to correspond. The difference in the thickness of foot of rafters above the plates is obtained from the plumb lines A E and *a e* crossing the common rafter and hip or valley on different angles, as shown, and corresponding to the difference in pitch. The sketch also shows how much longer the hip or valley will have to be cut at the foot to correspond with the common rafter.

I have been somewhat lengthy in this description, because I desire to cover every point so that all can see the whys and wherefores of every line in the diagram. I will now present a smaller diagram on the same general plan, omitting many of the lines and showing how easily the desired result may be accomplished. Draw a horizontal line, as A B in Fig. 2. From this line draw two parallel lines representing the pitch of common rafter and also its thickness from corner of plate to back, as C O. From line A B square up C E, and draw the dotted line E F parallel to A B and of any convenient length. Next draw G H, representing the pitch of hip or valley, and crossing E F, as shown. Square down from I to J the same distance as work may be put on, but this should not be done until the frame is in the position in which it is intended it shall remain. The brick should be set about an inch from the sheeting, for two reasons: In the first place, it gives an air space between the brick and sheeting, which is one of the principal features of brick veneer construction. Second, it allows one to carry the brick work up plumb and true, independent of the frame work. Special attention should be given to the brick work, and it should be carefully watched to see that it is plumb and true irrespective of the frame, although the latter is important, for if the frame is not plumb the brick work will be all wrong.

The method of securing the brick work to the frame is usually by employing 20d. or 30d. nails, either cut or wire. In the case of cut nails the head is usually too large, so it is better to use 30d. casing nails, although if the wire nails are used the head can be battered down. Sometimes a little nick in the brick is made with the trowel, to serve as a rest for the head of the nail. The anchors should be put in each studding on every sixth course of brick. There are other methods of securing brick to the stud-

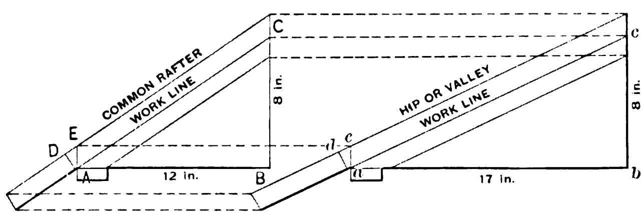


Fig. 1.—Method of Cutting Hip or Valley Rafter to Line with the Common Rafter.

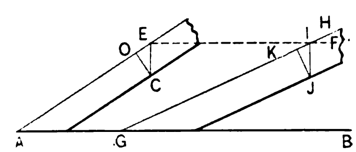


Fig. 2.—Another Method of Doing the Work.

Cutting Hip and Valley Rafters, as Suggested by "I. P. H." of Omaha, Neb.

corresponding hip or valley, I will try and make this point plain and easily understood. All that is necessary is to show the corresponding pitches of the common rafter and the hip or valley on a line with each other. It does not matter whether we take the whole length of rafters or only a section, so long as we observe the point of keeping the corresponding pitches of the common rafter and hip or valley correct. For illustration we will start with a foot run of one-third pitch common rafter. Let A B represent the run of common rafter, 12 inches; B C the rise, 8 inches; then A C will be the length on the work line and represents the pitch of common rafter. Next draw the parallel lines showing width of common rafter and the thickness the same extends above the plate, measured square from the back of the rafter, as shown by A D. Now take the corresponding run of hip or valley, which is always 17 inches to the foot run of common rafter on roofs of equal pitch, hence *a b* represents the run of hip, 17 inches; *b c* the rise, 8 inches, and *a c* the length on the work line and represents the corresponding pitch of the hip or valley. We will now trace the corresponding lines, which will show exactly how to cut the hip or valley to bring it on a line with the common rafter. From the run of common rafter square up to back of same, as A E, then from run of hip or valley square up the same hight, as shown by *a e*, and the distance measured square across, as *a d*, will be the corresponding thickness of hip or valley above the plate. The horizontal E C, which will locate the point through which to draw the parallel pitch line of hip or valley. From this line square across to back of rafter, as J K, which will give the corresponding thickness to cut the hip or valley rafter.

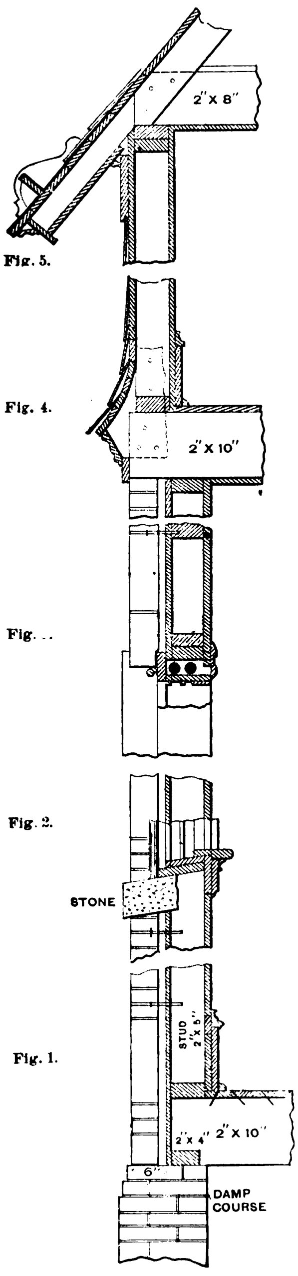
Brick Veneered Buildings.

From GEORGE F. BARBER, *Knoxville, Tenn.*—I notice from an inspection of various issues of *Carpentry and Building* that more or less discussion has ensued with regard to brick veneered buildings. This is a subject in which I am interested, and in calling attention to the construction of brick veneered walls, permit me to say, nothing is more simple after it is once understood. The first thing to be done after laying the foundation, as shown in Fig. 1 of the sketches, is to build the frame in the first story exactly as would be the case if a frame house was under construction. I would use 2 x 5 studding, as they are a little stronger and stiffer than 2 x 4, which are almost universally employed. The success of a brick veneered building depends upon the strength and stability of its walls, and the foundation should be made so that there will be no unequal settlement. If these three points are carefully guarded against, there is no kind of building which, in my estimation, will equal a brick veneered house.

After the frame has been put up, plumbed and sheeted, and brought to that position in which it will ever afterward remain, the brick veneer ding, as sometimes a wire is bent in a circle 1½ inches in diameter and an eye at the other end, through which the nail is driven into the studding. At other times galvanized iron strips about 1½ inches wide and 4 or 5 inches long, as shown in Fig. 6, are nailed to the studding and looped on the brick, holding the mortar secure. Perhaps the most practical method and most durable is the employment of nails in securing the brick to the wood work. In cold climates we generally cover the outside of the sheeting with tarred paper, placing the strips on the wall horizontally, laying a lath over the top and nailing often enough to keep it down tight, thus rendering the wall practically air proof.

The brick veneering may be done at any time after the frame is up. Many houses are built ready for the brick veneer, being otherwise finished and occupied in the spring of the year, while the veneer is not put on until the cold weather sets in. Residences, store buildings, mills and other classes of structures are erected in this way and the veneer can be carried any number of stories desired without danger of falling. It is necessary, however, that care be taken that the anchors hold well to the brick or to the mortar. All kinds of stone trimmings, such as caps, sills, &c., of plain or ornamental design can be employed in this character of work, the same as in cases where solid brick is used. In sections of the country where strong winds prevail it is best to brace the building on the inside corners by cutting 1 x 4 pieces into the studding, being careful to let the bottom end of the brace into the sill about ½ inch, also the studding at the top, making it secure and immovable. In this way the brick work will remain in position for all time.

Referring to the sketches, Fig. 1 shows the method of framing the sills and the plan of brick at the foundations; Fig. 2 represents the method of putting in window sills and frames;



Brick Veneered Buildings.—Section through Wall.—Scale, ½ Inch to the Foot.

Fig. 3 is a cross section of the window frame indicating the method of joining the brick and frame on the outside; Fig. 4 shows the plan of joining the brick to the frame above and the frame of the joist, as well as the method of starting the second story frame and Fig. 5 shows the construction of the cornice.

The advantages of a brick veneered house are that it gives an additional air space between the inside and outside of the house, thus making two air spaces, one between the brick and the sheeting and the other between the sheeting and plaster. This makes the house cooler in summer and warmer in winter. In this connection it is well to remember that what makes a house warm in winter will keep it cool in summer. Another advantage is that it gives the appearance of a solid brick house at a less cost than solid brick, while being a little more expensive than frame. It makes a much drier house, and is, therefore, in my estimation, healthier as a habitation. It will be found that any method of heating will prove more satisfactory and more economical than in a frame or a solid brick house. This method of construction in cold climates permits the use of double sash in the windows, giving an air space between the glass, greatly reducing the cost of fuel, and the comfort within is correspondingly increased. There will be no such things as damp walls in a brick veneered house, although the same cannot be said of those of solid brick. In this kind of a building the brick gives weight to the frame and the frame gives strength to the brick. In case of cyclones, solid brick houses are known to tumble in a heap, crushing

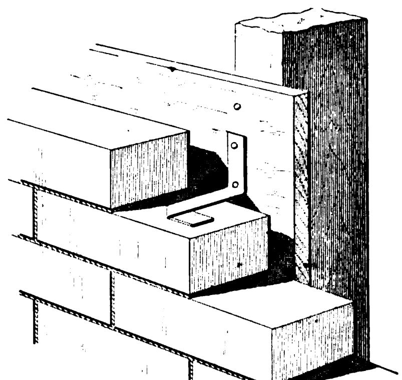


Fig. 6.—One Method of Securing Brick to the Studding.

everything within, while with the brick veneered buildings the frame will be strong enough to carry everything away bodily, the same as with a frame structure.

Proportion.

From H. B. GALLAWAY, *Baltimore, Md.*—In reply to the inquiry of "H. R. C." in the September number of *Carpentry and Building*, in which information is asked with regard to proportion, I submit the following: "H. R. C." must bear in mind that the whole secret of design in architecture is summed up in the terms Proportion and Expression. The difference of one style from another is merely derived from the form and proportion of the openings. Proportion is not confined to ratios and dimensions, but its influence is felt in the design of carpets, wall paper and decoration applied to furniture. We often see patterns obtrusive and distractive, owing to the want of quiet surface; furniture full of unrestful twists and turns, and carving which distracts rather than pleases, and all because the artist has not realized the sense of harmony and proportion between the plain parts and the ornamental. To study applied design the student should not confine his whole attention to examples in the art he is studying, but have models which will show him the most agreeable combinations. In this way he can realize for himself the proportion between structures and ornaments that accompany them. It is in this way that the student will learn the true value of proportion in the art of design and not merely regard the hights and widths of openings, the proportions of columns and entablatures and apartments as the only portions to be recognized in architecture. With regard to the parts that go to make up a building, the following information is that which I have gathered from different sources, merely by carrying in my pocket a small memorandum book and noting at the time the necessary particulars. Taking the rooms, and beginning with the dining room, we ask the question, What size should it be? The table is 3 feet wide. Persons sitting at the table require a space 16 inches from the table to the back of the chair. The space for serving between the chair and the wall should not be less than 30 inches, thus giving 10 feet 8 inches as the minimum width, which will not allow for furniture against the walls. With regard to the length of the room, we have 30 inches as the space a person occupies lengthwise, which gives, with two at the side and one at each end, a total length of 7 feet 6 inches, or 8 feet 6 inches if the table has rounded ends. We can therefore say that a dining room of the smallest dimensions possible should be 11 feet wide by 12 feet 6 inches in length, having a chimney in one corner and a sideboard and buffet in the other. The parlor should be square rather than oblong, but having some marked departure from a strictly formal outline in the arrangement of base, &c. The sitting room and library should be square, so as not to separate the family into informal groups. The kitchen will be found more serviceable if it is oblong.

The proportion between the width and hight of single doors is as two is to five; that of entrance doors, as one is to two. With regard to sliding or double doors, the hight equals four-fifths of the width, or about one-tenth greater than single doors. The width of stile and muntin equals three-sevenths of the width of the door; the bottom and lock rail, one-tenth of the hight and the molding on panel one-quarter the width of the stile. The timbers in a frame house will run in about the following manner: For light frame houses the sills should be 6 x 4 inches or 6 x 6 inches; the joist, 2 x 6 inches, 16 or 22 inches on center; posts, 3 x 5 inches; ledger board, 1 x 6 inches; studding, 2 x 3 inches, 16 inches on center; plates, 3 x 4 inches; inside studs, 2 x 3 inches, and rafters, 2 x 4 inches, 24 inches on center. In a medium frame house the sills should be 6 x 7 inches, 7 x 8 inches or 8 x 8 inches; the joist, 2 x 8 or 9 or 10 inches, 16 inches on center; window and door studs, 3 x 4 or 4 x 4 inches; ledger board, 1 x 7 or 8 inches, or else girt 4 or 5 x 7 or 8 inches; plates, 3 x 4 inches; rafters, 2 x 6 inches, and studs, 2 x 3 inches, 12 inches on center. For a heavy frame house the sills should be 8 x 8 or 8 x 10 inches; side girt, 5 x 8 inches; end girt, 6 x 8 inches; first floor joist, 2 x 12 inches; second floor joist, 2 x 10 inches; third floor joist, 2 x 8 inches; outside studding, 2 x 5 inches; inside studding, 2 x 4 or 5 inches; window and door studding, 3 x 5 inches; rafters, 2 x 8 inches; valley and hip rafters, 3 x 8 inches, and plates, 3 x 6 inches.

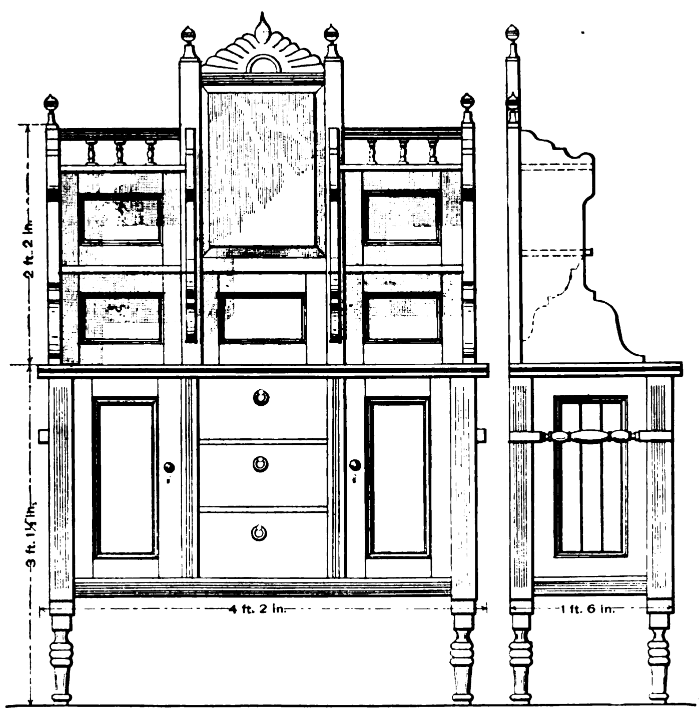
For common windows the width of sash is 4 inches more than that of the glass and the hight 6 inches longer, so that a two-light wide and a four-light high window of 10 x 12 glass is 2 x 4½ feet. The approximate rule for lighting is, square root of solid contents of apartments equals square feet of glass. In mortising joists into a header place the mortise at the center and one-sixth the depth of the joist. The depth of the fire place is 12 to 15 inches; the width of the front 48 to 30 inches; the back 8 inches less than the front and the hight 33 to 36 inches.

Finishing Pine Floors.

From D. M., *Fishkill Landing, N. Y.*—I desire to ask some of the practical readers of the paper if they will give me information with regard to filling and polishing Georgia pine floors. I want something that will stand constant wear.

Design for a Sideboard.

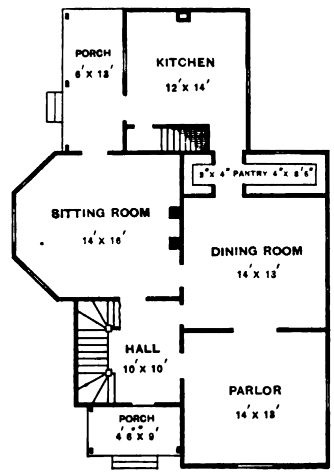
From G. N. H., *Bristol, Conn.*—In the April issue of the paper I notice a call from "L. J. F.," Chartley, Mass., for a design of a sideboard, and in reply I send sketches of one which I built of native oak. I selected the finest grain I could get, using no quartered oak except in the panels of the doors. The panels in the top of the doors are carved with oak stems and leaves, with acorns attached. Any design, however, can be used for the purpose. The legs are 2¼ inches, square, turned, and 12 inches from the floor end of the panel is 18 inches wide and the top of the sideboard 19 inches wide, with two beads around the edge and ends. The partitions between the doors and drawers run down and meet the bottom with tight joints. The doors are furnished with locks, and the drawers are so fixed that when the top drawer is locked the others are fastened. The top is of general frame work, the five panels being in one line of paneling and the glass frame made so as to plant on the face of the center panels and continue down to the top of the sideboard. It is fastened to the panels with glue and round headed brass screws. The small brackets are fastened to the glass frame on the outside edge. These brackets are glued and screwed to the glass frame from the back side, while the shelves are glued into the brackets. There is a chance for a little more carving on these small brackets, as well as the large end brackets, if additional ornamentation is desired. I had some old oak which was very dark, and I made the large brackets of it without any carving. The top piece, which carries the spindles, is fastened to the rear side of the glass frame, so that the spindles set in a little from the edge of the shelving. The latter are of ½-inch stuff, the brackets of ⅞-inch stuff and the outside end brackets of 1⅛-inch material. The glass frame is 1 x 2 inches in size. I ran a cove on the line to the body of the sideboard. They are not exactly, however, like the drawing which I send. In the end is also a turned piece running across the panel and gained in the legs in such a way as to serve the purpose of a handle for carrying the sideboard when occasion requires. The end panel is of narrow oak, matched and beaded with rails and stiles. The same sets back from the face of the legs ¾ inch, which gives plenty of room to grasp the handle. The piece crossing under the doors is 2¼ x 2 inches and is framed into the legs, the bottom resting the long way and showing the thickness of the lumber, with ½ inch bead. The sides of the inside, while the piece across the top is solid beaded. The ornamental piece is just set in between the stiles, with dowels in each end, so it can be taken out at any time. In fastening the top I used two dowels near the glass frame to hold the back, and screwed up through the top of the sideboard into the side brackets. If a long screw is used it holds the top very rigidly. The use of the screws is to separate the top at any time when necessary, as in the case of moving. I think that glass in the small panels would answer very well; and if I have the opportunity to make another I shall try the glass, as I like this plan better than that where they are built down to the floor. If my brother chip has any idea of carving he can display to good advantage a design on this style of sideboard.



Design for a Sideboard Contributed by "G. N H."

Roof Plan for Two-Story Cottage.

From E. K., *Upper Tract, W. Va.*—I send floor plan of a house which I expect to build, and desire to ask the readers of the paper for a roof plan which will give a neat and attractive effect. The house is to be a two-story structure and will be used as a country residence. It will stand on rising ground about 300 yards from the road. It will be covered with a metal roof. I hope the readers will send a variety of roof plans for the building, some showing a tower over the hall, and others with this feature omitted.



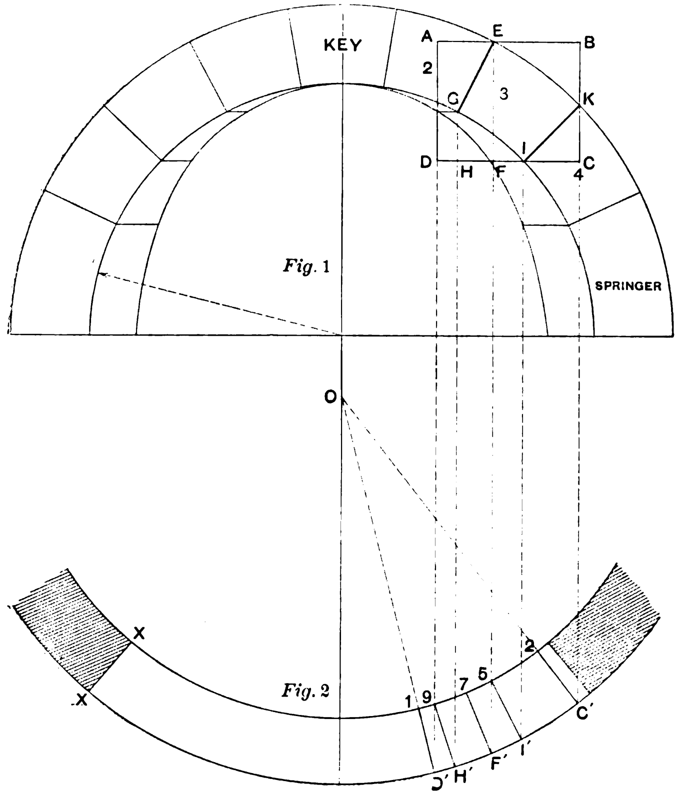
Floor Plan Accompanying Letter from "E. K."

Smoky Chimneys.

From J. R S., *Stonington, Conn.*—Some years ago I built for myself a house, and soon after moving in it was found that the kitchen chimney smoked furiously when the wind came from a certain quarter. I had the top carried up several feet higher but the evil was not remedied. Resort was then had to two or three ventilators, one of which proved to work very well. This continued for about a year, when the ventilator dropped from the chimney, and upon examination it appeared to be nearly eaten through from the effects of the products of combustion and atmospheric influences. I did not feel like expending more money upon patent ventilators, but after looking into the laws which govern the movement of air, I simply and effectually remedied the evil by contracting the mouth of the flue. This was done by inserting and cementing in the flue a short section of 6-inch Akron drain pipe. Since then I have had no trouble with gas and smoke. A number of my neighbors have suffered from these things, and are now adopting the plan which I have described. The reason for this simple and efficient remedy is plain enough. By the means employed the velocity of the current of air at the mouth of the chimney is made so great that unusual winds do not interfere with it. I have been a reader of *Carpentry and Building* for many years, but do not recollect seeing any article dealing with the subject of smoky chimneys in a manner similar to that which my experience has taught. I send the above in the hope that it may interest other readers who may possibly be in the same predicament that I once found myself.

Circle on Circle.

From D. F., *Philadelphia, Pa.*—Some months ago a correspondent asked for an explanation of the circle upon circle problem, as given in *Carpentry and Building* for November, 1892, by W. G. Wood of Australia. The system requires too many patterns to illustrate it in one article, but I offer an explanation of the point referred to by the correspondent named. I have never cut an arch with the extrados circle, but have when it was flat. Referring to the diagram which I send, let Fig. 1 represent the elevation of an arch in a circular wall and Fig. 2 the



Circle on Circle.—Diagram Accompanying Letter from "D. F." of Philadelphia.

plan, X X indicating the depth of the soffit. We will now work stone No. 3 as an example. Square the stone A B C D for the hight. Project C D downward, as D' C'. Connect D' C' with center O, from which the plan is drawn, when 1 2 and D' C' will represent the thickness and width. We now have the size of stone required. The next step is to work No. 3 arch stone. First work D C and then apply the bottom pattern 1 2, D' C' and work the face of the stone. We are now ready to work the joints. From G E and I drop perpendiculars to cut the plan at H' F' I'. Connect the points with the center O. Apply the plan pattern to D C and mark C' 2 from C, I' 5 from I, F' 7 from F and H' 9 from H. Measure up C K and connect I with K, which will be the line for one joint; also H C and connect E G. A part of the curve E K and G I can be used, which will be near enough for practical purposes and save the trouble of face development.

We will now work the joints. Through K work a draft to be out of wind with C' 2 and work off the wedge C I K. Through G work a draft to be out of wind from H' 9 and work the line E G, the point E being out of wind with F' 7. Work off the triangle B E K, the thickness being represented by X X in the plan. Take part of the inside curve for the back and work the soffit. All the other stones are worked in a similar manner. This system requires a plan pattern only, the different points for joints being found by measurement. There is another way of getting out a circle on circle arch the soffit of which runs right in the wall and does not converge to the center. If a diagram of such an arch is desired, I shall be glad to furnish it with a full explanation.

Note.—We have no doubt that the correspondent making the inquiry, as well as many others, will be interested in the method suggested by "D. F.," and we trust he will favor us with drawings and descriptive particulars.

Problems in Bridge Carpentry.

From W. I., *Mount Vernon, N. Y.*—Replying to the question by "L. H. H." of Sullivan, Ind., in the December issue of *Carpentry and Building*, as to whether, in the judgment of the readers, a sagged bridge timber could be raised by the method described by him, would say that the arrangement shown in the sketch will raise the girder, as "L. H. H." has a good combination of differential levers. Referring to the diagram here presented, we will suppose that between A and B there is a force acting through the jack screw of 1000 pounds in the direction of *a*, and 1000 pounds in the contrary direction toward *b*. At E we also get 1000 pounds downward pressure in the direction of *e*, consequently, as the points C and D are double the distance from the fulcrums F F that A and E are, where there is a downward pressure of 1000 pounds, there will be exerted at each of the points C and D a downward pressure of 500 pounds, or a total of 1000 pounds. Now, as we have seen that there is at A an upward pressure of 1000 pounds, and as G is one-half the distance of A from the fulcrum E, it will readily be seen that there will be an upward pressure of 2000 pounds at G, which is resisted by only 1000

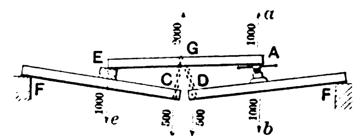


Diagram Illustrating Problem in Bridge Carpentry Submitted by "W. I." of Mt. Vernon, N. Y.

pounds acting downward at C and D. Therefore, there will be 1000 pounds, or the same power that is applied at the screw, tending to raise the timbers to a level position.

Chimney Flues and Their Drafts.

From CRITIC, *New York.*—It is an axiom that two things exactly alike will act identically the same when the conditions are the same. This is true of the flues of a residence as of anything else, although many builders will dispute it. If built alike and situated and used in the same way, the results will be equally good in each one.

There are, however, many slight changes or oversights that may, unknown or unnoticed by the builder, serve as a complete ruination of the draft of a flue. For example, we have six houses, each with a single chimney and a single flue, the latter, however, with four openings—two on each floor. In four of the houses the draft is good and no trouble from soot is experienced, while in two soot has accumulated rapidly. In the first four direct draft stoves are used in each four rooms having openings to the flues. In the unfortunate two only two stoves with return drafts are used. The brick work is the same in all, so, evidently, the heating apparatus or its arrangement is at fault.

First examine the apparatus. Any check in the passage of the smoke and gas from any heating apparatus means a loss of heat to the smoke, and (here is the valuable point) is, of course, retained in the room or building. The loss of heat to the smoke and gas means an increase in weight. It is not so light as when hot, and there is less tendency for it to rise. This makes the draft sluggish, and the small particles of carbon and ash that give smoke its color are carried with greater difficulty and are to a much greater extent left in the flue as soot. This is one reason. Next, examine the arrangement of the openings to the flue. There are four in all the chimneys. And here it will not be amiss to say that never should there be a flue with more than one fireplace, and it is best never to have more than one opening of any kind below the roof. In the "good" flues each opening is filled with an inflow of warm air and smoke, and each helps the draft of the others. In the "poor" flues two openings admit fairly warm smoke, while the others leak in cold or cool air, the latter not only not helping the draft but seriously injuring the movement by chilling the air that otherwise would rise because it was warm.

Thus, where at first glance the conditions are the same and results dissimilar, we find on examination that the things themselves are quite different.

Leaving the example taken, it may be suggested that a flue on the inside of a residence will burn better than one in an outer wall, and, quite as important, will give a far larger amount of heat to the building. If a flue is placed on the outside it should have 8 inches of brick work on the exposed side, all the way to the cornice. The interior walls of a flue should not be over 4 inches, as here the escape of heat from the smoke means the gain of warmth in the house. Tight brick work is absolutely necessary for a good draft, and it is better, if the surface is plastered, to coat the outside rather than the inside. A flue circular in cross section is the best, and the shape nearest approaching this is most desirable. A square is therefore the best shape for ordinary brick work, being 8 x 8 inches for the usual fireplace or range. Triangular flues are the worst a builder can conveniently make. They have over four-fifths the wall area, which means proportional loss of heat and proportional loss of speed, while their cross area is only half. Besides, the sharp angles offer additional friction, and so the resistance is even more than that of the square flue, while the volume is only half.

The man who builds a straight flue of good brick work above the top of the house and who has but a single opening to each flue need have no fear as to the results, provided his neighbors do not interfere.

Strength of Steel Roof Truss.

From H. B. G., *Baltimore, Md.*—I send herewith a number of sketches showing a roof truss, and would like to have some of the practical readers of the paper calculate the strains upon it, both graphically and arithmetically. In Fig. 1 of the sketches is shown the diagram of a steel truss having an inclination of 30°, a rise of 16 feet 6 inches, camber 18 inches and weight 3900 pounds. Fig. 2 represents a detail at the joint A in Fig. 1, while Fig. 3 shows a side view of the shoe indicated in the previous sketch. Fig. 4 illustrates the joint D; Fig. 5, detail of joint at E; Fig. 6, detail at B, and Fig. 7, detail of joint at C.

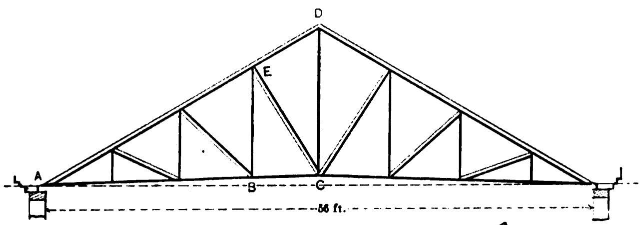


Fig. 1.—Diagram of Truss

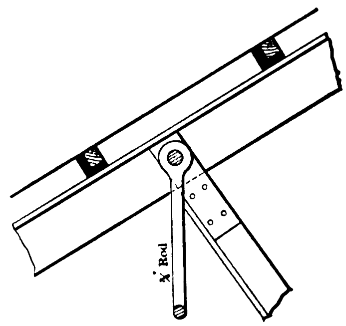


Fig. 5.—Detail of Joint at E.

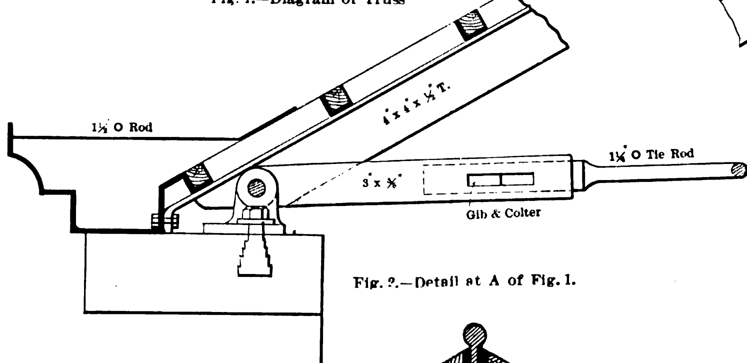


Fig. 2.—Detail at A of Fig. 1.

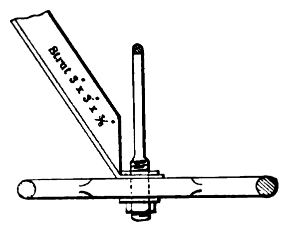


Fig. 6.—Detail at B.

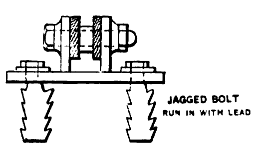


Fig. 3.—Side View of Shoe Shown in Previous Figure.

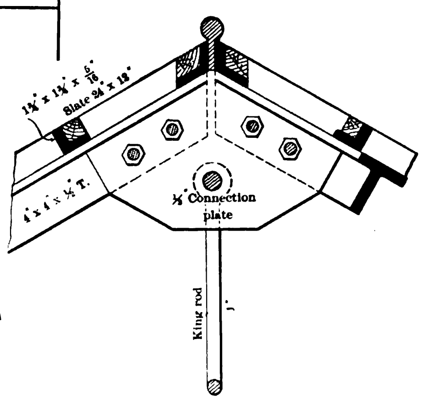


Fig. 4.—Detail at D of Fig. 1.

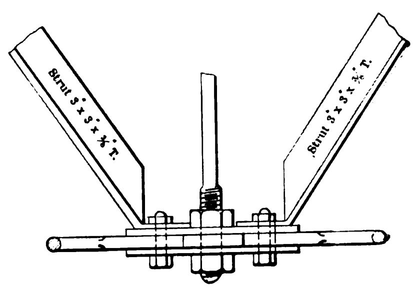


Fig. 7.—Joint at C of Fig. 1.

Strength of Steel Roof Truss.

Durability of Wire Nails.

From J. R. C., *Oswego, Ill.*—Are wire nails giving satisfaction as to durability? I am inclined to think that they rust sooner than steel nails, especially in shingles.

Note.—This question affords the opportunity for readers who have had experience with the use of nails of both kinds mentioned to express their views, as well as to describe particular jobs where these nails were used and in which the elapse of time has shown a difference in the results accomplished. In this connection it may be interesting to give an instance lately brought to our notice by a concern dealing in hardware in New York State. We are told that something like five years ago a factory building had a roof put upon it, the contractor using steel wire nails on the job. About a year ago the owner of the building brought to the firm referred to a hemlock board taken from the roof, in which was a cut nail as well as a number of wire nails. The cut nail is said to have been as good as the day it was driven, while the wire nails were rusted and eaten away to such an extent that in the case of some of them there was scarcely anything left. In fact, the roof was in such shape that the owner was obliged to renail the entire surface. It may be that readers of the paper have met experiences of a similar character in the course of their business career, and to them we extend an invitation to write us, discussing the question raised by our correspondent.

PRACTICAL HOUSE PAINTING.

By ARTHUR S. JENNINGS.

THE carpenter and builder often desires to employ his own men in executing a job of painting in preference to subletting the work to a master painter. It is not the intention to enter into the question of the wisdom of this course, but rather to give some information on the subject of painting in general, and the best method of executing it, for the use of those engaged in the building trades, who will find such knowledge of advantage, whether they employ their own men or not. That it is economical to keep property well painted does not appear to be generally appreciated among house owners. The most important function of paint is its preservative qualities, and if wood work be kept well covered with paint, the coats being renewed as often as is necessary, there is no reason why the wood—all conditions being favorable—should not last for an almost indefinite period. No practical builder would leave a tin roof long unpainted, or neglect to give it a new coat every few years. If he did not do this the tin would rust and a new roof covering would be necessary. What is true in this case is equally true with wood and other work, and in building cheap houses it should be laid down as a rule, never to be departed from, to well paint the work at first with good materials and to keep it well painted thereafter.

EXTERIOR PAINTING.

It will be convenient to first consider exterior painting, although many of the remarks which follow apply equally to all kinds of paint work. The best time of the year in which to do painting is generally supposed to be spring and fall. The hot weather, however, has its advantages. The pores of the wood in dry weather are more open than they are at any other time and are therefore in a better condition to receive the paint. Moreover, the warm weather hastens drying, because there is a greater quantity of oxygen in the air. It may be said that there is the objection to painting in summer weather that the freshly painted surface is likely to become marred with small flies and other insects which will adhere to the surface. This objection, however, is not so real as it appears at first sight, as flying insects are just as plentiful in the fall as they are in the summer. But whatever time of the year is chosen, in applying paint to wood work it is necessary that it should be thoroughly dry, and therefore after a shower of rain or a storm, two or three days should be allowed to intervene before commencing operations. When the lumber is not thoroughly seasoned it is a good plan to allow a house when finished to remain a month before applying any paint. Some people have an idea that it is best to prime new wood work as soon as possible. This is a mistake. Always leave the wood at least a month if possible and more if convenient. Knots and sappy places should then be given a coat of shellac, which will effectually prevent the resin and sap from coming through the paint afterward. By "shellac" is meant shellac gum dissolved in alcohol. This may be bought ready made at any store keeping painters' materials, but it is not difficult to make it one's self by adding pure alcohol to the dry lac and stirring until dissolved. For bad knots nickel leaf may be used instead of shellac.

The bad places having been shellacked and the surface sandpapered down and well dusted off with a dusting brush, it is now ready to receive the first or priming coat.

THE PRIMING COAT.

The priming coat is the foundation of the paint work, and although every practical builder knows the importance of providing a thoroughly strong and durable foundation for his brick work or masonry, when he attempts painting he is often inclined to use any rubbish that may be called paint, with the mistaken idea that anything is good enough for the first coat, which will be covered up. Not that the carpenter is the only person to blame in this respect, as there are many master painters who are in the habit of forming a priming of the waste of paint pots instead of employing a material that is especially adapted for the purpose. The object of the primer is to force the particles of which the pigment is composed into the pores of the wood to give a grip to the coat, as it were; just in the same way as the plasterer on a wall requires a roughtened surface in order to obtain a key. The second object of the primer is to give a thorough hold and substantial surface to support the coats of paint to be subsequently applied. The importance of the particles of the pigments entering the pores of the wood being recognized, it will be seen that a coarsely ground paint will not be suitable for the purpose. Perhaps the best primer is one composed of very finely ground yellow ocher; this is comparatively cheap, and answers the purpose admirably. Lead mixed with a little black is often used. Most of the paint manufacturers make a special paint for priming, and, as a rule, it is economical to use it, especially if the workman who is doing the painting is not very well up in the subject. In England the custom is to use in best work red lead for a primer.

In applying the primer it is necessary to use a good deal of "elbow-grease"—that is, to rub it in well. Do not, therefore, employ a man for this work who is inclined to be lazy, as he will very likely use his brush more in the way that varnish should be applied and will flow the paint on instead of rubbing it in.

We will suppose now that the whole of the wood has received a priming coat and that care has been taken that no portion has been skipped, even if it is not exposed to view.

Some so-called painters are inclined to skip all little edges and places here and there because they cannot be seen, but this is a very objectionable practice, because it leaves exposed to the elements portions of the wood work that are sure to decay later on. Almost without exception it is advisable to commence to apply the paint at the top, because this saves trouble and the work may be finished as it proceeds.

PUTTYING.

The next operation is to putty up holes and cracks. This sounds simple, but it is of more importance than is generally supposed. There is on the market a great quantity of rubbishy putty made of marble dust, ground oyster shells, sand, &c., mixed with rosin oils and sometimes even with coal oil. Good putty is simply a mixture of fine whiting (chalk) and pure linseed oil. Some manufacturers add a little cotton seed oil to prevent the linseed oil hardening too quickly. It is difficult to say exactly how good putty may be distinguished from bad, but if oil other than linseed is used it will usually sweat out on the surface when the keg or can containing it is left for any considerable time. On opening a package of pure putty it will be free from a glossy surface on top. If the hand be plunged into it, it will possess a uniform consistency and smooth feeling when rubbed between the thumb and finger. Perhaps the best test is that of smell. Pure putty will always have the characteristic odor of linseed oil, while that mixed with adulterated materials will generally "stink," in the painters' parlance. The effect of using bad putty is that it will drop out of the holes and will sometimes bleach the color out of the paint applied on top of it.

It has been said that the putty should be applied after the priming coat. Such simple advice might be laughed at by the practical painter, but the writer has often seen, in the specifications of even prominent architects, a clause to the effect that puttying is to be done after the priming, as, of course, it should be, or otherwise the dry wood will soak out all the oil from the putty and leave it useless.

Use the putty freely, but do not expect it to take the place of wood; it should only be used for filling up cracks and knot holes. While on the subject of putty it may be remarked that in glazing sash, especially those that are much exposed (in skylights, for instance) it is a good plan to add about one-third portion of white lead, which will give a harder and more durable cement.

NUMBER OF COATS.

Before considering the paint itself a few words may be said as to the number of coats that should be applied. In new work three coats should be the minimum for good jobs and an extra coat will not be wasted. Sometimes two coats are given and the result is poor work. Whatever the color of the priming coat may be, the color of the second coat should be as nearly as possible the same as that of the finishing coat. In two-coat work the primer must be similar in color to the finishing coat. It is advisable to allow two or three days to elapse between each coat, but where this is impracticable at least that length of time should be allowed after applying the primer so that it may become quite dry and hard. *(To be continued.)*

IT is announced in an English journal that the house which was Handel's birthplace is offered for sale. The house—wherein Handel's spinet, a clavichord, was discovered—is now No. 6, in the Nicolai-strasse, on the large Schlamm, at Halle-on-Saale, and stands in the midst of extensive grounds. The buildings are stated to be in good condition, having been repaired and decorated, with due regard for the older portions, at the 200th anniversary jubilee of the composer. We understand that the Incorporated Society of Musicians, whose annual congress will shortly be held, have undertaken to place tablets upon houses in London wherein certain eminent composers died.

AN English architectural paper says in a recent issue that an imitation of black walnut may be manufactured from pine. To accomplish this, one part of walnut peel extract is mixed with six parts of water, and with this solution the wood is coated. When the material is half dry, a solution of bichromate of potash, with water, is rubbed on it, and the made walnut is ready for use.

DOMESTIC ELECTRICAL WORK.*

IN THE PREVIOUS chapter was illustrated a simple single bell circuit. The next step will be a circuit with two or more bells operated from a single push button. Where a house is too large, or so constructed that one bell cannot with certainty be heard in all parts, it is often necessary to use a number of bells on one circuit, all of which will ring at the same time. In a house having a hall and stairway, and where two bells will be sufficient, one should be placed on the casing of the stairway well hole, so that it can be heard in the front part of the house both up and down stairs; the other should be located in the rear part of the house.

Fig. 2 shows the method of connecting bells in multiple arc, and is considered by many the most satisfactory way of operating two or more bells on one circuit. In this case run the wire from push button to bell A. Run a wire from bell B to battery and from battery back to push button. Connect a wire to opposite binding post on bell B, and splice to wire previously run from push to bell A, as shown in Fig. 2 at C.

To make the splice cut away the insulation on the main wire about ½ inch and scrape bright and clean, then cut away the insulation for about 2 inches from the end of splice and scrape; wrap this end around the bared space of main wire tightly, keeping the coils closely together, as shown in Fig. 3. This will insure a good metallic contact and will also prevent the splice from oxidizing and thus destroying the necessary metallic contact.

To proceed with the wiring, connect a wire to the other binding post on bell A and splice to main wire running from bell B to battery, as shown at D in Fig. 2. On this circuit three cells of battery should be used to obtain a good sharp ring from the bells.

In Fig. 4 is shown the common (and the writer believes the best) practice of connecting bells in series—*i. e.*, wiring from one bell directly to the next, and making all but one single stroke bells. This latter precaution is necessary, as the entire current passes through each bell, and unless the adjustment and tension of the armature springs were exactly alike in each bell (which is practically impossible), the vibrations of the first bell would interfere with the others, and as a consequence none of them would ring. Any ordinary electric bell can be changed to a single stroke very readily, as shown in Fig. 5. A and B represent the binding posts of bell; C is the magnet; D the regulating contact screw; E the armature, carrying the hammer, and F the armature spring.

In the construction of the ordinary vibrating bell, the current is carried from the binding post A to the magnet, and from the magnet to the iron frame of the bell, thence through the armature to the contact screw D, and from there to the binding post B. By this arrangement the circuit is broken every time the magnet attracts the armature by separating it from the contact screw. The circuit being broken the magnet no longer attracts the armature, and the spring draws it back and again brings it in contact with screw D, whereby the circuit is again closed and the armature is again attracted as before, and so on.

In order to change a bell of this description to a single stroke, all that is necessary, as will be seen, is to disconnect the wire from the contact screw D and connect direct to the iron frame in such a manner as will leave the contact screw D entirely out of the circuit, as shown by dotted lines in Fig. 5. By this change, when the armature is once attracted it will remain there until released by some other means, which, in the arrangement of bells just described, would be by the one vibrating bell put into the circuit.

(*To be continued.*)

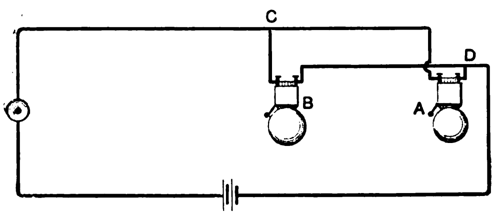


Fig. 2.—Two Bells Operated by one Push, Connected in Multiple Arc.

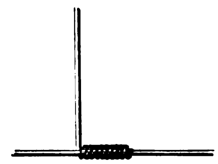


Fig. 3.—Splice for Connecting Branch to Main Wire.

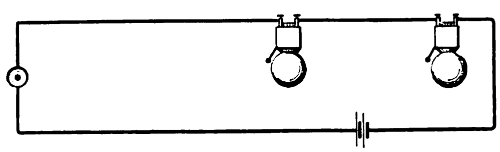


Fig. 4.—Two Bells Operated by One push, Connected in Series.

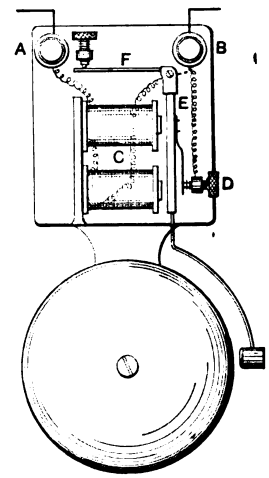


Fig. 5.—Method of Changing Vibrating to Single Stroke Bell.

Domestic Electrical Work.—Sketches Illustrating Multiple Bell Circuit.

* Copyrighted, 1893, by David Williams.

Architecture of Early California.

A correspondent of one of the New York evening papers, writing of early California days and the habits and customs of the people, touches upon the houses they built and in which they lived. He says the architecture of the houses of the Spanish and Mexican pioneers in California was a combination of all types—the Romanesque, Arabian, Moorish and Grecian. Out of these grew what is called the Spanish type. Very few of these ancient Spanish *casas* remain. The ruins show the splendor and comfort of their former occupants—the Spanish grandees who came to "New Spain" with grants of land large enough for a principality. The houses of the masses were built without a view to comfort or convenience. They were hastily and clumsily constructed, merely as a place where the pleasure-seeking Spaniards might eat and sleep. They lived out of doors and returned to their houses only when there was no other place to go. These houses were of adobe, with coarse timbers for the frame work and a tile roof—an improvement only over the huts of the Indians. They were of one story, sometimes whitewashed without, plastered within and had board floors. The interior was very rude, the only furniture being a bench along the wall, a small center table and a few chairs of state, plaited with thongs of rawhide. In an alcove and in the corners were the beds, separated by red curtains or board partitions. No inclosure protected the house, and little or no attention was given to gardening or floral adornment of the premises, although the brightest flowers grew in the wildest profusion at their very doors during the entire year. Their beds were of rawhide, stretched lengthwise, and fastened to head and foot pieces. Frequently the door was but a frame covered with rawhide. The houses seldom had chimneys; most of the cooking was done in the back yard. There was scarcely any Mexican family so poor that it could not command the services of an Indian slave.

This type of house is almost extinct. A few exist in the remote rural districts of Southern California, where the railroad has not penetrated and the enterprising American has not been in evidence. The "blue-blood" Castilians, however, had a better class of houses. They were of block shape, and around the inner court was a gallery or corridor upon which opened the rooms. In this court flowers bloomed, making the soft air fragrant with varied perfumes, and fountains played, the sparkling waters cooling the air. This type of architecture was brought over by the grandees from their native villages in Spain. It is also seen in the "Spanish quarter" of New Orleans. These houses were well supplied with imported furniture—the *conquistadores* bringing from Spain all their possessions excepting their *casas*, or castles.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers.

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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.

National Association of Builders.

Programme

of the eighth annual convention, Boston, Mass., Tuesday, Wednesday and Friday, February 13, 14 and 16, 1894, Convention Hall, Mechanics' Building, Huntington avenue. Electric cars (Huntington avenue and Cross Town), which pass the door of the Convention Hall, may be taken on Tremont street at any point between the Parker House and Boylston street. General headquarters for Monday and Monday evening. February 12, will be at the Master Builders' Association, 166 Devonshire street. Headquarters thereafter during the entire convention will be in Parlors 11 and 12, at the Parker House, Tremont, corner of School street.

Order of Business.

Tuesday, February 13, 1894.

MORNING SESSION.

Address of welcome, by Hon. Nathan Matthews, Jr., Mayor of Boston.

Annual address by the president.

Appointment of Committee on Credentials.

Recess.

Report of Committee on Credentials.

Roll call.

AFTERNOON SESSION.

Appointment of committee to report time and place of next convention, and to nominate officers for 1894.

Annual report of secretary.

Annual report of treasurer.

Reports of standing committees.

Reports of special committees.

Distribution of reports of filial bodies.

Submission and reference of resolutions.

Wednesday, February 14, 1894.

MORNING SESSION.

Roll call.

Submission and reference of resolutions.

Discussion of reports from filial bodies, with the object in view of securing suggestions which will lead to improvements in the administration of exchanges and the more effectual carrying out of the recommendations of the National Association.

AFTERNOON SESSION.

Address on "The Relations of Employer and Workman," by Hon. Carroll D. Wright, U. S. Commissioner of the Department of Labor.

Discussion of Mr. Wright's address, with the purpose of taking action looking toward the improvement of our form of permanent arbitration.

Friday, February 16, 1894.

MORNING SESSION.

Roll call.

Discussion of the Uniform Contract, with the purpose of securing suggestions as to possible improvement of the form, it being understood that the only action which can be taken by the association is to recommend our delegates to the Joint Committee on Uniform Contract to urge the adoption of changes, which, after discussion, may be approved by the convention.

AFTERNOON SESSION.

Report of the Committee on Resolutions and action on same.

Report of Committee on Time and Place of next Convention and nomination of officers.

Election of officers.

Naming and election of directors for 1894.

Unfinished business.

Miscellaneous.

Adjournment.

Preliminary Meetings.

A meeting of the directors of the National Association is called for February 12, at 10 o'clock a.m., in the rooms of the Master Builders' Association, 166 Devonshire street, Boston, Mass.

Provision has been made for meetings of all committees, standing and special, on February 12, at the same time and place.

Badges.

The Master Builders' Association of Boston will provide distinguishing badges for all the cities represented in the convention, and therefore no badges need be provided by any of the filial bodies for their delegates or visitors.

Intermission.

On Thursday, February 15, an intermission will be made in the programme of the convention, to give committees an opportunity to meet and consider subjects referred to them, and to afford delegates and visitors an opportunity to visit places of interest in and about the city without absenting themselves from sessions of the convention. The regular sessions will be resumed on Friday, February 16.

Railroad Certificates.

Delegates and others are reminded that certificates entitling the holder to return fare at one-third of the regular rates are useless unless signed by the National Secretary and countersigned by the agent of the railroad companies. They should be presented to the secretary for signature at the earliest possible moment. (See Circular No. 2 on Transportation.)

Sessions.

The opening session will be called to order at 10 o'clock a.m., Tuesday, February 13; 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 chairmen of delegations.

Entertainment During the Convention.

It is the purpose of the Master Builders' Association of Boston to arrange such entertainment as it has to offer to delegates and visitors in a manner that will avoid the introduction of large events, which would require the simultaneous presence of all those attending the convention. This method will permit each delegate or visitor to accept the hospitalities offered in an individual way, and to suit his tastes and convenience. Committees have been assigned so as to provide each delegation with special hosts, whose only concern will be the entertainment of their particular guests in the way most attractive to them. Souvenir books will be given each delegate and visitor, in which will be found detail of entertainment plan. No banquet will be given, but a reception and smoker will be tendered the delegates and visitors on the evening of the day upon which the convention closes.

Headquarters.

Headquarters for Monday and Monday evening, February 12, will be at the rooms of the Master Builders' Association, 166 Devonshire street. After Monday, February 12, parlors 11 and 12, Parker House, will be open as headquarters for delegates and visitors throughout the convention.

Lunch at Convention Hall.

The fact that the Convention Hall is at quite a distance from the hotels where delegates and visitors have been recommended to locate, and that a return for lunch between sessions would therefore consume much time and interfere with the work of the convention, has caused the General Committee on Entertainment to provide a collation which will be served in the rooms immediately below the Convention Hall between sessions each day.

Entertainment of Ladies.

A committee of ladies has been organized for the purpose of entertaining any ladies who may accompany the delegates and visitors. The headquarters of this committee will be in Parlors 1 and 2, Parker House, and visiting ladies are invited to meet the committee at these rooms as soon as convenient after their arrival.

Transportation.

Application has been made to all railway passenger associations for reduced fare, at the rate of one and one-third fare for the round trip on the "certificate plan," for delegates and others attending the eighth annual convention, and the National Association has guaranteed the fulfillment of the following

Conditions:

Each person attending the convention must purchase a first-class ticket at the regular rate from the point of departure to Boston, obtaining therewith a certificate of such purchase from the local ticket agent. This certificate, upon being signed by the National Secretary and indorsed by the representative of the passenger associations at the convention, will entitle the holder to a return fare, over the same route by which he came, at one-third of the regular rate.

Tickets for return journey will be furnished only on certificates procured not more than three days before the meeting assembles, 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 regular unlimited fares. Certificates will not be honored unless presented within three days after the date of the adjournment of the convention. It is understood that Sunday will not be reckoned as a day. In no case will the reduced rate for return ticket be granted without a certificate properly signed and indorsed as above, and no refund of fare can be obtained because of failure to secure certificate at point of departure.

Notice to Delegates.

All certificates must be presented to the secretary at the convention for his signature and to be vised by the railroad's representative, whereupon they will entitle the holder to a return ticket, over the same route by which the trip to Boston was made, at one-third of the regular fare, subject to the foregoing conditions.

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

By order of the
EXECUTIVE COMMITTEE.
WM. H. SAYWARD, Secretary.

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

Issued from the office of the secretary, January 1, 1894.

Hotel Accommodation.

The General Committee on Entertainment of the Master Builders' Association have issued the following letter to all delegates and visitors: The General Committee on Entertainment, fearing that hotels previously designated may be unable to accommodate all those whom it is now expected will attend the convention, suggests the names of the Revere, the Quincy, and the American House as down town hotels near headquarters, and the Brunswick and Vendome as being nearer the Convention Hall, in addition to the Parker House, Young's, Tremont, Adams and Hotel Bellevue, previously mentioned.

These hotels are all conducted on the European plan, and rooms may be had from $1.50 to $4.00 per day; special accommodation, however, can be had from $4.00 up to any price desired.

Guests will be insured better accommodation if they make early application for their rooms directly with the hotels mentioned.

The committee will be glad to co-operate in locating the guests.

WM. H. SAYWARD,
Clerk of General Committee.

A Phase of Organized Effort.

There is an element in the composition of organizations which is exceedingly important, though seldom considered and rarely, if ever, given its true value, or acknowledged as a factor in the permanency of reforms inaugurated by the pioneers. It is the incapability of certain members to thoroughly realize the full inherent merit of opinions and efforts of others. The quality and standard of every organization is made up and maintained by various individuals, in whom there are varying degress of comprehension of the ethics of their membership. There are always some who depend upon others for the formulation of their ideas and opinions, and for the conception and explanation of methods for securing necessary reforms.

It is an inevitable condition in every organization where reforms of long standing customs are sought that the many depend upon the few. The few are composed of such members as have the faculty of analysis and formulation, and who by the possession of these qualities become the inspiration of the many; the latter are little given to the study of principles involved or to considering where a given course of action will lead. With a keen sense of the falsity which exists wherever wrong customs prevail, the few, after earnest study of a situation, arrive at the causes which produce the condition to be reformed and set about devising the best means to secure eradication of the evils. Methods are suggested and plans are formed to bring about the desired improvement, and the many, with a purely theoretical knowledge of the situation, and dependent therefor upon the pioneers, lend the weight of their numbers to the project in hand. The clear explanation of the situation by the few, together with their earnestness, which is infectious, creates an enthusiasm which promises well for the accomplishment of the object sought. Here is where the element mentioned makes itself felt. The many, having no deep-seated, self evolved conviction of the wisdom of the cause they have been led to pursue, lose their enthusiasm while still retaining their theoretical knowledge of the result which must follow persistence in the right direction.

The sanction which universal usage has given to customs which have grown into recognition as such through long neglect carries with it what is to them ample excuse for continuing in the old ruts. Custom, no matter how inherently wrong it may be, provides a sort of defense in the minds of the many, behind which they can retreat and from which point it is difficult to distinguish between intrinsic right and what appears best, at the moment, for their pockets. Through long established customs it is difficult to see that injustice is possible of removal, or that the application of principle and abstract right is absolutely certain to produce the only true condition of equity. The many, having long yielded to customs in which they have felt that somehow they were party to unjust conditions, accept the opinion and advice of the few as being good, and are filled with enthusiasm to secure the results promised.

It is rare, however, that the opinions of another have sufficient weight to a man who lacks the power of original conception to become his motives for action; their value is not real to him, and his enthusiasm sooner or later flags or dies out altogether. His knowledge of the principles involved being not of himself, he sees only the cause and effect, with no true comprehension of the amount of long, hard work required before old and erroneous conditions can have their specific faults exposed and understood and the value of newer conditions, founded on principle, admitted and established. Seeing only the condition requiring reform, and the results promised by the methods proposed, his enthusiasm for reform is likely to be short lived, because he fails to see an immediate change follow the announcement that methods of reformation are to be applied. The existence of this quality in the membership of an organization should be fully recognized and should be viewed as one of the conditions to be met with in all organized effort. The diminishing of original enthusiasm should never be a cause for discouragement, and should never be accepted as an indication of futility of efforts at reform. Its appearance should be recognized as a natural condition, and should be the source of renewed effort on the part of the few to protect themselves against wrong customs they are seeking to correcct, and to help the many to protect themselves against their own apathy. Universal action is needed in order to secure reform, and even universal action is of little avail without persistence.

Boston Builders' Association.

The remarkably successful administration of the affairs of the Master Builders' Association of Boston offers a most valuable example of the possibilities which exist in all similar institutions in large cities. This association, which has been in existence only nine years, owns the building which it occupies, and holds a position in the business world of the city which secures for it full consideration in all matters which pertain to the building interests. The property held by the association has an assessed valuation of $250,000, but its actual market value is much greater, probably over $400,000. It was purchased five years ago and the price paid was $250,000. The net earnings of the association from rentals and annual dues of the members, after allowing ample sums for repairs on the building, the maintenance of the exchange rooms, &c., range from $18,000 to $20,000 per year. The spirit which actuates the members of the Master Builders' Association is demonstrated by the fact that the sum necessary to meet the expenses of altering the building into its present form, which was undertaken some three years ago, in amount over $80,000, was subscribed entirely by the members, who were secured by the demand notes of the association. This floating debt has now been reduced to $60,000, and it is now proposed to issue second mortgage bonds at 6 per cent., to run ten years, sufficient to cover all outstanding notes. The accumulation of yearly earnings will enable the association to meet the second mortgage bonds at maturity, to reduce the first mortgage to a minimum agreed upon, pay a 10 per cent. dividend on the capital stock, and have a surplus at the end of the ten years of over $60,000, thus leaving the association in possession of property amounting to at least $200,000 over and above all indebtedness. These computations are based upon a very conservative estimate, and allow for a more than average vacancy of offices in the building and for a less membership than now exists, notwithstanding that there are from 10 to 15 applicants for admission all the time. This condition of affairs exemplifies what can be done in organizations of this character, and demonstrates to the utmost the value in which membership is held. The admission fee to the association is $100 and the annual assessment is also $100.

LAYING ZINC ROOFS ABROAD.

THOSE engaged in building operations, and more especially the members of the roofing trade in this country, have always felt greater or less interest in the use of zinc for the covering of buildings, but no appreciable advance seems to have been made in the application of the material. We often receive letters from roofers asking how it should be applied and why it has not come into use here to some extent. We would like to have the subject of zinc roofs discussed in the columns of *Carpentry and Building*, for we think there must be many readers who have had experience in the use of the roof abroad and could tell us of the methods there followed in laying this metal. We print below an interesting account of one style of laying zinc roofs, as furnished by J. B. Marold of Saquache, Col., who gives some particulars of the construction, as well as illustrations of the method of applying the metal. In the early part of his letter he discusses the question of applying the material in this country. Among other things he says:

Concerning zinc roofs, I believe that the American climate, with its great variation of heat and cold and sudden changes, moves the metal more than the more temperate and even climate of Europe. Even there, however, I noticed that zinc had to be treated differently from tin. Standing seams, for instance, would not hold one year. In order to get space for contraction and expansion we employed different methods, but in no case did we put the sheets together in long rolls, but laid each one down separately. The cross seams were located and soldered and fastened down with cleats. On very small roofs it is customary to make a wide lock on the sheet lengthwise, fasten it down with cleats and draw a cap like an open round pipe over the adjoining edges. This style of roofing is shown in Fig. 1.

The most common way, however, and one that always gave good results, was with the use of battens or strips, which are screwed on to the roof between the sheets. Fig. 2 is a sectional view through one of these strips. On the bottom of the batten a strip of tin $5\frac{1}{4}$ inches long and about 2 inches wide was nailed, as shown in Fig. 3, the strips serving the double purpose of holding the sheets and securing the cap that fitted over the top of the batten. These battens were generally 16 feet long, 2 inches high, $1\frac{1}{4}$ inches wide at the bottom and $1\frac{1}{2}$ inches wide on the top. When the sheets were laid and the batten screwed on the sheeting, the strip of tin referred to was bent about the batten and over the edges of the tin, as shown in Fig. 3, holding it securely down, but leaving room, however, for the moving and working of the metal. After the roof was laid a machine-made zinc cap, Fig. 4, was drawn over the battens, as shown in Fig 5. Fig. 6 is a sectional view through batten, showing the way the zinc cap was locked down by the cleats.

I saw a curious variation of this style of roof on a royal castle, in which, instead of raised battens, there were grooves sunk in the sheeting. The valley rafters also pitched toward the center of the roof, where there was a large receiver, from whence the water was carried to the sewer. A plan view of this roof is shown in Fig. 7 of the illustrations.

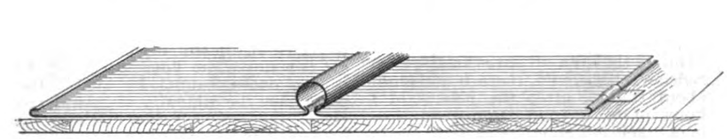


Fig. 1.—Method of Laying Zinc on Small Roofs.

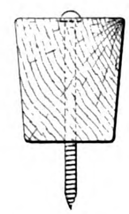


Fig. 2.—Roof Batten.

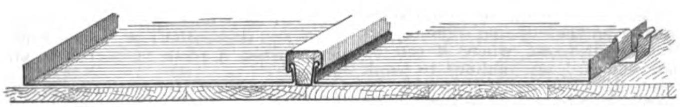


Fig. 5.—Perspective View of Sheets Laid with Batten.

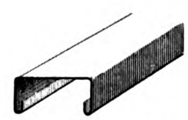


Fig. 4.—Cap with Lock.

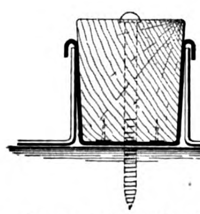


Fig. 3.—Batten with Cleats.

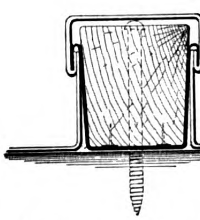


Fig. 6.—Section through Batten and Cap.

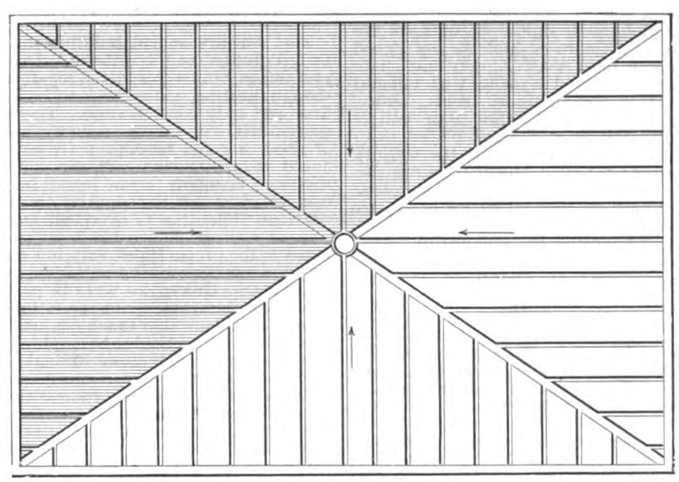


Fig. 7.—Roof Draining to Center.

Laying Zinc Roofs Abroad.—Sketches Illustrating Method of Construction.

WE find the following in a recent issue of *Invention*: It was said a little while ago that an obscure Hungarian priest was the inventor of lightning rods, and not Benjamin Franklin. Now a German Egyptologist, Herr Heinrich Brugsch, claims that he has ample proof that the ancient Egyptians used a form of lightning rod for protecting their temples against discharges of atmospheric electricity, and that

Franklin merely reinvented the same device. But, until he can also prove that Franklin was aware of what the ancient Egyptians had done in this direction, the American is just as much entitled to be regarded as an original inventor.

American School Buildings.

We take the following interesting remarks relative to school buildings from a paper read by Walter S. Pardee, at the Annual Convention of Building Inspectors and Commissioners, recently held at St. Louis, Mo. After referring to the growth of the science of education he takes up the requirements of modern school buildings as viewed from the standpoint of an architect and a sanitarian, and says:

As to the requirements of a sanitary school building and one best suited to the needs of children—say, a common school of 20 rooms: First, it should be as nearly fire proof as practicable. Children do not have the strength and experience of adults and cannot look out for themselves. If it cannot be fire proof reduce the fire risk as much as possible. Wooden partitions, though often used, should be avoided. If outer walls are furred it should be done with fire proof furring. Stairs should be inclosed in brick shafts, and the stairs themselves made of solid material, preferably of hard wood for both risers and treads, with fire proof or slow burning construction underneath them. If floors are of wood on wooden joist, as they generally must be, the spaces between the joists should be cut off with solid plank in addition to the usual bridging. On no account should the floors be raised from the joists for the purpose of circulating air underneath unless all parts are fire proof. Floors should be of good smooth hard wood, closely laid on an under floor, and deadened with mineral wool or something as good. Joists should not run through from wall to wall, and should be so placed as to drop out without tearing the wall in case of fire. The danger from fire can be considerably lessened by judicious planning, so that all rooms are easily accessible to the halls and the stairs. All exits should be so plainly indicated that a stranger would have no trouble in choosing them at once.

LIGHT.

The sanitary school building should be well lighted. This matter has received considerable attention from scientific men. It is claimed that an ideal system would bring in the light from the top of the room and distribute it equally throughout. Many object to this because it appears prisonlike; besides in a building with one room over another it is impracticable. Schoolrooms being generally lighted from side windows it becomes a question as to number and location. It is conceded that the light should enter as near the ceiling as possible, therefore windows reach to the ceiling or nearly so.

POSITION OF WINDOWS.

It has been customary to follow the rule that light should come over the left shoulder, so as to avoid a shadow on the desk from the right hand; but while this is a good rule it is found hard to apply it where several pupils are together, as in a schoolroom, since that which will be left shoulder light for one pupil will not be for some other. In practice an average is struck, and the windows so placed as to properly accommodate the greatest number. With windows on one side only about one-half the pupils get the left shoulder light in some degree when they sit with the left side to the windows. The other half gets the light chiefly in the left eye, or more in the left than in the right. That is a bad arrangement and prolific of unequal vision. This can in some degree be lessened by placing the side windows well toward the rear, and placing some on the rear as well. There is then, however, the objection that the pupils in the diagonal corner furthest from the light are too much in the dark.

In a room lighted wholly from one side, and the pupils placed with back to the light, some curious facts are noticeable. First, the same number of pupils receive left shoulder light, as in the former case—that is, one-half—the other half receives the light over the right shoulder, not a desirable thing and not to be tolerated unless there is enough reflected light to dissipate the shadow cast by the right hand on the desk. If there can be such reflected light, and there is no doubt about that, it gives the best light I know of for so many pupils, since as many get left shouldered light as in the other way, and none of them get it partly in front. That this is the best arrangement for the pupils I think there can be no question, though upon the teacher it is especially hard, though it may be said that the teacher can always move about, while the pupils must stay where they are.

I think it is common to put some windows on the side and some on the end of each room, where it can be done, though I am inclined to think the side light the better, if it could be properly curtained and managed by the teacher. Whatever the position of windows there should be plenty of them.

HEATING AND VENTILATION.

The sanitary school building must be well heated and ventilated. These two things can be considered together, though heating alone used to be the first and only consideration. The requirements call for the right amount of fresh air and heat, properly introduced to the rooms and circulated therein. Economy seems to call for a central plant for the supply. One of the main difficulties to overcome after a good heating device has been provided is the proper inlet, exit and circulation of the ventilating air in the schoolroom. Unless this work be properly done the whole plant is a failure, and it is a fact that much confusion exists as to the method to be employed. The problem is made more difficult of solution because the atmospheric changes are so rapid and radical that no single arrangement of the working parts will answer for any certain time. Obviously the best way to have the air enter a schoolroom would be at openings all over the floor, and it should leave at a like number of openings in the ceiling. That way is not practical where rooms are over one another, and therefore the common way of introducing air into the room is by a single and ample opening. It is let out by another. Where these inlets and outlets shall be placed with reference to each other and the room itself is a question in dispute. Much confusion obtains on this point—perhaps because people believe it is possible to adjust the openings to suit all occasions. The question will be much nearer solution when this belief is eradicated. In some rooms the inlet will be found at the top and the outlet at the bottom; in others it will be the reverse. In some there will be inlets and outlets at both top and bottom; in some others the inlet and outlet on the same side of the room. In others the inlet will be on one side and the outlet on the other. Probably there will be confusion on this point so long as the single inlets and outlets are used.

CIRCULATION OF AIR.

We must have circulation through the room, and we get it in one of two ways. Either the air may enter cooler than the room, in which case, if the inlet is at the bottom and the outlet at the top, a fair circulation will be given; or the air may enter warmer than the room, when, if the inlet is at the top and the outlet at the bottom, a good circulation may be got.

Since it is a fact that air must sometimes enter warm and sometimes cool, so as to maintain the standard of heat, it will be seen that neither arrangements of openings will answer for both cases, and the working parts cannot be so fixed as to give perfect satisfaction. If both inlets and outlets are provided at top and bottom when cool air is wanted, the floor inlet and the ceiling outlet cannot be used. But aside from the difficulty of getting any one to understand it, it would take one person's time to watch the thermometer and manage the dampers. Present practice largely adopts the ceiling inlet and the floor outlet, ignoring the fact that incoming cool air falls to the floor, and poor circulation is the result.

This intermittent lack of circulation is a grave difficulty and hard or impossible to be avoided when the inlet is high and the outlet low, more especially when a room is heated by air alone.

Some engineers try to prevent notice being taken of the difficulty by putting the inlet at or near the floor. When the air comes in warm it rises to the ceiling, distributes, cools and falls to the floor, leaving at the foul-air opening. Under these conditions the air appears to circulate properly, the only objection being a current of hot air striking the pupils. The current of hot air is made less noticeable by a screen. That is, of course, unnecessary when the inlet is above. On the other hand, with the inlet at the floor and the air coming in cool, there is and can be little or no circulation through the room, the air simply entering, flowing along the floor, and leaving at the outlet. This seems to be a case of out of sight and notice, out of mind. The lack of ventilation is not easily discovered, and thus gives a fine chance for the professional quack to show off his system of ventilation, for with his air meter at the inlet and the outlet he finds the full volume of air passing that he guaranteed to furnish, and no one stops to inquire whether that air gets to the proper parts of the room by circulation.

I believe it would be a good system to heat the floors evenly, and always bring the air in cool, provided that the floor heat could be controlled and unpleasant drafts prevented.

(To be continued.)

IT would be difficult to convince the average man that fir is a stronger wood than oak, but such has been proven by actual tests that were made by a fair and impartial committee appointed for that purpose, says an exchange. The timbers used were each 2 x 4 inches and 4 feet long, both ends solidly braced, and the weight applied in the middle of the span. Yellow fir stood a strain of 3062 pounds, common Oregon oak 2922 pounds. Fine grained yellow fir from near the butt stood a strain of 3635 pounds, and best Michigan oak snapped with a strain of only 2428 pounds. The tests were made by the Northern Pacific Railway Company, at Tacoma, Wash.

MASONRY AND STONE CUTTING.*

STAR-GROINED CEILING WITH LIERNES TO COVER THE NAVE OF A CHURCH OF SAME SPAN AND RISE AS WESTMINSTER ABBEY.

THIS PROBLEM was worked out in the upper classes of masonry at the City and Guilds Institute, London. It involved the working of about 200 stones, comprising springers, ribs, liernes, bosses, and also slabs for the cells. It is to be noticed as a peculiarity of this work that the cells are each made of one single slab of stone, ready to be pierced with tracery. To carry out this work as designed, and to work each stone accurately from the drawing, involves several interesting applications of geometry, and pair supports the ridge rib half way between the crown of the nave and the lateral wall, whereas another pair bisects the distance between the meeting of the diagonal ribs and the apex of the cross ribs. Every one of these ribs, with the exception of the wall rib, is described with one segment of a circle.

As each rib has to rise to the same level, and differs from its neighbor in the distance it has to span, it follows that each rib has from the very springing an inclination different to that of each neighbor. Hence arises a certain want of finish in the intersection of the ribs at the springing, and also the very great twist in the surface of some of as to allow constructing the ridge rib of two stones, each about 8 feet long. But why carry the center of the nave ridge rib, which is only about 7 feet long? Evidently the pair of ribs which fulfill that function are not constructionally required, and are merely ornamental.

The objection to the present arrangement of the ribs in the nave of Westminster Abbey is its obvious inconsistency. It may be avoided by introducing in the cross vaults several auxiliary ribs, which would carry the cross ridge rib in points sufficiently numerous to allow constructing this ridge also with stones about 8 feet 6 inches long. That is the principle we adopted in our design for covering the nave of Westminster Abbey with a new ceiling.

It will be observed that in the design, Fig. 261, 15 ribs start from each pier instead of the nine which exist in the actual ceiling. Even with the nine existing ribs, the intersections of the ribs with one another at the springing are exceedingly irregular. To obtain a neat arrangement of all the ribs at the springing we did two things: Firstly, we placed all the ribs at exactly the same distance from one another, so that all the angles between each pair of ribs be equal; secondly, we modified the shape of the ribs in such a way that they should start at the springing with the same curve, thus forming up to a certain level a regular fan vault Above that level each rib follows on with a different curve, so as to reach the ridge rib.

The ribs of the vaulted ceiling are, therefore, composed of two curves. The lower part of each rib repeats exactly the curve of the wall rib; the upper part is a segment of a circle which has to be tangent to the lower curve of the rib and to pass through the point determined on the plan which it must reach at the ridge.

Now, it would be desirable that the lower curve which the ribs have in common be carried high up enough to be above the level where the ribs separate entirely from one another, because in that case the intersections of the moldings of the ribs would be absolutely regular from the springing upward. On the other hand, the level to which the lower curve may reach is bounded by the condition that the upper curve of no rib can go beyond being circular at the crown. In other words, ribs cannot be made to dip downward at the crown. The diagonal rib is the one that differs most from the wall rib, and therefore the level for the rise of the lower curve which will suit the diagonal rib will suit still better the other ribs.

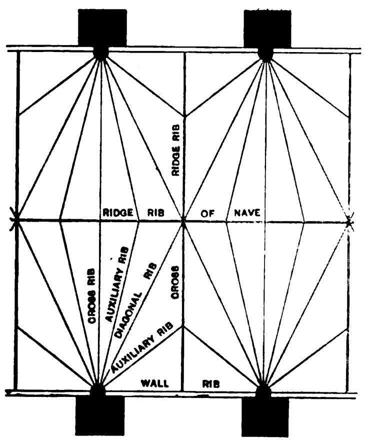


Fig. 260.

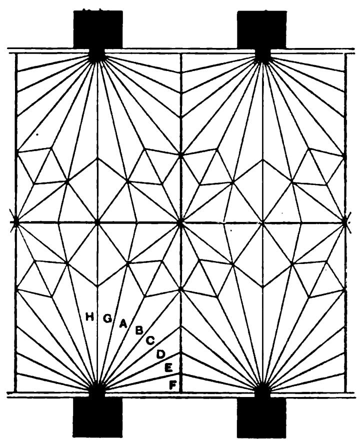


Fig. 261.

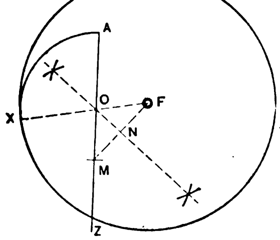
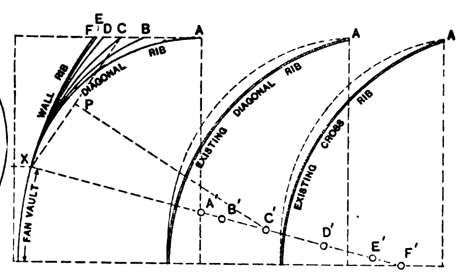


Fig. 262.



Figs. 263, 264 and 265.

Masonry and Stone Cutting.—Figs. 260 to 265 Inclusive.

this was the reason for selecting this problem.

The nave, Fig. 260, of Westminster Abbey is about 34 feet across, whereas the distance between the piers supporting the walls is about 16 feet 6 inches from center to center. The nave and the wall arches rise to the same level, viz., 22 feet 8 inches above their springing. The crowns of the vaults are decorated with horizontal ridge ribs. There is a ridge rib running along the center of the nave from east to west, and there are other ridge ribs crossing from north to south in each division of the vaulting between the piers. To support these ridge ribs there are cross ribs spanning the nave from pier to pier, wall ribs around the windows, diagonal ribs crossing diagonally from one side of the nave to the other, and carrying the central boss where the ridge ribs meet. There are also auxiliary ribs, of which the one the vaulted cells. To these there is no objection. In fact, lovers of Gothic architecture rather admire irregularities of all kinds, and plowshare vaults especially. On the other hand one of the beauties of Gothic architecture is the practical reasonableness of its construction. Now, there is in the scheme of the vaulting of the nave of Westminster Abbey a feature which cannot be defended on that score, and it is the wish to remedy that defect which has led us on to design the ceiling proposed in our model. We should be sorry to lose the rough dignity of the present ceiling of Westminster Abbey in order to improve one detail on however rational a scheme; but our design will perhaps illustrate how the architects of old were led to evolve one style from another in an everlasting effort to perfect their work.

The distance between the center of the nave and the apex of the wall rib is about 17 feet. Now, it is wise, and, indeed, indispensable, to carry the center of this 17 feet long ridge rib so

For this reason we began by drawing the diagonal rib, and we took the center of the upper curve to be exactly plumb below the the crown. Fig. 262 shows the geometrical construction for drawing that rib. Let the circle of center F be the lower curve of the rib taken from the wall rib; let the point A be the crown of the diagonal rib; let the line A Z be the plumb line from the crown downward. The problem is then to find a point O on the line A Z, from which a circle may be struck tangent to the circle of center F, and passing through the point A. To do this, carry radius of circle F from A to M; join M F and bisect that line in N; draw line N O at right angles to M F; the point O is the center of the circle required. Produce F O to X, and X is the point where the two circles are tangent.

In Fig. 263 we have applied this construction to the delineation of the diagonal rib. Then, having obtained

* Continued from page 305, December issue.

thereby the point X as the highest point the lower curve of the rib can reach, we have connected X with the center F' of the wall rib. As the upper curves of all the other ribs are to be tangent to the lower curve in X, it follows that the centers of the upper curves of the ribs will be on the line X F'. To find the center of the upper curve of any rib, say the rib C, join the points X C, bisect this line in P, draw P C' at right angles to it, and the point C', where the line cuts the line X F', is the center required.

Figs. 264 and 265 show in full lines the existing curves of the diagonal and cross ribs of Westminster Abbey, and in dotted lines the curves of these ribs to suit our new structure, and it will be seen that the character of the vaulting would be entirely changed. In fact, the diagonal rib would not be pointed at all, and the cross rib would be but slightly pointed. Although the new design is unmistakably Gothic, still it has some of the characteristics of regularity, repose and breadth of the old Roman vault. It is, thereby, a forerunner of the Renaissance.

The Golding Fire Proof Floor.

A series of experiments have been made lately at a foundry in South Boston, Mass., with the Golding fire proof floor. At the suggestion of Capt. John S. Damrell, inspector of buildings, a section of the flooring in question was constructed in the foundry yard. It consisted of a section of single floor arch, with a span of 16 feet, making a surface of 62 square feet, resting upon iron girders, which were supported by four heavy timber blocks imbedded in the ground and rising above the surface about 4½ feet.

In making this arch, after the forming under boards were in place, the expanded metal, which is composed of meshes of steel, was stretched across and the cement concrete poured in and leveled up to the required hight, the metal being thus thoroughly imbedded in the concrete. On this was placed a single layer of boards. This was left to set and harden for about three weeks, though it is well known that it takes at least as many months for such concrete to even approach a maximum hardness and tenacity.

Pig iron was then piled upon this floor arch to an amount equal to 750 pounds per square foot, or 46,500 pounds. Later an additional weight of pig iron was placed upon the arch of 9300 pounds, bringing up the total weight to 900 pounds per square foot. When the time set for the exhibition arrived an additional weight of about 72½ pounds per square foot was put on, which brought the total load of the section of floor arch up to 60,310 pounds, or about 972½ pounds per square foot of surface.

Under this great weight the arch began to give, but the movement was at first slow, and even when it went down it was a gradual and easy descent—not a sudden disruption and a crash. When its central part reached the ground it still held together, and its ends did not leave the supporting iron cross beams.

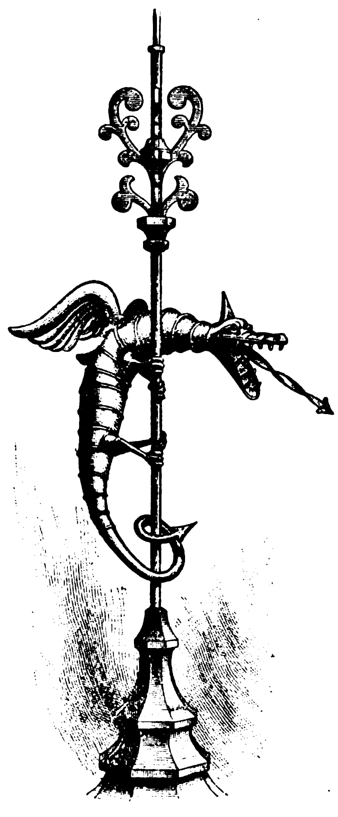
Cement Concrete.

A writer in one of the English trade journals gives the following recipe for cement concrete: For outside work, cellar floors, stables, cow sheds, piggeries or dog kennels. Prepare the ground for the work 7½ inches below the level of the finished work. Break bricks to pass through a 2-inch ring, and mix with sharp sand and Portland cement—four parts brick, two parts sand to two parts cement. Add water, and turn over twice. Pitch this on the surface of the work to the depth of 6 inches, and it is a good plan to have stakes in here and there the hight required for the work. When this mixture is on, it must be beaten down solid with beaters.

Sheet Metal Dragon.

The subject of our illustration is a sheet metal dragon, made by L. C. Caul, Beeville, Texas, and reproduced from a photograph sent to us with the following description:

The design was furnished by George F. Barber, architect, of Knoxville, Tenn., and was on a scale of 3 inches



Sheet Metal Dragon.

to the foot. The dragon is made of No. 26 galvanized iron and mounted upon a 1¼-inch galvanized rod, and projects above the top of house tower 8 feet. It is attached to said rod by steel rods coming through the legs in such a manner as to permit it to revolve with the wind, thereby forming a weather vane. The steel rods entering the legs are met by a flat piece of steel 1¼ x ⅜ inches the shape of the back, to which it is fastened by screws through the back, which serves the purpose of strengthening the whole fabric. The dragon from tip of tongue to dart on end of tail measures 12 feet, and is 9 inches in diameter at largest part of body. The length of time occupied in making it is impossible for me to state, as during the time I was at work I was frequently called off to do other work, which interfered with steady work upon his dragonship. Work in my line, tin and galvanized iron cornice work, in these parts is yet in its infancy, as we are in that part of the great State of Texas that is just now being developed and coming to the front. In a few more years these parts will emulate the large cities in their architectural designs. Already several public houses and banks have been built that are ornamented with iron fronts and galvanized iron cornices, &c.

CONTENTS.

RESIDENCE OF HON. A. W. KIMMELL, AT INDIANA, PENN.

E. M. LOCKARD, ARCHITECT.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

MARCH, 1894.

Building Operations in 1893.

Notwithstanding the fact that last year was one of extreme depression in business and financial circles, the amount of building undertaken in New York City during that time makes a very favorable showing, all things considered, when compared with the figures for the previous twelve months. By this statement it is not intended to convey the idea that the total cost of the buildings projected last year was greater than that of 1892, but rather that the decrease was much smaller than might naturally have been expected. The returns of the Building Department of the city show that 2172 buildings, estimated to cost $55,162,953, were planned last year, as against 2967 buildings, costing $59,107,618, during 1892. This gives for the year 1893 an average cost per building of $25,397, which is the highest on record. The nearest approach to these figures was in 1890, when the average cost per building was $21,282, these being the only years in which the average cost per building exceeded $20,000. It is interesting to note in this connection the variety of buildings planned during the year under review, as well as the amounts involved in their erection.

Variety of Buildings.

Of the 2172 buildings projected, 699 were flats and tenements, estimated to cost $15,178,900; 889 were private dwellings, involving an expenditure of $10,838,430; 175 were hotels, stores, churches, office buildings, &c., aggregating a cost of $23,907,400, and 509 were miscellaneous structures, stables, shops, &c., estimated to cost $5,238,223. As might naturally be supposed, the greatest activity in building operations was in the months of March, April and May, when about 50 per cent. of the flats, tenements, hotels, churches and office buildings were projected, while in the case of the other varieties something like one-third of the total was undertaken. The year witnessed the filing of plans for a number of imposing structures, some involving an expenditure of money running up into the millions. Prominent among these may be mentioned the Cathedral of St. John the Divine, estimated to cost $5,000,000; the Hospital of St. Luke, $1,000,000; the Manhattan Life Insurance Company's building, $950,000; the Corn Exchange Bank building, $500,000; the 12-story office building, at Fifth avenue and Eighteenth street, $650,000, and the 13-story hotel on West Forty-fourth street, $550,000.

Builders' Convention.

The eighth convention of the National Association of Builders, which recently took place in Boston, was one of the most successful that has ever been held. The true character of the work of the national body seems to have been understood by the delegates better than ever before. Builders who compose the filial bodies are gradually coming to understand that the National Association deals entirely and solely with the principles which underlie the relationships of builders, as man to man, in all their dealings with their fellows and with the public. The distinction between the work of the parent association and that of its filial bodies is coming to be better understood, and the fact is recognized that the purpose of the former is the formulation and presentation of methods for the improvement of existing conditions, while the work of the filial body is the application of these plans and methods to the conditions as they exist in the several localities. The tendency at the eighth convention to consider things which are primarily within the scope of the exchange alone was less conspicuous than at any of the preceding conventions and an intelligent understanding of the character of the work to be done in these conventions was demonstrated throughout.

Relations of Employer and Workman.

As was anticipated, the address on the "Relation of Employer and Workman," delivered by Col. Carroll D. Wright, United States Commissioner of Labor, proved interesting and instructive. Colonel Wright lifted the subject out of the usual limitations under which it is considered and dealt with it in a broad and comprehensive manner. In referring to compulsory arbitration, he took occasion to define the fact that such a thing was an anomaly, for arbitration which is compulsory is not arbitration. The altruistic tendency of the times has so affected the relationship in question that it would seem no longer to be the old question of individuals, wages and hours only to be considered, but the newer one of each body endeavoring to secure just and equitable conditions for the whole.

Favored Mechanics.

The majority of the mechanics of Philadelphia are in a better condition, financially, to struggle with hard times than those of any other large city in the United States, and probably in the world. This is largely due to the fact that there are thousands of small houses in all parts of the town which can be bought at reasonable prices. A small first payment will obtain the deed, and the other payments and the interest are so adjusted that the annual sum exceeds by a small sum the rent charges. Practically the purchaser is given his own time in which to pay for the home. He can pay a fixed amount yearly, and in addition he can reduce the principal at any time and by any sum he chooses. What is of first importance is that this system provides the incentive to economy. He cannot obtain a home in a city like New York, where he can obtain apartments at any desired rate, but in a building he never dreams of owning, as its value so far exceeds his means. The difference is that between small independent houses and those built on the tenement house plan. Therefore in times like the present the Philadelphia mechanic has some resources, in the shape of real estate paid or partly paid for, which will carry him until trade improves. Having acquired the habit of saving for a particular purpose, he can now reduce his current expenses to a greater degree than if he had never learned how much a dollar was worth.

Another Imposing Office Building.

Not very long ago we referred to the great hight of the structure now rapidly approaching completion on lower Broadway for the Manhattan Life Insurance Company, making mention of the fact that when finished it would measure 348 feet from the curb line to the foot of the flagstaff. This structure is soon to have a rival in the shape of an office building, which will occupy a site a little distance up the street, with a frontage of 84 feet on Broadway and extending back 85½ feet on Pine street. The structure will be of unique design, the style of architecture following that of the Renaissance. The material employed will be granite, and the total cost is estimated at about $1,000,000. The entrance to the structure will consist of six massive Greek columns 20 feet high and 4 feet in diameter, beyond which will be a circular open space leading to the entrance doors. A Greek entablature will crown the columns, while above to the sixth story the window cornices will be arranged to give a pyramidal effect. On the Pine street side will be six pilasters to correspond with the six columns of the front. On the Broadway side the pilaster effect will be carried out by seven rows of windows, rising like the flutes of a pilaster and carried with slight interruptions the full hight of the 20 stories. The first floor of the building will be occupied as a bank, the second as corporation rooms, while the third, fourth and fifth will be given up to the offices of the American Surety Company, who are erecting the building. The upper 15 stories will be devoted to offices, 20 on each floor, and so arranged as to open one into another or to be used separately, as circumstances may require. The architect is Bruce Price, whose aim in designing the structure has been to unite strength and simplicity with tasteful architectural effects.

The Brick Manufacturers' Convention.

The National Brick Manufacturers' Association of the United States of America held their eighth annual convention at the Auditorium Hotel, Chicago, from the 23d to the 27th of January. The famous banquet hall of the hotel had been fitted with seats for the occasion, and it made a very fine assembly room, amply commodious, notwithstanding the large attendance. Members were present from all sections of the country. Machinery manufacturers and supply dealers were also out in full force, and many of them made exhibits in the club rooms of the hotel. The officers at the opening of the convention were as follows:

President, Anthony Ittner of St. Louis; first vice president, A. L. McDonald of Louisville, Ky.; second vice-president, W. D. Gates of Chicago; third vice-president, B. W. Blair of Cincinnati; secretary, T. A. Randall of Indianapolis; treasurer, John W. Sibley of Coaldale, Ala. These officers constituted the Executive Committee, with the addition of the ex-presidents as follows: W. A. Eudaly (1886) of Cincinnati; D. V. Purington (1887) of Chicago; T. B. McAvoy (1889–90) of Philadelphia; J. C. Adams (1891) of Indianapolis; C. B. Pearson (1892) of Washington, D. C. The Chicago brick makers presented the members with a souvenir badge, consisting of a gold scroll to which a ribbon was fastened holding an aluminum medal appropriately inscribed.

PRESIDENT'S ADDRESS.

President Ittner called the convention to order on Tuesday morning and read his annual address. He referred to the late World's Fair as the great event of the last year and lauded Chicago as the only city that could have made it the success it was. He predicted that the progress in architecture and building to which the brick makers were so closely related would be more marked in the next decade than in the last century as an effect of the exposition. Chicago, he said, has refuted the prediction that after the fair it would be the deadest city in the country. It is the liveliest corpse that any one has seen. He recommended the establishment of a technical school for the training of brick makers and the gathering of statistics on the clay industries.

Secretary Randall in his report said the members of the association represent a combined capital of $30,000,000, and an annual output of $20,000,000. The total number of brick made last year by the 350 members was 3,500,000,000.

The Executive Committee presented a new constitution, which was adopted. Its principal feature was the enlarging of the scope of the association by admitting to membership "all persons interested in brick making.

Resolutions were adopted on the death of Secretary C. P. Merwin of Berlin, Conn., who died in office since the last meeting.

NEW OFFICERS.

The annual election of officers was then held, with the following result: President, William H. Alsip, Chicago; vice-presidents, Edwin C. McGraw of Pittsburgh, Frank Stiles of New Haven, Conn., and A. S. Blaffer of New Orleans; secretary, T. A. Randall, Indianapolis; treasurer, John W. Sibley, Coaldale, Ala. The newly elected officers were introduced to the convention, each making a short speech of acceptance.

A previously prepared programme of essays and discussions was then taken up. Donald McDonald of Louisville, Ky., said: "Ruskin wrote the 'Ethics of the Dust,' but the Programme Committee assigned to me the finding of similar elements in clay and I have the pleasure of presenting to you 'Ethics of the Brickyard.'" It was a well written paper and treated of the relations of the brick maker to his fellow tradesmen.

Frank McAvoy of Philadelphia led off in a discussion of "The Year's Record." The financial depression had affected the brickmen as well as every other trade, but its proportion of failures was fewer than in any other interest. The last part of the address was devoted to the year's improvement in machinery and appliances. Josiah Miller of Oaks, Pa., the pioneer in the manufacture of enameled brick, then presented a technical paper on "American Enameled Brick."

In the evening the "annual powwow" was held under the auspices of the Chicago brick manufacturers, with D. V. Purington in charge as master of ceremonies.

WEDNESDAY'S PROCEEDINGS.

The Wednesday morning session was opened by the reading of an essay on "Glazed Brick, Their Origin, Value and Use," by George B. Engle of Chicago. Next followed an address by J. B. McHose of Boone, Iowa, on "The Brick Maker."

A general discussion, in which most of those present participated, on "Profit and Loss in Brick Making," was led by X. Wittmer of Pittsburgh; another on "Drying Brick" was led by J. A. Snell of Barrington, R. I., and Max A. Th. Boehncke of Centinela, Cal., led the discussion on "Setting Brick in Kilns."

According to those who spoke on the subject of glazed brick there is a growing demand for that article. Mr. Griffin, an extensive manufacturer in this line for eight years, stated that last year in many factories the ratio of orders filled to those which were rejected on account of lack of facilities for making the glazed brick in large quantities was one to two.

James Taylor of New Jersey, speaking on the same subject, referred to the various uses to which white glazed brick were put, among the most notable being in the construction of tunnels and subways. He called attention to the subways of the Illinois Central and its Twelfth street depot in Chicago, and pronounced them the best specimens of their kind he had yet seen.

The afternoon session was devoted to the reading of papers on technical trade matters. The speakers and the subjects were: A. S. Blaffer, New Orleans, "Progress of Brick Making in the South;" Joseph Fairhall, Grape Creek, Ill., "Brick Making for Profit and Glory (?);" W. S. Purington, Galesburg, Ill., "Oil as a Fuel in Burning Brick;" W. H. Duffett, Beatrice, Neb., "Vitrified Paving Brick." Alex. Neidringhaus led a discussion on the question: "Is the Drug Process Suitable for the Manufacture of Paving Brick?"

In the evening an elaborate banquet was enjoyed, and many toasts and responses were made on subjects connected with the trade.

CLOSING FEATURES.

On Thursday Edward Orton, Jr., of Columbus, Ohio, opened the discussion of the question "How Can We Secure Trained Help?" by reading a thoughtful paper which contained such practical suggestions that they were afterward embodied in a report of the Committee on Resolutions. Capt. S. P. Crost of North Haven, Conn., read an essay on "Waste of Fuel in Drying and Burning," and W. H. Duffett of Beatrice, Neb., read one on "Vitrified Paving Brick." The afternoon session was devoted to "The Question Box," and a number of problems of great practical interest were thus called up for solution, eliciting an active discussion and bringing out valuable points. After thus terminating the formal work of the convention, Friday and Saturday were devoted to sight seeing under the guidance of the local committee. No action was taken toward selecting a place for the convention next year, as that comes under the jurisdiction of the Executive Committee.

Master Builders of Great Britain.

The National Association of Master Builders of Great Britain held its thirty-second half-yearly meeting at the North Stafford Railway Hotel, Stoke, Staffordshire, on Tuesday, January 30.

Owing to the death of Mr. Dennett, the late president, Stanley G. Bird was elected to the chair.

The chairman reported that the usual half yearly statements of hours worked, state of trade and supply of labor in the principal towns of the United Kingdom had been issued to the local associations.

With reference to the form of contract, the respective committees of the Royal Institute of British Architects and the Institute of Builders decided to meet in conjunction with the solicitors appointed to arrange the clauses with a view to settling any differences that may still remain on the legal points, so that the matter may be finally closed.

John Bowen of Birmingham, the senior vice-president, was elected president for the ensuing year, and in his opening speech referred to the severe loss the association had sustained in the deaths of their late president, Robert Dennett, and their secretary, William Knox. He congratulated the association on the state of its finances, and also on the attendance at the meetting, which was the largest he ever remembered.

T. F. Rider, London, and Jos. Stevenson Jones, Liverpool, were elected vice-presidents, and Stanley G. Bird, London, R. Neill, Jr., Manchester, J. Howard Colls, London, and J. C. White, Liverpool, were elected hon. vice-presidents. C. W. Green, Liverpool, was elected hon. treasurer, and W. H. Smith, Northampton, was elected hon. auditor. J. A. S. Hassal of Liverpool, who was a partner with the late secretary, was appointed secretary.

It was decided to hold the next half-yearly meeting at Bolton.

Prior to the meeting a number of the members were conducted through the pottery works of Messrs. Minton, where they viewed the whole process of manufacture.

The Potteries and Newcastle Master Builders' Association entertained the delegates at luncheon and tea.

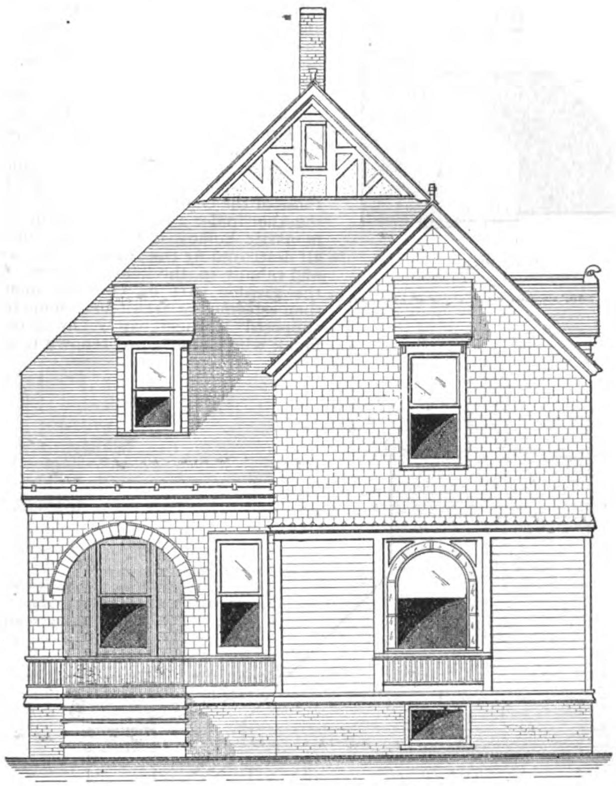
WHAT was supposed to be the largest walnut tree in Northern Maryland was recently felled on the farm of Col. Enoch Noyes, near Port Deposit, says a late issue of a Baltimore paper. The tree at the butt measured over 6 feet in diameter and nearly 18 feet in circumference. Its hight was 86 feet. The age of the tree, according to tradition, and close calulation, was nearly 300 years. Colonel Noyes intends to sell the tree, which he thinks is worth over $400.

COTTAGE AT LA PORTE, IND.

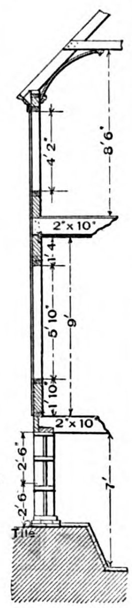
THE SUBJECT of our supplemental plate this month is the cottage erected a little more than a year since for E. Sherwood Martin, at La Porte, Ind., from plans drawn by architect George W. Allen of Valparaiso, that State. The illustrations which we present upon this and the two pages immediately following will give our readers a very good idea of the general arrangement of the rooms, the exterior architectural features and the main details of construction. The building covers a plot 28 feet 6 inches wide by 35 feet 2 inches in depth, not including the one story L in the rear, which is 10 x 14 feet. From an inspection of the plans it will be seen that the cellar extends under the entire area of the main building, but not under the rear extension. The cellar is divided into two compartments, which have brick floors. We learn from the architect's specifications that the foundation walls are of local hard burned brick 10 inches thick with 2-inch cavity, built on a shelf at the bottom. The sills are 2 x 6, placed 2 inches from the face of the wall. The joists are flush with the sill, and have a 2 x 10 piece well spiked to the ends, all as shown in the illustrations. On top of the 2 x 10 and the joist is placed a 2 x 4 piece to sustain the studding. The first and second floor joists are 2 x 10, placed 16 inches on centers, while the second floor ceiling joists are 2 x 8, also placed 16 inches on centers. The studding are 2 x 4, and the common rafters 2 x 6, all placed 16 inches on centers. The hip and valley rafters are 3 x 6.

The frame is pine throughout, sheeted on the outside from sill to plate with matched flooring. The first story is covered with clapboards and the second with California redwood shingles. The rafters were first covered with surfaced pine boards and then with the best water proof paper, upon which were placed Michigan pine shingles, laid 4 inches to the weather, being finished at the ridge with a 2 inch galvanized iron ridge roll and finial. The porch, it will be noticed, is finished with a shingle arch, with galvanized iron roll just above, while below it is embossed wainscoting in natural finish. The small gable above the front roof is done in rough cast. The exterior of the first story of the house is painted ivory white, trimmed in olive green, while the second story is redwood shingles in natural finish.

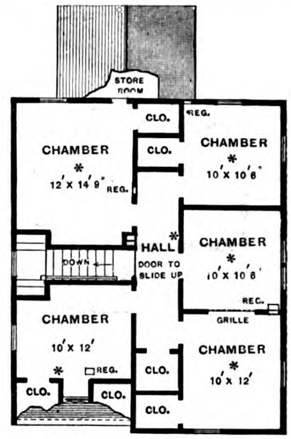
From an inspection of the floor plans it will be seen that the space available is utilized to the fullest extent, there being upon the first floor four rooms and bath, besides a commodious pantry and hall, the latter being arranged for use as a sitting or reception room. The hall is reached from the porch through a vestibule, the latter being provided with a window, which affords ample light. The parlor and dining room are connected by folding doors, while the opening between the sitting hall and dining room is closed with *portières*. The position of the reception hall, dining room and parlor is such that they may be thrown into practically one room if desired. Directly in the rear of the dining room is a large sleeping room which communicates with a bathroom. The pantry opening out of the kitchen is provided with modern conveniences, such as flour bins, tables, shelves, china closets, &c. The pantry door is hung with Chicago spring butts, double action. The kitchen has a large sink with hot and cold connections. The bathroom is so located as to make the plumbing of the house compact, thus tending to reduce the cost. In addition to the usual fixtures, it will be noticed, there is provided a wardrobe,



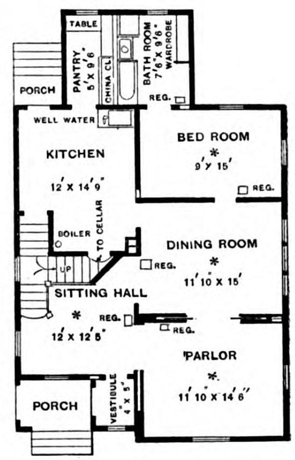
Front Elevation.



Section.



Second Floor.

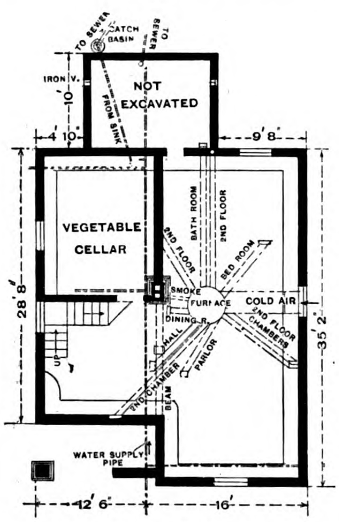


First Floor.

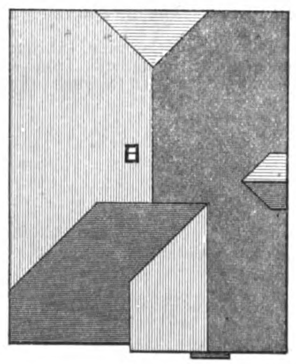
Cottage at La Porte, Ind.—George W. Allen, Architect, Valpariso, Ind.—Front Elevation and Section.—Scale, ⅛ Inch to the Foot.—Floor Plans —Scale, 1-16 Inch to the Foot.

as the sleeping room on the main floor has no closet.

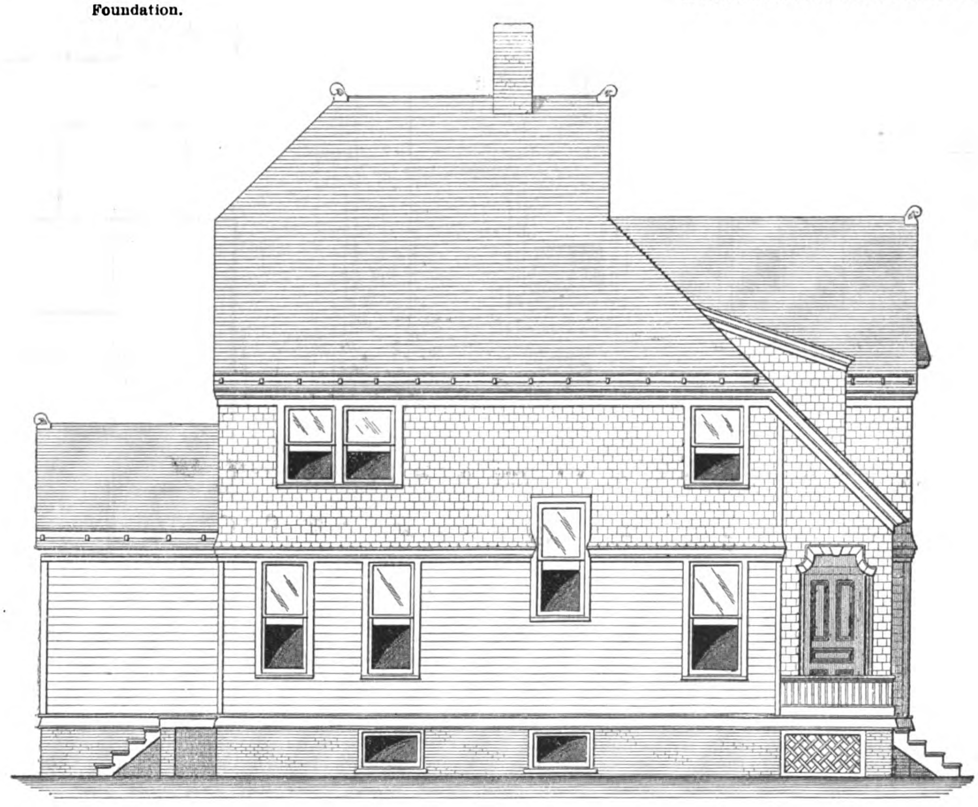
On the second floor are five sleeping rooms, with closets of ample size. One of the features of the house is the door at the head of the stairs, which is hung with weights so as to slide up and down, the intention being to use it only in winter, and keep the heat from the upper hall. The front and rear stairs are so located as to connect in a landing half way up, a feature which is economical both as regards space and cost. The trim throughout of the house is selected Georgia pine, finished with hard oil. The doors are all five panel, 1½ inches thick. The pantry, bathroom and kitchen are wainscoted 3 feet 10 inches high, finished with a molded cap. The house, which the designer states cost to build, exclusive of furnace, $2,300, was designed especially for the use of an old gentleman and his wife, who occupy the lower floor and rent the second story to a young couple, who use the two front rooms as parlor and sitting room, and take their meals at a hotel.



Foundation.



Roof Plan.

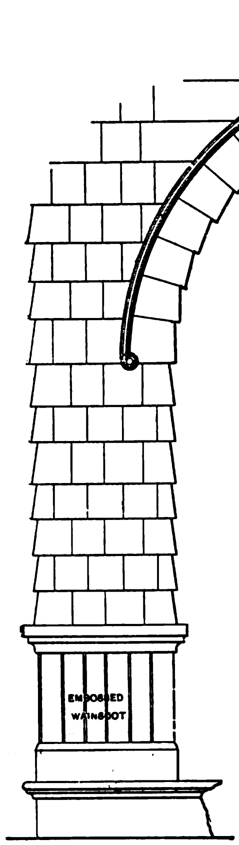


Side (Left) Elevation.

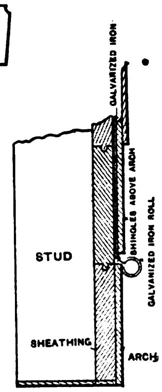
Cottage at La Porte, Ind.—Foundation and Roof Plans.—Scale, 1-16 *Inch to the Foot.—Elevation.—Scale,* ⅛ *Inch to the Foot.*

Italian Monasteries and Roman Houses.

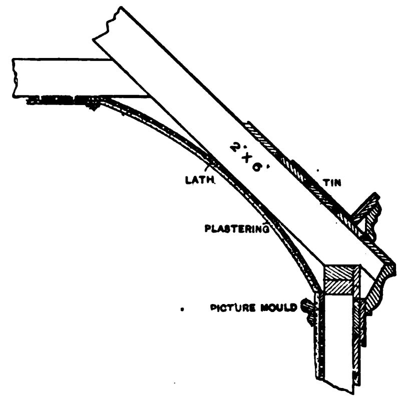
Fleury observes that in monasteries we see reproduced the arrangements of the antique Roman mansion as Vitruvius describes it. "The church, which stands foremost, so as to allow free access to seculars, occupies the place of that outer hall the ancients designated atrium, from which was entered a court surrounded by covered galleries, known as the peristyle, precisely corresponding to the cloisters we enter from our churches; whence we pass into other compartments, the chapter house answering to the exhedra, the refectory to the triclinium of the ancients; and the garden, usually at the back of the edifice, is placed also like that of the antique residence. A Roman council in 826 ordered that, attached to the church, should be built cloisters in which the clergy may dedicate themselves to ecclesiastical pursuits, where there must be one refectory and one dormitory common to all"—a plan apparently intended for those of the capitular bodies who lived together under a rule. The primitive, monastic homes of Italy were almost all destroyed by the Huns or Saracens and rebuilt in the tenth century, for the greater part by German monks then esteemed as architects; some it is supposed (V. Ricci, cap. x.) by an Irish monk who had attained renown in this art, Dungallo, as his name is Italianized. Those ancient cloisters were, no doubt, plain and rude constructions, but one excellently useful adjunct, the bath, is mentioned in several monastic constitutions. The use of this, in primitive times, was not only advised but enforced.



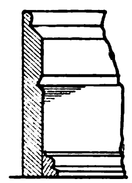
Detail of Arch and Galvanized Iron Roll.—Scale, ½ Inch to the Foot.



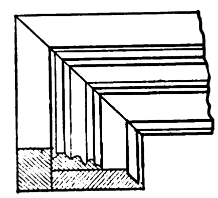
Section of Arch at A B.—Scale, 1½ Inches to the Foot.



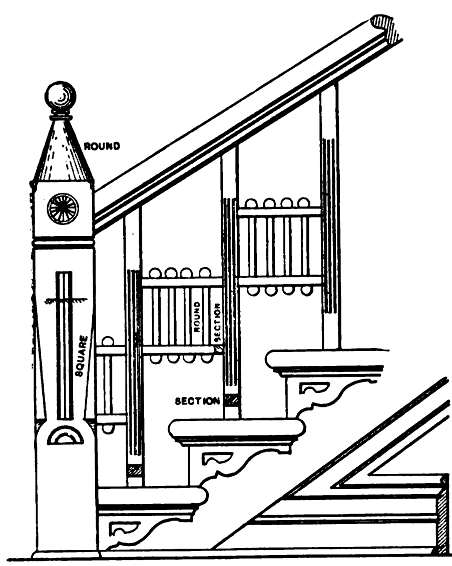
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



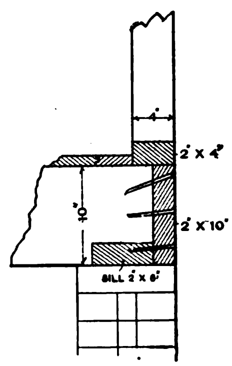
Detail of Inside Trim.—Scale, 1½ Inches to the Foot.



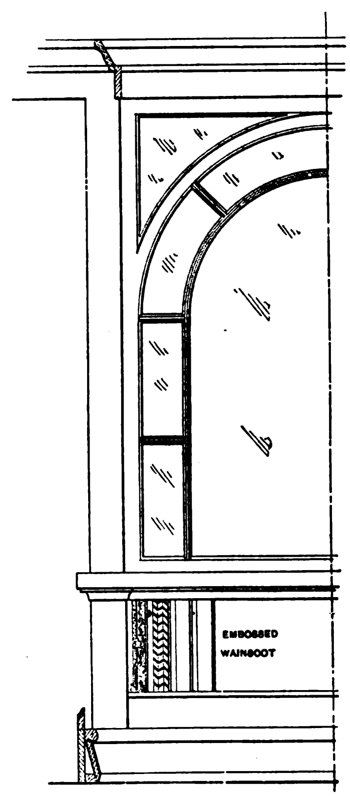
Detail of Inside Trim.—Scale, 1½ Inches to the Foot.



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



Detail of Sill.—Scale, ¾ Inch to the Foot.



Detail of Front Window and Water Table.—Scale, ½ Inch to the Foot

Miscellaneous Details of Cottage at La Porte, Ind.

PRACTICAL HOUSE PAINTING.*

By ARTHUR S. JENNINGS.

THE PAINT.

WE NOW COME to consider the actual paint. A great difference in opinion exists, even among the finest painters, as to what is the best paint; that is, best as considered in regard to its durability, cost and efficacy. Generally speaking, the color of the paint has little or nothing to do with the constituents of the paint itself, and although this is not exactly correct in all cases, as will presently be pointed out, it will be convenient to consider that the color is added according to the tint desired. The best paint is generally considered to be pure white lead mixed with oil and turpentine, color being added if desired. White lead, however, sometimes "chalks;" that is, it appears to decompose on the surface so that it will come off when the hand is passed over it. Zinc white is another excellent paint, but it cannot be used by itself for exterior painting, as it is too hard and brittle and will easily scale and chip. A mixture of two-thirds of white lead and one-third of zinc white, or even less, makes the best paint for exterior purposes, in the opinion of the writer, although in special cases it may be desirable to use other materials. The object of the oil is to form a binder between the particles of which the pigments are composed, while turpentine is added to thin the mixture and render it of a consistency to facilitate its application to the work. About two-thirds of oil and one-third of turps is the usual proportion used. Sufficient dryers must also be added.

In addition to white lead and zinc there are the earth paints, such as ocher, that may be used as primers in oil or by themselves. There are also metallic paints and various earth colors that are used entirely separate from white lead. Much of the paint material sold is largely adulterated, and the practical man should never be caught by purchasing cheap adulterated materials for the sake of economy. If he desires to have a cheap job and thinks it well to add, say a proportion of whiting to the white lead—and this is often done, by the by—he will find it more economical to buy the whiting and lead separately and mix them himself.

PURITY TEST.

It may be useful at this point to give a test for the purity of white lead which is so simple that any mechanic with a little practice may readily make it for himself. Obtain a piece of charcoal, say 2 or 3 inches square and flat on one side. With a knife hollow out a small space as big as a gold dollar; then take a little piece of the suspected white lead the size of a pea and place it in the cavity. Now take a blow pipe, or if this is not to be had a tobacco pipe will answer, using the bowl for the mouthpiece, and direct a gas jet upon the white lead. One portion of the flame will be blue, and this is the portion that should reach the little piece of white lead. Keep up a continuous blow for two or three minutes, when, if the white lead be pure, it will be reduced to a little bead of metallic lead that will be seen lying in the cavity shining brightly, while if the lead be adulterated, even with a small percentage of foreign materials, any amount of blowing will have no other effect than producing a cinder like ash. To use the blow pipe requires some amount of practice, as it is necessary to keep up a continuous draft. For this purpose the cheeks should be inflated and the air breathed in through the nostrils.

READY MIXED PAINTS.

During the past dozen years or so the use of ready mixed paints has very largely increased. Among their advantages is the fact that they are ready for use and may be applied to the work without any preparation, and that they are supplied in a large variety of tints, so that it is an easy matter to produce an attractive combination of colors. The chief among their disadvantages is that there is so much rubbish sold as ready mixed paint that unless one is well posted as to which is good and which is bad, it is very probable that a very common grade of paint may be chosen. There is another objection to their use. In mixing paint for a particular job due regard must be given to the exact requirements. In one case more or less oil will be required, while in another it may be advisable to use a special pigment. Ready mixed paints of the same brand or grade being alike in their composition no provision can be made for these special requirements and the same paint has to serve for all jobs alike. It would obviously be invidious to mention any particular brand of ready mixed paints, but it may be said that there are a number of good ones on the market that may safely be used for ordinary purposes. One of the tests that may be applied is that of price. It must not be expected that a good paint can be obtained for a low price. Some carpenters use paint that costs $1 or even 75 cents a gallon and then are surprised when the results do not prove satisfactory. The best ready mixed paints cost per gallon for the ordinary shades considerably more than this.

SELECTING THE COLORS.

Whatever kind of paint it may be decided to use, it is of great importance that an attractive scheme or combination of colors be chosen. The plainest house may be made to look pleasing and attractive by a judiciously chosen scheme of coloring and even those structures that possess some considerable claim to architectural beauty may be made more attractive if the right colors are employed. The builder who erects houses to sell or rent should bear these facts in mind, because if he succeeds in having his houses painted with good taste he will be sure to obtain a tenant or purchaser sooner than he would otherwise do.

The writer has frequently met with cases where the architectural beauty of a residence has been wholly destroyed because of a want of taste in the painting. A house in a Philadelphia suburb may be cited as an example. It was a large building standing in a double lot some distance back from the road and was painted when built in a fashion that to those who knew the difference between right and wrong in such matters was perfectly hideous. To the public generally it simply presented a comfortless, insipid appearance that led them to think that the builder didn't know his business. Cold grays had been used in wo tints with yellow and red in large patches, but without any taste whatever. After some five years the house changed hands and the new owner had it repainted. He employed warm browns and reds, introducing into some of the moldings a little very bright brown and very bright red. The result was little short of a transformation. The house that had been so cheerless in appearance was now one of the most attractive in the neighborhood. The architectural features had been brought up to advantage and the builder or architect received his just praise. In passing it may be mentioned that the immediate result in this particular case was that the neighbors soon commenced to have their houses repainted.

It is very much easier to impress upon the reader the importance of selecting his colors with care than it is to give him information as to what is good and what is bad in combinations. The task would be rendered easier if we were able to illustrate our remarks by the aid of samples of actual color, but failing in this we must content ourselves with some general hints.

As a rule the beginner at this class of work will obtain the best results by using one color for the main body of the house, with as many tints or gradations as may appear to be advisable and with a little brighter color used sparingly here and there. For instance, a small house with a pitched roof might be painted as follows: Siding up to first floor, a bright chocolate brown; siding above, very light sienna brown; trim, a brown darker than lower part of siding and with a little more red in it; shutters, a lighter tint of the same color: brick work in foundations, red; roof, a reddish brown that has the appearance of having been made by mixing the chocolate brown on the lower clapboards with the red of the roof.

Houses that are located on elevated ground and are surrounded with trees look best painted in the quiet olives and the warm grays. When a light olive is used for the siding darker shades of the same color for the trim usually produce a good appearance. As a rule the larger the surface is the more subdued should be the color used. In painting the roof care must be taken not to produce a glaring effect, but a warm color may be employed, because the shingles tend to break up and tone down the mass of color, which might be altogether too strong if applied to a level surface. Where a house is located in a position that gives the appearance of being cold and cheerless the treatment must be designed to remedy this defect and render the house warm, bright and homelike. The following were the colors used in a case of this kind, and they proved remarkably successful: The siding was painted a rather light sienna, the roof a rich brown, the trim a dark red brown to which had been added sufficient lake to give it a distinct contrast with the browns. The brick work was the usual red.

(To be continued.)

* Continued from page 41, February issue.

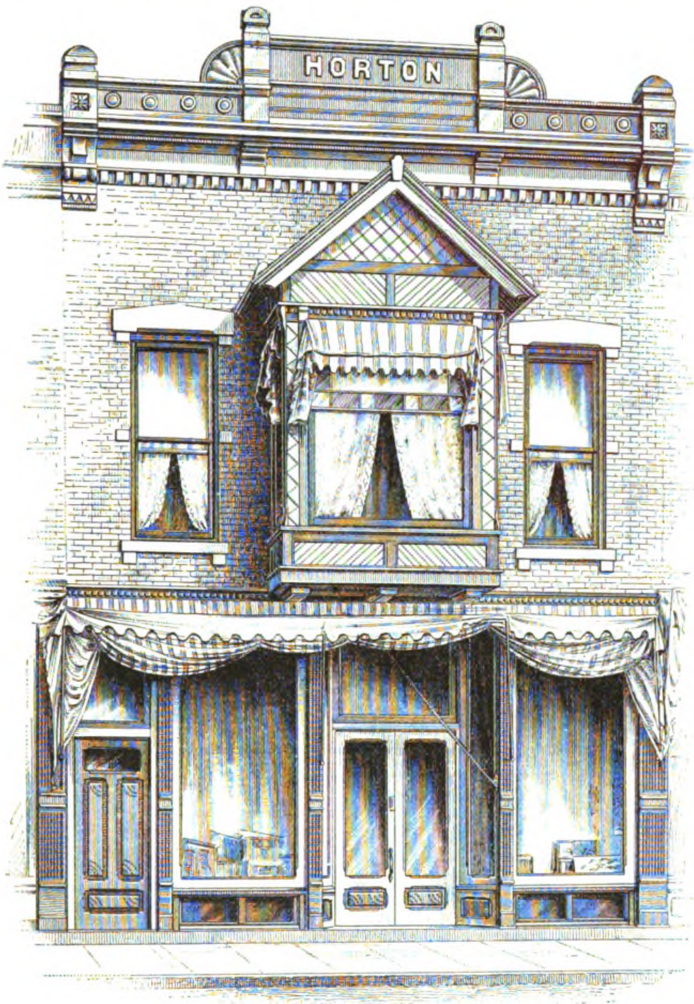
The Haish Manual Training School, at University Place, a suburb of Lincoln, Neb., was burnt down on January 29. The building was an adjunct of the Wesleyan University and was a gift from Jacob Haish of De Kalb, Ill., to the Methodists of the State of Nebraska. It was completed two years ago at a cost of over $60,000, and not a cent of insurance was carried. The loss of the building and the valuable machinery it contained is, therefore, complete, and will prove a serious setback to the manual training work of the university.

Store and Dwelling Combined.

The business block which we illustrate in this connection is adapted for both store and dwelling purposes, and is arranged in such a manner as will likely prove interesting to those of our readers who have lately expressed a desire for plans of structures of this general character. The building here illustrated is known as the Horton Block and was recently erected for the owner by S. F. Black of Wellington, Ohio. The front elevation is reproduced from a photograph of the building and shows in a faithful manner its general appearance, while the first and second floor plans clearly indicate the arrangement of the rooms. The cellar under the building is used as a bake room and oven, the first floor for light groceries and restaurant or dining hall, while the second floor is arranged with living apartments. The latter consist of parlor, sitting room, dining room, kitchen, one sleeping room, a storeroom, bathroom and an alcove communicating with the main hall.

The partitions on the main floor are beaded ceiling and can be easily removed without defacing the walls. The bay window shown in the front elevation has a large light of glass 4 x 6 feet and one above it measuring 2 x 6 feet, the latter being filled with small colored glass. The bay is supported by two ½ x 2-inch bars of iron about 7 feet in length, set on edge, one end being turned down and bolted to the under edge of the floor joist.

The parlor, sitting and sleeping rooms are 9 feet in the clear, while the pantry and the kitchen are 8½ feet. The dotted lines forming the squares in the sitting, dining and sleeping rooms, as well as in the bathroom on the second floor, indicate skylights which extend 4 feet 6 inches above the roof, having glass on all sides. They are fitted with rods for opening and closing and give ample light and ventilation. A detail of one of these skylights is presented in the accompanying illustrations. The cords A and X which can be reached from the floor run up in the corners to a pulley, from whence they extend to another in the casing above the center of the sash, then to the eyes at K K. The cord V runs down to within convenient reach. The windows of the skylights are opened and closed by manipulating the cords A, V and X, the arrangement being such that one or both windows may be opened or shut as may be desired. Close to the ceiling, between the bath and the store rooms, is a long, narrow window for the purpose of lighting the store room, while a hinged sash, which can be opened or closed by means of a cord, furnishes light to the hall. In the kitchen the cupboard is fitted with small doors above and below, while the china closet has doors above and a case of drawers beneath. The work table has a tip-out flour box, a place for a bread board and rolling pin, one drawer and a small door below. Above the table is a small cabinet for spices, &c. The coal room is ceiled, and five feet above the floor is a big tank, the position being indicated on the plan. The store room is fitted with cleats and hooks and with wide shelves above. The hanging porch at the rear is supported by rods running up over the walls and bolted to the roof joist, rods being preferred for the reason that braces tend to crowd away from the building. The whole floor is finished in center molded Georgia pine.



Front Elevation.

Store and Dwelling Combined.—S. F. Black, Architect, Wellington, Ohio.

Architecture in Apartment Buildings.

Among the papers read before the Congress of Architects of the World's Congress Auxiliary of the World's Columbian Exposition was one by F. Adolphe Bocage, member of the Central Society of French Architects, in which the author discussed the subject indicated by the title above. Among other things he said :

In the art of architecture the house certainly is what best characterizes the taste, the habits and the morals of a people. From the first centuries of the middle ages in France the habitation in the country presents a character of defense, while that in the city, occupying a narrower space from the necessity of surrounding these towns with walls as a protection against the enemy, was obliged to be raised, in order to find in hight the space wanting in surface. The same conditions existed at Rome in ancient times, where a great number of houses had several floors, while in the adjacent neighborhood this method does not seem to have been followed.

Other large cities in more modern times can be cited as examples of considerable increase in hight, but, happily, for very different reasons from those given above. I mention especially New York and Chicago. We believe that for these last their geographical position and the tendency of commerce to concentrate itself in the center of towns are the reasons for this agglomeration. If in Paris we have not attained these prodigious hights from love of the sun, the number of houses of six and seven stories above the ground floor has increased considerably on account of the habit now generally adopted by Parisians of living in apartments in the city while keeping to the old custom for the country—that is to say, private houses.

It was under the reign of Louis XIV that the period of apartment building began in Paris. The streets, laid out at a time when there was no thought of living at such an elevation, were sufficiently wide for small houses, but became too narrow after the change to higher buildings was made ; and in a part of old Paris many streets are found in which air and light scarcely penetrate. It is well to say that all those streets and the houses which line them are condemned and will disappear sooner or later.

BUILDING REGULATIONS.

The regulations of buildings which apply to the reconstructions on enlarged streets are called : Rules for large and small thoroughfares.

These various regulations form, indeed, the basis upon which the plans of the ordinary apartment buildings are established in Paris. Observing now the needs and tastes of the inhabitants, we will complete this short study by considering the comfort actually desired, according to the kind of apartments to be built.

For the most important we have in view the habits followed in private residences, the actual patrons for these being largely composed of wealthy men who have always lived in their own residences and now are gradually adopting more and more the idea of the apartment for several reasons.

The high price of ground in aristocratic quarters forced the owners first to suppress the garden, which was one very great advantage of the private residence, or to have one of restricted dimensions subject to the indiscreet curiosity of neighbors or surrounded by walls of adjoining buildings, sometimes 60 or 70 feet high. Moreover, for further reasons of economy, a small space of ground was found sufficient under the conditions of having three or four stories for the house. But this offered many inconveniences—the supervision of servants was difficult, and their numbers necessarily increased; and also for large receptions the reunion of several drawing rooms on the same floor was impossible.

Finally, in spite of the advantages of individual liberty, the inconveniences indicated above have been found sufficiently important to induce many owners of private residences to give up their old habits and adopt the better system of apartments.

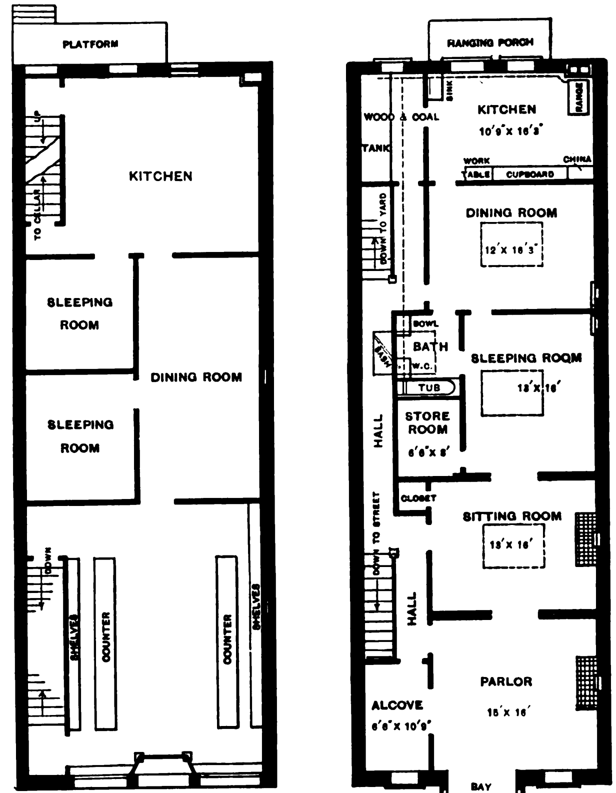
We speak of this as a general rule, notable exceptions still existing, in in which proprietors can afford expensive gardens and every luxurious surrounding.

The problem, then, to be solved by the architect charged with the construction of luxurious apartment buildings, is to suppress the disadvantage found in private residences and to diminish as much as possible the inconveniences arising from the assembling of several families in the same house.

(To be continued.)

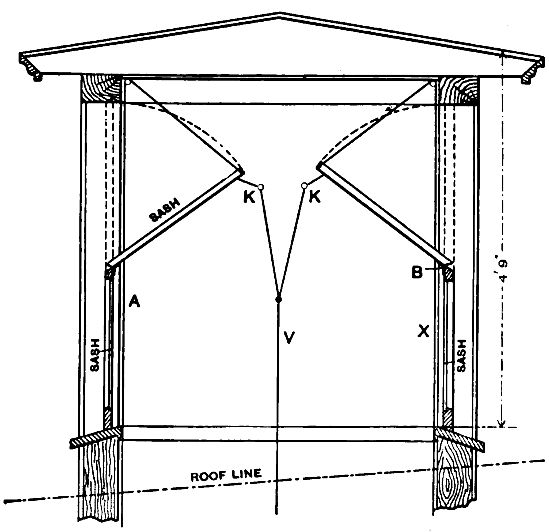
Influence of Mediæval Construction.

The combination of masonry and carpentry in building tended greatly to the advancement of both; for, it being required at times to make them act independently of each other, additional science and art were necessary, as the proportions must be retained that were given to similar works in which they co-operated. Hence the wondrous skill evinced in the vaulted roofs and ceilings, in the towers and lofty spires of some of our pointed cathedrals for the one, and the splendid piece of construction in the roof of Westminster Hall for the other, says a London architectural paper. To this point Sir William Chambers, who was no depreciator of the merits of the Romans in architecture, says: "In the constructive part of architecture the ancients do not seem to have been great proficients." Then, having referred many of what he calls the "deformities observable in Grecian buildings" to want of skill in construction, he continues: "Neither were the Romans much more skillful; the precepts of Vitruvius and Pliny on that subject are imperfect, sometimes erroneous, and the strength or duration of their structures is more owing to the quantity and goodness of their materials than to any great art in putting them together. It is not, therefore, from any of the ancient works that much information can be obtained in that branch of the art. To those usually called Gothic architects we are indebted for the first considerable improvement in construction. There is a lightness in their works, an art and boldness of execution to which the ancients never arrived, and which the moderns comprehend and imitate with difficulty. England contains many magnificent specimens of this species of architecture, equally admirable for the art with which they are built, the taste and ingenuity with which they are composed." To this Gwilt, in his edition of Sir William's work, adds in a note: "There is more constructive skill shown in Salisbury and others of our cathedrals than in all the works of the ancients put together."



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.



Detail of One of the Skylights Indicated by Dotted Lines on Second Floor Plan.—Scale, ¼ Inch to the Foot.

Store and Dwelling Combined.—Floor Plans and Detail of Skylight.

WHAT BUILDERS ARE DOING.

THE IMMEDIATE PROSPECT of recovery of the building business does not seem to be promised by the amount of work thus far projected for the coming season and yet a large majority of the builders from the various sections of the country, in attendance at the convention in Boston, were of the opinion that general business would prove to be better than the present outlook warrants. It was anticipated by some that the worst of last year's panic had not yet been felt, but the conservative builders are looking forward to a fairly good season. The relations between employers and workmen throughout the country are amicable at present, and no reports of prospective troubles have been made up to the present time.

Boston, Mass.

The builders of the country who visited Boston during the eighth convention were greatly pleased with the arrangement of the rooms of the Master Builders' Association and the facilities for transacting business. The business character of the institution made a strong impression upon all who were unfamiliar with what can be accomplished by a properly conducted exchange. On February 12 the association was called upon to mourn the death of Benj. D. Whitcomb, its first president. He was a man who stood high both in public and private life, and whose loss is seriously felt by the association. The committee appointed by the association to investigate the condition of workmen in the building trades, with a view to dispensing either labor or charity, has issued to the members of the association the following questions in the form of a circular letter:

1. Are any of the workmen usually employed by you, to your knowledge, in need of assistance?

2. If you are not informed, will you kindly make inquiry as to these workmen, and if there are any cases where assistance is needed report the same to the committee at the earliest opportunity?

It is the purpose of the committee to provide for all needy workmen who are worthy.

Buffalo, N. Y.

The annual election of the Buffalo Builders' Exchange Association was held at the exchange January 15 from 11 a.m. until 8 p.m. During that time a banquet was served, and the members partook of the numerous good things which were offered. All enjoyed themselves heartily. The election was the most spirited that has been held by the association. There were 91 votes cast, of which George Duchscherer received 50 for president and Henry Schaefer 41. For vice-president, George W. Maltby received 47 votes and Charles Geiger 44. For treasurer, George W. Carter received 47 and Harry C. Parsons 44. For members of the Board of Directors E. L. Cook and J. A. Wolsley were tied, and for delegates to the national convention John Wolsley, George W. Maltby and John W. Henrich were tied. The following is the result on the balance of the ticket:

Directors—H. C. Harrower, E. T. Coppins, Jacob Reimann, A. W. Day, Adolf Machwirth, H. Rumrill, Jr., J. H. Tilden, John Lannen, W. L. McClennan.

Secretary—J. C. Almendinger.

Arbitration Committee—A. A. Berrick, John Feist, George W. Carter.

Delegates to national convention—At-large, William D. Collingwood; delegates, George W. Carter, M. J. Byrne.

Chicago, Ill.

The Builders and Traders' Exchange of Chicago held its tenth annual meeting on January 16. The election resulted as follows:

President, J. G. McCarthy.
First vice-president, James. A. Hogan.
Second vice-president, E. S. Moss.
Treasurer, John Rawle.

DIRECTORS.

John Mountain,	William Grace,
C. S. Purington,	George Tapper.
Alexander Gordon,	

INSPECTORS OF ELECTION.

J. H. Brown,	N. J. Bigue.
J. C. Gould,	

President C. W. Gindele announced that the collation would not be so elaborate as usual, as the exchange had contributed $500 of the sum set aside for that purpose to the unemployed of the city. This was greeted with cheers. The president's address referred to the entertainment of visitors by the exchange during the World's Fair; recommended an outing day each summer for the exchange; spoke highly of the building ordinance adopted during the year.

The reports of Secretary H. S. Martin and Treasurer W. H. Mortimer made an excellent showing. The exchange has 600 members and there is $8000 in the treasury.

Cincinnati, Ohio.

The Builders' Exchange of Cincinnati held an interesting meeting on February 8 to consider the lien law amendment now before the Legislature. After considerable discussion for and against, it was unanimously voted to telegraph the Legislature at Columbus that the Builders' Exchange of Cincinnati favored the bill. The following is a summary of the bill:

The proposed amendment of Section 3184 gives an absolute lien upon the ground, and the buildings or structure mentioned therein, to contractors, sub-contractors, material men and laborers, and making the contractors, sub-contractors, architects and other persons having charge of the construction of any such building the agents of the owner. It provides that a lien for labor, material or machinery shall not exceed the actual value thereof, the intention of this supplementary section being to prevent fraud or collusion in regard to the prices for such labor, machinery or material. Section 3188 is amended slightly, and provides that the liens of all persons other than the original contractor shall be probated and that the lien of the contractor shall be postponed in payment to all such liens. It also provides for the filing of notice in order to stop the payment where the work is of a public nature, as in such cases the lien might afford no security.

All provisions inapplicable are repealed, as the purpose of the proposed law is to give all contractors an absolute lien on the property in place of a lien upon the fund, it being considered more to the advantage of sub-contractors, material men, laborers and mechanics to have such absolute lien than to be compelled to rely upon the stoppage of payment.

Louisville, Ky.

The Builders and Traders' Exchange of Louisville held an important meeting February 7 at its hall in the Board of Trade Building. The by-laws were modified in such a manner that a stricter enforcement of the rules can be had and the members bound closer together in the carrying out of the objects for which the exchange was formed.

The annual election of officers was held and resulted as follows:

President, George L. Smith.
First vice-president, Edward Spurrier.
Second vice-president, Paul C. Barth.
Directors (to serve three years), C. T. Hoskins, S. P. Snead and John E. Carpenter.

The exchange held a long discussion over the proposed license tax of builders, contractors and the like, as provided by the new charter. Many of the builders and contractors favor a rather high tax, believing it will keep out irresponsible parties, but on the other hand those who have no competition in their particular line are for a small license.

Milwaukee, Wis.

A meeting of the Builders and Traders' Exchange was held January 22, and after an extended discussion resolutions were passed opposing any further changes in the City Hall plans. The committee appointed to draft the resolutions was composed of Messrs. Quinn, Forster and Weden. The resolutions adopted were as follows:

Resolved, That we, members of the Builders and Traders' Exchange of Milwaukee, oppose all changes in the present plan of the City Hall, and deem it unwise to make any change, as it is costly and expensive to the city.

Resolved further, That the plans and specifications heretofore adopted, approved and contracted for should be carried out to the letter, except such changes as are absolutely necessary to make a first-class building.

Resolved, That this exchange also believes that in calling for building materials and all apparatus and devices for public use there should be at least three or four kinds of equal quantities or grades stated, so as to insure fair and honorable competition in public work.

Contractor Paul Riesen opposed the resolutions. Messrs. Quinn, Forster and Dunck were appointed a committee to present the resolutions to the council.

New York City.

The Mechanics and Traders' Exchange of New York held a special meeting on January 23 for the nomination of officers for the ensuing year. The following officers were nominated and subsequently elected, with the exception of Mr. Wright:

President, Isaac A. Hopper.
Vice-president, John Byrns.
Treasurer, Edmond E. Vaughan.
Secretary, Stephen M. Wright.
Trustees—John J. Tucker, John J. Roberts, John L. Hamilton, John J. Donovan, Thomas Dimond, John McGuire, Isaac E. Hoagland.
Examiners in Department of Buildings—Warren A. Conover, Edwin Dobbs.

Mr. Wright declined to accept the office of secretary again, the duties of the office interfering so greatly with the prosecution of his private affairs that he felt unable to continue in office. The retirement of Mr. Wright from the office of secretary was sincerely regretted by the membership he had served so faithfully and disinterestedly and it is a source of satisfaction that he still remains identified with the interests of the organization. Elliott Smith was elected as his successor.

The Mason Builders' Association elected the following members to represent them on the Building and Bricklayers' Arbitration Board: Otto M. Eidlitz, John Snath, P. Gallagher, H. M. Tostevin, Hugh Getty, Joseph Schaeffler, James Livingston and Alexander Brown, Jr.

The bricklayers on the board are William Stewart of Union 4; John Doyle, Union 7; Philip Bauer, Union 11; Owen King, Union 33; J. H. Hambly, Union 34; August Preible, Union 35; B. F. King, Union 37, and William Daly, Union 47. Mr. Eidlitz has been elected chairman and Charles A. Cowen of the Mason Builders' Association secretary.

The joint board will draw up the agreement for 1894 and pass on the changes which the builders are agitating among the men. The board will also settle all grievances which may arise during the year. The board recently settled one case of journeyman against a builder, after four months' discussion, in favor of the employer, five journeymen voting with the builders. The builders cannot now join any other combination of bosses in a fight against other workingmen and the bricklayers are prevented from ordering sympathetic strikes.

Omaha, Neb.

At a recent meeting of the Builders and Traders' Exchange of Omaha the uniform contract was up for consideration. The clause containing reference to work being done to the satisfaction of the architect was criticised and an amendment suggested making appeal to arbitration possible where the "satisfaction" of the architect required work or material not anticipated by the specifications and plans. The following resolution was unanimously adopted.

Be it resolved, That in all cases where bids are received from sub-contractors or material furnishers that a preference be given to members of the exchange, and that bids be received from parties outside the exchange with distinct understanding that a preference would be given a member of the exchange should then meet the competition.

Philadelphia, Pa.

On January 18 the Master Bricklayers' Association of Philadelphia celebrated its 104th anniversary by a dinner in the Builders' Exchange banquet rooms.

A short business meeting was held before the dinner, when the following officers were elected to serve during the present year:

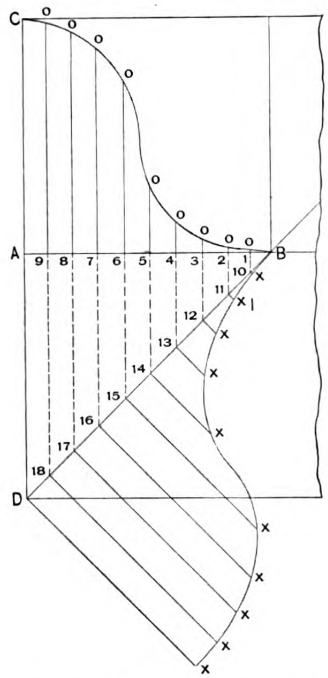
President, Joseph B. Hancock; vice-presidents, Michael Magee, Richard C. Ballinger; treasurer, John W. Miller; secretary, Wm. J. Gillingham; members of the Measuring Committee, John W. Miller, Samuel Hart, George W. Roydhouse, George P. Einwechter, Franklin M. Harris, Jr.

The Committee of Journeymen Bricklayers, who were present at the dinner, discussed with a Committee of Master Bricklayers the scale of wages for the ensuing year. There was no friction, and the scale was fixed at 45 cents per hour, the same as last year.

CORRESPONDENCE.

Concave [and Convex Valley Rafters.

From H. G. R., *Allegheny, Pa.*—In answer to "W. W. P.," East Liverpool, Ohio, whose letter was published in the July issue, I send a drawing with the accompanying explanation. Draw the seat of the common rafter as A B and the rise A C. Then draw the curve of the common rafter C B. Now divide the base line A B into any number of equal spaces, as 1, 2, 3, 4, 5, &c., and draw perpendicular lines to construct the curve C B, as 1 0, 2 0,



Method Suggested by "H. G. R." for Getting Out Concave and Convex Valley Rafters.

3 0, 4 0, &c. Now draw the seat of the valley or hip rafter, as B D, and continue the perpendicular lines referred to until they meet B D, thus establishing the points 10, 11, 12, 13, 14, &c. From these points draw lines at right angles to B D, making 10 X equal in length to 1 0, and 11 X equal to 2 0; also 12 X equal to 3 0, and so on. When this has been done draw through the points indicated by X the curve, which is the profile of the valley rafters.

Coloring Plaster.

From G. P. S., *Leavenworth, Kan.*—Will some of the readers of *Carpentry and Building* furnish me information as to how the finishing coat of plaster is colored or tinted, and which are the best colors to use? Cameron's Plasterers' Manual gives a number of colors to employ, but no information as to the quantity and manner of mixing.

Finishing Hardwood Furniture.

From C. G. P., *Monticello, Minn.*—I think I can give "J. C. W.," Pine Hill, Pa., some information with regard to finishing hardwood furniture, as I make and finish a great deal myself. I think if he will get "The Hardwood Finisher" referred to on page xxxii of *Carpentry and Building* for January it will help him out. I would say, however, that after filling and varnishing the furniture, take finely powdered pumice stone, moisten with raw linseed oil and rub with a cloth. I think if he will follow the directions given in the book named he will have no trouble, with a little practice, to make his furniture look as good as city made.

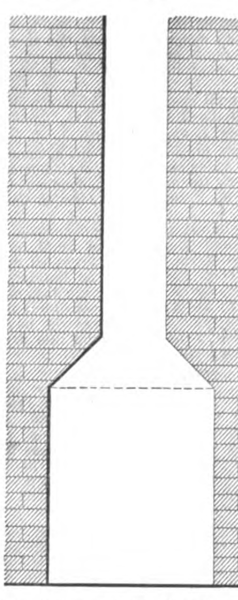
Design for a Pulpit.

From H. W. W., *Washington, Ind.*—Will some of the many readers of *Carpentry and Building* kindly contribute for my benefit a design for a pulpit of a character suitable for a neat little church?

Proportions of Fire Places.

From F. A. F., *Helena, Mont.*—Will some one please give me, through the columns of the paper, the proper depth and hight for fire places in which andirons are to be employed? I desire to know what should be the depth and hight of fire places 3 feet wide, 3 feet 6 inches wide, 4 feet wide, 4 feet 6 inches wide and 5 feet wide. There are very few fire places in this town which give satisfaction, as most of them smoke, and I think the fault is in the depth and hight of the fire place when compared with its width.

Note.—We referred the above inquiry to one of the leading grate manufacturers in this city, who furnishes the following touching the points raised by our correspondent: The proper dimensions of a fire place depend upon the size of the flue and its form. Usually the fire place is made 30 inches wide, 30 inches high and 12 inches deep, in connection with a flue 8 x 8 inches. A safe rule for regulating the size of the flue in its relation to the fire place is to make its area one-eighth that of the product of the width and hight of the fire place in inches. Thus a fire place 4 feet wide by 4 feet high, giving an area of 2304



Proportions of Fire Places.—Fig. 1.—Proper Form of Flue Construction.

inches, should have a flue area of 288 inches, or about 17 inches quare. This, however, is only a general rule, applicable more particularly to high fire place openings. Smaller fire places, as the 30 x 30 inches, will work well with a flue area less than one-tenth of the area of the fire place opening. A matter not less important than the size of the flue is its shape where it joins the fire place. No flue is a good one which does not slope at an angle of 45° from

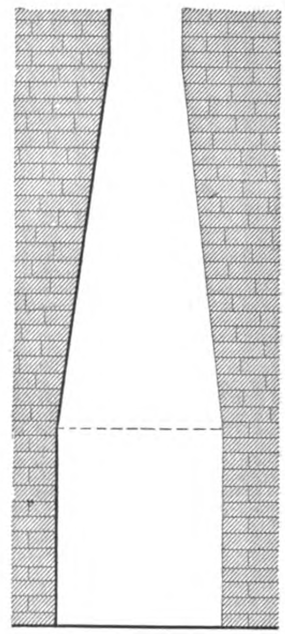


Fig. 2.—Incorrect Shape of Chimney Flue.

the horizontal line. While the smoke is hot it should reach the narrowest or smallest part of the flue, and that point should not be over 20 to 24 inches above the top of the fire place. Thus Fig. 1 shows the proper form for a flue, while Fig. 2 represents a bad form. There would be few complaints of smoky fire places if builders gave proper regard to the shape of the flues, and never was this caution more necessary than it is at present, when corner fire places are so much in vogue. Some masons think that if they make a flue very large all danger of bad draft may be avoided, but this is a great error. There is as great danger in making a flue too large as in making it too small. A flue should be no larger than is necessary to carry off the greatest volume of smoke that is made by the fire. If larger, eddies or counter currents are formed which greatly impair the draft.

Elevations of the Prize Winners in the Floor Plan Competition.

From W. P., *South Boston, Mass.*—I trust some of the readers of the paper will give front and side elevations, together with details for the three sets of floor plans awarded prizes in the XXIVth Competition, and presented in the issue for January.

Design for Bookcase.

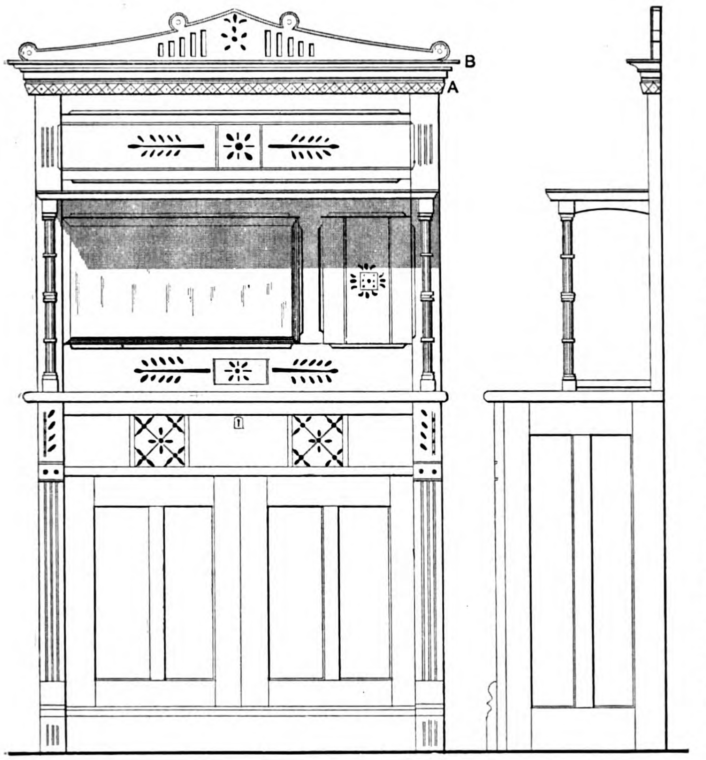
From W. A. M., *Mifflingburg, Pa.*—Will some reader of the paper please send for publication a design for a bookcase?

Plans for a Grist Mill.

From C. H. C., *Sault Ste. Marie Mich.*—I would like to ask some of th readers of the paper if they have an plans of grist mills of about 50 barrels per day capacity. I have been a reader of the paper nearly five years and have found in it practical information on almost everything in the building line, but do not recall anything relating to grist mills.

Design for a Sideboard.

From S. D. T., *Demorest, Ga.*—I send inclosed a rough sketch or two of a sideboard which may possibly prove of interest to some of the readers of the paper, especially those making inquiry for articles of this character. Fig. 1 of the sketches represents a front and end elevation showing the general appearance of the completed sideboard. At A is a V-shaped line, the diamond being completed with a dot in the center. The side pieces of the back are fluted where the lines show. The panels are beaded and around them and the glass the edge is stop-chamfered. The main portion has one drawer at the top and doors below, with a shelf in the center, as shown in the elevation. I think it would be an improvement to make two small drawers instead of one large one. In Fig. 2 of the sketches is shown a section through the molding at the top. The back is of ½-inch stuff. The sideboard is constructed of Georgia pine of handsome grain and makes a nice piece of furniture.



Design for a Sideboard.—Fig. 1.—*Front and End Elevations*

Henneries and Piggeries.

From G. M. B., *Barnesburgh, Ohio.*—I would like to hear from some of my brother chips in regard to the subject of henneries and piggeries. I am often called upon to build them and will, if the readers desire, send drawings of some I have erected.

Note.—The subject of henneries has received more or less attention in the past volumes of the paper, but has not, by any means, been exhausted. We trust therefore our correspondent will forward the drawings to which he refers.

Use of the Octagon Scale.

From D. E. B., *Fort Worth, Texas.*—I have been a constant reader of the paper for two years and have never yet asked a question through its columns. I now make bold to inquire if some of the readers of the paper will explain the octagon scale on the tongue of the steel square, as I think it would benefit many carpenters as well as myself. I think *Carpentry and Building* a grand paper. I have all the plates and have hung them in the choice places of my home.

Note.—In answering the inquiry of our correspondent we would say that the use of the octagon scale is as follows: Suppose it is required to reduce a square timber, say 12 x 12 inches, to octagon shape. In the first place, draw a center line along each face, which, necessarily, will be 6 inches from the several edges. With the compasses take 12 of the divisions in the octagon scale on the face of the tongue of the square, and set off this space on the face of the timber, measuring each way from the center lines. The points thus obtained will be correct for the gauge lines. The rule always to be observed is as follows: Set off from each side of the center line, upon each face, as many spaces by the octagon scale as

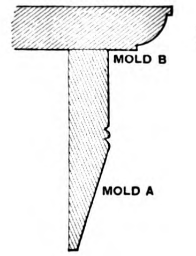
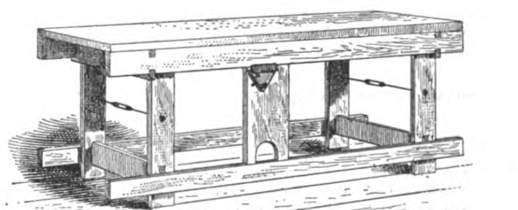


Fig. 2.—Section through Molding at Top of Sideboard.

the timber is inches square. For timber larger in size than the number of divisions in the scale, the measurements by it may be doubled or tripled, as the case may be.

Carpenters' Work Bench.

From G. N. H., *Bristol, Conn.*—I am an old reader of *Carpentry and Building*, and take the liberty of sending a rough sketch of a bench which I built a year or two ago. I find it very handy, as it can be readily taken apart and moved from place to place. It very often happens that a bench is wanted in one place and then in another part of the house, wherever the work may be, and in moving this bench it is only necessary to tip it over on its back, unscrew a turn buckle sufficient to unhook it from the eye, give the sides a kick, and the whole thing falls over on the floor. Then pick up any part desired and move it where it is needed. There are only five pieces to the whole bench, and it is unnecessary to take off the bench vise or the bench hook. The side pieces are bolted together in such a way that they can be handled very nicely and readily moved about. The bench which I made, and which is shown in the accompanying sketch, is 9 feet long and 3 feet wide, which is wide enough for two men to use. The width is also convenient in making frames for windows and for work of a similar character. The top is nailed fast to both end pieces, making it rigid. I put in a middle support, just catching it on the sides. The latter I grooved in order to allow a rest to slide in for holding up the opposite end of the stuff from the vise. This slide is made of oak ⅞ x 10 inches, with ½-inch tenons on the ends to follow the ½-inch plowing in the side pieces. Outside of this is a triangular piece of wood ⅞ inch thick, and of whatever size may be desired. It is hung by a bolt through a top corner and allowed to swing up and



Carpenters' Work Bench as Made by "G. N. H."

down, according to convenience. It fastens with a wooden pin having a flanged head. On the outside of the triangle is a plate of iron about 3 inches wide, screwed fast to the side to form a flange in which the $\frac{7}{8}$-inch stuff may rest. When working heavier material the latter will rest on the edge of the iron. A number of holes are bored in semicircular form so that as the triangular piece is raised the pin may be put through it and into the proper hole, thus holding the piece at the proper angle. The sides of the bench are made of oak and the legs of chestnut, although most any kind of wood will answer the purpose. The legs are gained in $\frac{1}{2}$ inch on both side pieces in such a way that they are locked firmly together. Two bolts are put through each leg, top and bottom, and the construction is strong enough to stand almost anything. There are no braces to the bench, nor does it need any, as when the rods are hooked and turned up the whole thing is strong and rigid. There are only two rods, one at each end. The ends of the cross pieces show through the sides, as will be seen from the sketch. I have used this bench for cabinet purposes and found it satisfactory. In case one desires to clamp anything to the bench it is only necessary to attach the thumb screw along the side and screw the article fast.

Joining Sash to Iron Columns.

From J. S. Z., *Morganton, N. C.*—I would like to ask through the columns of *Carpentry and Building* if some of my brother readers will send to the editor for publication drawings showing the best way of joining bulk sash to iron columns in store fronts.

Cobble Stone Cellar Walls.

From L. D., *New York.*—In reference to the inquiry of "S. A. S." Barton, Vt., which appeared in the June issue of *Carpentry and Building*, I will say that cobble stones laid in cement mortar will form good walls, but they are more difficult to build than others. An excessive quantity of mortar should be avoided, especially in damp weather. No more than about 3 feet in hight should be constructed the same day, as it is necessary to give the mortar a chance to set. If this is not done the wall is likely to bulge. The outside and inside faces should be carried at the same time, thus giving a better bond, as the short and long stones will bind in each other. The lines should be put up at the same hight and every course should be leveled off. The inside of the wall should be well filled with smaller stones and spawls, laid almost dry, and leveled with mortar in order to secure a good bearing for the next course. Continue this process until the work is completed. This is the suggestion of a practical cobble stone man of 30 years ago.

Tool Chest Construction.

From J. L. L., *Waxahachie, Texas.*—The first thing a carpenter or joiner needs is a suitable collection of tools for his trade, and the next thing he requires is a practical tool chest. Carpenters' tools should be well kept and cared for, and with this fact in view I have devised a plan for a tool chest in which there is a place for everything needed, with each tool in its place. I constructed the chest which I shall describe about a year ago and am well pleased with it, owing to the fact that the tools cannot become badly mixed. The plan, so far as I know, is original and meets the approval of all who are familiar with it.

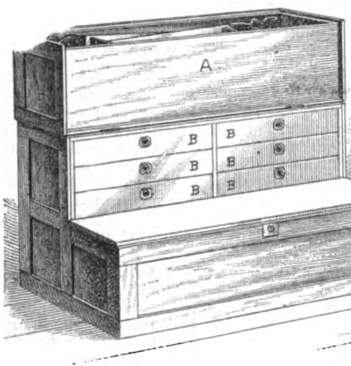


Fig. 1.—Showing Chest Open, with Cover of Saw Rack Removed.

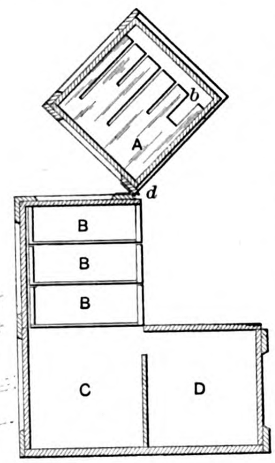


Fig. 2.—Vertical Cross Section.

Tool Chest Construction.—Cuts Accompanying Letter from "J. L. L.," Waxahachie, Texas.

I send a few sketches, Fig. 1 showing the chest open, with the cover of the saw rack A removed, while Fig. 2 is a vertical cross section indicating the various divisions. The saw and level rack is placed in the front top section, the cover to which may be worked in slides or on hinges. The letters B B B represent drawers, which may be partitioned with very thin material into different apartments for the reception of chisels, try and bevel squares, bits, gauges, &c.; C is a catch all for such things as planes, specifications, sandpaper and work-suit, and D is a receptacle for tools of general use, such as bench planes, beaders, molders, mallets, hammers, &c.

The chest is made in three parts, the first being the bottom or base section, which is the entire width of the chest and half its hight, as shown in the sketches; the second is the back top section, screwed on the base in a substantial manner, and being the receptacle for the drawers, as shown, while the last is the top front section, hinged to the top of the back section, as clearly indicated in Fig. 2 of the cuts. This allows it to fold or swing back on top of the rear section, as indicated in Fig. 1. The front section is provided with overlapping edges, snugly fitting all around. In Fig. 2 of the sketches *d* shows a groove in the rabbet of the back section for the purpose of preventing leakage, while *b* represents a receptacle for a spirit level. This chest I consider the most convenient of any I ever saw, as one may get from it any tool required without the necessity of hunting all through the chest for it, or moving the other tools out of its way. To reach the back of the base section, or the space designated as a "catch all," it is only necessary to take out one of the bottom drawers. With this exception there are no tills to be lifted out and in, as is the case with tool chests as ordinarily constructed. If any of the readers of the paper desire further information concerning this chest I shall be glad to hear from them.

Making Blue Prints.

From R. C., *Cramer Hill, N. J.*—I have been reading *Carpentry and Building* for several months and am well pleased with what it contains. I would like to further increase my knowledge by having the following questions answered, if some of the readers will kindly take the trouble to do so: How are blue prints made, and is it an easy or a difficult process? Also is it expensive and can a carpenter make his own prints?

Note.—The process of making blue prints is neither an expensive nor difficult one, and any person of average intelligence can do the work in such a way as to meet ordinary requirements. Without attempting to anticipate in any way the replies which our readers may see fit to send, we offer the following remarks as likely to prove interesting to the correspondent above: In making a blue print the first thing is to secure a supply of ferro prussiate paper, which may be obtained from any large dealer in photographic or artists' materials. If our correspondent is unable to conveniently obtain the paper he can make it with comparatively little trouble. Almost any white paper of good quality may be employed for the purpose. This paper may be prepared by subjecting it to a sensitizing solution, made by taking 1 ounce of citrate of iron and ammonia and 4 ounces of water, and mixing it with 1 ounce of red prussiate of potassium and 4 ounces of water. The two solutions are mixed in equal quantities and to an amount sufficient to sensitize the paper required for immediate use. The solution may be applied to the paper with a sponge or flat brush, or, if convenient, the paper may be floated in the solution, the latter plan being generally considered the better way. After this has been done the paper should be dried in a weak light. The paper prints better when fresh, and it would be well, therefore, for our correspondent to prepare his paper only as required for use. In this connection we would suggest that the citrate of iron and ammonia be kept in a dark bottle from air and light. The paper should be stored in a dry place and be entirely shielded from daylight before being used and while putting it into the printing frame.

After the paper is ready for use and a print is desired the printing frame is placed upon the table and the backboard removed. A negative, with the film side up, is then placed upon it and a piece of ferro prussiate paper with its colored side toward the film put in. The back part is then placed in position in the printing frame and fastened by slipping the springs attached to it under the buttons screwed on to the frame. The printing frame is then exposed in a place where the sunlight will fall directly upon every part of the front. It is thus placed in order to make the print equally intense in every portion and is left for from 15 to 30 minutes or longer, according to the strength of light and the intensity of the negative. In order to ascertain if the exposure is sufficient the frame may be removed to a place where the light is weak or subdued, one half of the back part opened and the paper bent back in order that the print upon its surface may be seen. If it is clear and distinct the paper may be taken out and placed in a pan of clear water, where it should be left until the whites of the print are clearly brought out. The paper being no longer sensitive may be dried wherever most convenient. The paper should soak from 15 to 30 minutes, when it may be taken out of the pan and washed a few seconds in water. After the print is dry it may be neatly trimmed and mounted upon cardboard if desired. If the printing frame containing the paper is not exposed long enough the picture will very likely have a pale blue instead of the indigo hue desired. If what should be white in the picture has a blue tint it indicates over printing or that the picture was exposed to a bright light before the paper was washed.

The blue print can be conveniently written on by using a solution of common soda thickened with gum arabic. Adding the soda to red ink will give a fluid by means of which a brilliant red line may be made on the print. From these suggestions we think our correspondent will be able to make blue prints which will serve his purpose.

Framing a Complicated Roof.

From S. B. C., *Middletown, N. Y.*—In the July number of *Carpentry and Building* "W. B. S.," Flemington, N. J., asks for suggestions relative to a roof plan. I send a sketch, Fig. 1, showing my idea of the best method of framing the roof. If the chimney cannot be made to come out at the flat square place in the center of the roof, it may be tinned over and any one from the ground would think it a short piece of ridging.

Note. — A correspondent, "J. C. McD." of Manchester, N. H., carries the idea suggested above a little further and makes a deck take the place of the short ridge running toward the front of the building. The deck starts very nearly on a line with the ridge of the left gable about as indicated in Fig. 1 of the sketches, but is a trifle wider; then at the line of the long valley at the right it broadens to nearly double the width with which it starts and terminates a short distance from the ridge of the front gable. The correspondent also sends a solution like that shown in Fig. 3 and states that the idea in either case is to have the walls of the tower high enough so that its cornice will clear the main roof of the house.

From H. I. P., *Omaha, Neb.*—Replying to "W. B. S.," Flemington, N. J., I would say that he has something of a problem in roof framing and I send what I consider the best way out of the difficulty. Referring to the sketch, Fig. 2, it will be seen that all hips and valleys are run on an angle of 45° with the plates, except the hip A and the valley B. These are the only ones necessary to vary from the square. By varying these points as shown in the sketch the roof can be framed without any particular difficulty or any feature that would be detrimental to its appearance.

Note. — A solution similar to the above is furnished by "J. N. H." of Galveston, Texas.

From W. C. W., *New Orleans, La.*—In reply to the inquiry of "W. B. S.," Flemington, N. J., whose letter appeared in the July issue of the paper, I inclose a sketch, Fig, 3, which is self explanatory.

Note.—Similar solutions of the problem are furnished by "F. H." of Osborn, Ohio; "F. L." of Elkhart, Ind.; "F. C." of Junction, N. J.; "C. W. M." of Indianapolis, Ind.; "D. J." of New Westminster, B. C; "Tramp" of Denver, Col.; "C. E. E." of Boone, Iowa, and "J. C. McD." of Manchester, N. H.

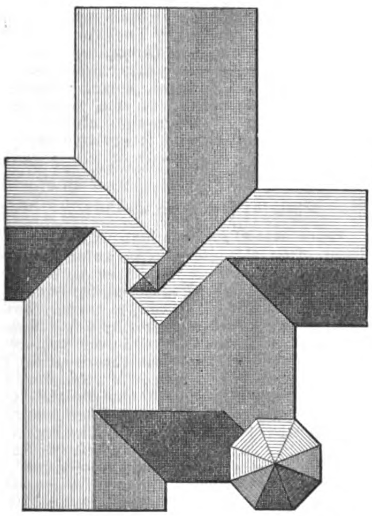


Fig. 1.—Method Suggested by "S. B. C."

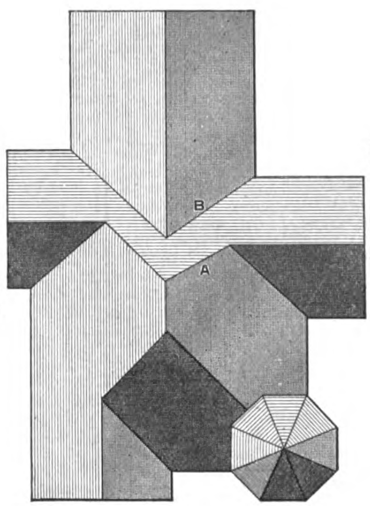


Fig. 2.—The Way "H. I. P." would do the Work.

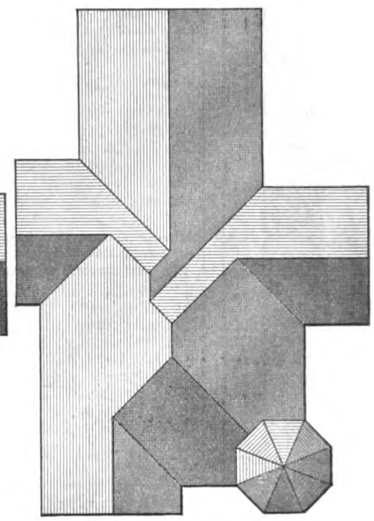


Fig. 3.-Plan Recommended by "W. C. W."

Framing a Complicated Roof.—Illustrations Made from Sketches Furnished by Different Correspondents.

Discussion of the Howe Truss.

From C. E. B., *Norfolk, Va.*—I notice in the December issue of the paper some problems in railroad work and think that a discussion of subjects like the Howe truss, for example, touching construction, the proportion of span to load and giving the camber, would be interesting to many subscribers of the paper. I have seen carpenters build these trusses who knew nothing of spacing the angle blocks, and would insist on gaining the camber by lengthening the beams. I trust that the practical readers will take up the matter and send the editor some interesting letters for publication.

Note.—The suggestion of our correspondent is a timely one, and although the Howe truss has been illustrated and described at length in some of the earlier volumes of the paper, there are now many readers who were not subscribers at that time and who, no doubt, will be interested and instructed in a discussion of the subject. We trust, therefore, that it will be taken up and considered at such length, as it has interest for the readers of this department.

Driving Nails.

From McD., *Mount Morris, Ill.*—We had a Kentucky man in our crowd at one time, who contended that a nail driven slowly with many strokes would hold better than one driven home with two or three strokes of the hammer. He also stated that in grinding a plain bit it was well not to put much weight on the bit, as it would be likely to crush the grit of the stone. I would like to know what members of the craft think of such teachings nowadays.

Wood Carving.

From S. R. McC., *Washington, Ind.*—I think the subjects of jack and hip rafters have been about exhausted, and I would like now to have some one give a few lessons in wood carving, stating what tools to purchase in order to accomplish neat work.

Note.—If our correspondent has the early volumes of the paper he will find in them several articles relating to the subject of wood carving. In the July issue for 1879 is the first of a serial entitled "Self-Instruction in Wood Carving," which is continued in the August and September numbers for that year. In the issue of September, 1880, is another article, illustrating and describing the tools employed in carving, while in the volume for 1881 there is a series consisting of five articles treating of the subject in a more advanced stage. There are doubtless many readers who are not in possession of the early files of the paper and were not subscribers at that time. For their benefit we trust the subject will be again taken up and discussed from a practical standpoint. There are many engaged in this particular branch of industry who could furnish a great amount of valuable information, and we hope they will come forward with letters for publication.

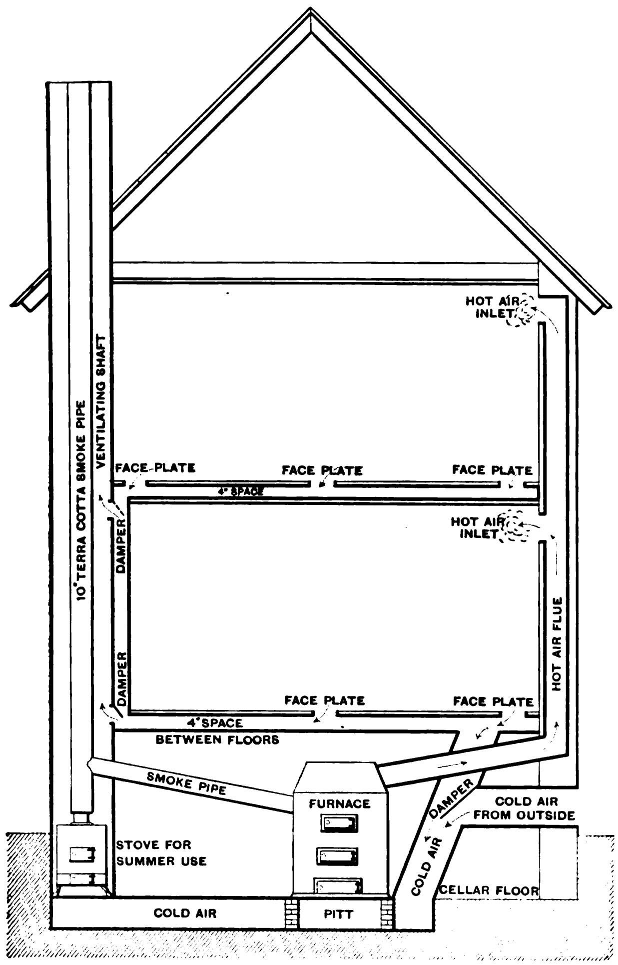
A Heating System.

From G. P., *Victoria, B. C.*—I inclose you a rough copy of my plan for heating and ventilating a school house, and would like your opinion of it and that of your readers.

Note.—No description coming with the sketch, some desirable information is lacking from which to form an opinion. The idea conveyed by the sketch has considerable merit, and if properly carried out in detail the work should prove satisfactory. The damper in the cold air box is so arranged that the outside air can be temporarily shut off, and by closing the ventilating registers at the same time the air will circulate through the building and furnace until the desired temperature is reached. The registers should then be opened and the damper arranged to take air from out of doors. A janitor in charge of such a system should have strict orders never to run it on the circulating plan when the school is in session. It is improbable that so many face plates will be needed in the floor, and the registers connecting the exhaust ducts with the ventilating flue should be properly proportioned in size to the heating registers. The necessity of the stove in the ventilating flue may or may not be felt. As our correspondent suggests, the plan is subject to further comment.

Details of an Incubator.

From W. C., *New York City.*—I would like to ask if any of the readers can furnish for publication details of a good incubator having special reference to ventilation and regulating apparatus for temperature. I also desire to ask if it is intricate for the average carpenter to make when the appartus named can be bought.



Vertical Cross Section of Building Showing Heating System Employed by "G. P."

Estimating Cost of Buildings.

From H. E. P., *Saco, Maine.*—I would like to know the quickest and best way of estimating the cost of a building and trust some of the practical readers of the paper will take an early opportunity to enlighten me.

Note.—Our correspondent asks a question which is not altogether easy of satisfactory answer for the reason that methods of estimating the cost of buildings vary not only with the locality, but with the individual as well. Therefore, a plan which would be considered rapid and satisfactory for the purpose by a builder or contractor in one part of the country might not be so regarded by those working in another and widely remote section, and yet the general conditions be practically the same in both. This may arise from the fact that in one case the builder estimates by the square, another by the piece, while a third employs a scheme differing from either of the others. All have their devoted followers and all give results which in the end are regarded as entirely suitable for the purpose. While there is no recognized method which may be said to have been universally adopted for estimating the cost of structures there is probably more uniformity in custom at the present day than there was a few years ago, owing, no doubt, in a large measure to the general discussion of the subject in our columns and to the expressions of opinion which have been presented on the part of those practically engaged in the building trades. Our inquiring correspondent will, however, find many valuable suggestions touching the question of estimating by carefully perusing the early numbers of the serial article entitled, "The Builders Guide" commenced in *Carpentry and Building* about two years ago and later published in book form. The subject, nevertheless, is one which admits of broad discussion and we hope our readers will freely express their views for the benefit of all who may be interested.

Plan of Sleeping Rooms.

From W. C., *Stapleton, N. Y.*—I have often thought when examining house plans that it would be a good thing if architects when designing such would cut out to scale a piece of black paper 6 feet 6 inches by 4 feet 6 inches and place it in different positions in the bedrooms, as they would then see at once whether or not the design was good or bad. One sees so many drawings of bedrooms, but on examination finds no place for the bed unexposed to drafts. It would be well in connection with such plans to draw straight lines from windows to doors, and then see if the bed can be placed so that it shall cross none of these lines. More attention to this would often insure better health and perhaps save life.

Cobblestone Houses.

From R. G., *Chicago, Ill.*—I have been a constant reader of the paper for some time, and would like to see more plans of the kind shown in a recent issue, illustrating a cottage at Brunswick, Ga. I would like to see the plan of a house of low price and modern design built of cobble and field stone, showing in what shapes the material could be used to the best advantage, on a farm, for example. I think it would be very valuable to many readers of the paper.

Self Supporting Roof.

From G. M. B., *Naresburg, Ohio.*—I have been a silent reader of *Carpentry and Building* for several months and have gained a great deal of information. One objection I have to the paper is that it does not visit me often enough—I mean that it should be a weekly instead of a monthly. I will say that the self-supporting roof given by "J. N. H." of New Orleans, La., in the January number is excellent. I notice it is for a brick or stone building, and I would ask the correspondent how he would connect the chords with a frame structure; also, how he fastens the angle blocks, and what is the cost of such a truss?

CONVENTION OF THE NATIONAL ASSOCIATION OF BUILDERS.

THE eighth annual convention of the National Association of Builders opened its first session in Boston on the morning of February 13, and in spite of a rigorous old fashioned New England snow storm the roomy hall was well filled with delegates and visitors.

The opening address, which was to have been delivered by the president of the Master Builders' Association, was delegated to the secretary owing to the inability of the president to attend. The secretary extended a cordial welcome, touched briefly upon the purposes of the meeting and introduced Nathan Matthews, Jr., Mayor of the city of Boston, who extended on behalf of the city a hearty greeting to those attending the convention. The Mayor paid a high tribute to the character of the Master Builders' Association and the estimation in which it is held and in which its members stand among the citizens of the city. His honor's remarks were brief and to the point and were very cordially received.

President Ira G. Hersey, of the National Association, next delivered his address, of which the following is a summary:

President's Address.

The president opened his annual address with a reference to the fact that the Eighth Convention of the National Association had brought the organization back to the city in which the preliminary work of its establishment was performed.

As to the character of the work, he showed that it was primarily educational and that its tenets were the advocacy of the appliance of principles of equity and honor to the transaction of the builder's business in all its phases. He said, "That the recommendations of the National Association had been prepared with the view to being directly applicable to the practical affairs of builders anywhere and under any given condition.

"The National Association lays down no law; it only asks that the builders of the country shall adopt for their own betterment the wisdom of all as represented by the delegates at the yearly meetings."

In reference to the work of the past year, particularly, after complimenting the National Association on the number in attendance as being indicative of the condition of affairs among builders, he alluded to the fact that retrenchment of expense in conducting the association was at the beginning of the year considered necessary, and that with the elimination of certain features of the work of previous years the association now finds itself with about the same balance in the treasury as with which the year opened.

COL. R. T. AUCHMUTY.

He referred feelingly to the loss by death of Col. Richard T. Auchmuty, the only honorary member of the association, as being a national loss as well as a personal loss to every citizen of the country who is in sympathy with trade education of American boys. He said: "No eulogy of mine can hope to express the love and gratitude felt for him by the building fraternity of the country, which the magnitude of the work and the gentle greatness of the man so justly earned for him. He was a man who, though not strong in body, dedicated his life to the interests of the American boy. Let us be thankful that he was spared to see help come to the cause which he had so long upheld single handed, and to know that the spark cherished by him had kindled like impulses in another, thus placing his school upon a permanent basis—a fit monument for a noble man." He also referred touchingly to the death of Vice-President Hugh Sisson of Baltimore, and of the directors, N. B. Hussey of Omaha and James Boland of Buffalo.

EARLY CONDITION OF BUILDING TRADES.

In commenting upon the condition of the building fraternity at the time the National Association was organized it was stated that no means existed for establishing universal customs of securing joint action for the eradication of pernicious practices which had grown to be considered excusable through long custom, and that such local organizations as existed at that time were in a more or less inefficient condition. From these small and almost unknown local bodies there have been awakened organized and strengthened institutions all over the country, until to-day there is a strong effective working exchange in nearly all cities of prominence in the country. These organizations have become acknowledged factors in their several localities, whose judgment and assistance in creating plans for the public advancement are more and more sought after as their capability and willingness to cope with these questions becomes apparent. In pointing out the value of organized effort the president used a most excellent simile in the World's Fair at Chicago, showing conclusively how necessary organization was to the carrying on of any great project. In support of the statement that the local organizations have been benefited by the work of the National Association, it was shown that material progress had been made by many of these organizations in the direction of acquiring property and establishing permanent homes for themselves, equipped with every modern appliance which can be suggested for the comfort and convenience of the members. The property acquired already, together with such other similar undertakings as are now in progress, will represent a value of over $3,000,000 invested by organizations in their homes.

The president congratulated the organization upon the result of its work as regards the establishment of the uniform contract adopted by the National Association of Builders in conjunction with the American Institute of Architects.

APPRENTICESHIP SYSTEM.

In referring to the apprenticeship system, he said: "Perhaps the two great drawbacks to the advancement of the mechanical and building trades are the decadence of the apprenticeship system and the unrestricted immigration of foreign labor. In regard to the first, we have, without doubt, in trade schools the correct solution of the problem. The public school system in adopting manual training has gone as far as it legitimately can, but we should not look for help in this direction. All building exchanges should sanction and assist in every way possible the establishment of trade schools. To this end I would recommend that our standing committees be added to by the appointment of five who will be given this subject for their special work. Upon the settlement of the second problem, to my mind, rests largely the success or failure of the first. It is an indisputable fact that flooding of our mechanical trades from other countries has a very demoralizing and degrading effect on the trades themselves. So much so, in fact, that tradesmen (who in many cases were themselves immigrants) show a reluctance to have their sons learn trades, and thus be thrown in contact with these undesirable elements—elements which show a constantly increasing unwillingness to adopt American ideas or assimilate with the American people. Until these conditions can be regulated, restricted or prohibited and the American workman protected against this free trade in foreign labor, it will be impossible to enlist the American boy in mechanical callings."

FORM OF ARBITRATION.

In touching upon the "form of arbitration" recommended by the National Association, he pointed out one of the obstacles to its more universal adoption as being the distrust which has been engendered between employers and workmen as the result of long lists of arbitrary acts on either side. He said: "That it was conclusively, however, that the adoption and steady growth in favor of the form had continued until no fairminded man was unwilling to adopt the principles of arbitration as the fairest and wisest means of settling all misunderstandings. The provision of this form that boards be appointed in advance of possible differences between employers and workmen before the heat of disputes had warped their judgment, he stated, is showing conclusively the wisdom of its recommendations; but it was his opinion that too frequent meetings of such boards, without special subjects to consider, would tend to create a tendency to magnify and distort minor issues into undue prominence, and would be likely to defeat the purpose for which the board was created. He urged the formation of special trade associations in connection with the various exchanges, and that they should work in unison with the central bodies, of which they should all form a part. By this means the humiliating spectacle of organizations, with a common end in view, working apparently at cross purposes would be avoided and harmony and effective action substituted.

PROFIT SHARING.

The question of profit sharing, which had been suggested at previous conventions, was, in his opinion, impractical of application to the building business under the present competitive system. Such other prominent matters as have been considered by the organization from time to time, show unmistakably a steady, healthy tendency toward the adoption of higher aims and methods, and in closing he said: "However thoroughly we may discuss these subjects in our conventions, and however wise our recommendations, they fall flat and will accomplish nothing if not supplemented by earnest, thoughtful and persistent effort in the filial bodies throughout the year."

COMMITTEE ON CREDENTIALS.

The following gentlemen were appointed a Committee on Credentials:

J. Milton Blair, chairman,	Cincinnati.
John S. Stevens,	Philadelphia.
Arthur McAllister,	Cleveland.
James B. McCormack,	St. Louis.
John Rawle,	Chicago.
Stephen M. Wright,	New York

The report of the committee, as follows, was presented after an interval, during which the credentials were examined: "Your committee would respectfully report that they have examined the credentials submitted to them and find that there are 24 exchanges represented by 93 delegates, 23 of whom are directors."

The representation was as follows, including the delegates at large:

Baltimore	4	Omaha	2
Boston	7	Philadelphia	7
Buffalo	4	Portland	3
Chicago	13	Providence	3
Cincinnati	4	Rochester	3
Cleveland	4	St. Louis	5
Detroit	3	St. Paul	2
Indianapolis	3	Saginaw	2
Lowell	3	Syracuse	2
Lynn	2	Wilmington	2
Milwaukee	4	Worcester	3
New York	7	Waco	1

After the submission of the report, credentials were received for two delegates from the Minneapolis Exchange, making a total of 95 delegates present.

The names of delegates and their alternates, as indicated by the credentials, were as follows:

BALTIMORE, MD.

Delegates.	Alternates.
E. L. Bartlett	Herman H. Decker
John Trainor	Israel Griffith
Alex. J. Denson	Isaac S. Filbert
E. D. Miller	

BOSTON, MASS.

James I. Wingate	
Parker F. Soule	John Y. Mainland
Isaac N. Tucker	Henry A. Root
Wm. H. Mitchell	Isaac F. Woodbury
Cyrus T. Clark	David McIntosh
Samuel Farquhar	Walter S. Sampson
John F. Burkel	S. Fred Hicks

BUFFALO, N. Y.

H. C. Harrower	
George W. Carter	Alvin W. Day
John A. Wolsley	Charles F. Mensch
John W. Henrich	Wm. Schumacker

CHICAGO, ILL.

John Rawle	
Chas. W. Gindele, Chairman	Wm. H. Iliff
	J. C. McFarland
J. G. McCarthy	Murdoch Campbell
George Tapper	D. G. Phinister
Wm. H. Mortimer	G. Hunter
R. S. Haldeman	D. Freeman
Wm. Grace	M. B Madden
B. W. May	J. A. McMahon
C. W. Dameier	James Bloomfield
E. S. Moss	Herman Mueller
Samuel I. Pope	J. C. Deacon
Louis Berg	John Griffiths
William Henry	

CINCINNATI, OHIO.

F. G. Neiber	
Henry E. Holtzinger	Geo. B. McMiller
J. Milton Blair	John Theobold
James Harwood	Jacob Freund

CLEVELAND, OHIO.

Arthur McAllister	
R. H. Jenks	J. A. Reaugh
Geo. E. Heidenreich	C. C. Dewstoe
G. G. Griese	E. E. Robbins

DETROIT, MICH.

	Joseph Myles
Martin Scholl, Jr.	George D. Nutt
Richard Helson	Henry Spitzley

INDIANAPOLIS, IND.

	Wm. P. Jungclaus
Thomas J. Morse	James E. Shover
Charles Wehking	Justus C. Adams

LOWELL, MASS.

	D. M. Prescott
Charles P. Conant	L. F. Kittredge
Patrick Conlon	C. F. Varnum
	C. H. Burt

LYNN, MASS.

	Andrew J. Mace
P. S. Curry	James Burns
	J. W. Haskell

MILWAUKEE, WIS.

	Henry Ferge
Garrett Dunck	Henry Kimpel
H. J. Sullivan	E. J. Roberts
R. J. Coogan	Lewis Clas
	Ernest Hilgen

NEW YORK, N. Y.

	S. M. Wright
Isaac A. Hopper	Henry M. Tostevin
Geo. Moore Smith	Henry A. Maurer
Andrew J. Campbell	George J. Wills
John L. Hamilton	Wm. T. Pitch
James Thomson	John McGlensey
John J. Donovan	James B. Mulrey

OMAHA, NEB.

Richard Smith	A. J. Vierling

PHILADELPHIA, PA.

	Stacy Reeves
Franklin M. Harris	Wm. S. P. Shields
George Watson	R. C. Ballinger
John S. Stevens	A. G. Buvinger
Wm. Harkness	James C. Taylor
James Hastings	Ralph Peverley
F. A. Ballinger	John N. Gill

PORTLAND, MAINE.

	Wm. H. Scott
J. H. O'Neil	George Smith
Chas. E. Snow	Thos S. Laughlin

PROVIDENCE, R. I.

W. F. Cady	W. W. Batchelder
John T. Maguire	H. T. Cate
M. Golrick	Thos. B. Ross

ROCHESTER, N. Y.

	W. H. Gorsline
J. J. L. Friederich	F. P. Stallman
John Luther	F. C. Seitz

ST. LOUIS, MO.

	C. B. McCormack
Thomas J. Ward	Thomas F. Hayden
William J. Baker	Patrick Rowan
Anthony Ittner	Charles C. Jackson
Thomas J. Kelly	P. I. Moynihan

ST. PAUL, MINN.

	J. W. Makinson
William Rhodes	Geo. J. Grant
	Paul Haupt

SAGINAW, MICH.

M. Winkler	J. H. Quallman

SYRACUSE, N. Y.

Luther S. Merrick	Chas. Merrick

WILMINGTON, DEL.

	A. S. Reed
George H. McCall	Henry A. Millen
	George Phillips

WORCESTER, MASS.

	O. S. Kendall
O. W. Norcross	Franklin B. White
Geo. H. Cutting	Chas. A. Vaughan

WACO, TEXAS.

J. B. Browning

The report of the committee was followed by a roll call and an adjournment for the noon intermission.

The provision of an elaborate lunch on the floor immediately beneath the convention hall was thoroughly appreciated by all in attendance, and the cordial spirit in which the delegates were received and their needs provided for was manifest in the good comradeship which was particularly conspicuous.

TUESDAY AFTERNOON.

The first business of the convention was the appointment of the following committee to report time and place of next convention, and to nominate officers for 1894.

COMMITTEE ON TIME AND PLACE, ETC.

Parker F. Soule,	Boston.
E. D. Miller,	Baltimore.
H. C. Harrower,	Buffalo.
Joseph Myles,	Detroit.
Henry Ferge,	Milwaukee.

Immediately following the appointment of this committee, Mr. Trainor of Baltimore read the following resolution, adopted at the regular quarterly meeting of his exchange held December 5, 1893:

Resolved, That our delegates to the eighth annual convention of the National Association of Builders, to be held in Boston, Mass., on February 13, 1894, be instructed to convey to the National Association the hearty and cordial invitation of this exchange to hold its ninth annual convention in the city of Baltimore, otherwise known as the Monumental City.

Mr. Trainor proceeded to make an eloquent appeal in support of the resolution and was seconded by able remarks in corroboration of his assurance and hospitality by Mr. Ballinger of Philadelphia, president of the National Master Painters' Association. This resolution was referred to the Committee on Time and Place, and the secretary proceeded to make his address.

The Secretary's Report.

The annual report of the secretary covered the ground very thoroughly, partaking as it did more the nature of an address on the conditions as they exist in the building trade, and the character and effect of the work of the National Asssociation in its effort to formulate and apply principles of truth and equity to the affairs of the builder. Taking the fact that the eighth convention was held in the city where the National Association was born as an opportunity for review, he stated at the outset that it was his purpose to deal less than usual with the detail of the work of the past year: and more with causes and results as indicated by the experience of the association; also to discuss the needs and methods of administration for the immediate future. Beginning with membership, he stated that since the last convention two new organizations had secured affiliation—Scranton, Pa., and Waco, Texas—while exchanges in Butte City, Mont., Chattanooga, Denver, Louisville, Peoria, San Antonio and San Francisco had dropped out. The defection of Butte City, Chattanooga, Peoria and San Antonio was owing to the dissolution of the organizations in those cities, while the reason for the withdrawal of the Louisville Exchange was not given. The San Francisco Exchange, after paying its assessment for the year, stated that its great distance from the majority of the country and the fact that many conditions exist in California which obtain nowhere else, coupled with the great expense necessary to representation in the annual conventions, caused it to withdraw, believing, however, in the great good the national body was doing. After touching upon the fact that many new exchanges have been formed under the advice of the National Association, and many others have continually sought its support, the secretary stated a case of specific benefit from the work of the National Association, which was secured by a member of the San Francisco Exchange, which was of more value than the expense of affiliation of his association with the national body would have amounted to in 20 years.

SPECIFIC BENEFITS.

This is a remarkably good illustration, said the secretary, of the failure of individuals to realize the indirect value springing from associated effort, and which could not be gained to anything like the extent through individual effort. Individuals as individuals are exceedingly listless in their efforts for, or interest in, other individuals, and their scope of effective work is likewise narrow and restricted. It is only through that entity which we call organization, or, as I prefer to designate it, associated effort, that it becomes possible to make the experience of the individual largely available and so lift and benefit great numbers. The man, therefore, who is not willing to help his class, by and through such means, even at a little cost of time and money to himself, is narrowly blind to his own interests as well as selfishly unmindful of the good of others.

This much I have thought wise to say under the general head of membership, for it is the failure to comprehend the true relation, import and value of our acts and services as a national or central body which militates against our usefulness when it reaches to the extent of lopping off one member after another until nothing remains.

Furthermore, I desire to call attention to the possibility that we may not have yet discovered the best and surest way to make it evident to all organized bodies of builders that if they wish to participate in benefits they must contribute proportionately in time and money and experience to the common fund, from which we all draw again in some way or other sooner or later, though we may fail to mark the time or way.

STATISTICS.

The statistics gathered during the year on the lines suggested by the Committee on Statistics show a total of organizations in the United States, so far as recorded, that are by nature allied to building to be 736, a net increase of 15 over the preceding year. This increase includes 11 builders' exchanges, all founded through the information and advice of the National Association. In referring to the condition of affairs among the filial bodies, the secretary stated that there seemed to be a lack of earnestness and activity in applying the recommendations of the National Association. In this connection he said :

The wisest recommendations are practically useless unless those for whose benefit they are prepared take pains to put them into operation and test their efficiency ; and no one has a right to declare the National Association does no good if its precepts—which are the essence of the best judgment of many minds from many quarters—are ignored by the very organizations they were prepared to advantage, and which are the only agencies through and by which these precepts can be operated and their value demonstrated.

The National Association lives and acts only for the good of its constituent bodies. It has no life of its own to cultivate as a separate existence. It is but the piece of machinery needful to keep up the tone and poise of the many parts that center on it to get a common impulse and a uniform movement.

The mistake is often made in thinking of such central body of concluding that its existence is of some consequence to itself, and to consider that whatever is done by its constituent or filial bodies for its support is a contribution to its personal and peculiar benefit and advantage. Nothing was ever further from the truth, for such bodies as our National Association exist but to produce a better state of things for their various parts and have no axes of their own to grind, no purpose but the betterment of the individual members of their various families. Yet it is only as the whole is fed and nourished that the individuals can be benefited, for unless the reservoir in which are collected from many sources the thousand rills of experience be furnished with the means to filter and distill the knowledge that flows to it, and provided with the ways and methods and power of distribution, then no good can come to the individuals who have with so much labor constructed the same and created the storage chambers. I can think of no better simile of the National Association than to speak of it as a great settling basin in which many streams pour their waters, there to be preserved, treated, purified, so that the flood may be returned in a state more fit and safe for use for the very individuals who first turned the water to a certain spot for the purpose of refining it and getting the best out of it In all the processes which lead up to this final good the basin itself receives no benefit, expects no benefit. It was not built for that purpose; it was only prepared that it might help and protect and strengthen those who contribute to its wise design and permanent establishment. But what would we say of a people who, after having created a reservoir and filled it with water, and opened out from it conduits that it approved of as safe and healthful, should then persistently refuse to profit by the work done, and continue on in the old ways, drinking and using the contaminated waters, letting the pure streams run to waste unnoticed and uncared for? Yet that to us seems to be too much the record among the constituent bodies of this National Association. The need for consulting together with the end in view of devising safe and proper methods which all may follow to secure relief from harrassing and injurious conditions was at the outset declared, and is still fully conceded, but it is quite as needful—nay, it is imperative—that the various parts should carry out their share of the programme, else the whole is a labor lost. For any constituent body to exclaim, as is too apt to be the case, that the National Association is no good, that it has not produced and secured the reform which it declared for, when the real default is in the constituent body itself, because it never applies the remedies or carries out the methods recommended, is unfair, unreasonable and untrue. It is as absurd as to summon a physician to prescribe for a patient and then, after neglecting to carry out the directions he gives, declare the doctor to be no good because the patient either fails to improve or grows steadily worse. The National Association might again be likened to a grand consultation of physicians, who diagnose the case laid before them, deliberate upon the best method of treatment, and then leave the patient in the charge of nurses to carry out the treatment. If the nurses pay no attention to their instructions, give none of the medicine, omit the applications, make no effort to do what they have been recommended to do, but perhaps do just the opposite, and the patient does not recover, who is to blame, the doctors or the nurses?

FINANCES OF FILIAL BODIES.

One of the causes for the existing conditions mentioned was attributed to the low state of the finances of the filial bodies ; but the secretary stated that if the local exchanges furnished and equipped their rooms and provided for the comfort and convenience of their members they could properly assess a sum for yearly dues that would not only prevent a depleted treasury but should have some dignity and significance. In this connection he added :

It is the plain duty of exchanges to so order their affairs in the matter of yearly dues that their treasuries shall always be in a condition to successfully resist the fluctuations which are sure to come every few years, for there is no time when business men need so much to be in close touch with each other as in times of business depression, no time when they need so much the cheer and strengthening of associated effort as when times are hard and their sharp pinch threatens to dull the mind to the finer conceptions of honorable practice and truer methods in the conduct of business which we are striving to attain to and which we cannot afford to have put at hazard by temporary disasters or depression in business. In hard times the exchange should be the rallying ground of those who are in its membership; here, if anywhere, they may expect to get strength for the daily need; here they should gather for mutual help, and if some fall by the way, as may be expected, then the ranks should close up until shoulder to shoulder again the line is unbroken.

MEMBERSHIP.

In speaking of the tendency of exchanges to accept as members any one who can pay the dues, the secretary laid great stress upon the importance of using rigid discrimination in electing new members. "It is quality and not quantity which makes for the good, the strength and permanency of all associations." If there is one principle more necessary than any other to the well being, the value, the permanency, the effectiveness of builders' exchanges, it is selection in membership. Good results in exchange work cannot be secured unless the best materials available are used in its construction and that which is unworthy and unavailable unflinchingly thrown aside.

VARIOUS MATTERS.

Brief allusions were made to missionary work and exchange buildings and the condition of the use of the Uniform Contract was shown to be much greater than ever before. The form of arbitration being in *statu quo* it was only touched upon, owing to the prospective discussion of the subject later in the programme. Under the head of publications the printing and distribution of the report of the last convention, fresh supplies of the code of practice, form of arbitration, the issue of bulletins to individual members of the filial bodies, the distribution of a large number of copies of the Uniform Contract and printed recommendations as to its use were all described. A description of the methods and *résumé* of the work done through the columns of *Carpentry and Building* was given, showing that this portion of the secretary's duties has been productive of large and significant results. In reference to this part of the work, he said :

By means of the monthly publication, in a reputable and reliable journal, of its tenets and recommendations, the National Association has become widely known as a wise counselor and a careful advisor ; it is recognized as the fountain of the best conclusions drawn from the experience of the best builders of the country, representing a selection from many organizations scattered through widely different localities. Both employers and workmen outside of its filial bodies have recognized the wisdom of its recommendations, and requests for specific imformation and expressions of approval have been received from each. Workmen have appealed to it to urge the formation of organizations of employers ; they have requested information as to its form of apprenticeship, and have offered hearty co-operation in its form of arbitration. Employers have sought its advice as to the best lines upon which to form organizations ; have asked for its code of practice, its form of arbitration, its Uniform Contract, beside innumerable queries to the secretary upon particular points of information. These, being outside of the cities represented in the National Association, have been almost entirely dependent upon the matter published in the columns of *Carpentry and Building* for information as to the character and work of the organization.

A high tribute was paid to *Carpentry and Building* on the score of its constituents and the excellence of the reputation which it bears among all its readers.

EARLY HISTORY.

In closing the review of the year and taking up the subjects necessary to be considered as affecting the immediate future of the organization, the secretary alluded to the formation of the national body in Boston, and the motives which led up to the preliminary conference which resulted in the formation of the organization.

BASIS OF ORGANIZATION.

The premises taken by the National Association at the time of its formation were shown to be correct, and the existence of evils which need correction and the great need of an independent advisory body to formulate principles of action for the guidance of all pointed out. Presuming that the valuable character of the work of the National Association was unquestioned, the Secretary said :

I think it will be readily admitted that the National Association found itself confronted at the start with a gigantic undertaking. The conditions which were prevailing among builders in the narrower limits of cities, which render them suspicious and jealous of one another to an extent which I have heard acknowledged a thousand times of "hating the other feller" and passing him unnoticed on the street, were present in larger degree and with more marked significance in the wider range of the country from East to West, from North to South. In addressing itself, therefore, to the removal of this feeling of aloofness as a ground work for future operations, it was of the first importance that the builders in the various parts of the country should become acquainted with each other, in order that they might discover that they were not dangerously dissimilar or unworthy of friendship. To this end there seemed to be no better avenue of approach than through gatherings of comparatively large delegations from the local bodies where a comparison of views and experiences would be sure to lead to that mutual confidence and sympathy which adds so much to the strength of those who are working for similar ends. Eight times, counting the present gathering, have we met together, and these meetings have produced a result in this short time such as would not have been produced under ordinary and pre-existing conditions in 50 years, if at all. One great end has been achieved for all time, as far as this country is concerned, namely, the entire eradication of the feeling of jealousy between builders in sister cities, and the substitution therefor of a feeling of friendliness and confidence which extends the hand of welcome to a fellow builder whenever he approaches the asylum of his brother builders under the safeguard and sign of the great brotherhood comprehended in the affiliation of the National Association.

CONVENTIONS.

In referring to the annual recurrence of the conventions and the fact that the majority of the great questions had been "threshed out," he said:

Might we not benefit our whole interest more by not running the risk of exhaustion through indulgence too often in large and comparatively frequent gatherings, which were imperatively necessary in the early stages of our history to produce those important and fundamental changes in the body politic of the building fraternity to which I have referred.

Following this trend of thought, the secretary said:

I believe not only that it will be safe, but that it will be much more for the welfare of the filial bodies for whom this central council exists and labors, to have our grand delegate conventions biennial or even triennial rather than annual. It will be better, I am convinced, not to subject the principles which we have clearly defined and firmly announced and recommended to the danger of disturbance which is always possible when the same subjects are rehashed over and over again by large assemblages, brought together too often, and perhaps too superficially informed to act wisely or refrain from acting. These principles should be given a fair chance to permeate through and through the operative bodies which are to apply them and benefit from their establishment, without running the risk of becoming altogether distasteful by reason of constant tinkering.

Under such a change as was suggested the various phases of the work of the National Association would more than ever imperatively demand the permanent continuance of the executive department with added duties and increased powers to meet the larger and more responsible position it would occupy. This new order of administration need not be so expensive as the present method of operation.

MONTHLY BULLETIN.

In referring specifically to the expense he said:

For instance, while I shall recommend, if my general suggestion in regard to less frequent conventions be adopted, that a monthly bulletin of information be issued to all members of all filial bodies from the secretary's office, which will, of course, make an expense not previously incurred, this will be offset by the saving of printing and distribution of annual reports, always a considerable item. The fixed charges under this new system can be very materially reduced, also by a reduction in the salary paid to the secretary. This will be very proper, for the larger strain upon the vitality of brain and body of the secretary, incident to the creation and safe conduct of the association through its early life, will be over, and the demand upon his time and original thought will be greatly relieved through the absence of the necessity to be constantly preparing for and then constantly recovering from the convention work. The work will systematize itself more perfectly, and much of the work under the new order can be delegated to his assistants. In short, it will be possible to make his work more oversight than absolutely personal, as it has largely been in the past. In view of these possibilities of reduction under the *régime* suggested, I believe that the annual assessment could be reduced to $2 per capita.

The secretary did not wish to be understood as believing that as much or even more money than had been spent in the past could not be used to very great advantage.

These conclusions are largely based upon three assumptions: 1. That the spirit of friendliness and confidence between the groups of builders in the various cities of the country, so necessary to our purpose, has become firmly established through the means we have adopted, and cannot now be shaken. 2. That the general principles of subjects that come within the range of treatment by our national council have been thoroughly considered, have been carefully prepared and placed in the hands of filial bodies in the form of methods by which the principles can be applied, and time is now needed by these operative bodies to establish these reforms and practices recommended, aided and stimulated by constant oversight and watchfulness of the executive arm of the national body but not unduly hurried or hindered by too frequent legislation. 3. That the rapid movement of all affairs in these modern times makes a longer period than a year between general gatherings essential, so that one meeting shall not tread too closely upon the heels of the preceding one. The longer interval will make the meetings still more prized and interest in their social features will not be lost by their becoming too common of occurrence.

SCOPE OF BULLETIN.

In referring to the bulletin the secretary recommended that it be issued monthly and in sufficient numbers to supply each member of the filial bodies and should convey arguments in relation to all the principles for which the National Association declares itself, repeated over and over again in new ways and from different points of view until they become fixed and definite in the minds of all, and thus more fully and correctly to carry out the idea that the National Association is in the best sense an educator. It should also be the means of directly conveying to each member of each affiliated exchange, in a convenient form to preserve for reference, instances of methods pursued and practices existing in the conduct of business which are harmful and to be avoided, lessons to be learned from the experience of others in their varied relations with owners, architects, public authorities, &c., &c. It should be the constant servant and counselor of the individuals entitled to it. It should be the channel through which our constituency would learn correctly all facts in relation to the attitude of organized workmen or organized employers.

In this connection it may be well to say that the frequently recurring discussion, in a bulletin which would reach our entire fraternity, of the relations of employers and workmen, coupled with ever increasing reasons for following a tried and successful method of solution of the difficult problem, such as we have formulated, will produce as far as we are concerned a thousand times the effect that results from the spasmodic appeals of economic writers on this subject in the magazines of the day, appeals which are painfully theoretical at best, from the fact that the writers are not in touch with the practical difficulties with which we are familiar, and usually leave us in the air, lacking, as they almost invariably do, the power to suggest a practical, common sense method of procedure to take the place of those which they condemn. Many other valuable features were suggested as being capable of incorporation into the bulletin. The expense attached to its issue was stated as nominal when compared with the results and would in any case save a large portion of the money now spent in other forms of printing.

PERMANENT SECRETARIES.

In closing, the secretary touched upon his personal belief in the importance of every exchange having a permanent and able secretary to fulfill the duties of the administration of such bodies, and said:

I still believe that there is large opportunity for local bodies to be of benefit to their members by devoting more time to putting into practice the precepts of the National Association. I still believe there are a multitude of ways yet unexplored, by and through which the active operation of the associate power comprehended in our exchanges will be wielded for good if we keep up our principle of hammering away, regardless of disappointment and discouragement.

I have never been discouraged by any failures of the filial bodies to advance along the lines of improvement and safety which the National Association has marked out. I have never lost faith in the ultimate advancement of the building fraternity of this country by virtue of the investigations we have made and the policies we have urged as a means by which the individual shall be regenerated and the mass shall be purified.

Standing at the close of one epoch in our history and at the opening of another, surrounded by the evidences that our labors have produced already the noble result of cementing in bonds of social friendship and business amity thousands of builders from one end of the country to the other, furnishing thus a stable foundation on which to proceed with the superstructure, which needs careful study and slow progress to perfect its details, we may well say that although we cannot hope to see the completion of the building, that though our eyes may never rest upon the glittering pinnacles that some day will crown the finished work, we still may dwell with satisfaction on the thought that our patient effort was not without some reward, and that upon our care and devotion, our willingness to proceed slowly and not expect too much for ourselves, the safety and beauty, the harmony and the permanency of the structure depend.

Oh! builders of the world's great temples,
  Seek not to grasp the full, completed prize;
He builds as well who lays the deep foundation,
  As he who caps the turret in the skies.

TREASURER'S REPORT.

The report of the treasurer, George Tapper of Chicago, which immediately followed that of the secretary, showed a balance in hand of over $1300. The receipts for the year were $9889.01, including a balance of $672.90 carried forward from the preceding year, and the total expenses were $8511.62. The report was referred to an Auditing Committee consisting of Arthur McAllister of Cleveland and Stephen M. Wright of New York City.

UNIFORM CONTRACT.

John S. Stevens of Philadelphia then made report for the Committee on Uniform Contract, as follows:

Your Committee on Uniform Contract beg leave to report as follows:

Since the modifications made in the standard form by the joint committee in October, 1892, there has been a manifest increase in the use of the form. It is apparent that builders and architects generally are becoming more familiar with the form itself and more deeply impressed with the importance of a uniform blank. It is not claimed by the committee that the form is perfect, as indeed it would be foolish to do so, for it is evident that time and use will develop points where improvement can be made, and in the hands of a joint committee representing both interests, the document will undoubtedly be from time to time judiciously amended, until it more nearly approaches perfection than at present. The committee feel that on the whole it is such a great advance over pre-existing forms, and its increasing use is such a complete recognition that the principles upon which it is framed are true and safe, even though some of its provisions may not yet exactly meet the full requirements of business, that we may well be gratified with the position it has already gained and safely trust to the future to correct defects now existing. It has been thought wise at this convention to have the contract openly discussed, with the view of obtaining suggestions from the delegates at large on points where they may think improvements desirable. In the earlier conventions it was not thought wise to proceed in this manner, for the reason that the principles upon which the existence of such a document rested might possibly be injured by vigorous attacks upon some of the provisions of the document itself, but now that the principles upon which the document is founded have been so completely and repeatedly approved, it will undoubtedly be advantageous to hear from one and another their views as to where defects may possibly exist and wherein the form may be improved. It will, however, have to be borne in mind that the power to change the document is only vested in the joint committee, and the only proper outcome of discussion will be recommendations to our representatives on the joint committee. These recommendations should not assume the character of instructions.

Confident of the great benefit which has resulted from establishing this standard blank, the committee sincerely hope that nothing may be done except to enhance its popularity and more general use.

(Signed.) GEO. C. PRUSSING,
JOHN S. STEVENS,
A MCALLISTER.

LIEN LAW.

The Committee on Lien Law submitted a majority and a minority report. The former advocated the abolition of all lien law except in so far as it protected the interests of the workmen. The minority recommended the National Association of Builders take such action with its filial bodies as would secure the enactment of just and equitable lien laws, for the protection alike of builder and owner. Considerable discussion followed the presentation of the reports, and the impossibility of establishing a uniform lien law, in addition to the variety of sentiment on the subject, finally led to the introduction of a resolution by Mr. Stevens of Philadelphia that the matter be laid upon the table and the committee discharged from further consideration of the subject.

After the introduction of a large number of resolutions, which were referred to the Committee on Resolutions without reading, the convention was adjourned for the day.

WEDNESDAY MORNING.

The delegates assembled promptly, and the first business of the morning was a motion that all resolutions which had been presented and referred to the committee be read, and that all resolutions to be presented be read before being referred to the committee. Resolutions on the death of Hugh Sisson of Baltimore, first vice-president, and N. B. Hussey of Omaha, and James Boland of Buffalo were passed.

COL. R. T. AUCHMUTY.

Several delegates spoke to the resolutions and extended remarks were made upon the following resolution to the memory of Richard T. Auchmuty, the founder of the New York Trade Schools:

Whereas, The National Association of Builders mourns the death of Richard T. Auchmuty with a depth and sincerity which no words could hope to express; and

Whereas, In the founding and maintaining of the New York Trade School and in endowing others, Richard T. Auchmuty has conferred upon all young men who desire to follow mechanical pursuits incalculable benefits of precept and example, pointing out the way for others who may follow; and

Whereas, It is the earnest desire of every member of the filial bodies to offer some tribute to his life and work; to make some sign which shall indicate the deep sense of appreciation of his life long, self sacrificing and fruitful effort in the cause of education for the "American boy;" to extol, with earnest hearts, the true and consistent greatness of the man, the gentle simplicity of his nature; the tenderness and magnitude of his love for the boys of our country, which knew no limitations, and which gathered all to its shelter and encouragement to share with him his life and his possessions; and

Whereas, He has conferred distinction upon us by accepting an honorary membership in this association, therefore

Resolved, That the National Association of Builders, assembled in the eighth convention, offer this preamble and resolutions, inadequate though they may be, as a tribute to Richard T. Auchmuty, and as an expression of the great and enduring sense of loss which his death has inflicted and as a mark of fervent gratitude to his memory, to his character and to his work; and be it further

Resolved, That these resolutions become a part of the records of this convention; that a memorial page in the official report be set apart in his honor, and that they be sent to his family as expressing respectful sympathy at their irreparable loss.

Reports of Filial Bodies.

The following is a summary of the reports from filial bodies, upon which considerable discussion was based and which was intended to help the local exchanges to profit by the experience of sister organizations. These will appear in full in the official report, together with all discussion thereupon:

BALTIMORE, MD.

The report from the Builders' Exchange discussed the condition of the building trade at present and the effect of the stringency of last year upon the members of that organization. Everything had moved along quietly and it was the opinion that the building interests in that city had been less affected than in many others.

An effort has been made to have proposals for contract work opened at a specified time and in the presence of the bidders, with the prospect of success at no distant date.

No labor troubles of any character were reported as having occurred during the year.

The Uniform Contract was reported as being used in a majority of cases and the organization had no suggestions to make for its improvement.

A tribute was paid to the late Hugh Sisson, who was president at the time of his death, resolutions in regard to which appear elsewhere in this report.

A resolution which was passed in the exchange was presented to the convention, extending an invitation to hold the ninth annual meeting in that city.

BOSTON, MASS.

The Master Builders' Association of Boston was shown to be in excellent financial condition, with an increased surplus over that of previous years. The gain for 1893 was $13,000. During the year the floating debt of the association, consisting of notes held by the members, to cover the expense of reconstructing the building, was funded into second mortgage bonds, bearing interest at 6 per cent. The administration of the affairs of the association, while being exceedingly liberal, is such as to enable it to meet all its obligations on the first and second mortgages, pay dividends on its capital stock and have a surplus of cash on hand, at the end of ten years, which time the second mortgage bonds are to run, of $65,000. The total surplus of the association at that time will aggregate about $175,000. The membership has been maintained at about the average which has existed for the past two or three years. Owing to the depressed condition of business affairs there has been a larger number of failures among the members than during any other three years of its history. It was noted, however, that almost all failures were the result directly of hard times rather than bad business methods. In referring to the recommendations of the National Association it was shown that the form of arbitration was still in successful operation with the Mason Builders' Association, but that its use had not been adopted by any other of the special trades. The Uniform Contract has been used to a greater extent than ever, and it is now on sale by all stationers who keep supplies of legal documents. The code of practice has never received official indorsement by the association, but has been considered at various times in pursuance of an effort to secure its application to the business affairs of the members, and a committee has recently been appointed to take the matter under consideration.

It was stated that the application of the Franklin Fund to the permanent establishment of the trade school has awakened much interest in the subject, and the association has offered hearty co-operation in the project.

The report also stated that a number of matters which it was considered desirable for the National Association to discuss would be presented later in the programme in the form of resolutions. The report concluded with a hearty welcome to the delegates and visitors to the eighth convention, and a renewal of its recognition of the value of the principles declared for by the national body.

BUFFALO, N. Y.

Buffalo reported a total membership of 190, a net gain of 18 during the year.

The financial condition was shown to be as follows:

Cash on hand, general fund.....	$2,243.62
Cash on hand, membership fund.	6,711.59
Furniture and fixtures..........	1,500.00
Disbursements for 1893..........	4,014.97
In the Stock Company.	
Value of exchange building and site..........................	$200,000.00
Receipts by rents...............	19,800.00
Expense, interest, taxes.........	12,252.50
Net earnings....................	$7,547.50

The net earnings represent more than 10 per cent. upon the capital stock during the year. A resolution was adopted amending the code of practice, to prevent bidders from accepting proposals to bid when work was asked for in two ways—namely, as a whole and by different trades.

The exchange has assisted the lumbermen in adopting a grading list for white pine lumber; and discussed methods, principles and practicability of quantity surveying as it exists in England.

In public affairs it has participated, by request of the Bureau of Streets, in fixing regulations to govern the placing of building material upon the streets and various other matters.

The report of the amount of building done in Buffalo during the year shows a total estimate of $7,500,000, a decrease of about 12 per cent. over the preceding year. Fully 80 per cent. of the work done was carried on by the members of the exchange.

At the beginning of 1894 work in the building trades was practically suspended. There were two strikes during the year, one being that of the plasterers, asking for an increase of 5⅔ cents per hour—39 cents, which lasted 18 weeks without effect, the workmen returning to work at the old wages, 33⅓ cents per hour, the other being that of the stone cutters for payment of wages every Saturday. The matter was settled by having a weekly pay day on Monday, it being impossible to accede to the demand without great inconvenience to a number of the employers, as banks close in Buffalo at noon on Saturday. In ten competitions bids were opened in the exchange rooms, and four members have been paid liquidated damages for estimates where work was not given to the lowest bidder. The Uniform Contract has remained in general use, and it was reported that it had been adopted by the Board of Public Works for all contracts in the Bureau of Building. The most friendly feeling exists between the architects and builders, and the code of practice, with an exceptional case now and then, is in general use. Out of 55 meetings called during the year only one was postponed for lack of a quorum. The building owned by the exchange has proved of immense value to the organization in many directions, and the stock is at a premium, with none for sale.

CHICAGO, ILL.

The Chicago Exchange reported having removed to new quarters and the adoption of the Australian ballot system in all elections. The City Council of Chicago formulated a new building law during the year, to which the exchange proposed 32 amendments, all of which were embodied and passed. One of the features of this ordinance is an examining board before which inspectors of buildings are brought and thoroughly examined before they can be lawfully appointed. The Builders and Traders' Exchange is represented in this board and also in the Committee of Three, forming a board of arbitration for the settlement of disputes regarding the construction of buildings and their safety. Reference was made to the World's Fair and the condition of labor during the construction of its buildings. The Uniform Contract was reported to have gained ground and a tribute paid to the late Col. Richard T. Auchmuty of the New York Trade School.

CINCINNATI, OHIO.

The report from Cincinnati rehearsed the conditions of the past year and showed that the builders had been affected by the great decrease in the volume of work done as compared with that of previous years. Fealty was expressed to the National Association and its work, and it was recognized that to derive any benefit from affiliation with the national body its recommendations must be accepted in the spirit in which they are presented and a vigorous effort made to comply with the same. There were no strikes or lockouts during the year with one exception; the Journeyman Painters asking for more wages, but returning to work at the old scale after five weeks' idleness. The report closed with the statement that the project of erecting a building was still in sight.

DETROIT, MICH.

The Builders and Traders' Exchange of Detroit had a prosperous year, and the members are full of confidence and courage for the year to come. The renting of an entire building, which they now occupy, has centralized the building interests of the city, and the recently added feature of a sort of club room on the top floor has resulted in strengthening greatly the mutual friendship and confidence among the members. The report recommended the adoption of the $2 *per capita* tax for the national body.

INDIANAPOLIS, IND.

While the builders of Indianapolis felt the general depression of the past year, the organization held its own, although there had been no actual gain in numerical strength. Owing to the hard times, the project for erecting a building has been postponed. The quarters of the exchange have been removed to 35 East Ohio street to the advantage of the organization. The offices in the new rooms are all occupied by the members of the exchange, which comes within $1.77 of paying the rent. Several social entertainments were reported as being thoroughly successful.

The Uniform Contract is gaining ground, although some of the architects still prefer to use the forms prepared by themselves. The delegates to the last convention urged upon the exchange the advisability of formally adopting the document as the official contract of the exchange. A circular letter to such effect was submitted to the architects with request for reply; with two or three exceptions prompt responses in favor of the form were received. The feeling in the exchange now is that necessary steps should be taken to bring the form into actual use, peaceably if possible, and forcibly if need be.

It was reported that under an act of the Legislature of 1891, a tax was assessed for the maintenance of a trade school in the city. Early in 1893 a site was purchased and plans have already been submitted for the buildings; the work was awarded to a member of the exchange. The building when complete will cost about $200,000, exclusive of the ground; work will be commenced at once. Wages in a majority of the trades have declined about 20 per cent. as the result of general depression; this is regarded as only a temporary condition.

LOWELL, MASS.

The Lowell Exchange reported a decrease of 13 in membership during the past year and various causes were assigned for the falling off. Building interests of the city were stated as exceedingly depressed, with few contractors busy at present.

The strike of brick masons, which was reported in these columns during its existence, was alluded to. The necessity of absolute unity of action on the part of the members, in order that the exchange may properly accomplish its objects, was pointed out. The death of John H. Coggeshall, secretary of the exchange at the time of the last convention, was noted as a severe loss to the exchange.

LYNN, MASS.

A small falling off in membership was reported from Lynn, and the members were stated as anticipating a renewal of the average amount of work during the coming season. Allusion was made to such prominent buildings as had been erected during the year, which indicated a great improvement in the character of the work done. The estimated cost of new buildings in 1893 was $2,250,000, or $466,000 more than in 1892.

The social features of the year were referred to as being particularly satisfactory, and the position of the exchange in reference to lien law again stated.

A hearty invitation to delegates to the convention to visit their organization before returning home was extended by the members of the Lynn Association, and a tribute was paid to the National Association and its work.

MILWAUKEE, WIS.

The Builders and Traders' Exchange of Milwaukee took great pride in stating that its members had secured a building, which has been occupied since May. A uniform form of proposal, previously printed in these columns, was referred to, and the purpose of the exchange to press the matter during the coming year was stated.

In the face of general conditions throughout the year, especially as existing in Milwaukee, the record of work done was considered satisfactory. No trouble was had with the workmen, several cases have been refered to arbitration and the process has the hearty approval of the organization. Prospects for the future were reported as being brighter.

NEW YORK CITY.

The report of the Mechanics and Traders' Exchange of New York begun with greetings and the reaffirmation of fealty to the National Association and its principles.

The change of location which took place in April from the old quarters in Vesey street to more commodious and centrally located rooms at 289 Fourth avenue, has resulted in benefit to the organization.

The plasterers' strike, a description of which was printed in *Carpentry and Building* at the time, was referred to and its specific conditions stated. In the opinion of most conservative builders, the coming year will be unusually devoid of activity. A most thorough effort has been made by Secretary Wright to secure the universal adoption of the Uniform Contract. Reference was made to the great work of Colonel Auchmuty in the maintenance of the New York Trade School, and it was stated that from the meager beginning of 35 only a few years ago, there are now 575 boys taking a course of training in this institution.

The project of erecting a building has reached the $100,000 point, at which time the provisional committee will take action looking to the permanent establishment of the building trades exchange and the election of officers and the board of management therefor. The total amount of building was $55,000,000, as against $59,000,000 for the preceding year. This may be caused by the fact that numerous large contracts were signed during 1892. It was suggested that if the present stringency should continue in the building trades serious results might follow, it being stated as obvious that the present stagnation in building, if long continued, would naturally result in the unsettlement of the present rate of wages.

A resolution under this head as showing the action of the exchange, and was to the effect that certain builders in the city and building supply dealers were willing to reduce the cost of building by dividing their profits and reducing wages and allowing discount from regular prices. This movement is, however, at a standstill; it has been seriously considered by several branches of the trade.

A large majority of the organizations of employers, contractors in every line of building business, are members of the Trades Club, which institution confers the greatest benefit upon its members.

The exchange finds itself year by year more fully recognized as one of the influential commercial bodies of the city and for more than three years has been affiliated with the State Board of Trade.

In closing the report states:

We cannot but commend the far-reaching wisdom of the founders of the National Association, and as, year by year, the good resulting from its annual deliberation is evinced by the inculcations of better methods and sounder principles, a confidence is inspired as to the future success of its efforts for the general betterment of the building industry in the nation, and we feel that the time and money employed in its upbuilding has been of inestimable benefit in the sustaining of so noble a purpose; and without desiring to make any invidious distinction, we cannot close this record without an expression of our profoundest gratitude to the National Secretary, William H. Sayward, whose indefatigable, systematic and comprehensive efforts have so largely contributed toward the success of the National Association; to him, as well as to every officer and member of the body, we extend our brotherly salutations.

OMAHA, NEB.

The Omaha Exchange was reported as being financially sound and that increasing care as to applicants for membership, with a view to select only the best elements among the builders, is being exercised. The two classes, corporate and non-corporate, have been merged into one. There has been no occasion to call on the Arbitration Committee during the year. All branches of business were affected by the financial depression, but none more so than the building trades, the inspector's report showing a falling off for the year of nearly 50 per cent. The code of practice, practically identical with that of the National Association, while formerly in successful operation, seems to have been recently ignored in some cases by both architects and builders. A serious condition of affairs was evidenced in the complaint against owners by contractors because of the tendency on the part of the former to ask for refiguring of bids received for work. This is pursued in diverse ways, and is an effort to reduce bids below their original amount. Some plan was desired to meet these conditions.

There has been no trouble during the year with the workmen. The exchange is in better condition financially than ever before, being out of debt and having a fair balance in the treasury. An amendment to the Uniform Contract was suggested in defining what the limits of interpretation as to satisfaction by the architect and increasing scope of arbitration. Attendance during the 'change hour has been satisfactory throughout the year.

PHILADELPHIA, PA.

With a greeting to the National Association and a statement of the appreciation of membership therein, the Philadelphia Exchange stated in its report that the net increase of assets during 1893 was nearly $7000 and a statement of the total receipts and expenditures in form of a summary was presented.

The Mechanical Trade School shows an excess of expenditures over receipts, its deficit, however, being paid by contributions in cash from the exchange and trade organizations and by the donation of materials from members and others. A proposition to incorporate this school in the Industrial Art School, by which its identity would be lost, was emphatically declined. The establishment of similar institutions wherever possible urged upon the attention of sister exchanges. The exhibition department continues its prosperity and has a record of visitors which averages 350 per day.

In regard to various trade organizations, the journeymen have been satisfactory and all differences between employer and employee have been amicably settled without strikes, except in the case of the journeymen plasterers, which strike was reported in these columns at the time of its occurrence. An interesting note in the report showed that 172,256 separate and distinct properties were assessed as a proof of the oft repeated assertion that Philadelphia is the "City of Homes."

An entirely new building ordinance was reported as having been passed during the year, and a special committee from the exchange assisted the City Councils in framing the bill, which was duly passed by the Legislature of 1893.

The report concluded with an expression of appreciation of the good accomplished by the formation of the National Association of Builders, and a congratulation upon the fact that the organization was among the first to respond to the call from Boston, which resulted in the organization of the National Association.

PORTLAND, MAINE.

The Builders' Exchange of Portland stated that business was unusually quiet during the past year. The condition of affairs was indicated in the report by the statement that some of the architects used a blank form of contract demanding the principal contractor to give, in his bid, the names of his sub-contractors and the contract price, also requiring the contractor to be responsible for the shrinkage for one year. It was stated that the Uniform Contract was not used in Portland.

PROVIDENCE, R. I.

The past year was reported by the Builders and Traders' Exchange of Providence as having been an exceedingly busy one for all members of the exchange, business being reported as excellent during the year. The total amount of work shows an increase of $300,000 over that of 1892. The general depression was somewhat felt and some jobs were postponed; wages were slightly decreased, but most of the work in hand was pushed to completion. There has been no trouble with the workmen in the building trades since the last convention.

The matter of the omnibus clause in specifications, to wit: "That all work must be done, materials furnished and labor performed necessary to complete the work whether such materials and labor are mentioned in the specifications, contracts and agreements or not," was taken up and thoroughly considered, and a committee of five is to be appointed to confer with the Rhode Island Chapter of Architects, who have been requested to appoint a committee of like number for the purpose. The Uniform Contract has attained general use. A hearty invitation was extended to members of the National Association to visit the Providence Exchange at any time.

ROCHESTER, N. Y.

The Rochester Exchange stated that while the amount of business during the past year had been less than usual there had been but one failure among the members. About a year ago a rate of wages was fixed by the Arbitration Committee for journeymen masons before it was realized that the depression was likely to occur. The rate fixed, however, was strictly adhered to by the members, although many idle workman offered their services for much less than the established rate. The financial condition of the exchange was never better, and although the membership has not increased, the additions have equaled the number that for various reasons have seen fit to withdraw, have toned up the organization and resulted beneficially. The attendance at 'change hour has fully demonstrated that the members appreciate the opportunities afforded by the exchange for facilitating the transaction of business.

A most excellent description of the value of organization and the benefits of the National Association was presented.

ST. LOUIS, MO.

The St. Louis Exchange stated that business during the past year had been fair in spite of the scarcity of money, and membership has been increased on a sound basis. Allusion was made to the death of several prominent members during the year.

The amount of building for 1893 shows a falling off of over $4,000,000 as compared with the amount in 1892. Several recommendations were presented to the National Association. A uniform fee was advocated for arbitrators when called upon to arbitrate fire losses as relating to the destruction of buildings. A clause of the code of practice relating to liquidated damages for bids submitted where the lowest bidder failed to receive the contract was urged.

The furnishing by the Government Supervising Architect of plans and specifications of Government buildings to all exchanges was urged for consideration. The appointment of legislative committees in the various exchanges to look after legislation and the appointment of officials by municipal corporations, &c. A meeting of the secretaries of all filial bodies to be called by the National Secretary during the year was recommended. A code of laws for governing relations between architects and contractors in their business dealings with each other was suggested for reference to the Joint Committee on Uniform Contract, with a request that the code of laws be framed and reported to the next convention.

ST. PAUL, MINN.

The exchange was reported as having taken a fresh start in reorganization, and as looking forward to successful operation in the future.

It was suggested to change Article V of the Uniform Contract by striking out all words after the word "architect" in the last line and inserting in place thereof, "An appeal from their decision may be made to arbitrators, as provided in Article III of this contract."

Also, an amendment to Article III by striking out "twenty-four hours" and inserting in place thereof the words "three days."

WILMINGTON, DEL.

The Exchange of Wilmington was reported to be in good condition. It was reported that a uniform code to govern the measurement of masonry had been established, and that this code had been enacted as a law of the State. Copies of this form of measurement may be had from the secretary or from the secretary of the National Association.

The volume of business for 1893 shows a decrease over that of the preceding year. The necessity for the adoption of the code of practice is greatly felt by all builders, there being no definite custom for the government of the relationship between themselves and the architects.

WACO, TEXAS.

The new exchange at Waco, Texas, submitted a report showing that the members appreciate the value of organization, and are earnestly endeavoring to establish uniform practices and methods which shall secure greater harmony among all builders and those with whom they come in business contact.

HOURS OF LABOR AND WAGES.

The request of the committee for information as to the hours worked and wages paid in the various trades in the different cities resulted in the following statements, which were incorporated in the reports from filial bodies:

BALTIMORE, MD.

Trades.	Hours worked per day.	Wages per hour. Cents.	Wages per day.
Carpenters	9		$2.50
Stone cutters	8	43	
Stone masons	9		4.00
Plasterers	9		3.00
Painters	9		2.50
Plumbers and gas fitters	9		3.00
Sash, door and blinds	9		1.50@3.00
Bricklayers, union	8	50	
Bricklayers, non-union	9		3.50@4.00

BOSTON, MASS.

Carpenters, outside	8	28@30	
Carpenters, inside	9	30@33	
Bricklayers	8	42	
Stone masons	8	42	
Painters	9	33	
Plasterers	8	43	
Iron workers	9	20	
Granite workers	9		$2 75
Freestone workers	8	50	
Copper workers	9	30	
Plumbers	9		4.00
Roofers	9		3 00
Building laborers	8	25	

BUFFALO, N. Y.

Stone masons	9	36	
Bricklayers	9	36	
Plasterers	9	33⅓	
Lathers....By yard.		2½	
Hod carriers	9	16⅔	
Stone cutters	8	44	
Marble workers	10		$3 00
Tile workers	9		3.00
Quarrymen	10	20	
Diggers	10		1.50
Common laborers	9	16⅔	
Carpenters, mill men	9	23	
Carpenters, rough	9	20	
Carpenters, finishers	9	25@28	
Painters, house	9	25	
Painters, grainers	9	33⅓	
Painters, fresco	9	27½	
Painters, decorators	9	33⅓	
Painters, sign	9	27½	
Plumbers	9		3.00
Steam fitters	9		3 00
Gas fitters	9		2.75
Helpers, steam fitters'	9	Per week:	6.00
Helpers, plumbers' and gas fitters'	9	Per week:	3.00
Paper hangers...By roll		15@25	
Tinsmiths	9		2.25
Electricians	9		2.00
Roofers, slate	10		3.00
Roofers, composition	10	20	
Roofers, gravel	10	20	
House smiths and bridge builders	9	28	
Stained glass	10	25@30	
Wire workers	10		2.50

CINCINNATI, OHIO.

Bricklayers	8	56	$1.50
Carpenters, outside hands	9	33⅓	3.00
Planing mill inside or bench hands	9	22@30	
Planing mill machine hands	9	25@33⅓	
Cornice makers and tinners	9	25@30	2.25@2.75
Iron workers	9	16⅔@33⅓	1 50@3.00
Painters	9	29	2.61
Plumbers, first class	9		3.50
Plumbers, second class	9		3.00
Plasterers	8	45	
Stair builders	9	33⅓@36 1-9	3.00@3.25
Stone cutters	9	45	
Stone masons	9	40	3.60

INDIANAPOLIS, IND.

Trades.	Hours worked per day.	Wages per hour. Cents
Stone masons	8	45
Stone cutters	8	45
Bricklayers	8	50
Hod carriers	8	28@30
Painters	8	30
Carpenters	8	30
Carpenters, foremen	8	35@40
Plasterers	8	45
Tinners	8	27½@32½
Mantel setters	8	40
Slaters	8	30
Iron workers	8	22½@30

Since September 1 wages in the majority of the trades have declined about 20 per cent., brought about by the hard times, which is regarded as only temporary.

CHICAGO, ILL.

Stone masons	8	50
Bricklayers	8	50
Plasterers	8	50
Lathers	8	50
Hod carriers	8	22
Carpenters	8	35
Stone cutters	8	55
House painters, general	8	30
Grainers	8	37½
Decorators	8	37½

There have been no strikes of importance during the past year.

CLEVELAND, OHIO.

Stone masons	9	25@30
Bricklayers	9	30@45
Plasterers	9	40
Lathers	9	2 per yd.
Hod carriers	9	15@20
Carpenters, rough	9	15@20
Carpenters, regular	9	22½@27½
Carpenters, finishers	9	25@33⅓
Stone cutters	8	30@45
House painters, general	9	27½
Grainers	9	40
Fresco	9	45
Sign	9	40
Decorators	9	50
Plumbers	9	42½
Gas fitters	9	30
Helpers	9	10
Slate roofers	9	27½@30½
Composition	10	25
Gravel	10	25
Diggers	9	26
General common laborers	10	10@15

DETROIT, MICH.

Trades.	Hours worked per day.	Wages per hour. Cents.	Wages per day.
Masons	9	..	$3.50@$4.50
Laborers	9	..	1.50@2.00
Stone cutters	8	46	
Stone masons	9	..	3.50
Carpenters	9	..	2.00@3.00
Plumbers and fitters	9	..	2.00@4.50
Painters	9	..	1.75@3.00

LOWELL, MASS.

	Hours worked per day.	Average wages per hour. cents.	Wages paid by
Carpenters, outside	9&10	25	hour.
Carpenters, inside	10	20	day.
Steam and gas fitters, outside	9	33	hour.
Steam and gas fitters, inside	10	25	day.
Cast and wrought iron workers, outside	9	30	hour.
Cast and wrought iron workers, inside	10	25	hour.
Brick masons	9	40	hour.
Stone masons	9&10	33	hour and day.
Plasterers	9	36	hour.
Roofers	10	32	day.
Metal workers, outside	9&10	25	hour.
Metal workers, inside	10	25	hour.
Plumbers	9	30	hour.
Painters	9&10	25	hour.

LYNN, MASS.

	Hours worked per day.	Wages per day.
Masons	9	$3.75
Tenders	9	2.50
Carpenters, sash and blind men	9	2.75
Plumbers	9	3.75
Helpers	9	1.25
Painters	9	2.50
Granite cutters	9	3.00
Stone masons	9	3.50
Slaters	9	3.00
Plasterers	9	3 75
Lathers	9	1.75 per M.

MILWAUKEE, WIS.

	Hours worked per day.	Wages per hour. Cents.	Wages per day.
Masons	8	40@45	
Masons, cut rate	..	30@40	
Masons' hod carriers	..	20@25 or	$1.75
Carpenters, outside	8	25@30	
Carpenters, inside	..	20@25	
Painters, house	8	25@30	
Painters, decorators	..	35 on an average.	
Plumbers	8		3.00@3.50
Tinners	8	20@23	
Galvanized iron men	..	25	
Iron men	10		2.50
Cut stone men	8		3.50

No strikes or labor disturbances of any kind during the year.

MINNEAPOLIS, MINN.

Carpenters	10	25	
Brick masons	9	45	
Stone masons	10	30	
Stone cutters	8	50	
Plasterers	8	40	
Plumbers	8	40	
Steam and gas fitters	8	40	
Slaters	10	30	
House painters	8	25	
Presco painters	8	35	
Common laborers			$1.75

All skilled workmen in the different branches of the building trades are paid by the hour in this city.

Sash, door, blind and mill men are not first class mechanics and therefore do not receive very large pay. They are paid by the week on an average of $10.50 for ten hours per day.

There have been no strikes in any of the building trades during the past year.

NEW YORK CITY.

Trades.	Hours worked per day.	Wages per hour. Cents.	Wages per day.
Cabinet workers	9		$3.00
Plumbers	8		3 75
Blue stone workers	8		4.00
Electric workers	9		3.00
Plasterers	8		4.00
Granite workers	8		4.00
Freestone workers	8		4.50
Marble workers	8		4.00
Masons	8	50	
Carpenters	8		3.50
Stair builders	8		3.50
Sash and blinds	9		3.25
Steam fitters	8		3.50@4 00
Painters	8		3 50
Decorators	8		4.00@5.00
Roofers, inside	8		3 25
Roofers, outside	8		3.75
Tile and grate men	8		4.00
Iron workers	9		3.50

Overtime is paid for in most trades at double rates.

OMAHA, NEB.

Trades.	Hours worked in summer.	Wages per hour. Cents.
Stone masons	8	45
Bricklayers	8	50
Plasterers	8	50
Lathers	9	30
Hod carriers	8	22½
Carpenters	9	27½
Rough carpenters	9	22½
Regular carpenters	9	27
Finishers	9	30
Stone cutters	8	45
General house painters	8	30
Grainers	8	35
Fresco painters	8	50
Sign painters	8	45
Paper hangers	8	35
Decorators	8	35
Plumbers	8	40
Steam fitters	8	35
Gas fitters	8	35
Helpers	8	12½
Tinsmith, general	8	30
Roofers	9	30
Slaters	8	35
Composition	8	30
Gravel	8	30
Diggers	8	22½
Common laborers	8	22½

PHILADELPHIA, PA.

Trades.	Hours worked per day.	Hours worked per week.	Wages per hour. Cents.	Wages per day.
Masons, bricklayers	8		45	
Carpenters	9		30	
Plasterers	8		45	
Plumbers	9		40	
Roofers	9			$3.00
Iron workers	9		30	
Granite		50	37	
Freestone workers		50	42	
Mill men, bench work	10		22½@27½	
Mill men, machine work	10		25@32½	

PORTLAND, MAINE.

Trades.	Hours worked per day.	Wages per hour. Cents.	Wages per day.
Carpenters, mill men	10		$2.00 aver.
Carpenters, outside	9	20	
Carpenters, inside	9	28	
Plasterers	9	31	
Masons	9	33⅓	
Plumbers	9	25	
Iron and metal workers	9	28	
Painters	9	28	

PROVIDENCE, R. I.

Carpenters	9	20@27½	
Masons	9	30@35	
Plasterers	9	35@40	
Painters	9	20@25	
Plumbers	9	30@40	
Stone cutters	9		$2.50@$4.00
Roofers	9	20@30	
Laborers	9	15@17	

ROCHESTER, N. Y.

Masons	9	40	
Masons' helpers	10	17½	
Carpenters, outside	9	31	
Carpenters, inside and mill men	10	25	
Stone cutters	9	36	
House smiths	10		$2.50
Marble and tile men	9	32	
Galvanized iron and tin men	9	29	
Plumbers	9	28	
Painters	9	23	

ST. LOUIS, MO.

Carpenters, outside	8	35@40	
Carpenters, planing mill, inside	10		$2.25@$3.0
Bricklayers	8	55	
Stone masons	8	50	
Painters	8		2.50

Plumbers	8		$3.50
Gas fitters	8		3.00
Plasterers	8	50	
Galvanized iron men	8	25@30	
Stone cutters	8	50	
Slaters	8	40@45	
Stair builders, outside	8	35@40	
Stair builders, inside	10		2.00@2.75

No strikes or lockouts.

ST. PAUL, MINN.

Carpenters	10	20@30	
Bricklayers	9	45	
Stone cutters	8	50	
Stone masons	10	25@40	
Plumbers	8		$3.50
Plasterers	8		3.00
Painters	10		2.50@3 00
Steam fitters			1.50@2.50
Cornice makers	9	30	

Mill men—namely, workmen in manufacture of doors, sash, blinds, moldings, &c., work ten hours and are paid by the hour.

SAGINAW, MICH.

Carpenters, inside	9	25	
Carpenters, outside	9	22	
Plasterers	9	35	
Stone masons	9	35	
Bricklayers	9	39	
Bricklayers, pressed	9	60	
Paper hangers	9		$2.00@$2.25
House painters	9		2.00
Frescoers	9		2.25@2.50
Slaters	10		2.00
Tinners	10		2.00
Plumbers	9		2.50
Mill men	10		2.00
Sash, door and blind men	10		2.00
One mill, both classes	9		2.00
Lathers	10		2.00
Hod carriers	9		1.50@2.00
Laborers	9&10		1.25@1.50

WILMINGTON, DEL.

Bricklayers	9	45	
Masons	9		$3.50
Plasterers	9		3.00
Laborers	9	25	
Carpenters	9	25@30	
Stone cutters	9		3.50
Painters	9	25	
Plumbers and steam fitters	9	28@30	
Gas fitters	9	28	
Helpers	9	13	
Tinners	10	25	
Diggers	10	12½	
General labor	10	10	
Inside, or shop, hands, in summer	10	20@25	
Inside, or shop, hands, in winter	9	20@25	

WORCESTER, MASS.

Excavators and stone mason's laborers	9	19 4-9	
Stone masons	9		$3.00@$4 00
Brick masons	9	36 1-9@41⅜	
Roofers and concreters	9	22 5-100	
Plumbers	9		2.50@3.25
Steam and gas pipers	10		2.00@3 50
Tinsmiths	10		2.50@3.00
Carpenters, outside	10	25	
Carpenters, inside		27½	
Manufacturers of inside finish, mill men	10		

Wages paid by the day and of great variety of prices.

WEDNESDAY AFTERNOON.

The afternoon session was devoted to the consideration of the relation of employer and workman and the form of arbitration advocated by the National Association. Col. Carroll D. Wright, United States Commissioner of Labor, delivered a most interesting address on the subject, treating the question on broad and comprehensive lines. The altruistic tendency of the times has changed the relation of employer and workman from a simple question of wages and hours to one in which equity and justice to either side must be conceded, and in which the rights of each, as to a voice in the settlement of conditions under which the relationship shall be maintained, must be recognized. Compulsory arbitration was, in the speaker's opinion, a misnomer, there being no such thing as compulsory arbitration. The moment arbitration becomes compulsory it ceases to be arbitration and is taken out of the realm of voluntary effort at the peaceful solution of questions at issue and placed in a condition which nullifies the meaning of the word. A sequential conclusion of the operation of compulsory arbitration would be death to industry. The address was listened to with marked attention and was very cordially received. A vote of thanks was extended to the speaker and the address ordered printed as a part of the proceedings of the convention.

The discussion of the form of arbitration advocated by the National Association which followed resulted in a further demonstration of the truth of the principles upon which it is founded and the passage of a resolution reaffirming the wisdom of its use and urging the filial bodies to make direct application of its operation to the various trades represented in the several organizations.

FRIDAY MORNING.

The morning session was given over to the consideration of suggestions for the improvement of the Uniform Contract. There were many suggestions presented, some of which indicated a lack of sufficient consideration of the extent of the operation of the form, for upon explanation they were found to be already incorporated in the contract. Several delegations advocated the extension of the limits of arbitration to cover specifically all points upon which differences might arise. The form was very thoroughly discussed and a number of suggestions were referred to the committee, with instructions to present the same to the joint committee at the first opportunity. None of the suggestions were of a radical nature, but were directly in the line of improvement of such clauses as already exist in the form.

FRIDAY AFTERNOON.

The first business of the afternoon was the report of the Committee on Resolutions. The resolutions, presented with the recommendations of the committee are as follows:

A resolution presented by James Hastings of Philadelphia for the reduction of the expense of the National Association to an amount which would be covered by a $2 *per capita* tax was favorably reported.

A resolution asking the National Association to give moral support to any action by any exchange in its efforts to improve the lien laws was favorably reported.

The committee reported unfavorably upon a resolution looking to the consideration of the value of the English method of quantity surveying.

The following, presented by Providence delegation, was reported favorably by the committee:

Whereas, The following clause often included in specifications is an injustice to contractors. "If anything is accidentally omitted either from the plans or specifications that is necessary to complete the job, it is expected that the contractor will furnish it free of charge."

Resolved, That it is the opinion of this convention that the above clause be stricken from specifications.

The committee reported unfavorably on the following resolutions:

That an effort be made to secure the opening of bids in the local exchanges by the secretaries in the presence of all bidders.

That members of filial bodies give their exchanges as their only business address.

That a permanent board of arbitration between contractors and architects be established in each city.

Favorable report was made on a large number of resolutions, of which the following are the more important:

That a Committee on Trade Schools of five be appointed.

That a committe of five be appointed to consider the question of immigration. This resolution, after an extended discussion by the delegates, was laid upon the table.

Future reports from all committees to be printed and distributed to all filial bodies 60 days prior to conventions.

When an entire contract has been let to one contractor, all dealings with the sub-contractor by the architect should be carried on through the general contractor.

That the inherent rights which belong to the workmen and those which belong to the employers can only be established through joint consideration by the two.

That filial bodies be urged to secure means for participating in the framing and administration of building laws in their various cities.

That all filial bodies be urged to use the most rigid discrimination in admitting applicants to membership.

That a uniform form of proposal be adopted in conjunction with the architects by all filial bodies.

RESOLUTIONS ADOPTED.

The following resolutions were passed without being submitted to the committee:

Resolved, That such builders' exchanges as desire to participate in the general advantages contributed by this body to the building fraternity at large, who from financial weakness are unable to affiliate with the National Association as such, and thereby partake of all such benefits, shall, upon the payment into the treasury of this body of the sum of $50 per annum, be granted the favor of all such information and aid as the secretary may be able to afford them; but shall not be permitted the full privilege at such conventions, or a vote therein; and such shall be known and recognized as corresponding exchanges only.

Whereas, The president in his annual report has recommended that this body take such action as shall result in the appointment of a regular standing Committee on Mechanical Trade Schools; therefore,

Resolved, That the incoming president and his successors in office shall be empowered and instructed to appoint from among the members of the several exchanges affiliating with this body a standing committee, consisting of five, to take and recommend to this body such action relating to trade schools as they shall deem proper.

COMMITTEE ON LEGISLATION.

The Legislative Committee made a report, which was adopted, as follows:

The Legislative Committee begs to report that in view of the action of this convention in carrying forward the time of the next convention to October, 1895, that special action will be necessary to provide the association with necessary funds for the conduct of its business and recommends that the following order be passed.

Ordered, That the *per capita* tax upon the constituent bodies of this association for this current year, 1894, be due immediately after the close of this convention and be payable within 60 days thereafter, and that the *per capita* tax for the year 1895 be due on January 1, 1895, and be payable within 60 days thereafter.

(Signed) EDWARD E. SCRIBNER,
Chairman.

REVISION OF CONSTITUTION.

The special Committee on Revision of the Constitution made the following report, which, after discussion, was adopted.

The special Committee on Revision of the By-Laws respectfully reports having given the matter careful consideration, and would submit the following amendment to the constitution, which in the judgment of your committee seems wise and judicious:

Amend the second paragraph of Article III by inserting after the word "exchange" on the second line the words, "possessing an actual membership of not less than 20."

Amend Article IV by adding to the second paragraph the following:

"And they shall meet at least once in each calendar year, such meeting to be upon a call issued by the Executive Committee."

Amend the sixth paragraph of Article V by making it read as follows:

"The president shall appoint the following committee from the members in good standing in any filial body."

Add to Article V the following new paragraphs:

"In the event of failure of any member of these committees to be elected as a delegate to a convention held during his term of office, the said member shall be entitled to a seat in such convention and shall be recognized and privileged to discuss any subjects referred to the committee of which he may be a member. Such member shall, however, in his capacity as a committee man be debarred from speaking in convention upon other than the subjects mentioned, except upon invitation of the chair, and shall in any case have no vote.

"The first named person on each committee appointed shall be its chairman until otherwise directed by said committee."

Amend Article VII by striking out the word "annual" in the first paragraph, and inserting after the word "held" the word "biennial."

Add to Article VII a new paragraph, as follows:

"No filial body shall be entitled to representation in excess of membership upon which the *pro rata* assessment has been paid."

Amend the second paragraph of Article IX so as to read as follows:

"This assessment will be due on January 1 of each year and must be paid within 60 days thereafter."

In concluding its report the committee desired to remind the delegates that any discussion of the amendments which it recommended must be entirely tentative, as no action can be taken until the next convention, inasmuch as the constitution now requires that all amendments must be presented to each filial body 60 days before the convention which considers them.

TIME AND PLACE OF NEXT CONVENTION.

The Committee on Time and Place of Next Convention and Nomination of Officers made the following report:

Your committee would respectfully recommend that the next meeting of this association be held on the third Tuesday of October, 1895, in the city of Baltimore, and nominate the following officers for election at this convention:

OFFICERS.

President, Noble H. Creager of Baltimore.

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

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

The report was accepted, and upon motion the secretary was instructed to cast one ballot for all officers, which being done by Assistant-Secretary Harkness of Philadelphia, the president declared the officers as nominated elected.

LIST OF DIRECTORS.

The various officers each responded to a call from President Hersey, and the convention proceeded to the election of directors for the ensuing year, with the following result:

E. L. Bartlett.........Baltimore.
E. Noyes Whitcomb...Boston.
W. D. Collingwood....Buffalo.
William Grace....... Chicago.
Geo. F. Nieber........Cincinnati.
Arthur McAllister.....Cleveland.
Alex. Chapoton........Detroit.
Geo. W. Stanley.......Indianapolis.
E. S. Foss.............Lowell.
J. S. Pool.............Lynn.
H. J. Sullivan.........Milwaukee.
Geo. Cook.............Minneapolis.
Stephen M. Wright....New York City.
J. Walter Phelps......Omaha.
Stacey Reeves..........Philadelphia.
Wm. H. Scott.........Portland.
Thos. B. Ross..........Providence.
H. H. Edgerton........Rochester.
Wm. J. Baker.........St. Louis.
Geo. J. Grant..........St. Paul.
Luther H. Merrick... Syracuse.
A. S. Reed ....Wilmington.
Chas. A. Vaughn......Worcester.

The *per capita* tax was fixed, by vote of the delegates, at $3 after an extended discussion and in the face of the recommendation of the Board of Directors. The vote stood 45 for $3 and 41 for $2 *per capita*. Suitable resolutions of thanks were passed to the Master Builders' Association for its boundless hospitality; to President Hersey for the excellent manner in which he had presided, and to the press of the city for courtesies extended. The convention then adjourned.

New Publications.

SOUND SENSE IN SUBURBAN ARCHITECTURE. By Frank T. Lent, Architect. Numerous illustrations by the author; 98 pages; bound in board covers with gilt side title. Published by the author. Price $1.

In offering this work to the public the author states that after an experience of 12 years, largely filled up with the designing and superintending of some 200 suburban residences in different parts of the United States, it seems to him that a straightforward, brief and practical little book on the subject of inexpensive country houses would be of great service to those about to build. It is natural, therefore, to find the volume consisting of a collection of hints, suggestions and bits of practical information for the use of those contemplating the erection of houses of the character named. The work is divided into six chapters, the first and second of which relate to the planning and arrangement of a house; the third discusses the question of drainage; the fourth takes up the water supply and heating; the fifth refers to the drawings used for the illustrations in the pages and the sixth deals with specifications of various kinds.

Foundations.

No foundation is more ineligible for a heavy structure than one that is rocky, says a writer in an English trade journal, especially if the rocks are in small masses, or if a sufficient surface is offered of one mass, in strata which dip considerably; in the former case, from the rottenness of the soil in which rocks are generally bedded and which consists for the most part of their detritus; and in the latter, from the liability of stratified rock to crack and slip, against which no precaution is available. Dry gravelly soils, again, are not only loose and infirm, but are exceedingly liable to vacuities of various extent, which are hardly sufficiently provided against by piling; wet gravel is generally more compact and may be better trusted both with and without piles. A deep compacted sand will be found firm if a sufficient surface of it be embraced by the footings, which should be wider in that than most other cases. In large and deep beds of alluvial deposits the heaviest building may be laid with security, if precautions be attended to for the equal distribution of the pressure throughout. The city of New Orleans, in a delta at the mouth of the Mississippi, rests on a bed of mud, which is held together by a bonding of trunks and arms of trees, but on a broad level bed below. Here the only precaution taken in erecting a structure of the greatest magnitude is to make the trenches for the walls wide and level, and to floor the whole of their surface with thick planks properly bonded; on these the footings are laid, and if any settlement occurs it is of the whole edifice and no injury accrues to any part of it at any time. Clayey and chalky soils are generally understood to form the best natural foundations; in these, under ordinary circumstances, no preparation is required, though for very heavy and unequally pressing works, such as bridges, which are placed on piers made as small as they possibly can be, piling has been considered a necessary precaution. Indeed, except perhaps on an extensive horizontal bed of firm compact rock, no foundation can be considered better than that afforded by piling in a deep clay.

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GEORGE W. ALLEN, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR,

96-102 READE STREET, NEW YORK.

APRIL, 1894.

The Building Outlook.

One of the most cheerful prospects in the trade situation is in the direction of building operations. Seldom has the future looked brighter for those in the building trades than at this time. There were indications of this not long ago, when architects' offices were reported to be again filling up with work. But what was then to some extent a matter of mere promise now seems actually nearing fulfillment. Building permits are being taken out in large numbers in the leading cities, and contracts are getting into the hands of builders. In the city of Chicago the records for the month of February show building permits granted for almost as great a frontage and nearly as high a total value as in February of last year. This is particularly significant from the fact that in the spring of 1893 building was very active in that city among those who were making preparations for the World's Fair. Few cities at that time were as busy in the building line as Chicago. If preparations for building there are now on a scale but little below that of last year, it augurs well for a very important branch of trade on which many other branches depend.

Moderation in Building.

The character of the permits now being taken out in the cities shows quite a change. Fewer large structures are in prospect, but the great bulk of the buildings projected are houses of moderate size, good store buildings and a sprinkling of warehouses and factories. Builders will consequently be more generally employed by the greater number of separate contracts, and the ordinary mechanic is likely to find employment of a more steady character than when large structures are being rushed to completion as speedily as possible. There has probably not been so favorable a season for making improvements of this character for 20 years. All kinds of materials are lower than ever before known in this country. Builders are anxious to obtain work, and, generally speaking, workingmen are even more anxious to get to work because many of them have had nothing to do for a long time and have either exhausted their resources or soon will do so if they do not speedily find employment.

Wages and Working Rules.

The contracting carpenters and their employees in Omaha have set the building fraternity an example that could be followed to good advantage by the builders in every city in the country. During the idle months in the winter, when the amount of business on hand was small, the carpenters and their employees have often conferred with each other for the purpose of mutually assisting in the establishment of wages, working rules, &c., for the coming year. Voluntary effort on the part of each, at such a time as this, is calculated to secure the desired results. Each side is equally desirous of establishing mutually satisfactory conditions, which may be accepted as final and binding, and upon which both can base their calculations for the ensuing year There is less likely to be heat and personal feeling than when the two parties are confronted with the necessity of immediate settlement of some difference, which has already, no doubt, produced a feeling of antagonism. The example of the Omaha carpenters is also a good one from a business standpoint, aside from all consideration of its humanity. The contractors are in this way enabled to know exactly what their work, so far as the labor is concerned, will cost and to bid for it with a feeling that the price is not likely to be altered even while their bid is being accepted. It is, for the same reason, equally desirable for the workman, as it shows him before the season opens the scale that has been fixed. Wages are much less likely to be depressed if a scale is adopted by the majority on both sides than would be the case if each contractor was at liberty to figure his labor on a sliding scale, governed by the closeness of competition, for in the latter case the employer might be tempted to bid low and then cut wages to fit his bid.

Wind Pressure on Tall Buildings.

The wind and snow storm, which visited nearly every section of the country late in February, was particularly severe in Chicago, and subjected its tall buildings to a trying ordeal. According to reports which reach us through the daily press, tests made during the storm in connection with several "sky scrapers" showed that buildings erected after the latest method are capable of standing any wind pressure that is likely ever to be brought to bear on them. In a wind that blew from 70 to 80 miles an hour and exerted a pressure of about 35 pounds to the square inch the Monadnock Building is said to have varied from $\frac{1}{16}$ of an inch at the north end, which is constructed of solid masonry, to $\frac{7}{16}$ of an inch on the south end, which is of steel frame work with light walls. The variation of the Pontiac Building was $\frac{1}{16}$ of an inch and that of the Old Colony $\frac{3}{16}$ of an inch.

Reformative Industrial Education.

The New York State Reformatory, at Elmira, which was established by act of Legislature in 1876, has long been taken as a model institution of its class. Its objects, as officially set forth, are to "take charge of males between the ages of 16 and 30, convicted of felony and not previously convicted of crime," and "to prevent them from committing crime, to secure their self support and to accomplish their reformation." Among the agencies utilized for this end, one which is considered of the first importance is a very complete system of trade classes, in which the prisoners are given a valuable industrial education, designed to send them forth into the world, at the expiration of their terms of detention, equipped with the means of earning an honest livelihood and so becoming useful and independent members of society. From a neatly gotten-up little book, printed and published in the reformatory, we learn that no less than 1615 inmates received instruction in the trade classes of the institution during the year 1892. Of 672 men received during the 12 months over 600 had no trade, while of 338 paroled during that period all except 47 went out to work at trades learned during their incarceration.

Trade School in Elmira.

The trade classes are held during the evenings in buildings specially adapted for the work and equipped with all modern facilities, while the tuition is given by expert instructors in the various trades. About 37 different classes are taught. Among those which have the largest number of pupils are the bricklaying and plastering, molding, plumbing, carpentry, painting, tinsmithing and brass-finishing trades. As a proof of the thoroughness of the instruction imparted it is pointed out that all the work of these trades required inside the reformatory in recent years has been carried out by the inmates, who have acquired their industrial capacity within its walls. The good thus done in sending young men, who were never hardened criminals, out into the world at the expiration of their terms of detention with the means of self-support at their fingers' ends can hardly be overestimated. Under the old penal systems a residence in prison meant, in the majority of cases, the ruin of a youth, who too often became on his release a recruit in the great army of loafers and criminals, whereas under the Elmira system he has every incentive to work out his redemption and gain his lost position through the medium of the trade knowledge that has there been put into his hands.

World's Fair Buildings.

The South Park Commissioners, who now own the Chicago World's Fair buildings, were evidently greatly surprised at the bids they received for those structures on March 10. From common report, contractors generally were expected to demand a bonus for the removal of the buildings, on the ground that it would cost more to remove them than the material could be sold for. But when the bids were opened, it was found that the buildings were considered of some value. Taking the highest bids on all the buildings, the commissioners would have received $36,596. This threw a new light on the subject. It was at once believed that if the buildings were worth so much they were worth a great deal more, and the bids were, therefore, incontinently rejected. Efforts will now be made to sell the several structures at private sale, in the hope to realize more. This is a case in which bidders injured their chances by bidding too high. They should have asked a bonus for removing each building. The Park Commissioners, it will be remembered, have been paid $200,000 by the World's Fair Commissioners to take the buildings off their hands, and the latter thought they had made a good bargain by getting out of the cost of removing the buildings, which they feared might exceed that amount.

Historic Mansions.

Among the many buildings remaining to connect the Hackensack of the nineteenth century with the first beginnings of the town, says E. K. Bird, the antiquarian is apt to linger longest and with greatest gratification in the Washington Mansion House, which stands facing the Green on Main street. It is a large three-story building (the original two stories of rough stone), with a double portico along the front. In 1776 it was the private residence of Peter Zabriskie, then a prominent citizen and patriot, who had as his guest for some days General Washington at the period of his retreat from Fort Lee. The building retains many of its ancient peculiarities of construction, including a few of the old double doors and the tiled lining of fire places in two rooms. The tiles are 75 in number, and are in excellent condition; the illustrations are all taken from Bible subjects — the temptation of Joseph, the wicked children and the bears, Jacob stealing the blessing intended for Esau, the finding of Moses, Samson bearing away the gates of Gaza, Jonah entering the whale's mouth (feet foremost), the Roman soldiers casting lots for the Saviour's vesture, David and Goliath, Daniel in the lion's den, with other equally familiar incidents of sacred history are presented with startling literalness. The tiles in the parlor are in brown tint; those in room 19 are blue.

The Mansion House was, many years ago, a relay station for the Albany stage line, and one of the last drivers of the old four-in-hand, Richard Doremus, is a grizzled resident of Hackensack, living with an interesting family of descendants in one of the stone houses that form such interesting features in the landscape.

Adjoining Mr. Doremus, who is but a block north of the Mansion House on Main street, is the ante-revolutionary stone mansion originally owned and occupied by the first Adam Boyd, whose family was connected by marriage with the Schuylers. The building, modernized with a French roof and in part devoted to trade, was once the scene of lavish hospitality and was a social center for an extended district.

The colonial mansions are all on Main street, which was the original turnpike and only public highway running north and south from Hoboken to Albany on the west side of the Hudson. So in walking north along this business thoroughfare another block brings you to the residence of Mrs. A. D. P. Gilbert. This was the best example of eighteenth century architecture in Hackensack, as it was originally the home of one of New Jersey's most distinguished citizens, Dr. Peter Wilson, the scholar and patriot. The capstones of the first floor windows are inscribed, one with the name "Peter Wilson, Anno. 1787," the other "Catherine Wilson," his accomplished wife. The ground now occupied by the Hackensack Library was originally the site of Dr. Wilson's Academy, which some of his friends endeavored to have chartered as a college, the success of the enterprise being frustrated by the refusal of the Doctor, then and for seven years a member of the State Legislature, to support it personally. In 1783 Dr. Wilson was appointed to revise the laws of New Jersey up to that date; subsequently he was Professor of Languages and of Greek and Roman Antiquities in Columbia College, New York City.

Another of the "old landmarks" is known throughout Bergen County as "the Vanderbeck House," standing on the east side of Main street, in the busiest part of the town, near the New York, Susquehanna & Western Railroad depot. The west end of the building stands to the street, from which it is separated by a deep lawn. To the east the grounds run off into the border of the river. There is but one other inhabited dwelling in New Jersey known to be older than this, and it too is in Hackensack. Some years ago a large stone was removed from beside the entrance door to a position over the modernized parlor fire place. The stone bears the inscription in old style rude letters:

AD 1717 VB.
IVDB. EVB
PIVDB

This lettering represents Isaac Van Der Beck, Eva, his wife, and Paul, their son. The Van Derbecks are a numerous and sturdy family in Hackensack. "Aunt Sally" Herring, a great granddaughter of Isaac Van Der Beck, lives in the old homestead, at the age of 85, with great-great-grandchildren. A few years ago, when the marriage of a great-great-great-grandchild of Isaac invested the house with new life, considerable changes were made in the interior arrangements. The most difficult task on this occasion was that assigned the masons, to open a new doorway through the 2-feet thick wall. It was a laborious task which had to be accomplished with hammer and chisel, the mortar that held the stones together resisting with the tenacity of a granite block. Everything about the building is equally substantial—the massive beams of polished oak, the heavy half doors, with rude hand made iron hinges and latches, the broad mantels, deep window seats and heavy oak frame work, bear no kinship to the cottages that mark the present day architecture in the newer part of the town.

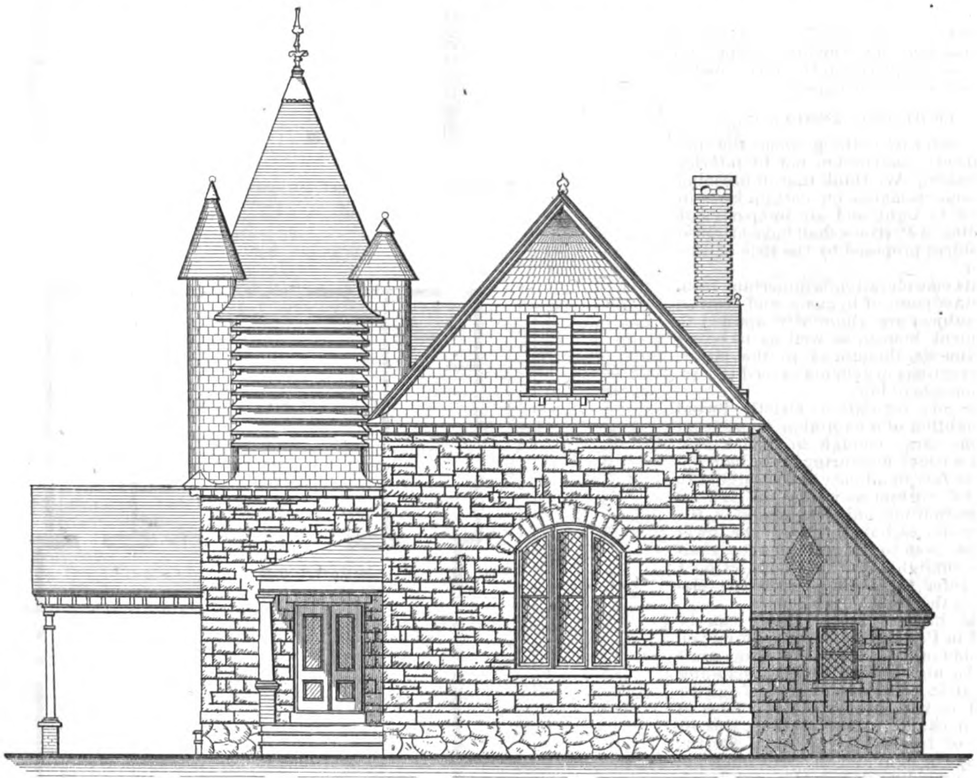
Expansion of Chimneys.

It does not often happen that facilities are afforded for exact measurements to be made of the expansion and contraction of a factory chimney. It is generally admitted that boiler chimney shafts should not be attached to the walls of any important building on account of the risk of cracking the walls by the expansion of the heated brick work, but it is not very easy to obtain reliable information respecting the amount of such expansion, and some persons have doubts whether brick work really expands or contracts when heated, says a writer in one of our English contemporaries. An unusual opportunity of making measurements on this point has recently occurred at Newcastle-upon-Tyne. The boiler chimney of the college was erected five years ago, and has been in constant use during the interval. As originally constructed it stood alone 60 feet from the college building, 99 feet high from the concrete foundation, and 90 feet from the ground level. To the hight of 33 feet from the ground an internal fire brick flue was constructed, with an air space of 3 inches between it and the shaft. The upper 57 feet of the shaft was built of stock brick only, and had a uniform diameter of 6 feet 2 inches externally, while the internal flue increased from 3 feet 11 inches to 4 feet 8 inches in diameter, the strictly cylindrical character of the exterior giving the chimney the appearance, when looked at from a distance of 50 yards or more, of being trumpet shaped, and larger at the top than at the bottom. During the last few months a casing of ornamental brick work has been erected around the chimney, but independently of it, so that the casing of the shaft forms one of four octagonal turrets surrounding the Royal Jubilee Exhibition Tower, and guarding the principal entrance to the college quadrangle. The near completion of the brick work surrounding the chimney afforded the opportunity of observing from the top of the casing any movement of expansion or contraction of the chimney itself. As the boiler fires are generally drawn or allowed to die out on Saturday afternoon and relighted on Monday morning, the chimney has an opportunity of cooling down during about 40 hours, and observations made from the top of the casing wall showed a contraction of the chimney of 5 mm, or 2 inches, during that time. As the surrounding wall was still about 6 feet below the top of the chimney when the measurements were made, and as the first 33 feet of the shaft remained practically cold on account of the air space between it and the central flue, it may be taken that the length of brick work in which the expansion took place was about 50 feet. According to this, a shaft 100 feet high should expand 4 inches when in use. The measurement was only of a preliminary character, made for the purpose of determining whether it would be safe to allow the decorative work at the top of the turret to rest partly on the outer casing and partly on the internal flue, and the result showed conclusively the desirability of keeping the chimney shaft entirely independent of any other structure. It remains to determine the temperature of the inner and outer portions of the brick work when the chimney is at its highest and lowest temperatures. It is probable that the expansion observed would have been 50 per cent. greater if the chimney had been allowed a longer time to cool down.

DESIGN OF A BRICK AND STONE CHURCH.

THE church edifice which we illustrate this month by means of our supplement plate and the engravings presented upon this and the pages which immediately follow, was erected at Forest Hill not long since from plans prepared by architect H. Galloway Ten Eyck of Newark, N. J. There is a cellar under the rear portion of the building which is devoted to kitchen, boiler room and coal bin, the foundation walls being of stone laid in cement mortar. The front of the building as well as a portion of the sides and the tower are constructed of broken ashlar of Belleville brown stone theater form, with a seat for each person. The auditorium has a seating capacity of about 300 persons, which number can be increased to about 500 by throwing open the doors of the parlor and infant class room.

It will be noticed from an inspection of the floor plans that the arrangement of the building is convenient, the requirements in the case of sociables, festivals, &c., having received special attention. The auditorium may be reached through the vestibule at the front of the church, or those arriving in carriages can enter from the side, as shown on the plan. The building is



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

Design of a Brick and Stone Church.—H. Galloway Ten Eyck, Architect, Newark, N. J.

20 inches thick. The remaining portions of the outer walls are 8-inch thick, faced with selected Hackensack brick, laid in red mortar. In those places where brick is employed in the outer walls the building was framed as though it was to be a frame structure, and then the brick filling and facing was done. The roof is sheeted diagonally with 1-inch hemlock boards and covered with slate. There are two rows of 6 x 10 inch girders on brick piers under the first-floor joist, the latter being of spruce 2 x 10 inches, and placed 12 inches on centers, bridged in each span with 2 x 4 bridging. The roof and ceiling beams are 2 x 8 inch spruce, while the trusses are open timber work, the exposed parts being of yellow pine and the balance of rough spruce.

The floors are of yellow pine, as are also the trim and wainscoting. The side walls are sand finish tinted in water colors. The ceiling is panel work of yellow pine, and all the interior wood work is natural finish. The pews are arranged in circular or amphi- heated by steam, and cost to erect in the neighborhood of $10,000.

Architecture in Apartment Buildings.*

ARRANGEMENT OF ROOMS.

Generally, these large apartments are divided into two parts, the one for family use and the other for occasions of ceremony; the former including a parlor, dining room, several bedrooms and closets, bathroom, pantry and kitchen; the latter comprising antechambers, large dining room, several drawing rooms, billiard room, smoking room, boudoir, &c., with every convenience necessary for easy communication.

In these luxurious apartments there are usually two antechambers, the first for the servants, with simple decorations, the second more ornate, and sometimes a third, called waiting rooms. It is to these different rooms that visitors according to their rank are admitted and obliged to wait. These different antechambers establish, with galleries, the communication between all the rooms of the apartment; a special passage for the servants is often placed parallel to the passage for the family that leads to the chambers.

In apartments of less importance, one or two antechambers with passages form the communication between the different rooms, which are all lighted and ventilated directly from the streets or large courts.

In these apartment buildings a passageway for carriages is reserved, with an apartment for the *concierge* (or janitor) near the entrance; this passage gives access to the court of honor in which the carriages turn. The stables have their entrance on this court and front often on a court of service, which is used for the washing of horses and carriages. Sometimes these stables are underground.

In the carriageway is a vestibule entrance, reached by several steps, which gives access to the apartment of the *rez de chaussée* or ground floor, and to a second vestibule which forms the entrance to the principal stairway. This stairway, built of iron and marble or stone, or more simply in wood, is more or less monumental and richly decorated according to the importance of the apartments, but in all cases is considered a subject for decoration, and the electric or hydraulic elevator for the use of all the apartments is in-

* Continued from page 56, March issue.

closed in a special place apart from the stairway.

To avoid the meeting of servants in the principal passageway, a passage for service is sometimes made with direct access to the street and leading to the servants' stairway placed at the back of the house and leading to the antechambers of the various kitchens and to the servants' rooms on the top floor. In connection with this stairway is a hydraulic freight elevator going from the cellars to the highest floor, for the use of all the apartments.

An electric or hydraulic letter carrier starting from the *concierge's* apartment leaves letters and papers in a box placed in each of the apartments. A telephone is often installed in the apartments, or more frequently in the *concierge's* apartment for the use of all.

A furnace, heating all the rooms of the different apartments except the bedrooms, is placed in the cellar under the care of the *concierge.*

LIGHT AND VENTILATION.

We will say nothing about the materials of construction nor of interior decoration. We think that in finishing by some remarks on certain laws in regard to light and air in apartment building in Paris we shall have attained the object proposed by the title of this paper.

This consideration is important from the standpoint of hygiene, and laws on this subject are rigorously applied to tenement houses, as well as to larger apartments, though, as to the latter, the exactions of tenants exceed the requirements of law.

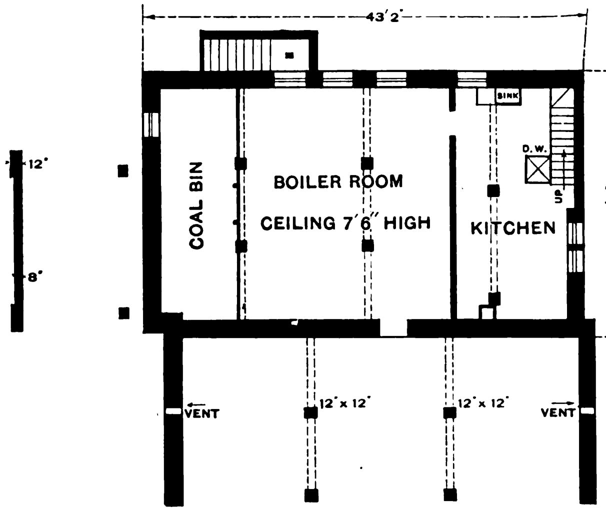
The city regulations strictly forbid the lighting of a habitable room—that is, one large enough to hold a bed, from a court measuring less than 200 square feet in a house 60 feet high. In general, custom as well as the law requires that not only the rooms of the upper stories, but all those of the lower stories, even to the ground floor, shall have sunlight. In this connection I will refer to another regulation relative to the hight of the houses.

The highest house which can be built in Paris, and this only allowed on streets not less than 65 feet wide, must not be higher than 65 feet, including the attic. The mansard roof above must be within an arc, the radius of which cannot exceed 30 feet; this by way of increasing the space for the passage of light and air. Nothing, not even a molding or a gutter, can be allowed beyond this line. After the building is finished a special supervisor of the city examines the work, and can order its demolition if it has not been executed in conformity with the regulations of the city.

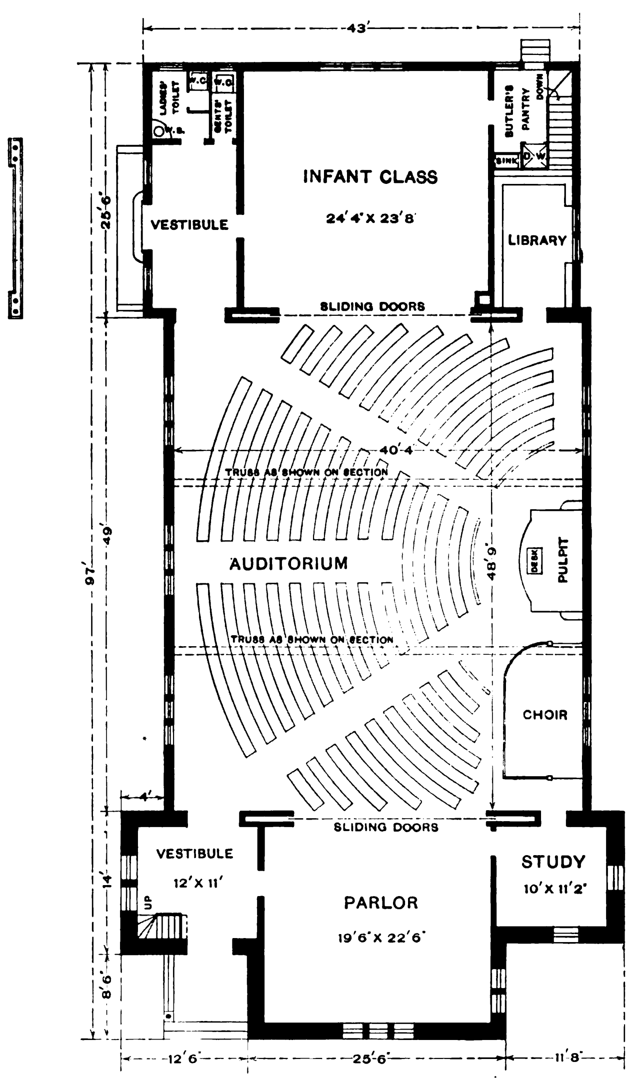
These laws, necessary for public hygiene and for the cheerfulness of the streets, have their inconvenience from a purely artistic standpoint, as they are the cause of the monotony of *façades* of apartment buildings in Paris. Their *silhouettes* being uniform, the talent of the architect has to struggle against this drawback in order to produce an original effect in this kind of construction. His compensation lies in the fact of his entire liberty in matters of detail and interior decoration.

The regret I have just expressed in thinking of the severe regulations of Paris must be followed by my congratulations to my American *confrères,* whose unfettered imagination has produced such remarkable works in so short a time.

My duty calls me to make a report to the Ministry of Fine Arts of France and to the Société Centrale; it will be inspired by my admiration for the beautiful results obtained from this liberty in art which is the privilege of



Foundation Plan of Rear Portion of the Building.



Main Floor Plan.

Design of a Brick and Stone Church.—Plans.—Scale, 1-16 *Inch to the Foot.*

America, and also by the cordiality with which my *confrères* have received my efforts.

American School Buildings *

INLETS AND OUTLETS.

It is hard to say where the inlets and outlets should be placed to satisfy all conditions, but I have advocated putting the inlet high and the outlet low, though I am quite ready to change should a better way be found.

The general plant that is to furnish the heat and ventilation in a sanitary school building must be ample to do its work. It must be durable, cheap to put in and cheap to maintain. Furnaces furnishing hot air, steam plants and hot-water plants, with numerous modifications and partial unions, are the principal kinds used in school buildings. For years the furnace did good duty, and it still holds its place, at least in the smaller class of buildings. Its first office was probably that of heating, though it was made so that it had to furnish ventilation in order to heat. When steam first came into use its work was entirely that of heating, and for a time schools heated by steam were a long way behind those heated by furnaces. Necessity soon compelled the use of indirect radiators to heat air for ventilation. This system had quite a run, and is still used, though it gradually loses favor as better methods come up.

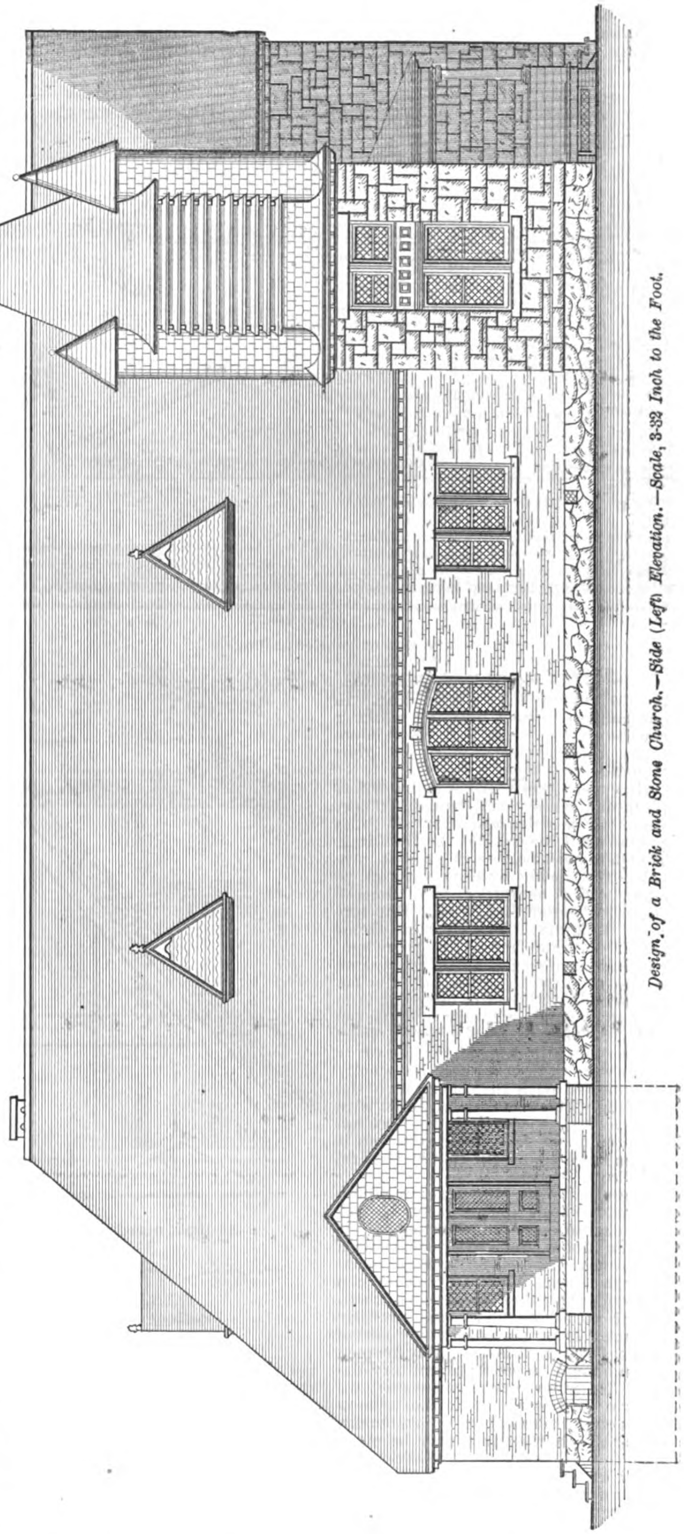
The marked advance in ventilation during the last few years has been the adoption of a fan or fans run by power for sending the air to the rooms. In furnace heated buildings the only method of creating suitable currents was by heat, and in order to induce currents in the foul air shaft it was connected with the smoke stack, the heat of which caused the current. In steam heated buildings coils were used in addition to the smoke stack. It has been recently discovered, however, that the heat used to create currents in the foul air shaft would be of more service in running a fan to do the same work. Hence fans are in common use. There is a difference whether one fan or two shall be used. I am of the opinion that with our ordinary leaky rooms two do the work better than one, though there is room for argument on that point.

HEATING APPARATUS.

From the old form of steam plant have sprung many modifications. There is one that heats entirely by steam coils placed in a fresh air room in the basement, the air being blown to the rooms by a fan. At present I favor the adoption of a central steam plant, running direct radiators to the rooms, an indirect set of radiators to heat the fresh air, a fan to blow it into the rooms and an exhaust fan to take it out. In a cold climate it works well; in fact, I do not see how it would be possible to get so good results from any other method. In warmer places than Minnesota I suppose the hot air system would be sufficient.

This steam system has its faults and can be much improved, especially as regards details of arrangement. While being somewhat more costly to put in than the indirect method, it makes a very low record for fuel—a good point in any plant. Contrary to expectation, it has been found cheaper to run and fully ventilate than to run the old steam plants without ventilation. It was said when fans came into use, and talk of 1200 cubic feet of fresh air per hour per pupil was made, that it might be very well and quite necessary that we have this fan ventilation, no matter what it cost for fuel. That the fuel bill would be increased no one doubted; nevertheless, it has decreased, and this fact should be a strong argument for its adoption over the country.

The sanitary school building must properly dispose of its waste. I declare for first class plumbing, without hesitation, where sewerage connection can be had. Where it cannot be had and cesspools are impracticable, I am



Design of a Brick and Stone Church.—Side (Left) Elevation.—Scale, 3-32 Inch to the Foot.

* Continued from page 46, February issue.

not so certain what to say. There is a choice among dry closets, crematories and out-of-door privies. As to plumbing, it has been often and justly condemned. It has been the cause of much sickness and death. Whatever it has been, the day has come when a plumbing job can be made practically perfect, so that it can be fully recommended for any kind of building. In our modern school building nothing can be better than our best known water closets, with slate or glass urinals.

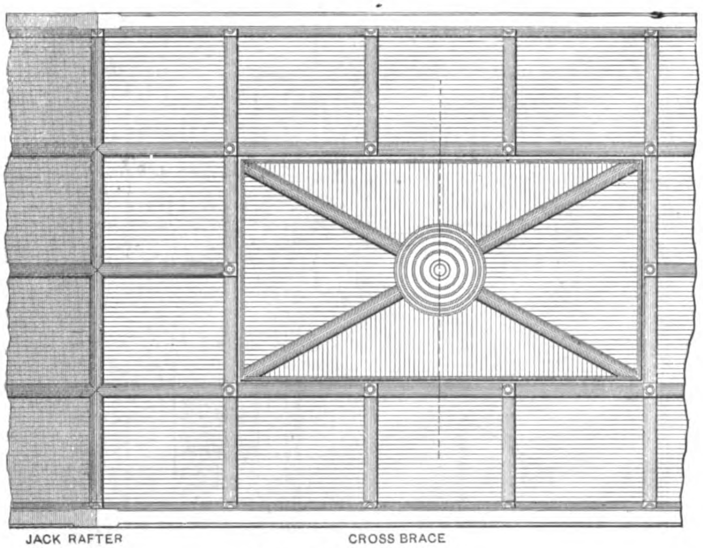
However, there are schools where plumbing cannot well be had. There seems to be a demand that all toilet rooms shall be inside the building. This demand I believe to be just, provided the inside toilet rooms can be made quite sanitary; the demand ought to be complied with. But here is the difficulty. The problem seems nearer solution than it did years ago, but there has been great injustice done in the attempt to get a safe device. The principle of the dry closet and the crematory is either to dry or burn the sewage. There has been a dry closet in use more or less where the privy vaults were in the basement but wholly unconnected with any other part of the building. This seems to have met with fair success, at least in that it does not admit odors to the schoolrooms, but it costs a large amount of fuel and has no great run.

There is another dry closet in which the privy vaults are connected with the schoolrooms by means of hollow wooden floors and partitions, though sometimes this connection is made through direct ducts. This bold step was evidently taken to save fuel, and though the whole device was carefully arranged and it possesses many taking points, I believe it is inevitably doomed to condemnation as an unsanitary device. No privy vaults connected directly or indirectly with the schoolrooms ought to be upheld for a moment, for, although the draft may be made to go the right way some of the time, it will occasionally back up from the privies into the rooms, and no such thing should be tolerated. If outside privies could not be used it would be better for a scavanger to stand at the basement door with a cart and remove the contents of vaults daily or hourly, than for the public to tolerate such a thing. Happily there is a strong sentiment against this device, and attention is being wisely turned to more sanitary contrivances.

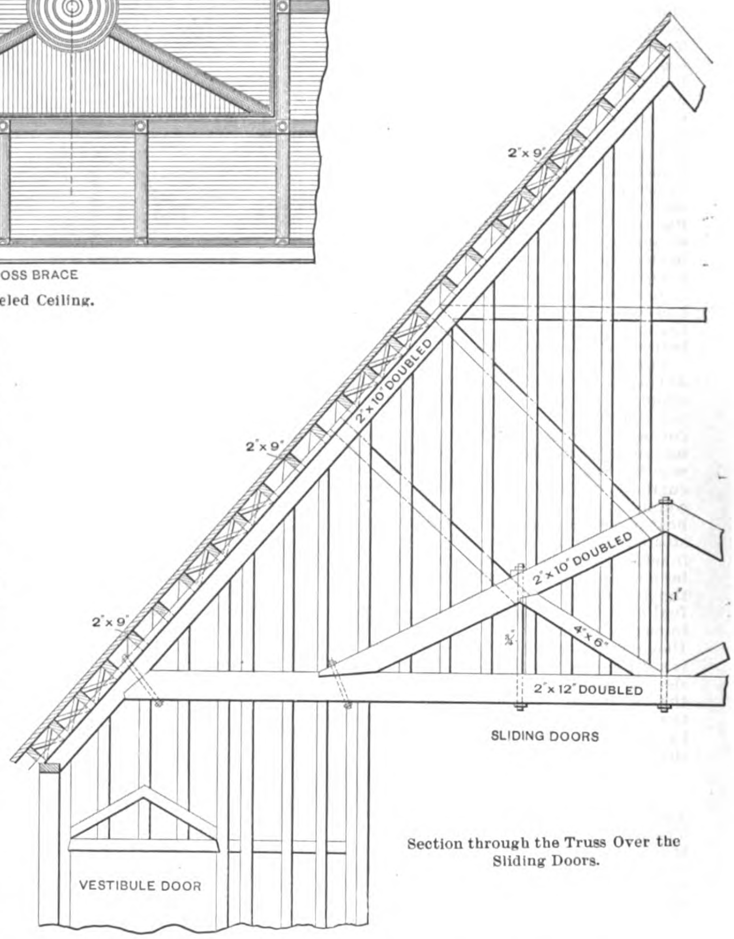
Along this line it may be well to say that the recent crematory closet seems to be somewhat in advance of the old dry closet. It has at least the merit of not being connected with the rooms, so what odor there is, not going up the stack provided for it, is not likely to get into the rooms. I have not seen the crematory closet tried, but it seems to promise well. The only difficulty I can foresee is in the disposal of the urine, which will accumulate in unpleasant quantities unless the greatest care is taken. It has been suggested that outdoor privies be used, warmed if need be; but the need of personal control while the children are in the toilet rooms by janitor and teacher is a strong argument in favor of the inside safe closet, if such can be found.

There are numerous other points that could be touched upon in the sanitation of a good school building, and the ones on which I have dwelt could be handled more effectively. I have spoken of things that do not come within the present scope of the duties of a building inspector. The subject of school buildings is not a new one to me, for I began the investigation long before I left the ranks as building inspector of Minneapolis. At that time I had it in mind to enlarge the duties of the office, so that it should include the oversight of public school buildings as regards all the points mentioned, and I here take the opportunity to entreat you as a body that you will use your best efforts to get the public school buildings of your various cities under the control of your office in so far as relates to sanitary requirements.

School sanitation is far too loosely managed now, and there are far too many selfish interests at work that ride roughshod over the rights of the school population. To-day our schools are the prey of unscrupulous heating and ventilation quacks. Boards of education, well-meaning enough in their way, are their dupes. Understand me as saying there are many honest and competent heating engineers, but we need protection from the dishonest ones. In fact, in a matter that means everything to our children and posterity, some competent body should have control. Such a body would justly bar out every man whose system is not the best to be had. Remember that this is not a question of who makes the best presentation of his system, but who



Section of Paneled Ceiling.



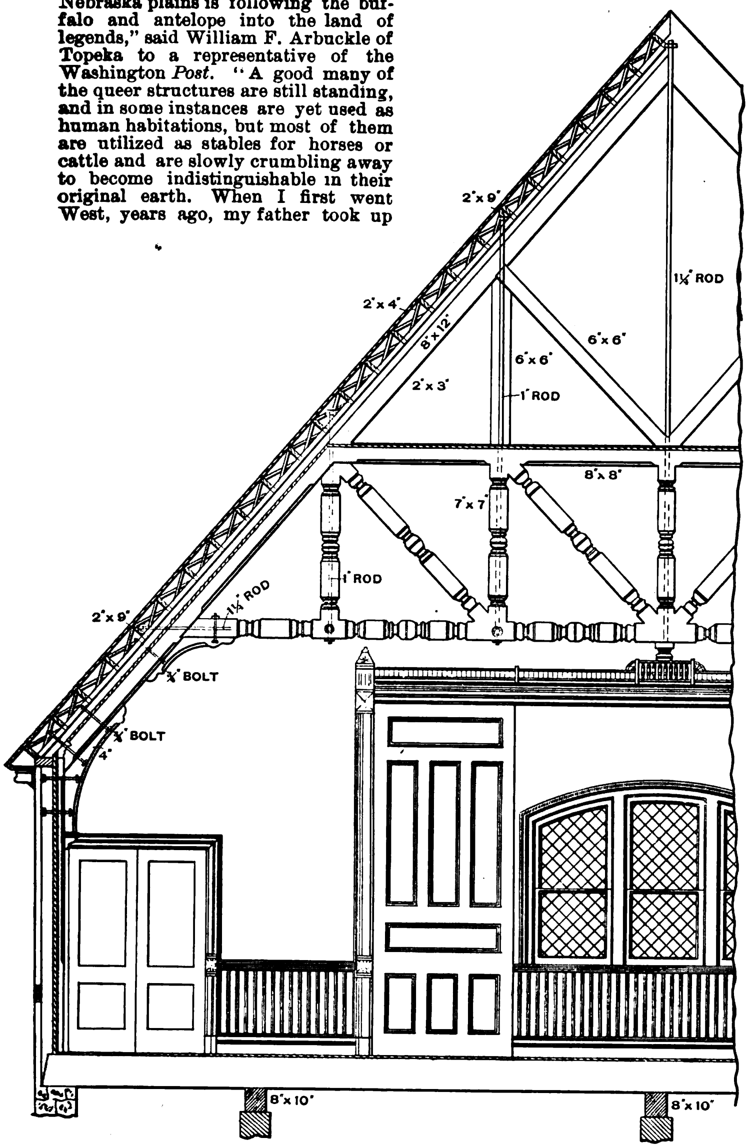
Section through the Truss Over the Sliding Doors.

Details of a Brick and Stone Church.—Scale, 3-16 Inch to the Foot.

has the best. At present there seems to be no competent body that has authority to investigate and pass judgment in these matters. Why should not the cities take up the matter through the inspectors of buildings?

The Prairie Sod House

"The sod house of the Kansas and Nebraska plains is following the buffalo and antelope into the land of legends," said William F. Arbuckle of Topeka to a representative of the Washington *Post*. "A good many of the queer structures are still standing, and in some instances are yet used as human habitations, but most of them are utilized as stables for horses or cattle and are slowly crumbling away to become indistinguishable in their original earth. When I first went West, years ago, my father took up the acres as far as his eyes could reach in what is now Eastern Nebraska. There was not a tree in sight of the knoll he had selected as the spot upon which his residence should be erected, and the nearest place lumber could be secured was 60 miles away. He put up a small tent in which to cook and eat—the family slept in the wagons—and, with my brothers and a hired man to help, set about making a house. The thick sod was cut from the prairie in slabs about 2 feet wide by 3 feet in length, and on the side of the knoll, where an excavation had been made in its side, these slabs were placed, one on top of the other, until the required hight was reached. It was arduous work, and I remember what a lot of excitement there was when my father and my brother Lem started off early one morning to go after the ridge pole and rafters that were to support the roof. They took only the running gear of our small wagon and I cried like a good fellow when they started off because I thought they had broken up my pet vehicle. They were gone nearly a week and reached home in the middle of one night after their journey of 120 miles. They had brought a long, round piece of timber, like a slender telegraph pole, with numerous other smaller pieces, and my mother nearly had a fit of delight when they proudly displayed a door and two window sashes, with a bundle of glass for the latter. There was great rejoicing when that ridge pole was put in place and the rafters run down from it to rest on the sod walls, and then came the laborious task of putting on the sod roof so that it would keep out the rain and snow. At last it was completed and we moved in. The house had four rooms, which was unusual for such structures, and its two windows soon made it known all over that section of the West as the 'Shack with the Glass Eyes.' There never was a more comfortable building erected than a sod house. They are not all damp, as one would suppose, and are warm as you could desire in winter, while in summer they are the most delightfully cool places imaginable. But they are rapidly disappearing now, and when you see one you are sure to find near it a modern cottage with its windmill, just as you do out at our place."



Section through the Building Looking Toward the Infant Class Room at the Rear.

Details of a Brick and Stone Church.—Scale, 3-16 Inch to the Foot

Cut and Wire Nails.

An interesting description of an extended series of experiments made by F. W. Clay to determine the holding power of nails is given in a recent issue of *Engineering News*. Accompanying the article are tables, diagrams and cuts illustrating in a forcible manner the tests which were applied to the different sizes and kinds of nails under various conditions. The conclusions arrived at are in some particulars so different from prevalent ideas regarding the most desirable form for nails, also of the relative value of cut and wire nails for effective use, as to excite the interest of all having occasion to use such goods. The following conclusions have been selected from those given in the article referred to as of interest to our readers:

Cut nails are superior to wire nails in all positions.

The main advantage of a wire nail is in its possessing a sharp point.

If cut nails were pointed their efficiency in direct tension would be increased by about 30 per cent; wire nails without points have but half of their ordinary holding power.

The tenacity of wire nails, at least, decreases with time, but not so fast, probably, when exposed to the weather.

The nail's surface should be very slightly rough, though not granular; should not be galvanized or otherwise made smooth, and should not be barbed, and especially the barbs should not be sharp and angular. Barbing decreases the efficiency of cut nails about 32 per cent.

Nails should be wedge-shaped in both directions where there are not special dangers of splitting.

The holding power decreases with time.

Nails are always strongest when driven perpendicular to the surface of the timber.

When subject to impact, nails hold less than one-twelfth the strain they can stand when weight is gradually applied.

Metal Plated Lumber.

One of the latest things in the way of so-called fire proof material for building purposes is "metal plated lumber," the invention of a Baltimorean. The method pursued is to take a piece of lumber of any desired shape or length, together with a strip of thin sheet metal to correspond, and run them through a simple machine, formed mostly of rollers, which folds the metal skin tightly around the lumber. Thus prepared, it is claimed that the lumber is specially adapted for use in the construction of doors, flooring, partitions, stairways, freight and passenger cars, granaries, refrigerators, &c., &c. It is claimed to be not only fire, but water and rat proof. The cost is said to be not much more than a coat of good paint, or about 1 cent per square foot, and it can be cut and nailed like ordinary lumber.

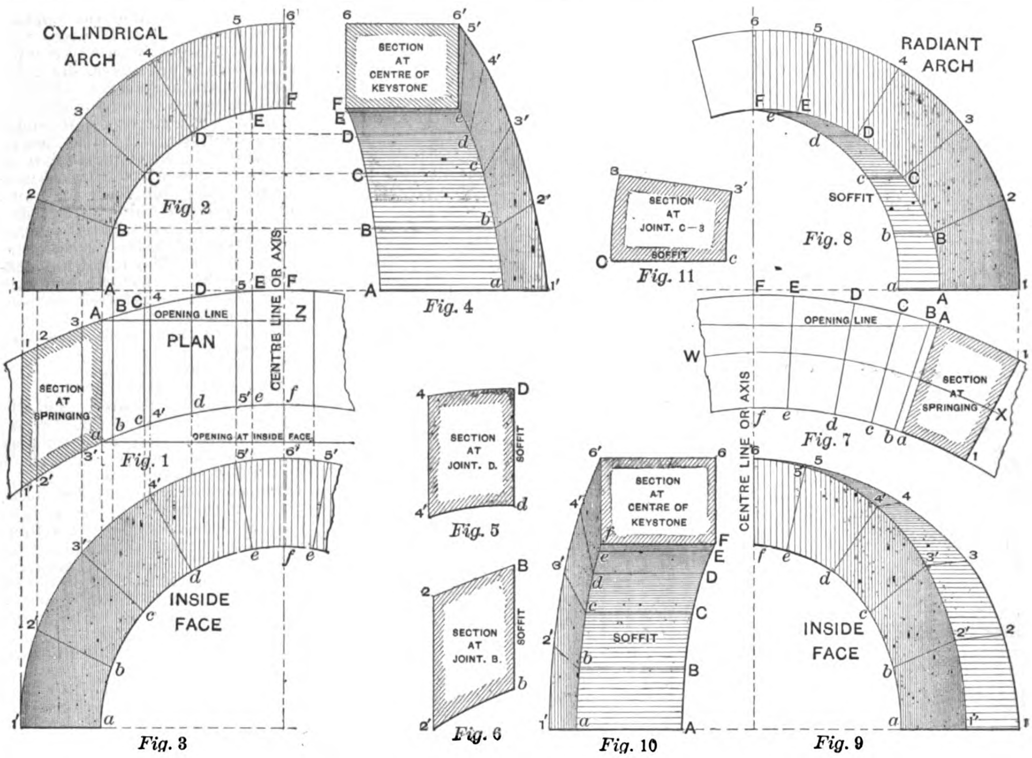
ARCHES IN CIRCULAR WALLS.*

THERE are many forms of arches which may be constructed within circular walls, and it may be stated that almost any form of arch which can be built within a straight or plane surface wall can also be made in a circular wall, provided geometrical principles are strictly observed in the projection of patterns and in the execution of the arch. It is not, however, the purpose to give here an essay upon this subject, but rather to show and explain clearly and simply the methods by which the patterns are projected and the stones cut to their proper shape for the two arches most frequently met with. The first is the cylindrical arch—that is, the arch having a cylindrical soffit, as in an ordinary arch—and, second, the right angles, thus making the opening at the inside face the same width as at the outside face. Also in the cylindrical arch the joint lines at the soffit are each parallel to the center line or axis, as shown projected by B *b*, C *c*, &c., of Fig. 1.

THE RADIANT ARCH.

In the radiant arch the joint lines at the soffit radiate toward a common axis, as shown by lines A *a*, B *b*, &c., in Fig. 7. This necessarily makes the opening at the inside face smaller than at the outside face, for it will be noticed the length A F is greater than *a f*, Fig. 7. The joint lines at the soffit of each arch are in all cases parallel to the plane surface joints have been projected. At Figs. 5 and 6, which are the sections of joints B 2 and D 4 of the cylindrical arch, the reader will notice the angles made by the soffits with the faces are more acute than the angle made by the face with soffit shown at Fig. 11, which is the section of the joint C 3 of the radiant arch.

In order to bring the stones to their required shape in the most expedious manner, and from the smallest possible quantity of material, we have first to project bed and face molds, templates containing the proper curvature, and twisting rules to give the proper twist at the face and joints. We shall in explaining the methods by which the several patterns are projected assume



Arches in Circular Walls.—Diagrams Relating to Cylindrical and Radiant Arches.—Figs. 1 to 11, Inclusive.

radiant arch, at the soffit and exterior surfaces of which all level lines radiate toward a common axis. The outside faces of these arches are very similar, but at the soffits, sections at joints and the inside faces, the arches are different, even supposing them to be constructed within the same circular wall and to have the same width of opening at the outside face.

The methods by which the several patterns are projected also involve separate principles, for it is possible to be enabled to construct the one and yet be entirely at a loss as to the methods to be employed in order to construct the other arch. By closely observing the diagrams represented in Figs. 1 to 11, which are orthographical projections of the arches named above, the reader may clearly see the difference between the cylindrical and the radiant arch. The soffit of the cylindrical arch is, in a manner, formed by one cylinder piercing a larger one, the axis of each cylinder being placed at plane which contains the spring line. They are, therefore, level lines, and, although in the radiant arch the opening at the inside face has become less than that of the outside, yet, at the crown of arch F *f*, Figs. 8, 9 and 10, the soffit becomes level. This will be understood by an inspection of the diagrams.

The joint lines at the outside and inside faces of the cylindrical arch are radial lines, and radiate toward the axis or center line.

In the radiant arch the joint lines at the outside and inside faces are in some cases made square to the curve of the soffit at the point where the joint line at soffit intersects the curve at outside and inside faces, thus forming a winding surface. In other cases the joints are made square to the curve of the soffit, found at the center point of the joint line through the soffit which belongs to the joint. By this method what are known as plane surface joints are formed. These are more expeditiously worked than the winding joints. In the diagrams, Figs. 8, 9 and 10, the utter ignorance on the part of the reader of any knowlege whatever of this subject, and shall avoid all technicalities and use as far as possible the every day language of the workshop.

FACE MOLDS FOR CYLINDRICAL ARCH.

Let Figs. 12 and 13 be the plan and elevation of the arch furnished by the architect. These have to be enlarged to the full size, and the face molds developed from them. To do this, first, at a convenient part of the drawing board draw a line of an indefinite length as the center line, and at any point, as O, Fig. 13, draw the base line at right angles to it and produce it to the left of center line, as shown. With O as center, and radius equal in length to that of the half opening of the arch when measured at a line square to the center line, as at the opening line A′ G, Fig. 12, draw the soffit line A F. Make A 1 equal to the depth of the arch stones at the face, and with radius O 1 draw the curve of the exterior surface 1 6. Now divide the soffit line into the

* Copyrighted, 1893, by Ed. W. Hind.

number of parts corresponding to the number of stones the arch may contain, in this case nine, and through the points obtained draw the radiating joint lines B 2, C 3, &c.

Now, using any point on the center line as center and a radius equal to that of the outside face line of wall, draw the curve H F′. Make F′ *f* equal to the thickness of wall, and draw the inside face line *f* 1. In the example presented here the arch stones go through the wall and show clean at outside and inside faces. From A, Fig. 13, draw a line parallel to center line through the plan, as A′ *a*, Fig. 12. Through the point A′ where this line intersects the outside face line, draw a line square to the center line, as the opening line 1 G. From B, C, 4, D, E, 5 of Fig. 13, produce lines parallel to the center line through the plan, as shown at B′ *b*, C′ *c*, &c., Fig. 12. From 1, 2, 3, Fig. 13, extend parallel lines to the opening line only, meeting it at the points 1, 2, 3. With A′ as center and 1, 2, 3 as radii draw arcs to the outside face line, meeting it at 1′, 2′, 3′. From these points draw lines through the plan parallel to the center line, meeting the inside face line at 1, 2, 3. By adopting this simple method we are at one operation enabled in all cases to project a uniform depth of arch stone at the outside face. Otherwise had the lines been produced to the outside face line, as shown at 1 H, the arch stones would necessarily become much deeper at the springing than at the crown of arch, and the length A′ H when measured around the curve will be found greater than from A to 1.

OUTSIDE FACE MOLDS.

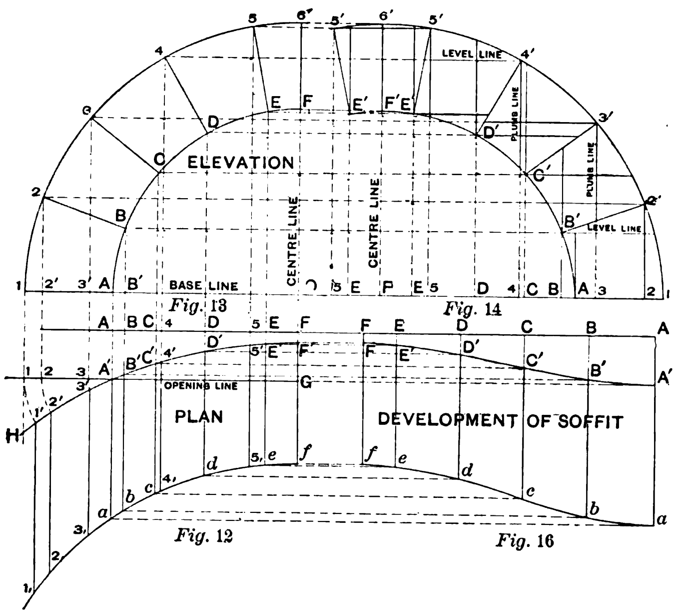
In order to obtain these we have to develop or stretch out upon a plane surface the space occupied by the arch in the circular wall. The reason for doing this will be very readily understood from the following illustration. Let the reader get a circular piece of wood and with an ordinary bit at any point bore into it a hole, keeping the bit at right angles to the wood. Then with the same bit cut a hole into a piece of paper. Fold the paper around the wood, keeping one edge of the hole in the paper exactly to the edge of the hole cut in the wood. He will find the paper to be short—that is, the hole in paper does not reach to the other edge of the hole in wood, although both have been made by the same bit and are of the same size. The reader will also notice the holes are of the same diameter when measured on the straight part of wood. At any point on the base line, as at F, Fig. 14, erect a line square to the base line. Make F E and F 5 at the right and left of F equal to F′ E′ and F′ 5′ of Fig. 12. Make 5 D, D 4, 4 C, &c., of Fig. 14 equal to 5′ D′, D′ 4′, 4′ C′, &c., of Fig. 12, and at the points obtained erect lines square to the base line. From B 2, C 3, D 4, &c., Fig. 13, draw lines parallel to the base line, intersecting the lines drawn square to base line at B′ and 2′, C′ and 3′, D′ and 4′, &c., Fig. 14. These are the points through which to draw the developed curves of soffit and exterior surface. Also draw the joint lines through the intersections corresponding to the points. They are drawn through at Fig. 13. In practice we may not at all times be enabled to produce lines parallel to base line from the elevation into the projected face molds, owing perhaps to confined space on the drawing board. Having set off the lengths F E 5, &c., and erected the lines square to base line, procure a rod or straightedge and on it set off the lengths 2′ 2, 3′ 3, B′ B, &c., Fig. 13. Transfer these lengths to their corresponding perpendiculars at Fig. 14 and through the points obtained draw the curves and joint lines as explained above. Now draw the plumb and level lines on face molds, as shown. Their use will be fully explained in the directions for cutting the arch.

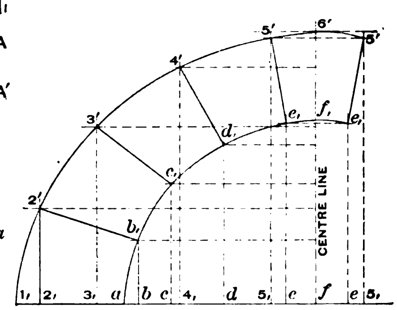
INSIDE FACE MOLDS.

At any convenient part of drawing board draw a base line, as 1, 5, Fig. 15. and at any point, as *f*, erect the center line square to it, and transfer the lengths *f e*, *f* 5, &c., at the inside face line, Fig. 12, to base line, and erect the perpendiculars, as explained above, for the like operation. As before stated, the joint lines at the soffit are level lines. Therefore the points *b*′, 2′, *c*′ 3′, &c., will be set off at a hight from the base line equal to the hight the corresponding points in Figs. 13 and 14 may be from the base line. Through the proper points draw the curves and joint lines.

DEVELOPMENT OF SOFFIT.

In cutting a rock face arch it is necessary to ascertain the proper pitching or cutting lines at the soffit and exterior surface, these having to conform to the curvature of the wall. Also in a molded arch a great amount of time may be saved in cutting the several stones if templates are projected in order to give the cutting lines of the members at the soffit. The pitching line for the rock face arch and the templates mentioned above may very readily be obtained if we develop or stretch out the curves of intersection. To do this, draw a line of an indefinite length, as shown at *a f*, Fig. 15. Make *a b*, *b c*, *c d*, &c., equal to A B, B C, C D, &c., Fig. 13. (In order to transfer these lengths accurately, A B, &c., should be subdivided, as the chord of the arc A B is necessarily shorter than the length of the arc. At the points obtained erect lines square to *a f*. Now make F′ F, E′ E, &c., Fig. 16, equal to F′ F, E′ E, Fig. 12, and through the points obtained draw a curve, which will be the development of the curve of intersection at the outside face. Make F′ *f*, E′ *e*, &c., of Fig. 16 equal to F′ *f*, E′ *e*, &c., Fig. 12. Through points obtained draw the curve of intersection at the inside face. In a rock face arch if after the soffit be cut and the joint lines marked on it at their respective positions, the development of soffit for the stone in question be placed on it at its proper position, the pitching line may then be marked at face by one operation. In a molded arch, set off from F′ E′ D′, &c., Fig. 16, the required depth of sinkings when measured from the face along the joint line of soffit. Through the points obtained draw the curves. These will in like manner give the cutting lines at the soffit for the respective members. By this method the curve of intersection at the exterior surface may also be developed, in order to give the direction of pitching line at the several stones.





Arches in Circular Walls.—Diagrams Relating to Face Molds of Cylindrical Arch and Showing Development of Soffit.—Figs. 12 to 16, Inclusive.

(*To be continued.*)

A CORRESPONDENT of one of the London architectural papers writes under recent date that while removing the earth around some old buildings in the Islington portion of his district, a wall was found to be resting on a piece of timber, which was carried on four whales' jaws and hollow trees, such as were once used as water pipes.

Relations of Employer and Workman.*

Colonel Wright opened his address by saying that "a generation ago the discussion of the labor question was exceedingly restricted; it meant a discussion of the question of wages and working time. To-day the ramifications of the question involve every feature of industry, of social relations, of temperance and of politics; it is psychological and sociological, because these sides comprehend the whole of it. In defining the relationship of capital and labor to each other, he declared that their interests are mutual, but not identical. The interests of the two cannot be identical, in the nature of things; they are reciprocal. The fact that in the divine plan of nature no two things are exactly alike, and that man is the only medium of creating uniformity, means much in the labor question, for it compels the recognition of the difference of men's minds; while units differ, interests differ, and the knowledge of this difference provides the methods and means for establishing harmony among the parts. Difference does not necessarily involve discord. The spirit of altruism, which leads each man and each body of men to seek to do something for every other body of men, as distinguished from the individualism of the past, is what makes great associated effort for the relief of conditions successful to-day. It is this altruistic tendency of the times, which it is impossible to evade, which brings us from what the political economists call status, to the condition of contract; or from a status fixed under the influence and customs of society and industry to one of contract where each man is at liberty to make such contract as he chooses with his fellow man. The one difficulty of this condition of contract so far as the workingman is concerned is that he is not always at liberty to make such contract as he chooses, because he is bound by economic conditions out of which he cannot reach. Freedom of contract, which is an expression belonging to this age, does not always mean what it says. The employer, trained and experienced in business practices, and independent in his position, suggests the terms of contract, and he who seeks to benefit thereby (the workman) must accept, because under the present condition of industry he cannot reciprocate in suggestion; for if he does then comes trouble. If the two parties cannot reach the high plane of independent contract then comes the strike, the lockout, &c.

COMMERCIAL SYSTEMS.

All these questions, however, have nothing to do with commercial systems; they have only to do with the minds of men, and emphasize the fact that the question is one of psychology rather than of economics. When men are able to recognize this principle then will they be able to reach conclusions which shall broaden and elevate the whole question into one worthy the consideration of the best minds of the age. Statecraft wherever civilization exists is striving to solve the problems which grow out of industry. The solution can only come when every man recognizes the rights of every other man, and is willing to meet him half way in the adjustment of the relations with each other. In the search for this solution some of the best and broadest men of the age are advocating what they are pleased to call "compulsory arbitration."

COMPULSORY ARBITRATION.

The speaker explained this as a "court or board of reference, to which disputes must be referred," and stated that compulsory arbitration is a misnomer, a thing which does not exist. As soon as arbitration is made compulsory it ceases to be arbitration and becomes something else. The compulsory system aims to accomplish something moral and economical by force, which means death to industry. The speaker proceeded to present the sequential conclusions of the effect of compulsory arbitration, pro and con, from the point of reference, to the execution of the findings of the board by the officers of the State, showing conclusively that the State might greatly simplify the obtaining of the same result by the enactment of laws fixing the price of labor and commodities and compelling compliance therewith. In either case the result would be the death of industry and the wiping out of the whole social fabric, which depends almost entirely upon the success of industry. Compulsory arbitration, if such a thing could exist, would mean the extinction of all freedom of contract and the destruction of all responsibility, moral or otherwise, on the part of the individual.

CAPITAL AND LABOR.

In seeking to remove the antagonism which exists between the two forces which are essential to production, capital and labor, the two have been too often considered personally; that capital means one man and labor means another man subject to the first. The two should not be compared in this sense, the terms should be used economically and ethically; they are two forces each essential to the production of property, each having its functions and each having its rights and privileges. They are relations which cannot be entirely separated, but all the different relations should be fully recognized. The only principle by which the different views on the subject of production can be harmonized lies in the organization of each force on such a plan that each shall recognize the rights, the dignity and the privileges of the other. It requires good men and good action upon the highest moral plane to recognize all the rights of another man. It requires that we should bring into our practical daily work some of the essentials of the broadest religion, which means in this sense the great moral principles which shall recognize the elevation of the whole people and not simply the temporary advantage of any one class. While the study which the mechanics of this age have been giving to economics and ethics may be crude, it has developed an intelligence, in spite of the fighting spirit which still exists, that is remarkable, and has established in the public mind a knowledge of the justice of two sides involved which cannot be eradicated. This sense of justice recognizes the power and privilege of every man to seek the best for himself that can be obtained.

CONCILIATION.

Colonel Wright referred to conciliation as a desirable preface to arbitration, where each party meets the other in that friendly spirit which should exist between employer and workman. He cited a number of cases to show that careful treatment of the situation by the employers, when differences with the workmen arose, would serve to avoid strikes and disturbances which would be serious if brought to the point of open breach.

The builders of the country were complimented on being the first to grant the shorter work day, and the first to introduce other movements which add to the dignity of the workman and of the employer. In closing, the speaker said: "If there is anything to be gained by concessions without forfeiture of principle, if there is any benefit to be gained to the individual by elevating him morally and intellectually, it is the duty of industry everywhere to do it; it is the duty of industry to see that every man who works for wages is a free born man, who can make his contracts and suggest the terms thereof as freely as the man on the other side. If out of the various systems of relief proposed, which are only ameliorative and not conclusive, there can grow up a new system of industry by which the iron law of wages can be removed, by which society and industry can each bear its burden cheerfully, then there will come an age when industry will be more prosperous than ever, when there will be freedom from harsh economic laws, entanglements, antagonisms and industrial wars. Until that time all that can be done is to help bring out a better system, better understanding, better freedom of contract, until the old rule, which was from status to contract, be reversed and progress made from contract on to a higher status. This is the acme of the whole altruistic principle of the age, the establishment, not of the millenium, but of better conditions."

*Summary of an address delivered by Hon. Carroll D. Wright, United States Commissioner of Labor, before the eighth convention of the National Association of Builders.

A Woman Carpenter.

One of the Western trade journals is authority for the statement that Miss Sophie Christensen of Copenhagen has decided to take up her residence in Chicago. She is a daughter of a retired captain in the Danish army and some years ago, at the age of 20, she determined that she would not wait for a husband to support her or be dependent on her father's limited income, but would learn how to make her own living. After some difficulty she found a carpenter and joiner who was willing to accept her as an apprentice and bound herself to him to learn the trade. Soon she displayed great aptitude for the work and having just completed her apprenticeship has been admitted as a full member of the Joiners' Guild, at Copenhagen, by a unanimous vote. In accordance with a sensible custom which prevails in Denmark, Miss Christensen had to submit a specimen of her own unaided work before being accorded the complete honors of the guild. She made an artistic self closing bookcase, the beauty and finish of which commanded the admiration of every member of the guild. The young woman, who is now 26 years old, thinks Chicago will be the best place in which to make a living and thither she will soon start.

THE new hospital just completed at Sing Sing, N. Y., as the gift of Mr. and Mrs. William F. Cochran, stands on high ground, commanding an extensive view of the Hudson River. The building, which is L-shaped, measures 200 feet in length by 75 feet in width. It is three stories and basement in hight, the exterior walls being of granite with trimmings of red brick. The heating will be by steam and hot air and the lighting by gas and electricity. The architect of the structure, R. H. Robertson of New York, has given special attention to the fire proof qualities of the building, which will possess all the known improvements of service in caring for the sick and injured.

WHAT BUILDERS ARE DOING.

THE PROSPECTS in the building trades of Baltimore seem to be bright at present, and considerable activity is already observed among the builders. The larger portion of work now planned appears to be in the residence portion of the city and in the suburbs. But little new work is anticipated in the business section beyond that already projected.

Among the buildings proposed to be erected, some of them to be commenced soon, are: John Hopkins Medical School, Knights of Pythias Hall, Maryland General and Lying-in Hospitals, adjoining the Baltimore Medical College; addition to Notre Dame Institute, addition to St. Mary's Seminary, electric power house for City and Suburban Railway Company, passenger depots for the Belt Railroad at Pratt and Howard streets, Bolton lot and other points on the line of the road.

Boston, Mass.

The present outlook for the coming year in the building interests of Boston indicates that the season will open quietly with about the average amount of work in the market. The condition of affairs among the workmen in the different trades is free from disturbance, although there is considerable complaint on the score of lack of work. The carpenters are now working eight hours, as has been previously announced, under an agreement with the employers which was reached through amicable conference of the two. The bricklayers and stone masons have recently held their annual meeting with the employers by means of the joint Committee of Arbitration, for the purpose of adjusting the conditions under which work shall be performed during the coming year. Everything was settled in a mutually satisfactory manner, with the exception of the wages, the fixing of which was postponed until about April 1. The joint agreement under which this action was taken is working with great satisfaction to all concerned.

The Master Builders' Association has received, since the national convention, many expressions of appreciation from other local exchanges, of the delightful manner in which their delegates were entertained during the meeting. The convention has already produced a manifest increase of interest in the work of the National Association on the part of the Boston builders, which promises to redound to the benefit of the local association.

Buffalo, N. Y.

The Master Plumbers' Association of Buffalo recently entertained the delegates to the New York State convention of plumbers at the Builders' Exchange. The entire building was brilliantly lighted and in the exchange room, which was beautifully decorated, an entertainment was given as a "starter" for the evening. About 300 people were present, including the visitors, members of the local association of master plumbers, members of the Builders' Exchange, Mayor Bishop and a number of others. The whole affair was an unqualified success

The last business of the convention was the selection of Troy as the next place of meeting and the election of the following officers: President, William J. McDermott, New York; vice-president, Henry E. Weiber, Kingston; recording secretary, Charles Schloesser, New York; financial secretary, Horace F. Westcott, Albany; treasurer, William Reid, Rochester; delegates-at-large to State convention, Messrs. Callahan of Jamestown, Barnes of Troy, Collins of New York; delegates-at-large to national convention, J. A. Rossman of New York and Charles Geiger of Buffalo.

The apprenticeship problem was referred to the incoming Legislative Committee.

The Builders' Exchange is reported as being in excellent condition, and the members are looking forward to a revival of business at the beginning of the season. Chas. A. Rupp, one of the prominent members of the exchange, and first vice-president of the National Association of Builders, has been recently appointed Police Commissioner of the city of Buffalo.

Chicago, Ill.

Early in February the carpenters on the Chicago Stock Exchange building were notified by the contractors that a cut in wages would be made from 30 to 25 cents per hour. The men declined to accept the reduction and a compromise of 27½ cents was offered, which was also refused. After a period of consideration the carpenters struck against the reduction. At the time of the strike the carpenters were being paid 5 cents per hour less than the scale agreed upon by the Carpenter Builders' Association and the Carpenters' Union. The contractors offered to arbitrate the matter, but the men refused, alleging that such action would be arbitrating the result of arbitration. After an attempt to fill the places vacated by the strikers the contractors were compelled to capitulate owing to the fact that the carpenters had turned the matter over to the Building Trades' Council for settlement and the council had called out all other trades employed on the building. When a general strike was declared against the building, the contractors immediately conceded the demand of the carpenters, but were thereupon informed that certain demands by the other workmen must be granted before any workmen would be permitted to return. The contractors finally yielded everything and the men returned to work. The following are the conditions of settlement with the carpenters:

Wages shall be placed at 35 cents as the minimum per hour. No discrimination shall be made among the men who were called out—all shall return to their respective positions. A steward must be allowed on the job, and the business agent must be admitted whenever he wishes to inspect the job. All carpenters employed, including foremen, must be members of the union, the superintendent alone excepted.

One of the largest carpenter contracting concerns in the city was waited upon by the representatives of the union shortly after the settlement of the Stock Exchange strike and requested to pay the workmen the agreed scale, 35 cents per hour. The request was immediately granted.

The masons and bricklayers through the joint board composed of committees from the Mason Builders' Association and the union, have adjusted their wages, working rules, &c., for the current year. There were but few changes made from the conditions which prevailed last year; wages remained unchanged.

Cincinnati, Ohio.

The annual election of officers of the Builders' Exchange took place on March 5. The entire Independent ticket with one exception was elected. The following are the new officers:

President................G. F. Nieber.
First vice-president....E. E. Locke.
Second vice-president..Dennis Flaherty.
Secretary..............F. Lawson Moores.
Treasurer..............Wm J. Tanner.

DIRECTORS.

Amos Tooker. Henry Wagner.
John Theobold. Silas Snodgrass.
Thomas Lee.

ARBITRATION COMMITTEE.

J. C. Harwood. H. B. Lucky.
J. R. Hancock. C. R. Brown.
F. McManaman.

The annual report showed a balance of about $1000, a deficit of over $300 in the past year. During the afternoon an inviting lunch was spread. After the election there were several speeches by the newly elected officers, several vocal solos, &c., the entire affair resolving itself into the jolliest meeting ever held by the builders of the city.

The Master Cut Stone Mason Contractors' Association has reorganized again and includes the yards of three cities. George Hummel has been elected president and Joseph A. Byrnes secretary.

The Master Stair Builders' Association has elected H. W. Schmidt president and John Kramer secretary. Daily meetings for the present will be held at 11 a. m. in the Bavaria Building, Court and Walnut streets.

Matters are quiet with the mill hands, and seemingly the same with the owners. Carpenters' unions are keeping quiet, but it is well known that unless agreements are entered into very soon there will be uncertainty in contracting circles. Both sides are in a quandary as matters now stand.

It is claimed by certain contractors that members of the unions have violated agreements, and on the other hand the carpenters insist that the contractors are to blame. The season will soon open and it looks as though the hammer and saw will lie quietly in the tool box, unless the carpenters' terms are complied with.

Suit was filed in the Superior Court, March 7, by the Morrison & Snodgrass Company against M. A. Clements and others to enjoin interference with their business. The employees of the concern went out on a strike on February 5. It is alleged that the defendants are intimidating the employees of the company and preventing them from working. Also, that they are interfering with the company's business by their acts, and that their acts are an invasion of the right of free labor, and unlawful.

Lynn, Mass.

The Master Builders' Association of Lynn held their regular meeting at the rooms, 18 Andrew street, on March 6 After routine business was transacted, reports on the outlook for business were discussed by the members, and the general opinion was that business was going to be good, not only in Lynn, but all over the country.

The Swampscott High School is to be built by members of the association, and there is to be a new library building in Nahant which is likely to be built by Lynn men, and the new public building will come later, so that confidence seems to have been restored.

The Board of Directors made their report, which showed the organization to be in first-class condition.

A vote of thanks was tendered the Master Builders' Association of Boston for their fraternal, friendly and more than generous treatment extended to the Lynn delegation during their attendance at the convention of the National Association of Builders of the United States.

A vote of thanks was also tendered to the committee in charge of the Lynn delegates for their fraternal treatment during the convention and the excellent condition in which they sent the delegates back to Lynn after a four days' campaign.

New York City, N. Y.

Aside from the usual cases of difference between individual employers and the unions, the building trades of New York City seem to be in a more than ordinarily tranquil condition, promising well for the opening of the spring building season. The amount of work at present being carried on is indicated by the statement that nearly if not quite half of the workmen in the building trades are idle. The wages of those who are at work are, however, being kept up to the union scale, and the workmen are anxiously looking for the beginning of the building season, in the hope that conditions will be improved.

Philadelphia, Pa.

At the annual meeting of the Master Plasterers' Company the following officers were elected to serve for the ensuing year: President, James T. Allen; vice-president, W. H. Albertson; secretary, J. Turley Allen; treasurer, Charles H. Reeves, and measurers, William H. Albertson, J. W. Reeves, C. H. Reeves, A. G Buvinger and Charles B. Noblitt.

The Painters and Decorators' Association have elected Select Councilman F. A. Ballinger president, S. W. Rudolph vice-president, Joseph B. Scattergood treasurer, Francis F. Black secretary, Charles H. Fowler financial secretary, and Alfred Shur, Frank A. Nichols and Charles Abel, directors.

The Master Builders' Exchange have elected Franklin M. Harris president, to succeed Wm. H. Albertson, and re-elected William Harkness secretary.

Portland, Maine.

The monthly supper of the Builders' Exchange was held in February in the association's room in the First National Bank building. About 30 members and guests were present. The exchange appointed a committee consisting of President C. B. Howard, F. H. Fassett, J. C. Stevens, F. A. Tompson, Charles E. Snow, Geo. Smith and A. D. Smith, to frame an ordinance governing the erection of buildings, to be submitted to the City Council. A resolution was adopted requesting the Board of Fire Underwriters to appoint a committee to confer with the committee of the exchange regarding the proposed ordinance. The

Portland Exchange begins the new year free of debt and with a keen interest in its welfare felt by the members.

Providence, R. I.

The members of the Builders and Traders' Exchange of Providence, R. I., recently held a special meeting at their rooms on Custom House street, to consider the subject of building specifications. A considerable number were present, and the matter was discussed very fully and at much length. The report of the committee appointed at the previous meeting, consisting of Messrs. Furlong, Hathaway, Phillips, Markham and Hemingway, was finally accepted, and another committee, consisting of Richard Haywood, George R. Phillips, John W. Furlong, H. M. Hemingway and F. L. Hathaway, was appointed to confer with the Rhode Island Chapter of Architects upon this matter and report at the next meeting.

Rochester, N. Y.

President H. H. Edgerton was absent from the annual meeting of the Builders' Exchange, and First Vice-President T. W. Finucane performed the duties of that office. The meeting was well attended.

Secretary J. H. Grant read his annual report, and also the report of Treasurer J. E. Summerhays, who was absent. The reports showed that the organization was in a prosperous condition.

These directors were re-elected for five-year terms: F. P. Stallman, John J. L. Friederich, John A. Smith, Frank Miles. J. B. Pike was elected a director in place of F. L. Heughes. William H. Gorsline was chosen a director of the National Association of Builders. The officers of the exchange will be elected at a future meeting of the Board of Directors.

St. Louis, Mo.

At the annual meeting of the Builders' Exchange of St. Louis the following officers were elected for the ensuing year:

President, Jeremiah Sheehan.

First vice-president, Adam Bauer.

Second vice-president, John W. O'Connell.

Directors—Stephen O'Connor, Wm. J. Baker, James Kearney, Anthony Ittner, Philip C. Ring and Michael Laine.

Committee on Arbitration—P. J. Moynihan, A. H. Haeseler, Thomas Mockler, Ed. J. Ryan, H. C. Gillick, Fred. Steinkamper, F. B. Berglar, Wm. H. Swift and Augustus Pullis.

Committee of Appeals—H. Thompson, John Tierney, George Sauerbrunn, John Meyerscough, John J. Fletcher, John F. Reardon, Thomas P. McKelleget, George M. Burke and James S. Dowling.

The builders of St. Louis are expecting an improvement in the condition of the building business as soon as the season is fairly opened. The amount of new work projected is less than is usual at this time of the year, but it is expected that work which was postponed last year during the panic will be resumed.

At the last meeting of the Board of Directors of the Builders' Exchange a communication was received from the St. Louis Chapter of the American Institute of Architects, requesting that the exchange appoint a committee of five to confer with like committees from the Engineers' Society, the Merchants' Exchange, Real Estate Exchange, Mechanics' Exchange, the Mercantile Club, Union Club, St. Louis Club, University Club and Commercial Club, making a joint committee of 50. The committees will confer upon the subject of widening the streets and forming boulevards in the business part of the city.

A special committee has been appointed to submit a plan whereby members of the exchange may receive reports as to the title of property upon which buildings are to be erected. Heretofore builders have in a great many cases experienced considerable difficulty in collecting money on houses built, owing to the title of the property being vested in parties other than those with whom the contract was made. The committee will report a plan whereby the members of the exchange may know to whom the property belongs before work is begun.

Washington, D. C.

The Builders' Exchange of Washington recently elected its officers for the ensuing year. The exchange complimented its efficient officers of the past year by a re-election with an accord so heartily expressed that it leaves no room to doubt the popularity of the men with the members of the organization. These officers are as follows: President, Henry A. Jones; first vice-president, Thomas Norwood; second vice-president, Albert Stephan; secretary, Thomas J. King; treasurer, William C. Morrison; directors, J. W. Thomas, John Lynch, T. V. Noonan, Michael Shea, Robert Clarkson, C. A. Langley, L. A. Littlefield, J. R. Galloway, Thomas P. Stephenson, James Nolan, William O'Conner and A. L. Phillips.

Immediately after these elections had been made and declared by Secretary King the members marched in a body to Wormley's, where a collation was served.

St. Paul, Minn.

St. Paul builders are anxious that Building Inspector Gauger's plan to abolish the fee for building permits shall be carried into effect. At a recent meeting of the Board of Directors of the Builders' Exchange the following resolution was adopted:

Resolved, That the action of the building inspector in recommending that the payment of fees for building permits be abolished, meets with the heartiest approval of this body, as we deem the enforcement of their payment and unjust discrimination against the builders tends to lower the recorded value of structures erected and improvements made.

Worcester, Mass.

At the last meeting of the Builders' Exchange of Worcester new by-laws were adopted, and C. D. Morse, J. H. Pickford and G. H. Cutting elected trustees for two years. The opening of the building season promises to be quiet, with less than the usual amount of building to be undertaken. The trades are all quiet so far as labor troubles are concerned, and there seems to be no prospect of unfavorable change.

Notes.

The workmen in the building trades of Bangor, Maine, have been making a united effort, by means of a petition to the employers, to secure a nine-hour day. With few exceptions the employers have agreed to the request of the workmen and a nine hour work day in all trades will doubtless be the result.

The builders of Bridgeport, Conn., have formed a Builders' Exchange, electing C. L. Chamberlain president and W. L. Savage secretary. About 33 of the most prominent builders of the city have identified themselves with the movement, and the new organization gives good promise of success.

Building in the Northwest is reported quiet, with little activity manifest. The amount of work projected in St. Paul and Minneapolis is far below the average, and at the head of Lake Superior everything is still awaiting the opening of the season. At Duluth the Board of Trade has decided to build a building to cost \$250,000, which is the largest contract likely to be let at the beginning of the season.

The Builders' Exchange of La Crosse, Wis., has disbanded and distributed its treasury balance of \$300 among the members. Internal dissention is stated as the cause of the abandonment of the organization.

The Builders and Dealers' Exchange of Mobile, Ala., celebrated its first anniversary March 7 by a banquet in its rooms on St Michael street. The association is in a flourishing condition and has a membership exceeding 50, representing seven-eighths of the builders and dealers in the city. Among the guests were Hon. C. L. Lavretta, Mayor-elect; W. T. West, secretary of the Commercial Club, and Colonel Price Williams, Jr., judge of the Probate Court. The officers of the association are: A. M. Quigley, president; H. G. Kearns, vice-president; N. K. Ludlow, secretary; N. Phelan, treasurer.

Letters of regret were read from Mayor Rich, Messrs. Cawthorn, Watkins, Fonde and Pillans. Speeches were made by Hon. C. L. Lavretta, Colonel P. Williams, Capt. Adrian Dure, T. W. Nicol, Wm. Marsh, Secretary N. K. Ludlow, W. T. West, President A. M. Quigley, Daniel Harrison, and members of the press.

The builders of New Haven, Conn., expect a general revival of business in all lines as soon as the season opens, as there are a number of large contracts in the hands of the architects. The members of the Builders' Exchange are considering the advisability of erecting a building to be owned and occupied by the organization. The plan comprehends the investment of \$100,000. The exchange recently gave a "smoker" and collation to its members, which was a most enjoyable affair. The delegates who attended the National Association as the guests of the Master Builders' Association of Boston made a report of their trip, and there were many speeches, toasts, &c.

At the annual meeting of the Builders' Exchange of New Bedford, Mass., officers for the ensuing year were elected as follows: President, Z. B. Davis; vice-president, Clarence R. Sherman; secretary, Charles O. Brightman; treasurer, Charles S. Paisler; board of directors, William B. Jenney, Charles G. Randall, Francis T. Akin, E. F. Penney, Davis W. Holmes.

It is stated that owing to the depression in business there will probably be a general cut in wages in the building trades of Pittsburgh, Pa., this season. Wages of carpenters and painters are reported as having been reduced. Efforts are being made to adjust wages, &c., so that a permanent condition of affairs for the season may be secured.

The young exchange in Salem, Mass., has demonstrated the need of its existence in the success it has attained as an organization. The 'change hour has been changed from between 11.30 and 12.30 to from 11 until 12 o'clock a.m. A Master Plumbers' Association has been formed.

At the annual meeting of the Toledo, Ohio, Builders' Exchange, officers were elected as follows: President, R. G. Bacon; first vice-president, H. E. Brown; second vice-president, Joseph Hunter; directors, Richard Kind, J. W. Lee, Joseph Pheils, W. M. Davis, John C. Romeis and J. L. Cresswell.

At the annual meeting of the Builders' Exchange of Toronto, Canada, in the rooms of the association at 8 Victoria street, the election of officers for 1894 resulted as follows: President, William Gears (re-elected); first vice-president, William Park; second vice-president, George Oakley (re-elected); treasurer, David Williams. The following were elected as a board of directors: J. Aldridge, J. Thomson, William Booth, James Craig and H. Martin.

A strenuous effort was recently made by the Builders' Exchange of Washington, D. C., to revive the building business by reducing the cost of construction. The field was very thoroughly canvassed by the exchange, and the majority of the contractors and dealers in building material agreed to reduce the cost of work and supplies for a given period. Unanimous action by all concerned, including the workmen, could not be secured, and the effort fell through. The exchange has been seeking for some time to bring about the establishment of a board of appeal from the decision of the building inspector of the district, and the movement has at last been successful. This board of appeals will be composed of one member of the American Institute of Architecture, one member of the Association of Fire Underwriters, two members of the Builders' Exchange, and the Engineer Commissioner of the district.

A Builders' Exchange has been formed by the builders of Windsor, Ont., with D. Willis Mason as secretary. As soon as the articles of incorporation are granted the exchange will elect permanent officers, directors, &c.

THE Eiffel Tower, built wholly of metal, is an example, and a good example, of a step in the direction which architects will be driven to follow in future, says a late issue of the *Pall Mall Gazette*. The great railway stations, exhibition buildings, and other structures of steel, concrete, paper and glass, which the needs and inventions of our day have called into existence, show which way flows the stream of tendency. The new building material has come to stay. In another century houses may not merely be built with steel girders; they may be made of metal frames bolted together, and gripping walls of papier mache. Then the age of the tent will return. A man will buy his house from a manufacturer and will hire a site to set it up on. When he moves from one place to another he will take his home with him. Building leases will die a natural death. Towns will wander about, and a great many curious results will arise.

CORRESPONDENCE.

Cold Storage Buildings.

From M. S. A., *Battle Creek, Mich.* —In reply to "A. G. M.," Beaver Dam, Wis., I submit the following in the hope that it may be of interest to the readers of the paper: Cold storage buildings should be divided into three stories—namely, cooler, ice box and icing deck. The outside walls should be insulated as shown in Fig. 1 of the accompanying sketches, referring to which *a* is a furring of 1 x 2 inch strips fastened to the brick wall vertically, and placed 16 inches from centers; *b* is a course of ⅞-inch D. & M. flooring; *c*, a layer of building paper; *d*, a course of ⅞ D. & M.; *e*, a 1-inch air space made by nailing on 1 x 2 inch furring; *f*, a course of ⅞-inch D. & M.; *g*, a layer of paper; and *h*, a course of ⅞-inch D. & M. laid vertically. If a salesroom is required in connection with the cooler, the partition between the two may be made as indicated in Fig. 2 of the sketches. It consists of 2 x 4 inch studding, set 16 inches on centers and filled in between with sawdust. Then on each side of the studding is a layer of paper, represented by *f*; a course of ⅞ D. & M., as indicated by *e*; a 1 inch air space made by furring and indicated by *d*, a course of ⅞ D. & M., indicated by *c*, a layer of the paper *b*, and a course of ⅞-inch D. & M. laid vertically, indicated by *a*. In Fig. 3 is shown a section of the cooler floor, which is made as follows: *a* is a course of ⅞ D. & M.; *b*, a layer of paper; *c*, another course of ⅞-inch D. & M.; *d*, 4 inches of sawdust, and *e*, a layer of ⅞-inch D. & M. placed between the joist on strips nailed to the same.

Fig. 4 represents a section through the ice box and icing deck floor. The floor is made as follows: Referring to the cut, A is a course of ⅞ D. & M.; B is slushing made of builders' felt, laid in tar and tarred on top before the floor A is put down; C is a course of ⅞-inch D. & M.; D is a 2-inch air space; E, a course of ⅞-inch D. & M.; F, 4 inches of sawdust; G, paper; H, ⅞-inch D. & M.; I, strips nailed to joist to support the floor H, while J represents joists and K, L and N two courses of ⅞-inch D. & M. with paper between.

Referring to the same figure, *a*, *b*, *c* are two courses of ⅞-inch D. & M. with paper between; *d* is a piece the same thickness as the joist, placed directly over the same and having a taper of about ¼ inch to the foot; *e* is a galvanized iron pan running the whole length of the ice box and having a gutter, 6, at the side of sufficient size to carry away the drip from the ice; *f*, *g*, *h* are two courses of ⅞-inch D. & M. with paper between; *i* is a 3-inch air space; *j*, *k*, *l* are the same as *f*, *g*, *h*, while *m* is a piece the same as *d*, placed on the joist to produce the required pitch of the pan.

Where it is not necessary for the bottom of the joist to be level, the outside end may be raised sufficiently to produce the desired pitch to pan, thus doing away with the piece *m*. Still referring to the same figure, 1, 1 are strips of 3 x 4 inch stuff set on edge and running the entire length of the ice box. They should be divided into sections of 8 or 10 feet in length and put in loosely, as it is sometimes necessary to clean the pan; 2, 2 are 2 x 3 inch blocks about 4 feet long, nailed to *d* between each piece 1, to hold them in place; 3 and 4 are pieces of 2 x 4 nailed to each of the studding to keep the ice from rolling into the gutter; 5 is a piece of 2 x 12 inch stuff placed against the studding to hold the outside of the gutter.

The insulation shown in Fig. 1 of the sketches should run from the top of the cooler floor to the bottom of the icing deck floor. Doors should be placed in the icing deck floor at convenient intervals for filling the ice box and made to correspond with the floor into which they fit. They should be beveled on the edges and a piece of rubber the width of the thickness of the door run entirely around them, thus insuring a perfectly tight joint.

The hight of the first story will be a matter of convenience to the user, but the hight of the ice box should be about 7 feet from the strips 1, 1 to the under side of the icing deck floor. The arrows in Fig. 4 indicate the circulation of the air, and it will be noticed that the opening from the cooler to the ice box is larger on one side than on the other. Where a wooden building is desired, the outside walls may be made similar to Fig. 2, adding to the outside a course of clapboarding. Doors through the insulation should be made to correspond with it as nearly as possible, with beveled jambs and fitted with rubber, as in the case of the icing deck doors. Single sash windows are preferable, set three in a window, as shown in Fig. 1.

The ice should be packed in the ice box as closely as possible, as it lasts much longer. I think I have given all the explanation necessary, but will be pleased to answer any further questions through the columns of the paper. I have seen several coolers built on the plan here described, and all are giving satisfaction.

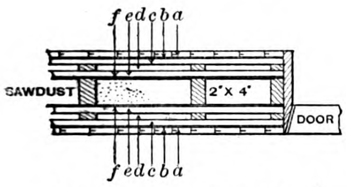


Fig. 2.—Partition Between Salesroom and Cooler.

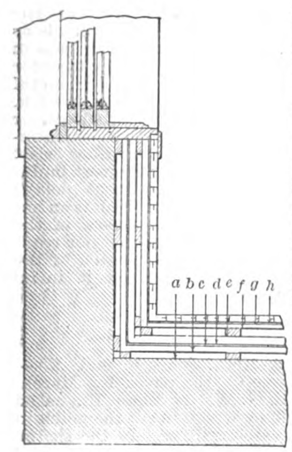


Fig. 1.—Showing Insulation of Outside Walls.

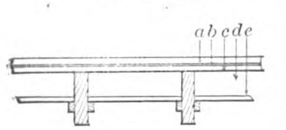


Fig. 3.—Section of Cooler Floor.

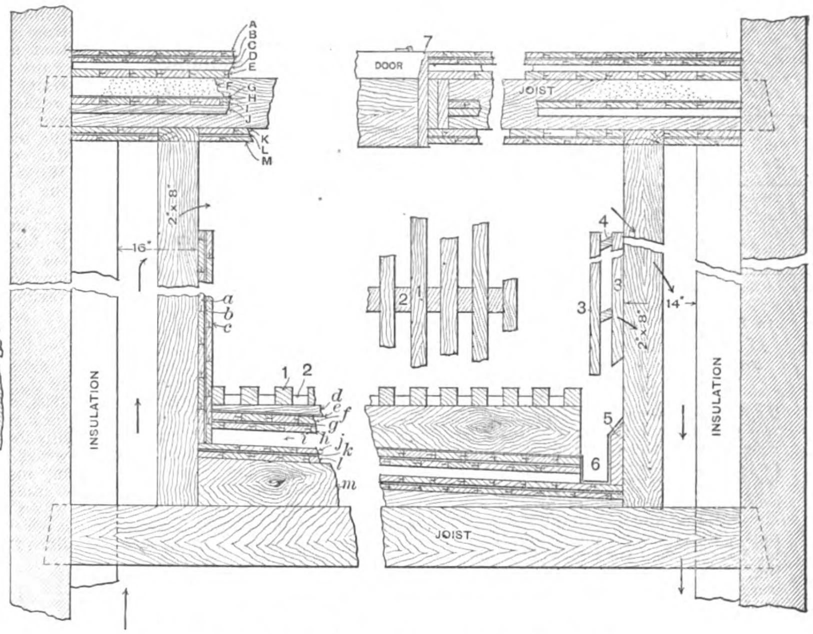


Fig. 4.—Section through the Ice Box and Icing Deck Floor.

Cold Storage Buildings.—Illustrations Accompanying Article by "M. S. A"

Finishing Furniture.

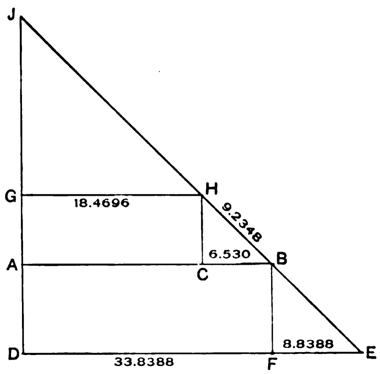
From H. C. R., *Hawkeye, Iowa.*—Should friend "J. C. W." of Pine Hill, Pa., whose letter appears in the January issue, use a good varnish brush (camel's hair), $1\frac{1}{2}$ inches wide and $\frac{1}{2}$ inch thick, to apply the varnish, being careful not to spread too thick, there will be no trouble in the direction which he mentions. Two coats will be sufficient. I would suggest, however, in this connection, that a good book on the subject of painting and hardwood finish would be handy.

Bridge of 75 Feet Span.

From F. C., *Grand Rapids, Mich.*—One of my customers desires a bridge of one span, 75 feet long, and does not wish me to make a lattice bridge. Will some of the practical readers of the paper send a drawing of a truss suitable for the bridge?

An Interesting Problem.

From O. I. O., *Brookfield, Mo.*—Having noticed replies to "O. L. W.," Dal-



An Interesting Problem.—Fig. 1.—Method of Solution Suggested by "O. I. O.," Brookfield, Mo.

las, Texas, whose interesting problem was presented in the July issue for last year, I would say that unless the correspondent understands logarithms he will be benefited in one case only, so I send a solution by which he may solve any building and any number of openings. Referring to the sketch Fig. 1, let A B represent the width of the building, 25 feet, and G H and H B the sides required. Since H B is one half of G H, I produce H B to E, making B E equal to one-half of A B, or $12\frac{1}{2}$ feet. I square B E, taking half the product and extracting the square root, which gives F E, or 8.8388 feet. Now add F E to D F, which is equal to A B, giving D E, which is equal to 33.8388 feet. I then have the proportion:

F E : D E :: B C : A B.

or 8.8388 : 33.8388 :: B C : 25.

Now multiply the extremes 25 × 8.8388 = 220.9700 ÷ 33.8388 = 6.530, or B C = 6.530 feet.

Square B C, double it and extract the square root, which will give the side B H, which equals 9.2348 feet. G H is equal to two times B H, or 18.4696 feet.

Now, "O. L. W." can solve any width building by making a proportion by extending the triangle and treating the lines of which he has the dimensions the same as to solve the unknown lines. Almost any one can work in proportion. The above reduced to feet will give:

C B = 6 feet $6\frac{23}{64}$ inches.
H B = 9 feet $2\frac{26}{32}$ inches.
G H = 18 feet $5\frac{20}{32}$ inches.

From G. M. Y., *Woodbine, Iowa.*—In the July number of *Carpentry and Building* for 1893 "O. I. W." of Dallas, Texas, submits a problem and sketch and desires a solution. I submit the following: Referring to the drawing, Fig. 2, let the three equal spaces be represented by x and the base and perpendicular of the triangle

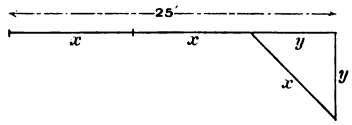


Fig. 2.—Sketch Accompanying Letter from "G. M. Y."

by y. Then $2x + y = 25$ feet and $x^2 = 2y^2$.

$$x = \sqrt{2y^2} = 1.414y +$$

Substituting this for x in the first equation we have

$2.828y + y = 25$ feet, or

$$3.828y = 25 \text{ feet, or } y = \frac{25 \text{ feet}}{3.828 +} = 6.53.$$

Now, $25 - 6.53 + = 18.46$, which is the distance represented by $2x$, and $\frac{18.46}{2} = 9.23$ feet $= x$.

Acoustics of Buildings.

From M. B., *New York City.*—I am an old reader of *Carpentry and Building*, and would like to ask the readers for information on the subject of acoustics.

Note.—Our correspondent will find in another column an article on the subject mentioned which will no doubt answer his question satisfactorily.

Learning a Trade.

From G. H. M., *Hart, Mich.*—I have just been reading the letter from "A. W." of Madison, Wis., and it expresses my ideas exactly. I would like to add that there is a difference in application between the American born and the foreign born, and although the American is generally quicker to take up new ideas, the foreigner is more tenacious of his ideas; but no person, whatever has nationality, can become master of his trade (carpentry) in six months or 12 months, as many seem to think, nor in any longer time unless he has first thoroughly mastered the underlying principles of that trade. He must understand the elements of geometry, for carpentry is nothing else than practical geometry. I have heard some of our brother chips say, "Oh, that is all fudge. No one ever studies geometry to learn a trade." I would ask some of those fellows, What about common framing of braces, rafters, &c., to say nothing of stairbuilding or handrailing and the numerous other angles and circles that occur in our every day work, is it not geometry applied? I would advise every young man who is desirous of learning the trade to inform himself on every point and in every way that he can both by study and observation. He will find many to lend him a helping hand, if not in cities, then in country towns, where there are not so many to be jealous of a new hand, and where he will find a greater variety of work with just as good mechanics as in the larger cities. My motto is, "Let the best man win" whether he is American or a foreigner. The American can win if he chooses. I will back him against the world. All he wants is steady application and he will "get thar." I am foreign born myself.

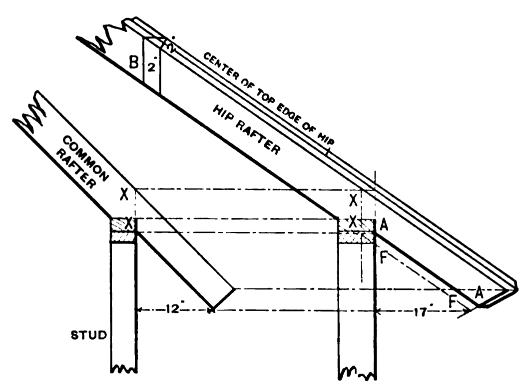
Unnecessary Delay in Building Construction.

From W. H. L., *Cohoes, N. Y.*—I would like very much to have the readers discuss the question, Why is so much time wasted in putting up a building? It seems to me that the time wasted amounts to as much as that actually worked. The mason waits for the material, the carpenter waits for the mason and the metal worker waits for both. They, in turn, are all waiting for the architect, or the owner, or the weather, or a holiday, or money, or something else. What can be done for pushing a building along smoothly without delay?

Note.—The question raised is an important one to the members of the building trades and we trust our readers will follow the suggestion of the correspondent and discuss it in its various phases.

Notching Rafters.

From S. McC., *Prices Branch, Mo.*—In the issue of the paper for March, 1893, "E. G. W." of Elgin, Ill., asked for a rule by which to cut the notch in hip and valley rafters. In the sketch which I send herewith will be found my method of doing the work. The common rafter is shown raised on a wall plate and the hip rafter raised on a plate at the corner post, with dotted lines running from the different points



Sketch Submitted by "S. McC.," Showing Method of Notching Rafters.

of the common rafter to correspond with the points of the hip rafters These show that X X of the hip must be the same as X X of the common rafter. The bevel to be used to obtain the line X X of the hip is taken at B, which needs no explanation. At the projection of the hip rafter it will be seen at a glance that if we cut to the dotted line F F we will have to work the bottom edge valley shape so as to bring the center up to the line A A. If, however, we cut square through on the line A A, it will be in line with the bottom of the common rafters and the planceer will come to the center of the hip and be on a line with the bottom of the common rafters. The hip cut by this method will need no backing, which is labor thrown away.

Wind Mill Construction.

From F. K., *Louisburg, Wis.*—In reply to the request of "W. H. A.," who asked in the December issue of the paper relative to details and specifications for erecting a wind mill tower, I submit the inclosed matter for his consideration. I would say, however, that the top of the wind mill tower should be made according to the kind of mill wanted, as some differ from others. The specifications which I send are intended for a mill that has a bed plate 8 inches wide. I would say, however, that in this part of the country steel wind mills and towers are so much used that the day of the wooden tower and mill has almost passed. Steel mills and towers are much more durable than wooden ones and are also run with less wind. The bill of material for a 36-foot tower, which is here illustrated, calls for 4 good posts, 9 feet long, 4 pieces, 4 x 4, 20 feet long, and 4 pieces, 4 x 4, 18 feet long, for the corner posts; 26 pieces, 1 x 6 and 16 feet long, for braces, ladder and platform; 5 pieces, 2 x 4 and 16 feet long, for platform and ladder; 8 bolts, 4½ x ⅜ inches, with washers, for splice bolts; 8 bolts, 12 x 1½ inches, with washers, to bolt to posts; 14 pounds 10d nails, 3 pounds of 20d nails, 2 pounds of 8d nails, the latter for the platform, and 2 pounds of 8d wrought nails to nail the cross braces at the crossing.

Referring to the accompanying sketches, Fig. 1 represents an elevation of the tower, Fig. 2 a plan view of the platform, while Fig. 3 is a top view of the tower. In this connection it may be interesting to give the directions for erecting a 36-foot tower, being those given in connection with the mills made by the Woodmanse & Hewitt Mfg. Company, Freeport, Ill. In the first place, splice the corner posts, laying them side by side and squaring them off to length. Nail a piece at top, making top on two of the corner pieces of the tower 8 inches from outside to outside of timbers. Next space off the posts for the braces, marking square across the four sticks at once, according to the distance given in the cut. The third mark (65 inches from top of sticks for 10-foot mill, 74 inches for 12-foot mill) is for bottom edge of platform sill, the second and third marks being for the top edges of the horizontal girts. In building any hight of tower, always bring this brace to within 4 feet of the ground, and put the platform sill at the distance from the top here given. The intermediate crosses can be varied according to hight of tower. Lay out two of the sticks in the form of an A. Spike on the platform sill, first spreading the corner posts so that the distance at bottom of platform will be 18 inches outside to outside. Spread the bottom of the A 9 feet and nail a temporary stay lath to hold it in place. The rule for the bottom spread in all towers is one-fourth the hight, which makes the posts bow inwardly about 6 inches from a straight line. Tack on the girts, bringing the upper edge to the marks as before stated, and use each of these girts as a pattern by which to cut the other three, two of which should be cut 2 inches longer than the pattern, to allow for lapping over the ends of the other two. Cut the diagonal braces, using the first cut as a pattern to cut the other seven by which belong to the same section of tower as pattern. To get the length of the diagonal braces, measure across between the horizontal girts diagonally from one corner to the other, and rack the corner posts until the distance from one corner to the other each way is equal, then scribe on diagonal brace. Proceed in the same manner with each section in the tower, observing the following: That the diagonal braces should all be of uniform length and cut. The two braces that form the cross on each of the four sides of the tower should be exactly alike, and the tower posts racked out or in to accommodate the joint.

After making one side of the tower turn it over, then make second side, laying on top of first. Then raise second side so that top of tower is 8 inches square outside of timbers, and at top edge of platform is 18 inches square outside of timbers. Then nail on second and third girts, springing the tower so that each side is just the same. Finish the platform as shown in cut. Now saw off the top of the tower (where the bed plate goes) perfectly square: then fasten plumb line in center at the top. Now raise the tower, and before bolting to posts, plumb the tower so that center is over pump, then bolt tower to anchor posts, putting them in ground at least 5 feet, with cross anchors at bottom. The anchor posts should be at least 6 inches in diameter at top and 9 or 10 feet long. Put the bed plate on top of the tower, and level with spirit level; then put on the main castings, put in guide plate and see that the center of the hole in the guide plate is on a line with the center of the bed plate. Put on the vane and wheel last.

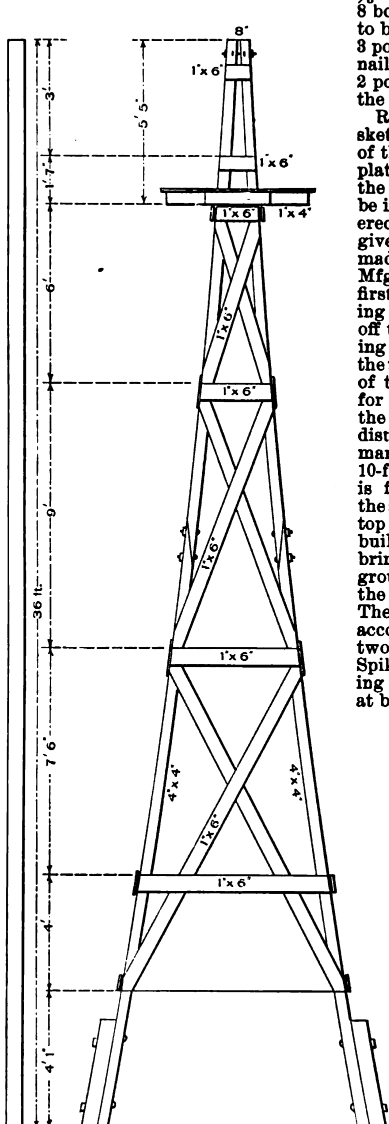


Fig. 1.—Elevation of 36-Foot Wind Mill Tower.

Fig. 3.—Top View of Tower

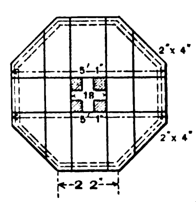


Fig. 2.—Plan View of the Platform at the Top of Tower.

Wind Mill Construction.—Sketches Submitted by "F. K.," Louisburg, Wis.

Development of an Ogee Hip Rafter.

From F. H. T., *North Topeka, Kan.*—I have been patiently waiting for some of the correspondents to take issue with the article published in *Carpentry and Building* for January, 1893, entitled "The Builder's Guide—Art of Roof Framing," by I. P. Hicks. The portion to which attention is called relates to the development of the shape of a hip rafter of ogee pattern. I have up to this time refrained from undertaking the task, under the impression that some one would prove the method therein delineated and described to be correct. In the April issue for 1893, "J. A. S.," of Portland, Ore., in answer to "A. G. B.," of Duluth, Minn., gives a correct method of development, although it does not show the principles involved in its execution. Referring to either of the two methods, the points of division on the working or pitch lines are of equal hight from the base line as regards corresponding figures or letters in the common or hip rafters. Consequently, the points of intersection of perpendiculars from these division points with the contour of the hip or common rafter must correspond, and lines drawn from these division points intersecting the lines of contour parallel with the base will bear the relations with the common rafter and hip as 12 to 17. Any lines diverging from these points of division to contour other than perpendiculars will not be equal. In order to exemplify the correctness of the theory here advanced, let any reader work out a solid molding to desired form. Then saw off square one end of it and the other to the required miter. After this has been done divide the width of the base into any number of parts by gauge marks along its length and square up from these gauge points the two ends. He will find that corresponding perpendiculars will be equal. Next divide the perpendicular side with gauge lines in the same manner as the base and square across the ends parallel with the base. It will then be found that corresponding lines bear to each the ratio of 12 to 17, thus showing the fallacy of the method delineated by Mr. Hicks. I remain open to conviction if my theory does not prove what is stated—namely, that none but perpendicular lines are equal to corresponding lines in the development of the curved hip.

Another Ink Eraser.

From James F. Hobart, *Brooklyn, N. Y.*—In recent issues of *Carpentry and Building* "J. W. G." and "S. P. G." recommend as good ink erasers broken glass and half worn sandpaper. They will do the work, but better results may be obtained by using a bit of rubber that has been prepared for erasing ink by having incorporated with it during the process of manufacture fine emery or other abrasive material. Separate pieces of ink eraser rubber can be had, or there may be purchased at any stationer's neat bits of polished wood with a piece of ink eraser projecting from one end and an ordinary pencil eraser from the other. After using the ink eraser it is well to go over the work with the ordinary rubber, in order to remove the grit that may remain.

Veneered Doors.

From R. B. A., *Jewett, Ohio.*—I would like to ask some of the many readers of the paper the best way to make veneered doors, and what, in their opinion, will make the best core—pine or hardwood. I would also like to know what is the best glue for the purpose. I have some doors of this kind to make, and would like to know what the practical readers of the paper have to say on the subject.

Figures on Lumber Rules.

From R. C., *Cramer Hill, N. J.*—Will some reader of the paper explain for me the figures on the rules used in lumber yards?

Note.—The rules employed vary to such an extent that it would hardly be possible to describe in the space available all that is implied by the question of the correspondent. If he will kindly indicate what particular rule he has in mind, it will no doubt facilitate obtaining the information desired. We submit the question, however, to our readers, in the hope that they will discuss it as suggested.

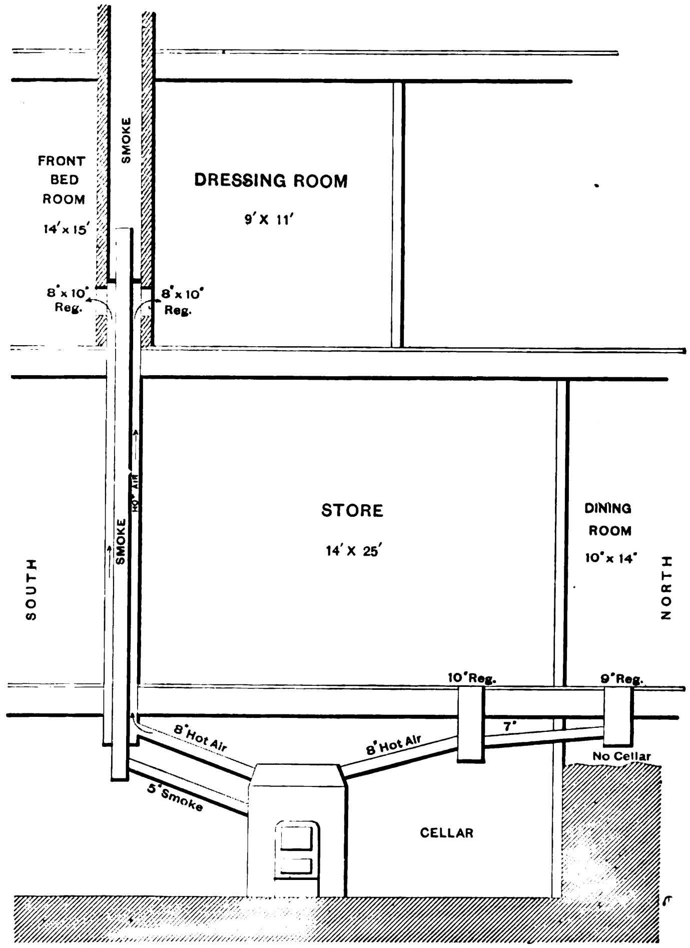
Warping Doors.

From F. K., *Gridley, Ill.*—I would like to ask through the columns of *Carpentry and Building* if there is any way of preventing doors from warping, and can they be restored to their proper position when badly sprung? About a year ago I finished a job of cypress doors, which was as fine a lot as I ever hung. Now some of them are badly warped, and one outside sash door does not shut in the jamb at the top at all. The outside doors are 2 feet 10 inches by 6 feet 10 inches and 1¾ inches thick.

Note.—We doubt if our correspondent will be able to restore the doors to a satisfactory condition without considerable trouble and expense. He might possibly overcome the difficulty to some extent by steaming the doors, and then placing them in clamps until thoroughly dry. This, however, will be a somewhat expensive method as regards time and labor, and may not be justified by the results. We think the easiest way out of the difficulty will be to supply new doors, and if our correspondent wishes to avoid the same trouble, it would be well to have the doors made of two or more thicknesses of material something after the manner in which drawing boards are prepared. The question is one, however, which is likely to furnish interesting discussion on the part of our readers, and we submit it to them for their consideration.

How a Furnace Job was Managed.

From A. S. R., *Philadelphia.*—A short time since I was called upon to put a heater in a house which had but one flue, and that stopped at the second floor. It was necessary to heat the store and dining room on the first floor and the front bedroom and dressing room on the second floor. The cellar was so arranged that the heater had to be set about 10 feet from the front of the building, which faces the south, the back of the heater being against the west wall. The cellar being very shallow it was necessary to cut the heater down to get an elevation, but I could not get enough to run a pipe from the heater direct to the dining room. To continue the flue to the cellar I used an 8-inch pipe, which was inserted in the bottom of the flue. I then connected this with the hot air pipe from the heater, which was also 8-inch, with a T joint, leaving a 5-inch hole in the head at the bottom. I then ran a 5-inch pipe inside of the 8-inch pipe above the cut off above the register on the second floor. This gave me a chimney and hot air flue, which heats the front bedroom and dressing room. I then made a register box from a joint of 10-inch pipe, placing a 10-inch floor register near the east wall of the building. I ran an 8-inch pipe from the heater to register, continuing from the same box with a 7-inch pipe to the dining room, connecting it with a 9-inch floor register. There is no cellar under the dining room. The inclosed sketch will show how the pipes were run.



How a Furnace Job was Managed.

Durability of Shingles.

From G. A. W., *Utica, N. Y.*—I desire to ask the practical readers of the paper which of the following varieties of shingles will last the longest on an ordinary roof: pine, spruce, hemlock or cedar.

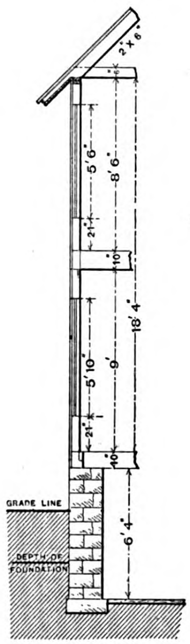
Building a Rowboat.

From E. H. F., *Palm Beach, Fla.*—In the August number of *Carpentry and Building* for 1891 is an article by Henry J. Geilow on building a rowboat, which I consider very good so far as it goes. The author, however, does not tell how to plank the boat. I have just finished a boat from his plans and had no trouble until I began to plank it. I would be glad if some of the readers would instruct me on this point and also give a plan and description of a 16-foot V-bottom sailboat, cat rigged.

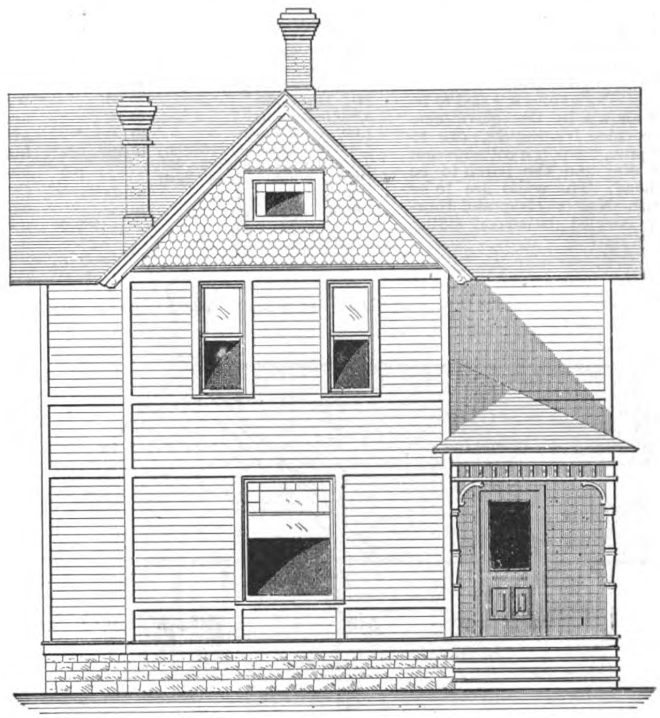
COTTAGE OF MODERATE COST.

THE NEATLY ARRANGED two-story cottage which we illustrate herewith was designed by F. Carl Pollmar of Petoskey, Mich. There are three rooms upon the first floor of the building, with an equal number of sleeping rooms on the second floor. The kitchen is so placed as to communicate directly with the dining room by the door shown on the plan and also by means of a slide in the pantry. The front door can be reached from the kitchen without passing through other rooms, a feature to be commended in houses of moderate cost, as well as in the case of those involving a greater outlay.

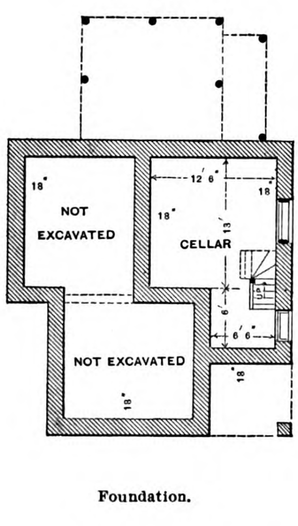
From the architect's specification we learn that all framing timber is to be of sound hemlock, the sills 6 x 10 inches; the first and second floor joists 2 x 10 inches, placed 16 inches on centers; the second story ceiling joist 2 x 16, placed 16 inches on centers; the rafters 2 x 6 inches, placed 2 feet on centers; the studs 2 x 4 inches, placed 16 inches on centers, and the plates 2 x 4 inches, double. The door and window studs are also to be doubled and all floor joists are to



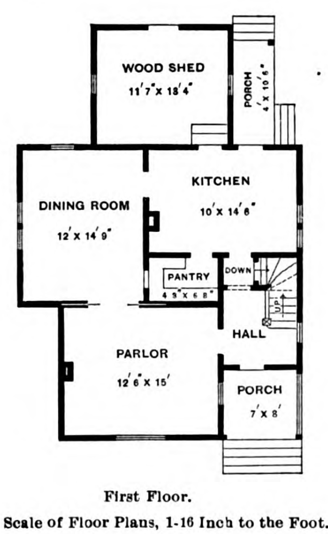
Section.



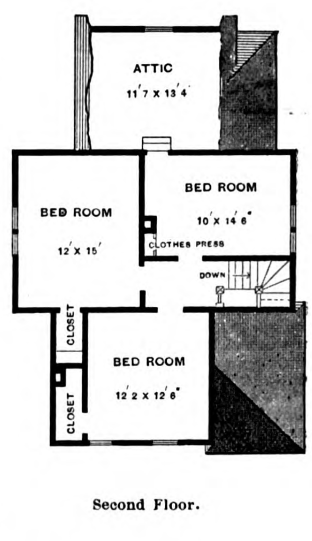
Front Elevation.—Scale, 1/8 Inch to the Foot.



Foundation.



First Floor.



Second Floor.

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

Cottage of Moderate Cost.—F. Carl Pollmar, Architect, Petoskey, Mich.

have a row of cross bridging. The partitions are to be of 2 x 4 inch stuff, placed 16 inches on centers, and all corners are to be made solid before lathing. The wood shed sills are to be 2 x 6, double, and rest on cedar posts; the studs and rafters are to be 2 x 4 inches and the attic joists 2 x 6 inches, placed 2 feet on centers. The outside of the frame, including the wood shed and the roof, is to be covered with ⅞-inch hemlock boards, dressed on one side. The roofs are to be covered with 16-inch cedar shingles, laid 5 inches to the weather. The gables are also to be shingled as shown by the elevations.

Casings, cornice frames, &c., are to be of white pine, the porch columns and pilasters of elm and the porch to be ceiled overhead. The walls are to be covered with No. 1 clear and thoroughly dry beveled basswood siding 4½ inches wide, laid with at least 1 inch lap. Under these boards is to be placed building paper, which is to extend under all casing, frieze, &c. The exterior wood work, exclusive of roofs, is to have two coats of paint, all wood work being primed as soon as put up. The tin work is to have a coat of mineral paint and a coat of lead and oil.

The interior finish of the house is to be of white pine, the casings and base in parlor, dining room and main hall being as shown in the detailed drawings. The other apartments are to have plain bevel edge casing and base. The kitchen is to be wainscoted 3 feet high with natural beaded ceiling, finished with a neat cap. The doors are to be of white pine and 1⅜ inches thick, except all pantry and closet doors, which are to be 1⅛ inches thick, and sliding doors, which are to be 1¾ inches thick. The treads of the main stairs are to be 1⅛ inches and the risers ⅞ inch thick. The interior wood work of the parlor, dining room and main hall is to be filled and then finished with two coats of hard oil. In the remaining apartments the wood work is to receive two coats of paint of such tints as may be preferred.

ESTIMATE OF COST.

The author of the design furnishes the following estimate of cost, which is likely to be of interest in this connection:

Excavation		$20.00
Mason work		195.00
Carpenter work:		
Cedar posts and 12,700 feet hemlock lumber	$95.00	
14½ M shingles	36.00	
2,800 feet siding	34.00	
1,900 feet flooring	35.00	
2,400 feet finishing lumber	50.00	
Turned work, moldings, &c.	22.00	
Doors, windows and hardware	90.00	
Labor	220.00	
		582.00
Plastering		89.00
Painting		90.00
Tinners' work		24.00
Total		$1,000.00

Acoustics of Buildings.

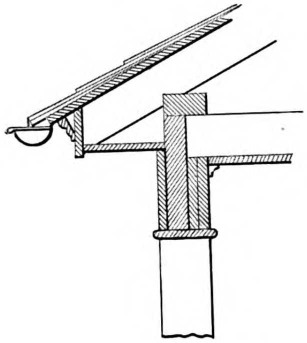
Like the laws of all other sciences, those which regulate the transmission of sound are most simple. They depend entirely upon proportion. To the hight of a platform or bench add the hight of a person sitting or standing, and to this one half the width of the room. These three dimensions—viz., the hight of the platform, the hight of the speaker and half the width of the room—being added together, should be the hight from the floor to the ceiling. The voice of a person speaking from this position will strike the two side walls and the ceiling at the same moment of time. Reverberation is thus reduced to a minimum, and the result of repeated practice shows that this rule is perfectly successful, even to the extent of twice its width in length; in other words, a double square. This simple law has been adopted in many buildings with uniform success. When a room is as high as it is wide the voice has to travel nearly twice the distance to the ceiling that it has to the side walls, and the consequence is that the auditory receives the second word from a speaker in a direct line before the reverberation of the first word has reached it from the ceiling.

Sax, the celebrated student and writer on the science of acoustics, says an exchange, published an illustrated article on the construction of opera houses and auditoriums, in which he has given to his ideal for perfect acoustic effects the form of a paraboloid or egg. The stage, which occupies the minor point of the egg, is naturally smaller than the auditorium. It takes up the sonorous center, and the sound waves or light waves are equally distributed throughout the hall and penetrate to every point. The adoption of this plan of building is just now strongly urged upon the contractors who have in hand the rebuilding of the Opera Comique of Paris.

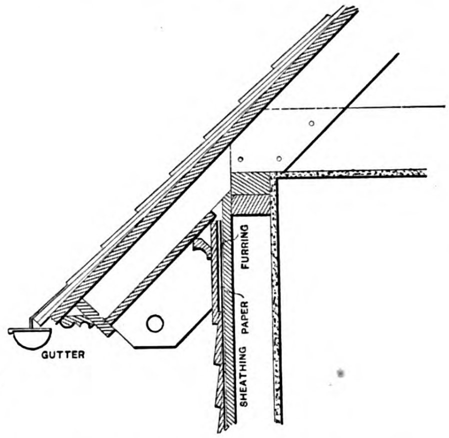
In his description, Sax insists that he can construct an immense auditorium which will seat not less than 20,000 spectators. While this figure may seem at a glance incredible, the reader need but remember that ancient Rome, with a population of 1,200,000, contained 32 theaters. Among these devoted to the drama, the Balbus and Marcellus theaters seated each 31,000 and 30 000 people. The Scaurrus, the largest and handsomest theatre which has ever existed, accommodated 80,000 spectators, and was ornamented with 360 columns and 3000 statues.

In view of this the plan proposed by Sax seems by no means out of proportion with the shape which he urges architects to give to future buildings devoted to music and the drama.

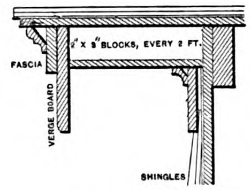
Cottage of Moderate Cost.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.



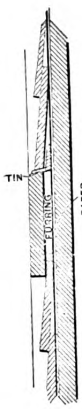
Details of Cornice of Front Porch.—Scale, ¾ Inch to the Foot.



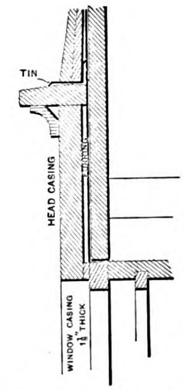
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



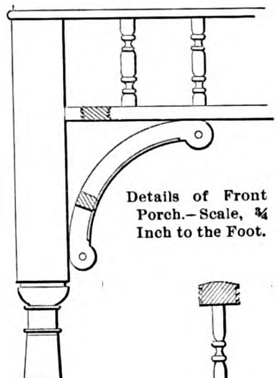
Section of Gable Cornice.—Scale, ¾ Inch to the Foot.



Section of Belt Course.—Scale, 1½ Inches to the Foot.

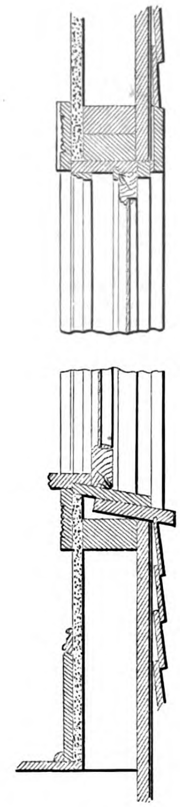


Head Casing of Windows in Front Gable.—Scale, 1½ Inches to the Foot

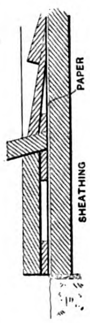


Details of Front Porch.—Scale, ¾ Inch to the Foot.

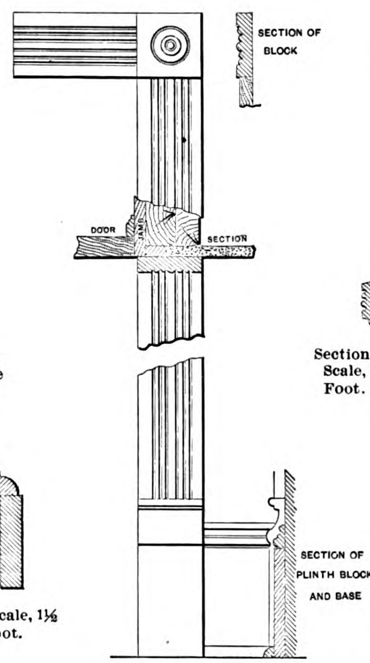
Porch Spindle.—Scale, 1½ Inches to the Foot.



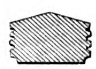
Detail of Window Frames.—Scale, 1 Inch to the Foot.



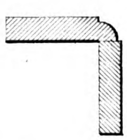
Detail of Water Table.—Scale, 1½ Inches to the Foot



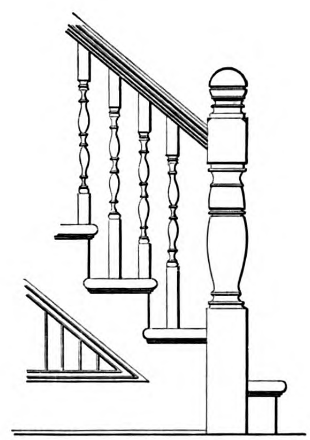
Detail of Door Frames.—Scale, 1 Inch to the Foot.



Section of Hand Rail.—Scale, 1½ Inches to the Foot.



Corner Boards.—Scale, 1½ Inches to the Foot.



Elevation of Main Stairs.—Scale, ½ Inch to the Foot.

Miscellaneous Details of Cottage of Moderate Cost.

PRACTICAL HOUSE PAINTING.*

By ARTHUR S. JENNINGS.

A FEW WORDS may be said as to the proper method of painting houses built in the Colonial style of architecture. The custom is to paint this class of residence in white and yellow, and because this produces a good effect in Colonial houses the style of painting is used on buildings for which it is wholly inappropriate. A structure need not be strictly Colonial to look well when painted in this style, but it should at least be of simple outline and have box cornice and molded trim. It is not necessary to use pure white; a warm gray—that is, a gray to which has been added a little yellow—is much to be preferred. The yellow may be bright, but it must not be glaring. For this reason it is advisable to add ocher to the chrome yellow to tone down the brightness of the latter. The shutters may be very dark olive green, but as these extreme contrasts are somewhat difficult to the inexperienced to successfully deal with, a dark brownish yellow may be used instead, if desired. In painting Colonial work it should be remembered that broad effects should be produced and no attempt should be made to indicate detail, as, for instance, in picking out the balustrades. The carpenter or builder who desires to obtain good combinations of color may use the color cards sent out by the mixed paint manufacturers as advertising matter to great advantage. Some of these manufacturers supply suggestions for painting houses of various styles. In one case a card is used having on the left hand a small perspective of a residence, the principal parts of which are numbered. On the right hand of the card are stuck samples of the colors that are recommended for use in something like the proportions they would be employed in. Thus the color intended for the siding is a large piece, while that intended for the sashes is a very narrow strip. The effect is good, and an idea of how the house will look may readily be obtained from these cards. As a rule, the paint manufacturers are willing to assist in the selection of colors, and the reader who does not feel very sure of his own ability is advised to communicate with some of the advertisers in *Carpentry and Building*.

MIXING COLORS.

Having selected the tints and given full consideration to a harmonious whole, it is now necessary to mix colors of the tints required, unless ready mixed paints are to be used, in which case selection by numbers is all that is required.

It is impossible for us to give anything like a complete list of colors or tints and how they may be made, but a few of the principal ones may be referred to. First a few general hints may be useful. Commence by thinning down the base, such as white lead, to a consistency a little thicker than required when it is to be applied; also thin down each of the colors to the same consistency, keeping each separate. If it is a cold day take care that the oil does not chill. Add one color at a time, not all at once, and take care to mix well together. Some colors, such for instance as Prussian blue, are very strong and a very little goes a long way; in these cases it is better to have the mixture too light than too dark, because it is easy to add a little more color, but impossible to take any away. Always strain the paint before using. To produce olive brown add lemon chrome yellow to raw umber as a base; for olive green add equal portions of Prussian blue and lamp black to lemon chrome; for sage green use white for a base and add medium chrome green and a little lamp black. Willow green is produced in the same way, adding a small quantity of willow green, black, or raw umber. Bronze greens may be obtained by adding lamp black to extra dark chrome green. Grays of various shades are obtained by adding French ocher to white for a base, more or less of the ocher being added according to the intensity of the shade required. The color known as "old gold" is obtained by mixing together white, medium chrome yellow and ocher with a little touch of burnt umber. For stone color, white is used for a base, to which is added medium chrome yellow and burnt umber; this produces a tint of the yellow drab order, and a great variety of different tints may be obtained by employing a varying quantity of the colors. Chocolate color is produced by adding carmine to burnt umber. To obtain browns and brown drabs use Venetian red for the base and add lamp black and ocher; a little white may be added if desired. Brick color is obtained by taking yellow ocher for a base and coloring up with Venetian red. For lead color, take lamp black added to white, which produces a good lead color, but a little Prussian blue may be added if necessary. Grays of all shades are produced simply by adding lamp black to white; French gray is produced in the same way, but a very little ultramarine and carmine are added. The bright brick red sometimes used for interior decoration is made by mixing burnt sienna, vermilion and umber, lighting up with yellow ocher. In painting on old work the same operations will be performed as those described for new work excepting, of course, that the primer will be omitted and the old painted surface will be thoroughly cleaned and rubbed down before the fresh paint is applied. Sometimes an excellent painting job will be obtained by thoroughly cleaning down the old surface and applying a single coat, using lighter or darker shades of the old colors if it is desired to change the general effect.

Having now considered the painting of wood work, we will take up other materials.

PAINTING BRICK WORK.

A good job of painted brick work gives considerable satisfaction, as it will last for many years, and always looks neat and clean. The first thing to be done is to thoroughly clean down the surface by vigorously rubbing it with a fire brick and then to apply the priming coat. This may consist of glue size and Venetian red, mixed in the proportions of ten to one, or oxide of iron paint mixed with boiled linseed oil, and a little drier may be employed. The priming coat should be well brushed out and be rather thin when applied. When this coat is thoroughly dry and all the joints and cracks puttied up with putty to which has been added a little Venetian red, the second and third coats are then applied. These consist of Venetian red and raw linseed oil mixed with as much drier as may be necessary, and considerable turpentine, especially in the last coat. It will be remembered that the object is to produce a perfectly flat surface—that is, one without gloss. To effect this but little oil must be used for the last coats. The final coat is made by mixing brick dust with Venetian red and ocher, using varnish and turpentine, but no oil. The brick dust gives a rough surface that is very like that of the bricks themselves.

Having completed the wall it is now necessary to paint in the joints; this may be done either in white or black paint. A long straightedge is used and the horizontal joints are painted in by means of a little brush made for the purpose, called a seamer, and it is well to have a gauge so as to get the horizontal joints exactly the same distance apart; it is also very necessary to take care that the joints themselves be uniform in width. Use the brush fully charged with paint and draw it quickly and firmly. When all the horizontal joints have been painted in, the upright joints may easily be painted in by means of a "header" brush without a guide excepting a gauge to mark the length of the bricks. In painting these joints it is generally considered the best plan not to paint directly upon the mortar joints, but a little below them; the object of this is to get a uniformly straight line, and the surface of the brick is more likely to give this than the more or less irregular surface of the mortar. We do occasionally see cases in which brick work is painted in oil colors with a glossy finish, but this is not at all desirable, and flat surfaces are always the most attractive in appearance. It must not, however, be supposed that the oil may be omitted from the first coat; if this were done there would be no binding material to keep together the pigment.

It is necessary to remember that a brick wall must be thoroughly dry before paint is applied, otherwise it will scale off and produce a very unsightly appearance. When painting those walls that are subject to an efflorescence on the surface this fact must be particularly borne in mind. If the wall be perfectly dry and the surface is cleaned off before the paint is applied there will be very little chance of the efflorescence again appearing, because the paint will form a water proof protection.

TIN ROOFS.

The method of painting tin roofs has already been referred to in the columns of *Carpentry and Building*, but it may be added that on no account should the tin be allowed to become rusted. The proper way is to clean the surface of the tin by applying freely benzine with a mop or rag, scraping off the rosin and taking care that the surface is thoroughly clean, then apply two or three coats of metallic brown ground in linseed oil, giving at least one coat on the under surface of the tin and two on the upper surface.

(*To be continued.*)

AT the recent meeting in Boston of the Building Inspectors' Association, a Mr. Brophy, speaking on the subject of "Electricity as Applied to Light and Power," said that "wires carrying a heavy current should never be placed between floors or partitions, or where they will be dangerous to occupants of buildings, but should be run where they may be easily reached for repairing, yet out of the reach of the occupants. In incandescent lighting care should be taken that the wires are properly provided with safety plugs and that they should have a sufficient air space around them. Neither should they be placed too close together. I wish to call attention to the importance of impressing upon architects and builders the necessity for providing in their plans for a system of electric lights and motors."

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* Continued from page 54, March issue.

DOMESTIC ELECTRICAL WORK.*

IN Fig. 6 is shown a single bell circuit having three pushes, located at front, side and rear door. Fig. 7 shows a circuit with two bells and three pushes, the bells being arranged as described in Chapter II. Both bells ring from either push. In Fig. 8 is shown an arrangement of bells, which is frequently very convenient, whereby either bell can be used at pleasure. This arrangement is particularly desirable for physicians or any one likely to have night calls. By using a two-point switch, as shown at A, either bell can be thrown into the circuit. Thus, by placing the regular door bell, say, in the hall, another can be placed in the chamber. By throwing the switch over from point 1 to point 2, as shown by the dotted lines, the hall bell will be thrown out and the chamber bell thrown into circuit.

This arrangement will, no doubt, suggest numerous uses to which it can be put to advantage besides that just described. Where it is intended to awaken a sleeping person an automatic drop should be used, which, when the push button is once pressed, automatically closes the circuit and keeps the bell ringing until the person intended to be awakened again hooks up the drop. When using the automatic drop an extra wire must be run so as to make a complete circuit without the push button after the bell has once commenced ringing. When the automatic drop is not used simply omit the wire B and connect C to D, which makes the arrangement first mentioned.

Among the many uses to which electric bells can be put, their use in the dining room should not be overlooked. By its use a servant may be called to the table without attracting the slightest attention, quite a contrast to the old fashioned clanging bell placed directly on the table and which is likely to attract more attention from those gathered about the board than from the servant for whom it was intended. The fittings for dining room bells can be purchased in combination so as to be operated by the foot pressing a push in the floor or by a neat little spring clamp push button provided with ten yards of flexible silk conducting cord, which can be slipped on the edge of the table by the side of the hostess and pressed by the finger without attracting the slightest attention from any one.

Another very useful little instrument is the electric buzzer. In places that are usually very quiet and where the ringing of a bell would be an annoyance, or where a person requires, for instance, to be called away from his desk without attracting any particular notice, the buzzer is invaluable. It operates on the same principle as an electric bell. A popular instrument of this kind can be purchased in the shape of an old fashioned beehive, not larger than 3 x 3 inches and which can be adjusted to emit a musical and pleasing hum instead of the harsh rattling sound which some of the earlier instruments of this kind made. In looking over the catalogue of any first-class dealer in electrical house goods a wide awake person will find a multitude of things which he can bring to the attention of customers with profit to himself and pleasure to the purchaser.

(To be continued.)

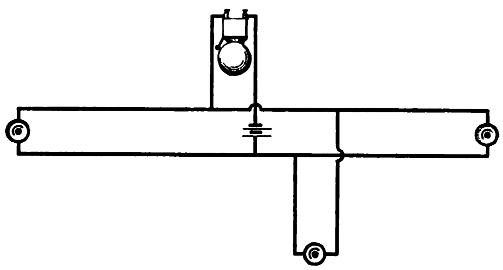

Fig. 6.—Single Bell Circuit with Three Pushes.

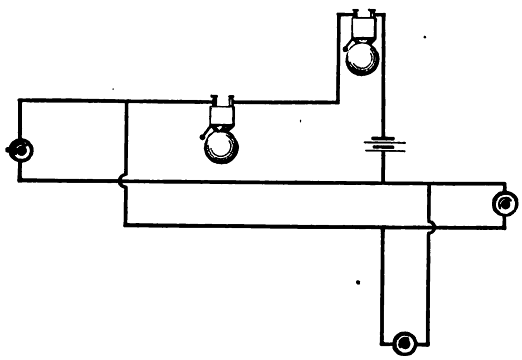

Fig. 7.—Two Bells and Three Pushes.

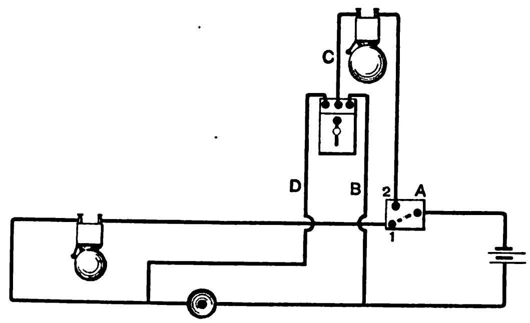

Fig. 8.—Throwing Separate Bells into Circuit by Switch.

Domestic Electrical Work.—Diagrams Illustrating Various Circuits.

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Testing for Foundations.

In this era of big and heavy buildings, the question of foundations is an all important one, as upon its satisfactory solution the stability of the whole structure depends. It is interesting, therefore, to recall the methods which have been used with typical buildings of this class in ascertaining the safe bearing power of soils. Among such buildings are those erected on the Columbian Exposition grounds, at Chicago, and those for the international exhibition at Paris a few years ago, and in both cases essentially the same test methods were employed with the view of checking the dimensions to be given to the foundations.

In the Paris tests, which may well be taken for the purpose of illustrations, says the *Mechanical News*, a perfectly level surface in the form of a square, with sides 118 feet long, was first prepared. On this were placed four rectangular cast iron blocks, 1 foot 8 inches square, the distance apart being 11 feet 8 inches from center to center, and these spaces were bridged by girders constructed of T-irons. These girders were then loaded with T-irons, the number and weight of which were carefully noted. At the end of 11 hours the weight on the girders had reached a total of 143,928 pounds, and indications of settlement became visible. The pressure on the surface of the ground was at that time 7311 tons per square foot, in which was included the weight of the blocks and girders in addition to the superimposed load. The experiment was then abandoned until the following day. It was then found that the settlement had increased during the night to an amount varying between 10¼ and 11 inches. The experiment was then resumed and the load was increased up to 209,776 pounds, at which the experiment was abandoned, as some of the blocks had then sunk completely out of sight, leaving the girders to be supported directly on the surface of the soil. The conclusions arrived at were that the ground at this spot was capable of resisting a load equivalent to 5.43 tons per square foot, and that it was totally incapable of bearing a load amounting to 8.14 tons per square foot. There was, therefore, very little left to guess work in proportioning the foundations.

THE Goshen City School Board of Goshen, Ind., contemplate the erection of a modern four-room ward school building, which is estimated to cost between $6000 and $7000. The structure will be of brick with stone trimmings, and finished on the inside with hardwood. It will be heated by furnace and will be equipped with ventilating closets. The building will be put up under the superintendence of Architect J. A. Arthur of the place named.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President, Noble H. Creager of Baltimore.

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Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

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Committees.

The committees for the ensuing year will be appointed by the President during the current month and will be announced in this department in the May issue of *Carpentry and Building.*

Convention Report.

The official report of the eighth convention will probably be off the press before the next issue of *Carpentry and Building* reaches its readers, and will be distributed as usual from the secretary's office to the exchanges, the delegates who attended the meeting, the directors for the current year and members of all committees.

A Feature of Trade Unionism.

The following example of the manner in which, in some of the large cities, the employe is occasionally made to suffer through factional discord between trades unions, when he is in no way concerned or to be blamed in the matter, is taken from a late issue of the New York *News :*

The 21 union carpenters who were struck against by the Board of Walking Delegates yesterday on the new Produce Exchange Annex are indignant, and have retained a lawyer to look after their interests. They assert that there is a conspiracy against them.

The men have drawn up a long statement giving their side of the story. It is to the effect that Delegate Schultz of the United Brotherhood of Carpenters and Joiners did not live up to the constitution of the Brotherhood District Council when he first ordered them on strike. A clause in the constitution says that no strike shall be ordered until an effort has first been made to settle the grievance with the boss. The carpenters say that Delegate Schultz never tried to settle the grievance about wages, and when the men struck they did not even know the reason.

The men have consulted a lawyer, and they now threaten to go back to work, and if they are interfered with by the board they say they will go to the courts and get out an injunction restraining the board from ordering a sympathetic strike. In spite of this threat, however, the strike took place yesterday.

The 21 carpenters also claim that all this trouble is solely for the purpose of throwing them out of a job so that personal friends of the delegates may secure work.

Character of Organizations.

Builders generally, in discussing the character and work of the National Association of Builders, are prone to consider the organization in a relative light and to compare it with other organizations with which they are familiar. The methods of operation of other organizations which deal only with a particular branch of business are so familiar to the majority that it is difficult to place the proper valuation upon the work of the National Association without basing the standard of value upon a comparison with the results achieved by other organizations. The latter, in the building trades of the country, deal with the conditions affecting only one branch, and occupy in it, the position of executor for the purpose of applying methods and practices operative only in the business of that trade. The meetings of such organizations are for the purpose of informing the members upon specific questions which affect the trade; methods of construction, action of materials under given conditions, &c. The existence of such organizations is of great importance to the trades which they represent, for they come into actual contact with the conditions which prevail in a given trade, and are the instruments by which reforms and improvements are secured.

Separate trade organizations create a preconceived idea as to the character of associated effort which makes it difficult for many to comprehend wherein the National Association of Builders differs from other organizations acting in the same general field. Carrying out the simile just used, its character might be epitomized as that which gives point to the "instruments by which reforms and improvements are secured." Its work is entirely the formulation of principles upon which its filial bodies and the separate trade organizations of the country may base their action. It has nothing whatever to do with the mechanical part of building, methods of construction, &c.; it lives only to find and show to the builders of the country the true principles which underlie their business relationships with each other, with their workmen and with their clients. The finding and formulating of these principles comprehends their preparation in such form as shall make them applicable to the business of each separate trade. The results of the work of the National Association are given to the builders in such form and so stripped of pretentious phrase, so reduced to simplicity, so axiomatic that they seem but the natural outgrowth of reason and the instrumentality of their presentation is lost to sight. By the very nature of its work the association frequently fails to receive its due of credit from the less thoughtful ones who profit by its existence, for such persons absorb the principles uncovered by its recommendations, and, because of their simplicity and naturalness, forget the source from which they were received. Action has been made possible numberless times in local organizations because of the knowledge afforded the members by the work of the National Association, and yet that knowledge has been so unostentatiously conveyed that it has been accepted as the result of experience in many cases and the formulator left unconsidered in the result.

ORGANIZATIONS CONTRASTED.

The difference in the character of the National Association of Builders from that of other organizations is aptly put in the following from T. A. Randall, secretary of the National Brick Manufacturers' Association, which appeared in a recent issue of the *Clay Worker*, of which Mr. Randall is the editor :

The National Association of Builders is somewhat different in its organization and methods from the N. B. M. A. The former is essentially a delegate body, and its external relations with architects and others with whom its members do business is more specific and tangible than is the case with the clay workers. Furthermore, its work is not of that technical character which affords such a distinguishing quality in our association. It deals more particularly with business methods, local organization and affairs of that general nature. To say that the association has done a good work in introducing the Uniform Contract, systematizing methods of arbitration, and in a broad way making the business of building a better, safer and more satisfactory one, is stating what every one acquainted with the history of this association already knows. It is a wonderful exemplification of the power of trade and business organization.

AT the World's Columbian Exposition there was exhibited a plank 16 feet 4 inches in width, which was regarded as something of a record breaker in its line. At the Midwinter Fair, held in San Francisco, Cal., is a plank 16 feet 8 inches wide and 7 feet in length. The section of log from which it was cut was set endwise on the carriage, and the immense plank dropped with a band saw. It is undoubtedly the widest plank ever sawed, as some of the biggest planks produced have been hewed out.

THE clients of a certain architect requested him to design for the house he planned for them a revolving sideboard, to be circular or oval in shape, with a double front, one front in the dining room and the other in the butler's pantry. By this arrangement it is supposed that dinners can be served with greater convenience and rapidity. On one side the waiter may arrange his dishes in the sideboard after each course, while the butler, who is on the pantry side, puts the food for the next course in place, all ready to serve.

Economizing Shop Space.

In every well ordered shop one of the first essentials is to have a place for everything in the way of tools and appliances, but where space is limited no little ingenuity is necessary to accomplish this and yet have everything so arranged as to be readily accessible. This applies with special force to such things as awkward ladders and unwieldy scaffolding, which are difficult to store away in such a manner that they can be reached in a hurry. A correspondent tells below how he manages in a shop where space is limited. He says:

I present herewith, for the consideration of your readers, my method of storing ladders and scaffolds from 20 to 28 feet long. As the space in the shop was limited, a novel idea came to mind, namely, to make the necessary hooks, bands and rollers, and store the ladders or scaffolds underneath the floor beams, or, in other words, hang them beneath the ceiling. The illustrations herewith presented will show how this was accomplished. In Fig. 1 is shown the front and sectional views of a ladder hanger, the ladder being placed at right angles to the beams. A, in the sectional view in Fig. 1, indicates the wooden beam; B, the sectional view of the $\frac{3}{16}$ x $1\frac{1}{4}$ inch band iron bracket, which is screwed against the beam A as shown; D and D show the front elevation of the brackets, screwed to the beam C. The width of the ladder J being known, the brackets D and D are spaced accordingly, so as to allow the ladder or scaffold play room to slide in or out, as shown. E represents a $\frac{1}{2}$-inch iron rod placed through the brackets D and D as shown.

By boring or drilling two $\frac{1}{8}$-inch holes at each end of the rod E, two pins, H and H, are placed in it to prevent the rod from slipping out of the brackets when putting up the ladders. Before placing the rod E through the brackets a $\frac{5}{8}$-inch gas pipe (inside measure) is slipped over it, as shown at F, and forms a roller, which lightens the work of sliding the ladders in place. L, Fig. 1, indicates a stationary hook made of $\frac{3}{16}$ x $1\frac{1}{4}$ inch band iron, twisted half way around, as shown, and screwed fast to the wooden beam. M is a twisted hook fastened to the beam with one long wood screw, which acts as a pivot, and allows the hook to be swung outward when desired. To hang a long ladder, say 25 feet in length, the brackets D and D and hooks M and L would be placed about 20 feet apart. To slide the ladder between the ceiling with hardly any trouble whatever proceed as follows: Raise one end of the ladder up from the floor until it rests upon the pipe F, Fig. 1, then raise the other end of the ladder, being careful always to press toward the pipe F, as the tendency is to slide out; now, holding it up at arms' length, obtain a spruce slat $1\frac{1}{4}$ x 3 inches in thickness and long enough to reach the ceiling, have a groove cut in one end of the slat, as shown in Fig. 3, and placing the groove under one of the rungs of the ladder, raise it slowly, always pressing toward the pipe F, until it sets in the stationary hook shown at L in Fig. 1; now press the hook N forward by means of a strip of wood to the position M, which secures the ladder.

When taking down the ladder or scaffold the same operations should be performed reversed. Fig. 2 shows the front and sectional views of a ladder hanger, the ladder being hung parallel with the beams; whereas in Fig. 1 the ladder is hung at right angles with the beams. The only change required in this case is that the brackets shown at D and D in Fig. 2 require twisting, as shown, and the hook shown at M in Fig. 2 must be hinged so as to allow it to work back and forth.

Fig. 3.—Spruce Lifter.

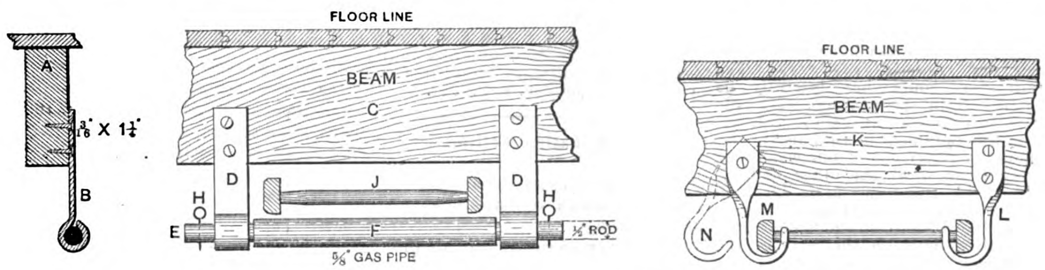


Fig. 1.—Front and Sectional Views of a Ladder Hanger, Hung Crosswise to the Beams.

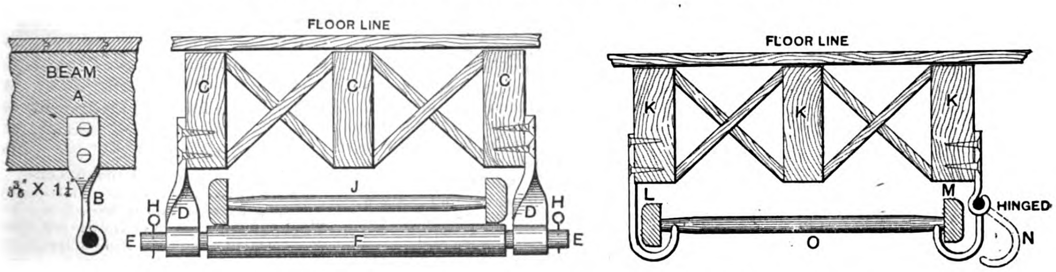


Fig. 2.—Front and Sectional Views of a Ladder Hanger, Hung Parallel to the Beams.

Economizing Shop Space.—Illustrations Showing Method of Suspending Ladder Hangers.

Law in the Building Trades.

Right of a Sub-contractor to File Lien.

The right of a sub-contractor to file a lien upon a building is not affected by a default on the part of the principal contractor in failing to keep his agreement with the owner, nor by an agreement between the owner and principal contractor, subsequent to the one under which he began work, and of which he had no notice, wherein the principal contractor undertakes to deliver the building to the owner free of all liens.—Cook *vs.* Murphy, Supreme Court of Pennsylvania, 24 At. Rep., 630.

Recovery Without Architect's Certificate.

Under a building contract, making payment conditioned on the architect's certificate that the work has been satisfactorily done, a certificate can be properly demanded, and recovery had on refusal thereof, only where there has been a substantial compliance with all the terms of the contract, and there remains nothing further to be done in relation thereto which it is practicable and reasonable to require to make the job a finished and complete one.—Craig *vs.* Geddis, Supreme Court of Washington, 30 Pac. Rep., 396.

Material Lien in South Dakota.

A sub-contractor who furnishes materials, lumber or labor, not to the owner but to the contractor for the erection of a new building, under the provisions of sections 5469, 5470, Comp. Laws, can acquire and enforce a lien on the building and on the interest of the owner of the real estate on which the building stands, to the extent of the value, or the price agreed to be paid by the contractor for the material, lumber or labor furnished. It is not the contract between the original contractor and the owner which supports the lien under the statute, but it is the use of the materials and work upon the premises—the putting of them into the building and attaching them to the freehold—whereby the owner is benefited by them, which entitles the party furnishing them to a lien to the extent of their value.—Albright *vs.* Smith, Supreme Court South Dakota, 51 N. W. Rep., 590.

Mechanics' Lien on Electric Light Plant.

An electric light company who have a franchise to occupy the street of a city with their poles, wires and lamps, and are engaged in furnishing light to the people of the city, are not so distinctively public in their nature and operations as to exempt their property from the application of the mechanics' lien statute.—29 Pac. Rep. affirmed. Badger Lumber Company *vs.* Marion Water Supply, Electric Light & Power Company, Supreme Court of Kansas, 30 Pac. Rep., 117.

Construction of Building Contract.

In a building contract it was stipulated that in case of the failure or unreasonable delay of the contractor to provide the necessary labor and materials to complete the work by a certain time, in the judgment of two architects named, then the other party to the contract might, after three days' notice, provide other labor and materials and complete the work. The contractor could not lawfully be stopped from proceeding with his work in constructing said buildings, upon the judgment of said architects, where the judgment of one was based solely upon what the other had informed him, and not upon his own examination of the premises and a proper inquiry into the facts constituting such default on the part of the contractor. He was entitled to the benefit of the joint judgment of the architects, based upon a full knowledge by each one of the facts which constituted such default, especially where the examination of the condition of affairs called for a personal examination of them as a condition precedent for the exercise of the discretion and judgment of each architect.—Benson *vs.* Miller, Supreme Court of Minnesota, 57 N. W. Rep., 943

Intermediate Cause of Injury Disregarded.

A firm of contractors and builders were engaged in performing certain work upon a building. In connection with this work they erected a derrick, which was held in position by means of "head" or "back" ropes attached to the building, and a guy rope extending through the derrick and across the street in different directions, the ends being fastened to posts on the opposite side. Their work being temporarily suspended, this derrick was borrowed from them by another contractor, for the purpose of putting in place some lintels upon the same building. In using the derrick, the one who borrowed it did not detach the guy rope from the post to which it was fastened across the street, nor was it otherwise changed, except slightly in direction, from time to time, by loosening the back ropes as the derrick was moved one way or the other along the front of the building. He completed the work in about four hours during one forenoon, and replaced the derrick in the precise position, as nearly as possible, it occupied when he borrowed it, tightening the guy rope and leaving it as he found it. Four days subsequent to the return of the derrick the projecting hood of a dairy wagon came in contact with one end of the guy rope, and the driver was violently thrown to the ground, receiving fatal injuries. Suit was first brought against the man who borrowed the derrick to recover damages on account of the alleged negligence causing the death, but upon trial of the cause verdict and judgment were given in his favor. Afterward suit was instituted against the first mentioned firm, basing the same on their alleged negligence in connection with the guy rope, and a trial took place, resulting in verdict and judgment for the sum of $4500. Where a sufficient and independent cause operates between the wrong and injury, resort should be had by the sufferer to the originator of such intermediate cause. But when there is no intermediate efficient cause, the original wrong must be considered as reaching to the effect and proximate to it. The inquiry, therefore, always is whether there was any intermediate cause disconnected from the primary fault, and self operating, which produced the injury. What is the proximate cause of an injury—whether it be the original negligence of one party or the intermediate negligence of another party—is ordinarily a question of fact for the jury, to be determined from the minor associated facts and circumstances. Compensatory damages for negligence causing death are the estimated accumulations of the deceased during the probable remainder of his life if he had not come to an accidental death, having reference to his age, occupation, habits, bodily health and ability.—Hayes *vs.* Williams, Supreme Court of Colorado, 30 Pac. Rep., 352.

A Fallen Ceiling.

Below we give a letter from a correspondent which contains some useful information:

The following experience in replacing a fallen ceiling may be of interest to some of your readers: The hallway in an ordinary city dwelling one morning was found to be littered with a lot of plaster that had fallen from the ceiling above. Appreciating the wealth of dirt that would accumulate in putting up a new plaster ceiling, a search was made for some more suitable material. In visiting the houses who make a specialty of interior wood decoration it was found that an ordinary strip ceiling with a hardwood finish, put up complete, would cost from 50 cents to 60 cents a square foot, and if something more ornamental and elaborate was desired, of a panel character, the cost would approach $1.75 per square foot. The next search was for something of the Lincrusta Walton or *papier maché* order, and here it was learned that it would be necessary to replaster the ceiling previous to the use of any such material, and after the ceiling was plastered, the cost of material, the labor of putting up and the cost of decorating would make such a ceiling cost from 35 cents to 50 cents a square foot.

The search was continued for something in sheet metal, which was found to be adaptable without any labor being spent on the old ceiling. What were called furring strips would be required to be nailed to the joists and wood work, and the sheet metal panels would be fastened to these furring strips, saving all the labor and dirt in tearing down the old ceiling, and the claim was made that after it was in place all joints would be covered, so that the ceiling would be of the same finish as if it had been of molded plaster and frescoed. The designs seemed to be almost unlimited in variety; borders and friezes with coves and cornices provided everything that could be desired for such a purpose. With all this variety to select from it was found that a ceiling put up, decorated and finished complete, would cost from 15 cents to 25 cents per square foot, according to the character of the design and distance of the building from the dealer's shop. An argument in favor of the metal ceiling was that the Lincrusta Walton would be permanently destroyed if a fire occurred in the room above and the water soaked through, and the same was true of wood. It was also stated that cracks and warping from the ordinary heat of the house were sure to follow the use of a wood ceiling. A fire in the room above with a metal ceiling might destroy its finish from water, but repainting would leave it in as good condition as in the first place, while a considerable fire might occur on the floor below without passing beyond the metal ceiling.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR,

96-102 READE STREET, NEW YORK.

MAY, 1894.

Evening Classes.

As the season of evening class instruction draws to a close there must come to many a young man who has profited by it a clearer realization of his opportunity in life. He will see that what he is and what he may be depends almost entirely upon his own exertions. He appreciates more fully than ever before not only the pleasure of possessing knowledge, but perhaps even now has learned how it profiteth a man to be wise. But a man can no more acquire knowledge by a mere receptive process without exertion of his own than he can gain strength without exercise. Thanks to the generosity and the foresight of individuals and various organizations, there can now be obtained in almost any town or city of moderate size evening class instruction in at least the rudiments of an education, and that without expense to the pupil, while in the larger cities free courses may be attended in drawing, the higher mathematics, manual training and designing, and such other instruction may be obtained as will thoroughly equip an ordinary mechanic for a responsible position. Doubtless many a draftsman or head designer can trace his progress back to a humble beginning in an evening drawing class. But even this general instruction is being supplemented by more detailed courses in certain departments, either in day or evening classes. To a young man who has his evenings to himself there can be no reasonable excuse if he lacks a fair rudimentary education. It all depends upon his own determination and persistency.

Self Education.

Even to the young man deprived of the advantages of evening class instruction there is still an opportunity to perfect himself by home study. True it is that such study is difficult, progress is far less rapid and there is much more excuse for failure than is the case when the student is subject to the encouraging influence of others studying with him under competent instruction. But on the other hand, once mastered, the subject is his by right of conquest who wins single handed. It is impressed on his mind as it could never be had the struggle been less severe. Success in home study is, to a large degree, measured by regularity and method in all that is done. One hardly appreciates the loss (if such it can be considered) of giving half an hour a day to study, and yet in a year—Sundays and holidays excepted—this foots up the equivalent of about 20 days of eight hours each. Enough time, it is evident, if taken in the aggregate to very considerably increase one's store of knowledge. It is related that John Tyndal's success began with his determination to devote all of his spare time to study, and so earnest was he in this effort that he arose for this purpose at five on the morning of the first day after he made this resolve and continued so to do for many years. One of the benefits of home study lies in the fact that it is generally impossible to proceed to more advanced study until that in hand has been mastered, so that there is a continued incentive to perfection in each day's work. Above all things the course of study should be clearly mapped out and persisted in. There should be no cursory reading, no skipping or slighting because the matter is not clear. There likewise should be no attempt to begin the course with studies too advanced. Arithmetic must be fully comprehended before algebra is attempted, geometry should be at least reasonably well understood before a course in drawing is entered upon, and to those who desire to study the languages English grammar is a first requisite. Books can be purchased at reasonable rates, and but few are required at a time by the home student, so that the real expense of his study need not be great.

Instruction by Correspondence.

As something between the evening class instruction and unaided individual home study there are gradually arising correspondence schools and courses of study conducted entirely by correspondence. The remarkable success of the Chautauqua circle in a line and by a method somewhat similar is evidence of the possibilities of an extension of the method. University extension is destined to do much along the higher lines of study, while less pretentious courses are likely to be presented to the mechanic and the artisan. Such a plan is that of the Correspondence School of Mechanics, which furnishes text books of its own preparation, conducts the instruction by mail and awards a diploma or certificate upon passage of the requisite examinations. While it is extremely difficult for a student under such a method to properly present in writing to the instructor the points that puzzle him, and perhaps as hard for him to understand the explanation that is written in reply, nevertheless there is, 1, a direct benefit in the necessity of clearly stating upon paper the existing difficulty; 2, a consequent indirect instruction in English composition; and, 3, an advantage in having the instructor's reply permanently recorded where it can be read and reread until the meaning is clear. Of course, such instruction by correspondence cannot be furnished without charge, but in the case of such schools or courses as are already in operation the expense is by no means excessive. In fact, the cost of an education by any one of the three methods here presented should not, and to a determined young man will not, be a serious hindrance. If he is sufficiently resolute to attempt and persist in a course of study he will somehow, even by serious self denial in other things, set aside the means to accomplish the end he has in view. He will make of himself a better, a nobler, a wiser and a more capable man.

American Ideas Abroad.

The builders of Glasgow, Scotland, are endeavoring to establish a builders' exchange as the term is understood in the United States upon the lines followed by such organizations in this country. Early in March a meeting of representatives from the various branches of the building trades met in Trades Hall, Glasgow, for the purpose of listening to an address on builders' exchanges by Col. J. R. Bennett, and to take preliminary steps in the establishment of an exchange. The speaker explained that during a recent visit to the United States he had observed the satisfactory and efficient operation of the exchanges, and set forth the general lines and principles upon which they are founded. He outlined the constitution of one of the principal exchanges here and advocated the creation of an organization of a similar character. Subsequent action by the Glasgow builders indicates that the value of the American form of organization has been recognized and the benefits to be derived therefrom appreciated sufficiently to warrant the establishment of an exchange.

Manual Training School at Cleveland.

The new building which is to accommodate the Central Manual Training School, in Cleveland, Ohio, was recently thrown open for use. Its interior arrangements and general design are after plans prepared by the principal, William C. Skinner, to whose unwearied efforts a large share of the credit for its erection is due. The building is of white sandstone, handsome in appearance and surmounted by a high tower. It is divided into three general subdivisions on the two main floors and in the basement, and a large number of windows afford perfect illumination to the various classrooms. Among the departments on the main entrance floor is that of wood working, which includes a pattern shop containing 25 lathes of latest design. This shop will accommodate 25 boys at one time, and four classes will be taught in a day.

The machine shop, equipped with engine lathes, planers, shapers, drillers, milling machines, &c., is on the same floor. The second floor contains the carpenters' shop and drawing room, each of which will hold a class of 25 boys at a time. The smiths' shop occupies one-half of the basement, with a score of modern forges. The other half is given up to the power, heating, lighting and ventilating apparatus. The heating and ventilation are well provided for. A large fan run by a small auxiliary engine draws in the air from outside and through a screen which separates from it the particles of dust. The air is then passed through a system of steam pipes, which heat it to the desired temperature before it is sent through the building.

Mediation and Conciliation.

An effort is now being made in this city which, if carried into successful operation, is likely to prove of no little benefit to employers and workmen in all branches of business. A number of persons, all of whom, by nature and familiarity with the practical application of economic principles to the relationship of employer and workman, are peculiarly well adapted to the purpose, have formed what is called the New York Council of Mediation and Conciliation. Among the members are Bishop Henry C. Potter, president; John E. Bogert, secretary; Hon. Seth Low, Edward King and C. R. Lowell. Two other members from the building trades will probably have been added by the time this issue reaches our readers. The objects of the council, as set forth in its constitution, are to promote amicable methods of settling labor disputes and the prevention of strikes and lockouts generally. The council is not to constitute itself a body of arbitrators, except at the express request of both parties to a dispute, signified in writing. The council is to be composed of five members and shall have power to enlarge its number or to fill vacancies. This project is eminently practical and follows the line that has already proved so beneficial in other localities. The standing of those who compose the council is a sufficient guarantee of the quality of the work it is capable of undertaking. The purposes declared are a recommendation in themselves and should secure for the council plenty of opportunity to demonstrate the wisdom of conciliation and the need of intelligent mediation between employers and workmen.

Local Building Operations in March.

It was hardly to be expected that building operations this spring would make anything like a favorable showing as compared with the work projected in the corresponding period of last year. But the figures are not at all discouraging. In fact, the returns of the Building Department of this city for the month of March show that there is considerable activity in the building line and that not a little new work is contemplated. Superintendent Brady reports that during the month named he approved plans and specifications calling for the construction of 241 new buildings, involving a total estimated cost of $3,523,520, and for alterations to 231 structures of various kinds, at a total estimated expense of nearly half a million dollars. For the month of March last year applications were approved for the erection of 306 new buildings, estimated to cost $6,273,270, and for alterations to be made to 271 buildings of varying descriptions, at a total estimated cost slightly exceeding $800,000. These figures indicate that the amount of building projected in the month named was a trifle more than half that for the same month of last year.

Evening Classes for Mechanics.

The Young Men's Institute of New York, Y. M. C. A., located at 222 and 224 Bowery, New York, is an institution doing splendid educational work in the line of instruction and assistance, in both general and technical knowledge, to the young mechanics of the city, by means of evening classes which are growing in importance every year. They have been found to fill, in a very satisfactory degree, the educational requirements of a large number of young men employed in various trades, who are anxious to widen their knowledge or supply the deficiencies in their early mental or mechanical training. During the season of 1893-94, just brought to a close, 635 young men have availed themselves of the advantages offered by the institute for a very small fee. These youths have had the choice of 11 different courses of study, which include such valuable practical subjects as freehand, mechanical and architectural drawing, carriage drafting, penmanship, bookkeeping, shorthand and typewriting, arithmetic, steam engineering and electricity, and it is a gratifying circumstance that so many young mechanics have embraced the opportunity. The mental and moral value of such work as is being carried on by the Young Men's Institute is obvious.

Built to Sell.

Not very long ago there appeared in an issue of *Harper's Weekly* an article dealing in such a way with the subject indicated by the title above, that it is of more than passing interest to all connected with the building trades. It reads as follows:

When any one, knowing whereof he speaks, says of a house, "It was built to sell," the term condemns that house as completely in the minds of persons of intelligent experience as the detection of a grievous flaw in the title to a piece of real estate would condemn that property. No one wishes to buy real property unless the title be entirely perfect. This is the case, notwithstanding the fact that the purchaser in possession may be able to defeat all efforts to dispossess him. But a flaw in a title is a dreadful agency of depreciation. The owner of such property has difficulty in borrowing on it; he has even greater difficulty in selling it. And so with a house built to sell. It gets less valuable all the time, and the owner has scant personal experience of that gratifying increase of wealth that Mr. Henry George calls the "unearned increment." And yet nearly all the houses in any rapidly growing town were built to sell.

Such is the case in New York and such has been the recent case, we are told, even in so ancient a city as Rome. It seems almost incredible that the building speculators should in these days have flourished in the Eternal City, but such has been the fact; and this fact has not been at all to the advantage of the town in which the Pope and the Italian King hold rival courts. In New York, in Chicago and in Brooklyn these speculators, with their houses built to sell, have done very great harm in many different ways. They scamp their work in every possible way in which, by so doing, any expense may be avoided and thereby they defraud the ultimate purchaser. But besides this they work a great wrong in showing to artisans and mechanics that money can be safely made by dishonesty. When an artisan is no longer permitted to take a pride in the integrity of his work, his labor not only loses its nobility, but a good share of its respectability.

FAULTY CONSTRUCTION.

Houses built to sell are not only constructed in defiance of good morals, but nearly always in opposition to good taste. The effort appears to be to confine the expense of building to those parts that will show, to those parts that will attract the notice of ignorant purchasers. And in their roguery these building speculators appear to be wise, for singularly enough such houses appear to sell most readily. But the purchaser has the beginning of his experience sadly and soon. The plumbing is defective, the flues will not draw. He hires mechanics to correct these faults. Then he learns that the plumbing is cheap and insufficient and that the flues are not large enough. A little while ago a lady paid $35,000 for a house near West End avenue, New York. The house was tastefully designed and skillfully arranged. It was a pretty little house and was advertised by the building speculator as a "bijou house." There were places for open fires in each room—tiled fire places—and the good lady laid in a quantity of hickory logs against the cold weather. When the nipping frost came she lighted her fires; they would burn a little, but the smoke came out into the rooms instead of going up the chimneys. One day she saw the architect passing and called him in. He listened to half her plaint, and then coolly told her that the fire places were not made for fires, but for ornament, that the flues were too small, and that if she must have fires she would have to use gas logs, and then he gayly went his way. Now this lady had been moved no little in making up her mind to buy the house by the presumed fact that she could have open fires in all the rooms. When she took further advice she learned that flues could have been properly constructed in the first place by an increased expense of $200; for her to do it would cost $2000. This was as plain a case of heartless robbery as though the building speculator had raised the black flag of piracy and had taken her money by force.

THE REMEDY.

But the purchasers have a protection before if they have no remedy after the transaction. It is an easy thing to employ an architect or engineer to report on the character of the construction, just as we employ a lawyer to examine the title. Without such advice it is a safe rule to decline to buy any house that has been built to sell, for building to sell means more frequently than not building to cheat.

RESIDENCE AT SOUTH BEND, IND.

LOCATED upon a commanding site, 20 feet above high-water mark and overlooking the St. Joseph River, stands the private residence which is the subject of our supplemental plate this month. The building was completed not long ago for Lucius Hubbard of South Bend, Ind., from designs furnished by O. H. Dirham, architect, of that place. The floor plans show in a very comprehensive manner the general arrangement which has been followed, while the elevations and details give a good idea of covered with Pennsylvania block slate in cut patterns for half the area, while the remaining portion is plain. The walls are sheeted outside with 1 x 6 D. & M. stuff put on diagonally, while the inside walls are sheeted with 1 x 6-inch material, closely fitted and made continuous from sills to rafters. All the outside walls are sheeted with Monahan's double ply parchment and finished with 4-inch beveled lap siding of clear poplar. The siding extends to the second-story window sills, above which point dimension shingles, woods with linings of 1 x 6-inch D. & M. white pine laid diagonally. The finish of the vestibule, front hall and stairs is in quarter sawed white oak, the parlor in mahogany, the library, dining room and chamber over the front hall in cherry, the second-story hall and front chamber in plain sawed red oak, the east chamber in black walnut and the chamber over the dining room in hard maple. The kitchen, butler's pantry, rear stairs, bathroom and rear bedroom on the second floor are finished in long leafed Southern

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

Residence at South Bend, Ind.—O. H. Dirham, Architect.

the construction and appearance of the building. From the architect's specifications we learn that the foundations are of field stone, rock faced ashlar above the grade lines, while the partition walls in the basement are of brick, 8 inches thick. The first and third floor joists are 2 x 10 inches, the second floor joists 2 x 12 inches, the ceilings in the two stories cross furred, 12 inches between centers, while the studding is 2 x 4 inches, doubled at all necessary places. The rafters are 2 x 6 inches and the hips and valleys 2 x 10 inches, doubled. The chimneys have all flues lined with glazed flue linings, those portions above the roof being of pressed brick. The roof is in plain and cut patterns, are employed.

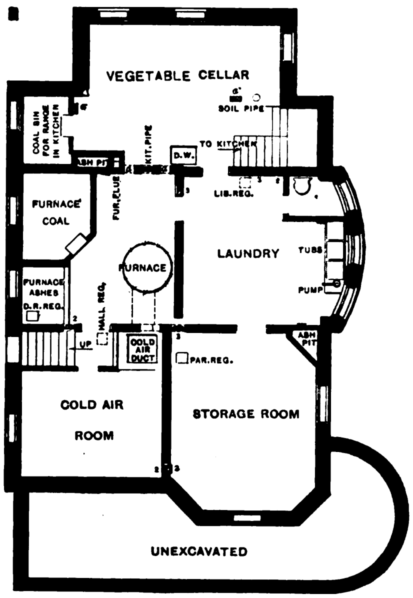
It will be seen from an inspection of the floor plans that four large rooms and a hall, together with commodious pantries, are provided upon the first floor. The main stairway rises from a reception hall, while a rear flight is easily accessible from the kitchen, thus permitting servants to reach the second-story rooms without passing to the front of the house. On the second floor provision is made for five sleeping rooms, a bathroom and ample closet room, while in the attic, or third story, is a sleeping room, workroom and laboratory. The floors in the first and second stories are of hard pine. The third story is finished in soft woods and painted. All hardwood finish is in the natural wood color and polished. The doors throughout the building are staved and veneered. All the principal rooms have plate and ornamental glass. The residence here illustrated is piped for gas and wired for electric lighting. The plumbing fixtures are first-class throughout and the heat is supplied by a Howard furnace. The cost is given at $8,500.

ARCHITECTS and others who keep in advance of the times insist, says the Philadelphia *Record*, that stone will be more extensively used next season than ever before for residences, the craze for mottled and colored bricks being on the wane.

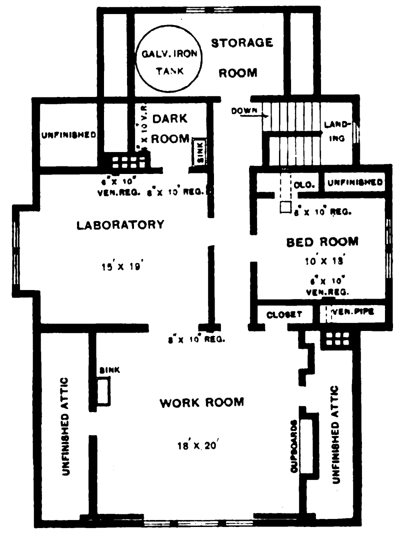
Remodeling the Front of a City Dwelling.

A piece of work which is a credit both to the architect designing it and of what can be done by builders when the cost is not an all important consideration. The architect in the case was Manley N. Cutter, who gives the following particulars of the work done and the manner in which it was carried into execution:

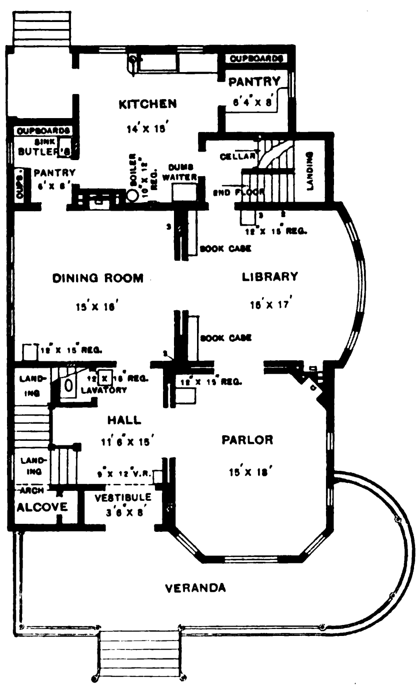
Briefly stated, the work to be done was the removal of all such parts of the old front as were not to form a new windows in fourth story and ceiling and walls made straight; new cornice and balustrade for bay window and taking down, rebuilding and repairing chimneys, skylights, parapet walls and tin roofs; the building of the new front with St. Louis yellow brick $1\frac{1}{2}$ x 12 inches and Connecticut brownstone; rebuilding the face of the side walls above the roof as far



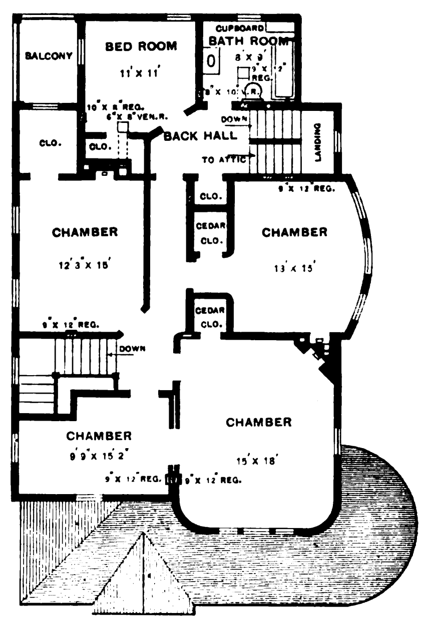
Basement.



Third Floor.



First Floor.



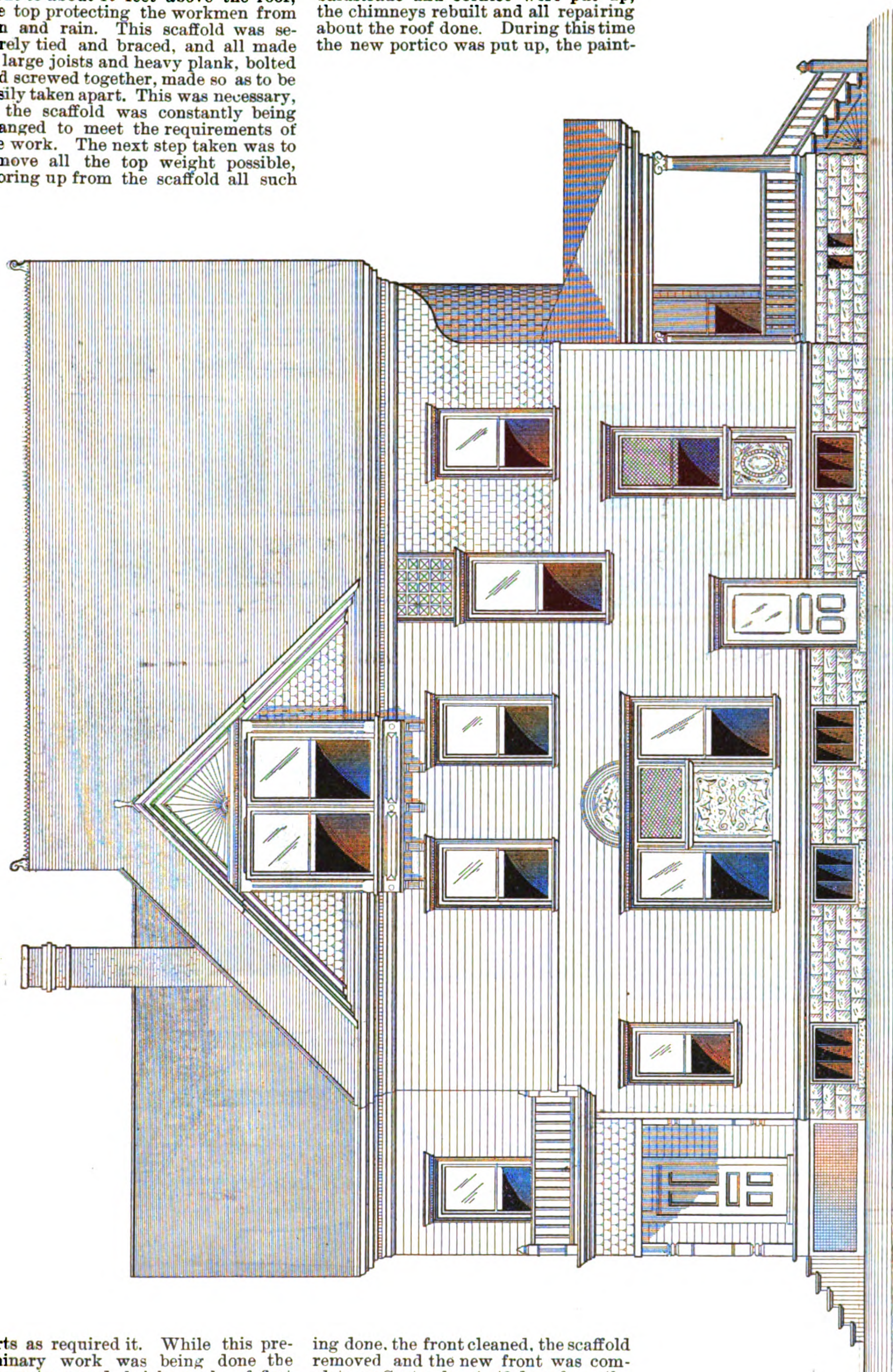
Second Floor.

Residence at South Bend, Ind.—Floor Plans.—Scale, 1-16 Inch to the Foot.

the contractors executing it was performed last summer in connection with a private dwelling in the residence section of this city, not far from the lower end of Central Park. The contract was executed in a little less than two months and is a good example part of the new one; the recutting of the basement stone work, the area steps and walls; modifying the stoop foundations; constructing an entirely new stoop portico, new entrance steps and railings; recutting and recarving the entrance door; new iron roof, back as the rear line of front chimneys; repainting the sashes, window frames, cornice and roofs, and erecting scaffolds and protecting all exposed portions of old building and adjoining properties.

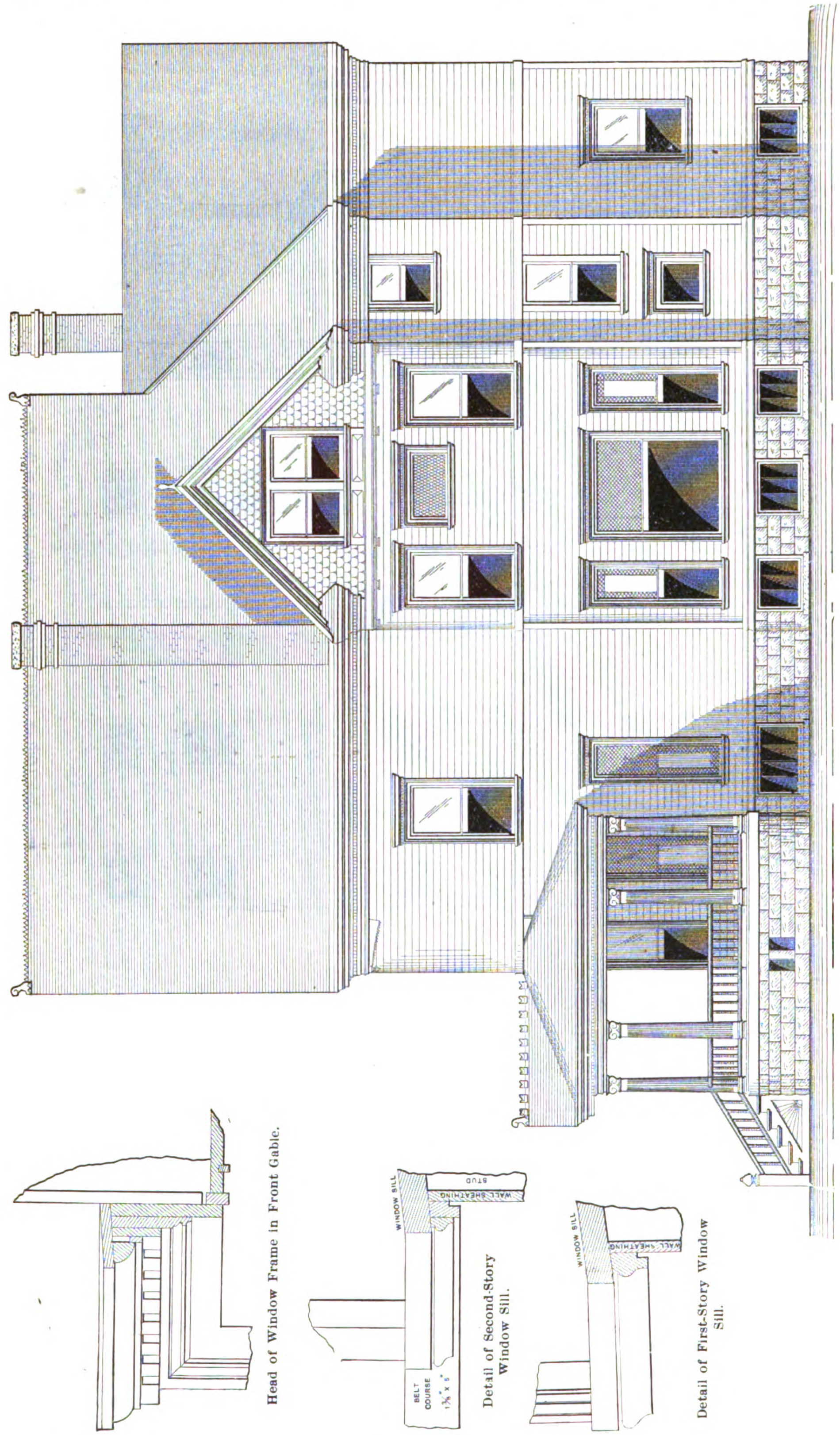
The work was commenced July 1 by

covering the entire area, basement and front stoop with 2-inch plank, taking down the front portico and shoring up the front to the third floor; then an unusually strong scaffold was erected across the entire front from the basement to about 10 feet above the roof, the top protecting the workmen from sun and rain. This scaffold was securely tied and braced, and all made of large joists and heavy plank, bolted and screwed together, made so as to be easily taken apart. This was necessary, as the scaffold was constantly being changed to meet the requirements of the work. The next step taken was to remove all the top weight possible, shoring up from the scaffold all such parts as required it. While this preliminary work was being done the brownstone and brick work of first story was removed and replaced with new stone and brick, which had been made ready during the preliminary work, the drawings having been sufficiently advanced to permit this. The second story was done in the same way. The third and fourth stories were started at the same time, and when the fourth story was finished the third story was complete. During this period the carving was progressing and the basement was recut, the new entrance steps and rails were put in place, the new iron roof and the upper side walls were built. Then the top balustrade and cornice were put up, the chimneys rebuilt and all repairing about the roof done. During this time the new portico was put up, the painting done, the front cleaned, the scaffold removed and the new front was complete on September 1, 46 days from the day the first brick was laid, without entering the house except in a part of the fourth story and without accident to the workmen. The men worked rain or shine and overtime, but no night work. During this time there were three tornados, but by care taken with the shoring and scaffold no accidents occurred. The entire cost, including extensive repairs and alterations, was $42,039.98; done under ordinary conditions the front could probably be erected for $28,000. Considering the lavish expenditure on the rest of the house and the large size of the front—being about 80 feet high and 33 feet wide with bay window—the minimum cost was obtained.



Residence at South Bend, Ind.—Side (Left or West) Elevation.—Scale, 1/8 Inch to the Foot.

In the days when coal was not so common as it is now, it was the custom throughout Aberdeenshire and elsewhere in the north of Scotland to heat schools—and private houses, too, for that matter—by burning peat. The schoolmaster got his peat by a very simple plan. Every morning during the winter each boy was obliged to bring to school a peat turf. The peat was piled in a stack, from which it was taken to the fire place whenever fuel was needed. The peat was not so much a gift to the teacher as an actual payment in kind instead of in fee, or in cash, for the heating of the schoolroom.



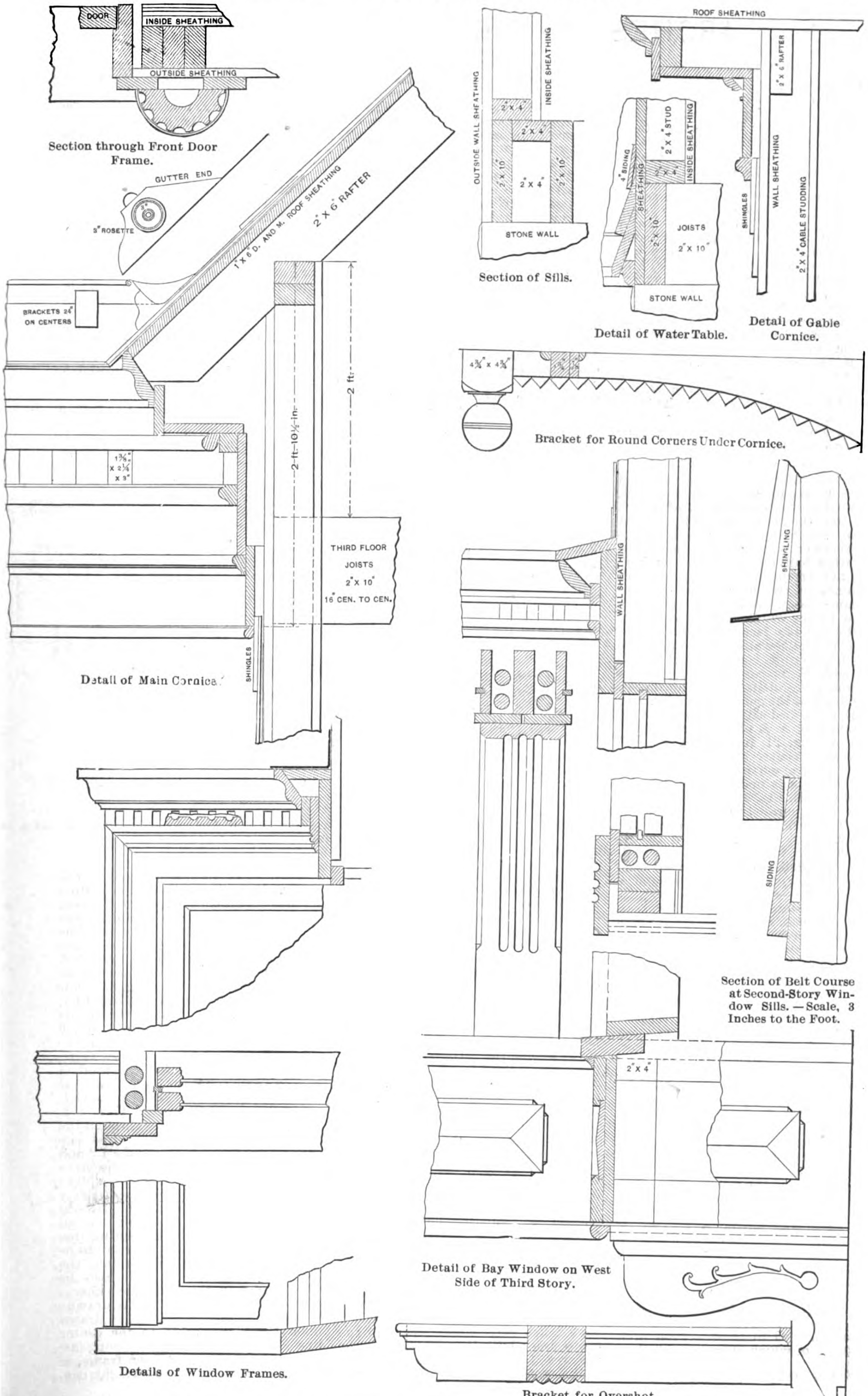
Head of Window Frame in Front Gable.

Detail of Second-Story Window Sill.

Detail of First-Story Window Sill.

Side (Right) Elevation.

Residence at South Bend, Ind.—Elevation.—Scale, ⅛ Inch to the Foot.—Details.—Scale, 1 Inch to the Foot.



Miscellaneous Details of Residence at South Bend, Ind.—Scale, 1 Inch to the Foot.

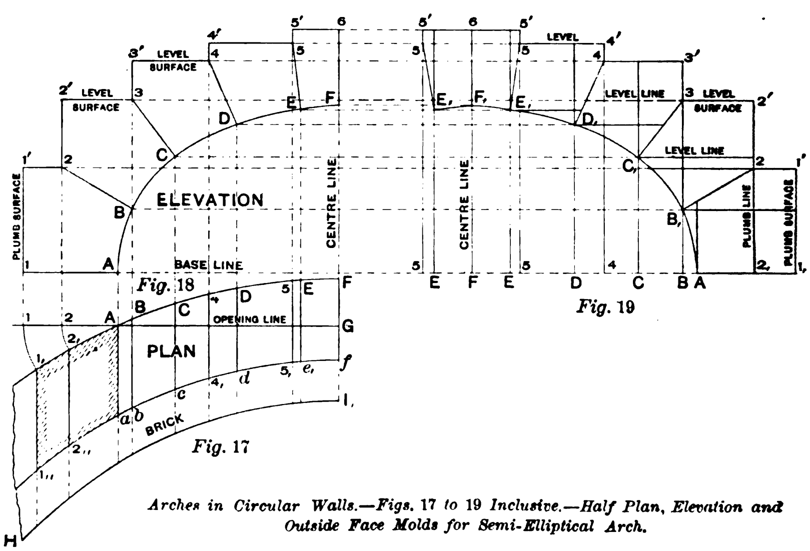
ARCHES IN CIRCULAR WALLS.*

SEMI-ELLIPTICAL ARCH.

IN Figs. 17, 18 and 19 are shown the half plan, elevation and outside face molds for a semi-elliptical arch, the exterior bounding surfaces of which are horizontal and vertical planes, or, as they may be termed, plumb and level surfaces. The face molds for this arch are projected in the manner already explained, as are also the face molds for any arch having a cylindrical soffit, no matter to what order the curve at soffit may belong, and from the explanations given above the figures will be very readily understood. In the plan, Fig. 17, the thickness of arch stones is shown at F *f*, as in this example they do not go through the wall, the arch being backed up with brick, so that in developing the inside face molds the lengths *f e*, *e* 5, &c., at the line *f* 1,, are set off along the base line instead of the lengths given at the line H I, which in this case is the brick line. Also notice the plumb and level lines are in all cases drawn at the outside face molds.

JOINT OR BED MOLDS.

In Fig. 21 is shown the elevation of an arch having a cylindrical soffit, situated in a circular wall, of which Fig. 20 is the plan. In this figure R A shows the half opening, and I *i* the thickness of wall at center line. The elevation is divided at A B, C D, E F, &c., to correspond to half the number of stones the arch may contain—in this example seven. A B, C D, &c., are equal to the width of the arch stones at the outside face. Having drawn the plan and elevation divide A B into any number of equal parts, as 1 2, and with R as center draw the arcs 1 7 and 2 8, cutting the joint lines C D and E F at the points 3 4 and 5 6. To project the bed mold required for the bottom bed A B of the springer, extend A, Fig. 21, into A, Fig. 20, and with A as center and A B as radius draw an arc, cutting the outside face line at B', thus making A B', Fig. 22, equal to A B, Fig. 21. From A and B' draw lines parallel to center line, cutting the inside face line at *a b*. The section A *a*, *b* B, Fig. 22, is the required mold for the bottom bed A B. In order to make the operation—that is, the revolving of the point B around A as a center—clearly understood, it should be stated that had a line been drawn from B, Fig. 21, parallel to center line it would cut the outside face line at S; then A S would be much wider than A B, C D, &c., of Fig. 21. If the point D, Fig. 21, be also projected into Fig. 20 in like manner, and the patterns, &c., be developed and the stones cut to the data given, we should have an arch constructed which, when viewed from a certain point at the center line produced, would present to the eye of the spectator the appearance shown in the elevation. That is, the arch stones at the outside face would appear to be of an equal width and the width as then seen at A B would appear to be equal to I J. Yet this arch, when viewed from other points either at the left or right of the center line, would present a very different appearance. This is noticeable if the arch be situated in a wall having a very quick curvature—that is, the curve of outside face be drawn by a short radius. By rotating all points which may be projected into the spring line between the points A B around A as a center into the outside face line, and projecting the patterns from the data given, we are enabled to construct an arch the stones of which at the outside face will be of an equal width. In the example here presented the points 3, 4, D at the joint line C D, Fig. 21, projected parallel to center line into 3', 4', D' at the spring or opening line, are in like manner to be revolved around A as a center, cutting the outside face line at 3, 4, D of the plan. To project the bed mold for the joint C D, carry C, Fig. 21, parallel to center line to C *c*, Fig. 20. Draw C D'' square to C *c*, and from the points 3, 4, D drop lines parallel to center line, cutting C D'' at 3'', 4'', D''. In Fig. 23 draw C *c*, making C D'' square to it. Let C 3'' 4'' D'' equal C 3 4 D of Fig. 22. With C as center draw arcs as shown. Now make 3'' 3, 4'' 4, D'' D equal to 3'' 3, 4'' 4, D'' D of Fig. 22. Through 3 4 D draw lines parallel to C *c*. Make D *d*, 4 4''', 3 3''', C *c* equal to D *d*, 4 4''', 3 3''', C *c* of Fig. 22. Through the points obtained draw the developed curves of outside and inside faces. The section C *c d* D will be the required pattern for the top bed of springer, and the adjacent joint of No. 2, at the joint line C D. In like manner Figs. 24 and 25 may be projected.



Arches in Circular Walls.—Figs. 17 to 19 Inclusive.—Half Plan, Elevation and Outside Face Molds for Semi-Elliptical Arch.

The molds projected as explained above are those required for arches having a clean or a rock face. In the rock face arch the curves give the direction of pitching line, and in the clean face arch the direction of cutting line, which, together with the developed soffit and exterior surface patterns, give the direction for cutting the clean face. Figs. 29 to 34 show the method of projecting the patterns for an arch having a molded face required in order to give the direction of cutting lines of each member at the several joints. A very simple section has been chosen, shown in Fig. 31. This is called the square section, and is obtained by a plane passing through the center of keystone, for then, as before explained, the faces and soffit are square to each other. We will assume the plan and elevation to be drawn, as before explained, for an arch having a clean face; then placing the face of section parallel to center line, and the soffit line square to the center line, as shown in Fig. 31, mark on the square section. Divide the curved member at any convenient point, as 5, 6, 7, 8. Project these with the angle points of the section, as 1, 3 2, 10 11, &c., into the center line; with R as center describe the arcs 11 11, 9 9, &c. Now, from K, at the center line of plan, set off the several projections of the points 1, 2, 6, 8, &c., at section Fig. 31—that is, make K 6, K 8, K 3, &c., equal to 9 8, 6 6, 5 5, *k* 1, Fig. 31. With the center by which the curve of outside face line is drawn describe arcs from each point, as shown at 1 1, 8 8, &c., of Fig. 29.

To develop the pattern required at bottom bed of springer, proceed as follows: With A as center, and A 4, A 5, &c., as radii, draw arcs, cutting the outside face line at 4, 5, 7, &c. From these points drop lines parallel to center line, cutting the arcs 1 1, 3 3, &c., at 1 2, 3 5, &c. The lines drawn from A and 4 give the length 1 2, Fig. 32, of the sinking corresponding to 1 2 3 of Fig. 31; likewise the lines drawn from 4 5 give the length 3 5, Fig. 32, of the sinking corresponding to 3 5 of Fig. 31. Trace the curve through the intersections given at 5, 6, 7, 8 and join 8 10 and the section is complete.

To develop the section required at joint G H of Fig. 30, proceed as follows: From G 4, 5, 6, &c., drop lines parallel to center line, G and H being produced through the plan, cutting the inside face line at the points *g'' h''*. The lines produced from 4, 5, 6, &c., are drawn to intersect the arcs 1 1, 3 3, 8 8, &c., of Fig. 29, which are drawn from corresponding points in Fig. 31; thus 4 is projected into the arcs 3 3 and 1 1, meeting them, as shown at the points 3 2, while 5 is projected into 5 and 6 into 6, &c. Now draw G H' square to G *g''*, Fig. 29. In Fig. 34 draw G *g''*, making G H' square to it; set off G 4', 5', 6', &c., equal to G 4, 5, 6, &c., at joint line G H, Fig. 30. Make G 1, 4' 3, 4' 2, 5' 5, &c., equal to G 1, 4' 3, 4' 2, 5' 5, &c., of Fig. 29. Through the points obtained trace the required section. The curved lines joining 1 2 and 3 5 should be drawn parallel to the curve of outside face line, shown by dotted line H G in Fig. 34. In like manner may the sections required at the several joints be developed, noticing that all points projected into the spring line R B between the points A B are to be rotated around A as a center into the outside face line. It will also be noticed that in this example a check, or rebate, *g n m*, Fig. 31, is drawn; also that a line, K'' A' X, is drawn upon the plan square to the center line. We have in this drawing assumed the window or door frame, as the case may be, to be a straight one,

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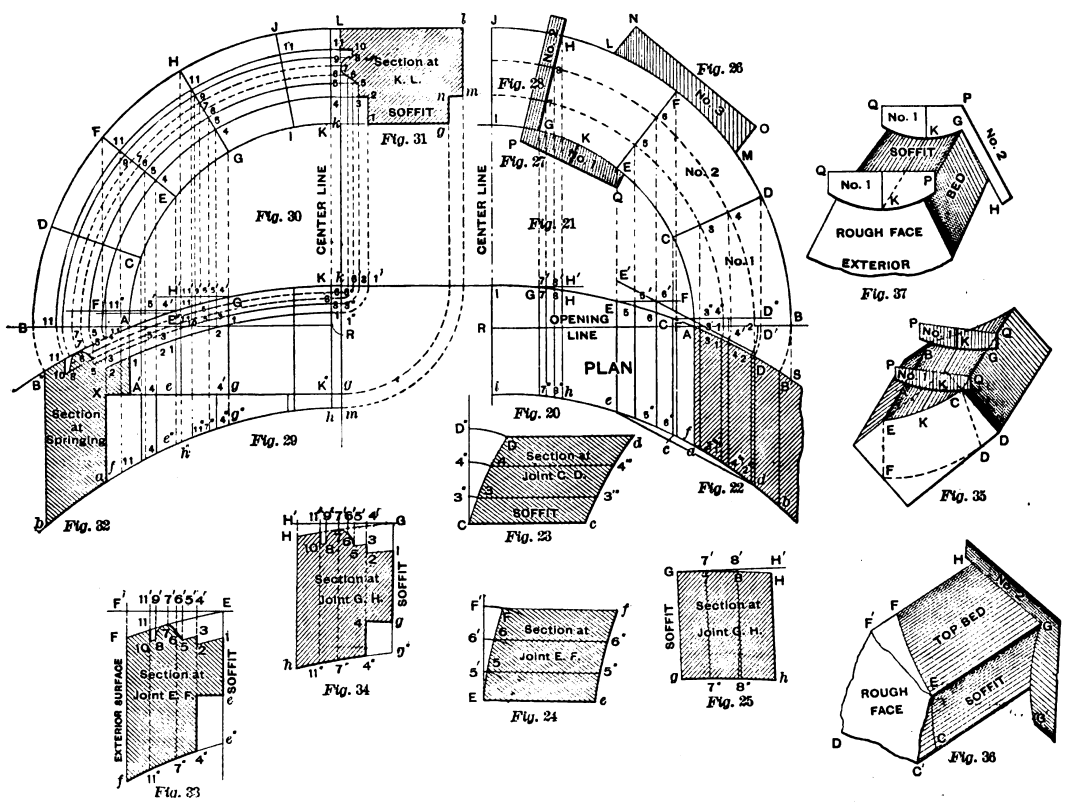
similar to the frame which may be built into any ordinary arch having a straight face, and that K K'' is the distance the frame requires to be set back from the face at the center line. Now K'' X being drawn through K'' square to the center line gives the projection of the cutting line at the soffit for the check in question.

To project the check at the bed molds, proceed as follows: In Fig. 34 make G *g* equal to G *g* of Fig. 29; 4 of Fig. 34 being the projection of *n m* of Fig. 31. By producing 4 parallel to G *g''* we obtain the development corresponding to *m n* of Fig. 31. Draw *g* 4 square to G *g*, and the development *g* 4 4'' of the required check is obtained. In like manner the check may be projected upon the several patterns.

In order to cut the separate stones of which the arch may be constructed in an expeditious manner we require, in addition to the developed soffit and bed molds already shown, other templates. Fig. 27 shows a template, the curve G E being drawn with a radius equal to that by which the curve of the soffit in the elevation is drawn. The curve requires to be a few inches longer than the one at the soffit of the stones to which it is to be applied. The outside of the template P Q is straight, and may be drawn at any convenient distance from the curve. Two No. 1 templates are to be made exactly alike, and the point K requires to be marked at the center of each curve. Fig. 28, or No. 2, shows a template commonly called an arch square. The blade G H is straight and radiates toward the center, by which the curve G E may be drawn. Fig. 26 shows a template, the curve L M being drawn by a radius equal to that of the exterior curve B J.



Arches in Circular Walls.—Figs. 20 to 37 Inclusive.—Diagrams Showing Manner of Cutting the Stones.

CUTTING THE STONES.

The size of rough stone through the wall, say for No. 2, is shown by the lines joining E' *e*, *d* D, Fig. 20, the perpendicular hight of which requires to be equal to C F, Fig. 21. Stones of the shape given in the plan admit of their being plugged, or sawn one out of another. First cut the soffit as for an ordinary arch stone. To do this the No. 1 templates are brought into use, and after having first roughed out the soffit to the direction of the curve G E when placed in a position square to the element of the soffit, cut clean drafts to the curve of No. 1. Do this in such a manner that when the two templates are placed parallel to each other and to lines square to the element of the soffit, the points K K being placed over an element, as K, Fig. 35, the curvature at the drafts will after one or more trials coincide to the curve of templates when the top edges P Q are out of wind. What is meant is clearly shown in Fig. 35. The line K is drawn in such a manner as to form an element of the soffit, the direction of the line being obtained by setting a bevel to the angle D E' *e*, Fig. 20. The points K K on the templates are placed exactly over this line and in such a position as to be square to the line, as shown at A C and B G. Then when the drafts coincide to the curve G E, when the top edges are out of wind, the proper direction at drafts is obtained. Applying the straightedge parallel to K K, the soffit may very readily be cleaned. Now mark on the soffit mold, placing the edges of the pattern parallel to K K. The direction of the cutting lines required at joints may be obtained by placing No. 2 to the square lines A C and G B and marking on the rough face the direction given by G H. Cut the beds to the direction given and mark on the developed bed mold for the beds in question. If the top bed has been cut first turn the stone and then cut the soffit to the direction given by No. 2, then mark on the developed soffit mold, which gives the width of soffit. The bottom bed may now be cut to the direction given by G H, No. 2. Mark on the bed mold for the joint in question, then cut drafts at the exterior surface to the direction given by the curve L M, No. 3, and mark the lines from bed patterns, applying No. 3 square to the joints. The exterior surface may readily be cut in the same manner as the soffit. Mark on the developed pattern for the exterior surface in question. We have now a line around the stone. If the face is rock this line gives the direction for pitching off the rock; if clean it gives the direction of cutting line. Cut a draft around the stone to its direction; then applying the straightedge parallel to plumb line C F, the face may be readily cleaned. At Fig. 37 is shown the manner by which the soffit may be cut when the rough face is square to the joint, and Fig. 36 shows the manner by which the beds and soffits are cut to the direction given by template No. 2. If the soffit be cut first, cut the beds to the direction given by radiating blade G H, when the curve G E is placed square to the joint lines at the soffit. When the bed is cut first, the soffit is cut to the direction given by curve G E, when G H is applied square to the joint line at the surface of the beds. When the soffits are checked as at Fig. 31 to receive the frame, the developed soffit will give the cutting line, and the check may be gauged from the soffit to the depth required. In like manner, if the frame fits against the inside face of arch, the soffit mold gives the required width and cutting line at soffit. When the face of arch is molded, cut the stones as above, after marking on the bed molds. When the face is clean and of a much larger surface than the soffits or beds, it will be more expeditious to cut the face first.

(To be continued.)

WHAT BUILDERS ARE DOING.

THE general outlook in Boston for the approaching season is less promising than it appeared earlier in the year. New work comes into the market slowly, and the amount now open to competition is less than the average at this season. It is stated that only about 70 per cent. of the workmen are now employed. The Boston Board of Underwriters is considering the adoption of the following:

That the rule in relation to the valuing of buildings be changed so that the master builders, who are to make an estimate of the amount of insurance to be guaranteed in lieu of the use of the 80 per cent. insurance form, may fix the amount at what in their opinion is 80 per cent. of the true value at the time of making the estimate, instead of, as is now the case, at the full value.

That policies cannot be held open awaiting a reduction in rate, but must be written at the rate in force at the time the insurance applies.

The trade school for apprentices in the plumbing trade, which has been in operation under the auspices of the North End Union, is accomplishing an excellent work. The classes are required to study 16 different kinds of work in the regular course, and after this has been fulfilled additional work of an ornamental or less ordinary character is given to the apprentice. No apprentice is admitted for less than a full course. Materials are supplied without cost above the tuition fee, which is $10. The following, taken from an announcement of the North End Union in reference to the school, gives the position of the apprentice when he has completed his studies:

"The course of study is made progressive, from the simple to the complex, each step overlapping the next, and by this course the pupil is enabled to acquire the principles of any trade more intelligently and in less time than by the ordinary apprenticeship system.

"It will be understood that the graduate of a trade school is not a full fledged journeyman. Facility and speed of execution must be acquired by practice in the trade itself. The trade school is not a mill where journeymen are ground out, but a place where the science and practice of a trade are fully taught by instructors selected because of their skill in their own craft and their ability to impart their knowledge and skill to others. The trade school movement demands that as the various learned professions are taught in special schools, so should carpentry, bricklaying and plumbing be. Labor is dignified and elevated in proportion to the amount of skill and intelligence put into it."

Baltimore, Md.

Reports from the builders of Baltimore show the building trades to be in good condition, as compared with that which prevails in many of the other large cities. The members of the Builders' Exchange are nearly all busy and very little complaint is found with the situation. The new building which is being built as a home for the exchange is rapidly nearing completion and the members are looking forward to occupying it not later than June. The building is located in the most desirable part of the city and is fitted with every modern convenience, particular attention having been given in its design and arrangement to the needs of the exchange.

Cincinnati, Ohio.

The Builders' Exchange of Cincinnati recently indorsed the plan of having a local Board of Arbitration to which shall be referred for settlement all difficulties between employers and employees. The local board will probably be organized immediately to settle the differences between the planing mill owners and the hands. A committee was appointed to examine certain legislative bills and act thereon.

The building outlook is summed up by the members of the exchange by stating that there are a great many bids being made for the construction of small dwellings, with the prospect of a season of about the same amount of building as at this time last year.

The carpenters' union of Covington wanted the employers to sign an agreement for 37 cents an hour, to go into effect next year, but they would not agree to this. They signed the scale in force last year, which is 33⅓ cents an hour, or $3 for nine hours. This to be in force for one year.

Chicago, Ill.

The building trades of Chicago are at present very much disturbed, there being differences between employers and workmen in nearly every branch of the business. On April 1 fully 10,000 men, representing plumbers, painters, brick makers, machinists, brass, steel and iron workers, were on strike for higher wages or against a reduction ordered by their former employers. All the members of the Journeymen Plumbers' Association, from 1200 to 1500, were out and several hundred members of the Junior Plumbers' Association had joined them.

The plumbers refused to accept a reduction in their wages from $3.75 to $3.25 and $3 a day, with a proportionate reduction in the wages of the junior plumbers. The plumbers were also asked to provide their own furnaces in future. This is their first great fight since 1886, when they struck for an eight-hour day and won in less than an hour.

The Brotherhood of Painters and Decorators some time ago adopted a new schedule of wages for this year. This provides for a raise of 5 cents an hour. The present rate of pay is 30 cents an hour and the men want it raised to 35 cents.

The provisions are as follows:

Eight hours shall constitute a day's work (between the hours of 8 a.m. and 5 p.m.), after which hour, in the event of overtime, work shall cease for at least 30 minutes.

All overtime shall be paid at the rate of time and one half, except Sundays, Christmas, New Year's Day, Thanksgiving Day and Fourth of July. Those days shall be paid at the rate of double time.

The minimum rate of wages shall be 35 cents per hour until April 1, 1895.

The Central Building League, which is composed of employers in the building trades, has taken action looking toward a general lockout in all the trades except that of masonry. The bricklayers and stone masons' union is under agreement with the employers based upon the form of arbitration advocated by the National Association of Builders, and the union has no relations with the other unions of the city. In the Builders and Traders' Exchange the more prominent members seemed to be averse to the lockout proposed by the league, and protested strongly against such action as being unnecessary. The plumbers and painters, in both of which trades a strike was in force, were most urgent in favor of a lockout. The general opinion among the more conservative of the builders was that the lockout would fail for lack of support, as there appeared to be much difference of opinion as to the merits of the action. If the league lockout becomes universally operative the No-Rent Association proposes to put its principles into action, which is to order its members to stop paying rent during the time they are kept out of work by the boycott.

The fight of the bosses seemed aimed wholly at the Building Trades Council, claiming that it has inaugurated a system of "sympathetic strikes," which, if allowed to continue, will be destructive to the building industry or the building contractors of all the trades. In other words, the council is composed of painters, plasterers, plumbers and allied building trades, and if any one union gets into trouble with its employer and strikes, all the other trades back it up and withdraw their men from work in the event of the employment of non-union men to replace the strikers.

The bosses say they have become weary of these tactics, and having been tutored by the Trades Council have combined for their own protection—hence the Central Building League.

Building operations continued with unabated vigor up to the first week in April. The total proposed cost, as indicated by the building permits, for the week mentioned exceeded $1,000,000, as did the returns for the preceding week.

Detroit, Mich.

Secretary Guiney of the Builders' Exchange of Detroit says mechanics in the building trades will have a busy season. A large amount of building has been started to take advantage of the low price of material.

The carpenters' unions of the city, which have been more or less disturbed by factional disputes for the past three years, are trying to establish a harmonious condition in which united action can be taken for the general welfare. One of the conditions which, it is claimed, has been the outcome of the lack of harmony is the exceedingly low wages which prevail at present. An effort is to be made to have the wages increased. The bricklayers are seeking the restoration, on May 1, of the old wages of $3.50 per day. The men confidently expect to secure the increase without serious opposition.

Indianapolis, Ind.

About April 1 the Indianapolis carpenters struck for an increase in wages from 27½ cents to 30 cents per hour. About 1200 men were affected, and the contractors claim that there are plenty of non-union men willing to work. In speaking of the strike Conrad Bender, secretary of the Carpenters' Association and a prominent member of the Builders' Exchange, said:

We are getting along all right, and have more men than we know what to do with. We are willing to pay 25 cents an hour, but will not pay 30. The statement made by the men that we agreed to restore the scale April 1 is false. They declare that the scale was suspended for the winter because of the hard times, and that a mutual understanding existed to the effect that we should give them the old price again in the spring. Certain of the carpenters during the past winter forced one of the contractors to pay 30 cents an hour. If such an agreement existed they were the first to violate it, not we.

The bosses, although they have taken no formal action in the matter, insist on the classification of workmen. They claim that the inferior workmen are in the majority, and that they brought on the strike, desiring to profit at the expense of the first-class workmen, whom the contractors are willing to pay 30 cents an hour.

New York City, N. Y.

The building trades of New York City have been disturbed during the past month by factional disputes among the workmen. About April 1 the Board of Walking Delegates ordered a strike of all workmen on a certain job. The delegate representing the Brotherhood of Carpenters refused to order his men out, and thereupon was suspended by the board. The latter then ordered strikes on every job upon which Brotherhood carpenters were employed, thus involving all the other trades to a greater or less extent. After calling into requisition the services of several prominent gentlemen as arbitrators, and seeking to secure a settlement of some kind, the board and the Brotherhood finally arranged the matter among themselves. Concessions were made on both sides, and nearly all the men are at work again.

The subscribers to the fund for the erection of a building, to be owned and occupied by the Building Trades Exchange, met at the rooms of the Building Trades Club on March 30. The meeting was well attended, and action taken resulted in the following announcement:

It was unanimously adopted as the sense of the meeting that the scheme should be prosecuted with increased vigor, and a determined effort made to carry it forward to ultimate success; for such purpose it was decided to postpone the permanent organization of the body until a meeting which is to be held on the 20th inst., and in the meantime the under-mentioned, being the present subscribers, were constituted a Committee of the Whole, with an earnest request that each one secure at least one additional subscription prior to the contemplated meeting. With the impetus already given to this undertaking, notwithstanding the discouragements of a severe financial depression, coupled with the usual apathy toward any progressive movement, it is possible from the present nucleus to very soon have an organization that will be thoroughly in keeping with the magnitude of the building industry in this city. It may require from each some sacrifice of time, and perchance some personal comfort, but when such is to result in the furnishing of a permanent home, and securing of the prestige to a commercial interest with which we all are so intimately associated, why should we hesitate?

The names of the subscribers to this fund were added to the foregoing, and included some of the most prominent builders in the city.

The members of the Building Trades Club recently presented Secretary Stephen M. Wright with a beautiful bronze as a testimonial of appreciation of his untiring services in behalf of the club and the entire building fraternity.

Philadelphia, Pa.

At a recent meeting of the Master Builders' Exchange of Philadelphia, Franklin M. Harris, the new president, was introduced by William H. Albertson, the retiring officer, and upon taking the chair solicited the cordial support of every member of the exchange. Secretary Harkness read a communication from the managers of the Childs-Drexel memorial fund, suggesting that the memorial be a huge hall or building, in which a board of arbitration is to sit to hear complaints of all kinds, with a view to avoiding strikes, lockouts and other similar difficulties. The proposed hall is to be under the care of the municipal authorities.

After the preliminary business had been dispatched President Harris announced as the subject for discussion, "The Benefits of the National Association of Builders." Stacy Reeves, John S. Stevens, James J. Ryan, Col. Thomas Flood, John R. Wiggins, J. Turley Allen, William S. P. Shields, George Watson, John Atkinson, Joseph B. Hancock, William T. Leslie and David H. Watts took part in the discussion, which was by far too one-sided to be exciting. It was the best attended and most satisfactory conference meeting of the exchange held since its organization.

The building trades are quiet at present, it being reported that not more than 60 per cent. of the workmen are employed. Everything seems to be tranquil among the workmen, with nothing to indicate any probable disturbance in the near future.

St. Louis, Mo.

The carpenters of St. Louis are seeking to secure the establishment of a uniform rate of wages with 40 cents per hour as the minimum. Several small strikes occurred during the month, but did not become general or involve any other trade.

Reports from the Builders' Exchange indicate that organization to be in excellent condition, and the members hoping the building season may prove more profitable than it seems to promise at present.

Notes.

The builders of Carthage, Ill., are at work on the preliminary steps to the formation of an exchange. M. Flynn is one of those who are most interested in the movement.

The builders of Peterborough, Ontario, have applied to the secretary of the National Association of Builders of the United States for information as to the best manner in which to set about the organization of an exchange.

The Builders' Exchange of Bridgeport, Conn., has adopted the by-laws of one of the filial bodies of the National Association of Builders, and will establish itself anew as an organization of value to the builders of that city.

The exchange at New Haven has recently bought a property upon which it proposes to build a home of its own. The Wilmington Exchange is also looking for a place to build.

The members of the Builders' Exchange of Springfield, Mass., met recently at the Board of Trade rooms. They discussed the lien laws as referring to mechanics, and favored giving the men who furnished material for building the same chances to make liens as the mechanics possess. A bill to carry out this idea will be put before the House at Boston by parties in that city. The exchange will take hold of the builders' department of the Board of Trade and improve it in every way, incorporating as many new ideas in the builders' and architects' lines as possible. They will have an exhibit of bricks, tile, &c., at the rooms as soon as the materials can be collected.

The Master Carpenters' Association of Germantown, Pa., has elected the following officers: President, John D. Caldwell; vice-president, Thomas W. Wright; treasurer, A. S. Tourison; secretary, William Garvin; corresponding secretary, William C. Wright. It was stated at the meeting that the best of feeling now exists among the bosses and their men, and that the former are sincerely desirous of bettering the interests of the employees. The outlook for spring and summer work, according to statements made by several of the builders, is encouraging, although there is not much on the boards at present.

The Master Builders' Association of Fall River has elected the following officers for the year 1894: President, John J. Murphy; vice-president, C. H. Sears; secretary, John Crowe; assistant secretary, Albert Wagner; treasurer, John J. Highlands.

Muncie, Ind., bricklayers are trying to secure 45 cents per hour, last year's rate. They have refused 35 cents.

Fifteen hundred bricklayers in Bellaire, Ohio, and vicinity are on strike against a reduction of wages from 40 to 30 cents per hour.

The carpenters of Montreal have secured a reduction of working hours to nine per day. The wages are 20 cents per hour.

The stone masons and the hod carriers of Wheeling, W. Va., are both having trouble with the employers on account of reduction in wages. The bricklayers are helping the stone masons in their opposition to a reduction from 40 to 30 cents per hour.

The lathers of Cleveland have adopted a minimum scale of $2.50 per day, and a contract price has been agreed upon at 2½ cents per yard.

A Notable Barn.

There has just been completed at Rhinebeck, N. Y., a barn which, in its way, is probably the most notable in the country. It belongs to ex-Vice-President Levi P. Morton and is situated on his stock farm at the place named. In August, 1893, the structure was destroyed by fire, since which time the new barn has been built, embodying many improvements which were not found in the old building. The present barn is 297 feet long, 65 feet wide and 50 feet high, with an L 89 x 52 feet in size. The barn includes besides three 500-ton silos, each 47 feet deep, a tool and engine room, laboratory and bathroom, grain bins and ample hallways. There are also 120 common stalls and 46 box stalls on the main floor, with an equal number in the basement. The bays above the stalls accommodate 400 tons of hay without covering over the corridor and the grain bins will hold 20 carloads of grain. The basement is lighted and aired by windows running to the bottom, while the air is kept pure by means of box ventilators, running from the basement and out of the roof lanterns. These ventilators are also used as chutes to convey the hay from the loft to the main and basement floors. The ventilation for the main floor is by opening lantern sash, 78 in number, and are attached to a shaft running the whole length of the lantern, while a perpendicular shaft runs down to the main floor, operating six sash at a time.

In constructing the barn, which was erected by Ackert & Brown of Rhinebeck, from plans drawn by architect Dudley Newton of Newport, R. I., 250,000 feet of yellow pine timber and 250,000 feet of spruce were required as well as 310,000 cedar shingles to cover the roof and sides above the brick walls. It required 330,000 brick in addition to those which were available from the old barn. The building is box frame and gave steady employment to 100 men, 70 of whom were carpenters, 10 masons and 20 laborers.

The main floor of the barn is made of 2 x 9 spruce, tongued and grooved, laid with planed side down. To this was applied a coating of tar, which in turn was covered with three-ply tarred paper and then another coat of tar. Upon this was laid the finished floor, consisting of 1¼ x 5-inch tongued and grooved spruce. The basement bottom is made of concrete 6 inches thick with brick piers to accommodate chestnut sleepers which support a 2-inch floor of spruce where stalls are put in, fitted up the same as on the main floor.

New Publications.

GREENHOUSE CONSTRUCTION. By L. R. Taft, Professor of Horticulture and Landscape Gardening at the Michigan Agricultural College. Illustrated with 118 engravings; size, 5 x 7½ inches; 208 pages. Bound in cloth. Published by Orange Judd Company. Price, $1.50.

This volume is referred to by the author as a complete manual on the building, heating, ventilating and arrangement of greenhouses and the construction of hot beds, frames and plant pits. Mr. Taft has made at the Michigan Experiment Station a careful comparative test of the various methods of building, glazing, ventilating and heating greenhouses, which he was able to do with scientific accuracy by reason of his 15 years' experience in greenhouse management, combined with a large experience in greenhouse construction and a careful study of the methods employed by the leading flower and vegetable growing establishments in the larger American cities. The work is divided into 29 chapters, covering in detail the various topics suggested by the opening sentence above. Some of the illustrations are half tone engravings from photographs of actual greenhouses and forcing establishments, and these, in connection with the text, are likely to prove of no little interest and value to those having to do with work of this kind.

GUIDE AND ASSISTANT FOR CARPENTERS AND MECHANICS. By H. G. Richey. Size, 6¼ x 9¼ inches; 177 pages; illustrated with 201 engravings. Bound in board covers. Published by William T. Comstock. Price, $2.

The scope of this work is largely indicated by its title. Its pages present a number of geometrical and practical problems likely to arise in the every day work of the carpenter, together with quick and easy methods of solution. The use of the steel square is described, while tables showing the strength and weight of materials, methods of framing employed, recipes, &c., constitute features of interest and value to members of the trades addressed. The last chapter, of which there are 20 in the book, is devoted to legal forms of various kinds, ending with a glossary of terms used in architecture and building construction.

Penny as Applied to Nails.

Referring to the explanation that the word "penny" is a corruption of "pound," so that a 4d nail was originally one of such a size that 1000 of them weighed 4 pounds, a correspondent of the *Ironmonger*, London, says that this explanation is new to him, and instead of it, gives one entirely different. He states that his grandfather, father and himself have been makers and sellers of nails for at least 100 years, and they have always understood that by 6d nails was meant the size of nails that could be sold at 6 pence per 100, and in confirmation of this theory states that up to this day they keep 2d, 3d, 4d, 6d, 8d, 10d, 20d, 24d nails, which they retail in small lots at these prices per 100 nails counted out.

CORRESPONDENCE.

Lengths of Braces.

From M. D. S., *Pittsburgh, Pa.*—In the September number for 1893 "J. C. W." asks for a method of obtaining the length of braces and how to cut roof timbers without a draft or square root, &c., as indicated by his sketches. At A, Fig. 2, he shows a "3-foot run brace," the length of which he finds by applying the square from 12 to 12 three times. This much he understands. Taking this, then, as a starting point, I will say that the same principle in the use of the steel square, with some modifications, may be applied in determining lengths and finding bevels for braces, leaners, rafters, &c. Having for some years followed heavy framing in nearly all its phases, I will try briefly to explain the methods successfully used by myself and others of "laying out" timber.

The sketch, Fig. 1, embraces all the problems submitted by "J. C. W.," with some additions, and represents a part of an end bent of a barn frame. B shows a brace with a lean of 4 feet, extending from the center of cap sill below to the stress beam above, a distance of 12 feet, and intersected at regular intervals by a 4 x 4-inch railing. The first problem then is to lay off with the square a leaner brace with a run of 4 feet and a rise of 12 feet.

The divisions on one side of every good square are duodecimal, inches and twelfths of an inch, so we may assume that inches represent feet and twelfths represent inches. Now, laying on the square (to the corner of the timber if sawed, or to the line if hewn) with 4 of the short blade and 12 of the long blade on the line, the short blade gives the first bevel at Y. Make a point at 12 on the line and move the square up until 4 on short blade comes to first point. Apply the square in this way 12 times. The last point gives the exact length of the brace; and by reversing the square to the same point and marking, we have the bevel.

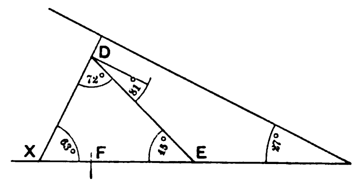


Fig. 2.—Diagram Showing where to Mark Angles in Previous Figure.

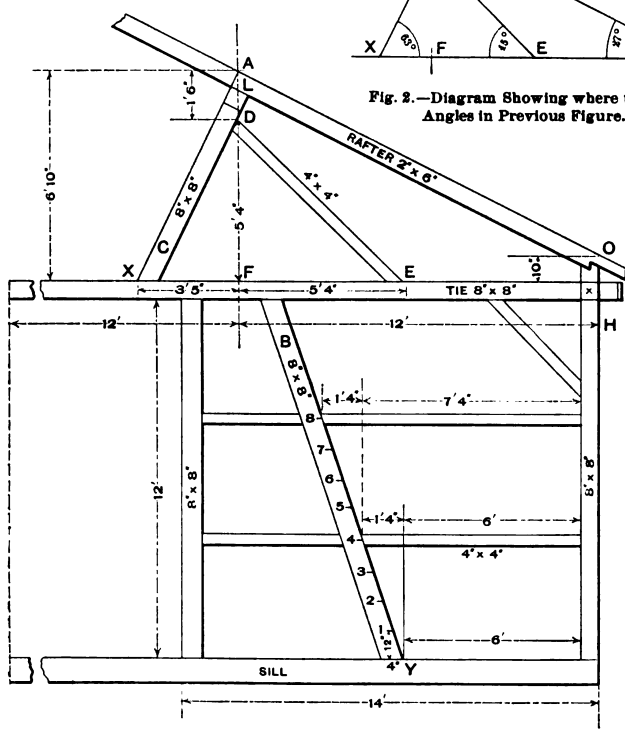


Fig. 1.—Portion of End Bent of a Barn Frame, Showing Method of Finding the Lengths and Bevels of Braces, Leaners, Roof Timbers, &c., with the Steel Square.

Lengths of Braces.—Illustrations Made from Sketches Submitted by "M. D. S.," Pittsburgh, Pa.

The location and lines for the mortises for the railing are obtained in the same manner. Suppose that, for convenience, we divide the 12 feet space into three equal parts: then from sill to center and from center to center will be 4 feet. The fourth and eighth points made in laying off the length of brace will be the centers of mortises for the railing. The remainder of the process of laying out the face lines is obvious. Now, in laying out the railing the space is 14 feet from "out to out," as we say, with the leaner standing in the center of the cap sill. Deducting the thickness of the outside post, and the one-half thickness of the leaner (4 inches), we have 6 feet left—the exact space between on this line. Now, as we have already learned, the leaner inclines just 4 inches in 1 foot of hight, so at the first 4-foot mark, it will require a railing 6 feet + 1 foot 4 inches (four times 4 inches), or 7 feet 4 inches, long on the center line; and for the top rail, which centers on the eighth point, it will require a railing 7 feet 4 inches + 1 foot 4 inches (four times 4 inches again), or 8 feet 8 inches long. By subtraction, the short lengths on the other side may be obtained.

Before taking up the next problem, I will say to "J. C. W.," or any of the readers of *Carpentry and Building*, that if the principle involved in the foregoing demonstration be thoroughly mastered, then he will be able to apply it successfully in that which is to follow or in cutting any brace or rafter where the lines are parallel or at right angles. There are some modifications of the rule which it might be well to note here. It often is possible to abbreviate the operation by doubling the run; as in the instance above, we can take 8 inches and 24 inches, and of course apply the square one half as many times for the same result. Or suppose, as is often the case, that the run was fractional parts of a foot or an inch, say 4 feet 6 inches in a hight of 10 feet 5½ inches. Take $4\frac{6}{12}$ inches on the short end and $10\frac{5\frac{1}{2}}{12}$ inches on the long blade, or double, and we have 9 inches on the short blade and $20\frac{11}{12}$ inches on the long blade, &c.

The second problem submitted by "J. C. W." is to lay out the roof timbers of a barn without a draft. Now, I would have him regard the sketch accompanying this explanation not as the process itself, but rather as the verification or proof of the method. In demonstrating the method of gaining the lengths and bevels for the roof timbers, I have assumed that the sketch, Fig. 1, represents a part of a bent of a building 48 feet wide, and that the roof is quarter pitch; also, that the center of the rafter A on one side is the point from which we determine the position of the roof stool, a line let fall from which cuts the tie beam at right angles and also divides one-half of it into equal parts or crosses it at the point F, 12 feet from the outside H. The plate being 8 inches, and allowing 2 inches more for depth of rafter at O, we have for the hight at A one-half of 12 feet, or 6 feet, to which we add 10 inches, the hight through the plate and rafter at O, or 6 feet 10 inches, which is A F. We proceed to lay out the purlin post C, which is 8 x 8, and for convenience in illustrating we will suppose it to be 1 foot longer than is necessary. The whole plumb hight as we have already seen from tie at F to A being 6 feet 10 inches, and as the roof is quarter pitch, the run will be $3\frac{5}{12}$ inches on the short blade and $6\frac{10}{12}$ inches on the long blade. Proceeding in the same manner as described before, we apply the square with these points on the line or angle, marking along the short blade, which gives the heel cut X. Apply the square in this way 12 times, or treble the run to $10\frac{3}{12}$ inches on short blade and $20\frac{6}{12}$ inches on long blade, and apply one-third of 12, or four times, and the last point will correspond to A in the sketch. But we must allow for the depth of rafter and thickness of purlin plate. Some allowance should be made also for sizing of rafter, so we assume the plumb cut of rafter to be 6 inches at A, and before we remove the square, drop back 6 inches from A and make a point at L. Now, with the awl remaining at this point, lift the square and measure down the timber and parallel with its face 8 inches, which is the thickness of the purlin plate. Square across at this point and we have the line for the top or shoulder cut of the purlin post. While here we will locate the mortise for the back brace. The distance across the post at X we find is 9 inches, and keeping in mind that this is a quarter pitch roof, it will require twice 9 inches, or 18 inches, for our imaginary line to pass from A through the face of post to D. In practice, lay the square with the 18-inch point to A and the 9 inch point on the angle of the post, and the angle of the square gives D, the face and location of the mortise for the back brace.

The whole plumb hight from F to A is 6 feet 10 inches, but from A to D is 1 foot 6 inches, so we have for the run of the back brace 6 feet 10 inches less 1 foot 6 inches, or 5 feet 4 inches. If we set the brace at an angle of 45° with the tie, the cut at E is a square miter. In relation to the tie, the purlin post or line X A is at an angle of 63° and E D is 45°. Subtracting, we have 18° for the angle at D, or one-fifth of the quadrant (90°), or a cut requiring 4 inches on the short blade and 12 inches on the long blade. It only remains now to lay out the tie beam. For convenience, in practice, I would trace a line across the face of the timber at F, and in this case just 12 feet from the outside of building or H. This point corresponds with or is the point in fact where our imaginary line A F passes through. Measure off to the right 5 feet 4 inches to E for the face or toe of the mortise for the back brace. Measure off to the left 3 feet 5 inches to X, which is the face of the mortise for the purlin post C. After having read the foregoing, "J. C. W.," or any other amateur, will see that to lay off the rafter the square is applied 12 times from O to A with the points 6 inches and 12 inches, or six times using the points 12 inches and 24 inches. Experience has shown that this method, while reliable enough where the process is thoroughly understood, grows more intricate as we depart from any regular pitch, as from one-quarter, one-third, or one-half pitch, and that, after all, in cutting a roof, it is better to have a suitable board at hand on which to make a sketch or draft.

Figuring Stone Work.

From CARPENTER, *Baltimore, Md.*—Will some of the practical readers of the paper give a method for figuring the number of perch of stone in a foundation wall, and also the number of perch of masonry in a foundation, say a wall 27 x 8 feet, 6 inches by 1 foot, 6 inches thick? I should be glad to have the correspondent supplying the information give an example showing the method of working it out.

Cold Storage Buildings.

In the letter published last month from "M. S. A.," Battle Creek, Mich., descriptive of cold storage buildings, a slight error occurred in the fourth line from the bottom of the middle column, page 85. The text should have read "2, 2, are 2 x 3 inch blocks about 4 inches long," &c., instead of 4 feet long, &c.

Taking Wind Out of Timber.

From A. W. W., *Sudbury, Ontario.*—In answering the question from "H. P. F.," Lapel, Ind., who asks how to take the wind out of timber, I will endeavor to present a plan which entirely does away with plumb spotting the timber, which, especially in hewed stuff, causes a loss of valuable time. Referring to the sketches, Fig. 1 shows what is called a wind batt. In taking the wind out of timber, two wind batts are required. This wind batt consists of a piece of board $\frac{1}{2}$ x 4 inches and about 18 inches long. The edges of the batt must be made parallel to each other. Then a line is drawn down the center, leaving 2 inches on each side of the line, as shown in the sketch. The brad awl is then stuck through the bottom half for the purpose of fastening to the end of the timber. The wind batts are then stuck on the ends of a piece of timber as shown in Fig 3 of the sketches, half the batt projecting above the timber. The operator then sights over the upper edges of the batts and moves either end until the edges coincide. He then takes the scratch awl and marks across the bottom edge of the batts at each end of the timber, as shown in Fig. 4. This completes one side. The rest is easy, as in the other side the wind is taken out by means of a steel square as indicated in Fig. 5. Place the inside edge of the tongue of the square even with the line made by the wind batt, the outside edge of the blade being even with the smallest place on the outside of the timber. Mark with a scratch awl down inside of the blade. Move the square up 2 inches on the timber and mark through to the top of the timber. The latter is then out of wind and the operator will proceed to line it, as shown in Fig. 2, which represents a stick of timber with the wind taken out and lined. Stick the scratch awl in the end of the timber at the point where the plumb lines cross each other, the awl being through the small loop in the line. All four sides of the timber may then be lined without moving the scratch awl. In taking the wind out of timber in this manner considerable time is saved, as one man can take it out of wind and line it without other help.

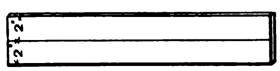


Fig. 1.—A "Wind Batt."

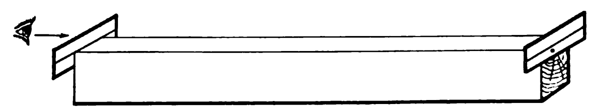


Fig. 3.—Showing "Wind Batts" Applied to a Piece of Timber.

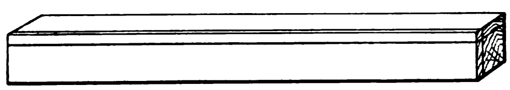


Fig. 2.—Piece of Timber with the "Wind" Taken Out and Lined.

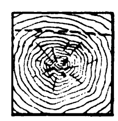


Fig. 4.—End of Timber, Showing Awl Scratch Along Bottom Edge of "Wind Batt."

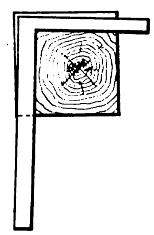


Fig. 5.—Showing Position of Steel Square on End of Timber.

Taking Wind Out of Timber.—Illustrations Submitted by "A. W. W."

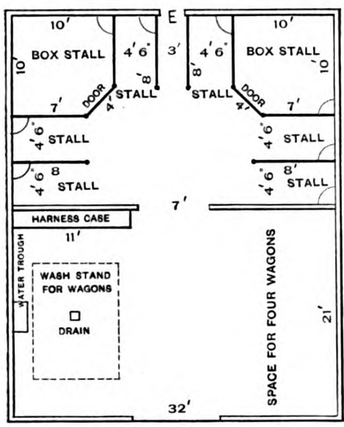
Trouble With Electric Bell.

From R. P., *Huntsville, Texas.*—I am in trouble with electric bells, one single stroke and the other vibrating. The difficulty is that I cannot get a blow hard enough. The vibrating is not as strong as the other. I have eight cells of dry battery and the hammers are on No. 14 brass wires. The size of the magnets is 1 inch in diameter by $1\frac{5}{8}$ inches long. The core of the magnets is $\frac{7}{16}$-inch in diameter. Do you think the magnets too small, and if so, how can I make them stronger? I want to know if in Fig. 5 in *Carpentry and Building* for February the small spring shown just below the one marked E that strikes the contact screw is of much use. The spring seems to be of no use in the vibrating bell, as it lies flat. On the single stroke bell there is no spring. I have had these bells worked on three times at an electrical establishment where they were made, but with no good result—simply a loss of time and money.

Answer.—We assume from our correspondent's letter that his bells are connected in series, and that the whole current passes through each bell. Eight cells of battery are entirely too much and are liable to burn out the contact points on the bells. The resistance of the magnets should be about the same on each bell to have them work properly—in other words, there should be the same size and amount of wire in the coils of each bell. The size of his magnets appears to be right, provided they are properly constructed. The small contact spring should be substantially the shape shown in the cut, as referred to. Both bells should have these springs, as they not only admit of a more delicate adjustment, but also prevent the adjustment being deranged by the hammer-like blows of the armature on the screw. Four cells of battery, if in good condition, should furnish an abundance of power to operate these bells. Never connect batteries of different makes together. Take four of the cells and test them. If our correspondent has no galvanometer this can be done with an ordinary electric bell. Connect it by means of short wires to the battery. If it rings sharply the battery is all right; if it does not, test each bell separately in the same manner, to discover which one is to blame, as one weak bell in a battery of 50 would destroy its working power. If the battery proves all right, close the circuit and try the adjustive screw on the vibrating bell. Turn it back until the magnet will scarcely attract the armature, then reverse and turn the screw up slowly, and when the proper adjustment is reached the bells should ring clear and regular. If this does not remedy the trouble, test the bells separately. If all else fails, try connecting the battery in multiple arc—that is, connect all the negative elements with one wire and all the positive with the other. The bells may be wound for a quantity current rather than intensity.

Plan of Stable.

From C. D., *New York City.*—I send inclosed sketch showing plan for stable in answer to the inquiry of "W. K. T.," Houstonville, Pa., whose letter



Plan of Stable Contributed by "C. D."

appeared in the issue for August last. The sketch is so clear that very little explanation is necessary.

Durability of Wire Nails.

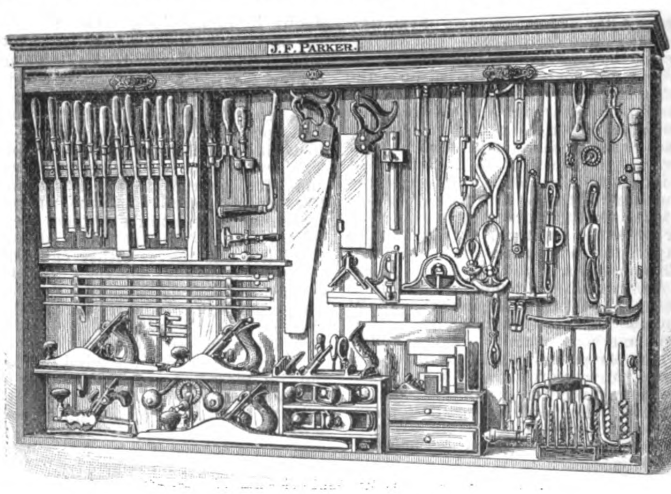
From F. C F., *La Porte, Ind.*—I have been a subscriber to *Carpentry and Building* for a number of years, and take great pleasure in reading the notes and queries from brother chips the country over. I wish to speak my piece about wire nails. One carpenter asked about their rusting out on shingled roofs. I would say that they have not been used here long enough to satisfactorily answer the question. I will, however, ask, What are wire nails good for to the carpenter, anyhow? They will split the wood when driven near the end sooner than a cut nail, and they will not stand a last blow if the board is a trifle warped, because they lose their grip. For toe-nailing they are a fraud, and will raise a studding from the sill if you try to draw on them. For building board sidewalks, the heads will serenely bob up to the extent of ½ inch in a few months, not to mention a carpenter's hands being as black and greasy as a machinist's, leaving finger marks all over the wood work, while the carpenter's nail apron is punctured by them until it resembles a hedgehog. Let the cut nail fellows reduce the temper in their nails so that the heads will not fly off when driven home and carpenters will go back to them.

From G. W. B., *Cincinnati, Ohio.*—I am glad the question of the comparative durability of cut steel and wire nails is up for discussion. I think either will rust quicker than the old iron nails "we used to have." I quit using cut steel nails for outdoor work some years ago, because I thought they rusted away very soon. I laid sawed pine shingles on a large roof in this city, using 4d cut steel nails and employing two nails to every shingle. Within three years the nails began to rust in two in the middle and the shingles to drop down. In five years the roof was recovered with tin. It was rather a steep shed roof and had a Southern exposure. One great objection to cut steel nails is the tendency of the heads to fly off. Herewith I send samples of cut steel nails and wire nails taken to-day (February 6) from the bottom band of my shop sign, which is just nine and a half years old. The cut nails (steel) were driven up through the band in the signboard, while the wire nails were driven down through the band into a 2 x 4, on which the sign rested. The 4d steel nails held the wall brace at the top of the sign. These cut nails are steel and are like any cut steel nails I have ever seen after being out in the weather five years. One of the wire nails is nearly as good as new, but why I do not know.

Note.—The nails sent us by the correspondent above are so thoroughly eaten away by rust that with two exceptions they are in small pieces. The two named are intact as regards the length, but one of the wire nails is badly eaten from its head half way to the point, in one place it being so nearly eaten through that a little effort breaks it. The other wire nail, which is the one specially referred to by the correspondent, is in fairly good condition, considering the number of years it has been in use.

Tool Cabinet.

From J. F. P., *Portland, Maine.*—I have been a reader of *Carpentry and Building* for a number of years, and I have seen presented a good many ideas in regard to tool chests. I have a tool cabinet in place of a chest, which I think much better for a man who intends working any length of time in one place. Of course, if a man is mov-



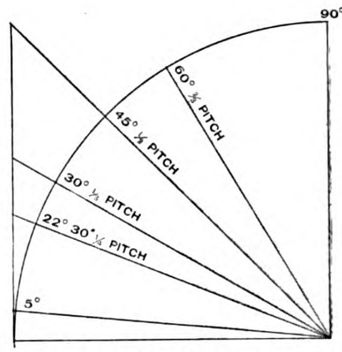
Tool Cabinet of "J. F. P.," Portland, Maine.

ing about a chest is far better. Thinking, perhaps, that some of the readers of the paper might be interested in my cabinet, I inclose a photograph showing its appearance when opened. It is made of white wood and so put together that it can be easily taken apart. The front is about on the same principle as a rolling top desk. It rolls over a very small circle, but moves on trucks, so that it works very easily. It drops on the back part between two partitions. When the photograph was taken there were 122 tools in the cabinet. The rack which holds the chisels moves to one side, and back of it is an equal number of gouges.

Note.—From the photograph sent us by our correspondent we have made the engraving presented herewith, which clearly shows the position of the various tools and the general proportions of the cabinet.

Pitch of Roofs.

From H. P. C., *Prentice, Wis.*—In looking over the May number of *Carpentry and Building* for last year I notice several replies to "G. A. L.," in regard to the pitch of roofs. I am



Pitch of Roofs.—Diagram Submitted by "H. P. C."

prompted thereby to send my idea, which is roughly conveyed by the sketch inclosed. "O. L. W." of Dallas, Texas, says that he has found it the rule to express the pitch of a roof as the fractional part of the span. Now, I claim it is the fractional part of a quarter circle, as shown in the sketch which I send. I do not wish to criticise, but I would ask "F. E. C." of Marion, Ind., what pitch he would call a 5, 7 or 9 inch rise? Most workmen claim that one-half pitch is an angle of 45°. Will some one tell why this rule will not work from the horizontal to the perpendicular? In this part of the country workmen are asked to cut the rafter at an angle of 25°, 35° or 40°, as the case may be. "A. W. W." sends a sketch published in the May number showing a one-third pitch to be 34°.

Design of a Hennery.

From S. C. C., *Altoona, Pa.*—The poultry house illustrated in the accompanying sketches was constructed for John Lloyd of this place, and designed particularly with regard to warmth, light and fresh air for the several varieties of fancy chickens on his farm in the vicinity of Altoona. The building, as will be seen from the plan view, covers an area 12 feet 6 inches by 30 feet, and has a hight on the square of 8 feet. Fig. 1 represents the front elevation, Fig. 2, plan ; Fig. 3, a side or end elevation ; Fig. 4, a sectional view, and Fig. 5 a detail of a corner post. The partition which makes the passageway is built over the nests and in the middle of the partition is a screen door. The wire netting employed is galvanized and has a 2-inch mesh. Adjustable posts are set on the inside for extra partitions to separate fancy breeds. The manure catch is built of ⅞-inch boards covered with sheet iron. The nests are so built that eggs or fowl may be taken out from the passageway and a sliding door arranged to be pushed down in front of the entrance to the nest, so that the hen, if necessary, can be secured without getting into the coop proper. The door to the nests, as shown, is hinged at the bottom. The design here presented was intended for a house to be placed against a barn, but was changed so as to be separate and apart from the others ; therefore, the left end of the building was constructed the same as the right, which is shown in the illustrations. The building is lined up to the square hight, 8 feet, and is heated by steam pipes running under the floor four times the length of the building. The contract for the structure without steam pipe was about $250, including three coats of paint.

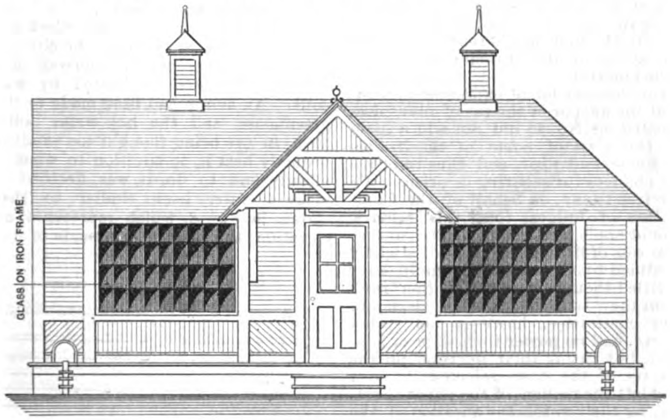


Fig. 1.—Front Elevation.

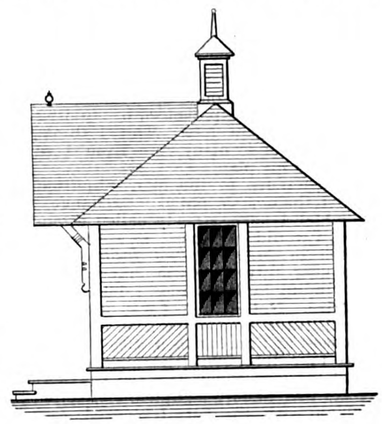


Fig. 3.—Side Elevation.

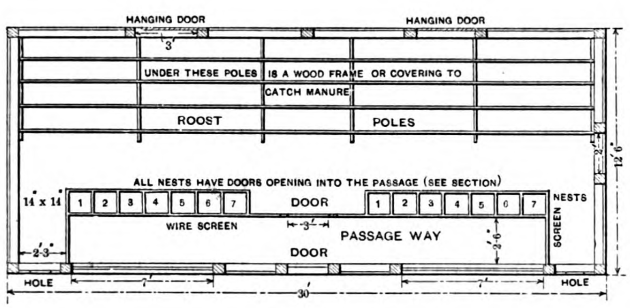


Fig. 2.—Plan View.

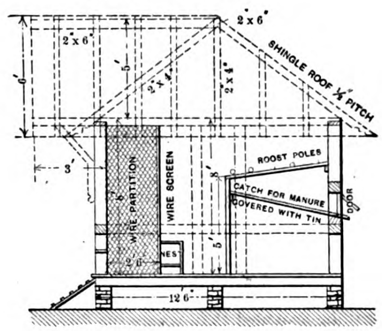


Fig. 4.—Sectional View.

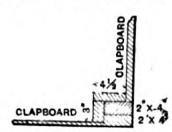


Fig. 5.—Detail of Corner Post.

Design of a Hennery.—Plan and Elevations, Scale, ⅛ Inch to the Foot.—Detail.—Scale, ¼ Inch to the Foot.

Criticism of Floor Plans of an Eight-Room House.

From J. P. KINGSTON, *Worcester, Mass.*—While I was satisfied with my position in the Floor Plan Competition, I cannot help thinking there were others smarter than myself. They have caught on to an idea of which I did not think, else I might have planned differently. It was in putting the house on a corner lot, as I cannot see how some of them could be used otherwise, judging from the scale measurement. How any judges could select some of the plans is a puzzle to me. For instance, take No. 63. I find it measures 34 feet on the first floor and the second floor 33 feet, and this without allowing for any cornice. How can such a house set on a 33-foot 4-inch lot? Either the owner would be obliged to borrow land from his neighbors, construct a tunnel, or go through his house to get to the back yard. The next widest one I find is No. 65, measuring 33 feet. It had the same number of votes as the one submitted by me, and it was only 26 feet wide. No. 46 is 31 feet on the first floor and 32 feet 6 inches on the second floor. No. 5, the winner of the Third Prize, is 30 feet 6 inches wide on the first floor and 32 feet on the second floor. No. 83, the winner of the Second Prize, is 30 feet wide on the first floor, and that not counting the back steps ; while the second floor is 31 feet, and so on, until we come to the First Prize winner, which measures 28 feet in width. No. 78 is 26 feet wide. All the above measurements do not include any cornices or projections of any kind ; and as before remarked, I cannot see how the committee could take some of them into consideration for a lot 33 feet 4 inches wide. It is more than I can comprehend.

Personally I had four other plans submitted, none of which measured over 26 feet wide and less—and, by the way, the plan I doted on most was not selected at all. It was marked "Exchange." I was more than surprised that it was not chosen when No. 2 and No. 78 were so nearly alike. It may be that the engravings are not made strictly to a $\frac{1}{16}$-inch scale, and I am in error as regards the measurements I have mentioned. If so, I ask pardon of the committee.

Now, about the prize plans. I want to congratulate F. J. Grodavent on his success, as his was one of the best plans published, but I cannot say it was better than my own. Mine had all the conveniences his possessed and was 2 feet narrower, leaving so much more of the lot vacant. I am sorry G. E. Gilbey, the owner of No. 48, did not get a prize, as he certainly deserved it. Had he only put a little more room in one or two of his chambers, it would have been one of the best, and then there would have been left 5 feet 4 inches of the lot. The next best plan, I should say, was No. 66, possessing good rooms and being only 27 feet, thus leaving sufficient space to enter the house without trespassing on neighbors' land.

I should like to ask all who voted for Nos. 83 and 5 if they took into consideration the width of the lot, or if they put a rule on the plans to see how wide they were. I do not see how either could be built within 1 foot 6 inches of the line on one side, and that would not leave room enough to do the work on it, and then how much room would there be left on the other? Not enough to carry a basket of coal or put in a barrel of flour. The first-floor plan of No. 83 is good, but the second floor is very poorly arranged. I cannot see much to commend No. 5. The plans of Nos. 94 and 11 are even better than it or No. 83. In this State, and in fact all the New England States, they do not have lots less than 40 feet wide and most of them are 50 feet, so we do not often come in contact with the difficulties experienced by building on such narrow lots. This, I think, accounts for so many votes from these parts for my plan.

In reference to the plan submitted under the *nom de plume* "Exchange," to which I have already called attention, I would be pleased to see it published in *Carpentry and Building* in the near future. Some may think I am finding fault because I did not get a prize. Not so; for I was awarded first prize in the Competition for $1000 Houses, and am satisfied with that. I also take into consideration the fact that the plan which received the most votes was almost a duplicate of mine, which, with the vote I secured, goes to show that my plan was very popular and as good as second best anyway. I hope to hear from a number of the readers of *Carpentry and Building* on the merits of the several plans, as in my opinion it will result in much good.

Note.—After a perusal of our correspondent's letter, one is very apt to get the impression that the prime object of a floor plan competition instead of being the most convenient and economic disposition of the rooms, is that arrangement which will give the greatest amount of space between the building lines and the sills of the house intended to be erected. It is perfectly obvious that in a building planned to occupy nearly the full width of the lot, larger and more airy rooms can be provided than where the dwelling covers but half or two-thirds the space, for a gain in area about the structure must, necessarily, be at the expense of the rooms within. Just what constitutes a proper ratio between the width of a house and the lot upon which it is erected, seems, however, to be a debatable point, judging from the drawings submitted in the competition under discussion. In fact, our correspondent states that in his section it is usual to have the building lots not less than 40 feet in width, while most of them are 50 feet, which it can be readily seen would allow for a commodious dwelling based on the plans published in the January issue, and still leave considerable open space on all sides. In other sections of the country, especially in this vicinity, it will be found that many suburban residences come surprisingly close to covering the entire lot, for where ground space is so very expensive the width of the site is usually but little, if any, in excess of that of the house. It is therefore reasonable to suppose that the sets of drawings contributed in the XXIVth Competition were fairly representative of the customs and practice prevailing in the localities from whence they come. This being the case, it is evident that what is regarded as satisfactory in one section is wholly out of keeping with the views of those residing in some other part of the country. Individual preference might decree more space between the house and the building lines than was indicated in some of the plans presented in the issue for January, but there was nothing in the conditions of the contest to determine what this space should be and the committee had no discretion in the matter. So long as the original drawings came within a strict interpretation of the requirements of the contest, and possessed features of merit sufficient to warrant a place among the selected twelve, the committee had no justification in throwing them out on the ground of width. With regard to the scale of plans, we may be permitted to state that it sometimes happens, in the process of printing engravings, slight discrepancies occur which, in the case of drawings to so small a scale as $\frac{1}{16}$ inch to the foot, would readily account for apparent inaccuracies in the published matter.

Our correspondent expresses sorrow that the author of the set of plans designated as No. 48 did not add a little to the size of some of the rooms on the second floor, and thus improve his chances for securing a prize. We are free to say, on behalf of the Committee of Judges, that this remark would apply with equal force to several sets of drawings which, if slightly modified by their authors, would have entitled them to a much higher rank than they took in the final decision. The committee, however, as stated above, had no power to change or suggest, but basing their decision on the merits of the case selected 12 sets and left the readers of the paper to settle, by their votes, the question of the several prizes. This they did in a way which indicated careful study of the plans presented and a thorough appreciation of the work of the committee.

Our correspondent also congratulates Mr. Grodavent on his success, but seems to consider the plans receiving the first prize no better than his own, more especially as his possessed all the conveniences of the prize winner, and were "2 feet narrower, leaving so much more of the lot vacant." All things being equal, we are inclined to the opinion that more votes would be cast for a plan showing reasonably large and airy rooms, with little or no open space at the sides of the house, than for one in which the size of the apartments had been sacrificed for the sake of more room outside. Without attempting to explain why more votes were cast for No. 2 than for No. 78, we can offer a hint, derived from letters received from many of the voters in the contest. Not a few of the writers expressed a liking for both sets of plans, but favored No. 2 the more on account of the arrangement of the first floor and the facility with which parlor, library and dining room could be thrown into one when necessary. Both plans, however, were popular with our readers, as may be judged from the aggregate vote cast for them. We are glad to know that Mr. Kingston is satisfied with the hearty indorsement which his efforts received at the hands of the readers of *Carpentry and Building*, and to assure him that his record is one of which he may justly be proud.

Heating Greenhouse with Hot Water.

From OLIVER TWIST.—Hot water heating, like every other business, has its difficulties, which can only be overcome by experiment and thought. The difficulty in the case which is described and illustrated was to continue the circulation of hot water past a doorway in a greenhouse which is heated by wall coils. An annex had been made to the greenhouse, and the hot water boiler then in use being thought too small to properly heat it, in addition to what it already had to do, it was decided to make a water back similar to that shown in Fig. 3, which represents an elevation and plan. It is made of five pieces of 1½-inch pipe, connected with elbows and headers, as shown, being 5 feet long. This is placed in the furnace at an inclination of about ½ inch to the foot at or near the top of the fire box. This supplies about 600 feet of 1 inch pipe, arranged in wall coils five pipes high, as may be seen by reference to Figs. 1 and 2. Fig. 2 shows a plan of building in which can be seen the location of boiler. Fig. 1 shows the method of getting past the doorway A 1¼-inch pipe is taken from the bottom of the header and continued down to and across the floor, then up and into the bottom of the header on the opposite side of the door. From the top of each header is taken a ½-inch pipe, which runs up to a hight somewhat above the level of the expansion tank, to allow for expansion of the water without overflowing. This plan gives entire satisfaction.

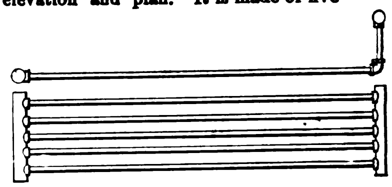


Fig. 3.—Plan and Elevation of Auxiliary Heater.

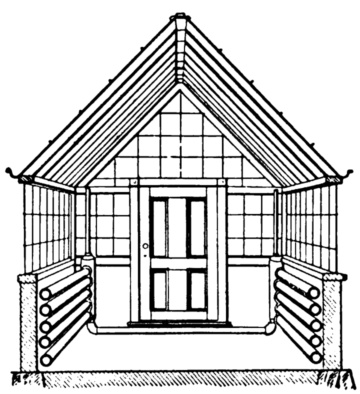


Fig. 1.—Section through Building, Showing Method of Passing the Door.

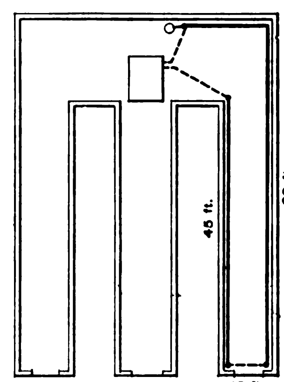


Fig. 2.—Plan of Greenhouse.

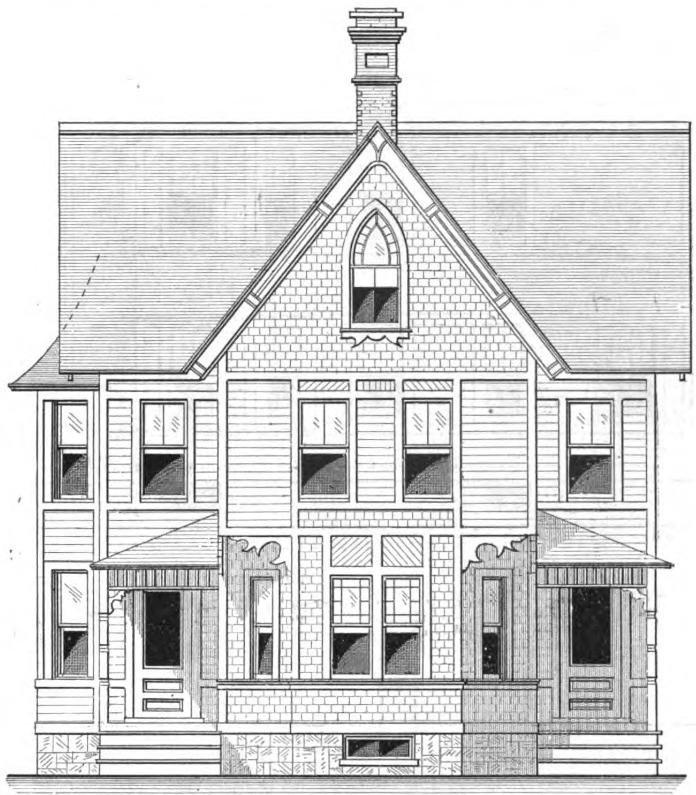
Heating a Greenhouse with Hot Water.—Illustrations Accompanying Letter from "Oliver Twist."

TWO-STORY FRAME COTTAGE.

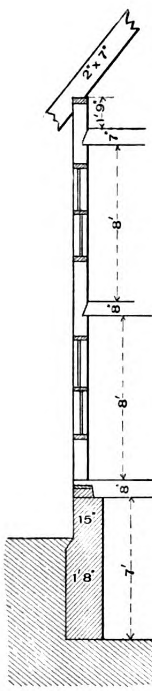
THE accompanying engravings represent elevations, floor plans and details of a two-story frame cottage intended for erection near the seashore and designed by Henry F. Wenzel of Waterbury, Conn. The cellar extends under the entire house, the underpinning being cut granite with vertical joints. The hight of the first story is 9 feet in the clear and of the second story 8 feet. From the specifications we learn that the first floor joists are 2 x 9 inches, the second floor joists 2 x 8 inches and the third floor joists 2 x 7 inches—all 16 inches from centers. The sills and cross sills, 4 x 6 inches; the studding, 2 x 4 inches; the posts, 4 x 4 inches; the plates, 2 x 4 inches, doubled, well spiked together, and on each studding; while the rafters are 2 x 7 inches, placed 2 feet from centers. The exterior face of the frame work is covered with hemlock sheeting, put on horizontally with all joints cut on the studs. Over this is placed building paper, which, in turn, is covered where indicated on the drawings with cedar shingles 5 x 18 inches, laid 6 inches to the weather. With the exception of the shingles the exterior is treated with coats of white lead and pure linseed oil.

The interior of the house is finished with a hard white coat of plaster, the parlor and vestibule having a small plaster cornice overhead, while all of the rooms are provided with picture molding. The parlor, sitting and dining rooms also have plaster center pieces 18 inches in diameter. The bathroom and kitchen are wainscoted, as shown in the details.

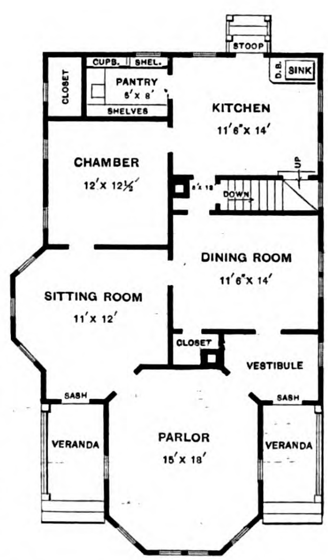
The author states that the cottage is designed more especially for summer boarders, and is so arranged as to accommodate from 25 to 30 at a time. The sleeping rooms on the second floor, which are five in number, are well lighted and ventilated, and each has opening from it a commodious closet. The situation of the bathroom is also such that it is readily accessible without interfering in any way with the other rooms on that floor. The attic is not wholly finished, but can be transformed at any time, at small expense, into a number of sleeping rooms.



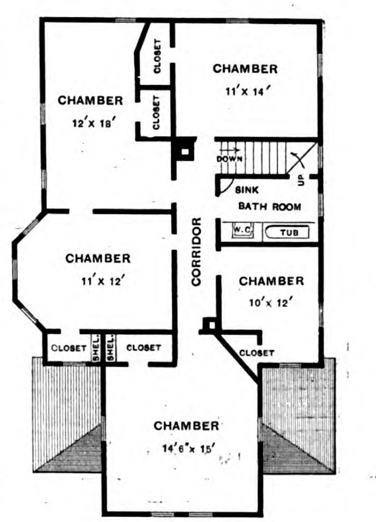
Front Elevation.



Section.



First Floor.



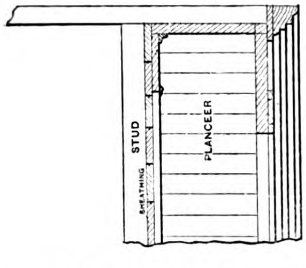
Second Floor.

Two-Story Frame Cottage.—Henry F. Wenzel, Architect, Waterbury, Conn.—Elevation and Section.—Scale, ⅛ Inch to the Foot.—Plans.—Scale, 1-16 Inch to the Foot.

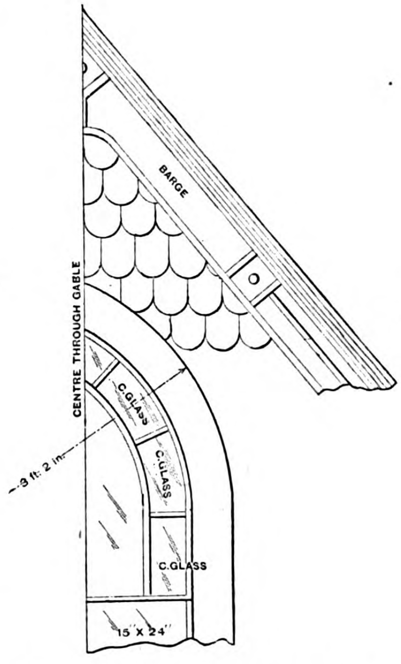
Side (Left) Elevation.

Side (Right) Elevation.

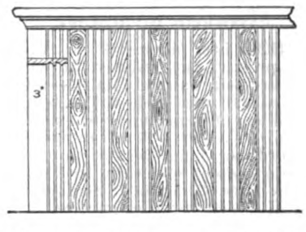
Two-Story Frame Cottage.—Elevations.—Scale, 1/8 Inch to the Foot.



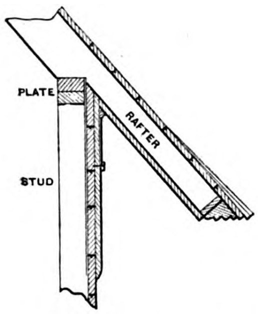
Section of Gable.—Scale, ½ Inch to the Foot.



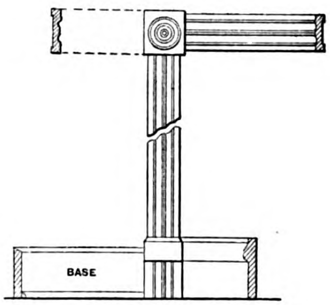
Detail of Gable.—Scale, ½ Inch to the Foot.



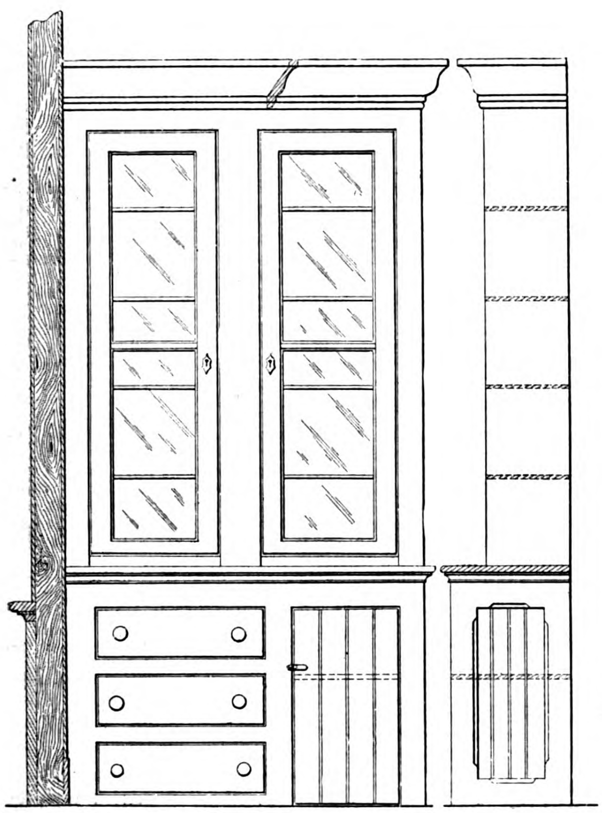
Detail of Wainscoting.—Scale, ½ Inch to the Foot.



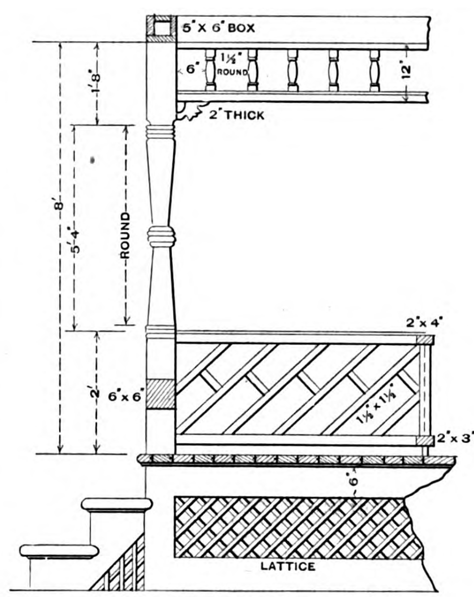
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



Details of Door and Window Trim.—Scale, ½ Inch to the Foot.



Front and End Elevations of Cupboard in Pantry.—Scale, ½ Inch to the Foot.



Detail of Veranda Trim.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Two-Story Frame Cottage.

PRACTICAL HOUSE PAINTING.*

By ARTHUR S. JENNINGS.

FINISHING WOOD WORK.

THERE is so much wood work at the present day finished in what is termed natural finish—simply stained and varnished—that it becomes a problem of importance to know how to finish it to the best advantage. Taking ordinary pine, the first thing to be done is to apply something that will fill up the pores of the wood. Shellac is frequently used for this purpose and is now employed for good jobs, but its expense stands in the way of its being used largely. Liquid wood fillers are now almost exclusively employed for ordinary work, and if a good filler is used excellent results are obtained at a comparatively small cost. It may be explained that a liquid filler really consists of a coat of varnish to which has been added some pigment that will fill up the pores of the wood. Silex is sometimes used; also corn starch. A single coat of liquid wood filler is applied to the wood to give a substantial surface or filler and a coat of varnish at the same time. The surface is then lightly rubbed with sandpaper and as many coats of varnish applied as may be thought necessary—two coats usually giving a good surface. It is not a bad plan to add about one-third of the liquid filler to the second coat of varnish, although this is not very frequently done. The staining of the wood may be done at the same time as the first coat of liquid filler is applied, this material being manufactured in various shades under the title of "liquid filler and stain combined." The closer grained hardwoods may be finished in the same way, but the more open grained woods require the application of what is known as the paste filler. This may be purchased ready made, and is thinned down with a little turpentine and applied with an old, worn brush. After being allowed to dry on for a few hours, all the paste filler that remains on the surface is scraped off with a hardwood scraper, leaving the pores of the wood completely filled. It is necessary to take care to remove as much of the filler as possible, as any that may be left on the surface will cause a very unsightly mark. A coat of shellac may be applied on top of the filler, and then as many coats of varnish as may be desired.

Some painters prefer to make their own paste filler, and the following recipe is intended for such: Mix together corn starch and boiled linseed oil, to which has been added a little japan dryer, until a thick paste results. Reduce this with turpentine to a working consistency. If the filler is to be applied to a light colored wood no color will be necessary, but for dark ash or chestnut a little sienna may be added, and for walnut, umber and a little Venetian red. As soon as the filler is applied it is well to go over the surface with a broad bladed square ended putty knife, as this will force the filler well into the pores of the wood, and by it may be removed during the same operation any surplus filler that remains on the surface.

Some painters are in the habit of using glue size for priming wood work that is desired to be finished in natural finish. The writer has seen an architect's specifications in which glue size was called for in very high class work, and the architect, by the by, was generally looked upon as a man of considerable practical knowledge. Glue size is entirely unsuitable for the purpose, not because it fails to give a good surface for the varnish, but because it is liable to be affected by variations of the temperature. In hot weather it is too brittle for the purpose, and a blow accidentally given to the wood work will cause a section of the varnish to chip off owing to the brittle undercoat of glue. In damp weather it is also found to give unpleasant results.

* Continued from page 92, April issue.

FLOORS.

The method of finishing floors presents a somewhat difficult problem, especially where they are located in such positions as to be subjected to great wear. The finish for floors in painting materials may be conveniently divided into three—paint, stain and varnish and wax. The best paint for the purpose is made of finely ground yellow ocher mixed with litharge, emery and boiled oil. The work should be primed with oil and ocher, mixed very thin and well brushed in, and then the paint be applied, allowing plenty of time between each coat. Two or even three coats should be given, finishing with a coat of elastic floor finish. The proportions of materials used with the paints may be as follows: 3 pounds of ocher, 1 pound of color of emery and 1 pound of litharge ground in oil. This mixture should be added to one part of quick rubbing varnish and one part of boiled oil; turpentine may be used for thinning, if necessary. Another good paint for floors is made by mixing white lead and zinc white in the proportions of two of the former to one of the latter. In this case it is necessary that ample time be allowed between each coat; in fact, the efficiency of the paint depends largely upon the time given to it for drying. Ocher or other color may be added if desired. Many of the paint manufacturers produce special floor paint, and some of it is very good. The simplest way of finishing a floor by means of stain is to buy the stain ready made, giving a single coat, rather lighter in tone than is required for the finish; then putty up cracks and holes with a putty to which some of the stain has been added; then give another coat of stain, and when this is thoroughly dry one or two coats of varnish. The varnish used for this purpose is specially made to resist the action of water, and it is very necessary to remember that ordinary varnish will not answer. A still simpler plan is to add a little asphaltum to boiled linseed oil; the asphaltum gives a slight brown tint to the oil, and the result is a good surface, although not so good as one that has been varnished.

Hardwood floors are best finished with wax, beeswax dissolved in turpentine being used. This is applied freely with a brush after the wood is filled and polished with a long bristled brush specially made for the purpose, weighted with lead. On the Continent of Europe, where wax polished floors are seen in a state of perfection, the custom is to wax them as frequently as once a week. A little of the wax is applied and then a brush is affixed to each of the operator's feet, who waltzes over the surface with great dexterity, producing a high degree of polish with great rapidity. For such floors as receive an application of wax it is well to leave a little of that article behind with the owner or tenant in order that he may polish them himself occasionally.

Another method of finishing hardwood floors, and a very good one, is as follows: First fill the pores of the wood with a paste filler similar to that already described. Then scrape off superfluous filler with a wooden scraper, putty up holes and cracks with a litharge putty and when dry apply a coat of elastic varnish thinned with turpentine. Then apply a little wax with a piece of muslin and polish with a piece of burlap or other suitable fabric. Prepare the wax as follows: Take two cans, one larger than the other, place some water in the outer one and put the smaller tin into it, as though to melt glue. Shave off beeswax with a sharp chisel into the inside can and cover the shavings with turpentine. Set on a warm stove until the wax is dissolved and the mixture is of the consistency of butter, when it is ready for use.

MEASURING FOR PAINTING.

Plain painting is usually measured by the square yard or by the square of 100 feet, and varnishing is measured in the same way. Posts, balustrades, &c., may be counted at so much each, and cornices, lined work, &c., by the foot or yard run. The following hints will be useful in estimating: Two coats of paint require from 6 to 9 pounds of paint for every 100 square feet, 7 pounds being about the average. The third coat requires about 3 pounds more. The first coat on new wood should have from 6 to 7 gallons of oil to the 100 pounds of lead, while the second coat should have about 5 gallons. A gallon of linseed oil weighs 7½ pounds, and estimating that the work will take 6 gallons of oil to 100 pounds of lead, every 100 pounds of lead will make 145 pounds of mixed paint, the ground pigments for tinting perhaps making it 150 pounds, or 20 gallons. These figures are based on the rules given by an old painter of extensive experience and may be relied upon as being accurate. The same authority says, on the question of how much time to allow: "The amount of surface which one man can cover in a day depends upon circumstances. To such an extent is this the case that I have known a man to work as hard to do 200 feet of work as he did at another time on other and very plain work to paint 1800 feet, the difference being that in the latter case he used his 'locomotives' more. On the average of plain ordinary work, probably 1000 feet is about as much as most men will do. I speak, of course, of the day of ten hours."

In measuring blinds take the superficial area and add one-half; allow 1 inch for moldings, ½ inch for beads and 1 inch for cutting edges.

Measure brick work solid and deduct one-half of openings.

Measure lattice work solid and multiply by one and a half to three, depending upon the class of work.

Of two colors in sashes, allow half extra; edges of shelves to be measured three times.

Ballusters one and a half and three times measurements.

For cleaning off new work add 3 per cent. to the whole bill.

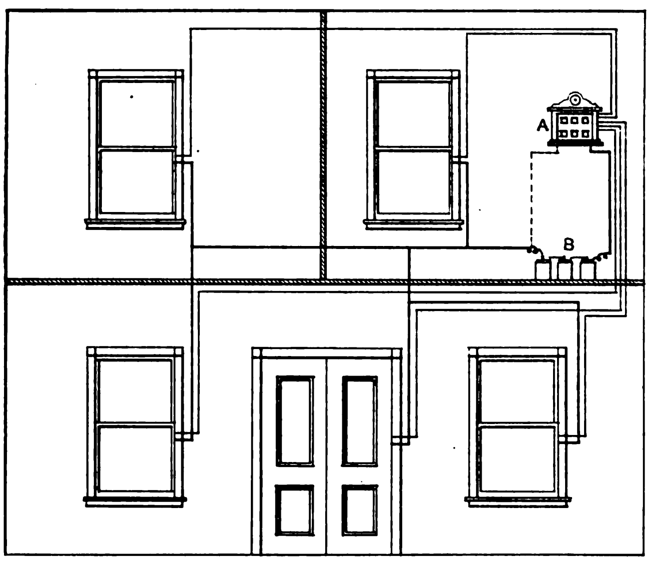
All work done over 2 miles from the city limits and under 3 miles, add 5 per cent.; over 3 miles and under 4 miles, 8 per cent., and over 4 miles, 10 per cent.

ARCHITECTS and others who keep in advance of the times insist, says the Philadelphia *Record*, that stone will be more extensively used next season than ever before for residences, the craze for mottled and colored bricks being on the wane.

DOMESTIC ELECTRICAL WORK.*

IN installing a system of burglar alarms, it should be born in mind that it is both safer and more agreeable to scare a burglar off than to fight him off, and the system that will most successfully accomplish this comes the nearest to being perfection; at least, that is the writer's view of it. Another point to look after carefully is to conceal all wires, batteries, &c. Knowing full well that the average burglar is possessed of a great deal of ingenuity and cunning, too much importance cannot be attached to this part of the work. The writer has found burglar alarm systems installed in quite pretentious dwellings where the battery was set on a shelf at the head of the cellar stairway, and the switch placed on the inside of the cellar door casing, with no connection on the cellar door or windows. A burglar entering this house through the cellar would at once divine the object of this battery and switch, and if he was possessed of the slightest reasoning power would, before proceeding further, disconnect these and keep silent the obnoxious bell. A system installed in this manner is simply ridiculous. It is worse than none at all, for while the occupants are sleeping in fancied security a burglar may be ransacking the house, and next morning burglar alarms in general will be condemned as useless "fakes." The writer cites this case in order that the beginner in this class of work may guard against committing a like folly.

The battery, annunciator and switch should be located in the chamber occupied by the head of the house. The battery and switch can be placed in a closet which opens into this room only, so that nothing but the annunciator need be seen, and in no other part of the house should the slightest suspicion of a burglar alarm be visible. In addition to the ordinary door and window connections, electric burglar alarm floor matting may be used. This is an article that beats the craftiest of burglars or sneak thieves. The latter is perhaps the hardest of all dishonest persons to guard against. He is watching your every movement, sneaking in as you go out and sneaking out as you come in, leaving no trace behind him except the loss of what he has pilfered. But this electric matting watches his footsteps and gives warning of his presence. This is placed under the carpet, and no sign of it is visible on the surface. It can be put in front of doors, under windows, in the center of the room, on the stairway; it can be so placed that it will be impossible to step from one room into another without causing an alarm. In order to make the scaring off plan more effectual, where gas is used an automatic electric gas burner may be included in the circuit in each room, so that at the first attempt to enter the house the gas is automatically turned on and lighted, and it is safe to say that any burglar will take to his heels with the ringing of a bell in the house and the light of a gas jet flashing in his face.



Domestic Electrical Work.—Fig. 9.- Burglar Alarm Circuit.

Fig. 9 shows a burglar alarm circuit with five connections. The heavy lines indicate the battery wire and the light lines the return wires. The dotted line indicates the wire running from battery to annunciator to operate the continuous ringing attachment (with which every burglar alarm annunciator should be provided). A is the annunciator and B the battery. Where more than one opening is connected from the same room all the return wires from that room should be spliced together and but one wire run to the annunciator and connected to the name or number corresponding to the room.

A switch must be connected to the battery wire so that it can be switched off to permit of the opening of doors and windows during the daytime. For window connections there is perhaps none better than what is known as the ventilating window spring. It possesses the advantage of permitting a room to be ventilated in warm weather without interfering with the alarm. By raising the window a little higher than it is intended to be left and then drawing it down to the desired hight, say, for instance, so that a man cannot crawl through without moving it, the alarm is in proper position. The window can at any time be closed entirely without in the least disturbing the alarm, but the slightest upward movement of the window closes the circuit and sets off the alarm.

The burglar alarm system just discribed is the one usually adopted for nearly all classes of buildings, but there are cheaper as well as more expensive systems. A cheap, and at the same time very serviceable system, may be installed in the following manner: Make a complete circuit about the building with the wires. Use an ordinary electric bell (a large size, however). Start one wire from the battery, the other from the bell, terminating their ends in one of the connections. Now from each door or window connection run one wire and splice to the return, and one to the battery wire; then running a wire from the battery to the bell completes the job. This makes a very inexpensive alarm, and will indicate an attempt at housebreaking just as effectually as a more expensive system, the only inconvenience being that there is nothing to indicate in what part of the house the attempt is being made.

The most perfect, and in some cases almost indispensable, system is the combination annunciator and automatic clock work cut out. With this instrument the system may be so arranged that where servants or others arise earlier than the family the clock work automatically cuts out the desired sections at any hour it is set for, so that doors or windows may be opened in such parts of the house with out disturbing any one where the annunciator is located.

(To be continued.)

* Copyrighted, 1893, by David Williams.

A Curious Law.

A late issue of one of the leading architectural journals of London, England, contained an item to the effect that for something over 40 years "builders, and especially contractors for painting, would appear to have broken an act of Parliament. This strange fact was discovered by Dr. Thomas, the coroner for the Paddington district. At an inquest held on January 2, on the body of a laborer who fell from a window sill while engaged in removing a ladder, the coroner pointed out that ordering a man to stand on a window sill was illegal. Section 28 of 10 and 11 Vict., c. 89, enacted that 'every occupier of any house or other building, or other person who orders or permits any person in his service to stand on the sill of any window, or upon any house or building within the said limits, is liable, unless the window be in the sunk or basement story, to a penalty not exceeding 40 shillings ($9.60), or, in the discretion of the justices before whom he is convicted, to be committed to prison for a period not exceeding 14 days, and any constable by virtue of this act shall take into custody without warrant, and forthwith bring before a justice any person who, within his view, commits any such offense.' The coroner could not decide whether the act applied to all England, to London alone, or to the provinces; but there was no doubt that the prohibition was on the statute book. The builder who had employed the man said he could not understand how work was to be done under such conditions; and as the act has been allowed to fall into desuetude, it would appear as if the authorities were also of that opinion."

The Builders' Exchange

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Resolutions Adopted at the Eighth Annual Convention, Held in Boston, February 13-17, 1894.

The following resolutions will be issued from the office of the secretary to all filial bodies and to such other organizations as may be desirous of benefiting by the same:

CODE OF PRACTICE.

Resolved, That all filial bodies be recommended to urge the use of the "Code of Practice" upon the architects in their several cities, and that the architects be asked to specifically state their objection to its adoption, wherever objection exists, in order that their position in the matter may be defined and a basis established for future consideration of the "Code" by the National Association.

Resolved, That for the purpose of facilitating the improvement of the "Code of Practice" advocated by the National Association, all filial bodies be recommended to fully discuss the form and report their conclusions to the National Secretary, to form the basis of future action on the part of the national body.

Resolved, That a clause be incorporated in the "Code of Practice" recommending to the architects the justice of opening all bids at a specific time and in the presence of bidders.

Resolved, That the following clause be added to the "Code of Practice:"

Where an entire contract has been let to one contractor all dealings, by the owner or by his agent, the architect, with the subcontractors should be conducted through the general contractor.

Resolved, That all filial bodies be recommended to secure some recognition from their various city governments in the administration of their sundry building laws, to the end that the builders may co-operate in the establishment and maintenance of safe and equitable building laws.

EXCHANGE ADMINISTRATION.

Whereas, The magnitude and character of the work carried on by the builders of the country is such as to entitle the business to a place beside that of any other avocation in rank and dignity, and

Whereas, The standard of the fraternity is best conserved by the reputation of the organizations which profess to represent its best elements and interests, and from the *personnel* and methods of which the public must form its opinion of the estimation in which the builders hold themselves and their calling; therefore,

Resolved, That all filial bodies be urged to use the most rigid discrimination in the admission of members, requiring reputation for honesty, skill, honorable dealing, as prerequisites to membership, and that the advantage of quality over quantity in membership be earnestly recommended to their consideration.

Resolved, That each exchange be recommended to appoint a committee whose special duty shall be to watch the action of the Legislature in their various States, and to combine with the similar committees of sister exchanges in the same States in opposing legislation prejudicial to the interests of the builders and in assisting all legislation looking to the correction of existing evils.

Resolved, That the experience of every local exchange which employs a regular permanent secretary warrants the National Association in recommending to every filial body that it secure the services of a competent secretary whose term of office shall be permanent and whose salary shall be such as to enable him to devote his entire time to prosecuting the interests of the exchange.

Resolved, That all filial bodies be recommended to urge the establishment of organizations among the separate trades represented in their membership, for the adjustment of such regulations and rules for guidance as affect only the separate branches of the business.

Whereas, The standing of a builders' exchange in the community in which it exists depends upon its moral tone and reputation for requiring, as prerequisite to membership, skill and honorable dealing on the part of its members, and

Whereas, The value of membership in an exchange is largely dependent upon the reputation which the organization bears in the community and the consequent prestige conferred by connection with it; therefore,

Resolved, That any member being possessed of information regarding infringement of the by-laws and rules and regulations or dishonorable practice on the part of a fellow member who fails to make complaint of the same to the administration or to the proper committee, is in his conduct as detrimental to the best interests of the exchange as the member who has broken the rules and regulations by which he has bound himself to abide.

'CHANGE HOUR.

Resolved, That the "'Change" hour is not advocated as a regular daily meeting of the members of an exchange at which attendance is requested, but is an opportunity provided by the organization for transacting the entire business of the day, in so far as concerns affairs between contractors and sub-contractors, and between contractors and dealers in building materials, leaving the rest of the day free to be devoted to the prosecution of the practical part of fulfilling contracts, "work on the job," &c.

Resolved, That it is the experience of all filial bodies, which have established the same, that a full attendance of the members during the "'Change" hour is one of the surest methods of establishing the benefits of the exchange form of organization as a business institution for business purposes.

Whereas, There is more or less general complaint from the filial bodies of the National Association that attendance of members at regular meetings and during the "'Change" hour is small; therefore,

Resolved, That filial bodies which have not already established the custom be recommended to hold all regular and special meetings during the "'Change" hour, in order that the members may be helped to form the habit of visiting the exchange rooms during the regular hours designated for daily meetings.

THE UNIFORM CONTRACT.

Resolved, That the National Association of Builders urge upon all its filial bodies which have not already done so the desirability of definitely adopting the Uniform Contract as the official form recognized by the organization, and that appropriate announcement of the fact be made to all architects in the vicinity.

ARBITRATION.

Whereas, The National Association of Builders advocates the establishment of the relationship between employers and workmen upon a basis of justice and equity and recognizes that each have certain rights which are inalienable and which should not be questioned or assailed; therefore,

Resolved, That the inherent rights which belong to the employers and those which belong to the workmen are incapable of being fixed by either side alone, and can only be established through joint consideration by the two.

Resolved, That for the purpose of facilitating the improvement of the "Form of Arbitration" advocated by the National Association, all filial bodies be recommended to fully discuss the form and report their conclusions to the National Secretary, to form the basis of future action on the part of the national body.

UNIFORM FORM OF PROPOSAL.

Whereas, One of the filial bodies of the National Association has demonstrated the possibility and feasibility of establishing in connection with the architects a uniform form of proposal for furnishing material and performing labor incident to the execution of building contracts in conjunction with the architects, and

Whereas, The establishment and use of such a form would facilitate the transaction of the building business and simplify the conditions of competition; therefore,

Resolved, That the National Association of Builders recommend to all its filial bodies the desirability of establishing some method of uniformity in this particular as suggested by the following example.

FORM OF PROPOSAL.

Adopted and Recommended for General Use by the Builders and Traders' Exchange of Milwaukee, Wis.

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 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 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..

Name..... ....

Address.....................

LIEN LAW.

Whereas, The lien laws of the various States differ materially, and the conditions existing in the various States are so much at variance; therefore,

Resolved, That it is inexpedient for the National Association to attempt any legislation on this subject; but each exchange connected with the National Association is recommended to examine carefully the lien law now existing in its State, and where it is not satisfactory to endeavor to secure such changes as may, in the judgment of the exchange, seem desirable.

Supports for Sagging Drawers

A simple yet effective device for preventing drawers from sagging when they are pulled out is illustrated in the accompanying engravings, which, with the descriptive particulars following, are taken from one of our English exchanges, and therefore represent foreign practice. Fig. 1 shows the device as used in connection with a drawer which approaches the square in shape, the strips A A being attached to the framing or casing, while B B are pivoted to the bottom of the draw through a slot. Of course it is understood that it is not desirable to attach one of these supports, or upholders as they are called by the writer in our contemporary, to a small drawer or to one which is not intended to bear heavy loads. The rails or supports are made of hard wood and neatly pivoted. Metal rails are much better than the wooden ones, but the carpenter will prefer to use the latter, especially as metal ones cannot always be easily obtained, while wooden ones can easily be manufactured.

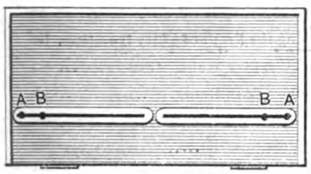

Fig. 1.—Showing Position of Supports when Drawer is Closed.

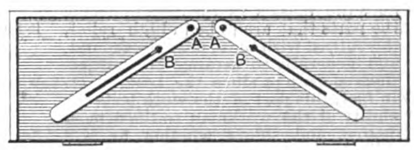

Fig. 3.—Supports for a Wider Drawer.

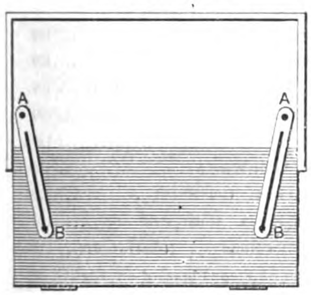

Fig. 2.—Position of Supports when Drawer is Open.

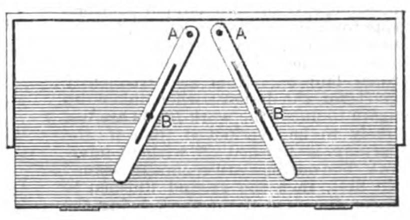

Fig. 4.—Position of Supports with Drawer Partially Open.

Supports for Sagging Drawers.

When the draw is pulled out, the rails assume the position shown in Fig. 2 of the engravings. In the case of long, narrow drawers the treatment is a little different, and is indicated in Fig. 3. The inner ends of the rails A are pivoted to a wide middle rail, which is fixed in the framing or casing inclosing the draw, while the outward ends, B B, are pivoted to the bottom of the draw through a slot. When the draw is pulled out, as shown in Fig. 4, the rails are forced toward each other, as indicated in the engraving. When the draw is pushed back in place the reverse action with regard to the rails takes place. It will be thus seen that no matter to what reasonable extent the drawers are pulled forth, the rails are always partially under them and partially within the casing, and that if the rear portion of the drawer always remains within the casing, the weight of the drawers will not break the rails, but will rest horizontally upon them. The pivot heads are sunk flush with the rails, which can be done by widening a portion of the slots in the latter. The author of the article from which the above particulars are taken suggests that full size patterns be cut out in cardboard, and taking one of the forms described, experiment as to the best position to pivot the rails.

Wood Carving.

Some of our readers who have been making inquiries recently with regard to wood carving are likely to be interested in a paper on the subject read by J. Daymond before the January meeting of the London Architectural Association. The paper was addressed more particularly to those studying for their profession rather than to architects in practice and was profusely illustrated by specimens and plaster models, photographs, and also by practical examples executed by workmen at a bench beside the lecturer's table. The speaker first referred to the great antiquity of the craft of the wood carver, and called attention to the wonderful collection of specimens of wood carving to be found at the South Kensington Museum. In treating of the practical part of the subject he said :

The wood for carving should be the best of its kind, free from knots, shakes or other defects, as the specification always mentions, well and naturally seasoned, that which is baked, steamed or seasoned by any artificial means being harsher and more brittle under the tool, or, as the carver says, "without any nature in it." Unless the work is small in detail, the wood should not be too hard to produce the best results. Take oak, for example ; if the wood has hard fibers running through it, like most of the American species, it is much more difficult to work, and prevents one using the tools with freedom. Figured woods, again, most of which figure is produced by the change in direction of the fibers, are difficult to finish. The carver has to continually change the direction of his tool, which prevents those happy effects and twists on the face of a piece of foliage or ornament, which seem to suggest themselves naturally if the course of the tool were not impeded by the different directions of the grain. To obtain clean-cut work the carver must cut with the grain, much as a boy who whittles a stick with his knife, or a joiner planes a board with his plane. The piece of padouk has been faced with a metal plane, a cut has afterward been made upon the face with a flat gouge ; you will see that one-half of the cut is clean, while the other is against the grain. The piece of mahogany has also the same defect, which increases the difficulty of cutting the work clean. A piece of carving cut against the grain is seldom satisfactory ; it can be done, but to dig a piece of ornament out of the end of the grain is a very vexatious proceeding, and withal expensive. Take a simple illustration : An impost cap, carved with egg and tongue, if worked by the joiner in the solid, the returns are end grain, and the ornament must be cut against the grain or fiber of the wood.

WOODS FOR USE.

A piece of good Riga wainscot is the best wood for architectural carving (but it is now very scarce, and the Hungarian oak is the best substitute); the grain is not too strong, and one can deal with it with more freedom than any other wood. Mahogany is variable. Some kinds are very good, others very indifferent, the Mexican and African, for instance, cutting very much like cork—that is, it will not stand against the tool. The harder kinds of Cuba and Spanish mahogany are rather more expensive working, especially if figured. Teak is a good wood for carving ; it wastes freely, or perhaps we should say the surplus wood is easily removed and the work shaped readily. Another advantage possessed by teak is that when used for purposes where the material is cut away more in some parts than others—as, for instance, an animal terminal or very bold panel out of 6-inch or 4-inch plank—it is more likely to stand than some of the other varieties of wood. Its only fault is that the grit in it dulls the edge of the tools rather quickly. Walnut is a fairly good wood for carving, the American being the easiest to cut. The English is very close and firm in the grain, and some of it very hard. The American walnut is rather remarkable for showing a whiteness on the surface of the wood after it is finished if viewed in certain lights. On turning the wood round the whiteness is reversed. This, of course, disappears if the wood is polished. Italian walnut carves very well if straight in the grain. Satinwood carves well, and being light in color, the work is effective. Pine is less expensive to carve, but it is easily damaged if used for undercut work. Lime tree is a splendid wood for carving, but so perishable that one can only recommend it for temporary use, such as patterns for metal casting, for which it is admirably adapted, although some founders prefer mahogany for the purpose. Kawrie pine cuts well, but has the reputation of shrinking lengthwise in addition to across the grain, a fatal defect for joiners' work that cannot be provided against. It is quite enough to have to contend with the ordinary shrinkage in wood without the shoulders of framing showing an open joint when the work is finished. Some samples of bass or American whitewood cut well, some very badly. English cedar and pear tree are also good woods for carving. Pitch pine is unsatisfactory. The darker portions of the fiber are hard to work. It develops shakes when the wood is cut into, and if very dry it is harsh and short under the tool. In fact, pitch pine and yellow deal are nearly at the bottom of my preference of woods suitable for carving. Sequoia (the red wood from the mammoth trees of California) is simply bad, and it is well nigh impossible to get any life into the work. It cannot be cut clean across the grain, and dulls the tool almost immediately. Cork is almost preferable. Most of the Australian woods, yarra and others, padouk wood from Burmah, are all very indifferent for the use of the wood carver.

TOOLS FOR CARVING.

The tools next claim our attention. They require to be of the very best steel and well tempered. The shapes seem to have varied very little through the centuries; some found in the Pyramids and now in the British Museum are similar in shape, but made of copper or bronze, to the tools of the present day. A wood carver requires a set of flat gouges from ¼ inch wide to 1¼ inches; a set of quicker section gouges, called "fluters," though used for many other purposes than fluting; some flat tools of varied widths called "firmers;" small quick section gouges known as "veiners," though the less they are used for putting veins on the faces of leaves the better for the appearance of the work. V-shaped tools, called "parting tools," are also necessary. Besides all these, a certain number of similar tools, but bent instead of being straight, are required. These are necessary to take up the cutting in the hollows or undercuts where the straight tool would stick into the grain of the wood. There is also a variety of tool known as the "macaroni," which is of doubtful utility for ordinary work. A set of oil stones ground to fit the various sections of the gouges and called slips is indispensable; a leather strap prepared with tripoli, similar to a razor strop, for putting a fine edge on the tools after sharpening with the slips is also necessary. Small wheels are used to clean out the inside or concave surface of the bent tools. A mallet of wood, lead or iron, bench screws, clamps for holding the work and a pair of compasses, make a fairly complete list. All wood carvers' tools require to be carefully sharpened and kept in good order, if the work is to be cleanly and well finished. We may note that the tools are generally sharpened by rubbing both sides, and not as joiners' tools, with cutting edge at one side. For soft woods the tools must be sharpened at a more acute angle than for the harder varieties. To distinguish the tools from one another as they lie upon the bench, the carver uses wood of various colors and shapes for the handles of them. Those not in use are generally kept in a small chest containing a quantity of small drawers or trays. On the table are specimens of carvers' and joiners' tools, showing the different methods of sharpening. The bench must be kept free from grit if we wish to preserve a good edge upon the tools.

KINDS OF WOOD CARVING.

The simplest and most inexpensive kind of wood carving is that in which the outlines of the design are first set in from the face of the wood, and a gouge or other tool then being used to make a sloping cut to meet it, thereby taking out a chip or piece without leaving any rough places or awkward corners to be cleared out afterward. This description of ornament is used very frequently on Jacobean furniture and old chests; some spandrels of the Gothic period are also examples of this kind of treatment. The faces of acanthus leaves in the enriched moldings and some of the capitals of the seventeenth and early part of the eighteenth centuries are also worked in a similar fashion. This treatment obviates grounding out the ornament, which must be done in ordinary work, such as a spandrel or panel showing a background.

CARVING A PANEL.

We will now describe the method of carving an ordinary panel or spandrel. The joiner has rebated the wood all round to the depth of the groundwork for the carving; if it is a large panel he has glued it up, in this case taking care to put the tongue in joint far enough back to prevent us cutting into it; a precaution which, I am sorry to say, is not always observed, to the obvious detriment of the work, especially if the cross tongue is of deal in a hardwood panel. We sketch or paste a tracing of the design to be carried out on the wood, and proceed to cut away the parts that are to be the ground of the panel, afterward using a tool known as the "old woman's tooth" to rout out the wood to the required depth. Care must be taken during this part of the work that no cuts made by the chisels or gouges in forming the outline should go below the surface of the ground. In hurried work this is a very common occurrence, and frequently shows much if the work is afterward polished. This seems a very mechanical proceeding, but it is the general method; one reason is that when the face of a piece of wood is roughly cut away it is difficult to sketch upon, therefore the carver likes his outline set in first, that he may be able to keep to his design. When the panel is grounded, the finest skill of the craftsmen is called into play to balance the masses in the design, decide the parts that are to be in high relief, in contrast with those near the ground, and generally to arrange the projections so as to produce the best effect. In fact, this part of the work tests the ability of the workman to the utmost degree, and shows whether he is a skilled craftsman or merely one of those who, unfortunately, never seem to be able to master their craft, and always require a model or copy, which they reproduce with more or less success. After the panel is roughed in, if possible, it is advisable to put it on one side for a short side; it is good for the material, for, after cutting away one side of a piece of wood, it is well for it to be laid by. It is also frequently good for the design; when taken up again to finish the work faults are less likely to be overlooked than if the carving is finished off without interval. The outlines are generally cleaned up first, then the ground finished to them, the face of the work being the last part to receive our attention. Here again the craftsman has an opportunity to show his ability, or otherwise. The groundwork of panels is sometimes stamped to give a matted effect and bring out the ornament, but it is not a desirable treatment, giving a common appearance to even good work. The best finish for the ground is that of a slightly undulating but smooth surface.

(*To be continued.*)

AT the commencement exercises of the New York Trades School, recently held at First avenue and Sixty-seventh street, this city, 328 young men were graduated, who have chosen the building trades for their life work. Among the number there were 154 plumbers, this being the largest class; carpentry came next, with 57; bricklaying, 45; house and fresco painting, 35; blacksmithing, 14; sign painting, 10; plastering, 10, and stonecutting 3. The exercises were attended by relatives and friends of the graduates and friends of the school.

ONE of the results of the International Congress of Education in Chicago last summer is the organization of the Manual Training Teachers' Association of America, to secure the development of manual training in the educational system of the United States. At a meeting held in Cincinnati recently the association was formally organized, the plan and scope of the association were considered and a constitution was adopted. The officers of the association—Geo. B. Kilton, Springfield, Mass., president; Geo. S. Waite, Toledo, vice-president, and Geo. Robbins, Frankfort, Ky., secretary and treasurer—constitute the Executive Committee, which is now making arrangements for a summer meeting.

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RESIDENCE OF LUCIUS HUBBARD, ESQ., AT SOUTH BEND, IND.

O. H. DIRHAM ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

JUNE, 1894

Notable Building Operations.

The building operations which have lately been projected or are at present under way in this city are notable in many instances, not alone for the vast sums of money involved, but for the hight to which many of the structures intended for office purposes are being raised. From the amount of work of this kind in view the impression prevails in some quarters that the erection of buildings containing hundreds of rooms is likely to be overdone, but so long as there exists a demand for well appointed offices there will be found capitalists and corporations ready to invest in such structures. Another reason for activity in such building operations is found in the prevailing conditions, which are probably more favorable to undertakings of this character than have existed for many seasons, and the opportunity is being improved by moneyed men in a way not only to return them a fair profit on their investments, but to reflect credit on the metropolis. Immediately after the first of May workmen in many localities on Broadway and streets adjacent thereto began tearing down old buildings and making preparations for the erection of new ones which have been planned to cost, exclusive of the value of the land on which they are to be placed, many millions of dollars, and these figures do not include the smaller or cheaper class of business structures, scores of which are under way or in contemplation. Among the more important enterprises may be mentioned a 20-story building for the Presbyterian Board of Missions at the corner of Fifth avenue and Twentieth street, to cost $1,000,000; a 16-story structure on Broadway and Greenwich streets, adjoining the Washington Building, to cost $1,600,000; a 12-story building on Elm street for the New York Life Insurance Company, to cost $1,000.000: a 10-story edifice on the east side of Washington Square for the University of the City of New York, to cost $1,000,000; the 20-story building for the American Surety Company on lower Broadway, reference to which has previously been made in these columns, to cost nearly $1,000,000, besides many others ranging in cost from a quarter of a million dollars upward and covering warehouses, churches, hotels and theaters.

American Tract Society's Building.

One of the more notable of these structures, to make room for which the old buildings on the site have already been torn down, is that of the American Tract Society, at the corner of Nassau and Spruce streets. The main portion of this building will rise 24 stories above the sidewalk and will have a frontage of 100 feet 7 inches on Nassau street by 94 feet 6 inches on Spruce street. The first five stories will be of light colored stone, while the remaining portion will be of brick, with terra cotta ornamentation. One of the interesting features in connection with the building is the foundations, which will be commenced 36 feet below the level of the street and will involve the sinking of 2000 piles. In order to carry the weight away from the neighboring walls and to give a sufficient spread to the foundations, a system of steel girder cantilevers will be constructed at the south and east elevations. Another feature is the latticed girders to be introduced to carry the brick work between the different stories and to give to the structure a rigidity which would not otherwise be secured. On the sixth, tenth, fourteenth and eighteenth stories the front masonry will be supported by steel girders, which will depend in turn for their support on the steel columns. The structure is to be made as nearly fire proof as possible, and above the fourth floor there will be accommodations for 600 small offices, so arranged that each may be made part of a suite. The top floor will be occupied as a restaurant. The architect is R. J. Robertson and the cost is placed at $1,000,000. It is expected that the work will be completed and the building ready for occupancy before May 1 of next year.

The Mason Builders.

The experience of the Mason Builders' Association of New York City and eight unions of bricklayers in adjusting wages and working rules for interests as great as those represented, should be conclusive evidence that strikes and lockouts can be avoided if both sides will agree to do their part. Unions and associations of employers should think twice before ignoring the example thus given them, for what is possible in a city like New York, with its great interests, must be possible elsewhere. The form of the agreement may not satisfy either employers or workmen of other cities, but the fact that an agreement has been reached at all between an employers' organization on one side and eight unions on the other demonstrates beyond question that the two hold in their own hands the power to prevent disastrous struggles which often result in great suffering and loss. It is not to be supposed in the light of the present strained condition of affairs that harmony will be accomplished without an effort and some failures. Both sides must help to find the ground upon which the two can stand side by side, each in the conscious possession of its rights. The only means by which employer and workman can learn what belongs to each is by joint amicable consideration. Nothing can be finally established by either side acting alone. Builders in all branches of the business and in all localities would do well to profit by examples of this character.

Spread of Sanitary Legislation.

The wave of sanitary legislation that is sweeping over the United States is a most encouraging and excellent sign of the times. A few years ago it would not have been thought possible that so many cities would so soon have adopted measures regulating the plumbing and sanitation of houses. Of course, there have been rules governing this work in the principal cities for some years past, and it is not to the spread of such laws among the cities of the first magnitude that we allude. It is the permeation of the spirit of sanitary reform into the small cities and towns throughout the entire country that awakens surprise and admiration. In fact, so general has been the adoption of laws of this sort that it has been almost impossible to keep track of the places that have followed in this line of reform. It is natural to ask the cause of this sanitary revolution which has been so wide sweeping, and we think it will be generally admitted that the body largely responsible for the good work is the Master Plumbers' Association of the United States, acting upon legislators through the various local associations. For this work they cannot be too highly praised; and it is evident that, with the still further spread of the organization among smaller towns and remoter parts of the country, there will be a corresponding spread of sanitary legislation that will conduce to the health, happiness and material welfare of all people.

The Lowest Bidder.

The fact should be recognized by all contractors in the building trades that every time they submit to unfair conditions of competition they are openly inviting future unjust treatment, and at the same time permitting the whole plane upon which the business is transacted to be lowered without protest. Granting that the contractor knows when he is unfairly treated, his submission to injustice is virtually a statement that he knows his rights have been violated, and is willing to transact business under conditions which he admits are unfair, hence dishonorable. A contractor who submits without protest to the loss of a contract through injustice participates in the wrong equally with the person through whose methods the contract is lost. The contractor who loses a contract through neglect to claim and protect his rights helps to prolong the continuance of unfair and dishonorable practices, to which the building business is particularly susceptible under the present form of competition. Such a contractor adds also to the difficulty of establishing fair and honorable conditions of competition, for the more firmly injustice becomes fixed by laxity and neglect the more difficult becomes its eradication. In another part of this issue an example is given of the way in which the rights of the lowest bidder are sometimes treated, resulting in personal loss and damage to the whole building fraternity.

The Building Trades Exchange.

New York City seems destined, at last, to have a builders' exchange that shall be "up to date" in every particular, and which will not only be eminently practical and beneficial, but will place the organization which represents the building contractors of the metropolis before the country in a proper light. The need of a builders' exchange is greater the larger the community, and although the contractors of New York City have not yet familiarized themselves by practical experience with the benefits of such an organization, there is not the slightest doubt as to the result of the present undertaking. The Building Trades Exchange, owning and occupying a $1,000,000 property, will command the respect not alone of the members but of the community at large as well. A concentration of the live contracting interests into one locality, and the identification with an enterprise which will reflect credit upon all who are in any way connected with it, will inevitably produce an improved condition throughout the fraternity which could be obtained by almost no other means. As a financial investment alone, membership in the new organization would be a good thing, and when successful financial relationships are coupled with other substantial business and social benefits, the success and character of the organization depend only upon those having its management in charge. The preliminary committees and the officers have done earnest, hard work to place the undertaking on its feet, and are deserving of great praise for the conscientiousness and disinterestedness with which they have labored.

THE practice of the Italian school in the composition of arcaded ordinances may be generally followed with advantage, says the London *Architect*, except in mingling and confusing them with columnar. The pier is based by a deep square plinth, and surmounted by a square or molded cap or impost, the upper surface of which is the base line of the arch. In rusticated work the radiating stones of the arch show their joints, and are cut to a uniform appearance with the ordinary surface of the wall. In other cases there is a molded archivolt, whose width varies from an eighth to a tenth of the opening of the arch. A dropping keystone is generally used, but this very much injures the simplicity, and consequently the beauty, of the arch, and should be avoided. The most graceful average proportion for arcades is that the opening be twice the width of the pier, and twice its own width in hight to the crown of the arch.

Chimney Construction.

In a very interesting article which has been running through late issues of one of our contemporaries, F. E. Kidder, the well-known engineer, presents some remarks on chimneys and their construction which are entitled to consideration on the part of builders generally. Among other things he says:

In planning brick chimneys the principal points to be considered are the number, arrangement and size of the flues and the hight of the chimney. Every fire place should have a separate flue extending to the top of the chimney. Two or three stoves, however, may be connected with one flue if it is of sufficient size, and the kitchen range may be connected with the furnace flue without bad results, and often the draft of the furnace will be benefited thereby. For ordinary stoves and for a small furnace an 8 x 8 flue is sufficiently large if plastered smooth on the inside, but it is generally better to make the furnace flues 8 x 12 inches and also the fire place flues, except for very small grates.

The best smoke flue is one built of brick and lined with fire clay tile, or else a galvanized iron pipe supported in the middle of a large brick flue. When the latter arrangement is used the space surrounding the smoke pipe may be used for ventilating the adjoining rooms by simply putting registers in the wall of the flue.

Smoke flues are sometimes made only 4 inches wide. Such flues may work satisfactorily at first, but they soon get clogged with soot and fail to draw well, and should never be used unless it is impractical to make the width greater. More flues smoke or draw poorly on account of the chimney not being of sufficient hight than from any other cause.

A chimney should always extend a little above the highest point of the building or those adjacent to it, as otherwise eddies may be formed by the wind which may cause a downward draft in the flue and make it smoke. If it is impractical to carry the chimney above the highest point of the roof it should be topped out with a hood, open on two sides, the sides parallel to the roof being closed. The walls and withs (or partitions) of a chimney should be built with great care and the joints carefully filled with mortar and the flues plastered smooth on the inside with Portland cement, both to prevent sparks or air from passing through the walls and to increase the draft. Chimneys were formerly plastered with a mixture of cow dung and lime mortar, which was called pargetting, but this mixture is now seldom, if ever, used. Portland cement is not affected by heat and is the best material for this purpose.

In building the chimney more or less mortar and pieces of brick are sure to drop into the flue, and a hole should be left at the bottom, with a board stuck in on a slant, to catch the falling mortar. After the chimney is topped out the board and mortar should be removed and the hole bricked up. If there are bends in the flue, openings should be left in the wall at those points for cleaning out any bricks and mortar that may lodge there. The outer wall of a chimney should be 8 inches thick, unless a flue lining is used, to prevent the smoke being chilled too rapidly. During the construction of the building the architect or superintendent should be careful to see that no wood work is placed within 1 inch of the walls of a flue and that all the flues are plastered their entire hight.

FIRE PLACES.

To secure a good draft the throat or lower opening of a fire place flue should be small, so that no air may pass through it without first coming into contact with the fire and being thoroughly warmed. To accomplish this the back of the fire place should be brought forward and a heavy sheet iron damper should be arranged to slide back and forth and so regulate the draft as desired.

There are several forms of iron backs for fire places that are provided with sliding dampers for this purpose. The draft in a fire place is also affected by the hight of the fire place opening above the grate, which should not exceed 24 inches, the usual hight of the opening above the hearth being 29 or 30 inches. Where there are fire places the bottom of the chimney is generally built hollow, so as to receive the ashes from the grates above, and flues should be provided for ashes to pass through. A cast iron ash door should be built in the bottom of the ash pit to permit of removing the ashes. The hearth is generally supported by a trimmer arch springing from the chimney and resting against a header framed in the floor. The space above the arch is filled in with concrete and leveled off with cement to receive the tile. The facing of a fire place should project 4 inches beyond the rough breast so as to bring the grate forward as far as possible, as the further the grate projects into the room the more heat it will give out.

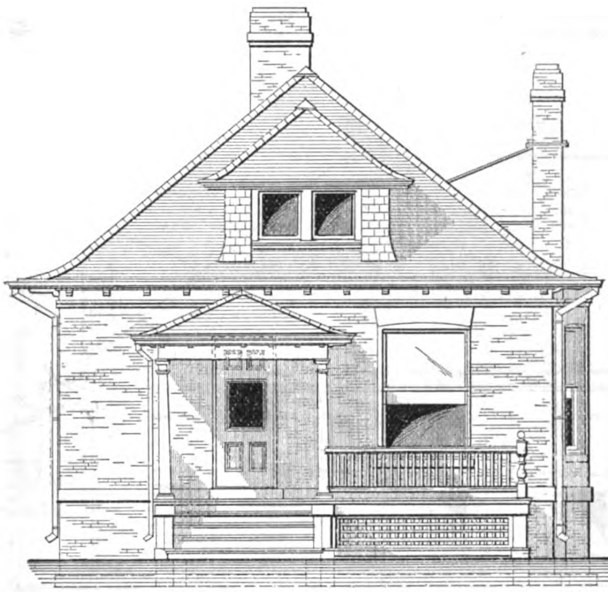
Ventilation in Canadian Factories.

In his annual report, recently issued, Dr. C. I. Samson, sanitary inspector for the Province of Quebec, Canada, makes some pointed remarks on the obstacles interposed by the workmen themselves to the introduction of any efficient system of ventilation in the factories and workshops of that section. He says: In this matter it is especially the workman's prejudices that we have to deal with. If we ask the latter what are the sanitary defects of the workshop where he is employed, ten to one he will answer, "there are drafts." This constitutes the great source of disease, in the minds of the workmen. Therefore, no sooner does one attempt to open a ventilator to renew the air in a room than 20 arms are raised to close it. With such notions the working of any system of ventilation becomes a difficult problem to solve. I have seen suction pipes reaching above the roof which were stuffed with rags. At another place a ventilating apparatus was put up at the suggestion of my predecessor so as to draw off contaminated air from the center of a large room; all the pipes are still set up, but great care has been taken to cut off their communication with outside for fear of drafts. The workman does not sufficiently appreciate the sanitary physician's part in industry, and this hinders the efficiency of the service. That notions of hygiene should be diffused among the people is the problem to be solved.

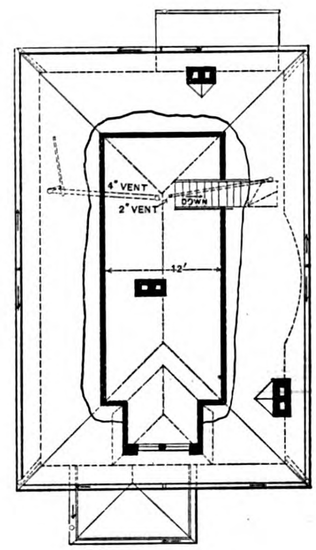
DESIGN OF A LOW COST BRICK HOUSE.

MANY of our readers have made inquiry in the recent past for designs of brick dwellings of moderate cost, and in response to these suggestions we this month present plans, elevations and details of what may be designated as a low cost brick house. The plan affords a very good idea of the general arrangement of the rooms, most of which, it will be noticed, are upon the main floor of the house. The supplemental plate shows the external appearance of the house as viewed from the front and side. The illustrations here given represent the residence erected not long since in the city of Denver, Col., for F. H. Caylor, the plans being drawn by Grodavent Brothers, architects, of the place named. The house covers an area 25 x 40 feet in size and has a cellar 7 feet in the clear under the rear portion. The first story is 9 feet 10 inches and the attic or second story 7 feet 4 inches in the clear. The outside foundation walls are of brick, 13 inches thick up to grade, above which they are 9 inches thick to the wall plate. The front is faced with red pressed brick and the other facing walls with stock brick, all laid in white mortar. The first-floor joists are 2 x 10 inches, the second-floor or attic joists 2 x 6 inches, the rafters 2 x 4 inches, the hip rafters 2 x 6 inches and the studding 2 x 4 inches, all placed 16 inches on centers. The studding is doubled at all openings and made solid at all corners. The roofing boards are 1 x 6 inches, spaced for 16-inch shingles. The latter are of California redwood, laid 4½ inches to the weather. All valleys are laid close, with tin shingled in with each course of shingles. The hips are double shingled with 4-inch dimension shingles. The doors and windows below the cornice line have cut stone sills and brick arches. The windows in the first story have box frames with pockets and the sash are hung upon pulleys with weights and cord. The window frames in the circular bay have heads and sills made on a true circle with the bay.

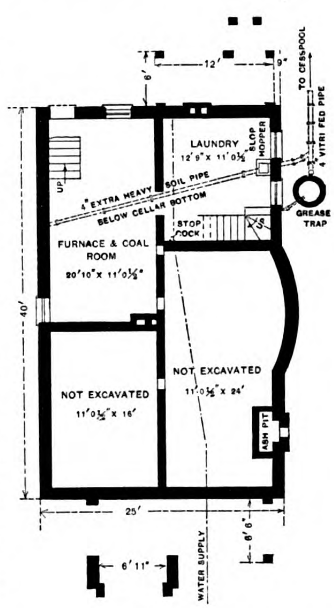
The floors in the kitchen, pantry and china closet are of quarter sawed Texas hard pine 3¼ inches wide, the other floors being "first and second" Southern yellow pine. The front porch floor is composed of white pine 1⅛ inches thick and 3 inches wide, the strips running full length across the porch. The flooring is laid with white lead at all joints. The inside wood work is of clear white pine, finished in natural color. There are wood cornices over the door and window openings in the main rooms, the latter having wood picture moldings on all sides. The doors are made with ogee stiles and ogee raised panels, but instead of being the regular stock patterns the panels are put in full width of the door between the stiles. This is clearly shown in the illustrations on page 126. The hardware employed is bronzed plate butts for the doors, brass faced locks and bronze plated trimmings. The bathroom and kitchen are wainscoted and finished with surbase. The house is piped for hot air furnace, bronze plated registers being placed in the parlor and dining rooms and japanned registers in the other rooms. The dwelling is also piped for gas and wired for electric lights. The plumbing is first class, all fixtures being trapped and ventilated, the vent pipes in all cases extending through the roof. The discharge from the kitchen sink is direct to a grease trap on the outside of the building. The trap is 30 inches



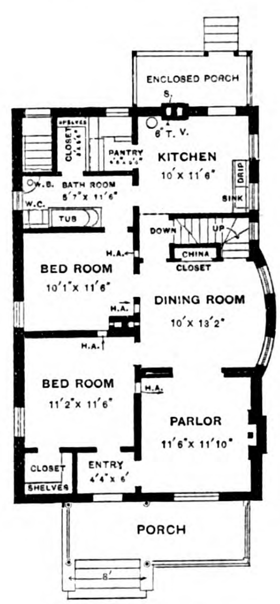
Front Elevation.—Scale, ⅛ Inch to the Foot.



Attic and Roof Plans.



Foundation.

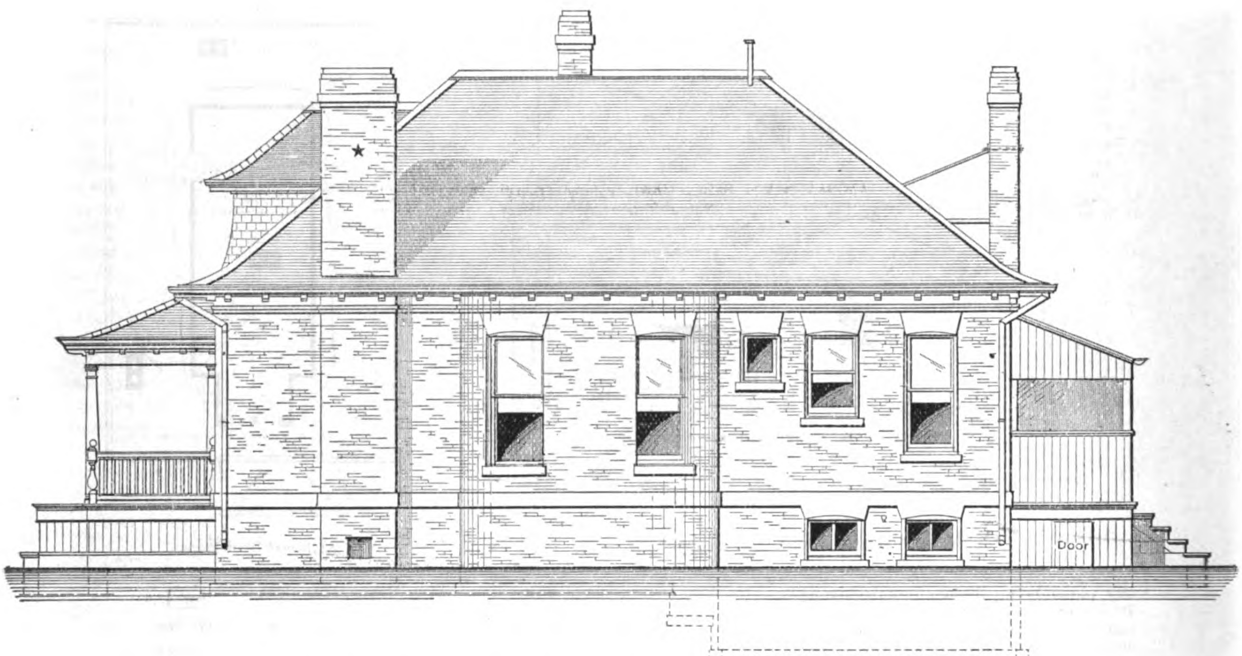


First Floor.

Scale, 1-16 Inch to the Foot.

Design of a Low Cost Brick House.—Grodavent Brothers, Architects, Denver, Col.

in diameter and 40 inches deep, is made of hard brick and cemented water tight, the top being covered with a single flagstone 2½ inches in diameter, placed 6 inches below grade. The discharge from the grease trap is through vitrified sewer pipe direct to a cesspool. The latter is 4½ feet inside diameter and 16 feet deep. It is made with hard brick, a single brick thick, and finished with arched top and 20-inch manhole, which is covered with a 2-inch stone, placed 1 foot below grade. An outer building was included in the contract and was built with 9-inch brick walls and shingled roof. It was 5 feet 6 inches wide and 10 feet long, with an ash pit at the end 5 feet 6 inches by 3 feet 6 inches. The main building gives a fuel room 4 feet by 4 feet 9 inches, the walls being 8 feet 6 inches above grade. The building is situated on an alley, and has a door to receive the fuel and also a door to the ash pit at the ground level from which the pit can be cleaned. The architects state that the contract price of this house was $2186, including screens for windows and outside doors, but exclusive of the parlor mantel, the latter being furnished by the owner and selected from stock patterns. It has tile hearth and facings.



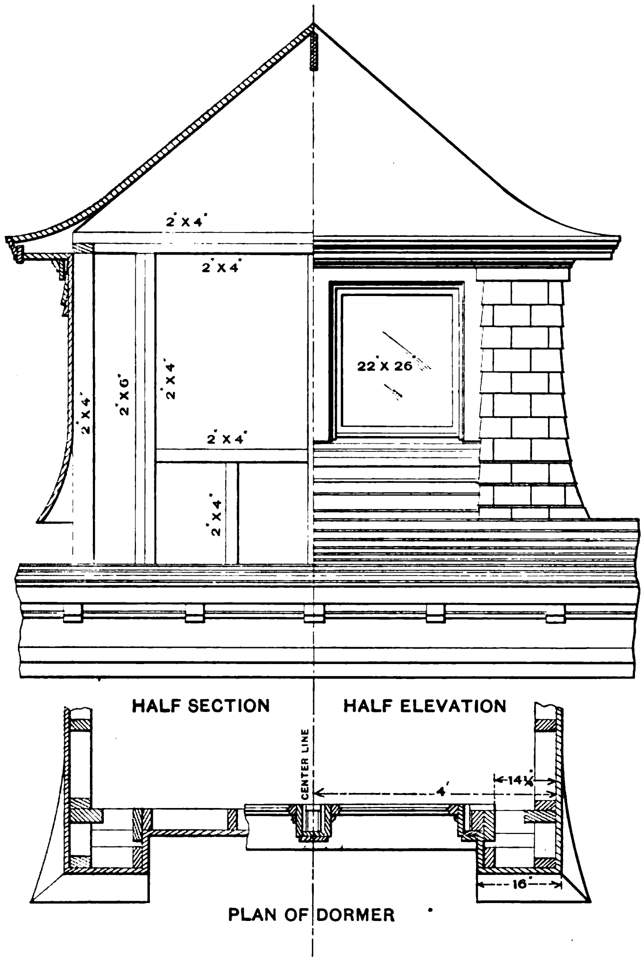
Design of a Low Cost Brick House.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Value of a Laborer in Contract Work.

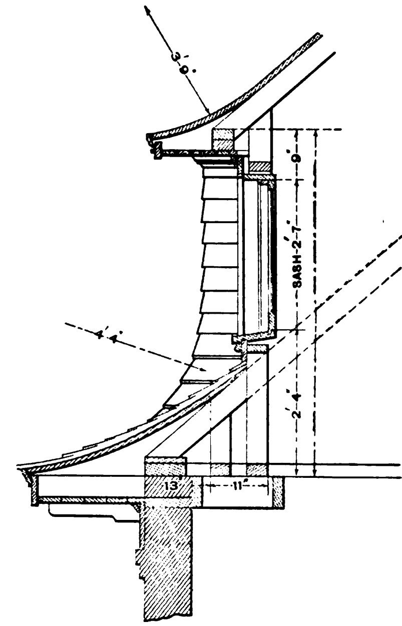
There is no article that enters into contract work of so uncertain value as that of labor, says a writer in the *Eastern Contractor*. In all the multitudinous things to be done on a large contract, labor is one of the most important for various reasons. The conditions of every kind of work change so that labor values cannot be accurately gauged. The times of year in which work is done, the class of work, and the experience of the laborer at the different kinds of work, all make a case where the discrimination of the contractor must come into play to arrange a system of gauging the value of a man's labor on any given work. Some contractors contend that skilled laborers at advanced prices pay better than hiring indiscriminately any and every class of men who present themselves for labor work. In hiring untried laborers much can be saved by having a live foreman who is good at forcing the men to work; yet there are men of so stupid a disposition that getting work out of them is next to impossible. A contractor of wide experience says that he can, by intuition, tell in a short time just what men are capable of doing, and that he can detect a shirk in short order; as soon as he finds a man inclined to shirk, that he discharges him at once, and finds that it has a salutary effect upon the others. In ditch digging he marks off equal spaces and watches the work done by each, giving the men fair play at steady digging, and if he finds some men continually behind, he either cuts their wages or hires able bodied men in their places. The difference in the amount of labor that one man can perform, compared with another of about the same physical strength, is in the same ratio when one accounts for the payment of the two men that from 10 to 60 minutes loss per day on a laborer would foot up in the course of a week. In employing a large number of men, day in and day out, there is no doubt a great variety of difference in the results of the labor performed, and those results depend very largely upon the study that employers and foremen give to the subject of labor. The loss of 10 cents per day on a man's labor does not apparently amount to much; but on 100 men it is $10. Now, 10 cents is a small amount to reckon as difference in value of one over another, for 25 cents would be nearer the mark. One can see when he pays close attention to the labor on his contracts where one contractor comes out ahead of another by close attention to labor details. Quantities and qualities of material in contract work can be valued to the penny, but labor cannot.

The Flamboyant Style.

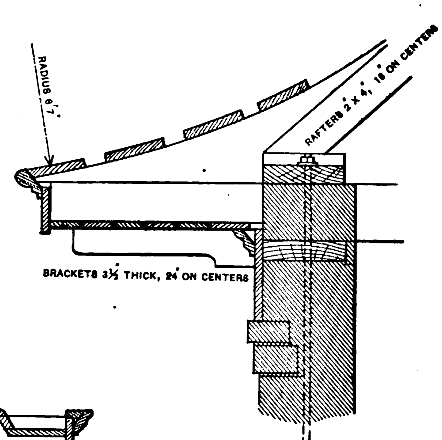
Flamboyant resembles in many respects our Perpendicular or Tudor architecture, says the London *Architect*, but exhibits many very marked differences when we compare it with that style. Thus we have, in both these styles, pinnacles crocketed, finialed, grouped and formed into niche canopies; surfaces covered with molded panels, pierced parapets; and, as we advance, Italianized members and arrangements make their appearance in both. But while the Tudor style has the four-centered arch peculiar to it, the Flamboyant has the three-centered and the horizontal line arched at the ends. It is also far more common in the French than in the English style to have in various situations a multitude of niches filled with statuary, and especially in the hollow moldings of arches. The lines of Flamboyant paneling and tracing are not by any means distinguished, as those of the Tudor times with us are, by the universal predominance of perpendicular lines. On the contrary, they run into peculiar flame like forms, from which the name has been taken. Some of the features of the Tudor and the Flamboyant styles which most deviate from the Gothic of the better times probably indicate in both a nearer approach to the period of the revival of classical architecture; as polygonal pedestals and abacuses with concave sides, the prevalence of hollow projecting moldings filled with flowing strings terminated by lines of coronal points above, and lines curved and broken in various ways, substituted for the straight sides of the triangular heads of pinnacles. The superiority in richness and variety appears to be on the side of the French style—at least we have nothing which can be well compared with the richest members of their work; especially their portals with free tracery hanging like an edging of lace from the border of the arch, and the arch moldings completely replaced by lines of canopies and statues.



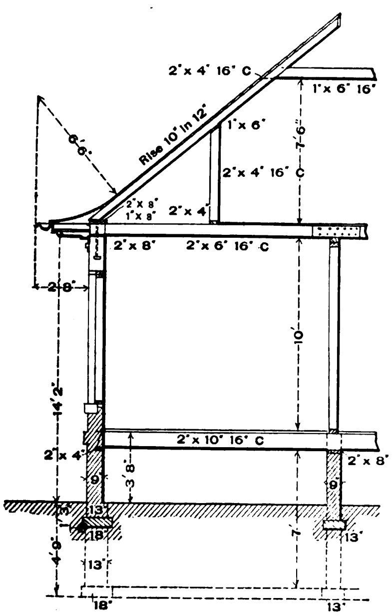
Details of Dormer Window.—Scale, ⅜ Inch to the Foot.



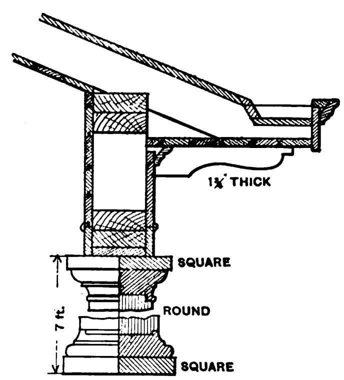
Section through Dormer Window.—Scale, ⅜ Inch to the Foot.



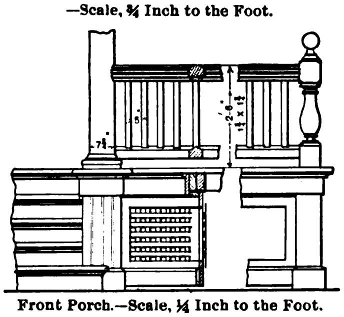
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



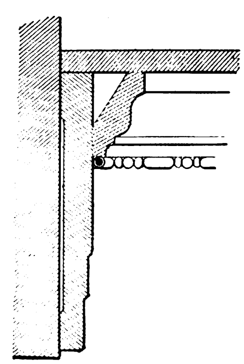
Section through Building.—Scale, ⅛ Inch to the Foot.



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

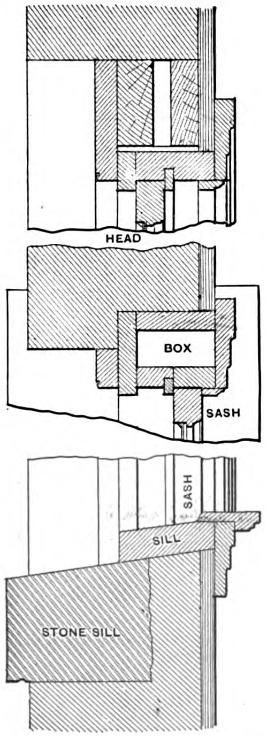


Front Porch.—Scale, ¼ Inch to the Foot.

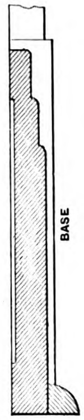


Detail of Head Casing.—Scale, 3 Inches to the Foot.

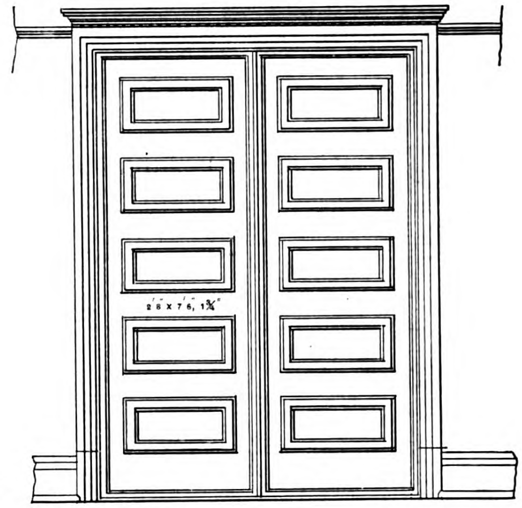
Miscellaneous Details of Low Cost Brick House at Denver Col



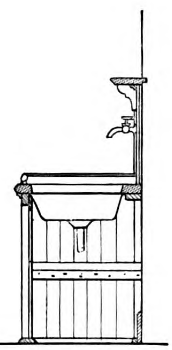
Sections of Window Frames.—Scale, 1½ Inches to the Foot



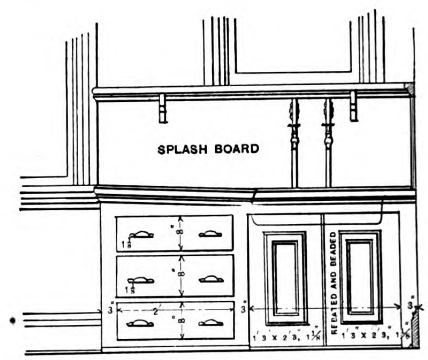
Detail of Base.—Scale, 3 Inches to the Foot.



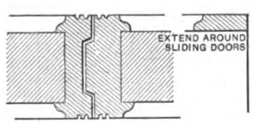
Elevation of Sliding Doors.—Scale, ⅜ Inch to the Foot.



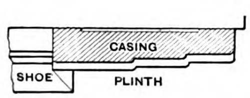
Section through Sink.—Scale, ⅜ Inch to the Foot.



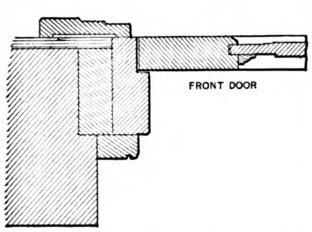
Front Elevation of Kitchen Sink.—Scale, ⅜ Inch to the Foot.



Astragal for Sliding Doors.—Scale, 3 Inches to the Foot.



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



Detail of Front Door.—Scale, 1½ Inches to the Foot.

Section and Elevation of Pantry Shelving.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of Low Cost Brick House at Denver, Col.

ARCHES IN CIRCULAR WALLS.*

FACE MOLDS FOR RADIANT ARCH.

THE radiant arch was briefly mentioned in the issue for April, several illustrations being presented in connection therewith. We now take up the question of face molds for a radiant arch, the solution of the problem shown in Figs. 38 to 42 inclusive explaining all that it is really necessary to know for a complete understanding of the construction of face molds for any arch in a circular wall. We will explain first the construction of face molds when the convex surface G B', Fig. 38, forms the outer wall. We shall assume Fig. 38 to be the half plan as furnished by the architect; the half opening of the archway to be equal to H A, and the elevation of the arch to correspond to that of a semicircular arch in a straight wall. Draw the center line, Fig. 38, and square to it lay off H A, making it equal to the half opening of arch. Now, with the radius by which the outside face line was drawn and with A as center, cut the center line at H'; with H' as center draw the outside and inside face curves, as shown at G B' and *g b*, Fig. 38; bisect G *g*, and with *v* H' as radius draw the center curve *v w*. Now, with H A, Fig. 38, as radius and with H as center, draw the curve A D G, Fig. 39. Now divide it as shown at C, D, E, &c., to correspond to half the number of stones the arch is to contain. At each point draw a tangent to the curve, W W being the tangent at C and the line X X being the tangent at D, &c. From the points C, D, E, F, Fig. 39, draw lines parallel to center line, extending them to the opening line, meeting it at F, E, D, C. These are points through which the elements of the soffits are to be projected; therefore, through each point draw lines radiating toward H', meeting the outside and inside face curves as shown at F' *f*, E' *e*, D' *d*, C' *c*, and the center curve at 1, 2, 3, 4. Through 1, 2, 3, 4 draw lines parallel to opening line, meeting the center line at 1', 2', 3', 4'. From W and X, the point of the opening line at which the tangent lines intercept it, draw lines radiating toward H', that from X meeting 3' 3 at X', that from W meeting 4' 4 at W'. The points 1, 2, 3, 4 are the centers in the right line element of the soffits which belong to the joints at C, D, E and F, Fig. 39, at which the normals are to be projected in order to construct a plane surface joint. The points W' and X' are the horizontal projections through which the tangent plane passes, required in order to give the direction of the above mentioned normals.

To obtain the vertical projection of the normals proceed as follows: At any point of the center line, as H, Fig. 40, draw H X; square to it set off H 1, H 2, H 3, &c., equal to 1' 1, 2' 2, 3' 3, X', and 4' 4, W', Fig. 38. Through 1, 2, 3, 4 draw lines parallel to center line; make 4 C, 3 D, 2 E, 1 F, H Z and H Y equal to C C, D D, E E, F F, H Z and H Y, Fig. 39. Through the points obtained at C, D, E and F draw lines parallel to base line H X. Join W C, X D, E Y and Z F by right lines, which give the projection of the required tangents. Now draw C 5 square to C W, D 6 square to D X, &c. This gives the projections of the required normals. We may state that the normals as now projected are not the mathematically correct normals to the elements at which they are projected. They are, however, near enough correct for all practical purposes.

In Fig. 41 is shown the developed

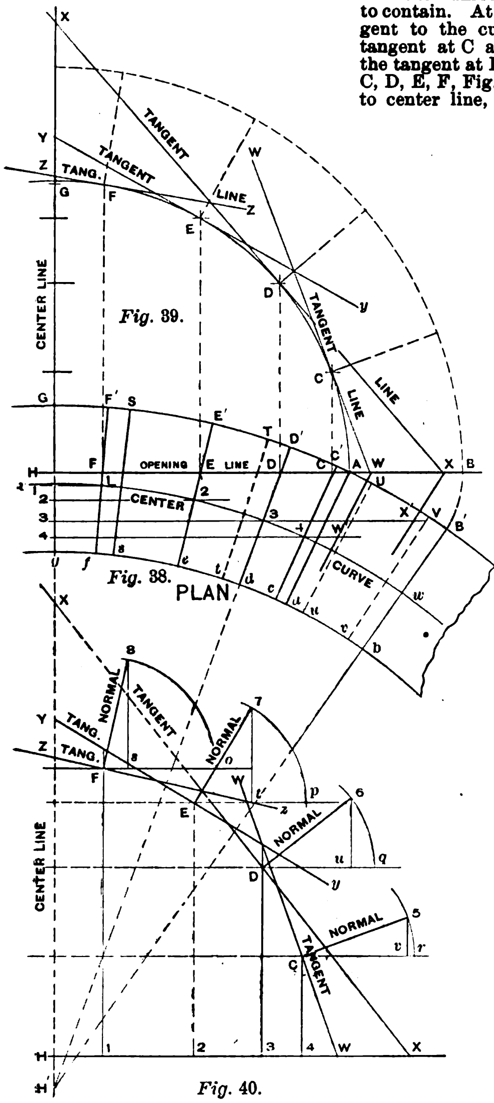


Fig. 39. Fig. 38. Fig. 40.

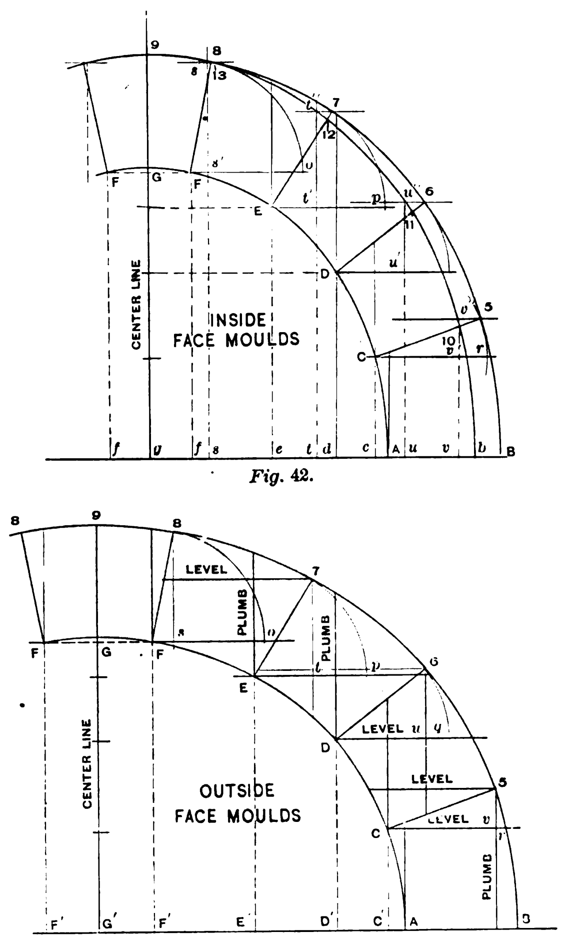


Fig. 42. Fig. 41.

Arches in Circular Walls.—Figs. 38 to 42 Inclusive.—Face Molds for Radiant Arch.

* Copyrighted, 1893, by Ed. W. Hind.

outside face molds. To project these draw F' B indefinitely, making G' G square to it; set off G' F', F' E', E' D' &c., equal respectively to G F', F' E', E' D' on the outside face line, Fig. 38. At each point obtained draw lines square to F' B; make C' C, D' D. E' E, &c., equal to the hight of corresponding points from the opening line in Fig. 39. Through the points obtained at A, C, D, E, F and G draw the developed curve of the soffit; also through these points draw lines parallel to F' B. We have now to project the normals C 5, D 6, &c., Fig. 40, into their respective positions in Fig. 41. To do this proceed as follows: With the width of the arch stones at the outside face (in this case A B, Fig. 39) as radius, and C, D, E and F, Fig. 40, as centers, draw arcs cutting the normals and the lines produced through each point, as shown at *r* 5, *q* 6, &c., Fig. 40. Now with same radii—that is, the width of the arch stones at the outside face—and A, C, D, &c., as centers, Fig. 41, draw arcs. Make *r* 5, *q* 6, P 7 and *o* 8 equal corresponding lengths in Fig. 40. We have at this one operation ascertained not only the direction of joint lines, but also the points B 5, 6, 7, 8 and 9, through which to draw the developed curve at the exterior surface, required in order to have a uniform width at the face of arch. Draw the joint lines and trace the curve through the points, as shown; also draw the level and plumb lines parallel to F' B and G' G, which will complete the drawing.

INSIDE FACE MOLDS.

To develop the inside face molds proceed as follows: Draw *f* B, Fig. 42, indefinitely; make *g* 9 square to it; set off *g f*, *f e*, *e d*, &c., equal to corresponding lengths in the inside face curve, Fig. 38, and at each point erect lines square to *f* B. We have already shown that the elements at the surface of the soffit are level, therefore the hight of any point at the inside face of the arch at the soffit will be at the same hight from the horizontal plane as a corresponding point in the element at the outside face. As H A, Fig. 39, F' B, Fig. 41, H X, Fig. 40, and *f* B, Fig. 42, are in each respective drawing the vertical projections upon the horizontal plane, the hight of a corresponding point from the base line is made equal in each figure. Understanding this, make *c* C, *d* D, &c., equal the hights from base line of corresponding points in Figs. 39 and 40, and through the points obtained draw the developed curve of the soffit. Draw lines through each point parallel to base line *f* B, and transfer normals in the manner explained for a like operation in Fig. 41. As the elements of the exterior surface radiate toward the axis H, Fig. 39, in the manner the elements of the soffit radiate, as explained above, we have, in order to develop the curve of the exterior surface at the inside face mold, to first ascertain the horizontal projections of the elements in question. To do this, notice first in Fig. 41 that the plumb lines produced through 5, 6, 7 and 8 intersect the level lines produced through C D, E F, at *v*, *u*, *t*, *s* (the same result may be obtained in Fig. 40, as shown), by setting off C' V, D' U, E' T and F' S at the outside curve, Fig. 38, equal to the corresponding lengths in Fig. 41. Then through each point draw lines radiating toward H'. The lines thus obtained on the plan, as shown at V *v*, U *u*, T *t*, S *s*, are the horizontal projections required of the elements in question. In Fig. 42 set off *f s*, *e t*, *d u*, *c v*, equal to corresponding lengths on the inside face curve, Fig. 38, and through each point draw lines parallel to *g* G. As the elements are level and 5, 6, 7 and 8, Fig. 42, are the projections of the elements at their proper hights from the horizontal plane, then by drawing lines through these points parallel to *f* B to intersect the verticals drawn from *v*, *u*, &c., as shown at *v''*, *u''*, *t''* and *s''*, we obtain the points through which to draw the developed curve of the exterior surface. Draw the curve through these points. It will be noticed this curve intercepts the normals, as shown at the points 10, 11, 12 and 13. The lengths of *v''* 10, *u''* 11, &c., measured vertically show the difference in the level of the arris at the joints of the exterior surface between the extreme points at joint line of the outside and inside faces.

This simple method gives a uniform width to the face stones, both at the inside and outside faces of the arch.

The developed patterns are shown in Figs. 41 and 42, which represent the outside and inside face molds.

Painting Seaside Houses.

A paper was recently read by Paul Brazo before the Master Painters' Association of New Jersey on "Seaside Painting," and among other things he said:

"I will relate what I have observed, experienced and practiced for the past 13 years on the ocean front at Long Branch. In the first place, we have to contend with a great amount of dampness and fogs, which always leave a residue of salt on the surface of the work to be painted or otherwise treated. So it follows we must be on the alert to know that the work is perfectly dry, especially new work. It was only after I had several jobs badly blistered and spoiled that I concluded to seek a remedy, and my remedy was this: To leave all piazza ceilings, floors and clapboards under piazzas and porches until 10 o'clock or later in the day, if possible to do so. I have followed this rule and have had no trouble in that direction since.

As to the salt on the surface of the work, where it was practicable and the work was not hurried, I had it washed thoroughly a day or so before applying the priming coat. I then primed with pure lead, used thinnings composed of one-third turpentine and two-thirds raw oil, with ¼ pint of good japan to the gallon, in shade of color as near to the finishing color as possible. My object in keeping the priming the same shade as finishing is that it makes the work more solid, and as the priming coat has to stand at least three days or more before applying the finishing coat, and it generally makes its own color, or, in other words, the priming darkens, it follows where we put on finishing there is just enough difference to be perceptible and comfortable to work over without showing brush marks, &c.

I have also observed that a combination of pure lead and French zinc is the best, using good japan and raw oil only as a binder. For finishing coats, the zinc and lead should be in the proportion of 25 per cent. and 75 per cent. pure lead—no pulp lead—as we have all the moisture on the surface that is necessary. At all times I use the French zinc, for the reason that it does not contain sulphur to such an extent as our American zinc, consequently does not bleach any coloring matter so quickly.

I particularly avoid using ochers or other earth paints, except in priming coats, for I have observed that all buildings where ocher was used as a stainer, no matter what grade it was or what lead was used in combination with it on the sea coast, were in all cases attacked with the painter's worst enemy, mildew, particularly when painters were foolish enough to use boiled oil as a means of conveyance. On the contrary, I have observed that lead, zinc, chrome yellow and their kindred pigments, with raw oil and japan as a binder, are not molested by mildew, and that they wear longer, hold their luster better, and instead of bleaching in spots and mildewing, will wear uniform; in fact, grow darker in course of time, and in all cases give your customers good satisfaction.

I have noticed that all, or nearly all, of those who came here from the cities or from towns away from the coast use boiled oil, and that all of their work goes wrong in the first six months, and makes a difficult job for the painter who follows them to do good work.

A word about shellac work in our damp air may do some fellow craftsman good. Do not do any shellacking in the early morning. If you must do it in damp weather or in the early part of the day, have your men take a piece of cheese cloth, dampened with raw oil, and rub dry, and the work will not turn white, as I see some of the cottages at present which I have been called in to remedy; that is, if you cannot varnish immediately after shellacking, or if a shellac finish only is required.

Boston's New Theater.

The new theater of B. F. Keith in Boston has recently been completed and is regarded as one of the handsomest in the country. The proscenium arch is 34 feet square and the stage 45 feet deep, the latter being equipped with the latest improved appliances. There are 350 automatic sprinklers with full equipment of stand pipe and hose, roof hydrants and two large automatic steam pumps. The theater is surrounded by fire walls, has an asbestos curtain for the stage opening and 18 exit doorways. The system of heating is novel in the extreme, hot air being forced into the space beneath the floor of the auditorium, which is perfectly tight and of fire proof construction, and then rises through the hollow chair legs, flowing out through perforations in them. The seating capacity is 3600, there being 761 orchestra chairs and 429 balcony chairs. Electricity is utilized in all parts of the structure and the lighting is an important adjunct to the chief decorative effect. The electrolier in the center is beautifully wrought in the shape of a vine made from solid metal covered with embossed *papier maché* and finished in antique ivory, with a relief of solid gold leaf. It is 42 feet long and contains 180 incandescent lights. The electric lighting plant in the basement includes three dynamos of an aggregate capacity of 4100 lights. The interior decoration of the theater is on a very handsome scale and is a combination of the Romanesque in architectural effect with the decorative ideas which mark the reign of Louis XV. The new theater cost about $600,000.

A CIRCULAR staircase of white marble, with a richly carved balustrade that winds and winds till it reaches a floor where a stained glass window in the roof throws down upon its wide steps an ever changing light of rainbow colors, is not the dream of an artist, but the reality that an architect has made fast in a beautiful new house. To light the lower part of this stairway at night, a life sized marble figure upholds on her shoulders a large and very graceful candelabrum of bronze. A stately library that grew in the brain of the same architect restores black walnut to favor among the trees and people of fashion. The wood is used for the richly carved concave ceiling, for the paneled walls, the bookcases and the floor, which looks like a sheet of dark and shining water.

Estimating Material and Labor in Building Construction.

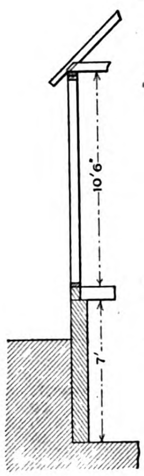
By I. P. HICKS.

THE work of planning, designing and erecting buildings is of such a nature as to appear to be practically without end, while books of neat and artistic structures, giving elevations floor plans, cost and general information in regard thereto, have been issued to such an extent that it would seem there was nothing more to be presented in the direction indicated. Without attempting, therefore, anything new in the way of designs, we will proceed with the consideration of the subject of practical estimating. We have had plans in endless variety, ranging in cost from a few hundred dollars up into the thousands, and having had occasion at different times to estimate material and labor from designs appearing in books and papers, found in most cases that the printed estimate was placed at too low a figure. We are free to acknowledge that it is very difficult to give in connection with a design a detailed estimate, the sum total of which will be acceptable figures in different localities, where varying prices for material and labor are sure to exist. The point which causes more or less confusion in prices is the listing together of material and labor in the estimate. Material and labor should be listed separately, particularly that of lumber and carpenter work. Both should be so listed that they may be readily calculated at prices to suit different localities and a different grade of work if the occasion should require it. The author believes there is a better form of making estimates than that generally furnished with printed plans. For example: Suppose we find in an estimate that the sum total is $940, which includes lumber and carpenter work and sometimes a part of the hardware —the nails, for instance. Now, considering that these estimates are frequently from 10 per cent. to 15 per cent. too low, where is there a carpenter who would not be more or less confused and liable to be misled in the given estimate, unless he had some practical system by which he could single out the cost of labor from that of the material? By thoroughly going over the plans and specifications in detail an estimate of the labor may be found, but in no other way.

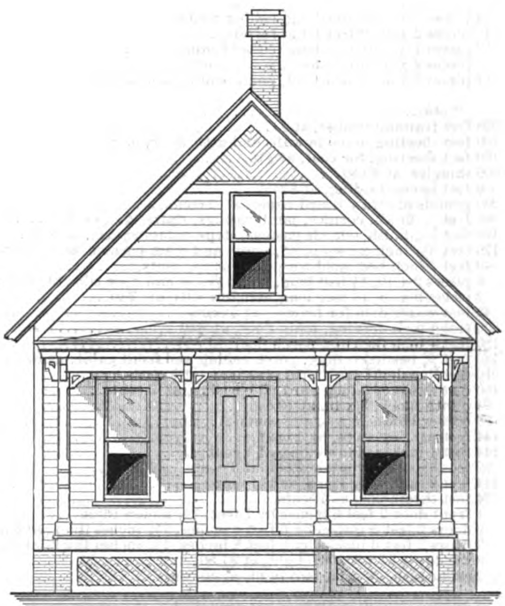
The plans, specifications and details must be thoroughly consulted in making an estimate, but for practical estimating material should be listed separately and first. If this is properly done the work of estimating the labor will be found much easier, and the estimate, although it may be somewhat longer and have a few more items than the one in which things are lumped off in a heap, as it were, will be more clearly understood by all interested. If changes in prices are necessary they can be readily and understandingly made by any contractor or builder in any part of the country. In "The Builders' Guide," published in these columns in the volume for 1892, was presented a practical system of estimating material and labor, while in the present instance it is our aim to show how that system may be easily and successfully carried out.

To illustrate and prove the adaptability of this method to all parts of the country nothing can be better than a few examples of estimating from actual plans, and if we can present some practical designs which will be useful otherwise than as examples in estimating, then they will answer a double purpose and meet the requirements for which they are intended.

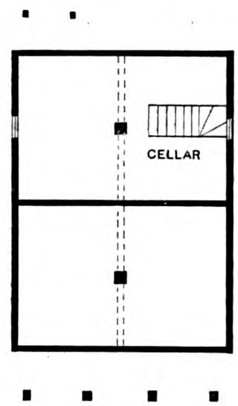
Not wishing to repeat what has already been published in "The Builders' Guide," we will merely take one table* therefrom, which we will use as a basis for prices of labor in making the estimates of carpenter work on the designs given in this connection, leaving the readers to make such changes in prices as to them may seem suitable for the locality in which they live.



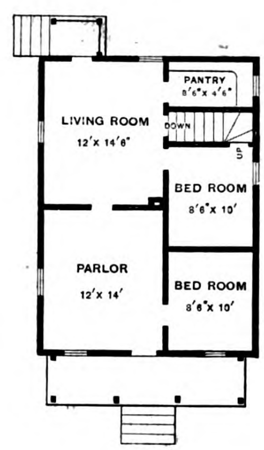
Section.



Front Elevation.



Foundation.



First Floor.

Estimating Material and Labor in Building Construction.—Elevation and Section.—Scale, 1/8 Inch to the Foot.—Plans.—Scale, 1-16 Inch to the Foot.

TABLE OF PRICES FOR ESTIMATING LABOR.

Framing and laying floors, per square	$1.30 to	$2.65
Framing, sheeting and siding, per square	2.25 to	3.25
Framing and setting partitions, per square	.60 to	.90
Framing, sheeting and shingling roofs, per square	2.30 to	3.65
Hips and valleys each	.75 to	1.50
Shingling belt courses and gables, per square	2.00 to	3.50
Cornice, per lineal foot	.10 to	.15
Corner casings, per lineal foot	.04 to	.06
Gutters, per lineal foot	.06 to	.10

* See *Carpentry and Building*, page 157 June, 1892.

Porches, per lineal foot....	2.00 to	4.00
Window frames complete in building, each	2.66 to	20.00
Door frames complete in building, each...........	2.70 to	20.00
Sliding doors complete in building..........	13.00 to	30.00
Folding doors complete in building.................	3.75 to	5.50
Wainscoting, per square...	.90 to	2.70
Wainscoting cap, per lineal foot.....................	.02 to	.05
Sinks.........	2.00 to	10.00
Bathrooms, finished complete....................	7.00 to	21.00
Putting down base in houses, per lineal foot....	.03 to	.05
Finishing pantries....	3 00 to	40.0
Cellar stairs, very common	3 00 to	5.00
Plain stairs................	20.00 to	35 00
Front stairs...............	30.00 to	150.00

In the table of prices there are given two sets of figures, offering a wide range of prices. This is necessary to meet the requirements of different jobs, or various classes of work, and the contractor can use his own judgment in discriminating on prices to suit the time, place and work he has in view. The rates in the first column of figures are those taken in estimating straight, plain work, the prices increasing as the work becomes more complicated and of a better class.

We will now present plans and details for the first estimate. Specifications are customary with all plans, but as they are usually more to specify the quality of material used and workmanship employed than they are for specifying the amount of material and labor, we will make them very brief in this case. The amount of material and labor is necessarily figured from the plans and details, the quality being determined from the specifications, hence the amount of material and labor is the first consideration in making an estimate. First learn to estimate the proper amount of material and time for labor, and the establishing of prices corresponding to the quality of material and workmanship called for in the specifications will soon become an easy problem. Specifications are necessary in order to estimate work understandingly and without guessing at many parts of it; but, as we have stated, a brief specification will suffice in this case.

SPECIFICATION IN BRIEF.

Size and style of building, 22 x 30, one-story frame, cellar under back part, as shown on foundation plan. Foundation walls to be 8-inch brick wall, as shown in section. Cellar wall to start from bottom of cellar, other walls to start from top of ground. Chimney to start from cross wall, as shown on plan.

Plastering to be two-coat work troweled down smooth for papering.

The frame work to be of good quality of pine. Sills 6 x 8, floor joists 2 x 8, studding 2 x 4, ceiling joists 2 x 4, rafters 2 x 4, collar beams 1 x 6, and all joists, studding, rafters and collar beams to be placed 16 inches from centers.

House to be sheeted, papered and sided and have shingled roof. Front porch to have tin roof and ceiled underneath with $\frac{5}{8}$ beaded ceiling. Platform at back entrance to have plain railing around, as shown on side elevation. Front gable to be finished with beaded ceiling above window, as shown in elevation and detail of front gable. One window to be provided in each gable. Window frames to be made in the usual manner and all, except the two in the attic, to be hung with cord and weights.

Blinds not required.

The flooring to be of good quality of matched pine. The attic to have a floor of common sheeting through the center, 10 feet wide and full length of building.

Inside finish to be plain hard pine of such designs as are generally kept in stock.

Hardware to be of good quality and of the usual kind in general use.

Painting to be two-coat work of lead and oil colors for outside work. Inside to have three coats of hard oil finish.

All work throughout to be executed in a substantial and workmanlike manner, and the entire design to be carried out in accordance with the plans and details.

Enough has now been given to enable any ordinary mechanic to accurately estimate the cost of material and labor required for the construction of this cottage.

ESTIMATE OF MASON WORK.

65 yards of excavating, at 30 cents......	$19.50	
9,300 brick laid in wall, at $10 per M..	93.00	
27 lineal feet of chimney, at $1 per foot....	27.00	
		$139.50

ESTIMATE OF LUMBER.

	Feet.
8 pieces 6 x 8, 22 feet long, sills..........	264
6 pieces 6 x 8, 16 feet long, sills........	384
22 pieces 2 x 8, 22 feet long, floor joists........	638
132 pieces 2 x 4, 10 feet long, outside and partition studding......	858
40 pieces 2 x 4, 20 feet long, gable studding........	520
32 pieces 2 x 4, 16 feet long, plates....	352
24 pieces 2 x 4, 14 feet long, ceiling joists	216
24 pieces 2 x 4, 10 feet long, ceiling joists........	156
48 pieces 2 x 4, 18 feet long, rafters........	576
12 pieces 1 x 6, 16 feet long, collar beams........	96
8 pieces 2 x 6, 14 feet long, porch joists........	112
14 pieces 2 x 4, 14 feet long, porch ceiling and rafters........	126
Total........	4,298

4,298 feet framing timber, at $17........	$73.06	
1,700 feet sheeting, outside walls and attic floor, at $17........	28.90	
1,100 feet sheeting, for roof, at $16........	17.60	
10,000 shingles, at $3.50........	35.00	
1,500 feet beveled siding, at $25........	37.50	
250 pounds of straw board paper, at 2 cents........	5.00	
800 feet $\frac{7}{8}$ finish, cornice, jamb casings, stairs, &c., at $35........	28.00	
420 feet $1\frac{1}{8}$ finish, outside casings, steps, columns, &c., at $40	16.80	
176 feet $3\frac{1}{2}$-inch crown mold, porch and main cornice, at $2\frac{1}{2}$ cents. ..	4.40	
42 feet 2-inch bed mold for porch, at $1\frac{1}{2}$ cents........	.63	
3 pieces 2 x 10, 14 feet long, porch frieze and door sills, at $40	2.76	
2 pieces 2 x 6, 16 feet long, window sills, at $40........	1.28	
40 feet water drip for frames, at 2 cents........	.80	
800 feet 6-inch flooring, main floor, at $20........	16.00	
180 feet 4-inch flooring, porch floor, at $25........	4.50	
140 feet $\frac{5}{8}$ beaded ceiling, porch ceiling and front gable, at $25........	3.50	
210 feet lineal of 8-inch hard pine base, at 5 cents........	10.50	
400 feet lineal of 5-inch hard pine casing, at 3 cents........	12.00	
24 plinth block, 5 x 10, at 10 cents........	2.40	
38 corner blocks, 5 x 5, at 8 cents........	3.04	
144 feet parting stops, at 1 cent........	1.44	
144 feet 1-inch window stops, at 1 cent........	1.44	
32 feet $3\frac{1}{2}$-inch window stool, at 3 cents........	.96	
144 feet 2-inch door stops, at $1\frac{1}{2}$ cents........	2.16	
24 feet thresholds, at 4 cents........	.96	
1 front door 2 feet 8 inches by 7 feet, $1\frac{3}{4}$ inches thick........	3.50	
2 doors 2 feet 8 inches by 6 feet 8 inches, $1\frac{3}{8}$ inches thick, at $2.15....	4.30	
5 doors 2 feet 6 inches by 6 feet 8 inches, $1\frac{3}{8}$ inches thick, at $2......	10.00	
9 windows, 22 x 30, two-light, at $1 80........	16.80	
2 cellar sash, 10 x 12, two-light, at 80 cents........	1.60	
		$346.23

ESTIMATE OF HARDWARE.

30 pounds 20-penny wire nails, at $2.40........	$0.72	
100 pounds 10 penny wire nails, at 2 50........	2.50	
150 pounds 8-penny wire nails, at 2.60........	3.90	
50 pounds 6-penny wire nails, at 2.70........	1.35	
35 pounds 4-penny wire nails, at 2.90........	1.01	
40 pounds 10-penny wire finish, at 2.70........	1.08	
60 pounds 8-penny wire finish, at 2.85........	1.71	
20 pounds 6-penny wire finish, at 3.10........	.62	
5 pounds 4-penny wire finish, at 3.40........	.17	
8 pair of butts, at 15 cents........	1.20	
1 front door lock........	2.00	
7 mortise knob locks, at 75 cents	5.25	
200 feet of sash cord........	1.00	
28 window weights, 196 pounds, at $1\frac{1}{2}$ cents........	2.94	
7 sash locks, at 15 cents........	1.05	
24 wardrobe hooks........	50	
150 feet of roofing tin, laid, at 8 cents........	12.00	
		$39.00

ESTIMATE OF CARPENTER'S LABOR.

Framing and laying floors, 8 squares, at $1.30........	$10.40	
Framing, sheeting and siding, 14 squares, at $2.25........	31.50	
Framing and setting partitions, 6 squares, at 60 cents........	3.60	
Framing, sheeting and shingling roofs, 10 squares, at $2.30........	23.00	
132 feet of main cornice, at 12 cents........	15.84	
48 feet of corner casings, at 4 cents........	1.92	
20 feet lineal of front porch, at $1.50........	30.00	
Back platform and railing........	5.00	
7 window frames complete, at $2.40........	16.80	
2 window frames in attic, at $1.85........	3.70	
8 door frames complete, at $2.70........	21.60	
210 feet of base, at 3 cents........	6.30	
Finishing pantry........	3.00	
Making cellar stairs........	3.00	
Making attic stairs........	5.00	
Making two cellar frames, at 75 cents	1.50	
		$182.16
Plastering, 355 yards, at 25 cents........		85.75
Painting........		45.00
Total estimate........		$840.64

To many our estimate may seem somewhat lengthy, but there is nothing difficult or complicated in making out an estimate in detail as above and it has a good many special advantages, a few of which we will mention :

1. Estimates given with plans in trade journals are almost invariably too low, but if the estimate is either too high or too low, by referring to the estimate in detail one can readily determine the parts that are over or under estimated and make the proper corrections.

2. If it is desired to cut down the expense of material the estimate will show just what can be done and what cannot.

3. In the estimate of lumber it is indicated what each item is for, and if the correct amounts are not given they are easily discovered and corrected. It will also show where it is possible to reduce the estimated quantities.

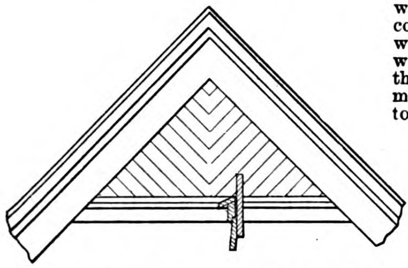
4. In the estimate of carpenter work it shows the carpenter just the parts of construction he can afford to cut rates on and just about how much; and if he has to cut rates, as in close competition, he can cut rates and know pretty nearly what he is doing, which is a great deal better than to jump at conclusions and cut rates indiscriminately.

There are many advantages in this method of estimating which will be readily seen by those who are engaged in the work. Supposing that it does take a few hours longer to make the estimate, is it not better to have an intelligent estimate—one that tells the whys and wherefores—than to jump at conclusions and perhaps sacrifice from $10 to $50 for two or three hours' extra time in estimating?

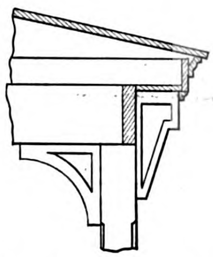
The estimated cost of cottage is $840.64. By dispensing with the cellar this could be reduced to $775.

Our estimate for carpenter's labor is liberal, and if desired the prices could be cut something like $30 on the job, leaving $150 for the work. But who will claim that $30 is too much for a contractor to make on the carpenter work, when it is sure that he has always to take some chances in doing the work? Without doubt, there are many carpenters who would be willing to undertake to do the work given in the estimate for $125 ; but to all such we would say : Consider well the estimate in detail, go through with every item separately, and carefully sum up the amounts. What seems like plenty too often proves little enough and it is a very easy matter to get left, especially when it comes to cutting rates, as in cases of close competition.

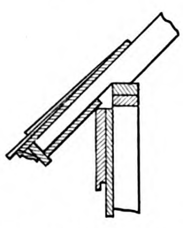
In concluding this part of the subject, we take the liberty of expressing the hope that the readers of the paper will criticise and suggest, to the end that all may be heard.



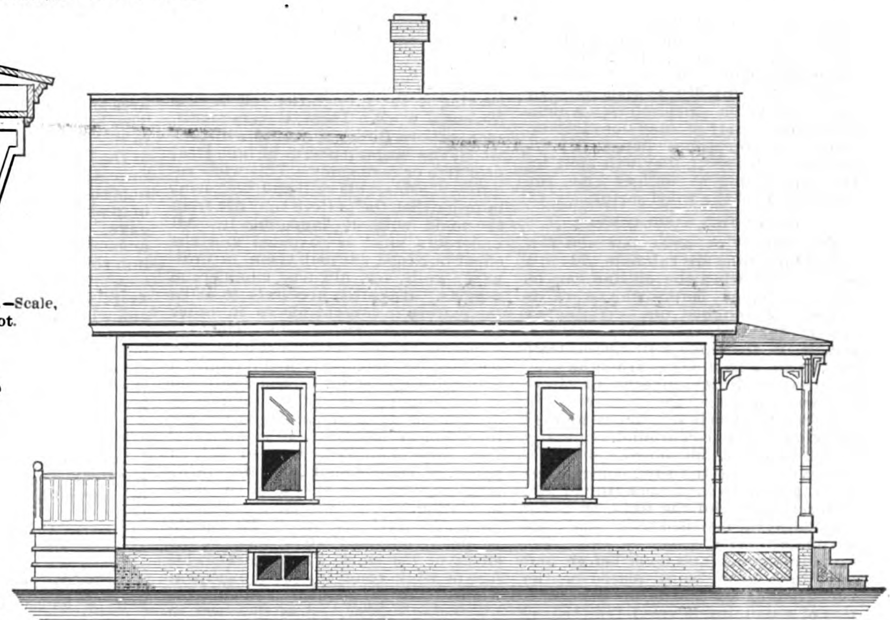
Detail of Front Gable.—Scale, ¼ Inch to the Foot.



Detail of Porch Cornice.—Scale, ½ Inch to the Foot.



Detail of Main Cornice. Scale, ½ Inch to the Foot.



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

Estimating Material and Labor in Building Construction.

THE plans of Architect Ernest Flagg of 54 Broad street, this city, have been accepted for the new capitol of the State of Washington, at Olympia. There were 189 competitors. The plans call for the erection of a building to cost $1,000,000.

THE section of a redwood tree, 32 feet long by 23 feet wide, which was a feature of the Interior Department's exhibit at the World's Fair, is to stand on a concrete foundation now nearly completed in the Agricultural Department grounds in Washington. The interior of the tree has been removed so as to leave a circular chamber 16 feet in diameter, and in this hollow a small museum will be established.

Wood Carving.*

CARVING AN ORNAMENT.

We will next take a length of molding, egg and tongue or leaf enrichment, for example. First space out the ornament, then mark the outline upon it and set it in as we did with the panel. The groundwork is next picked out and the face afterward carved, the more projecting parts being finished last. If egg and tongue, the shell is set in, the egg shaped and finished, the tongue being carved afterward. We may remark here that full size sketches of egg and tongue or other moldings as given us are often very deceptive. The enrichment is generally drawn on the molding in elevation, probably looking fairly broad or otherwise in correct proportion, but when developed on the actual molding it becomes quite different, and really works out very much narrower than was expected. If these sketches are set out for short breaks, it is evident we must either alter the arrangement or execute the work to a different proportion than that shown or intended. Gothic strings and space ornaments are sometimes cut in the solid and sometimes applied in both old and modern work. If applied with an intervening space between the carved portion and the cavetto background, there is a lightness of effect and more shadow than can be obtained if they are worked out of the solid stuff. The section for a carved molding is an important point ; if it contain deeply sunk hollows the carving must be done with bent tools, which increases the time required for its execution. The model for an architrave similar in section to those at Hampton Court Palace, but with simpler detail, is a good example of its kind ; but flatter sections are much more economical to work.

CAPITALS.

Capitals generally should be prepared with the grain of the wood vertical for carving. If the grain is hori-

* Continued from page 120, May issue.

zontal, as for Ionic caps with angle volutes, they must be glued up at the miters or angles, otherwise two sides have to be carved endwise in the grain. If the caps are of any size they should be built up. Take a Corinthian cap, for instance: a good method is to glue up the bell in sections, with angle and center scrolls in the same pieces of wood; if for a column, have the bell turned. The scrolls and husks can then be carved and well undercut, or pierced if preferable; the lower tiers of leaves being absent, there is more room to get at the undercut parts. The leaves for lower part of cap are shaped and carved separately, being afterward glued on and screwed from the back or inside. It is also convenient to build up the abacus in pieces, and if properly put together with dowels and well screwed to the cap, the whole will stand better than if cut from a solid piece of wood, even if such could be procured large enough for the purpose. The Corinthian caps on the choir screen at St. Paul's Cathedral are built up in a similar fashion to that just described. If the caps are executed in the solid, the probability is that roughing out and exposing fresh parts of the wood to the action of the air will cause the outer parts of cap to shrink rapidly, so that splits or shakes develop themselves, which, after a time, may or may not close up again. It sometimes happens if the shakes are filled up they will split up the cap, acting as wedges when the inside parts of the wood shrink.

AIDS TO THE WOOD CARVER.

The endless or band saw and fret cutting machine are valuable aids to a wood carver when the outline can be cut or pierced before the work is shaped or roughed out—cresting or tracery, for instance. The small terminals on the table will demonstrate this. One is as it comes from the saw, the next with the superfluous pieces knocked away and the third roughed out. This method is sometimes adopted for work with a background, especially if in high relief. The outline of the design is cut with the saw, being afterward glued upon a background and well screwed from the back, or, if for painted work, fastened with fine nails or brads from the face as well. The carving is sometimes done before and sometimes after being placed on the background. By this means the operation of grounding is saved, but the perfectly level background is not so artistic looking as the slightly undulating one produced by the first method described. It is almost needless to say that the design must be thoroughly thought out before the fret cutting is begun. The large console on our left was cut to the outline before being carved; the surplus wood is thus easily removed; it is then roughed out and afterward finished as described in the case of a panel. The enriched three-quarter column was first made out with deal to complete the circle, then turned and carved. The moldings forming the cornice and those round the panel in satinwood were prepared with the aid of machinery, then mitered up and fitted by a joiner, the joints carefully marked and protected; the pieces are then carved before the moldings are glued up, the miters being finished off afterward. The wood carver always prefers his work in small pieces. As a rule, he lays and fixes it on the bench before him, whereas the stone carver, if possible, puts his work up in front of him. It is rather remarkable that in those cases where the craftsman is both a stone and wood carver he puts the stone up in front and lays the wood down before him. The explanation is that the stone carver does most of his work, even when finishing, with a mallet or hammer, whereas the wood carver, hampered by the grain of the wood, has more power over and a freer use of his tools by having the work below him.

CARVING WORK IN POSITION.

Wood carving executed *in situ* is always much more expensive than if done on the bench before the work is put together. Cutting tracery is part of the wood carver's craft, though it is often left to the mercies of a joiner, who gets as much as possible done by a machine, which takes all the spirit out of the cusps, the pockets and miters being sometimes wonderfully and sometimes fearfully worked afterward. Simple quarterfoils on the table show the difference in the appearance of plain cusping when worked by hand and by machine. Those worked by hand stand up and have a crisper effect than the one taken off to a dead level by the machine. The slightly varied section of the molding as worked by hand is also better looking than the mechanical hollow which runs with unfailing regularity through the machine work. While speaking of tracery we may mention that among the small models will be found some examples of carved cusps and terminations. An interesting branch of wood carving is the preparation of models for metal work. These, if very small, such as bows for keys, are made of boxwood, the larger patterns of lime tree, pear tree or mahogany. This work requires considerable skill and judgment in order that the pattern may lift from the mold without damaging it. All undercuts must be avoided and the effect obtained without them in ordinary work for obvious commercial reasons. It is often necessary to make the pattern in several pieces in order to draw it out of the mold. They are sometimes cored or worked out at the back to the thickness of metal required and sometimes solid, at the discretion of the founder Into the province of designs for wood carving it is not my intention to enter, but it is desirable that they should be worked out on paper, or a model made, that the craftsman may cut into the wood without hesitation, or as we say, "without having to feel his way." He should be able to mentally see or imagine the effect of his work when finished, before or while roughing out the subject. Figures always require modeling before being carved, unless they are to be in very low relief, in which case a skilled carver can produce good effects with the aid of a careful drawing.

POLISHING.

Concerning polishing, as a rule, some polish is required to protect wood against changes of temperature, and to keep it clean or bring out the color. If left from the tool or plane some woods soon show the dirt very much, especially in this city of ours, and therefore some protection is necessary. But let there be as little polish used as possible. It is generally applied with a brush and needs great care, for at the very best it spoils the appearance of the carving, for a time at least, and certainly in no case does it improve the work. It is generally disappointing when one sees their work for the first time aftor being polished. Teak is a satisfactory wood from this point of view, it being a good color and standing well without polish. A good treatment for oak is to have it fumed in a chamber with ammonia, afterward finishing with wax polish.

DURING the excavations conducted at Delphi by the French School of Archæology the caryatides and the frieze of the Temple of Apollo were reported to have been found.

Law in the Building Trades

Mortgages of Fixtures.

A building erected on the land of one person by another may be mortgaged as personal property if it was so erected under an understanding or agreement that it might be removed at any time. Apparently, such a building would be a fixture and would not be removable. The legal effect of putting it on another's land is to make it part of the freehold, and to sustain a mortgage of it as personal property an agreement of the parties controlling the legal effect of the transaction must be proved. If the mortgagor after mortgaging such a building remove it to other land which he subsequently purchases, and then mortgages the land to another with the buildings and fixtures thereon, but the latter mortgagee has full knowledge of the prior chattel mortgage, this will have priority over the mortgage of the land. If the owner of the land purchase such building after it has been mortgaged, the lien is not thereupon extinguished. Buildings erected under an agreement with the owner of the land to convey it to the builder upon his paying a certain sum within a limited time are not strictly personal property, but they are fixtures and constitute a part of the realty. The builder has an equitable interest in the realty, and not a pure ownership of the buildings as chattels, and therefore a mortgage by him of the buildings should be recorded as a mortgage of real estate and not as a chattel mortgage. Where a building has been erected by a tenant whose lease gives him the right of removal at the expiration of the lease, this right must be exercised within a reasonable time, and one who has taken from him a chattel mortgage upon the building acquires no better right than the tenant had, and cannot remove the building after the tenant's right of removal has expired.

Bond to Discharge Mechanic's Lien.

Where the statute relating to mechanics' liens provides that a lien may be discharged by the owner of the premises or the person against whom notice of lien is filed executing a bond with sureties, conditioned for the payment of any judgment which may be rendered against the property, no recovery can be had on such bond until the lienor, by an independent action, shows that he had a lien which he could have asserted against the property but for the giving of the bond.—Brandt *vs.* Radley, Supreme Court of N. Y., 23 N. Y. Supp., 277.

Rights of Parties in Sale of Property.

Where one sold a house, taking in payment money and a house on another avenue, and at the same time the purchaser agreed that if, on the sale of the latter house, he should realize more than he allowed for it, after deducting repairs and the expenses of sale, he would pay such surplus to him, the seller had under the agreement an equitable interest in such house, and if the purchaser, on selling it, took other property as part of the price, without the seller's consent, he was accountable to him for the valuation at which such other house was taken, though he afterward sold it for a less sum.—Maguire *vs.* Richards, Supreme Court of N. Y., 25 N. Y. Supp., 1117.

Malicious Interference with Contract.

An action will not lie against one who maliciously, but without threats, violence, fraud, falsehood or benefit to himself, procures a breach of contract between others.—Boyson *vs.* Thorn, Supreme Court of California, 33 Pac. Rep., 492.

WHAT BUILDERS ARE DOING.

BUILDING INTERESTS are generally quiet throughout the country, with a less amount of work in course of construction than was the case at this season of last year. There are no reports of excessive depression, but the best which come to hand do not indicate a situation in excess of normal, so the total may be safely considered as below the average. The medium sized and smaller cities seem to be more affected than the large cities, for in the latter the amount of work seems to hold up in a surprising degree when the scarcity of large building investments at the present time is considered. Workmen in Chicago seem to be suffering more than those of any other of the large cities, and the reason seems to be lack of harmony among themselves and between them and their employers. The amount of work projected early in the season was very satisfactory, but much of it now seems to have disappeared.

Boston, Mass.

Building is quiet at present, the amount of new work in hand and projected being considerably less than the average for this season. A serious fire destroying property covering an area of about 15 acres in the "South End" occurred on May 15, and was followed by another large one on the 17th in the wholesale district of the city. This will doubtless cause new work to come into the market before very long. The district covered by the fire first mentioned was built up mainly with frame dwellings, stores, factories, &c., and was included in the last revision of the fire limits. It will be impossible now to build anything but first or second class buildings in the burned district, and the character of that part of the city will be very much improved. There is little disturbance among the workmen, although the Central Labor Union is endeavoring to do away with the system of letting municipal work by contract, and is trying to have the city employ all labor direct, thus giving the workmen in wages what is now supposed to go to the contractor as profit. About May 10 the cornice makers locked out their workmen on account of their refusal to sign individual contracts. On March 1, 1893, the master cornice makers and the Cornice Workers' Union entered into an agreement stating the hours of labor that should constitute a day's work for the ensuing year; also the rate of wages. This year the representatives of the union endeavored to secure the signatures of the employers to a similar agreement for one year. The master cornice makers, instead of signing, met their employees with a counter proposition. Since March 1 the matter was in controversy until early in May, when each employee was asked to sign an individual contract. As this virtually meant severing their connection with their union the men refused. As a consequence every member of the trade employed in Boston, with the exception of five men, was locked out.

The situation at the hour of going to press is unsettled, and such work as is being done has been given to non-union men.

While this issue was in the printer's hands the trade school, under the supervision of the North End Union, gave an exhibition of the work of the plumbing class. The following announcement indicates the nature of the occasion:

> The directors of the North End Union, desiring to give recognition to the faithful work done by the pupils of the plumbing school, will close the term with an exhibition of the work accomplished, on Wednesday evening, May 23, with several short addresses by friends of the school:
>
> SAMUEL B. CAPEN,
> Formerly president of the Boston School Board.
>
> WILLIAM H. SAYWARD,
> Secretary of the National Association of Builders.
>
> WILLIAM G. MITCHELL,
> President of the State Association of Master Plumbers.
>
> REV. CHARLES G. AMES.
>
> The work of the pupils will be on exhibition for an hour before the speaking, which begins at 8 o'clock.

Arrangements were made for the celebration of a "ladies' night" on May 29, the first entertainment ever given by the Master Builders' Association for the benefit of the ladies. The programme included music, a collation and a variety of entertaining features. A pleasant time was anticipated by all, and a full account of the event will be given in the next issue. During the past month the association received a magnificent engraving by Sartain after a painting entitled "The Iron Worker and King Solomon." The engraving is set in a very graceful black iron frame, and the whole is the gift of John S. Stevens of Philadelphia, an ex-president of the National Association of Builders and one of the prominent members of the Philadelphia Exchange. The engraving has attracted universal admiration.

Buffalo, N. Y.

The Builders' Exchange Association, the organization in whose name the building occupied by the exchange stands, held its annual meeting recently. The following trustees were elected: Charles A. Rupp, H. C. Harrower, Alfred Lyth, John Feist, George W. Carter, A. A. Berrick, Henry Schaefer, Jacob Reiman, Emil Macwirth.

The trustees immediately held a meeting and elected the following officers:

Charles A. Rupp, president.
H. C. Harrower, vice-president.
Alfred Lyth, treasurer.
J. C. Almendinger, secretary.

Building Committee: John Feist, George W. Carter, A. A. Berrick, Henry Schaefer and Emil Macwrith.

Business is reported as being in a fair condition with prospect of improvement in the near future. No trouble has occurred with the workmen this spring, and it is anticipated that none of a serious nature will transpire in the near future.

Baltimore, Md.

The builders of Baltimore are well satisfied with the condition of business as compared with that in many of the other cities. Baltimore builders have felt the depression of the past season very lightly and have nearly the average amount of work on hand at present. The members of the Builders' Exchange are anxiously looking forward to the completion of their new home, which is now rapidly nearing completion. It was hoped that the building would be finished sufficiently for occupancy by June 1, but it was decided not to attempt to occupy the new home until it was fully ready. The character of the building, together with its location, will give a prestige to the builders which could be gained in almost no other way. The exchange will be housed in a building of its own, arranged for its special use and for builders' offices and located in the most desirable part of the city, and must inevitably feel the benefit that such a position in the business community must bring. As soon as the building is ready the exchange will take up its new home and a full description of the building will be given in these columns.

Chicago, Ill.

Building in Chicago is comparatively active, considering the fact that the difficulty in establishing a settled condition among the workmen has been so great. The prospect for the season's work was at best below the average, and recent labor troubles are reported as having been felt in the withdrawal of some of the projected work from the market. The painters' and plumbers' strikes of two months ago which promised to involve the whole building interests of the city have come to nothing permanent or satisfactory. Continual threats of general strike or lockout are being made, and work meanwhile is being carried on in a more or less unsatisfactory condition. It has been stated in the daily press that the plumbers have returned to work at $3.75 per day, and that the painters have been conceded the 35 cents per hour which they demanded. Information from the more conservative of the employers among the builders indicates that much of the uncertainty is due to the failure of the employers to act in harmony.

Cleveland, Ohio.

The Cleveland carpenters are making a strong effort to establish a fixed minimum wage and secure some certainty as to what a day's work will bring. At present the carpenters are working for all sorts of wages, from 15 cents per hour up, and all are dissatisfied with the condition of affairs. The majority seem to want 27½ cents per hour, although many are willing to work for 25 cents.

The lathers have made an agreement with the employers, whereby the workmen shall receive a fixed per cent. of all work done under contract. In former years the contractors and journeymen worked independently, but it is the intention this year for the contractors to take the work at a certain figure and the workmen to receive a certain per cent. They decided to make the contract price 2 cents per yard, which took effect on May 1. This makes the journeymen's wages average $2.25 or $2.50 per day.

The tinners are dissatisfied on account of an effort that is being made to change a day's work from nine to ten hours without a corresponding increase in wages. One firm of tinners have already done this and others threaten to follow.

Indianapolis, Ind.

Indianapolis carpenters have been making an effort to secure 30 cents per hour as average wages, and struck work in support of their demand. The contractors had no difficulty in securing all the men they wanted, and the strikers then reduced their demand to 27½ cents per hour. The strike was a failure, and the union men are again at work at such wages as they can get. Good men are paid at least 30 cents. The carpenters are trying to establish an organization of contractors from among themselves, and intend to bid for work in competition with the regular contractors. The brick masons are now in conference with their employers seeking the adoption of a fixed scale of wages.

The Builders' Exchange is in good shape, with the majority of the members busy.

Lowell, Mass.

The following officers were elected by the Lowell Master Builders' Exchange at the annual meeting.

President, F. L. Weaver.
Vice-president, P. Conlon.
Secretary, Charles P. Conant.
Treasurer, George H. Watson.
Directors: F. L. Weaver, P. Conlon, Charles P. Conant, George H. Watson, W. H. Kimball, P. O'Hearn, P. B. Quinn, George H. Kirby, Robert Goulding.

The annual reports of the officers showed the organization to be in good financial condition and holding its own as to numbers. An excellent lunch was served at the meeting and the members enjoyed the occasion thoroughly.

Milwaukee, Wis.

At a special meeting of the Milwaukee master carpenters, held at the Builders and Traders' Exchange, the following resolution was adopted:

> *Resolved*, By the master carpenters in assembly convened, that eight hours shall constitute a day's work, and that the lowest scale of wages to be paid to carpenters shall be 22½ cents per hour for the coming season. That this agreement be and remain in full force and effect until the next regular conference, to be held the first week in February, 1895.

Two years ago the carpenter unions of the city demanded that the minimum rate per hour be fixed at 25 cents. After a prolonged strike the organizations were successful, and that rate has governed as a minimum basis for compensation until the present time. That is to say, it has been the nominal basis, but as a matter of fact carpenters, both union and non-union, have been working for much lower wages—in some instances for $1.25 per day.

The resolution was thoroughly discussed by the unions and the scale finally accepted. It is now expected that the carpenters will work through the season without break on account of wages, unless the employers should fail to live up to the scale.

New York City.

The building trades of New York City are steadily improving and at present promise much better than the earlier season seemed to warrant. There is comparatively little trouble among the workmen, although the low price of brick as compared with a year ago and a consequent reduction in wages led to a general strike among brick yard laborers along the Hudson River.

The project for creating a modern exchange, which has been frequently mentioned in these columns, has taken definite shape in the formation of the Building Trades Exchange. The method of procedure by which the necessary funds for the undertaking were secured has been printed in these columns, and is proving as successful as the most sanguine could hope. The following officers have been elected:

President, John J. Tucker.
Vice-president, Edwin Outwater.
Secretary, Stephen M. Wright.
Treasurer, Isaac A. Hopper.

The following gentlemen have been appointed a committee to select a site for the building:

Charles A. Cowen, Charles T. Galloway, Henry K. S. Williams, Theodore W. Morris and Ronald Taylor; and as a Committee on Building, Messrs. Augustus Meyers, Geo. Moore Smith, Matthew C. Henry, John J. Roberts and James B. Mulry.

A new prospectus of the "Builders' Building" has been issued, which sets forth the need of some adequate headquarters for the builders of the city, and describes the method of raising the $400,000, which it is proposed to invest in a property which shall represent a valuation of $1,000,000.

It is earnestly believed that the project, even as a financial proposition, will receive a hearty response, for there certainly can be no question as to the security when it is considered that with a property ready for occupancy valued at $1,000,000 the statement would be as follows:

INCOME.

From rent of offices...... ..	$128,000	
From rent of exhibit space..	30,000	
From rent of basement, exchange and club floors.....	10,000	
		$168,000

EXPENDITURES.

Interest on bond and mortgage, $600,000 at 4 per cent.	$24,000	
Operating expenses...	35,000	
Taxes, water and incidentals.	25,000	
Allowing annual dividend of 5 per cent. on certificates and stock....................	20,000	
		$104,000
		$59,000

This leaves a net profit of nearly $60,000 per annum to be applied either to increasing the dividend or liquidating the mortgage.

The subscriptions had passed the $100,000 point before the organization took place, and the present condition of the list warrants the assumption that the entire amount necessary will be available by the time the site and building are settled upon.

At the last meeting of the Mechanics and Traders' Exchange Stephen M. Wright, on behalf of the delegates to the recent convention of the National Association of Builders, verbally reported at considerable length the doings of the convention, and availed himself of the opportunity to set forth in proper light the immense advantages to the building fraternity of the annual assemblages of the National Association as well as what had been accomplished through its efforts in the past years of its existence.

The following resolution was unanimously adopted:

Resolved, That the Mechanics and Traders' Exchange of New York extends its warmest thanks to the Master Builders' Association at Boston for the generous hospitalities extended to its delegation while attending the annual convention of the National Association of Builders.

When the regular business had been disposed of, President Hopper invited Hon. Charles W. Dayton, the postmaster of the city, to address the exchange. The speaker took for his subject the need of the builders making their influence better felt in the community, as they certainly were a commercial interest which should not feel ashamed of their calling, but rather should be proud of their position when they realized their important part in the construction of the magnificent edifices of the city. He closed with the thought that recognition of the dignity of the builders' calling could be best secured by the erection of a sightly building of their own, such as was already contemplated, and he was glad to learn that the project was well under way. It is the intention of President Hopper to invite some prominent person to address the exchange on some important topic at each of its meetings.

Omaha, Neb.

The building business in Omaha is very quiet, and the present outlook is not flattering for the season's work. Some new buildings are under way, but the total amount is far below the average of past years. At the recent meeting of the Builders and Traders' Exchange, the first since the national convention, the report of the delegates, Messrs. A. J. Vierling and W. M. Dodge, was presented and listened to with marked interest. Secretary Wedge read the resolutions adopted by the convention and it was intended to discuss the same, but the hour being late it was decided to call a special meeting for the purpose.

The exchange is in good financial condition and the daily attendance at 'Change hour is steadily improving. A tasty lunch was served after the business of the meeting was over, and the members thoroughly enjoyed the friendly meeting and recess from business cares. The carpenters have made a demand for 30 cents per hour to take effect on June 1 and eight hours per day; overtime to be paid for at the rate of time and a half, and none but union men employed. The carpenter contractors do not object to paying good workmen 30 cents per hour, but will probably decline to pay 30 cents as a level price for all workmen. Many of the best carpenters want to work nine hours and the difference among the workmen may prevent any serious trouble. There will be little objection on the part of the employers to conceding the eight-hour day.

Philadelphia, Pa.

The first regular planked shad dinner of the Philadelphia Master Builders' Exchange, at Gloucester, on May 5, was a great success. The builders and their visitors from other cities left Walnut street wharf after 2 o'clock and steamed up to Cramps' shipyard and then down to League Island, giving all a fine view of the harbor, and passing the schoolship "Saratoga" and the beautiful new warship "Columbia." Arriving at Gloucester at 4 o'clock, the party, augmented by other members and guests who came down on separate boats, sat down to dinner. There were upward of a hundred at table. President Franklin M. Harris presided, and in opening called attention to the fact that the active builders had a right to shut up shop once in a while and go off to enjoy the good things of life. He welcomed the guests and introduced W. S. P. Shields to speak for the Builders' Exchange of Philadelphia. Mr. Shields made a stirring address in the interest of Philadelphia, and was followed by President J. V. Snedeker of the Trenton Builders' Exchange. The other speakers, as called, were J. Hampton Moore of the *Public Ledger*, J. R. Jones, president of the Stylus Club; T. Henry Martin, James Hastings, R. G. Kennedy, Select Councilman Thomas B. McAvoy, George E. Vickers, Chief Eisenhower of the Bureau of City Property, Robert W. Lesley, Select Councilman F. A. Ballinger, James E. Lennon and David A. Woelpper, ex-president of the exchange.

The Journeymen Bricklayers' Protective Association has made an offer of $23,000 for the two properties adjoining Bricklayers' Hall on North Broad street, with a view to enlarging their present building.

Rochester, N. Y.

The bricklayers and carpenters of Rochester are unable to satisfactorily adjust their differences with their employers, and a strike by the masons is the result. The brick masons struck on a contract which brought them into contact with the stone masons. The masons say the contractors had no right to employ stone cutters on the job, as all the work was of a nature which comes within the scope of the masons' trade. The constitution of the Union of Stone Masons, Bricklayers and Plasterers contains this clause:

Stone masons' work shall consist of laying all rubble work, cutting all shoddies, including all rock faced ashlar, jambs and corners, and setting all cut stone cut in yard by stone cutters, when the same is covered by stone.

The work on the job is going on, but the matter has not yet been adjusted. The carpenters are working hard to get a uniform wage scale adopted, and would have struck on May 1 had they felt that they possessed sufficient strength to assure success.

The Builders and Building Supply Dealers' Exchange is in good condition and is steadily securing a firmer footing in the estimation of the business community as one of the solid and beneficial institutions of the city.

St. Louis, Mo.

The Builders' Exchange of St. Louis is making a most praiseworthy effort to bring about harmony among the building trades of that city. A committee, consisting of W. J. Baker, Patrick Mulcahey, T. F. Hayden, Patrick Rowan and Philip G. Ring, has been appointed to present the form of arbitration advocated by the National Association of Builders to all the labor organizations in the city and to urge its favorable consideration. Copies of the form, together with a circular letter, have been sent to all the unions and to the Building Trades Council. The form was favorably received by the council, and the Builders' Exchange is now awaiting a report from that body. The exchange is also considering the manner in which its annual outing shall be spent, a committee having been appointed to report on the subject. Business is reported as being good, with no strikes of any importance in force or prospect.

Notes.

Covington, Ky., carpenters have demanded nine hours and 30 cents per hour, and from present indications are likely to succeed, as part of the contractors have granted the request.

Contracting carpenters of Montreal, it is reported, have been requested to sign the following agreement, which explains itself. Where employers have failed to sign their workmen have struck:

To whom it may concern:

No. —

MONTREAL, May, 1894.

I, the undersigned employer of journeymen carpenters and joiners, do fully agree to the demands of the Brotherhood of Carpenters and Joiners.

The demands are as follows:

1 The minimum rate of wages shall be 20 cents an hour.

2. That the working week shall consist of 54 hours or nine hours a day.

3. That all time over nine hours a day or 54 per week shall be paid at the rate of time and a half. I do hereby bind myself to faithfully abide by the said condition until May 1, 1895.

Signed for the Brotherhood, Executive Committee, President, ———; Secretary, ———.

Signed for the Contractor, Witness, Mr. ———, street———, No. —.

The union bricklayers of Scranton, Pa., have struck for 40 cents per hour, which is an increase of 5 cents per hour over the present scale. The contractors have declined to accede to their demand.

Though the bricklayers on the University of Illinois Engineering Building at Champaign, Ill., have been receiving $4.50 for 10 hours' work, they made a demand on May 5 that the time be reduced to eight hours or they would strike. The contractors paid off the whole force, which stopped the work until another force of men could be secured. This is the second strike which has occurred on the building.

The strike of the stone masons of Wheeling, W. Va., for an advance in wages, which was inaugurated some weeks ago, has been settled, the masons receiving 35 cents an hour. No settlement, however, has been made with the demands of the stone cutters, but the matter is said to be in a fair way to an adjustment.

The builders of San Francisco held an annual reunion on April 25 in the rooms of the Builders' Exchange, 14 Post street. The occasion was celebrated by a banquet of the most thoroughly enjoyable character. The following brevity from the *Chronicle's* report of the affair laconically describes the feast: "The president's opening address was brief and to the point. He said: 'Gentlemen, we are here to eat and drink and enjoy ourselves while the band plays. There is a strong man among us to pull the corks and there are plenty of good things to eat. Let no man neglect himself.' And no man did."

During the last week in April the carpenters of Richmond, Ind., struck for 30 cents per hour without gaining their demand. After 800 men had been out of work for about a week the strike was declared off and such workmen as could returned to work.

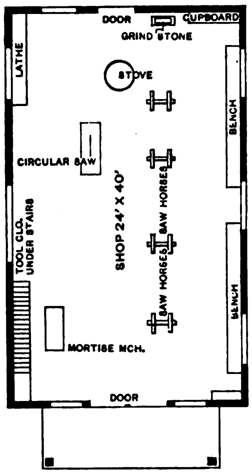
The Builders' Exchange of Winnipeg, Man., held its annual meeting April 30. The membership has been largely increased and the association has in its membership all the principal builders and contractors in the city. Several amendments to the constitution and by laws were deemed advisable, and notice of motion was given to that effect, which will come up for consideration at the next regular meeting on May 14. The treasurer's report was presented, showing a balance of $600 to the credit of the association in the bank. The election of officers for the ensuing year resulted as follows:

J. A. Girvin, president; E. Cass, vice-president; J. G. Latimer, treasurer; H. McConuck, secretary.

CORRESPONDENCE.

Plans for Carpenter Shop.

From YANKEE, *Popasquash, R. I.*—Some months ago a correspondent in Illinois asked for plans showing the arrangement of machinery in a carpenter shop, since which time I have



Carpenter's Shop.—Fig. 1.—First-Floor Plan.

not seen an answer on the part of readers of the paper. While I have nothing of my own to suggest, I would call the correspondent's attention to a letter published in the issue of the paper for September, 1889, in which the writer describes a carpenter shop which he designed and submitted sketches indicating the arrangement of the equipment. If the Illinois correspondent making the inquiry has not back numbers of the paper to which he can refer, it is possible the editor will republish the matter in question for the benefit of all concerned.

Note.—We take pleasure in complying with the suggestion of "Yankee," and present herewith the two floor plans of a carpenter shop submitted by "M. F. B." of Waterloo, N. Y., together with such portions of his letter as relate to the drawings.

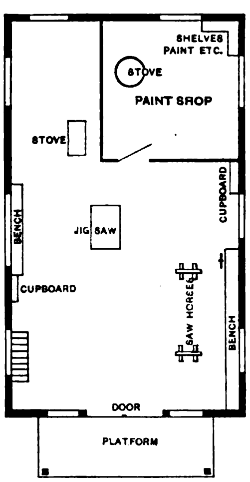
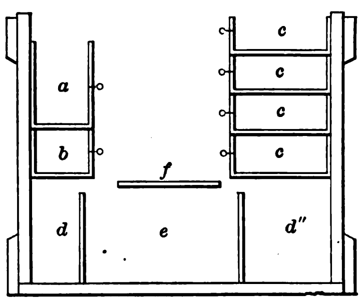


Fig. 2.—Second-Floor Plan.

"I have been much interested in the building plans which have been published, and thought I would take the present occasion to forward floor plans of a carpenter's shop which I have designed. The size of the shop is 24 x 40 x 18 feet. It is sided with grooved siding and paper and sheeted inside. The cost of the shop was about $850. The tools, foot power machinery, cases, work benches and cupboards cost about $800 more. Referring to the sketches which I inclose, Fig. 1 is the ground floor, in which is shown the position of the work benches, cupboards, turning lathes, buzz saws, mortise machine, grindstones, saw horses and other articles contained within the building. Under the stairway I keep my coarse tools, such as ropes, pulleys, crowbars, boring machines, &c. Fig. 2 represents the second floor of my shop, with the position of the various tools, benches, &c., clearly indicated. The platform shown at the front of the shop I use for drying articles that have been painted. I make use of a very convenient carpenter's tool cabinet, the drawers in which I use for chisels, bits and small tools of similar description. I also employ a conveniently arranged case for screws, nails, &c."

Tool Chest Construction.

From F. M. D., *Newport, Vt.*—I have been reading *Carpentry and Building* for the past year or more and find it very instructive. I have read with deep interest the articles on tool chests and found many good points. With

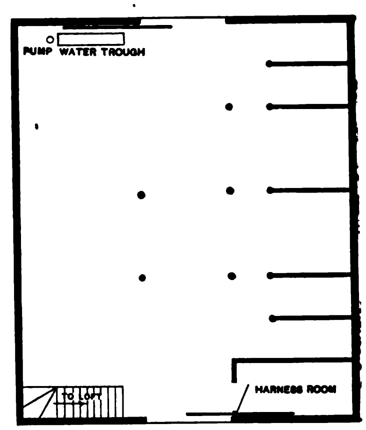


Section through Tool Chest as Arranged by "F. M. D."

one exception I especially like the chest presented by "N. E. O'C.," Porter's Mills, but if he wants a tool that is in the bottom of a drawer he is obliged to lift out a tray to get it. The correct chest has no trays in the tills. The sketch which I inclose herewith represents an end view of a chest built a year ago last winter, which suits me the best of any I have yet seen. The inside of the chest measures 3 feet 2½ inches in length, 1 foot 10½ inches in width and 1 foot 8¼ inches in depth. The body of the chest is made of pine trimmed with brown ash, the cover being of ash with three raised panels. The chest is bound with gun metal corners made for the purpose. Referring to the sketch, *a* represents the saw till; *b*, a till fitted for levels, both of which draw out so as to get at the space marked *d*, which holds tools not often used. The tills marked *c c c c* are for all small tools in daily use. The space marked *d* is for molding planes, &c.; *e*, for holding planes and such tools as are not conveniently placed in the drawers. The portion *f* is made to slide out and will hold boring machines, adze, working clothes, &c. Now close the cover, give the Griffin combination lock a turn, and the tools are as safe as though they were in a bank vault.

Design for a Stable.

From J. E. S., *Sparland, Ill.*—For the benefit of "W. K. T.," Houstonville, Pa., who asks in a recent issue of



Plan of Stable Contributed by "J. E S."

Carpentry and Building for a plan showing convenient arrangement of a stable covering an area 84 x 40 feet, I submit the accompanying sketch, which may prove of service. The arrangement of the stalls, harness room, &c., is so clearly indicated that a detailed description appears to be unnecessary.

Development of an Ogee Hip Rafter.

From H. D., *New York City.*—In reply to an attack made by "F. H. T." of North Topeka, Kan., on a method of ogee rafter development by I. P. Hicks, I feel obliged to defend the method shown by Mr. Hicks. There is no fallacy whatever connected with it, and a simpler method could not, in my estimation, be devised. I would further state that a method which is O K needs no one to come forth and prove its correctness, and the correspondent "F. H. T." is probably on the wrong track.

A Mathematical Problem.

From TRAMP, *Denver, Col.*—I submit for solution the following problem: As shown in the sketch, there are three circles of equal area, the circumferences of which just touch, as indicated. They inclose a space, *a*, the

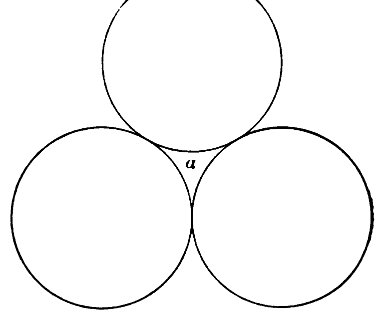


Diagram Illustrating Problem Submitted by "Tramp."

area of which is 180,680 square feet. What I want to know is the diameter of the circles and also the distance from the center of each circle to the center of the space *a*, as well as the method for figuring it.

Strength of Steel Roof Truss.

From H. D., *New York City.*—In reply to "H. B. G." of Baltimore, Md., I send inclosed a graphic solution of the strains in the members of a roof truss submitted by him in the February number of the paper. As the correspondent fails to state the distance between the trusses, my results will be based on the assumption that the trusses are 12 feet apart. The load on each will then be, taking 40 pounds per square foot of roof surface, about 16 tons, including the truss itself. There will be 2 tons weight acting on each of the points indicated by the arrows shown in Fig. 1, and 1 ton resting on each abutment. The solution is as follows: Draw a skeleton diagram of the truss to any convenient scale, and letter the points of intersection of the members as shown. Now, in another diagram, Fig. 2, draw a vertical line, E F, to represent 16 tons by any convenient scale, and lay off the various weights, as E A = 1 ton, A B = 2 tons, B C = 3 tons, &c. Now lay off a point on E F of Fig. 2 midway between G and D and call it M. Now draw the line A-1 of Fig. 2 parallel to the rafter, Fig. 1. Through M draw a line parallel to the tie rod to intersect the first line at 1. Through 1 draw parallel to A B, and draw parallel through B (Fig. 2) to intersect at 3. Now draw the vertical 3-4, intersecting 1-M. Draw 4-5 parallel to B C′ of Fig. 1, and through C draw a parallel line to intersect at 5 of Fig. 2. Draw the vertical 5-6 to intersect 1-M. Draw 6-7 of Fig. 2 parallel to C D′ of Fig. 1, and intersect with D-7 of Fig. 2. Draw the vertical 7-8, and intersect with a line drawn through G of Fig. 2 parallel to the right hand rafter. This completes the diagrams of strains, and will give them on the members of one-half the truss. There being no moving load, the other half is strained to the same extent.

Referring now to Fig. 2, we get the strains on any member by measuring the lines by the scale used in representing tons:

A-1 = 15 tons, which equals the strain on the rafter from A to E.

1-3 = 2.15 tons, which equals the strain on the strut A B′.

3-4 = 1 ton, which equals the strain on the tie rod B B′.

4-5 = 2.7 tons, which equals the strain on the strut B C′.

5-6 = 2 tons, which equals the strain on the tie rod C C′.

6-7 = 3.5 tons, which equals the strain on the strut C D′.

7-8 = 6.8 tons, which equals the strain on the tie rod D D′.

B-3 = 13 tons, which equals the strain on the rafter from B to A.

C-5 = 10.8 tons, which equals the strain on the rafter from C to B.

D-7 = 8.7 tons, which equals the strain on the rafter from D to C.

1-M = 13 tons, which equals the strain on the tie rod from E to B′.

4-M = 11 tons, which equals the strain on the tie rod from B′ to C′.

6-M = 9.3 tons, which equals the strain on the tie rod from C′ to D′.

The rod A A′ has no other function than supporting the weight of the tie rod from E to B′ and could be conveniently omitted in this case. By way of criticism I would say that "H. B. G.'s" method of joining his rod and struts is very poor, especially at C of his Fig. 1. There would be a tendency to badly distort the joint.

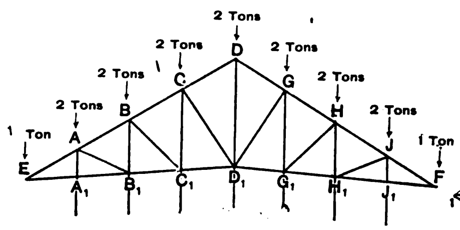


Fig. 1.—Skeleton of Truss.

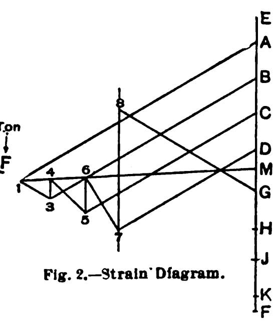


Fig. 2.—Strain Diagram.

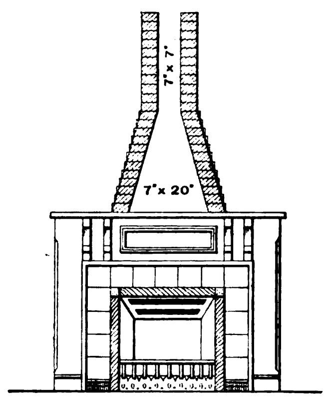
Strength of Steel Roof Truss.—Diagrams Accompanying Letter from "H. D."

Durability of Shingles.

From G. C., *Mount Sherman, Ky.*—I would like some of my brother chips to tell me which variety of shingles will last the longer without painting—prime spruce or 8-inch clear butt pine?

A Smoky Fire Place.

From J. A. S., *Fairfield, Iowa.*—I was much interested in the article on the proportion of fire places in *Carpentry and Building* for March. It is a fact that half of the grates in this town smoke, and some of them that have the smallest flues work the best, so that I think it is not so much the size of the flue as the way the grate is connected to the flue and the shape of the flue at the grate connection that causes the trouble. The question is, How ought the grate to be connected with the flue and what should be the size of the opening that leads to the flue to make a good draft for soft coal or wood? For an ordinary sized fire place which has a front opening 24 x 30 or 30 x 30 inches, what is the best proportion or shape for the opening to the flue? Should the opening be over the front or the back part of the grate? I inclose a drawing of a grate that is located in the corner of a room which has about 1 foot of space between the back of the grate and the flue. Fig. 1 shows a front view of the grate and the shape of the flue over it. Fig. 2 shows a sectional view of the grate and the open space behind the grate. This grate smokes when burning either wood or coal, and I would be under obligations to some reader of *Carpentry and Building* who can suggest a way to make it work well without smoking. As will be seen by the sketches, the smoke flue is 7 x 7, and at the top of the grate it is 7 x 20 and gradually tapers into the flue above.



A Smoky Fire Place.—Fig. 1.—Front View, Showing Flue.

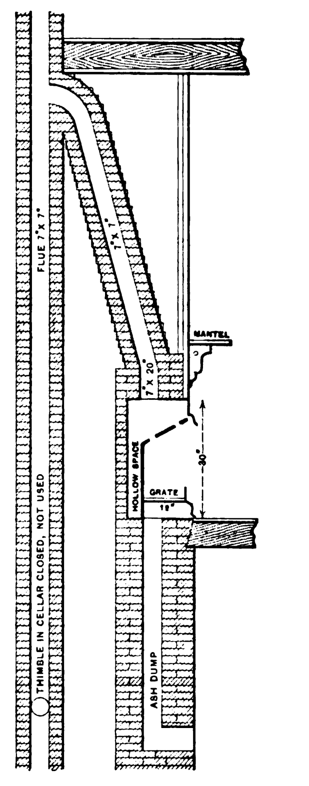


Fig. 2.—Sectional View.

Area of a Circular Roof.

From G. H., *Narrowsburg, N. Y.*—In the October issue of last year "D. L. W." of Madalin, N. Y., asks how to obtain the area of a roof of circular form. I notice that you have given him rules for finding the area of the base, but as there is perhaps an elevation, as in the case of a tower roof, the correspondent would then require the surface of a cone. The rule for this form of roof would be, multiply the circumference of the base by one-half the slant hight.

Cement Cellars.

From W. A. L., *Keyser, W. Va.*—I would like to know how I can build a cellar in low, clayey ground where drainage is impossible, and yet keep out the water. I used 40 barrels of cement in a little cellar last season, but the water still found its way in. It seemed to sweat in all around the side walls and I finally gave up in despair. I used Cumberland cement. Would any preparation of coal tar stop the leak?

Felt and Gravel Roofing.

From OLIVER TWIST, *Owen Sound, Canada.*—In *Carpentry and Building* for July, 1893, "W. B. W." of St. John, N. F., wishes to know how to make tight a chimney or skylight on a flat roof with ¾ inch fall to the foot, covered with felt and gravel or with three-ply felt. I notice no one as yet has given him the information, so I hope the following will be of service to him. In order to make a good roof of this kind it is necessary to have it well sheeted with sound lumber, an even surface without knot holes being desirable. If there are any, cover them up by nailing over them pieces of tin. When boiling the pitch have the cover to fit the pitch pot close at hand, as the pitch is liable to catch fire, and the only way to extinguish the blaze is to smother it by putting on the cover. Before applying any of the pitch to the boards unroll the felt half way across the roof, in order to see that it is running parallel with the eaves. Then roll it up again. Let the felt project about 2 inches over the eaves. While one man applies the pitch along the eaves of the building, covering the boards for about a foot up the roof and along the inner edge of the roll, the other man rolls the felt into the hot pitch, following the first man as closely as convenient. Be sure that the first layer is stuck well to the roof, so that the wind will have no opportunity to get under it. Now lay another thickness of felt immediately over the first, sticking it well down in order to insure a good start. For a three-ply roof, if the felt is 30 inches, leave 10 inches exposed to the weather after the manner of shingles.

In Fig. 1 of the sketches is illustrated a method of flashing against a fire wall or around a chimney. The course of brick is allowed to project 1½ inches beyond the face of the wall, as indicated at A. The felt is left long enough to turn up underneath this as shown. A galvanized iron flashing is then fitted with 1 inch turned into the seam of brick, all as clearly indicated at B of the sketch. In Fig. 2 is shown another method. In this case a 4 x 4 scantling is sawn diagonally and placed at the intersection of the wall and the roof. Another scantling 2 x 4 inches is built into the wall, affording a nailing place for the strip C, which is usually ordinary lath, to hold the felt in place.

To flash chimneys and skylights, the only difficulty is at the corners. After having turned the felt up around them as indicated at B, Fig. 1, cut out a piece of felt as represented by Fig. 3, cutting down the solid line and bending at the dotted lines. After this has been done apply it with hot pitch in the manner indicated in Fig. 4 of the cuts. In the next place cut out a piece similar in shape to that indicated in Fig. 5, cutting on the solid line at the corner and bending at the dotted line. With more hot pitch stick it immediately on top of the previous one, so it will present the appearance indicated by Fig. 6. In flashing around wooden skylights, leave a saw cut into which a galvanized iron flashing may be turned like that in the case of the seam of brick in Fig. 1. After this is completed commence at the top with a pail of pitch and swab and cover every inch of roof and flashing with the pitch. When this has set hard, get a few boards up on to the roof on which to run a wheelbarrow to distribute the gravel, commencing as before at the top. With a pail of coal tar and swab cover a few square yards of roof, then spread the gravel into it, repeating this operation until the whole surface is covered. In many cases the tar is not used, but it is an excellent preventive against cracking of the pitch in cold weather. In some places it is customary to nail wooden strips 1 x 2 inches along the edge of the eaves, leaving a space of 6 inches every 2 feet for waterways.

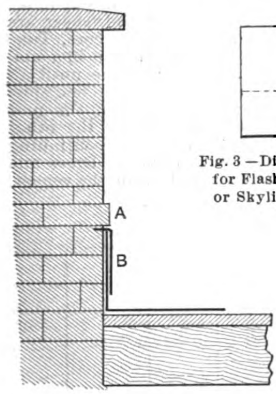


Fig. 1.—One Way of Flashing Against a Fire Wall or Around a Chimney.

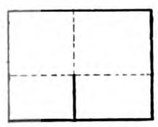


Fig. 3.—Diagram of Piece of Felt for Flashing Around Chimneys or Skylights.

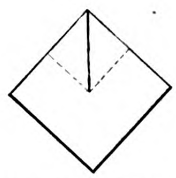


Fig 5.—Diagram Showing How to Cut and Bend the Second Piece of Felt.

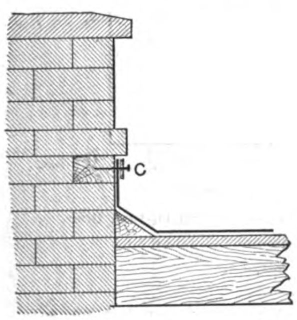


Fig. 2.—Another Method of Flashing.

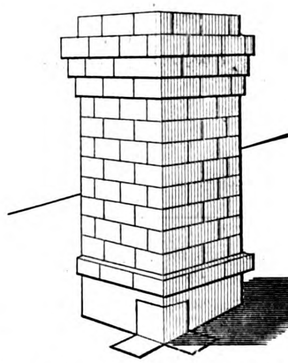


Fig. 4.—Showing the Piece of Felt in Position.

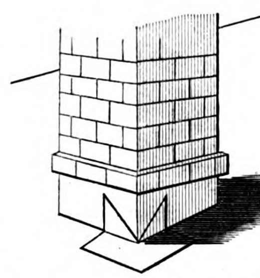


Fig. 6.—Appearance of Work with the Second Piece of Felt in Position.

Felt and Gravel Roofing.—Illustrations Accompanying Letter from "Oliver Twist."

Builders and Harmony in Building.

From A. A. W., *Mt. Angel, Ore.*—Lately perusing *Carpentry and Building*, I found in it a question which every carpenter, or man who wants to be a builder, is supposed to know by heart. I think it is a great mistake for any man to be called a builder before he has learned his trade. It is not so easy to become a good carpenter or builder as many perhaps think, but sometimes a carpenter or builder makes money, and then, again, it is a clean trade. The man watches closely, and the first chance he gets to work with a carpenter—sometimes he could be called a wood butcher—he takes it. He works a few weeks and then calls himself a builder. Afterward he thinks, "I can learn the rest out of *Carpentry and Building.*" The consequences of such an education are seen all over the country—more perhaps out here in the West than in the East.

With regard to the physical strength of houses and cottages, it seems to me they are built to do for bright days for as soon as a storm comes on they look very different. It is for this reason we have so many cases of house burning, due, without doubt, to poor chimneys. It is true when the wind shakes a house the chimney or flue becomes cracked, or sometimes so moved as to invite conflagration. If a house and roof are not well constructed how can a man expect such a roof not to leak after a storm, even though the roof might be well shingled? Moreover, it seems to me that few buildings are put up in this country after a regular style. In the more common private houses, called cottages, we find little else than windows and gables, but never in one and the same house a window like unto another. Such things as windows should be more or less uniform. To my eye, it does not look well to see in the lower story a double window and just above it in the second story a single one, or as I saw once, only a half size window; and again, an arch above windows and doors. We sometimes find in the same house Roman, Early English and straight and shouldered. I consider it a miracle that the Roman and ogee style mixed together on the same building is yet to be found, but perhaps there may be some in existence. Much more might be said about this matter of style, but I consider it more important to say something about the knowledge of practical carpentry. First of all, a man who intends to become a builder must have by nature some idea of buildings and be endowed with good common sense. In the next place, to thoroughly learn his trade he must study elementary geometry, which is the principal thing for mensuration. He must know something of descriptive, constructive and mechanical carpentry and also something about physics. In addition to all this he must study drawing, so as to be able to understand a plan, and before he ever intends to do business in building he should fully comprehend the steel square. A man who does not understand the steel square cannot be called a carpenter, for he does not know the use of his own tools. Every man, therefore, who intends to do any business in the building line should first go to school and learn what it is necessary to know and afterward engage in practical work. It will then become easy for him to achieve reputation as a builder, and he will do more good to the country and less damage to the people, who are already too much imposed upon.

Screw Holes in Butts.

From I. S. C., *New Orleans, La.*—It strikes me as a little singular that none of our manufacturers pay much attention to the position of the screw holes in hinges. Instead of running in nearly a straight line they should run out and in at least $\frac{3}{8}$ inch full from center to center, in order to firmly hold in the edge of the casing and jamb. As they are now holed in nearly all hinges the screws run as indicated in Fig. 1, while they should run as shown in Fig. 2. Our door casings are $\frac{7}{8}$ inch thick, and the doors run from $1\frac{3}{8}$ to $1\frac{3}{4}$ inches thick. This gives $\frac{1}{2}$ inch on the jamb for the $1\frac{3}{8}$-inch doors and 1 inch on the jamb for the $1\frac{3}{4}$-inch doors. In large butts two holes should come in the jamb and two in the edge of the casing, as shown in Fig. 4, while in the smaller butts there should be one hole in the jamb and two in the edge of the casing, as in Fig. 3. If some manner of holing could be adopted to remedy the present insecure manner the manufacturers would very soon obtain a monopoly of this market. The larger hinges should be holed $\frac{1}{2}$ inch full from center to center, as indicated in Fig. 4, which represents the butt for a $1\frac{3}{4}$-inch door, while Fig. 3 shows the butt for a $1\frac{3}{8}$-inch door.

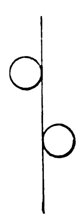


Fig. 1.—Position of Screw Holes in Hinges as Now Made.

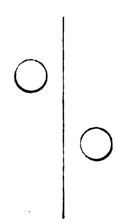


Fig. 2.—Position Suggested by "I. S. C."

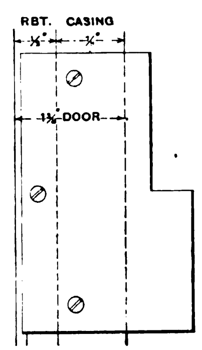


Fig. 3.—Butt for a $1\frac{3}{8}$-Inch Door.

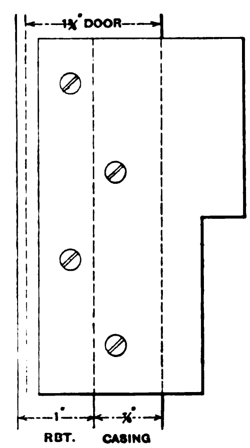


Fig. 4.—Butt for a $1\frac{3}{4}$-Inch Door.

Screw Holes in Butts.—Diagrams Submitted by "I. S. C." of New Orleans, La.

Durability of Wire Nails.

From S. F. B., *Wellington, Ohio.*—A few years ago I said a great deal in favor of wire nails for siding, but I take it all back now, and do not use or specify them for any purpose, for I see no good in them.

Veneered Doors.

From H. H. D., *Newburgh, N. Y.*—I have been a reader of *Carpentry and Building* for several years and find in it many hints about the trade, as well as much useful information. I think, however, some of the correspondents are not as explicit in their answers as they might be, but I take great interest in what they have to say. With regard to the question of "R. B. A.," Jewett, Ohio, whose letter appeared in the April number, I would say that dry white pine makes as good a core as any for a veneered door. If hard wood is employed there is no use to veneer a door, as it can be made double—that is, use one of each kind, fasten the two together with clamps and glue and then use screws, driving them in far enough so that the hole may be plugged with wood of the same kind as the door. This is called a "built up door," and is much better than the veneered or solid one, as it will not warp. Doors made in this manner can be of one kind of lumber, or each face of the door can be of a different wood. The tenons should not come through the stiles.

To treat a door with thin veneer and do it right is a pretty hard job for one who is not used to the business, as the veneer is apt to let go from the core and blister. The best veneer for doors, &c., is $\frac{1}{4}$ to $\frac{3}{8}$ inch thick. It is much easier to work than thin veneer and gives greater satisfaction in all cases. In order to veneer a door "R. B. A." needs clamps, cauls, hot irons or water cans for moving over the surface of the veneer to keep the glue from setting too fast and until the cauls and clamps are in place and screwed up tight; a few veneer tacks and sufficient extra weight handy to put on the cauls where the clamps do not give it an even pressure on the lock rail. Use good glue and cook it well—until the water is boiled out of it. Get out the veneer of the proper size for stiles and rails, making allowance, however, on the stiles, for mitering the veneer on the outer edges of the door. The shop should be at a high temperature when veneering is to be done. Stand or lay the pieces of veneer close to the stove so they will become very warm, while the door is placed on the bench and the tools gathered together. Have the irons hot, or if water cans are used, fill them with water which is boiling hot.

We will now veneer the door. The latter can be glued up like a "regular" or driven together, trued up and cleaned, but not sandpapered. Drive it apart and veneer each piece separately, after which the door can be glued and wedged before the edges are veneered. The cauls should be made to suit the width of the stiles and of sufficient length to fit the parts where used. They should be true and straight on the surface next the veneer. Everything being ready, heat very hot the piece of veneer to be put on, then with a brush quickly spread the glue on the core, after which lay on the veneer, tack it in place, put on the cauls and clamps, set them up hard, and make sure that all parts of the veneer are pressed tightly down to the core. Take up the next piece and treat it in a similar manner, and so continue until all the pieces are veneered on one side. When the glue is hard on the first piece reverse it and veneer the other side in the same manner, so continuing until all the work is done. Drive and clamp the door and clean the veneer, using a sharp scraper, but no sandpaper. A No. 0000 glass paper can be used after the scraping is done. Do not rub across the grain. In fitting the doors allowance must be made for twice the thickness of the veneer and the plate for hinges, &c. "R. B. A." will find strong dark glue the best. In order to tell good glue take a piece between the fingers and bend it. If it does not crack or fly to pieces, but bends tough, showing no signs of snapping, it is a glue that will hold if properly cooked. A copper steam heater is, in my estimation, the best for glue. A little vinegar added to the glue will prevent its setting too fast, but it dries slowly.

Lumber Measurements.

From TRAMP, *Denver, Col.*—I would like to have some of the readers enlighten me on the subject of lumber measurements. Suppose, for example, there is a round log 12 feet long and 18 inches in diameter at the small end, which is sawn into boards 1 inch thick by means of a gang of saws. Each board is then edged on an edger, so that the edges are square the entire length of the boards, the latter being the same width at each end. Suppose each saw makes a kerf $\frac{1}{4}$ inch thick, and the narrowest board counted not be less than 4 inches wide. How many square feet, board measure, would the log make and how is it figured? I would also like to know how many thousand shingles there would be in 100 blocks 12 inches in diameter, the butt of the shingle being $\frac{3}{8}$ inch thick, the top $\frac{3}{32}$ inch thick and the saw kerf $\frac{3}{16}$ inch. No shingle less than 3 inches in width is to be counted; also how is it figured out?

Plans for a Five-Room House.

From ARNOLD MILLER, *Owensboro, Ky.*—In reply to the inquiry of "A. A. N.," Lafayette, Ind., I send the floor plan and front elevation of a five-room cottage, one story in hight. The foundations are of brick and the body of the house is weather boarded, while the front gable and roof are shingled. The hight of ceiling is 10 feet and the length of the studding 12 feet. The house has three coats of plaster inside and three of paint outside. The arrangement of rooms is clearly shown on the floor plan which I send. The house throughout is finished inside in what is known as fluted casing. A veranda which extends along the front and side of that portion of the house used as a front hall constitutes an attractive feature.

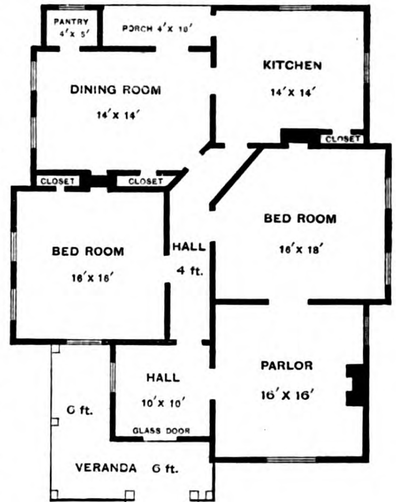
Economy of Time in Building.

From H. W. W., *Washington, Ind.*—In reply to "W. H. L." of Cohoes, N. Y., I could make more important suggestions on the economy of time in building than I would be allowed space for in this popular journal, consequently I shall just give a dim outline of the method adopted by us "Hoosiers." The owners most always have their drawings and specifications before the carpenters are ready for them, and if the house is to be built by the day, the carpenters in most cases are at work as soon as the masons. By the time the masons have completed their part of the foundations the carpenters have the essential part of the building framed, and raise it so rapidly that the masons can commence the chimneys and flues in a few days. By the time the flues, &c., are up the roof is decked. The roofers now execute their part of the work, and the painters put on the last coat of paint while the carpenters are trimming the verandas, porches, building the outside steps, &c. In this way we progress, and when the stairs are framed and the sliding door partitions set, for they are the last partitions, the plasterer has most of the building completed with asbesto cement. We then begin at once the inside finish. I can say for this method, it is practical, beneficial, and rapidly becoming universal. I believe it would produce favorable results in any other section if practiced as it should be. It must be remembered that in a job as above described the contract is so arranged as to make prompt delivery of all material.

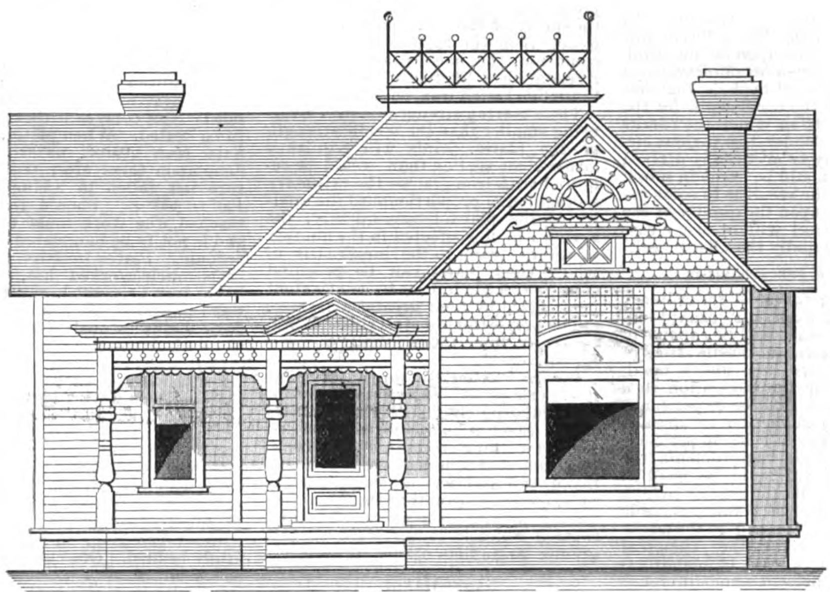
Grinding Plane Bits.

From L. E. McG., *Woodford, Tenn.*—I noticed in the February issue of the paper an article by James Francis, written in answer to a correspondent making inquiry about grinding corner chisels. It was very interesting to me, as were also the numerous other articles which have appeared in the journal since I have been a subscriber—a period of about two years. There is one thing, however, which I would like to have Mr. Francis or some other correspondent explain. Some mechanics claim that a jack plane bit should be ground very rounding on the corners, so as to prevent them from staving up the surface of the timber being dressed. My observation and experience go to show that a bit ground upon that principle furrows the lumber being dressed, and by that means causes a greater amount of labor while finishing or leaves the lumber in a ridged condition. I leave the subject to those who profess to understand it, and trust they will take it up for discussion, to the end that all opinions may be expressed.

Note.—This question was discussed in the March issue of the paper, and some remarks were presented in answer to a correspondent which may prove of interest to "J. B. W." It is there stated that the question is not altogether easy of satisfactory answer, owing to the fact that methods of estimating the cost of buildings vary, not only with the locality, but with the individual as well. A plan, therefore, which would be considered rapid and satisfactory in one part of the country might not be so regarded by builders in another section. Our inquiring friend will doubtless find much that is of interest and value to him in this particular line by referring to the serial article, entitled, "The Builders' Guide," which was published during 1892 and the early numbers of last year. It is also possible that the article in the present issue may prove of service to him.



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



Plans for a Five-Room House.—Front Elevation.—Scale, ⅛ Inch to the Foot.

Short Method of Estimating.

From J. B. W., *Muncie, Ind.*—I would like to hear from some of the craft in regard to estimating. I want something short, showing pretty nearly what the building would actually cost without the necessity of itemizing everything.

Steel in Building Construction

The rapidly increasing favor with which steel is now regarded as a material for general construction, and the position which it is ultimately likely to hold, render a study of its nature and possibilities of more than ordinary importance, says S. H. Davies in a recent issue of one of our foreign exchanges. The various substantial advantages which may be gained by its use, in the matter of greatly increased strength, and consequent saving in "dead load," together with the greater facility in handling, make it more than likely that it will ultimately supersede both cast and wrought iron.

OBJECTIONS TO USE.

The greatest drawback at the present time to the general employment of steel is that the Board of Trade regulations prohibit a greater working stress than 6½ tons per square inch. This amounts to an increase of only about 30 per cent. over the 5 tons allowed for wrought iron, whereas if care is taken to procure the best material, it may safely be regarded as 50 per cent. stronger. In the case of the Forth Bridge, this regulation was not insisted upon, and a working stress of 7½ tons was allowed.

Another objection to the use of steel is that under ordinary circumstances it corrodes more quickly than wrought iron, and very much more so than cast iron. The comparative liability to oxidation has been given as follows: Cast iron, 100; wrought iron, 129; steel, 133. Considerable variation may be caused, however, by the different corroding agents acting upon the material. A formula is given in Molesworth's "Engineers' Pocket-book," together with a table of the coefficients for the several agents, from which the results likely to occur under the various circumstances may be accurately arrived at. The fact should be borne in mind, however, that the result is to some extent dependent upon the quality of the metal. Mild steel will in every case corrode more rapidly than hard steel.

TERMS OF SPECIFICATION.

In specifying for steel for ordinary roof and girder work, it is usual to insist that the metal shall be capable of sustaining a minimum tensile stress of 28 tons per square inch and a maximum of 30; that the elongation in a length of 8 inches shall be 20 per cent., and that the contraction of area at point of fracture shall be 40 per cent. In addition to these requirements the limits of elasticity should be fixed at 15 tons, and the specific gravity (which in the case of steel is a fairly reliable test) at 7.9. With regard to the advisability of specifying the chemical composition and process of manufacture, there is at present some difference of opinion. In the report recently published by the committee appointed by the Society of German Engineers, it is stated that "the physical properties afford a sufficient index to the composition of the metal, and the result depends not only on the quantitative identification of the component substances, but also upon their mechanical combination." Further, respecting the method of production, "the committee are of opinion that the specification must be limited to such general normal conditions for the identification of quality as can indubitably be conformed to, and that any minute limitations are technically impracticable, without result, and commercially injurious." On the other hand, the Austrian Society of Engineers and Architects, after an elaborate series of experiments, have arrived at the conclusion that Siemens steel (basic process) is indisputably the best material for engineering purposes.

QUALITY OF STEEL.

The quality of steel generally used in construction is mild steel, containing a percentage of only 0.35 to 0.60 of carbon. The desirability of employing a softer material, even at the sacrifice of strength, in positions where vibration takes place, need hardly be pointed out. Hence the advisability of fixing a maximum as well as a minimum strength.

STEEL RIVETS.

The fact of the shearing strength of steel being only about three-fourths of its tensile strength, whereas in the case of wrought iron the one is equal to the other, would make it at first appear that iron rivets are slightly stronger than steel, and it is by no means an uncommon thing to see it stated that iron rivets should be employed in steel structures on account of this superiority. The statement, however, is not well founded. The shearing strength of steel may be regarded as 5½ tons per square inch as against 5 for wrought iron; in addition to which the fact must be borne in mind that the ultimate shearing strength of wrought iron rivets when used in steel plates is reduced from 22 to 16 tons per square inch. The great objection to steel rivets is that, when fixed by hand, the heads frequently split and fly off, as they do not retain their heat so long as iron ones, and the metal when worked at a blue heat is always unreliable. This rapid loss of heat is fully appreciated in riveting steel plate boilers, as the spring of the plates having less time to act upon the metal while in a soft condition, the holes filled with steel rivets are less likely to "weep" than those filled with iron ones.

The shearing strength of steel rivets being smaller than the tensile strength of the plates, joints will require a larger rivet section than would be required with iron plates—the necessary section being proportional to the quality of the plates; consequently, the saving which is effected in the number of covers owing to the larger sizes in which steel plates can be procured compared with iron, is to some extent neutralized by their greater length.

The proportions of steel rivets should be larger than those usually adopted for iron ones.

Before leaving the subject of rivets it is, perhaps, as well to mention that in calculating rivet sections for either iron or steel it is unwise to allow for the full working strength of the rivets, and, in actual practice, steel should be taken at 5 and wrought iron at 4½ tons, for the reason that the stress frequently acts upon a group of rivets, some of which have to sustain a much greater stress than others.

ANNEALING.

The effect of annealing upon steel is the same as upon wrought iron. It increases its ductility while lessening its tensile strength. It therefore follows that though very useful for hard steel, it is, as a rule, unnecessary for the softer varieties. Steel plates ½ inch thickness and over should, however, be annealed after punching, by which means the loss in strength and ductility is restored. Plates under this thickness do not need this precaution, the loss of strength being comparatively little.

In cases where punching is absolutely necessary and annealing cannot be done, the holes should be punched with a smaller diameter than required, and then reamed out.

CLAUSES OF SPECIFICATION.

The following clauses taken from a specification prepared in the Government offices will be found useful in specifying for steel work.

Strength and Quality.—The steel shall not fracture under slowly applied tensile stresses, or with elongation, less than are shown in the following table against each variety respectively:

	Tensile stress. Tons per square inch.	Elongation in 8-inch length.
		Per cent.
Steel plates, bars, angles, tees and channels........	Max. 32 / Min. 28	20
Steel joists........	Max. 32 / Min 28	20
Steel for rivets and bolts... ..	Max. 30 / Min. 27	25

Plates, Bars, &c.—Strips, 2½ inches wide, cut lengthways or crossways, heated uniformly to a low cherry red, and cooled in water of 82° F., must bend double in a press to a curve with an inner radius equal to one and a half times the thickness of the sample tested without showing any signs of cracking.

Rivets and Bolts.—Steel rivets must bend double, when cold, on a radius of half their diameter, and when hot must close double, without cracking, and bolts must bend cold to 90° on a radius equal to their diameter, and when hot must bend double on a radius half their diameter, without cracking.

General Forge Test.—Plates, angles, tees or other sections shall also stand such forge tests, both hot and cold, as may be sufficient, in the opinion of the inspecting officer, to prove soundness of material and fitness for the service intended.

Treatment of Steel.—All plates, bars, &c., required to be bent are to be bent cold if practicable. If the whole cannot be bent cold, as little as possible is to be heated. When plates, bars, &c., have been heated, no work is to be done upon them after their temperature has fallen to "blue heat," say 400° to 600° F. Should this limit be reached, the work must be reheated, and is not to be hammered cold on any account. Plates or bars which have been much worked hot, and which have been reheated, must be afterward annealed, such annealing being done simultaneously over the whole piece when possible.

Castings, Annealing and Testing.—All steel castings to be carefully and thoroughly annealed by keeping them at 1700° F. for 24 hours, and then gradually cooling without being exposed to the air. Completed castings may be subjected to a percussive test, those weighing over 15 hundredweight each to drop 12 feet, and those under 15 hundredweight to drop 15 feet without breaking, on to an iron slab firmly bedded. One casting in 50 may be tested.

In addition to the above, clauses relating to the following points should be inserted:

1. Hydraulic riveting to be done wherever possible.
2. Members to be so placed that the fibers will run in the direction of the greatest strain.
3. All bending which may require to be done is to be effected by crushing, and not by hammering.

ARCHITECTS THOMAS & RAPP, Chicago, have received instructions from the Board of Education of South Evanston, Ill., to rebuild the school house recently destroyed by fire. The building is to be heated with steam and furnished with the latest improvements in ventilation. It will cost about $40,000.

DOMESTIC ELECTRICAL WORK.*

TO BECOME AN EXPERT at running wires in buildings already finished it is necessary to study closely the general construction of buildings. It is very essential to be able to determine beforehand where and what sort of obstructions we are likely to encounter in attempting to wire a building, and perhaps nowhere else has the electrician a better opportunity for the display of skill and ingenuity than in wiring an old house and leaving scarcely a trace of his work behind him. It seems at times a very difficult matter indeed to get a certain wire into a certain place without tearing up floors or disfiguring the wood work of a house, but by the exercise of a little patience and perseverance it can usually be accomplished.

We will begin with an ordinary door bell and let the push button be placed on the door. This is not usually the case, but is sometimes required. It frequently happens that an old fashioned door bell is taken off to make frame until the open space back of the plastering is reached. The drop line, with piece of chain or lead weight attached, should be lowered from the upper hole, and with a piece of wire, with a small hook at the end, enough of the line should be fished through the lower hole to permit another piece of line to be tied to it. To the ends of these lines the wires must be fastened. By driving a wire finishing nail through the floor alongside of door frame we can easily locate the spot from below. From here a ¼-inch hole should be bored diagonally through the sill, so that it will come out in the space behind the plastering. Through this hole the drop line, with wires attached, must be fished. The bell, which should be placed against a partition, presents less difficulty in wiring; it is only necessary to bore a hole where the bell is to be located, put in the drop line, drive a nail as before, to locate the place, bore a hole from below and fish it out. This makes a very neat job if properly executed. The hinges of the door acting as a part of conveniently be reached with a fishing wire and draw the line through here, and so on until the fixture is reached. All holes should afterward be neatly plugged up, giving the plugs a coat of shellac varnish before driving in to prevent them coming out. Where, for fishing purposes, holes are bored through plastered walls that are papered, three sides of a small square should be cut in the paper and the paper dampened a little so that it can be loosened and turned back. When done the hole should be filled with plaster of paris and the paper pasted back, thus obliterating all traces of the work done.

In lightly built houses it is often found easier to take off the baseboard molding and run the wires under it. Care should be taken, however, to break off all old nails, as any attempt to drive them back would be almost certain to injure the molding.

When it is necessary to run wires between floor and ceiling crosswise to the joist, the first thing to do is to locate their centers. From the centers bore

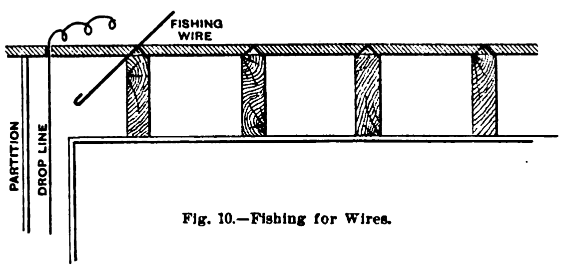


Fig. 10.—Fishing for Wires.

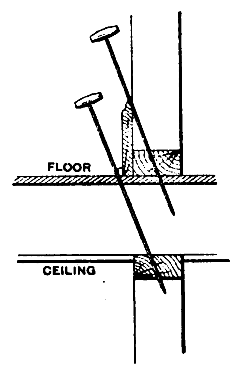


Fig. 11.—Section of Partition, Showing Method of Wiring.

Domestic Electrical Work.—Illustrations Showing Method of Running Wires in Finished Buildings.

room for an electric bell, but in doing this an ugly looking hole is left in the door, which must be covered up some way, and we naturally look to the electric push button as the most suitable thing to help us out. The neatest way of wiring a door is to bore a ¼-inch hole from the hinge side into the door until it intersects with the hole left by the old bell. With a floor groover cut a groove on the edge from the hole just bored to the lower hinge and another to the upper hinge. It is best to remove the door from its hinges, take off the hinges and file bright on the back side around one of the screw holes. Bare the end of the wire and lay a few turns of it so that it will come in contact with the spot filed bright and around one of the screws. Lay the wires along the grooves on the edge of the door, driving a staple every 5 or 6 inches. Be sure to drive these deep enough so that none will project to interfere with the closing of the door. Run the wires to the push button through the ¼-inch hole previously bored and connect in the usual manner.

Proceed in like manner for the parts of hinges and door frame. Bore ⅜ inch holes from back of these through the door the conducting wire leaves the door free to be taken down and also obviates the unsightly slack wire running from door to frame.

Where a job requires a general wiring, such as gas lighting or annunciator work, the building must be well studied before starting out, so as to avoid as much as possible all serious obstructions. The first story of a building seldom presents any serious difficulties in wiring. In a two-story building it is usually found much easier to run a wire from the cellar to the garret, where we are generally permitted to work with hammer and tongs, as there is nothing to disfigure, and it is an easy matter to branch off to the various fixtures and drop down from above. Where it is necessary to run wires between ceiling and floor the circuit, if possible, should be so arranged that these wires will run parallel with the joist. A small hole just large enough to let the drop line through should be bored so as to reach into the partition below. Let the drop line down and fish out in the cellar, attach the wire to this and draw it up. Drop part of the line back into the hole again. Next bore a hole through the floor in the direction in which the wire is to run and as far from the first hole as can ¼-inch holes each way in the form of an inverted V, and work from one joist to the next with drop line and fishing wire, as shown in Fig. 10.

In old houses where partitions are directly under each other it is an easy matter sometimes to drop a line from garret to cellar. In the modern house, however, it is not such a simple job, as we usually find a 2 x 4 plate on top of the studding underneath the joist, and another 2 x 4 sill on top of the floor on which the upper partition studding rest. In Fig. 11 is shown a method of passing obstructions of this nature. The obstructions met within a finished building are of such great variety that space will not permit of a description, or even mention of them all. But enough has been shown and described to indicate the general plan adopted for doing this kind of work, and by exercising a little ingenuity no serious difficulty should be experienced in reaching almost any part of a house with a wire. Where wires are run exposed on baseboards, door or window casing they should be drawn taut and well stapled, and last, but not least, never, under any circumstances, run more than one wire under a staple; it is dangerous practice and is sure to cause trouble sooner or later.

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The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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An Example.

The following is a fair sample of the requests which are continually being received by the National Secretary, and indicates the range covered by the association:

TAMPA, FLA., May 7, 1894.

W. H. SAYWARD, Sec'y.

DEAR SIR: Please send us a copy of the Uniform Contract advocated by the National Association of Builders, and oblige,

Yours truly,
MCGECKIN & JAY,
Architects.

Requests for the form and other association printed matter are being constantly received by the secretary from localities remote from any filial body, thus showing that the work of the association is steadily widening its area.

Committees.

Immediately following the names of the directors on this page will be found the members of the committees for the ensuing year, as appointed by the president. Members of the filial bodies are urgently requested to forward suggestions for committee work, either to the chairman of the committees or to the National Secretary.

The Rights of the Lowest Bidder.

The following letter from a member of the Builders' Exchange of Minneapolis to a contractor in that city is self explanatory, and is made public for the benefit of bidders who may find themselves in the same situation. The case is one which should command the attention of all the filial bodies, and an effort should be made to insure honorable treatment for the sub-bidder in all such cases. The treatment of one contractor by another should be honorable and fair in every particular, especially in cases where a general contractor bids for an entire contract and solicits sub-bids from other contractors, who are thereby subjected to treatment similar to that in the case cited. The practice of "hawking" bids cannot be too severely condemned, and no possible excuse can be made for failure to award sub-contracts to the lowest invited bidder. The action of Brown, Howard & Co. in seeking to secure a precedent for the benefit of the fraternity is commendable, and every such effort to establish clearly what is morally as well as legally right must result in profit to builders everywhere.

DEAR SIR—We address you regarding the glass contract for rebuilding the Syndicate Block of this city, which we understand you have let to another firm, which we claim is not in accordance with your agreement with us. *You requested us* to give you figures on this job, and *came yourself to our office for same*, and in the presence of witnesses stated that if we were the lowest bidders, and if you got the contract, *that we should furnish the glass.* You also stated that you wished our bid to include all the glass in the building except the skylight glass, and we accordingly submitted you *a complete estimate for all the glass*, as per plans and specifications. We are confident that our bid was the lowest that you or any of the other contractors had up to the time that this contract was awarded you. After we heard that you were the successful bidder on this contract, the writer personally saw you the following morning and asked you if we were the lowest bidders, to which you would give no satisfactory answer, instead resorting to excuses and evasions, saying that you "had not checked up the sizes as yet," &c., and that you "had not as yet signed any contract yourself, and that you would not say anything definite until you had done so." I told you I was going East that night and was very anxious to have the matter decided, and you claimed that you could not do anything about it in so short a time; but in the office of Messrs. Long & Kees you distinctly and repeatedly stated that you would not do anything in the matter of letting this contract for glass until my return from the East, which I told you would be in about two weeks. This promise was clearly violated by you, and you did let the contract before the time you distinctly stated you would not. Now what we claim in this matter is that *you did use our bid*, and had you not done so it is very doubtful if you would have secured the contract, as the difference between our bid and what we believe to have been the next lowest was almost, if not quite, equivalent to the difference between you and the next highest bidder of the general contractors. We believe that your entire course in this matter *was exceedingly unfair and dishonorable*, and that you used our bid and since have "*hawked*" it around, and, owing to a decided decline in glass the past few weeks, have succeeded in making a few dollars by not awarding us the contract, as you agreed to do if we were the lowest bidders.

We claim and are ready to prove that we are legally and morally entitled to this order. You will remember that during my absence you came to our office and stated that you had out-of-town figures at a certain price, and before several witnesses offered to give us the order if we would reduce our figures. Now, if we were not the lowest bidders originally, this was certainly a very peculiar transaction for a man pretending to do business on a square basis. On this occasion we allege, and will attempt to prove, that in order to *induce us to lower our original bid, you misrepresented facts and made statements that were untrue.* We believe that such methods as you have pursued in the above case are detrimental to the business interest of honest general contractors who treat their sub-bids fairly, as well as being rank injustice to sub-contractors giving figures as we have done to you. We shall certainly endeavor to enforce what we believe to be our legal rights in this matter, but as we have no wish to take any technical advantages of the law, and, if possible, would be glad to avoid the expense of litigation, believing that the amount might be appropriated to better advantage, we accordingly make you the following proposition:

We are quite willing to leave the entire matter to arbitration, you selecting three persons from whom we choose one, and we naming three persons for you to select one from, and the third to be appointed by Messrs. Long & Kees, or by the other two, as you may prefer, each party having the privilege of examining any witness required, under oath; to have full power to demand any books or testimony of any kind that could be used in a regular court of law. The arbitration to be held in the Builders Exchange rooms or any public place that may be preferred by you. We agree to prove to the satisfaction of the above arbitrators *that we were the lowest bidders for the complete glass* for this block at the time you put in your bid, and that we are entitled to receive the contract from you. If we do not prove this, *we agree to forfeit check of $100 to any charity that the arbitrators may deem best. In any case we will pay the entire expense of the arbitration* and having the proceedings recorded in shorthand. If we do prove our statements, we are to receive such damages as the arbitrators may award. We will also make any minor modifications to this proposal that may seem fair and just. Our reason for proposing arbitration, rather than resort to the courts, is that we would sooner give money to the poor than to pay same in court expenses, which would, in any event cost us each more than the proposed method.

This proposal is subject to your acceptance any time up to the 28th inst., not hearing from you by which date we shall place matter in our attorney's hands for prompt attention. If we have wronged you in any way in our statement of this matter, you shall also receive due acknowledgment and apology from the writer.

Awaiting the favor of a reply, we remain,
Yours faithfully,
(Signed) BROWN & HAYWOOD CO.,
C. W. BROWN, General Manager.

As we consider this question of vital importance to the building trade generally, it is our intention to make public this letter and your reply to same. B. & H. Co.

An English Trades School.

The Borough Polytechnic Institute of London, Eng., was the first established under an act of Parliament passed in 1891 to encourage technical education in Great Britain. It was opened in September, 1892, by the Earl of Rosebery, the present Prime Minister of England, with well equipped classrooms, halls, laboratories and offices for the efficient conduct of the general technical education and recreative advantages which it was designed to provide for the working men and women of the South London district, in which it is located. Its courses of instruction cover a very wide field, embracing the teaching of subjects to suit all trades and classes, thus aiming to promote greater industrial skill and general knowledge among the younger working people of the British metropolis.

TRADE CLASSES.

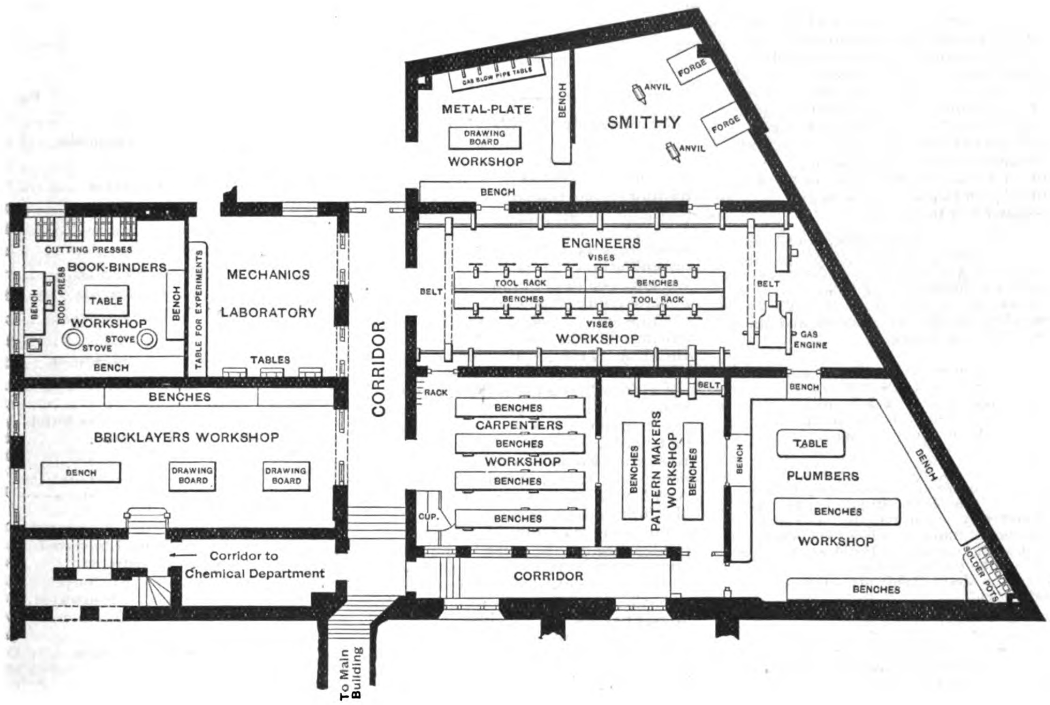
Among the principal educational departments of the institute are the classes for practical and theoretical instruction in various trades. These include carpentry, plumbing, sheet metal working, engineering, blacksmithing, pattern making, bricklaying, bookbinding, &c. Instruction is only given to those already engaged in these trades, and is arranged to supplement the training of the factory or workshop and not to supersede it. For this reason no student is admitted for trade training only, but is expected to join at least one of the science or art classes, such as the elementary science class or the classes in practical geometry or technical drawing, which are open on nights other than those devoted to trade instruction. Thus it is intended to give the mechanic an all round training which will help him in his trade, by stimulating his mental faculties as well as his manual capacity.

NEW WORKSHOPS.

The trade classes were at first housed, as a temporary measure, in the original institute building, until adequate accommodation and facilities could be provided. They soon outgrew the space there at their disposal, and it was decided to at once erect new workshops for the trades in a separate building. This was done, and the shops were completed and opened for use in March of this year. The plan view, presented herewith, gives a good conception of the arrangement of the different shops. All, with the exception of the bricklayers' and bookbinders', are top lit with lantern lights, the side sash s being hinged to open for ventilation. They cost $15,360 to build and nearly $6000 to equip. The students of the trade classes assisted in the work of furnishing and fitting them; sheet metal workers, carpenters, bricklayers, &c., contributing their labor and skill with good effect.

PROGRESS OF TRADE TRAINING.

The new and more capacious accommodation thus provided enables the managers of the institute to largely develop and extend the work of the trade classes, which have been found to meet a very pressing need in South London. Eighteen months of work have shown that the advantages offered are eagerly grasped by the class for which they were intended. The entries in the trade and technical classes for the first session were 497. In the last session—October, 1893, to May, 1894—they numbered 701, an increase of 264, and the prospects are that the next courses will be still more numerously attended.



Plan View of an English Trades School, Showing the Position of the Various Workshops.

Indian Mortar.

The lime used in India is peculiar and is called "khunkur." It is picked up in the beds of rivers and small streams after the rains, and is found sometimes in isolated beds; but generally it is in detached masses composed of pieces of about the size that stone is broken for metaling roads. It is of a light gray color, and is burnt in the usual way, either in heaps or in kilns, the latter being preferred, and the percentage obtained is generally about 55 per cent. The mortar used is generally made of 1 part of lime to 1½ parts of "soorkee," which consists of brick pounded and passed through a sieve of eight meshes to the inch. This mortar is of the best description, being hydraulic, and setting almost better in water than out of it. No sand is found in India sufficiently sharp for making mortar, hence the use by the natives in the first instance, and now by Europeans, of brick dust, as it may be called, in place of sand for making mortar.

ARCHITECTS BEERS, CLAY & DUTTON, Chicago, have designed for John R. Geary a four-story apartment house to be built on the east side of Okenwald avenue, south of Forty-fourth street. The interior will be divided into eight apartments of seven rooms each and be heated by steam.

THE magnificent new station of the Pennsylvania Railroad at Broad street, Philadelphia, is approaching completion. With its vast train shed and generally splendid appointments the station makes one of the finest railway terminals in existence.

Practical Arbitration.

The agreement between the Mason Builders' Association and the bricklayers' unions of New York City, given below, is decidedly interesting as an example of the value of joint arbitration between employers and workmen, because of the character of the participants. The impression which an example conveys to the mind depends upon its quality, and the example in this case offers convincing proof of the practicability of arbitration under all circumstances, because it indicates successful operation under conditions sufficiently exacting to constitute a test which should be satisfactory to all fair minds. The agreement proves the fact that employers and workmen (in a city where unions and organizations are most complete and powerful) believe joint arbitration to be the best means of establishing upon a fair basis the relationship between the two.

The mason builders and the workmen's unions have been under an agreement of some form with each other for eight years, and although there has been occasionally some difficulty in securing a mutually satisfactory adjustment of affairs, a decision once reached has always been binding. The text of the agreement for 1894 is here given in order to extend the value of the example by showing others what may be followed or improved:

NEW YORK, May 1, 1894.

It is hereby agreed to by the Mason Builders' Association of New York City and the Bricklayers' Unions Nos. 4, 7, 11, 33, 34, 35, 37 and 47 of New York City, members of the Bricklayers' and Masons' International Union:

I.

That the wages of the bricklayers from May 1, 1894, to May 1, 1895, be 50 cents per hour, eight hours, six days in the week, and that the hours of labor be from 8 a.m. to 5 p.m., with one hour for lunch.

II.

The unions, as a whole or single union, shall not order any strike against the members of the Mason Builders' Association, collectively or individually, nor shall any number of union men leave the works of a member of the Mason Builders' Association before the matter in dispute is brought before the Joint Arbitration Committee for settlement.

III.

That no member of the unions shall be discharged for inquiring after the cards of the men working upon any job of a member of the Mason Builders' Association, nor will the walking delegate be interfered with when visiting any building under construction.

IV.

Except in cases of extreme necessity, no work shall be done between 7 and 8 o'clock a.m. and 5 and 6 o'clock p.m on six days in the week, and all overtime shall be paid a double rate. Overtime means all time between 5 p.m. on Saturday and 8 a.m. on Monday; also all time between 5 p.m. and 8 a.m. on other days, and the following legal holidays: Washington's Birthday, Decoration Day, Independence Day, Labor Day and Christmas Day.

V.

That the members of the Mason Builders' Association shall do their own fireproofing.

Each bricklayer must be provided with a kit of tools, consisting of a trowel, brick hammer, hand hammer, level, plumb rule, bob and line, and chisel.

If he is discharged for lack of tools, he will be obliged to wait until pay day for his wages.

VI.

That all cutting of masonry or fireproofing be done by those best fitted for the work, and that the members of the Mason Builders' Association make the selection; but light brick work cutting with hammer and chisel shall be done by bricklayers.

VII.

That the bricklayers be paid every two weeks before 5.30 p.m., Saturday; pay time to close on Thursday evening.

VIII.

That no complaints for waiting time are to be considered by the Arbitration Board, unless a man has been laid off for more than eight hours; after which time he shall have a right to demand his wages.

IX.

That the Arbitration Committee meet on the fourth Thursday in every month, or at the call of the Chair on either side; and that the second Thursday in January be a special meeting for the consideration of the yearly agreement, which must be signed on or before March 1, to take effect from May 1 to May 1.

OTTO M. EIDLITZ, Chairman, JAMES LIVINGSTON, JOSEPH SCHAEFFLER, ALEX. BROWN, JR., P. GALLAGHER, JOHN SNAITH, HENRY M. TOSTEVIN, HUGH GETTY,	For Mason Builders' Association.
34. J. H. HAMBLY, 4. WILLIAM STEWART, 7. JAMES GOUGH, 11. OTTO BÖHM, 33. OWEN KING, 35. JOHN GRIX, 37. BENJ. F. KING, 47. WM. J. DALY,	For the Bricklayers' Union.

The Glasgow Builders' Exchange

We mentioned in these columns last month the fact that a movement was on foot among the builders of Glasgow, Scotland, looking to the formation of a builders' exchange upon much the same lines as those followed by such organizations in the United States. Recent issues of the foreign trade papers contain the information that the movement has been successful, resulting in the organization of the Building Trades' Exchange for the city and district of Glasgow. The association has a capital of £10,000 divided into 1000 shares of £10 each, and the membership is to be of a corporate and non-corporate character. The Executive Council consists of 21 members. At a recent meeting Sir William Arrol was elected president and W. M. Cunningham secretary.

The memorandum of association of the exchange is almost identical in purpose with the by-laws of some of the more prominent American organizations, the objects sought being, among others, the provision of suitable rooms for daily meeting of members with the purpose of ultimately acquiring property, the promotion of uniformity in contracts, commercial usages, &c., to acquire and disseminate business information, to regulate the examination of applicants, and to grant certificates of competency or other diplomas to such applicants, to prescribe the qualifications of candidates for admission to the benefits of the exchange, to adjust controversies and misunderstandings arising out of trade transactions between members of the exchange and others, and to promote the settlement, by the arbitration of members of the exchange, of all disputes arising out of contracts entered into under the rules of the exchange; to adopt suitable means for enforcing against members the awards of arbiters issued in pursuance of the immediately foregoing purpose, and to promote such legislation as may be necessary for giving effect to the objects of the association, or for furthering the interests of the said trade.

Builders' exchanges have demonstrated their practical necessity in this country, and out of their existence have grown improved conditions in every branch of the building trades. They have raised the tone of the whole fraternity, and have set in motion machinery which will go on improving the conditions under which the business is transacted. There is no reason why the builders of Scotland and England should not profit by our experience, as have their brethren of Australia.

THE houses from the corner of Pine street to the United Bank Building along Broadway, this city, have just been torn down for the purpose of erecting on the site the 20-story edifice for the American Surety Company, reference to which was made in these columns some time since. At the corner of Pine street was an old five-story building that has a history. Half a century ago, and even later, it was the retail store of John Anderson, the tobacconist. About midway of the windows on the second story, exactly at the corner of the building, could be seen the iron eyelet which held the statue of Sir Walter Raleigh, which statue was taken down by J. M. Layman in 1872 and replaced in front of John Anderson & Co.'s tobacco factory in Liberty street, where it is still to be seen.

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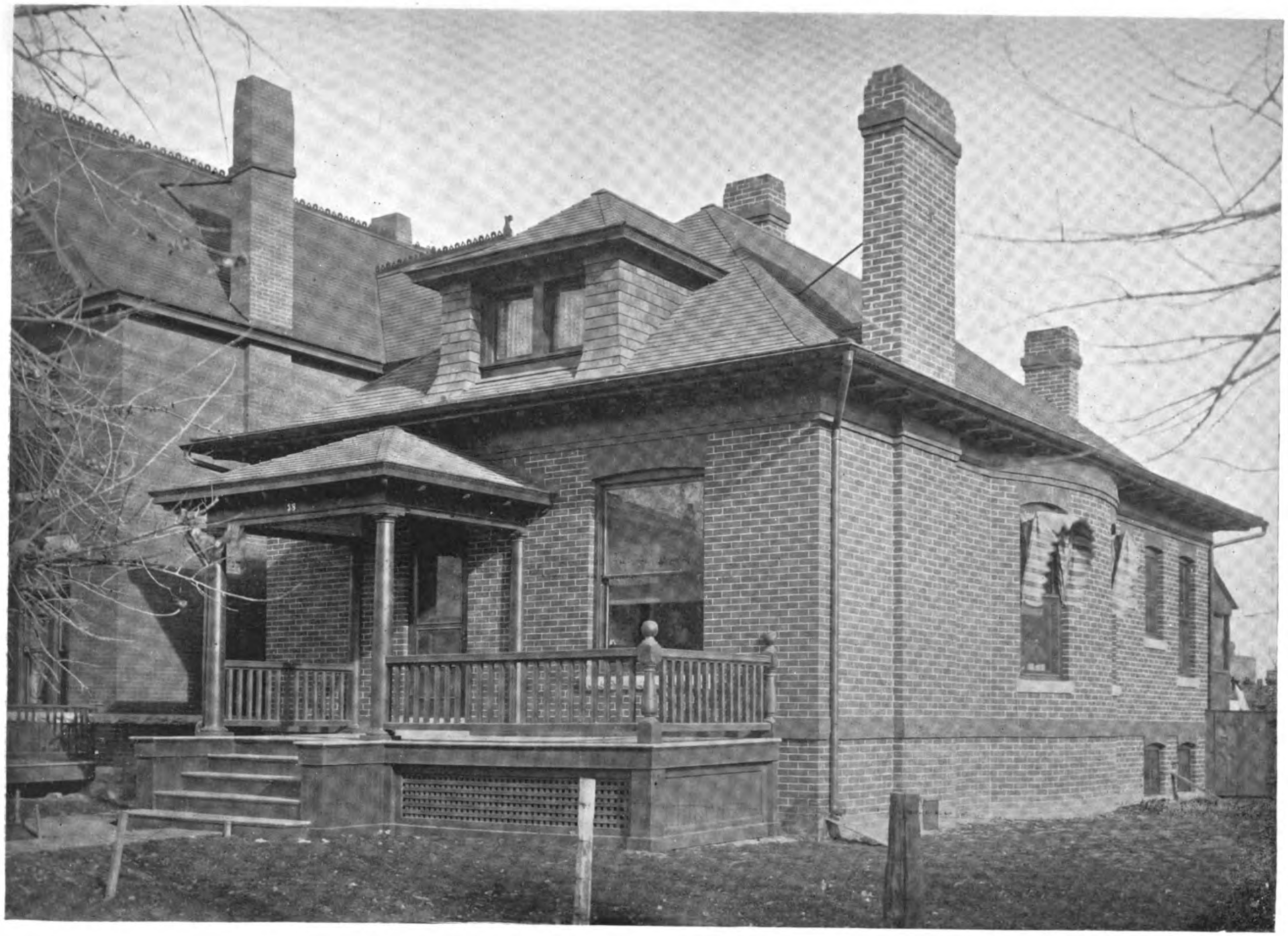


BRICK RESIDENCE OF F. H. CAYLOR IN DENVER, COL.

GRODAVENT BROTHERS, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, JUNE, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

JULY, 1894

Building Restrictions.

The past few years have witnessed great advances in the enactment of laws designed to so control the erection of buildings as to render them in every way safe for the occupants. Scarcely a city of any size can now be found that does not possess a code of building laws, while sizes of timbers, thicknesses of walls, provisions for escape in case of fire, as well as precautions to prevent fire itself, are all to be in accordance with the said laws. In the larger cities competent inspectors have laid upon them the duty of enforcing the laws, and, as a rule, in a somewhat less efficient manner, the matter receives attention in smaller municipalities. The subject of heating in its relation to legal protection against fire is of no little interest in this connection. Much of the good legislation in this line has been at the instigation or through the co-operation of the fire underwriters. They are certainly in a position to accurately judge of the practical efficiency of any arrangements that may be legalized, but too frequently their good judgment has been outweighed by exigencies of politics. Thus many laws of this character bear the marks of the influence, politically applied, to make the restrictions agreeable to persons who look only for the cheapest but not the best way in all things.

Diversity in Building Laws.

As a consequence there exists to-day a surprising diversity in the laws relating to the installation of heating systems. It is obvious that only one of them all can be exactly right, and yet the variety is to a certain extent excusable when we consider that in many cases the law makes the arrangement more than safe enough, and hence differs from those which approach nearer the danger line. Nowhere is this more noticeable than in the matter of permissible distances between heating pipes and adjacent wood work. Even a superficial inspection of the building laws relating to hot air pipes in some of the principal cities of the country will serve to clearly show this wide diversity. Thus, in Boston the law reads that all hot air pipes shall be 1 inch from the wood. The same holds true with steam pipes, and this distance must be maintained with either hot air or steam pipes unless the wood work is protected by metal casing or by stone or earthen ring. The laws in Providence and St. Louis are substantially the same.

Laws of Western Cities.

In Chicago, however, we find the other extreme. Here the hot air conductors, if placed within 10 inches of the wood work, must be made double, with at least ½ inch air space between the two. Steam pipes, on the other hand, need be kept only 2 inches from wood unless protected. Chicago, like many other cities in the country, dictates the material to be used in the construction of its pipes—in this case IC or IX bright tin. Under the law, literally followed, galvanized iron cannot be used. Of course it is, however, and the crudeness of the law thereby illustrated. The Cleveland restrictions are nearly the same, except that the steam pipe distance is increased to 6 inches, and the Milwaukee law is identical with regard to hot air pipes.

Memphis Building Law.

Memphis has an elaborate series of restrictions. It dictates that all brick or stone hot air shafts shall be lined with tin pipes, something very desirable, it must be admitted, but entirely unnecessary, as a matter of fire protection, under all ordinary conditions. Elaborate arrangements are required in the case of all flues; thus it is necessary, under the law, that all metal flues or pipes for the conduction of heated air shall be inclosed with 4 inches thickness of hard incombustible material, except in the case of horizontal pipes, which must be double, the inner one 3 inches from the stud, with ½-inch air space between itself and the water pipe. In addition, the inside faces of the exposed stud must be well lined with tin plate and the outside with iron lath or slats. Horizontal hot air pipes must furthermore be kept 6 inches below floors or ceilings if they are unprotected, or 3 inches if protected by a metal shield. Hot air pipes passing through partitions must have 4 inches of brick insulation or else a double collar of metal with 2-inch air space and holes for ventilation. Steam pipes may be placed within 2 inches of wood work, or within 1 inch if protected by a metal shield. New York City has a code of regulations practically identical with that of Memphis. Cincinnati makes the required distance of steam and hot air pipes 6 inches from unprotected combustive material, but makes all arrangements subject to approval of inspector. Detroit limits the distance to 3 inches. Denver requires metal flues to be double or wrapped in incombustible materials if not placed in stone or brick walls. San Francisco has a similar law, which specifies that the double pipe shall have ½ inch space filled with fire proof material.

Opportunity for Revision.

Many more examples might be given, but enough has been shown to indicate that there are either most reckless risks taken under some of the laws, or else the safeguards prescribed in others are practically unnecessary. Notwithstanding the numerous experiments that have been made, it is still an open question just how far removed wood work must be from steam and hot air pipes to avoid danger by fire. Of course this uncertainty is largely due to the conditions under which the pipes are installed and the system is operated, and a distance that is safe where there is ample ventilation around the pipe may become dangerous when the pipe passes through a partition and opportunity is given to overheat both air and wood work. It would seem that the most practical method of revising existing laws which have proved unsuitable would be to carefully and exhaustively study the laws of other municipalities in connection with the reports of the fires occurring within their limits. The inspectors, the fire department and the underwriters are all supposed to express, when possible, their knowledge or belief in the cause of a fire, and the extended examination of such reports must serve to show the adequacy of existing laws. In connection with the celebrated trial of the Chicago anarchists, the judge gave us in a single sentence the spirit that should rule in all law making: "The law is common sense." Most truly is common sense called on to establish the perfect and comprehensive building laws that are necessary in every community to protect its citizens, so far as may be possible, from all danger through improper construction of their dwellings, their factories, and their places of amusement, instruction and worship.

Builders' Methods.

One of the principal reasons why the building contractor has so much ground for complaint in the methods prevailing in his line of business is the laxity displayed in permitting an injustice to be done him without protest. When the average contractor finds objectionable requirements in specifications, or in the demands of other contractors, he says not a word lest the objection prevent his opportunity for obtaining the work. He is aware that many of his brother contractors occupy the same position and he therefore knows that others would be likely to accept irksome conditions from the same fear as that by which he is governed. If he didn't take the job as it was, some one else would. Failure to reject all unjust conditions has resulted in the establishment of a general opinion that any amount of injustice may be done a contractor, and he will stand it through fear that a protest may throw the work to some one less scrupulous than himself. To the apathy with which the contractor accepts unfair conditions and requirements is attributed the sole cause of the injustice.

Co-Operative Housekeeping.

Some time ago we called attention to a plan of co-operative housekeeping, doubtless suggested by Bellamy's "Looking Backward," the scene of the scheme, if we remember correctly, being laid in Denver. The plan is now to be tried again, this time in Hyde Park, Chicago, the originator being, it is said, a lady who for some years has been perfecting a scheme for model houses. The site chosen is to have erected upon it 44 houses of pressed brick and stone, tastefully constructed and the architecture varied, so that one may dwell behind a Venetian, a Spanish, Renaissance or a Romanesque front. The houses are to be of several stories, but none more than two rooms deep, in order that all shall have the necessary light and air. In the center of the plot is to be a large two-story building, under the roof of which will be gathered the kitchen, laundry, cold storage plant and the machinery for the heating and lighting. In the second story are to be a kindergarten, circulating library and a hall for amusements. The different houses are each to be connected with the central building by telephone and electric conduit, the latter so arranged as to convey hampers for the meals to and from the kitchen. These hampers will be constructed of some non-conductive material so that they will retain the heat. There will also be a central dining hall for those who wish, or where large dinners may be given. Each house will have a lawn in front, while in the rear will be a playground with provision for croquet and tennis. We understand that the scheme has attracted such attention that the Illinois Chapter of the American Institute of Architects has invited the originator of the scheme, who is lately from Denver, to address them on the subject.

Factory Hours in England.

William Mather, Member of Parliament for the Gorton Division of Lancashire, and the senior member of the firm of Mather & Pratt (Salford Iron Works), has made a report of the experience of his firm in the first year's experiment of giving his employees an eight hour day instead of nine hours, without any reduction in wages. Mr. Mather, whose works employ a large number of hands, reports that the experiment has proved in every respect a complete success. The output of the works has been greater than ever before, without an increase of expense, despite the reduction of hours. The 1200 hands employed in the works have worked cheerfully in double shifts during times of pressure upon the works, due to large orders, but they have never been paid, nor have they expected overtime, the reduction of the regular hours and the retention of the regular wages offsetting that. Converts to the eight hour system, Mr. Mather says, have invariably been permanently won over. Mr. Mather has furnished the government with full details of the working of the experiment in the Salford Iron Works and recommends its adoption, even tentatively, in the government arsenals, dockyards and other public works.

A Curious Japanese Dwelling.

A unique structure at Yokohama owes its existence to Dr. W. Vander Hayden, and has now successfully withstood the cold, heat and earthquakes of a year and a half. The walls are built of hollow glass bricks filled with solution of alum, which intercepts certain heat rays but allows light to pass. These hollow bricks, or boxes, rest upon cast iron supports, and the space between them—made as small as possible—is filled with felt. The roof, which is flat, is supported by cast iron pillars. Glass panes, with strips of rubber between them, form the horizontal ceiling, and over this is a thick layer of ashes, above which is a cement covered frame work of wood. The roof is thus made an effective non-conductor of heat. No light passes through it, of course, but the walls are totally translucent and allow more light to enter than is received by any other kind of dwelling. Suitable arrangements provide for ventilation and drainage.

Long Leaf Yellow Pine

At a recent meeting of the Engineers' Club of Philadelphia, E. R. Keller presented some interesting remarks relative to the results obtained in the Government investigations of American timbers, now in progress under the supervision of B. E. Fernow of the Forestry Division. The investigations have been productive of some very valuable results regarding long leaf yellow pine, and Mr. Keller described in detail the apparatus and methods used by Prof. J. B. Johnson in testing logs to determine cross breaking of large and small beams; tension; compression—endwise and cross grain; shearing, and the properties of full size columns. The results of tests of this wood were given and the following deductions by Professor Johnson:

The long leaf pine timber is specially fitted to be used as beams, joists, posts, stringers in wooden bridges, and as flooring when quarter sawed. It is probably the strongest timber in large sizes to be had in the United States. In small selected specimens, other species, as oak and hickory, may exceed it in strength and toughness. Oak timber, when used in large sizes, is apt to be more or less cross grained, knotty and season checked, so that large oak beams and posts will average much lower in strength than the long leaf pine, which is usually free from these defects. The butt cuts are apt to be wind shaken, however, which may weaken any large beams coming from the lower part of the tree. In this case the beam would fall by shearing or splitting along this fault with a much smaller load than it would carry without such defect. These wind shakes are readily seen by the inspector, and sticks containing them are easily excluded, if it is thought worth while to do so. For highway and railway wooden bridges and trestles, for the entire floor system of what is now termed mill or slow burning construction, for masts of vessels, for ordinary floors, joists, rafters, roof trusses, mill frames, derricks and bearing piles; also for agricultural machinery, wagons, carriages, and especially for passenger and freight cars, in all their parts requiring strength and toughness, the long leaf pine is peculiarly fitted. Its strength, as compared to that of short leaf yellow pine and white pine, is probably very nearly in direct proportion to their relative weight, so that pound for pound all the pines are probably of about equal strength. The long leaf pine is, however, so much heavier than these other varieties that its given strength for given sizes is much greater.

A great many tests have now been made on short leaf and on loblolly pine, both of which may be classed with long leaf as "Southern yellow pine," and from these tests it appears that both these species are inferior to the long leaf in strength in about the ratio of their specific gravities. In other words, long leaf pine (*Pinus Palustris*) is about one-third stronger and heavier than any other varieties of Southern yellow pine lumber found in the markets. It is altogether likely that a considerable proportion of the tests heretofore made on "Southern yellow pine" have been made on one or both of these weaker varieties.

Expansion of Girders.

A writer on strains in girders, 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° F. of heat 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 vibration of 100° 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.

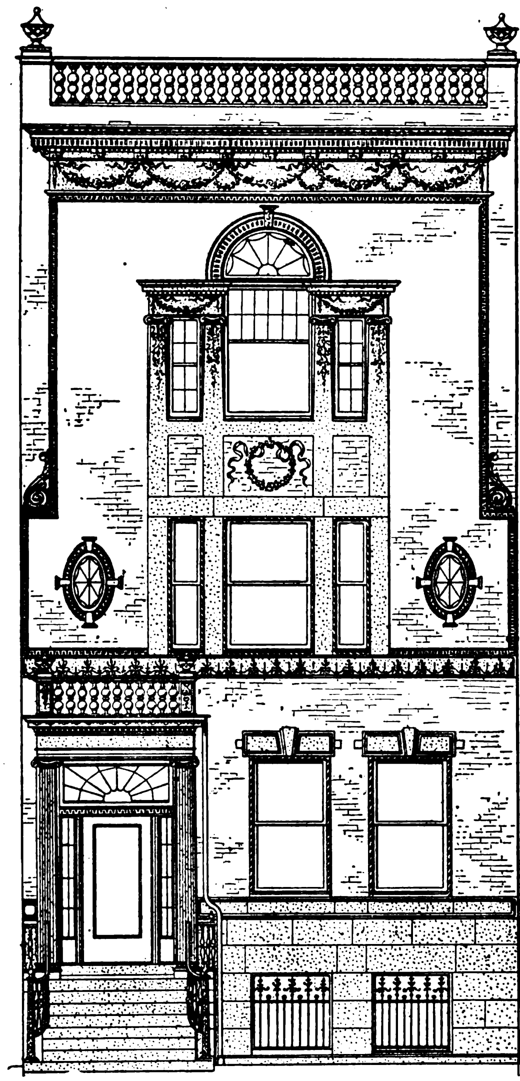
Hard Wood.

A recent issue of the *Timberman* contains the following legal decision in regard to what constitutes "hard wood." A certain man had a contract with a railroad company to deliver "hard" cord wood and he delivered poplar in part fulfillment of the contract. The railroad company objected, but the contractor won his case in court in consequence of the judge's decision that botanically any tree that had a leaf as distinguished from a needle was a hard wood, regardless of what the actual texture of its fiber might be. This is, as far as we know, along a new line, but it is strictly in accord with other decisions based upon the technical and commercial nomenclature of the wood. There may be no particular reason for saying that Lombardy poplar, or basswood, or cottonwood is a hard wood, but such it is commercially, as decided by the courts, and those dealing in timber may as well understand it. If this new decision, based upon botanical considerations, is sustained it will merely add strength to the old position.

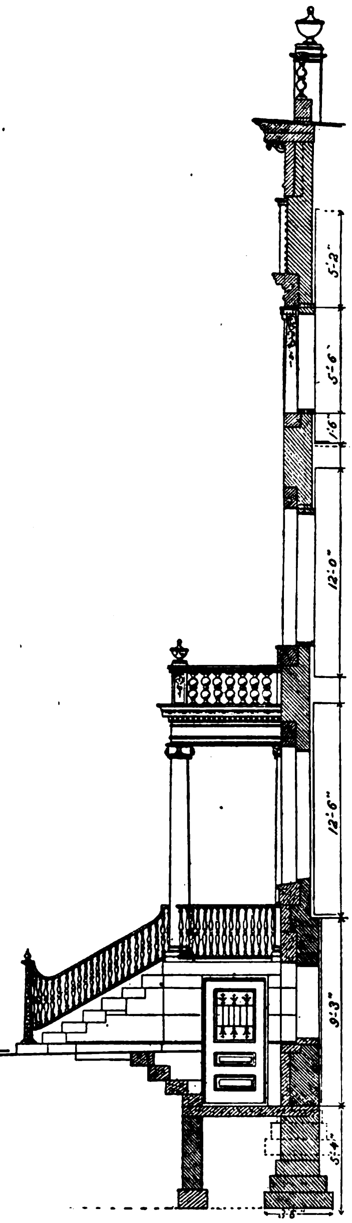
STEEL FRAME CONSTRUCTION FOR DWELLINGS.

OUR readers are doubtless more or less familiar with the methods employed in putting up office buildings and business blocks by what is known as "skeleton frame" construction, in which an iron or steel frame work of columns, girders and joists carries the loads to be supported independently of the stone or brick walls with which the metal is generally incased. This system is becoming more and more extensively employed in the larger cities of the country, for the reason that it permits of the use of thinner foundation walls than would otherwise be the case, while at the same time adding to the fire proof qualities of the buildings. It cannot be said, however, that iron and steel in this form have yet found their way to any appreciable extent into the construction of private dwellings, but it is doubtless only a question of time, for it is well known that many of the reasons which have led to the introduction of these materials into magnificent office buildings and business blocks apply with almost equal force to the more palatial city residences. This is especially true just now, when the very low price of steel is stimulating its use in the smaller classes of buildings where wood would no doubt continue to be employed if there existed a great difference in the cost of the two materials.

The first application of the "skeleton" system to the construction of private dwellings has been brought to our notice by the structural department of the Illinois Steel Company of Chicago, Ill., where a strictly fire proof residence is now in course of erection, and which is expected to mark the beginning of a new era for this type of buildings. Contractors and builders generally cannot fail to be interested in seeing how steel construction can be employed in this way, and we therefore take pleasure in presenting herewith the elevations, floor and framing plans, and miscellaneous details of the building in question. The residence is that of W. H. Reid and represents the design of Beers, Clay & Dutton, architects of 218 La Salle street, Chicago. The



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

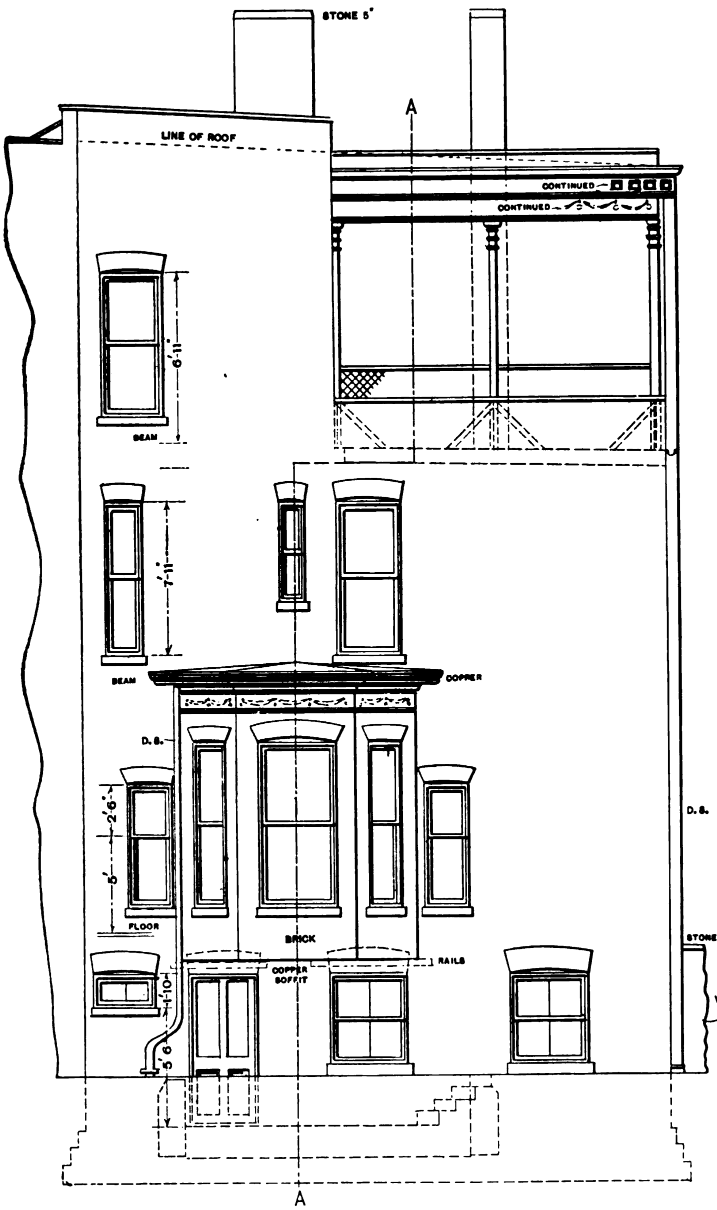


Vertical Section.

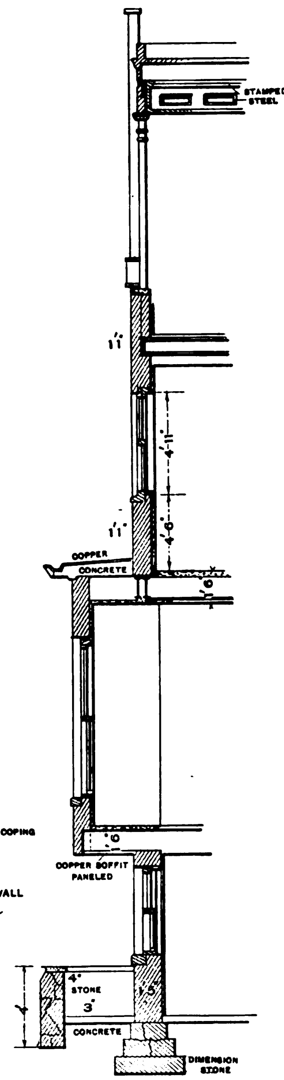
Steel Frame Construction for Dwellings.—Residence of W. H. Reid.—Beers, Clay & Dutton, Architects, Chicago, Ill.

house faces directly west and is constructed with brick walls, on the interior of which 1½-inch furring tiles are used. The front of the basement, steps and platform are of granite, while the porch and all the trimmings, including cornices, are of a delicate cream colored terra cotta. The front bricks are of cream color, laid in Flemish bond with white mortar. The of cast iron columns and steel girders. On this side the basement wall is of brick, and supporting the iron columns are three 65-pound rails, each 4 feet long. On page 150 we show a section through the old and new walls at column No. 2, looking toward the front of the house. The 8-inch wall indicated is supported upon the beams running parallel to the old party wall, and on the interior with stamped steel. All the stair stringers are of cast and wrought iron.

The basement windows, north elevation windows, the rear windows in the second and third stories, as well as all the basement and rear balcony doors, are to have plain or ornamental iron guards. There are also to be iron guards over the two skylights. The



Side (Right) Elevation of Dining Room Extension.—Scale, ⅛ Inch to the Foot.



Vertical Section taken on the Line A A of the Elevation.

Steel Frame Construction for Dwellings.

porch post 10 feet long is in one piece of terra cotta. All the floors and the roof are supported upon steel beams varying in size from 9 to 15 inches, according to the load they are required to carry. In the plans which we give on pages 150 and 151, showing the iron framing, the various dimensions are given together with the weights of the beams.

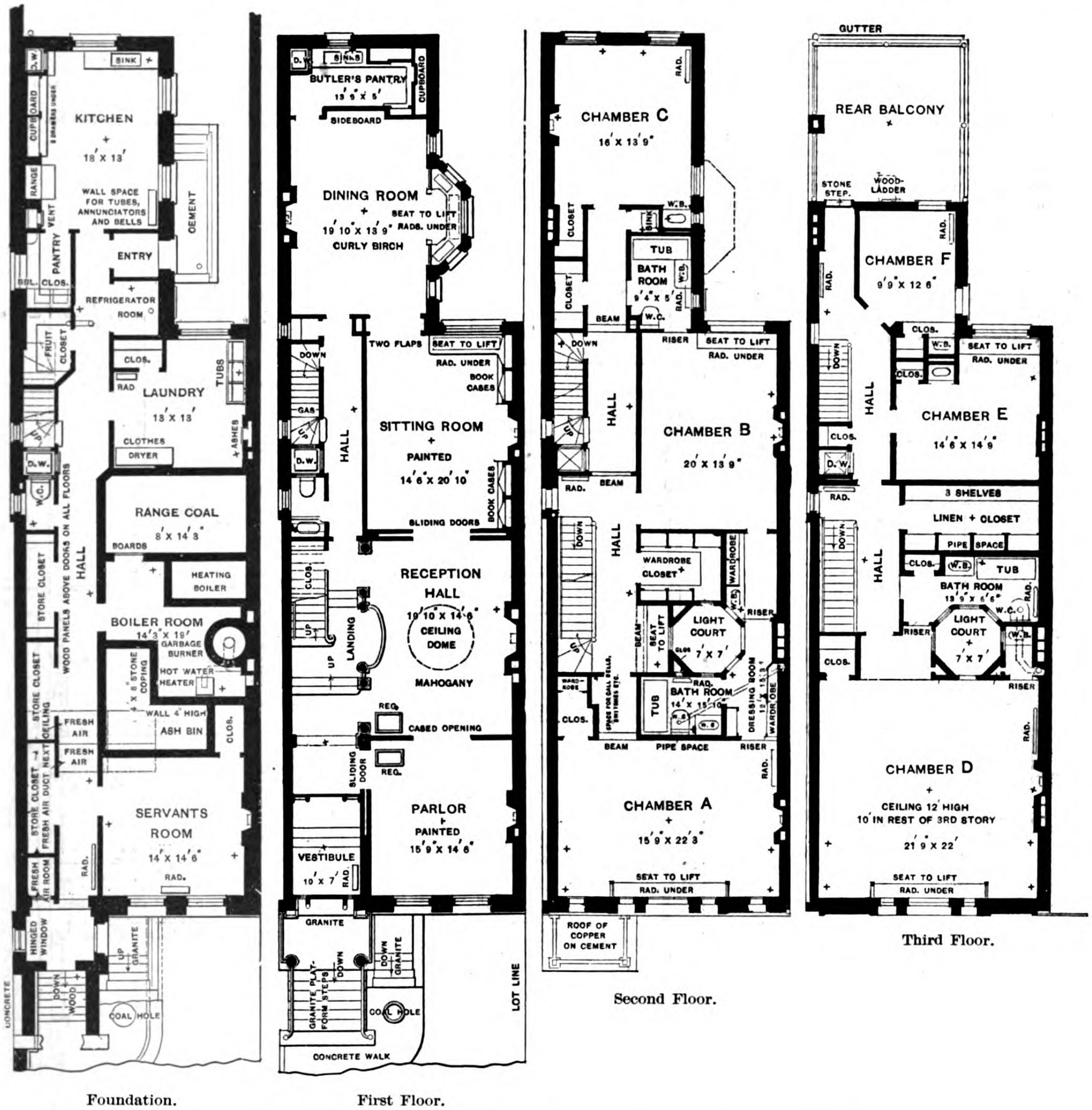
Adjoining the site of this building on the north was an old party wall, and here it was necessary to make use and by surrounding them, form a fireproof covering. In order to hold the brick work of the rear bay and the walls above, a construction of columns and steel beams is employed.

The rear portion of the third story, as will be seen from an inspection of the partial elevation of the dining room extension on this page, is to be used as a large balcony. All the posts and other parts for this balcony are of cast iron, thoroughly braced, and covered on the exterior with copper front porch railings and fences will be of ornamental wrought iron.

The floors of the house are built according to the improved fire proof system of the Expanded Metal Fire Proof Construction Company, which may be briefly described as follows: Between the I beams of the building, running transversely, are channel iron arches ranging, according to the weight the floor is to sustain, from 3 to 8 feet apart. Between the channel irons are placed wood centerings, leaving the channel arches and I beams exposed. These arched ribs or haunches are first filled with concrete, over which expanded metal is laid, crossing the arches and covering the false flooring. Above these concrete is placed to the required thickness. As soon as the concrete is set the false flooring and other wood work is removed from beneath, leaving a system of steel and concrete arches and flats of concrete having imbedded in their under side a continuous layer of expanded metal.

All the partitions of the house are of 3-inch tile, the roof and rear balcony skylights and basement door lights. The plumbing will be first-class in every respect, and will consist in part of porcelain bathtubs and onyx slabs for bowls. There will be a complete system of call bells, speaking tubes and annunciators, and also conduits and wiring for electric light and telephone.

The heating will be done by means of hot water, and in this connection it is interesting to note the method of running the pipes. These are laid in slots built in the exterior walls, next to which, and under the window seats, form a good idea of the method of construction employed. The house here shown, as may be inferred from the description, is not a cheap one, and will cost in the neighborhood of $37,000. Owing to the fact that it was necessary to construct a portion of the north wall of iron, and having a plan that gave parallel walls and no recesses or irregular lines, the architects found that to substitute steel beams in place of wood joists cost about $2000 extra. The architects of this house have also designed and erected many notable buildings in various parts of the country, and may be justly considered pioneers in this new field.



Steel Frame Construction for Dwellings.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

floor being covered with 6 x 6 x ⅞ inch glazed tiles, imbedded in Trinidad asphalt. The basement floor is of concrete laid on the ground, and this in turn is covered with a wood floor. All ceilings are of metal lath and cement mortar.

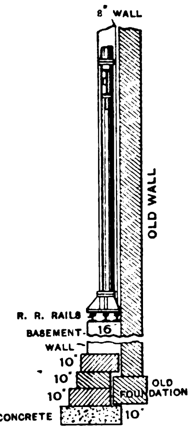
The finish of the interior will be of mahogany, curly birch and white oak painted, the latter being four and five coats of enamel paint. The floors will be of strips of quarter sawed oak 1⅝ inches wide. Tiles will be used for bathroom floors and walls, kitchen wainscoting and the lining of the air shaft. Wire glass will be used for are placed the radiators. One of the great difficulties experienced in the plumbing was in connection with the pipes. On account of the large size of the soil pipes, waste pipes, revent pipes and hot and cold water supply pipes, the architects were compelled to resort to double thick partitions, leaving a pipe space between and raising the bath and toilet room floors one step.

The floor plans, which we present on page 149, clearly show the arrangement of the rooms at the several stories, while the framing plans on the following pages will enable our readers to

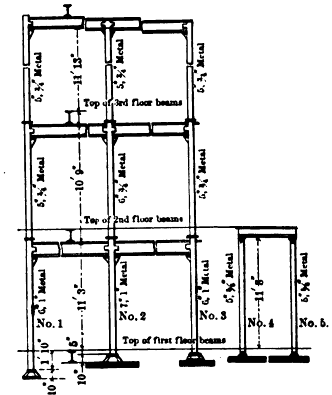
The American House Beautiful.

In referring to the homes of American business men and contrasting them with the stately and the cottage homes of his own land, a writer in a late issue of *All the Year Round* presents the following views, which may prove interesting to many of our readers:

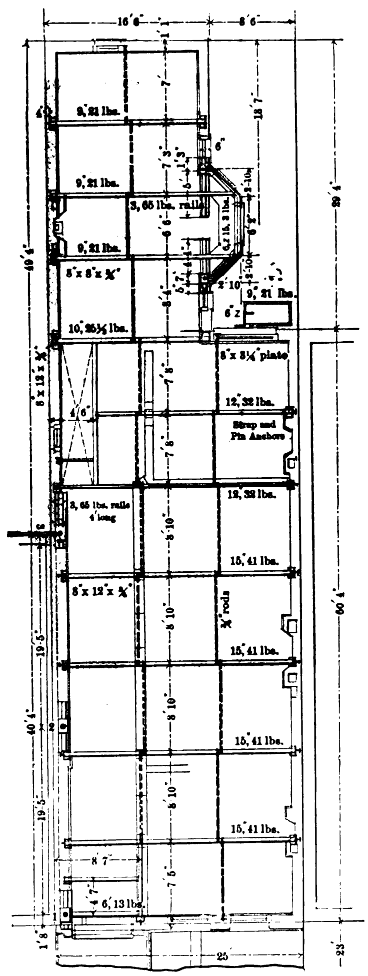
We Englishmen are proud, and justly so, of the stately and the cottage homes of our land. There is nothing like them elsewhere in the world, for they possess peculiar features of their own—the former in their antiquity and their associations, the latter in their own beauty and that of their surroundings. But the great mass of us live neither in stately homes nor in cottages, and of our residences—externally, at any rate—we have very small reason to be proud. Now, as the Americans have no stately homes of our English type, with the exception of the fine old colonial residences of Virginia and New England—and as their cottage homes are modern, practical and consequently ugly, and, as we have said, there is a wealth of refinement in many American minds, they have succeeded in making the villa residences of their big city suburbs the most beautiful in the world. I call them "villa residences," despite the fact that many of them are mansions in size and feature, because they are the homes of business men. The town residences of American business men are beautiful internally, but



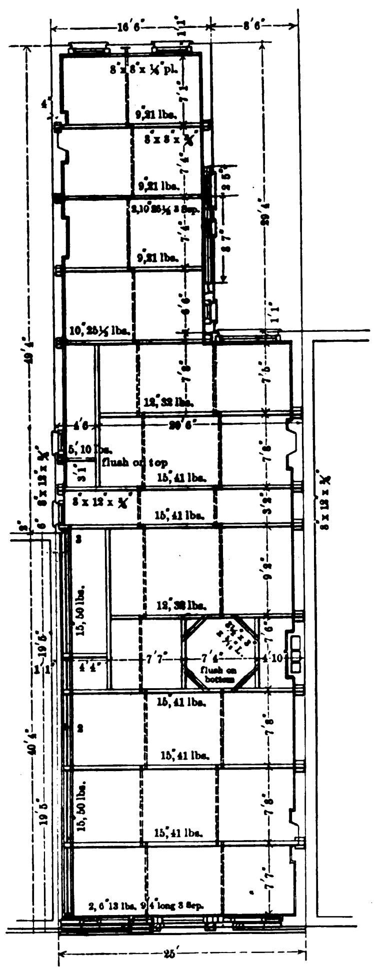
Section through Old and New (North) Walls at Column No. 2, looking toward the Front of the House.—Scale, ⅛ Inch to the foot.



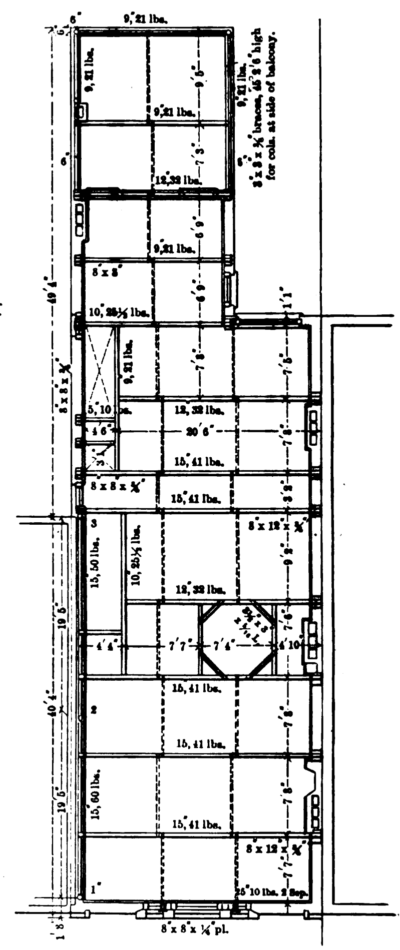
Vertical Longitudinal Section.



Framing for First Floor.



Framing for Second Floor.



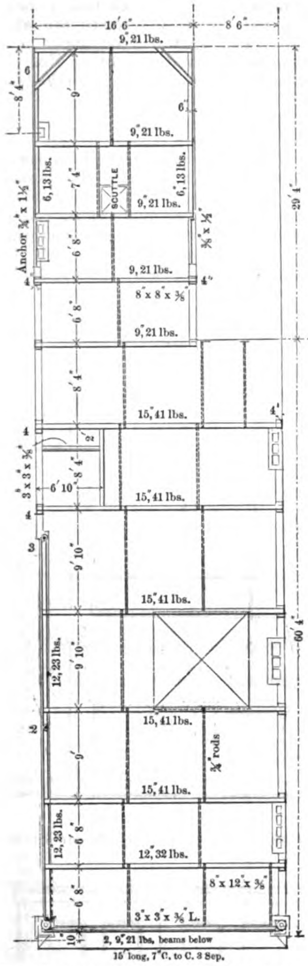
Framing for Third Floor.

Steel Frame Construction for Dwellings.—Plans showing Iron Framing; also Longitudinal Section.—Scale, 1-16 Inch to the foot

being in streets and rows they necessarily lack the external features which induce us to select the suburban home as a type of the American House Beautiful.

ORIGINALITY IN DESIGN.

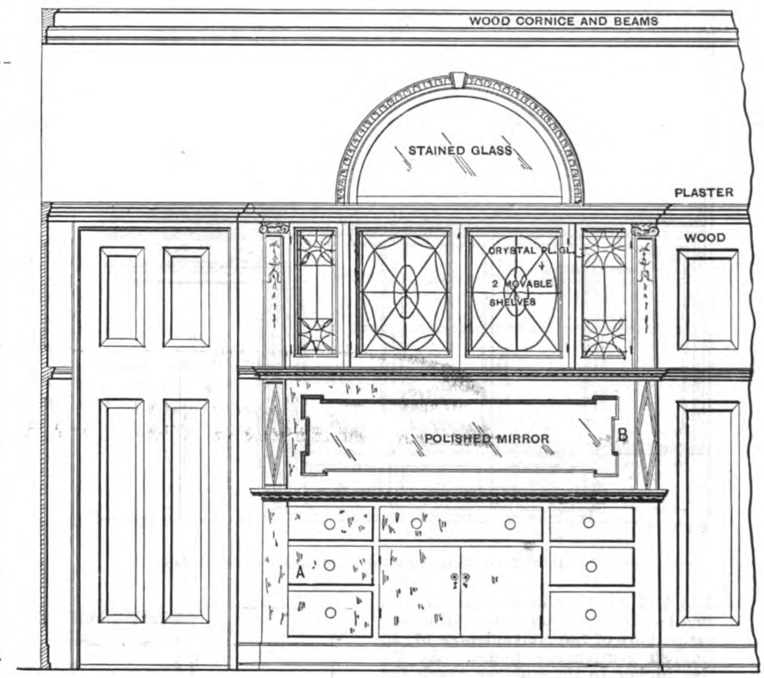
In a survey of these the first fact which strikes the eye of the stranger is the extraordinary fertility of the American architectural brain in original design. A family likeness pervades all London suburban houses, be they north or south of the Thames. If there be one pretty house, there will be scores exactly like it all around: but until within the past very few years the London suburban builder reared as fast, as cheaply, and, in consequence, as inartistically as he could, with the result that the very great majority of London suburban houses are absolutely hideous. But in an American suburb, let us say for example, Brookline, near Boston, a suburb extending over miles



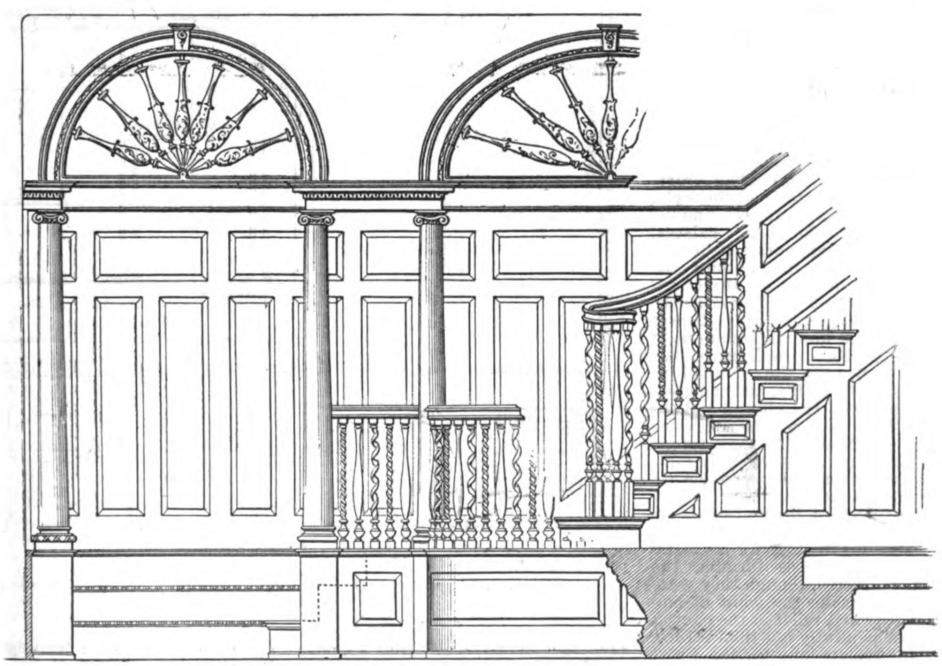
Roof Framing Plan.—Scale, 1-16 Inch to the Foot.

of hill and dale, and planted thickly with houses, it may be asserted that not half a dozen buildings are exactly alike. The straining after the original and the striking has, of course, resulted in the erection of a few monstrosities, and of some houses more eccentric than pleasing in design, but the general average is exceedingly high. In this general originality of house design I seem to see a far greater instance of the much vaunted American liberty and independence than in any of the political and social institutions of the country.

After we have surveyed the exteriors of the houses and proceed to their interiors another new fact strikes us, and this is how very much better the different classes of American business men are housed than are their corresponding grades in our own country. Shop walkers, counter men and good artisans go home every evening to houses which in England would not be deemed unworthy of city men of good position. The taste in furnishing and decoration may not always be as good as the houses themselves, but there is



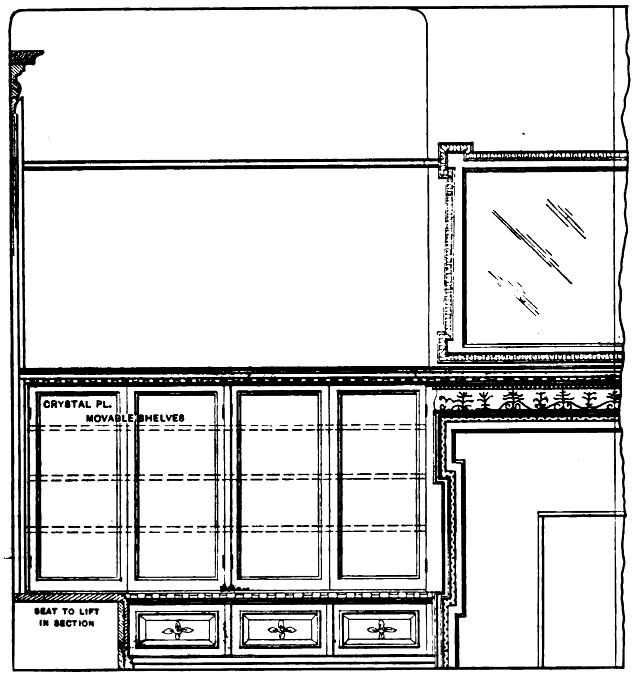
Elevation of Sideboard in Dining Room.—Scale, 3/8 Inch to the foot.



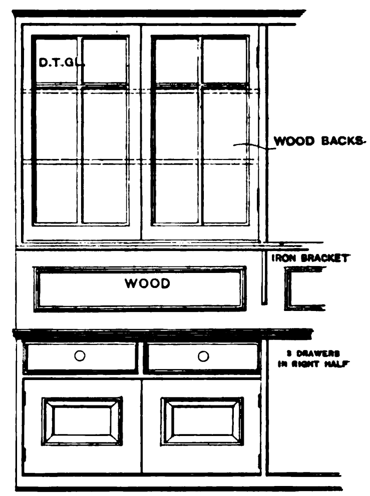
North Elevation of Reception Hall with Section of Stairway.—Scale, 3/8 Inch to the Foot.

Steel Frame Construction for Dwellings.—Roof Plan and Miscellaneous Details.

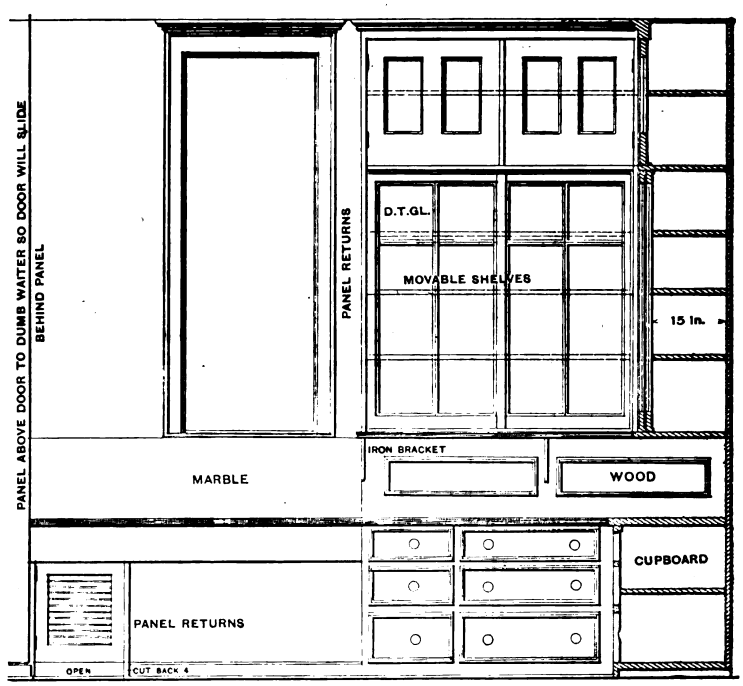
nothing corresponding to what may be called our London "genteel villa residence," and the bank clerk, instead of huddling in one yellow brick box in a long row with a big name shuts himself up for the evening in his own little



Partial Elevation of Sitting Room Mantel and Book Cases at its Left.



Partial Front Elevation of Kitchen Cupboard.



Elevation of Butler's Pantry.

Steel Frame Construction for Dwellings.—Miscellaneous Details.—Scale, ⅜ Inch to the Foot.

detached castle, which contains on a small scale all the accommodation and many more of the conveniences of an English gentleman's house. As we rise higher in the scale we reach the American House Beautiful, as distinguished from the American House Magnificent.

Bernini as an Architect.

A writer in one of the London trade journals says that the greatest architectural genius of the seventeenth century was Bernini, whose name is generally associated in architectural history with that of his contemporary, Borromini, as a corrupter of the style. He was sculptor and architect, and designed several churches, palaces, fountains and other works at Rome, among which may be noticed the palaces Barberini and di Monte Citorio, the churches del Noviziato de' Gesuiti and Gandolfo, the college of the Propaganda, and the fountains of the Piazza Navona, the Piazzas Barberini and di Spagna, the colonnade of the Piazza di S. Pietro, and the great staircase between the church and the Vatican. Bernini has sometimes displayed the highest art in the arrangement of light and in overcoming difficulties of situation, and his effects are occasionally inimitable. His style presents more licenses than absolute errors or abuses, and his graces and elegances go far to atone for his many faults. The porticoes forming the Piazza di S. Pietro, though they were calculated to make the want of columnar beauty and relief in the church itself more painfully felt than before, are in themselves one of the finest creations of Italian architecture. Columns had never before in modern times been employed in such profusion, or to the production of so great an effect.

WHAT is claimed to be the largest single stone ever quarried is said to have been taken recently from a quarry at Houghton Point, near Ashland, Wis. This monolith, of Lake Superior brown stone, is 115 feet long, and when completed is to be 10 feet square at the base and 4 feet square at the top. The apex will be about 5 feet long and tapered to a 6-inch tip. This obelisk is 10 feet longer than the largest of the Egyptian obelisks.

ABOUT 100,000,000 feet of lumber were cut in the Maine forests the past winter, as compared with 130,000,000 feet a year ago. The lumbermen complain that the unprecedentedly mild weather of March took all the snow out of the woods and greatly hampered the hauling of the logs to the landing places. Consequently quantities of lumber will be held over for another year before reaching the market.

WHAT BUILDERS ARE DOING.

A SUMMARY of the conditions prevailing in the building trades in the different sections of the country seems to show that the work at present under way is the result of necessity and is being conducted as economically as possible. There seems to be very little building anywhere of a speculative character; capital seemingly prefers to wait for better times before embarking in large building enterprises. Competition is unusually sharp and extensive, there being many bidders for all work opened to competition. Where it is usually the custom for four or five contractors to submit bids for work, many times that number now compete, and tenders are remarkably low. Builders say that the effort to secure work has been so great that figures have been reduced below the point of profit.

In some of the larger cities the condition has not been improved by the unsettled condition of the labor market. Cincinnati particularly is reported as having suffered greatly because of strikes, &c. It is stated that many important contracts were withdrawn from the market because of the uncertainty in the progress of work. The carpenters, together with such other unions as have acted in sympathy with them, have unwittingly given those who were timid among the investors an excellent excuse to withdraw from operations at present.

The condition among the workmen throughout the country is difficult to ascertain, as "times" are so precarious that little is heard from them except in localities in which they are well organized. But few general movements of any kind among the workmen are to be noted this year, those of the Chicago painters and the Cincinnati carpenters involving the greatest number. The volume of building now being carried on may be roughly estimated as at least a third less than at this time last year.

Baltimore, Md.

The following officers of the Builders' Exchange of Baltimore were elected June 5 at the annual meeting:

President, Noble H. Creager.

Vice-presidents, Wm. Ferguson, Isaac S. Filbert and S. B. Sexton, Jr.

Secretary, E. D. Miller.

Treasurer, B. F. Bennett.

Directors, E. L. Bartlett, Geo. W. Hetzell, P. M. Womble, Jr., Israel Griffith, John B. Sisson, Henry Seim, E. D. Crook, John Trainor, John Bunnecke, J. J. Walsh, W. N. McCauley, Joseph T. Lawton.

The president in his report recommended that the scope of the Polytechnic Institute be increased by giving instructions in building trades. The exchange has 131 members at present. Its new quarters in the building corner of Charles and Lexington streets will be occupied shortly after July 1.

Boston, Mass.

Everything in the building trades of Boston and vicinity is moving along without much activity, although the amount of work in progress is sufficient to keep the builders and their workmen from being seriously affected by the quietness of trade. The members of the Master Builders' Association, as a whole, are fairly well satisfied with conditions, believing, from reports from other places, that the situation in Boston is less irksome than in some of the other large cities. No strikes or lockouts of any importance have occurred during the past month, and there is no reason to anticipate any unusual labor disturbance in the near future.

Cincinnati, Ohio.

It is reported that out of the strike of the Cincinnati carpenters a general strike of the workmen in the building trades, involving in the neighborhood of 4000 men, is in force. The strike was ordered on May 21 to secure an eight-hour day at \$2.50, or a nine-hour day at \$3 with eight hours on Saturday.

It was agreed that when this year's contract was made with the carpenters a clause should be inserted specifying that only union made product should be used in the construction of a building. This, it seems, the boss carpenters refused to allow, but they signified their intention of employing the men as formerly.

The Building Trades Council, the highest in authority of any of the local labor bodies, have the carpenters' strike in hand, and have made their first move toward securing an amicable settlement of the existing difficulties. A committee of three, consisting of President J. B. Rodgerman, Henry Cannon and J. H. Lightfoot, accompanied by committees from the carpenters' council and the strikers, called at the Builders' Exchange and asked that their credentials be recognized so that they could go into that body for the purpose of having a committee appointed from the exchange to meet with the committee from the Building Trades Council to settle the present difficulty and adopt measures to prevent a recurrence of strikes in the future. The Board of Directors of the exchange discussed the matter at some length and then decided that the exchange, according to its constitution, was not empowered to act in any wage or hour question occurring in any one of the building trades, and so reported to the committee in waiting that they would have to settle their differences with the Master Carpenters' Association; that they, the Builders' Exchange, had no jurisdiction in the matter whatever.

At a later meeting of the bosses in the Builders' Exchange resolutions were passed to remain firm in the stand already taken. From this it may be judged that the strike will be a long and bitter one.

Applications for membership posted in the Builders' Exchange, to be considered at the regular monthly meeting, are those of the J. F. Binder & Bros. Company of Hamilton, the Millcreek Valley Lumber Company and the Kingston Lumber Company.

The *Commercial Gazette* is authority for the statement that the estimated cost of new structures projected on June 1 had fallen to the low amount of \$24,000. The cause was stated as being largely the uncertainty in the employment field, capital not caring to become involved during such an uncertain time.

Chicago, Ill.

At a mass meeting of the journeymen painters of Chicago, held May 20, the contract agreed upon by the boss and journeymen painters' executive committees was ratified, and thus ended the strike which had been on since April 2. The contract stipulates that it shall be binding for a period of two years from June 1; that the wages of journeymen painters be 35 cents per hour until June 15, 30 cents per hour from June 15 until March 1, 1895, and 32½ cents per hour until March 1, 1896. None but union painters are to be employed, and all differences that may arise between the men and bosses are to be settled by arbitration, the arbitration committees to be composed of five journeymen and five bosses. If these committees cannot agree, then they shall choose a disinterested person, whose decision shall be final and binding.

The meeting was an enthusiastic one, and forcible and happy speeches were made. All said they were glad the long strife was over and that the shops would all resume operations at once, and work provided for the men. To accomplish the settlement of this strike both sides have been forced to make concessions. The bosses conceded 35 cents until June 1, and agreed to be bound by the contract for a period of two years. The journeymen have come down from 35 to 30 cents per hour for the remainder of this year, and 32½ cents during 1896. William Sorenson of the Painters' Union is the man who has worked night and day to bring about this settlement. He is a broad minded, cool headed man, and has labored unceasingly to get the men back to work. Several strikes of minor importance have occurred during the past month, but none sufficiently extended to cause serious effect. The Builders and Traders' Exchange is reported as being in good condition; the members fairly content with the amount of building on hand.

New York City.

The Building Trades Conference of New York City, representing 42 different organizations, has taken a decided stand against the use of all foreign and convict made materials in buildings now in course of construction or to be constructed hereafter in New York. The stoppage of work by the strike of 49 union men employed on Commodore Gerry's residence was a step in this direction. Marble brought here by Allard & Co. of Paris was being used in Mr. Gerry's house contrary to the policy mapped out in a report of a committee of the conference which was recently adopted. The report declared that the concentrated efforts of the building trades must be directed against the prevalent system of wealthy residents, architects and builders who, in the past, have awarded contracts to firms whose manner of conducting business is of extreme detriment to New York mechanics and laborers. Thousands of wood workers, plasterers, marble workers and other descriptions of craftsmen, it was said, were impoverished through the enforced idleness caused by those who award contracts to foreign firms and who purchase prison-made material. It was decided that the trades who were obliged to handle foreign and prison-made materials should refrain from so doing on and after June 1. The Board of Delegates of the Building Trades of New York had already indorsed this course, and all kindred trades were instructed to support the movement. It was also resolved that materials from suburban localities should be handled only when made under the same conditions that govern wages and hours in this city, but this provision is not to go into effect until September 1.

A very interesting report, according to the *News* of June 14, was made by the various delegates of the trades present at a meeting of the Building Trades Council in connection with the number of men out of work in each trade. Chairman Collanan asked each delegate the percentage of men out of work in his union.

The reports of the delegates were as follows:

Tin and Sheet Iron Workers' Union, 20 per cent. of its 500 members out of work.

Reliance Labor Club of Marble Cutters, 35 per cent. of 400 members idle.

Progressive Painters' Benevolent Union 1, 50 per cent. of 435 members out of work.

Terra Cotta Workers and Mold Makers' Union, one branch fully employed and about 30 per cent. of the other branch idle.

Progressive Varnishers' Union 1, about 50 per cent. out of 350 members out of work.

Only 15 per cent. of the members of the Machine Stone Workers' Union were reported to be out of work.

Independent Iron Workers' Union of Jersey City, all members at work four days in the week only and idle the rest of the time.

Progress Association of Steam Fitters' Helpers, out of 500 members 80 per cent. are without work.

Of the 260 members of the Granite Cutters' Union, 20 per cent. are idle.

The United Wood Carvers' Association, 55 per cent. are out of work and have been for months.

About 80 per cent. of the 250 members of the Gilders' Union were reported to be unable to get work.

Out of 1000 members of Local Union 3 of the Brotherhood of Electrical Workers, L. A. 5468, about 60 per cent. were said to be unable to find work.

The delegate of the Journeymen Plumbers and Gas Fitters' Progressive Union said that only about 10 per cent. of his 250 members were idle.

Numerous comments were made as delegate after delegate made reports, and it was emphatically stated that in some trades work was as hard to get now as last winter, and that the condition of affairs and the general destitution was as deplorable as ever.

Philadelphia, Pa.

At the last regular monthly meeting the Master Builders' Exchange of Philadelphia indorsed the proposed ship canal between that port and the Raritan River. The following resolution was adopted:

The Master Builders' Exchange, believing that the construction of the proposed ship canal between the Delaware and Raritan rivers would be of great benefit to the city of Philadelphia in particular and to this exchange in general, would respectfully urge upon City Councils the immediate passage of the ordinance appropriating \$10,000 for the purpose of making a preliminary survey and demonstrating the feasibility of the project.

Prof. Lewis M. Haupt spoke on the subject, and pointed out the value the canal would be to the exchange. Thomas Martindale and Coroner Ashbridge also spoke in favor of the canal. James Hastings opposed it because he thought New York would be more benefited by it, and that city ought to bear the expense. He believed that if the canal was ever built it would be done by Congress.

Edward Miller replied by saying that Philadelphia would receive the first benefits of the canal, and he thought the business men of this city should take the initiative in the matter. Franklin M. Harris, president of the exchange, also replied to Mr. Hastings by saying that the great projects of the past century were started and carried through by Philadelphia capital. The resolution was adopted by a *viva voce* vote, only two out of 200 voting against it.

John S. Stevens, ex-president of the Master Builders' Exchange and ex-president of the National Association of Builders, has been appointed one of the Public Buildings Commissioners for the city. Mr. Stevens fills the vacancy caused by the death of John L. Hill and was the only candidate whose name was presented.

Reports from the Master Builders' Exchange show that organization to be in its normal condition of excellence. Building interests are quiet, much more so than is usually the case this time of year.

St. Louis, Mo.

The union carpenters of St. Louis are out on strike. It is stated that on June 1 about 1500 men quit work. The situation seems to be not very clearly defined. Ostensibly the strike was for the purpose of establishing a union scale of 40 cents per hour and eight hours. Several meetings of the various unions have failed to establish what the desire of the majority is in the matter.

Carpenters have been and are willing to work for almost anything and are anxious for employment at almost any wages. The final adoption of a union scale of 35 cents was satisfactory to the employers, as few good men were receiving less than that amount. As many as could find work have done so, although many places were lost, being filled by non-union men.

The joint conference between the heads of the Knights of Labor and the American Federation of Labor, which it is confidently expected will cement all great labor organizations, was opened on June 11, in the Laclede Hotel.

The Knights of Labor organization was represented by J. H. Sovereign, John W. Hayes and W. J. Bishop; the American Federation of Labor by Samuel J. Gompers, P. J. McGuire and Frank K. Foster; the Brotherhood of Locomotive Engineers by A. B. Youngston and Messrs. Mills and Naylor; the Brotherhood of Locomotive Firemen by F. P. Sargent, Frank Warnold and Charles W. Maier; the Brotherhood of Brakemen and Federation of Railway Trainmen by S. E. Wilkinson; the Order of Railway Conductors by E. E. Clark, and the Farmers' Alliance by I. E. Dean.

Wilmington, Del.

At a well attended meeting on June 4 the bricklayers of Wilmington, in view of the hard times and in order to give an impetus to building, agreed to reduce their own wages. The men who were employed have been receiving $4.05 a day. Under the new scale they will receive $3.60 a day, a reduction of 45 cents.

Notes.

The bricklayers of Scranton, Pa., who had been out on strike since May 1 for an increase of 5 cents per hour, returned to work on June 11 at the old wages, 35 cents.

About 20 members of the Master Builders' Association of Fitchburg, Mass., attended the last regular meeting. Mayor E. S. Moulton, William Edwards, A. P. Williams and Daniel O'Connor, newly elected members, were present with the association for the first time. An excellent banquet was served.

The progress of the Montreal carpenters' strike has been slow. Some 400 men are still out. They have been aided by funds from the United States as well as from the labor unions of Canada. Although 72 of the master carpenters have acceded to the strikers' demands, the larger firms still refuse and will not recognize the union in any way. The men have been trying to arrange a conference with the employers and have asked Mayor Villeneuve and Sir Donald Smith to act as arbitrators. The strikers are remarkably quiet and it is hard to realize that so extensive a strike is going on in the city.

Muncie, Ind., plasterers want 40 cents an hour and eight hours per day. The employers say they can get men to work nine hours for $2.50 per day.

Law in the Building Trades.

Contract Liens on Homestead for Work and Material.

Where the statute exempts a homestead from debts, except for purchase money, taxes and work and material used therein, and provides that the work and material must be contracted for in writing, with the consent of the wife, given in the manner required in a sale of the homestead, and that no lien on a homestead shall be valid, except for the purchase money and improvements, and provides for a lien on buildings for work and material used therein, and that the legislature shall provide for the enforcement thereof, in the absence of the legislation declaring the only mode in which a lien may be had on a homestead for work and material, it may be given in the contract providing for the work and material, properly executed, as in a case of a sale.—Lippencott *vs.* York, Supreme Court of Texas, 24 S. W. Rep., 275.

Materials Furnished Sub-Contractor Not Entitled to Lien.

A person who furnished materials to a sub-contractor for the erection is not entitled to a lien on such building therefor. A provision in a contract between the owner and the contractor that all money for brick work and materials should be paid by individual checks to parties furnishing the same does not entitle a company furnishing brick to a sub-contractor, and used in the building erected under such contract, to a mechanic's lien on such building therefor, since parties cannot enlarge the statute by contract, if such is the intent.—Lowenstein *vs.* Reynolds, Supreme Court of Tenn., 22 S. W. Rep., 210.

Construction of Building Contract.

A contract for the construction of a county court house provided that the county might make any alterations in the specifications, and that such alterations should not make the contract void. The fact that the county, under agreement with the contractor, changed the window lintels from stone to railroad iron did not affect the obligation of the sureties on his bond. A stipulation in a contract for building such court house that the county should pay 85 per cent. "on the amount of material furnished on the grounds and work done on the building on the first day of each month, as the work progressed," does not restrict the payments to be made by the county so that they shall at no time aggregate more than 85 per cent. of the amount bearing the same proportion to the total contract price as the amount of the materials then furnished, and the work then done might bear to the total amount of the work and materials necessary to complete the contract.—Howard County *vs.* Baker, Supreme Court of Missouri, Division No. 2, 24 S. W. Rep., 200.

Certificate of Architect on Building Contract.

A building contract which provides that final payment shall be made within 30 days after completion, "provided that . . . the architect shall certify in writing that all the work . . . has been done to his satisfaction," constitutes the architect the agent of the owner, and his decision as to completion of the work is final. A certificate under such contract sufficiently complies with the terms of the contract where it states that "there is now due to" the contractor "the final payment on his contract," specifying the amount.—Snaith *vs.* Smith, Common Pleas of New York City and County, General Term, 27 N. Y. Supp., 379.

Double Windows

In advocating the use of double windows in town and country houses, an English doctor writes to one of our foreign contemporaries as follows:

The thinness of the walls of our houses, as well as most private and public buildings, being provided only with single windows, are doubtless among the chief reasons conducing to the freezing up of so many water pipes, and their bursting subsequent to the thaw. In my Brighton residence, some 120 feet above the level of the sea, which it faces in a southwesterly direction, I find the foreign plan of having double windows has many advantages.

1. In winter, by keeping in the heat of the room and excluding cold, double windows diminish the quantity of coal necessary for heating one's rooms.

2. During fierce storms double windows completely exclude wet and wind.

3. Double windows greatly deaden the noise attending storms, and frequently prevent one's hearing the cries of intinerant hawkers, as well as the belligerent discord of street music.

4. Double windows seem often to enable one to put up with the discomfort of having no convenient means of heating, by open fire places, hot air or hot water pipes, the staircase of one's house, which, of course, in winter ought to be warmer than the living and sleeping rooms.

5. During cold weather, on both sides of the panes of single windows ice is often deposited. Hence in a room which is well warmed, when striking against this cold surface, the heated air is radiated or reflected back into the room in the shape of a sharp, cold draft, which may be injurious to the health of delicate people, especially if seated near the window. However, in the case of double windows, these drafts by radiation are scarcely perceptible because in a heated room the internal window is warm, particularly if there is a broad space separating the outer from the inner window.

"The back of my house being directly exposed to northerly and northeasterly gales has enabled me often to observe a difference of 15° to 20° F. between the temperature recorded in the inner side of the outer window as compared with the temperature on the room side of the internal window. When I first lived in my present residence, during the winter in passing from the front to the back of the house there was frequently a difference of 15 or more degrees F., so that one felt as if one were almost entering another climate. However, subsequently, being protected by double windows and double skylights throughout the house, as measured from within it, there has been during winter only a very slight difference between its two aspects. Even draining all the cold water pipes at night time in this house, furnished with a constant water supply, which has practically no cold water cisterns (except small ones for the lavatories), nevertheless, during sharp frosts some of the cold water froze up.

"I presume this experience proves that even double windows will not prevent the freezing of one's cold water pipes in houses where the walls are too thin, as unfortunately is too often the case in our modern jerry built British houses, usually architectural and artistic abominations."

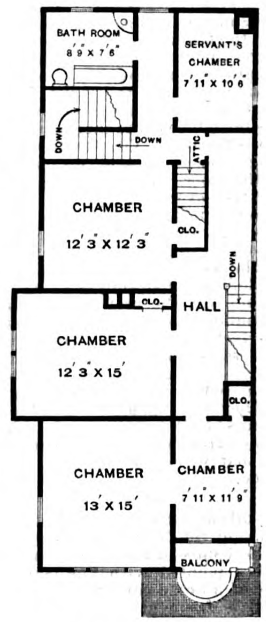
HOUSE AT ONEIDA, N. Y.

THE subject of our supplement plate this month is a two-story moderate cost dwelling in semi-colonial style, adapted for erection upon a 25-foot lot. In the present instance a site having a street frontage of 60 feet has been utilized for the erection of two cottages, with a driveway and walks between them, all as shown in the half-tone engraving. The residence here illustrated was built not long since for R. M. Baker of Oneida, N. Y., from plans prepared by W. Irving Tillotson, architect, of that place. The elevations, floor plans and details which are presented upon this and the pages immediately following will afford the reader a good idea of the arrangement of the rooms and the general appearance of the completed structure.

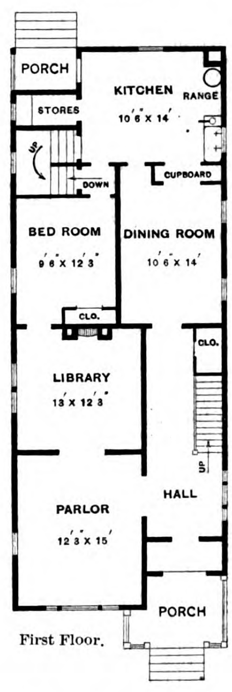
The house has a frontage of 21 feet 2 inches and a depth of 55 feet, exclusive of the porch. The cellar is 6 feet 6 inches in the clear, the first story 9 feet 6 inches, and the second story 8 feet 6 inches, above which is an attic. The cellar walls are of local quarry stone, laid in hydraulic cement with all exposed joints neatly pointed. The frame is of hemlock, semi-balloon style. The studs are 2 x 4 inches; the floor beams 2 x 8 inches, placed 16 inches on centers; the sills 6 x 8 inches and the rafters 2 x 6 inches, the latter being placed 20 inches on centers. The outside of the frame is covered with dressed, matched seasoned hemlock boards, carrying heavy building paper, which in turn is covered with No. 1 white pine beveled clapboards. The roof is sheeted with 1 x 6 inch hemlock strips, laid 1½ inches apart, and covered with white pine shingles laid 5¼ inches to the weather. The porch roof is boarded close and covered with tin. The windows have check sash 1½ inches thick and are glazed with No. 1 double thick sheet glass. The exterior is painted with two coats of best white lead and oil, colonial yellow, trimmed with white. The front gable is shingled and painted dark red.

The floors in the kitchen and vestibule are of narrow matched North Carolina pine, all other floors being of pine 1 inch thick. The library has a wood mantel, grate, tile facings and hearth. The kitchen and bathroom are wainscoted 3 feet high from the floor with narrow matched North Carolina pine neatly capped, the trim being of the same wood. All other trim in the house is of white wood, natural finish. The building is heated by hot air and cost, exclusive of the plumbing, $2300. The house is also piped for gas.

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



Second Floor.



First Floor.

Scale, 1-16 Inch to the Foot.

House at Oneida, N. Y.—W. Irving Tillotson, Architect.

Chinese Shops and Dwellings.

The general design of the native house, however humble, is a modification of the more ornate temple or *yamen* (*i. e.*, official residence and office). There is the same catenary curve in the roof, with more or less ornamentation at the gables. A sober drab will replace the gaudy glazed yellow or green roof tiles, and varnished or plain wood the brilliant paint work of the more public edifice. But the elevation will still suggest the same general design. Stone is almost unknown as a house building material except for foundations. Bricks, sifted earth and matting or thatch for the walls, brick tiles for the roof and wood for interior fittings are the ordinary materials used. Houses are sometimes constructed of wood alone, but are not common. No private house is allowed to equal in hight the temples in its vicinity, nor be ornamented in the same manner; nor may yellow—the imperial color—be used about the building. Cellars and basements are absolutely unknown. Two-storied houses are infrequent. We summarize from Dr. Wells Williams' well-known work the most important details as to Chinese house building.

The *Ni Chuan*, or sifted earth, is a

compound of sifted gravel and lime mixed with water and sometimes a little oil or varnish, of which durable walls are made by pounding it into a solid mass between planks secured at the sides and elevated as the wall rises, or by beating it into large blocks and laying them like bricks in a wall. When stuccoed and protected from the rain, this material gradually hardens. In houses of the better sort the stone work of the foundation rises 3 feet or 4 feet above the ground, and is laid with great regularity and solidity. Between the stone work and the lower brick course an anti-damp layer of fine cut straw is introduced and this appears to be very effective. The fronts of the dwelling houses present no openings except the door, and when the outer walls of the several houses join those of gardens and inclosures the street presents an uninteresting sameness, unrelieved by steps, windows or porticoes. The walls are 25 to 30 feet high, usually hollow, or so thin as to be unable to support the roof unaided, nor are the builders very particular about their perfect uprightness. The bricks are the same size as our own and burned to a grayish slate color, although red bricks are sometimes seen. They are made by hand and cost from $3 to $8 per thousand. Lime is obtained from shells, and it does not appear that it is ever derived from limestone.

WALLS.

The walls are often stuccoed but not painted, and the bricks are occasionally rubbed smooth with stones and the interstices pointed with fine cement. In place of a broad cornice the top of the wall is frequently relieved by a molded ornament in burnt clay representing a battle, landscape, cluster of flowers or some other design, defended from the weather by the greatly projecting eave. A black painted band, relieved by corners and designs of flowers and scrolls, is a common and cheap substitute for the carved figures. Chimneys are almost unknown. The smoke from kitchens is allowed to escape through a latticed roof, while open fires are never burned. The charcoal stove is generally used, but in the north the sleeping rooms are fitted with kangs or brick bed places kept warm by a fire beneath. A hole in the wall acts as a chimney, but numerous deaths from charcoal suffocation take place every year.

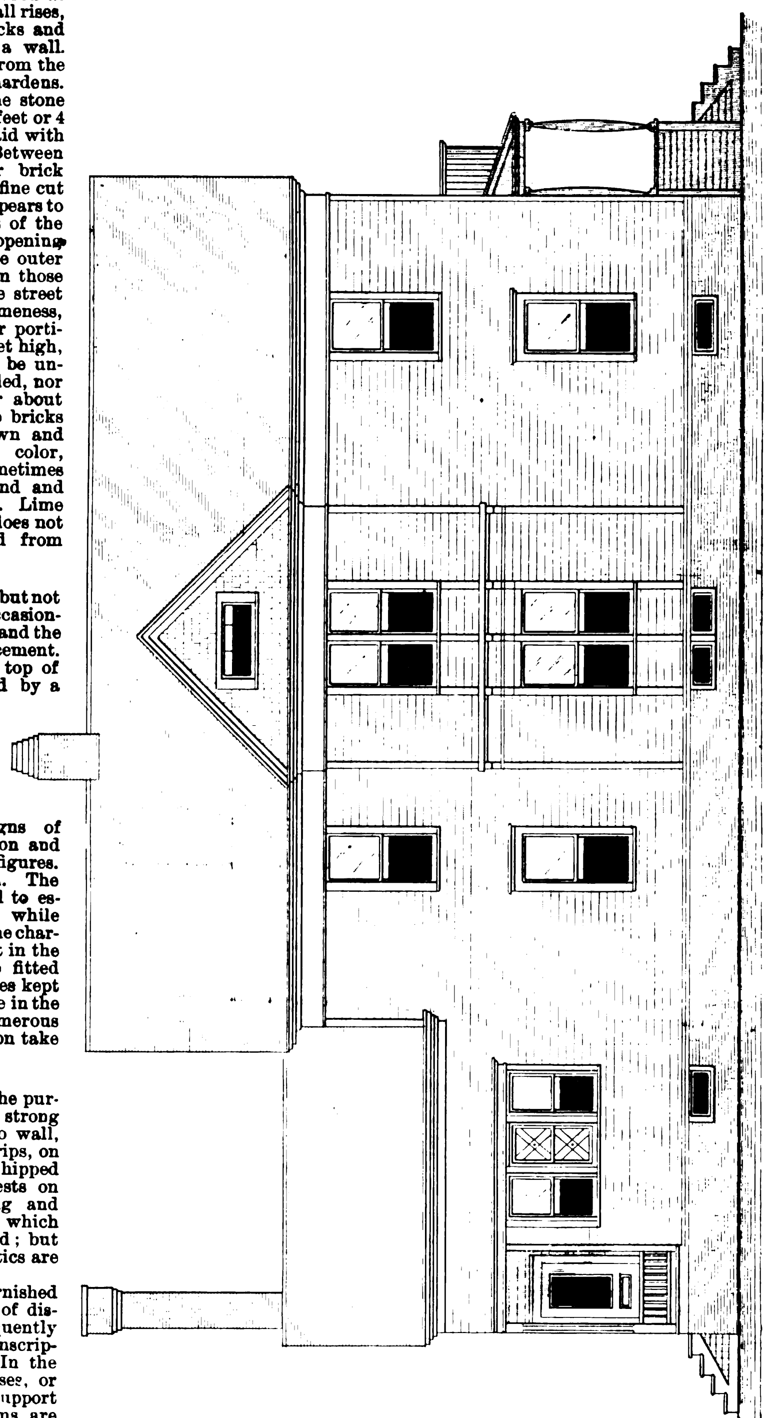
ROOF SUPPORTS.

In order to support the roof the purlins and ridge poles consist of strong timber extending from wall to wall, and the rafters of slender strips, on which the tiles are upheld. In hipped roofs the principal weight rests on pillars, with a series of king and queen posts intervening, by which every part is equably supported; but curb roofs are not made, as attics are as unknown as cellars.

The pillars are of red or varnished wood without base or capital, of disproportionate shape, and frequently ornamented with carvings or inscriptions, or concealed by scrolls. In the rare cases of the two-story houses, or where it is impracticable to support the roof in this way, the rooms are contracted and the cross walls built up to the plate, each room being covered with its own roof. The pillars are occasionally arranged so as to form side passages to the rear rooms, the intercolumniations being screened or built up. A slight ceiling usually conceals the tiling, but the apartments appear lofty, owing to the elevation of the roofs.

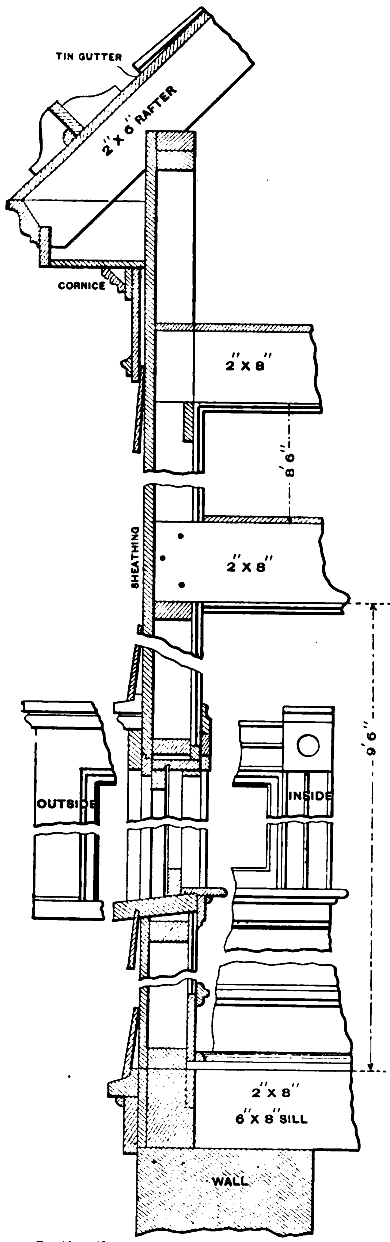
ARRANGEMENT.

The general arrangement of a Chinese dwelling of the better class, standing in its own grounds, is that of a series of rooms of different dimensions, separated and lighted by intervening courts and accessible along a covered corridor communicating with each, or by side passages leading through the courts. In the former case the corridor opens out upon a garden. In towns, where the houses are of one story and the lots irregular in their shape, there is more diversity in the arrangement and size of the rooms. In the country establishments of the wealthy families it is customary to provide for the increase of members by marriage, &c., by adding additional courts and buildings.

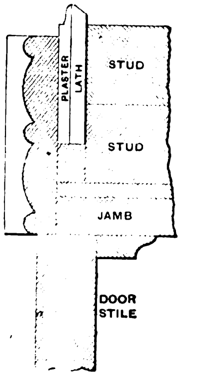


House at Oneida, N. Y.—Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

We have already noted that "private" houses are not allowed to overtop any neighboring temples. An exception to this rule is made in the case of pawnbrokers, who are permitted to build square towers of four or five stories, the goods received being stored on the upper floors as a better protection against thieves. In nearly all disturbances the pawnbrokers' shops are the first to be attacked and, if possible, looted by the mob. The doorways are defended by stout posts, their lower

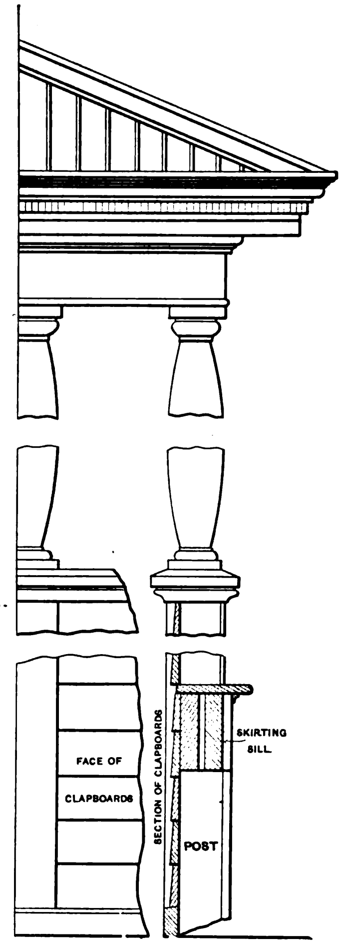


Section through Exterior Wall, and Details of Outside and Inside Window Finish.—Scale, ¾ Inch to the Foot.

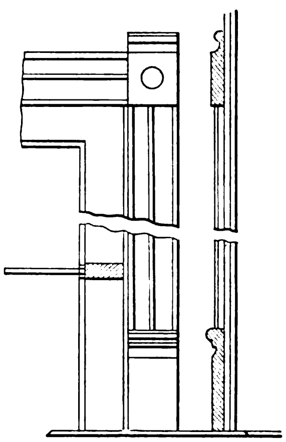


Section through Door Stile and Studding.—Scale, 3 Inches to the Foot.

Miscellaneous Details of House at Oneida, N. Y.



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



Inside Door Trim.—Scale, ¾ Inch to the Foot.

ends dropping into mortise holes cut in the stone threshold and locked by an ingenious arrangement above.

Glass is unknown for windows in the interior, and in place of it oyster shells are employed (*Placuna placenta*), being scarcely inferior to ground glass in transparency.

BUILDING METHODS.

The process of building strikes the European spectator as somewhat curious. The first thing is to raise a complete bamboo scaffolding, which supports a mat roof and thus insures immunity from rain or sun to the workmen. The peculiar value of the bamboo when subjected to a perpendicular strain only is well known. The lengths are tied together with rattan and the scaffolding thus made is as strong and useful as the more elaborate construction of poles and rope used in Western countries. The next proceeding is to put in the uprights, and these once in place and sufficiently braced, the roof is at once proceeded with. The walls are, therefore, built up to the roof. One of the most valuable materials known to the native builder is *chunam*. It consists simply of lime and earth (or fine sand and gravel) thoroughly incorporated with sufficient water and then beaten to a level with a hand maul of special shape. This is the universal substitute for plank flooring and its adoption by our own builders would in many cases be beneficial. It is easy to mix and work, and hardens quickly and satisfactorily.

The tools and other adjuncts used by the Chinese bricklayer or mason resemble our own, differing only in shape and size. The hod is replaced by the basket. The average wages of a workman are 20 cents per day.

It should be noted that underground house drains are unknown in China. All offensive matter is removed every morning by men who are not paid, but pay for the contribution to the manure heap thus obtained, which they dispose of at fair rates to gardeners and cultivators.

The comparative immunity from epidemic disease enjoyed by the Chinese generally is probably due to this system of removing what would otherwise pass into cesspools and drains. One other point is worth passing notice. The architect, like the painter or author, however distinguished in his own line, neither claims nor receives any special recognition in consequence. Scarcely a single name has been handed down to an admiring posterity, while at the present day the most ingenious builder fails to secure even passing honor.

Novel Method of Reducing the Width of a House.

The Elba Apartment House, owned by H. and H. E. Law, is four stories in hight and occupies 30 feet front on Van Ness avenue, says the San Francisco *Examiner*. After standing in its place two years it was discovered a short time ago that it was a fraction of an inch on the land of Thomas B. Evans, adjoining. Mr. Evans had a surveyor go carefully over the ground, and he reported that the front line of the house on Van Ness avenue was ¾ inch on the Evans property, and the encroachment increased to ⅝ inch at the rear line, 90 feet back.

Mr. Evans notified the Messrs. Law and they sent for the man who built the house, and he went all over the ground with another surveyor. The Laws offered to pay $100 for the inch or the fraction of it. But Evans had sent his engineer to the top of the building, and he dropped a plumb line and declared that the fire wall extended 1½ inches at the top over the line at the bottom. Evans added that to the ¾ inch at the ground line and declared that, taken up and down and back, there was an encroachment of over 2¼ inches.

Then the Laws said that they would pay $100 an inch for all encroachment that could be demonstrated. The estimated value of lots thereabouts is said to be $300 a front foot, and $100 an inch the Laws held to be a very good figure.

But Evans said he would take \$350 and nothing less. This the Laws would not give. Through the contractor, who had carried on all the negotiations, they said: "Mr. Evans, if we are on your property we will get off."

And the next day ladders were swung from the roof against the side of the house and men began to chisel from $\frac{3}{4}$ to $1\frac{1}{8}$ inches off the brick wall. Chip by chip as the hammers fall Mr. Evans' land is being slowly cleared, a perpendicular shaving from the brick wall is being scattered over the neighborhood, and the tenants living in the house have a realizing sense of what it might be to live in a boiler yard.

Various Methods of Roof Flashing.

A valued correspondent of *The Metal Worker*, writing from Milwaukee under the *nom de plume* "B. W.," discusses various methods of roof flashing in a way to interest many of our readers. He says:

One of the important parts of a roof is the flashing, or connection between the roof and wall. One of the first methods I used for the purpose is shown in Fig. 1. The tin was laid in the wall by the mason, thus securing a tight joint. After the roof was laid the flashing was bent down and out so it could be nailed to the roof. In this instance tinned nails were used, so they could be easily soldered. In time the nails worked through the solder and caused leaks. When nails are to be used as shown in Fig. 1, it is best to drive them through strips of tin cut about $\frac{1}{2}$ x 1 inch, thus allowing the ends of the strips to be bent over the nail heads and soldered. Another method of securing the flashing to the roof is shown in Fig. 2. After the roof is laid the flashing is bent down and out, then an edge is turned up so the flashing can be nailed, when the edge is turned over and soldered. While this method allows the nail heads to be covered, two edges are to be soldered in the place of one, as in the previous instance. By laying the flashing in the wall, then bending down and out, as shown in Fig. 3, a lock can be turned over and secured to the roof boards by nails or cleats, when the roof tin can be joined in the usual manner. In Fig. 4 the roof tin is shown bent up against the wall. After the roof has been soldered the flashing is bent down and soldered to the roof, and if this joint should break, it is supposed the bent tin behind the flashing would prevent water from entering the building. Some tinners prefer to have a 2 x 4 strip laid in the wall, as shown in Fig. 5. After the brick work is finished, the joint above wood can be cut out by means of a coarse saw, then after sweeping the roof boards the flashing can be placed in position and secured by nailing into the wood. The joint is to be cemented in the usual manner. A strip of tin can be laid in the wall and then bent over the roof tin, as shown in Fig 6, or a lock joint can be made between the two, as shown in Fig. 7. By the methods thus far presented the flashings have been placed against the wall, thus producing a right angle. Some tinners prefer to have the flashing placed at an angle, as shown in Fig. 8. A strip of wood is secured to the roof boards, and against this strip the flashing is laid; thus abrupt bends are avoided.

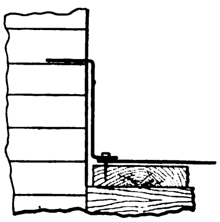


Fig. 1.—Head of Roof Nail Exposed.

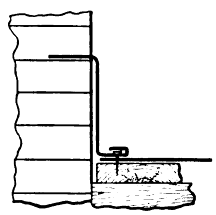


Fig. 2.—Head of Roof Nail Covered.

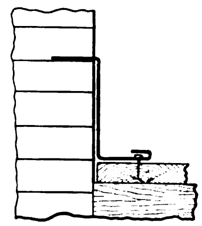


Fig. 3.—Lock Turned on Flashing.

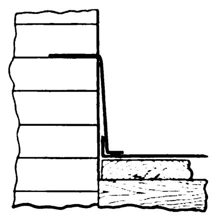


Fig. 4.—Flashing Bent Over Roof Tin.

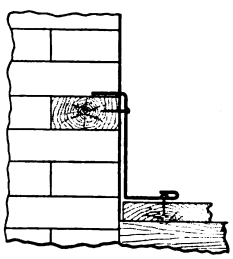


Fig. 5.—Flashing Nailed to Wood in the Wall.

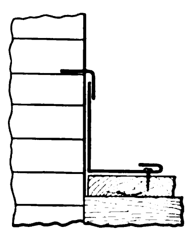


Fig. 6.—Strip of Tin Bent Over Roof Tin.

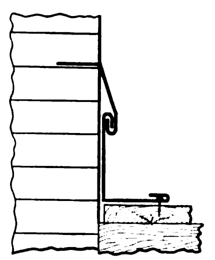


Fig. 7.—Strips Joined by Means of Lock Joint.

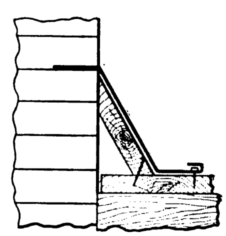


Fig. 8.—Strip of Wood Placed Behind Flashing.

Illustrations Showing Various Methods of Flashing in connection with Roof Work.

Making a Cellar Water Proof.

A cellar can be so constructed as to be water proof, says a writer in one of our exchanges, if the bottom or the floor is first covered with cement, the walls built thereon laid in cement and the exterior of the walls covered with cement. This makes practically a water tight basin. The cement used must be the best Portland cement, one part; clean sharp sand, one part. After a cellar is built it is not so easy to make it water proof. Still it can be done. Cover the exterior of the wall with the above cement, ditto the bottom, and work the cement in under the bottom of the wall. If these directions are followed you will succeed. But if cheap materials are used and the work badly done, you will be sure to fail. A drain put around the outside of the wall, or even inside, below the cellar floor, may be efficient in carrying off the water if you can give it a good delivery.

House of Noah Webster

Residents of West Hartford point with pride to the birthplace of Noah Webster, says a recent issue of the Hartford, Conn., *Times*. The house is still in a good state of preservation and looks quite cool and comfortable on a summer afternoon under the wide spreading trees which surround it. It is situated about a mile south of the center of the town.

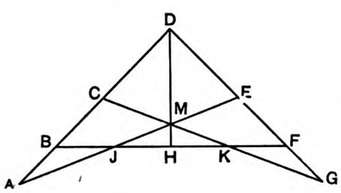
Here the famous lexicographer was born, October 16, 1758—the son of a farmer and the Justice of the Peace. Here young Webster worked and studied, and with the assistance of the Rev. Nathan Perkins, the clergyman of the parish, prepared for college and entered Yale in 1774. Then came the Revolutionary war, which interrupted his college course. During part of his junior year he served in his father's company in the alarm list. During his college course and for several years after this old house was his home. In 1781 he was admitted to the bar. After an interval of school teaching he returned to the old home in 1783, and here probably a large part of his famous spelling book was compiled. Both of Noah Webster's parents are buried in the old cemetery a few rods north of the church.

CORRESPONDENCE.

Calculating Strains in a Roof Truss.

From SUBSCRIBER, *Hickory Corners, Mich.*—Will you kindly give me the analysis and method of computing the strains in a roof truss of the form shown on page 35 of *Carpentry and Building* for February 1893?

Note.—The roof truss in question is used in a small church at Asbury Park, N. J., and is one of many that are insoluble as regards the stresses affecting the various members, owing to the complexity of their arrangement. By referring to the diagram which is presented herewith, representing a skeleton of the truss, it will be noticed that the latter, taken as a whole, consists of two distinct trusses, either one of which, if made sufficiently strong, would probably answer the same purpose as the two combined. If the reader will refer to page 35 of the February issue of *Carpentry and Building* for last year, he will find that the truss in question supports the roof and also a ceiling below. These loads act on opposite sides of the structure, causing a variety of strains which cannot be computed in a truss of this pattern. Referring now to the diagram it is evident that the principal rafter is in compression. At first glance it would appear that the timber B F served as a tie beam, and therefore was subjected to a tensile strain. This, however, is not the case, as those portions from B to J and K to F are in compression owing to the load on the



Calculating Strains in a Roof Truss.—Skeleton of Truss Shown on Page 35 of the Issue for February, 1893.

roof. The timber B F being rigidly connected with the diagonals A E and C G at J and K respectively, is subjected to a tensile stress in the portion J K. Again it will be seen that the diagonal ties are rigidly connected at their intersection M with the rod D H, and in consequence of this rigid connection together with the thrust of the rafters, the ties are subjected to a tensile strain only between A and M and G and M. The remaining portions C M and E M are in compression owing to the load on the roof. It will thus be seen that certain members in tension in one portion are in compression in another portion.

Front for Brick Store Building.

From J. W. R., *Oakesdale, Wash.*—I shall esteem it a favor if some of my brother chips will give me a good plan for a front of a 25-foot brick store building.

Lumber Measurement.

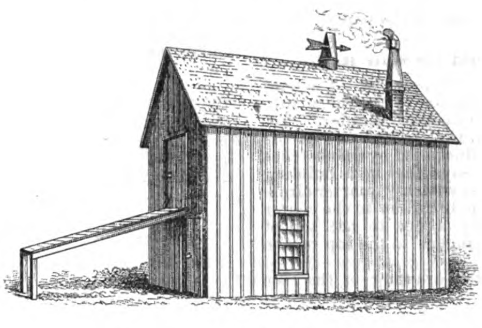
From A. G. Y., *New London, Conn.*—In the June number of the paper "Tramp" of Denver, Col., wants to know a rule for the measurement of logs. Having used several makers' log rules for a number of years I also learned a rule which I have compared many times and found it as nearly correct as can be expected in log measuring. I have retained this rule in mind for more than 25 years. It is to take the diameter of the small end, deduct 4, quarter it, square it, multiply by the length, and the answer is in board measure. I deduct 4 from the diameter in inches for all sizes. Taking his example of a log 12 feet long and 18 inches at the small end we have: $18 - 4 = 14 \div 4 = 3.5^2 = 12.25 \times 12 = 147$ feet board measure. With regard to the shingle part of his problem I know nothing about it.

Church Roof Truss.

From A. T. B., *Lafayette, Ind.*—In reference to the church roof truss mentioned in the December number of the paper, permit me to say that I built a church in White County, State of Indiana several years ago and it stood the test. There were three trusses 16 feet apart, each of the timbers being 6 x 12. Each truss had two collar beams 4 x 12 inches. The frame was halved together and bolted with ¾-inch iron, using large washers on each side. I say it is the strongest and best self supporting roof I have made of timber. All the timber employed was pine, the wall plates being 4 x 12 inches, purlins 6 x 8 inches and rafters 2 x 6 inches. I used tongued and grooved sheeting and pine shingles. Allow me to state that the architect, "C. W. B." of South Denver, Col., must have used in his truss timber that was too light.

Design for a Hop House.

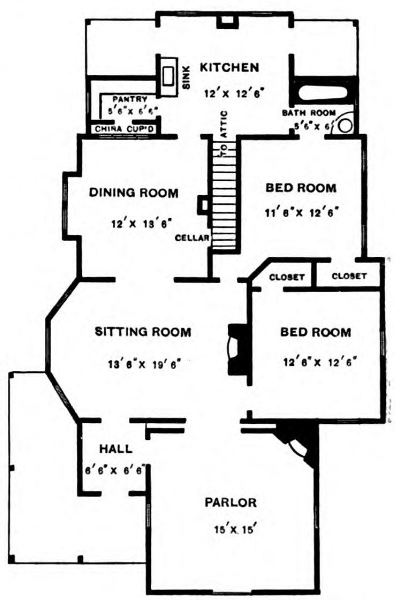
From H. C. R., *Hawk Eye, Iowa.*—Allow me to say to "J. R." of Jervis, Oregon, that a good hop house can be built 14 x 24 feet in size, using the following material: The posts should be 14 feet in hight, to the second story 7 feet, the frame of 4 x 4 placed 4 feet apart and the girts 2 x 4 placed 4½ feet apart. The outside of the building should be boarded up and down and the joints covered with battens. The roof should be covered with shingles laid 4½ inches to the weather. The floors should be of seasoned ship lap with an opening 5 feet square in the second floor for grate. The latter consists of hardwood bars 2 inches wide, ½ inch thick at the middle, beveled to ¼ inch at the edges and placed ¼ inch apart in the frame. The cupola carrying the weather vane may be 12 or 24 inches in diameter with shoulder of narrow boards about 4 feet long fastened to a piece of 2 x 4 the same length as the bottom, for the top. There is an opening the width of the ridge 2 inches at the top and 12 inches at the bottom. There are two cross pieces 2 x 5 inches in the cupola, one being placed middle way and one at the bottom. In the center of each is a 1½-inch hole. In constructing the house place one pair of rafters so that in connection with the center post and two collar beams 16 inches apart a collar 1 inches thick and 6 inches wide will support the cupola. A weather vane passes through an opening with the head at the back so that the opening will always be on the side opposite to the direction of the wind, as shown in the sketch which I send. The construction makes a convenient warehouse as well as a kiln or drier and can be built on a scale to suit requirements.



View of Hop House.—Contributed by "H. C. R"

Plan of Six-Room Cottage.

From J. W. R., *Vandalia, Ill.*—In the December issue I notice the



Plan of a Six-Room Cottage.—Submitted by "J. W. R."

"Hawkeye" of Marshalltown, Iowa, has granted my request previously published for a six-room cottage, and he has my thanks for it. I will, however, send a plan of my own design which is almost the same as his, although I think a little more convenient. Now, I would like to see some of the brother chips send elevations for both of these plans in the Queen Anne and modern styles of architecture. In my judgment the floor plans are well arranged and command something well up in architecture.

Question for "J. L. L." of Waxahachie, Texas.

From E. H., *Huey, Ill.*—I would like to ask "J. L. L.," Waxahachie, Texas, what are the inside dimensions of his tool chest illustrated and described in the March number of the paper.

Face Mold for Stair Rail.

From A. L., *Napa, Cal.*—I would suggest as a solution to the query submitted by "Constant Reader," Toronto, Canada, that he use one of the two methods illustrated by the sketches inclosed. He says that he is building a flight of stairs with a "quarter circle cylinder 9½-inch radius to the center line of rail, 9½ inches to the top of wreath, and 4 inches to the top of the straight rail."

He asks for a drawing of the face mold for this rail. Referring to the sketches, A B of Fig. 1 is the center line of straight rail and the pitch of tangent over A H. The 4 inches are represented by B F, while B D is the tangent over H *d*. Extend A B to E. Square from C over to F. Set one leg of the dividers in the point F and with the other tangent to B E mark the segment to *a*. Connect *a* with D; then with the point tangent to B D mark the segment to *b*. Connect *b* with E. The bevel at *a* is applied at A and the bevel *b* at *d*. To draw the face mold make A B C of Fig. 2 equal to A B C of Fig. 1. Square over to D indefinitely. Connect B D. Set off on each side of A and D the half width of the rail on bevels as indicated by the dotted line C X of Fig. 1. Bend a flexible strip and mark the edges, starting square with the joints at each end. If the parallel and bevel lines are desired for additional joints to assist in drawing the face mold, make A W equal to B D and W D equal to A B. Make A E equal B E of Fig. 1. Connect W E, which is a level line. Make W *y* equal W A of Fig. 1. Set off half the width of the rail on each side of *y*. Leave straight wood as shown at each end of the wreath piece. After the wreath is plumbed, apply the bevel at D, Fig. 1, on the plumbed sides from the end D and make the joint accordingly. Get the wreath piece a little thicker than usual. Leave the extra wood on top for the easing that is to be worked in at the end D, starting square with the joint work to suit the fancy.

My second method is illustrated by Figs. 3 and 4, the former showing an elevation of the steps and risers with straight rail in position and the bottom line of same extending to *y*. Make *y* X 4 inches. Let the lines O O and O O represent the thickness and position of the wreath piece. Draw the center line A B C. Make A B C of Fig. 4 equal to A B C of Fig. 3. Make C D equal H *d* of Fig. 1. Set off the half width of rail each side of A and B and have the width of the rail on the bevel at D. Draw the ellipse through these joints. The bevel at C, Fig. 3, is applied at D. The manner of applying the bevel at the end A and the easing is clearly shown in Fig. 3. The joint A of this figure may be varied to suit the fancy, but should extend below the spring line at B. This explanation is given with the impression that "Constant Reader" has some knowledge of stair building.

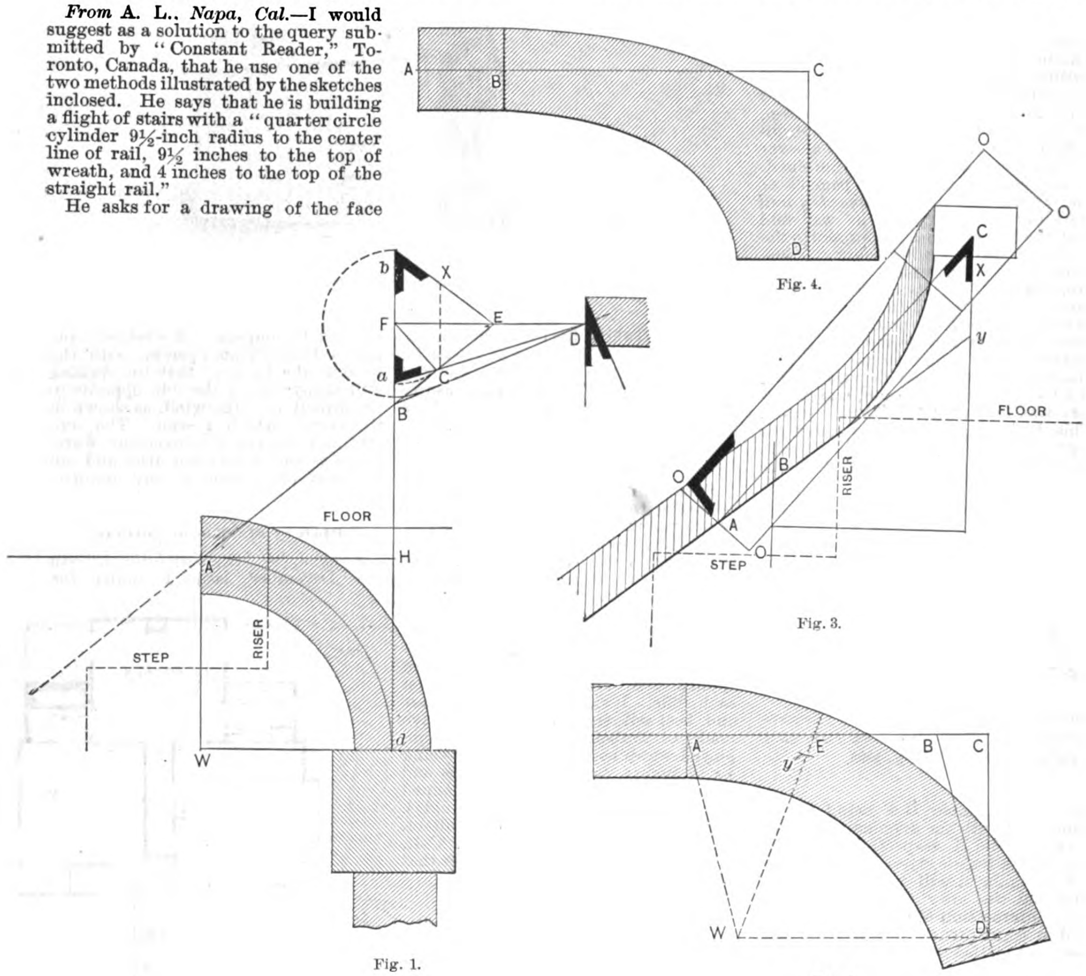


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Face Mold for Stair Rail.—Diagrams Submitted by "A. L."

What is Thought of the Paper.

From M. E. O'C., *Porter's Mills, Wis.*—I am a constant and interested reader of *Carpentry and Building*, being especially pleased with the Correspondence Department. I think it is doing the readers a great deal of good one way or the other. I know I am well paid for the money invested in the paper in the two self sustaining roof plans contained in recent issues. I do not expect to build any such roof myself, but like to know how because knowledge "is a good thing to have in the house."

From F. H. T., *North Topeka, Kan.*—I am an old subscriber of *Carpentry and Building* and have all the volumes from 1879 to 1893, inclusive, bound in uniform style. These I consider the most valuable collection in my library. While I have been a subscriber and close reader of some dozen or more building publications, issued in various parts of the country, I am free to say that I consider *Carpentry and Building* the peer of them all for practical information for the use of progressive and scientific mechanics and builders. It is almost impossible for any one to present unsound or impractical theories in its columns without being detected by the scrutiny of its able and ready correspondents. The publication is one that should be in the hands of every person who has to do with building, especially the young mechanic.

Problem in Roof Areas.

From T. W., *East Nashville, Tenn.*—I send inclosed three diagrams, two of which relate to the problem in roof measurement presented in the July number of the paper. The diagrams indicate so clearly the method followed in dividing the roof in question that very few particulars seem to be necessary. The problem is solved by the use of lines only and the figures are left on the lines, showing that the latter are correct. There are only a few explanations which I desire to make. To find C G the equation is as follows:

$$CG = \frac{AC \times CD}{AB - CD}$$

To find K L and M N of Fig. 2, I consider the radius I M as a diagonal to the triangle having I N as a base. Fig. 2, it will be observed, shows how to divide a trapezoid into any number of parts by means of lines, while Fig. 3 shows how any triangle can be divided into any number of equal parts by lines only. In this figure G H and D E are found in the same way as K L and M N of Fig. 2. In the diagrams the dotted lines show the radii.

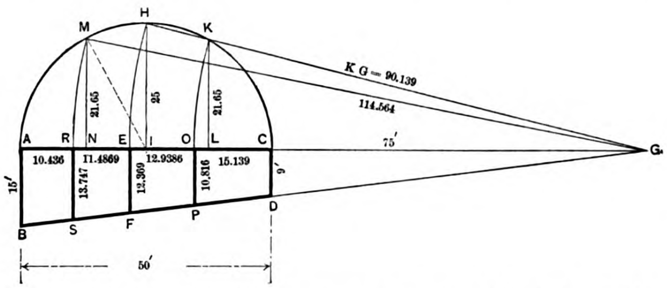


Fig. 2.—Diagram Showing Method of Dividing a Trapezoid into any Number of Parts by the Use of Lines.

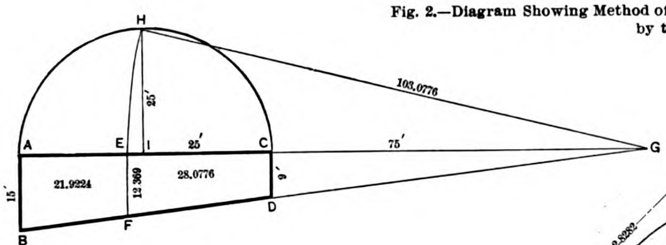


Fig. 1.—Solution of Problem Presented by "C. A. J." in the April Issue.

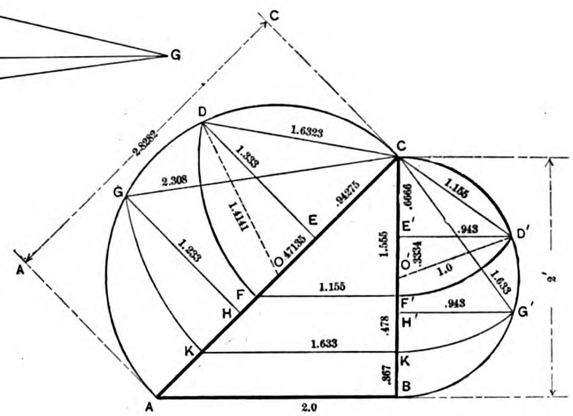
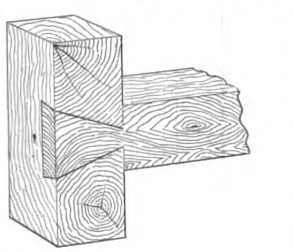


Fig. 3.—Showing How any Triangle can be Divided into any Number of Equal Parts by Lines Only.

Problem in Roof Areas.—Diagrams Submitted by "T. W.," East Nashville, Tenn.

Dovetail Puzzle.

From M. A. W., *Evanston, Ill.*—I send you herewith a sample of dovetailing which may be a puzzle to some of the readers of the paper. Please illustrate it showing the dovetail on the side and edge, and if no one solves it print the views of the separate parts in the following issue. The pieces, made of black walnut and dovetailed together, make an ornament for many a parlor table.



Dovetail Puzzle, Contributed by "M. A. W."

Note.—We have made an engraving from the sample puzzle sent us and present it herewith. In the next issue we will show the parts separated.

Measuring Stone Work.

From C. H. C.—If the correspondent writing in the May issue under the name of "Carpenter" will refer to "Vodge's Architects and Builders' Pocket Companion," he will find the following general rules relative to the measurement of rubble masonry which may prove of interest: "Stone walls are measured by the perch. Thus 16 feet 6 inches long, 12 inches high and 18 inches thick equal 24¾ feet, cubic measure. It is frequently agreed to count the perch at 25 cubic feet for the convenience of measurement. Net measurement is that where all openings through the walls are deducted and 24¾ feet (cubic) allowed to one perch. Gross measurement is that where no openings under one perch are deducted and 25 cubic feet allowed to one perch. When the openings are deducted it is generally agreed to allow a compensation for plumbing and squaring the jambs and for the lintels and sills. It is customary to measure foundation stone and dimension stone by the cubic foot, and all sills, lintels, base courses, water tables and ashlar by the foot superficial and by the foot lineal." I assume the example given by "Carpenter" to be that of a solid wall 27 feet long, 8½ feet high and 1½ feet thick. The number of cubic feet is found by multiplying the several dimensions together thus:

$$27 \times 8\tfrac{1}{2} \times 1\tfrac{1}{2} = 344\tfrac{1}{4} \text{ cubic feet.}$$

Dividing this by 24¾, the number of cubic feet in a perch, we have as a result 13.9 perches, or taking 25, which for convenience is often used as the number of cubic feet in a perch, and dividing 344¼ by it gives 13.77 perches.

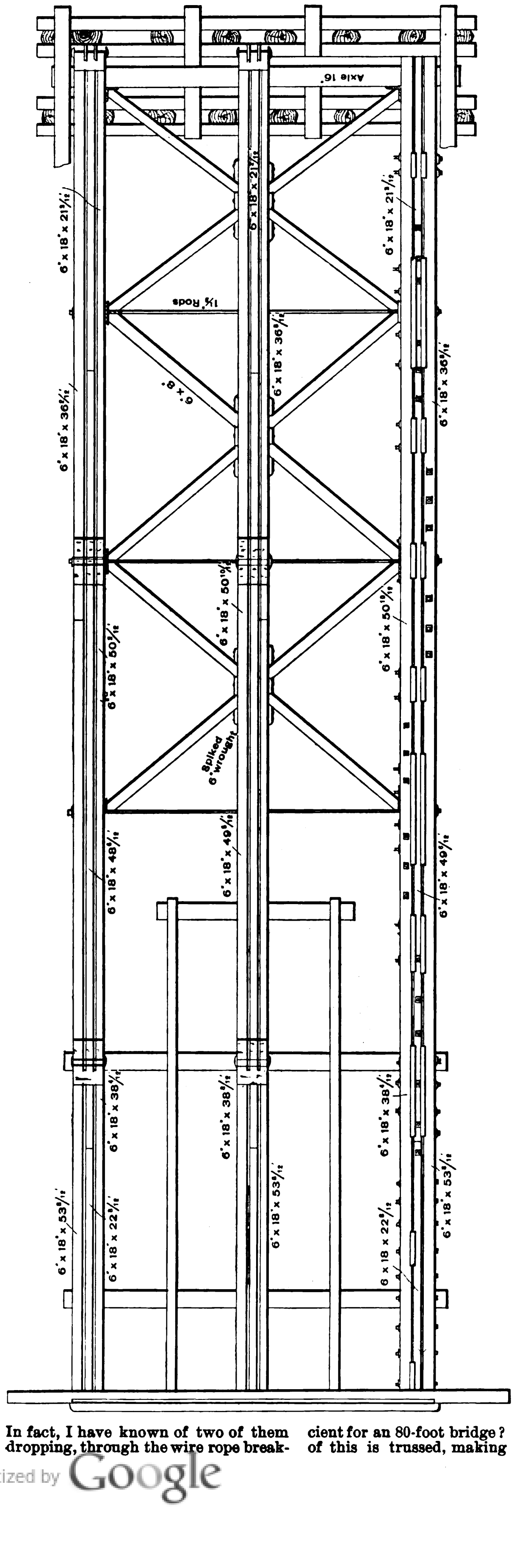
Note.—With regard to the above we would say that a perch of stone is often figured differently in different sections of the country. For instance, in some parts of Eastern Pennsylvania 22 feet are considered a perch, while in some of the New England States 16½ feet are used as a perch.

Wood vs. Iron in Howe Trusses.

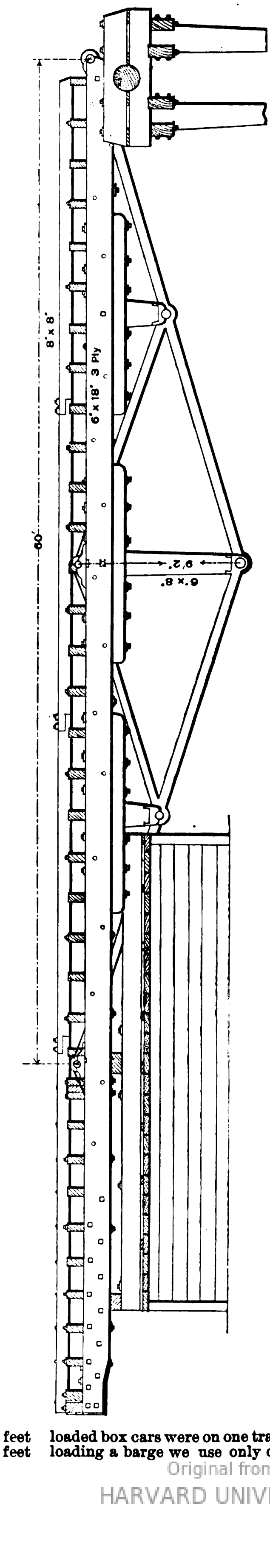
From J. W. O., *Montreal, Canada.*—In a few Howe trusses built here recently, there has been a falling off in the use of iron castings for prisms and more especially lateral blocks, their places having been taken by wooden ones of tamarack or oak. Perhaps some practical reader will give a few hints on the above subject.

Strength of Truss in Transfer Bridge.

From C. B., *Norfolk, Va.*—I am an old subscriber to *Carpentry and Building*, and while I have contributed sketches in the past I have never before asked questions. I present myself this time with both. Inclosed find tracings of a bridge used for transferring cars to barges. I lay no claims, however, to the general design. I have seen such bridges in operation without the pontoon work, counterbalanced with tons of car wheels and a crab to-raise and lower them, but I think this is risky, as something might give way. In fact, I have known of two of them dropping, through the wire rope breaking. Now, the most important thing to me is this: Is the truss shown sufficient for an 80-foot bridge? Sixty feet of this is trussed, making it 15 feet from the center of the pins on the chords. Say, for example, that two loaded box cars were on one track, for in loading a barge we use only one track



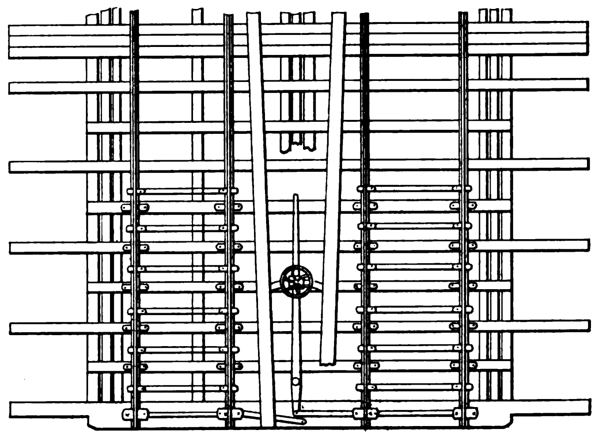
Plan View of Transfer Bridge, Showing Framing.



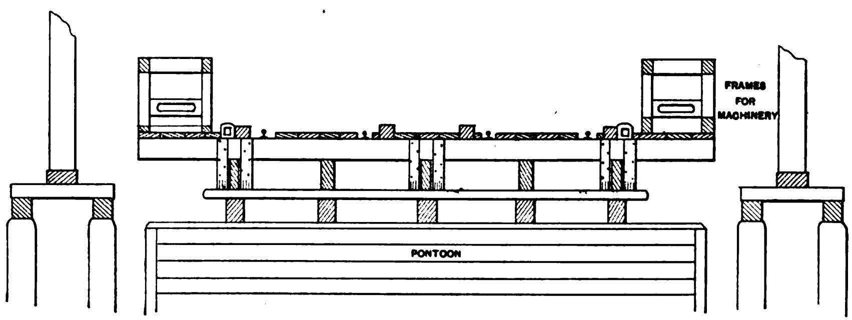
Side Elevation of Transfer Bridge and Pontoon.

Strength of Truss in an 80-Foot Transfer Bridge.—Sketches Submitted by "O. B." of Norfolk, Va.

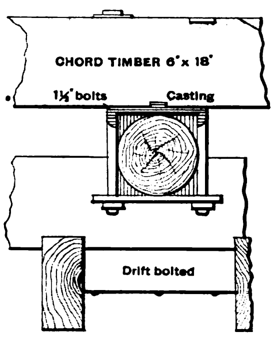
at a time; this weight, on one side of the bridge, or two chords outside and center, supporting it, listed the bridge to such an angle that the cars looked as though they would capsize. What I would like to know from the readers of *Carpentry and Building* is this: Is the truss deep enough? Are the eye bars and pins sufficient and are the castings properly arranged? I desire a close criticism and should be glad to have some of the transportation people reply. How about bolsters and bolts? The pont timber is in two pieces, with a 1-inch iron plate bolted between. This is the weak spot. I have put this timber in three times in the bridge now in use, which is a Howe truss. There is a piece of 1-inch iron between each chord to stiffen against the strains sustained in the rising and falling of the barge in use or in loading, and also to protect the chords from wearing against iron barges. Referring to the illustrations, the castings marked X X on the end of the bridge are designed to hold the rails down in place. A piece of soft steel 1 x 12 inches in size and 22 feet long goes across the end of the bridge between the timbers marked C C shown in the longitudinal section, indicating one of the steel pins which connect with toggle on the barge. There is also a piece of steel 1 x 18 inches in size by 14 feet in length between the three chords at the end of the bridge. The pontoon under this bridge is 30 feet square, 7 feet deep, trussed and well braced. The lever arrangement is such bridge level with the barge. Still another strain is with a light barge floating high, necessitating the bridge being raised. This is done by hoisting gear with chains attached to gallows frame. The ordinary Howe truss, which in ebb and flow waters cannot be built with overhead bracing, is of little service for heavy work; that is, where 20 to 36 cars are handled per



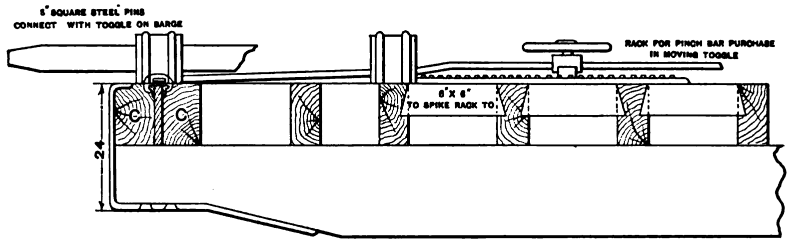
Plan View of Tracks at Barge End of Bridge.



End View of Transfer Bridge and Pontoon, Showing Position of Gallows Frame.



Section Showing Manner of Fastening Chord to Axle of Bridge.



Longitudinal Section at End of Transfer Bridge, Showing one of the Steel Pins which Connects with Toggle on Barge.

Strength of Truss in an 80-Foot Transfer Bridge.—Sketches Submitted by "C. B.," Norfolk, Va.

as to stop the track with the barge tracks. As the toggle casting has more play the tracks cannot be worked with a regular stop throw.

This truss when employed for a car transfer, one track being used at a time, is subjected to all sorts of strains, as, for example, in loading one side of a light barge, listing the bridge to put under the deck of the pontoon, while another strain fulcrums the bridge on the pontoon, as in coupling a barge heavily loaded, and necessitating the weight of the locomotive to sink the load. The best principled transfer in these parts is a solid web girder affair.

A Jug Shaped Cistern.

From A. V. H., *Hillsboro, N. D.*—I should like to see the method of making a jug shaped cistern discussed in the columns of the paper. By jug shaped I mean a cistern that tapers at the bottom and is arched over at the top. I should be glad to learn the best method of construction, best proportions and practical rules for obtaining the quantity of materials required and for computing capacity. I am certain that if some of the practical cistern builders will explain their methods it will afford many of the readers valuable information.

Note.—This is a good subject for discussion, and we trust those of our readers who have had experience in doing work of the kind mentioned will take the time to write us touching the questions raised.

A Smoky Fire Place.

From I. G. L., *New York City.*—In reply to the inquiry of "J. A. S.," in *Carpentry and Building* for June, I would say he can overcome his trouble to a large extent by stopping off the chimney just below where the flue from the grate enters it.

Timber Roof of 62 Feet Span.

The construction of roofs having a clear span of more than 50 feet is a branch of the building trade in which all its members are interested to a greater or less extent, according to the standpoint from which it is viewed. While iron and steel are largely employed for roofs of wide span, especially in the principal cities, there are many localities where timber is used, either through force of necessity or because it is more conveniently secured as well as more economical for the purpose. The illustrations which we present upon this and the following page represent the details of a timber roof having a clear span of 62 feet, the engravings being to a convenient scale for the use of the reader. The details of construction are so clearly indicated that little explanation would seem to be necessary. It may, however, be remarked in passing that the king rod and the diagonal struts marked 1 in Fig. 9, which represents a skeleton of the truss, will be affected by wind pressure only, this having a tendency to distort the truss in a manner similar to that indicated by the dotted lines in the figure named. The struts will be strained alternately according to the direction of the wind, that inclining to the left being strained when the wind blows from the left, and the strut inclining to the right being strained when the wind comes from the right. It is evident that the king rod will be strained in either case.

New York Council of Conciliation.

The New York (City) Council of Mediation and Conciliation, which was mentioned in these columns in the May issue, has perfected its organization by the addition of a representative of the building trades, Mr. Charles A. Cowan.

The recently published explanatory note and constitution of the board briefly set forth the functions of the organization. The purpose of this council and of every such project deserves the highest commendation. Particular praise is due to the council, as it is the first one of its character established in this country.

New Building for Presbyterian Missions.

The new structure in progress of erection on the northwest corner of Fifth avenue and Twentieth street, this city, is being built by the Board of Home Missions and the Board of Foreign Missions of the Presbyterian Church, from plans prepared by Rowe & Bacon, architects. The structure has a frontage of 92 feet on Fifth avenue and 192 feet on Twentieth street. Bed rock was found at a depth of 25 feet, upon which the foundations were placed. The building will tower aloft 12½ stories, and will be constructed of Indiana limestone with a frame of steel. The architecture will be Romanesque, and there will be a double peaked roof of Spanish tiling. The interior and exterior of the building will be severely plain and the decorations of a simple order. There will be two entrance halls, floored with marble and having a wainscoting of the same material. The light shafts will be extra large, so that every room will have windows opening directly on the street or into one of the shafts. The toilet rooms on each floor will also open upon isolated shafts, through which all the plumbing pipes will be carried, the arrangement being such that plumbers can work in the shafts without disturbing the tenants. The wood work throughout the building will be of oak. There will be six passenger elevators, two of which will be express to the seventh floor. There will also be one freight elevator and a safe lifting apparatus for raising heavy weights.

On the first floor of the structure will be two stores, and in the rear of the building, fronting on Twentieth street, will be a chapel extending up through the second story. The remainder of the second and third floors will be left as lofts, or will be divided to suit future

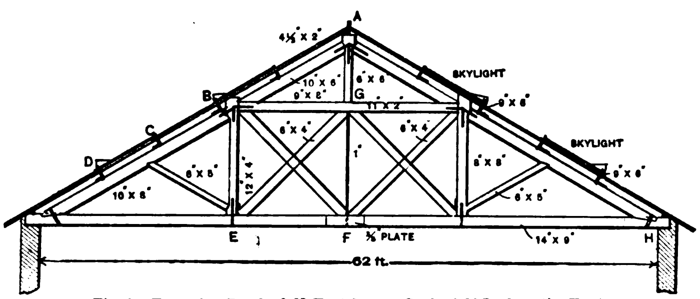


Fig. 1.—Truss for Roof of 62 Feet Span.—Scale, 1-16 Inch to the Foot.

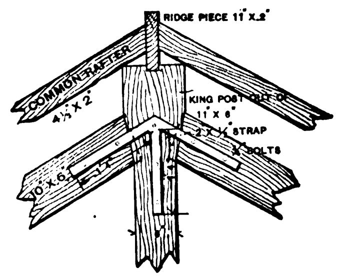


Fig. 2.—Detail of Joint at A of Fig. 1.—Scale, ⅝ Inch to the Foot.

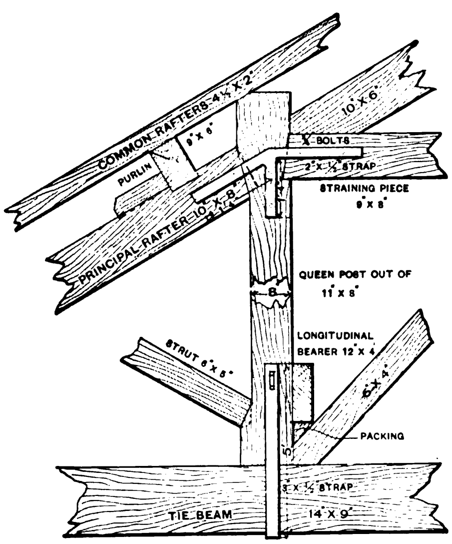


Fig. 3.—Details of Joints at B and E of Fig. 1.—Scale, ⅝ Inch to the Foot.

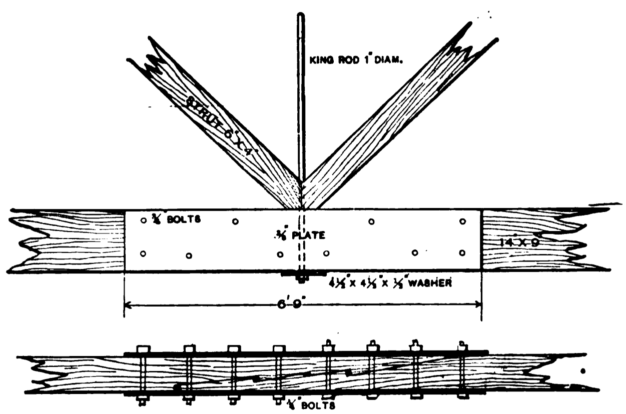


Fig. 4.—Detail at F of Fig. 1, Showing Side and Top Views of Scarf Joint Secured by Iron Fish Plates.—Scale, ⅝ Inch to the Foot.

Miscellaneous Details of Timber Roof of Sixty-two Feet Span.

tenants. The entire seventh and eighth floors will be occupied by the two boards of Presbyterian missions as executive offices, the rest of the floors being rented for business purposes. Altogether there will be about 400 rooms for renting, these having steam heat, running water, electric lights, messenger call and telephone connections.

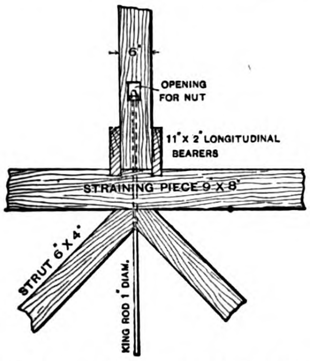


Fig. 5.—Detail at G of Fig. 1.—Scale, ⅜ Inch to the Foot.

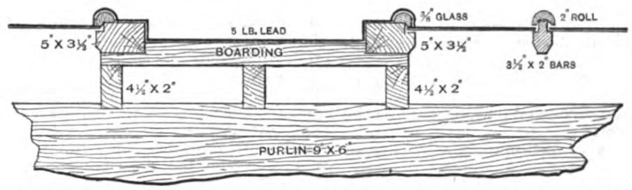


Fig. 6.—Section through Gutter Between the Skylights.—Scale, ¾ Inch to the Foot.

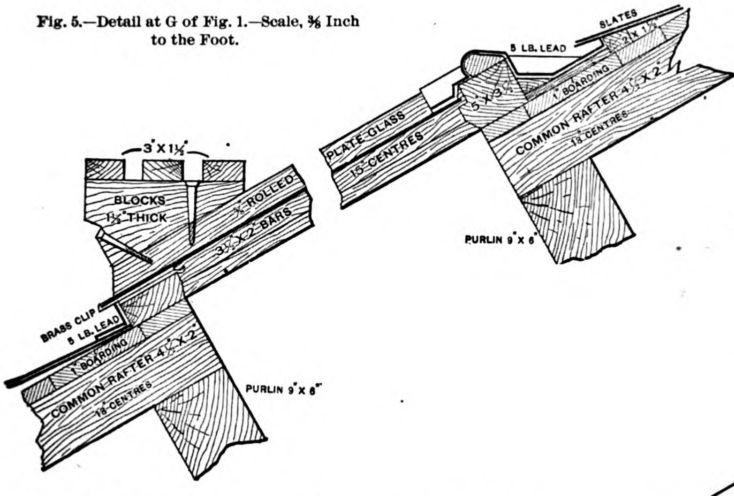


Fig. 7.—Details of Skylight, Showing Section through C D of Fig. 1. —Scale, 1 Inch to the Foot.

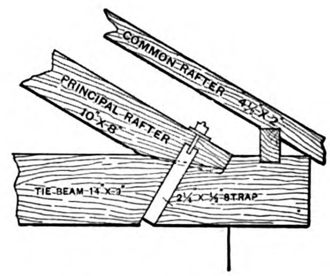


Fig. 8.—Detail at H of Fig. 1.—Scale, ¾ Inch to the Foot.

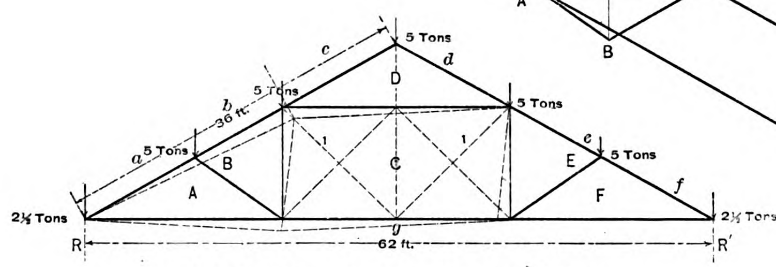


Fig. 9.—Skeleton of Truss.—Scale, 1-16 Inch to the Foot.

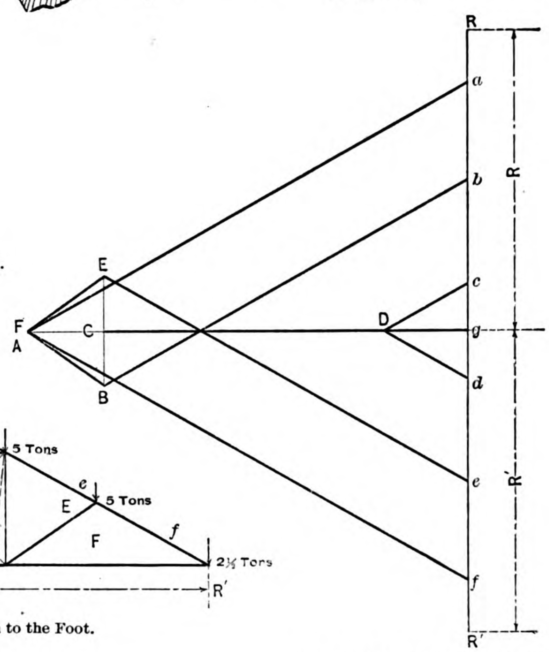


Fig. 10.—Strain Diagram.—Scale, 8 Tons to the Inch.

Miscellaneous Details of Timber Roof of Sixty-two Feet Span.

Determining the Age of a Tree.

"I have frequently been called upon in court to pass upon the age of a tree, in order to decide as to the date of a land survey," said Dr. J. T. Rothrock, the State Forester, the other day. "I cannot say that the rings of a tree are a certain indication of its age, although the common belief is that a tree makes a ring every year. I remember a very important case in New Jersey where a great deal depended on determining the exact year of a survey. Our side based its case upon the fact that a section of a tree that had been chipped at the time of the survey showed it had afterward grown a certain number of rings. To show the fallacy of such an argument I produced a section of another tree chipped during the same survey, which, when cut in half, had more rings upon one side than upon the other. I asked why one-half should be taken any more than the other to determine the age of the tree. It had either only made a half ring or a ring and a half some one year. Trees may make no rings some years, while in others they may make two. I have known of cases in the tropics where they have made three or four rings annually."

ACCORDING to a report on the values of building stone, &c., produced in the United States during 1893, compiled by Dr. W. C. Day of the United States Geological Survey, the slate produced during the year was valued at $2,523,173, of which $1,472,275 is credited to Pennsylvania. The product of Vermont was valued at $653,572, and of New York, $204,982. The valuation of the product of other States is given as follows: Georgia, $11,250; Maine, $139,200; Maryland, $37,884; New Jersey, $3653; Utah, $850, and Virginia, $117,347.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

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General Principles.

Contractors for building work are not on the same plane as the mere buyer and seller of goods. The estimates they submit are a combination of skill in calculation, judgment in methods of application and administration, experience in the conduct of work and knowledge as to possibilities gained in the educational processes incident to their profession. Each piece of work involves new or different combinations, and is not and cannot be of the same character as that applying to the sale of merchantable articles. They therefore must not be put at the same hazard as those who are simply bidding on the delivery of stock articles of merchandise. The contractor's services must be considered, in a degree, of the same character as those of other professional men. No lawyer gives his time, or the knowledge resulting from his experience and education, without pay, but charges a fee therefor, the amount of which depends upon the character and complications of the case submitted.

In the code of the National Association of Builders the idea of compensation is based upon the right of the builder (as distinct from a mere trader in goods) to receive something in the nature of a fee should the work under consideration be abandoned or be diverted in any way from its natural and honest award to the lowest bidder. A distinction is also made from the usual right of professional men to a fee in making the lowest bidder the only one entitled to a fee. If lawyers, doctors or other professional men are called into consultation, the value of their experience is signified in the payment of a fee to each. The distinction in the code gives large allowance for the difference in service, but recognizes the general principles as operative to an extent which must be considered as very conservative. Aside from the abstract justice and propriety of the code in this particular, it is also most essential as a guaranty of good faith in the treatment of bids submitted, which bids represent the education and experience of the estimators just the same as the advice of the other professional men represents their education and experience. In other words, the contractor must base his estimate upon a diagnosis of the peculiar conditions of each job as presented, and bind himself and his property to the fulfillment under it with all the varying and peculiar responsibilities incident thereto. He must not be used as a tool nor be judged upon the same lines as the mere seller of ordinary stock goods in the market. In short, he is in a degree a professional man and must be treated with the consideration due to such.

The McNeil Case.

The absence of ostentation in the working of the National Association of Builders permits numberless cases of specific benefit to occur without the knowledge of builders generally. The following letter shows one case in which the contractor would probably not have known what his rights were if they had not been defined for him by the National Association. The precedent established by the McNeil case and given to the builders of the country by the National Association of Builders has resulted in enabling the contractor to secure his rights where he would have failed to do so without resort to the courts in a large number of instances. The papers relating to this case have traveled all over the country in response to inquiries similar to the following:

DETROIT, MICH., May 11. 1894.

W. H. Sayward, Secretary National Association of Builders, Boston, Mass.

MY DEAR SIR: I have a suit involving the question of acceptance of bids made for the construction of work on public buildings and the rights of builders. My client, a member of the exchange here, tells me that you have printed in pamphlet the report of a case, title of which he could not recall, and which I could obtain by writing to you. Will you kindly send me copy? Whatever cost is I will remit. Yours, &c.,

GEO. GARTNER.

Exchange Administration.

A recent decision by the Board of Directors of the Master Builders' Association of Boston upon the disposition of a sub-contract by a general contractor points out the manner in which sub-bids should be treated, and also indicates the value of using the machinery of an exchange to keep the tone of the fraternity up to "concert pitch."

The case was as follows: The general contractor solicited and received estimates for certain stone work from B and C. The bid submitted by B was expressed as covering the stone work required by the specifications; C's bid made no reference to the specifications, but stated that he would furnish all stone according to the plan. C made a verbal explanation to the general contractor, who may be designated as A, when his bid was submitted, stating that stone for a chimney cap which was not shown on the plan was included in the estimate. The bid submitted by B was the lower, but A used C's figure under the belief that had B included the chimney cap C's bid would have been the lower. After A had been awarded the general contract a conversation occurred between A and B, in which B asked which figure was the lower. A replied that C's bid was $4 higher than B's, but that C had included a chimney cap. A then asked B if he had also included this chimney cap, it being A's intention to then award the contract to B if he had done so. B replied to the effect that he had not included the chimney cap in his estimate, because he had not found one called for in the specifications, but that he would furnish it, in other words, "throw it in," without additional cost beyond the estimate.

A then awarded the contract for stone to C. Then B appealed to the directors of the association for their judgment as to whether A in thus awarding the contract had proceeded in accordance with the practice which should properly prevail between contractors.

The directors were of the opinion that the use of C's figure upon the strength of his verbal statement that he had included work (of an unfixed value) additional to that which was demanded by the plans, and upon the assumption that such inclusion would probably bring his figure below that of B, was questionable practice. The fact that C's estimate simply stated that it was based upon demands of plans and omitted any reference to the specifications, suggests to the directors that it was dangerous for A to use a sub-estimate so carelessly drawn, for upon the basis of such wording a sub-contractor might refuse to do anything except that which was shown on the plans; but A having used C's figure, it was undoubtedly his duty to award the contract to him.

Further than this, and as touching the principles which should underlie the treatment of sub-estimates, the directors were of the opinion that while the inquiry made by A of B to discover whether they had included the said chimney top was in itself harmless, the admission by A in his testimony that he made the inquiry with the intent to give B the job if they had included the chimney cap, regardless of the fact that C's figure was the one used, shows that A fails to recognize the true principle which should govern the use of sub-estimates.

The directors were of the opinion that the sub-contractor whose bid has been used in making up an estimate is entitled to the work, and that it is an exceedingly dangerous practice for any general contractor, after having made such use of a bid, to entertain explanations or propositions of any kind from other sub-contractors. The opportunity for double dealing is too great and offers too large a field for criticism, and therefore should be studiously avoided.

It seemed to the directors that the whole of this difficulty and unpleasantness had arisen from an improper conception as to the propriety of entertaining a proposition from a sub-contractor whose figure had not been used, with the idea that if what he had to propose should make his figure lower than the one used, the job might then be shifted to him.

The directors were of the opinion that the action of B was not entirely beyond criticism, for the willingness to include certain work within the sum of the estimate, which he had not originally so included, in the belief that this concession would throw the work into his hands, is not in the line of the best and squarest practice, although the directors regretfully confess that it is not unusual; it is, in fact, one of the manifestations of laxity in the whole matter of sub-estimating and sub-contracting.

The directors did not believe from the testimony that there was any intent upon the part of A to deal wrongfully. They cannot but feel, however, that his method of procedure was careless and open to criticism on general business principles.

Building a Small Greenhouse

Some of the readers of the paper who have made inquiries with regard to the construction and arrangement

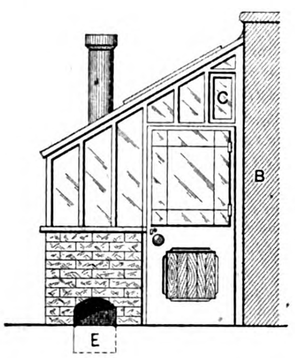


Fig. 1.—Front Elevation.

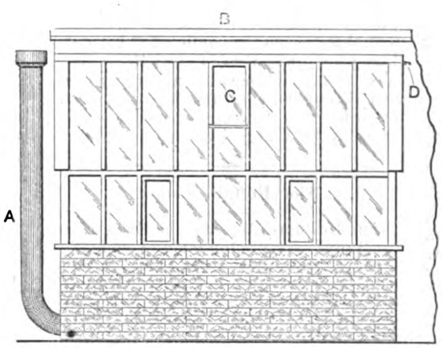


Fig. 2.—Side Elevation.

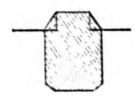


Fig. 5.—Detail of Framing.

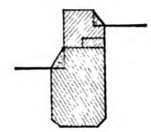


Fig. 7.—Section through Roof Ventilator and Rafter.

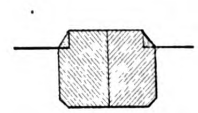


Fig. 6.—Joint of Ventilators.

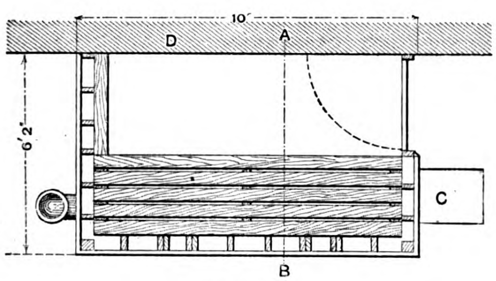


Fig. 3.—Plan View.

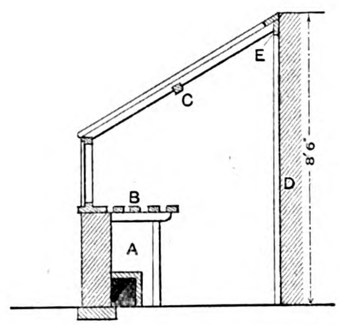


Fig. 4.—Section Taken on Line A B of Previous Figure.

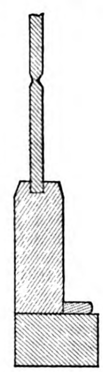


Fig. 8.—Section of Door through Panel.

Building a Small Greenhouse.

of a small greenhouse are likely to be interested in the illustrations which are presented herewith. The drawings represent elevations, plan and sections of a pent roof greenhouse, the lower portion being of 9 inch brick work. Upon the latter rests the frame work, made with mortise and tenon joints and rabbeted for glass. The design here presented is taken from one of our foreign exchanges and represents English practice. The author, H. M. McDonald, states that in constructing the greenhouse the sides and ends are first carefully put together and then the rafters are "fitted at the top to a runner plugged to the wall." At the bottom they are neatly jointed and nailed to the sill. The ventilators marked C C are hung on pivots in such a way as to be readily opened and closed. The ventilator in the roof is hinged at the top and works on a checked combing like an ordinary skylight, a section being presented in Fig. 7 of the cuts. The flower stands are sparred, resting on the walls at both ends and on strong bearers in the center, as shown in Fig. 4, which represents a section of the greenhouse taken on the line A B of Fig. 3. The door is mortised and tenoned with the lower portion paneled and stop chamfered, the upper part being glazed. The timber employed in connection with the design here presentedi s pine, dressed and painted inside and out with two coats of white lead and oil. The corner posts are 3 x 3, the bottom sill 2 x 4, and the frame for the side and roof 2 x 3 inches. The heating is done by an ordinary fire, the flue being composed of cemented tiles, although a 6-inch earthenware pipe will probably answer the purpose in a small building like that shown, while being much cheaper. The author refers to the fact that the principal points of superiority in one greenhouse over another are found not so much in size and construction as in the heating and ventilating arrangements, and if these are good the house is generally satisfactory.

Highest Tower in the World

At Wembley Park, which is about 6 miles from the heart of London, says a writer in *Harper's Young People*, there is in course of erection a tower the total hight of which will be 1150 feet or 175 feet higher than the Eiffel Tower. Unlike the latter tower, which gazes down on the houses and roofs of the crowded city, the Wembley Tower crowns an eminence of the beautiful Wembley Park, affording a lovely view of the surrounding country.

A few years ago the building of such towers as these would have been impossible. It is only with the new methods of handling steel and iron girders that such structures can be successfully put up. Over 150 men have been employed fitting pieces of the tower together, and it is wonderful what rapid progress they make. The foundations which have to support such tremendous weight above them have to be laid in place and kept there for a long time, to allow for the settling in the earth. There are four legs at the base, and each leg is composed of four smaller legs, or, better, feet. These rest on tremendous foundations that were placed in position over two years ago. These foundations are made of stone and concrete, upon which are fastened the iron plates to which the legs are attached.

The material of which the tower proper is composed is called "mild steel." There is not such a network of intricate little girders which we see in the Eiffel Tower; the spaces are more open and the tower appears to be narrower and lighter in the air. The "lifts," as they call them in England, or the elevators, as we call them here, which are to carry the people to the top of the observatory, are four in number. Two of them go up to the first platform only, which is at a hight of 150 feet from the ground, and two will go up to 900 feet, where there is to be an upper landing. Above this there will be several smaller landings to be reached by stairs only.

According to the *Labor Gazette* of London, labor disputes in England last year involved 602,668 persons. Of these strikers 390,844 were successful and 134,864 were partially successful, while 68.934 were unsuccessful, and the results were not known in the cases of 8026. The figures for 1893 are of unusual interest, since they embrace the results of the Lancashire cotton strike early in the year and the great coal strike in the summer and fall. The latter dispute is included among the "successful" ones, which accounts for the large figures under that heading.

New Publications.

BRICK FOR STREET PAVEMENTS. By M. D. Burke, C.E. 108 pages; illustrated with numerous diagrams; bound in colored paper covers. Published by Robert Clarke & Co. Price 50 cents, postpaid.

This volume consists of an account of tests made of bricks and paving blocks, together with a brief discussion of street pavements and the method of constructing them. Samples of 15 varieties of bricks or blocks manufactured for street paving were furnished the author of the pamphlet for testing, and these were chemically analyzed, subjected to tests for determining their respective percentages of absorption, their specific gravity, transverse strength, crushing strength and resistance to abrasion and impact. The samples, methods of preparing them, the work of testing and the results obtained are set forth in detail and condensed in tabular form. This edition of the pamphlet, which is the second, also contains a paper on country roads, prepared by the author named for the Engineers' Club of Cincinnati.

Manual Training at Pratt Institute.

Some highly creditable specimens of the work done by the students of the Trade School and of the Technical High School Department of the Pratt Institute, Brooklyn, N. Y., were shown at the annual exhibition of the institute, held on May 31, June 1 and 2. Manual training is a regular part of the three years' High School course provided for the male scholars of the Pratt Institute, and, while it is not intended to prepare them for any particular mechanical pursuit, as is the case in the regular Trade School of the institute, it serves to give them manual dexterity and a valuable insight into several mechanical pursuits.

The course of manual work, which runs concurrently with the academic curriculum, consists in the first year of instruction in bench work or practice in the use of the principal wood working tools, turning, pattern making, and metal spinning. This is followed in the second year by practice in molding, tinsmithing and forging, the third and last year of the course being devoted to instruction in vise and machine tool work, which includes the more exacting operations of the machinist. The course ends with the construction of some object, such as a small dynamo, motor, or steam engine. In the recent exhibition were shown some very excellent specimens of such construction, which received high commendation from the visiting experts. The pattern making exhibits included some examples of complicated and highly finished objects made by the students, together with the castings made from the same.

The forged iron work exhibited was especially creditable and tasteful, and showed how a remarkable degree of dexterity can be attained by intelligent students within a comparatively short time, provided the quality of instruction is good. This exhibit included some artistic iron work in the shape of grilles, brackets, lamps, door knobs, hinge straps, &c., which would compare favorably with any of the modern art iron work.

Instruction is also given to those who desire it in geometry, physics, chemistry, electrical construction, steam and the steam engine, strength of materials and machine design, as well as in mechanical and architectural drawing. These subjects are taught by means of lectures and by class room and laboratory work.

The regular Trade School of the institute imparts instruction by practical mechanics to those desirous of learning definite trades. Carpentry, machine work, plumbing and house, sign and fresco painting are the branches now taught, and each of these trades made a very excellent showing as the result of their past season's work. Prof. C. R. Richards, director of the Department of Science and Technology of the institute, has brought this branch of educational work up to a high state of efficiency.

The Buffalo Code.

The Builders' Association Exchange of Buffalo have adopted and endeavored for the past three years to enforce a code of practice governing the action of contractors in the submission of bids, and the manner in which bids shall be treated by architects after passing out of the possession of the bidder.

This code was submitted to the local chapter of the American Institute of Architects and finally received its sanction and was acknowledged as being a fair code for the control of relations between the contractor and the architect.

The portion of the code which pertains to the granting of compensation for estimating has always been the source of more or less friction, that section of the code reading as follows:

SECTION 12. Should the owner proceed with the work within 60 days from the date on which the bids are submitted, and refuse to contract with the lowest invited bidder, or refuse to abide by a decision of a majority of the arbitrators, then the said owner shall compensate the lowest invited bidder as follows:

For all cases where the bid does not exceed \$1000, \$10.

For all cases where the bid exceeds \$1000 and does not exceed \$5000, one-half of 1 per cent. upon the excess over \$1000 and \$10 added.

For all cases where the bid exceeds \$5000 and does not exceed \$20,000, three-eighths of 1 per cent. on the excess over \$5000 and \$30 added.

For all cases where the bid exceeds \$20,000 and does not exceed \$40,000, one-fourth of 1 per cent. on the excess over \$20,000, and \$86.25 added.

For all cases where the bid exceeds \$40,000, one-eighth of 1 per cent. on the excess over \$40,000, and \$136.25 added.

SEC. 13. Should the lowest invited bidder, at any time within 60 days from the date on which bids are submitted, refuse to contract at his bid or to abide by the decision of a majority of the arbitrators, the said bidder shall pay the owner liquidated damages (not a penalty) in the same amounts and ratio stated above for "compensation for estimating."

Several attempts have been made by the architects to ignore this provision of the code, but without success. During the past month drawings and specifications for a large job were prepared, in which "the owner reserved the right to reject any and all bids without the payment of fees." Five local contractors were invited to estimate the cost of the work, and upon learning the conditions required by the specifications, all of these five invited bidders refused to submit an estimate so long as the obnoxious clause remained unchanged. The architects then invited ten bidders from outside cities to estimate the work, thus hoping to be able to destroy the code and secure a return to the old condition of affairs typified by the clause mentioned, in which the architect is sole maker of all conditions under which competition shall be conducted.

There were, in addition to the claims already mentioned, other requirements in the specifications which made an exact estimate of cost by the contractor an utter impossibility.

CONTENTS.

HOUSE OF MR. R. M. BAKER, AT ONEIDA, N. Y.

W. IRVING TILLOTSON, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JULY, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

AUGUST, 1894

Present Needs.

It is in such times as these that we need the earnest thought and assistance of every person who has any suggestion for the better understanding and improvement of the relations existing between employer and employed. It is impossible for the present condition of this relationship to exist, except upon the hypothesis that the true relation, and all that belongs to it, is not understood, either by the workmen or by the employers. It is absurd to suppose that either the workmen or the employers, as a class, desire the antagonism of the other; and yet each one is inclined to mark out the ground upon which he thinks he may rightfully stand without the least consultation with the other side. Both are much surprised to find that their grounds overlap at many points, and yet, having taken and announced their ground, neither seems willing to yield that which they have claimed as rights. What is the result? Contest immediately ensues based upon the assumption that one side is trying to acquire by force the rights of the other, no consideration being given to the cause of the contest, whether it be right or wrong. Each side fights to maintain that which it has assumed to be its rights, and because the other side is looked upon as a common enemy, whose every move is a usurpation. It is a fact, whether generally conceded or not, that neither one of two parties to a given condition acting alone can fix all the rights and privileges of both. This being true, anomalous as it may seem, the cure for the present "labor" troubles lies not in remedy, but in prevention. Employers and workmen owe it to themselves to demonstrate to each other their willingness to stand only upon such ground as is rightfully their own and to co-operate for the purpose of finding what that ground may be.

World's Fair Buildings.

The work of demolishing the World's Fair buildings at Chicago was expedited by a destructive fire on the evening of July 5th. It broke out in the Terminal Building and spread to the Administration, Mines and Mining, Electricity, Machinery, Agricultural and Manufactures buildings, inclosing what was known as the Court of Honor. Some of these buildings were not completely destroyed, but not much was left of most of them but shapeless masses of distorted steel frame work and charred timbers. While the buildings burned were seven in number, the salvage company, to whom they belonged, still have left no less than 14 to demolish, among which are the Transportation, Fisheries and Woman's buildings, which were classed among the main buildings, as well as the Forestry, Shoe and Leather, Anthropological and other large structures. The great arches of the Manufactures building were completely leveled, owing to the burning of the heavy timbers forming their foundations. To the same cause can be ascribed the collapse of other structures with steel frame work. Part of the Machinery Hall arches were left standing. A curious feature of the fire was the almost total destruction of the "staff," or outer covering. Nothing was left of it but fine sand. The officers of the company figure that the loss sustained on the lumber burned will probably be more than covered by the labor saved on wrecking the great buildings, as the iron and steel frame work is now in such shape that it can easily be handled, but it will be useless for any other purpose than scrap.

A Good Example.

During the month of June the carpenters of St. Joseph, Mo., are reported as having struck for certain concessions from the employers which would involve an increase in the cost of building. The principal demand of the workmen was for an increase in wages, but an unusual course was taken in the effort to secure the concession. The carpenters refused to work only on such jobs as the contractors had been afforded an opportunity to estimate upon at the increased rate of wages. It is reported that no movement was made against jobs that had been taken by the contractors at the lower rate of wages; the whole action of the carpenters seeming to be a refusal to work upon new jobs at the old wages. The course pursued by the men in this case showed a just appreciation of business principles, and enabled such contractors as were willing to do so to increase the wages without loss to themselves. It is stated that the employers were so favorably impressed with the stand taken by the men and the spirit of fairness in which they acted that all but two conceded the increase at once; and the two who are reported as having held out, finally fell in line. It is rarely the case that a manifest effort to be fair fails to elicit a proper response, and every such effort by either workmen or employers should be met half way by the other.

New University Building.

The new structure which will occupy the site of the old building of the University of the City of New York in University Place will rise ten stories above the sidewalk and extend two below. It will have a frontage of about 180 feet on Washington Square and a depth of nearly 100 feet on Washington and Waverly Places. The two lower stories will consist of limestone, above which white brick and terra cotta will be used, the whole surmounted by a tile roof. The lower seven stories of the building will be occupied by the offices, printing and book binding departments of the American Book Company, while the remaining upper stories will be reserved for the Law School, the Graduate Schools of Language and Philosophy, School of Pedagogy, together with the offices necessary for the administration of the University. There will also be lecture rooms, laboratories, reading rooms, library, &c. The university schools will be reached by express elevators which will ascend to the upper floors without stopping. For the shipping and business purposes of the book concern, there will be at the southeast corner of the building in Washington Place three large electric elevators of high speed and strong capacity. The cost of the building is estimated to be about $1,000,000 and the architect is Alfred Zucker of this city.

Practical Arbitration.

The agreement between the Mason Builders' Association of Boston and the bricklayers, the stone masons and the building laborers' unions has been frequently referred to in these columns as existing under the form of arbitration advocated by the National Association of Builders. The successful operation of the method has been the source of deserved congratulation in the past, and the fact that at this time of industrial disturbance its success has been further signalized is worthy of notice. On another page will be found an account of the only difference which has required the assistance of the umpire, as provided in the "form of arbitration" alluded to since the agreement was made. The questions at issue were first considered by the joint committee from the Mason Builders' Association and the Bricklayers' Union, and when it was found that an agreement could not be reached the services of the previously appointed umpire were called into requisition and his decision accepted with the utmost good faith by both sides. As usual, during the entire course of the consideration of the subjects for adjustment the greatest good feeling prevailed on both sides, the whole proceedings of the joint committee being conducted with courtesy and respect. The value of such permanently existing boards of adjustment cannot be overestimated. They form an amicable court of immediate resort in which each side knows it has equal representation and whence it will receive fair and unbiased conclusions. By such means debatable ground is prevented from becoming battle ground, and in no case does work cease during the adjustment of any point of difference.

Change in New York Trade School.

An alteration which will be made in the arrangements of the New York Trade School for the season 1894–1895 is that the length of the course for the day trade classes will be four instead of three months, as heretofore. The extra month is introduced in order to give the necessary time for instruction in elementary plan drawing in connection with each of the classes taught. This is a new and valuable departure in the work of the school. The ability to make and comprehend a plan of work is an absolute necessity to a first-class workman in these days.

Proportions of Flooring Beams.

Authorities on the strength of timber are by no means agreed as to the proper ratio of breadth to depth of beams for flooring, the ratios differing for bridging joists, for binding joists and for girders. A writer in *Indian Engineering*, in a series of articles, has been discussing the subject mathematically, and gives several equations for the best spacings when the ratio of depth and breadth of beam is fixed. The least practicable amount of material for stiffness is one of the data in regard to problems of this kind, though this element would necessarily vary for the respective purposes mentioned above. It is not necessary to enter into the formulæ given by the author, but the method of his investigation appears to be a just one. In India, he says, naked flooring is used for the support of flat roofs, which are covered with a thick layer of earth to keep out the heat. Here strength is the chief desideratum, and if, as is often the case, timber is scarce, and the roof must be built at the expense of as little felling as possible, the best value for R is $\frac{1}{\sqrt{2}}$, since this is the ratio of breadth to hight which insures the strongest beam from a round log. The author then works out the equations for spacing when the least material is used. The writer gives an example of a common arrangement in the East, the value of R being as shown above. "S_3, the breadth of the flooring, is 20 feet; A is 1 hundredweight per square foot; P, ¾ ton per square inch. Then S_2 equals spacing of binding joists, equals 5.8 feet, and S_1 (spacing of bridging joists) equals 2.6 feet. The main beams should therefore be placed 6 feet apart, and the cross beams 2 feet 6 inches. Strips of wood ⅝ inch thick will serve the purpose of boards to support the deep layer of sand and dry earth. This form of roofing, common throughout India and the East, is a very efficient protection against the heat of the sun, though not durable." The problem of design for naked flooring is more intricate where the proportions of the members are predetermined than where stiffness and strength alone are made absolute. The writer says these latter qualities may be different for the different tiers of beams and joists; the main beams may also be made stiffer than the cross beams. For timber structures in the East, the economical distribution of timbers in floors and roofs is of moment to the architect and engineer, and any rules or formulæ that can be used to effect a saving in timber or in the construction of floors are of value.

Electricity in the Home.

An article in a late issue of the *Engineering Magazine*, contributed by F. A. C. Perrine, deals with the use of electricity in the home and office, and among other things the author describes the many ingenious devices which can be employed in a well appointed dwelling where a current of electricity is readily available. He says:

Let us suppose that we have met on a rainy winter evening and have accepted the invitation of a genial host to dine and spend a night under his roof. He knows that we have never before seen a house appointed as his, and perhaps with a touch of pardonable pride he calls into action all the appliances at his command. As we ascend the steps to his front door he pushes aside the escutcheon about the push button of his door bell and there are revealed two other buttons, one white, the other black. The white one is pushed, and at once the vestibule door flies hospitably open and at the same instant a flood of light is thrown upon us from an electric lamp placed overhead, which enables our host to find his latch key and let us into the hall without any annoyance of waiting outside in the rain. As we are removing our coats the host touches a button in the hall which extinguishes the vestibule light and explains that, had he pressed the button disclosed through the escutcheon as a visitor might, he would not only have thrown open the door and lighted the lamp, but would also have summoned a servant to open the inner door and receive our card, but that the two concealed buttons were for the use of the master of the house, so that he could light his way on entering and extinguish the light on leaving his house.

It is a comfort which those who have never enjoyed it are unable to appreciate, to live in a house which is completely lighted by electricity and in which the switches are conveniently placed. There is no annoyance in searching for matches in the darkness of an unfamiliar room; no constant danger as we light our match to ignite the gas of burning one's fingers or of setting fire to the adjacent draperies. But as we enter each room one or all of the lights may be turned on from the outside. There is no convenience in burning any light longer than it is needed, for with the same ease that a gas jet may be turned up or down an electric lamp may be completely extinguished or brilliantly lighted again. The housewife may delight her friends and family by her dainty conceits of decoration about her lamps and chandeliers with no fear of fires from a breath blowing some light drapery into a neighboring flame. And after spending the evening with his reading lamp in exactly the position to suit his eyesight or whim, the master may retire, and by turning a switch at his bedside cut off all current from entering the building.

But our host, who has just ushered us into his library, where his wife sits with the children before a blazing wood fire, is possessed of many luxuries besides this great one of complete lighting. There is yet time in the afternoon for a cup of tea before dinner is announced, and the maid soon enters with the tray, which she places before her mistress and, after adjusting the plug attached to a flexible cord leading from the water kettle into a socket in the wall near by, departs. Then our hostess, having turned on the current by a switch at her hand, asks each his preference as to cream and sugar, and by the time the cups are arranged ready for the tea making the water is boiling furiously, and soon we sit down for our chat, each holding a steaming cup of tea made from water which has never been approached by fire. As the talk proceeds, touching now upon the rare books, china and silver on the library shelves, the thought occurs to me that extraordinary precautions are needed here to protect against burglars, and, on inquiring concerning this, we find that here also electricity has aided in making comforts for the head which wears the crown of magnificent possession.

Should a door or window or shutter of the house be opened or a leaf or drawer of a cabinet be tampered with in the night, at once the room intruded upon becomes billiantly illuminated by a lamp which is set in the ceiling and out of reach to smash; in the master's room a light springs up at the ringing of the alarm bell, and the news of the intrusion is at once telegraphed to the nearest police station. Should the burglar attempt to escape through the house, he must light room after room as he opens the doors.

Against a fire, too, these elaborate fittings have provided whatever protection man has devised against that all destroying fiend, and it is at least possible to aid the exit of the unfortunate inmates of a burning house. In each room are several of what are called "thermostatic push buttons," little devices which close and keep closed an electric circuit whenever the temperature of the apparatus rises above a certain amount. When this occurs in any room, at once every room in the house is lighted, bells ring loudly in all the bedrooms, and, at the same time, the nearest fire alarm box is automatically pulled and the alarm sent in. Help is brought at once, but, above all, those who are escaping from the building are not still further imperiled by confusion in the darkness.

Stone Working in Athens.

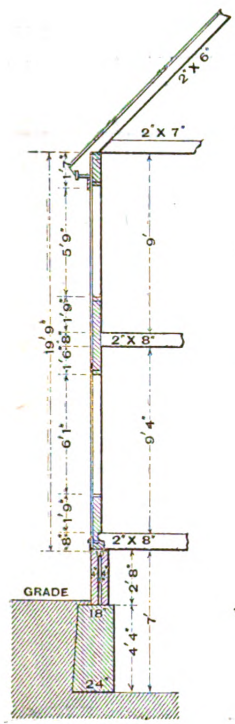
A writer in one of the London architectural papers, in discussing the above subject, says: It appears that the Athenians worked the marble to an even, but not a very smooth, face with a toothed chisel before they placed the blocks in the work, and that they afterward went over the whole exposed surface and finished it to the greatest smoothness and nicety, but without polish, taking off in this operation about ½ inch; and this has been the practice on the horizontal as well as the upright surfaces, for the columns of the Propylæa are sunk in to about that depth below the general level. The place intended for their reception was sunk before the lower cylinders were placed, and lest any inconvenience should arise from the wet remaining there before the building was completed, a small channel has been cut from the recess to carry off the water. In the steps the adjoining faces are carefully finished at the internal angles, but both are left rough at the external angles, by which means the accidents and wear which take place during the execution of the work would rarely be of any consequence.

A FRAME HOUSE IN WORCESTER, MASS.

THE two-story frame dwelling which forms the subject of our supplement plate this month was erected a short time ago for a doctor in Worcester, Mass., from plans drawn by George & J. P. Kingston, architects, of 518 Main street, in the city named. A good idea of the appearance of the completed structure may be gained from the supplement plate, while the elevations, floor plans and details presented upon this and the pages which follow show the arrangement of rooms and some of the more important constructive features. The building is finished throughout in a thorough manner and is of moderate cost. The cellar, which extends under the entire building, is 7 feet in the clear and is low the joist as a preventive against both fire and vermin. The walls, roof and lining floors are covered with ⅞-inch spruce. The outside walls and first floor are covered with sheeting paper, and the outside of the building up to the eaves is covered with 6-inch clapboards. The gables are finished with smooth pine shingles, fancy cut, as may be seen from an inspection of the elevations. The roof is covered with tarred paper, on which is placed dark Brownville slate. The finials, hips and ridges are galvanized iron. All outside finish is in pine. It will be noticed that the rear portion of the second story is cut off for the sake of economy, as there is plenty of room without the extension.

On the second floor of the house are four sleeping rooms, out of each of which opens a closet provided with two rows of wardrobe strips and a shelf. On this floor are also bathroom and linen closet, together with a commodious hall. The attic is unfinished, but has ample room for three chambers if such should become necessary.

The top floors in the dining room, kitchen, pantry, rear hall and the bedroom over the front hall, are laid with ⅞-inch strips of narrow birch flooring, blind nailed and laid crosswise of the lining floors. They are thoroughly smoothed and varnished. The remaining top floors are of square edge pine, all top floors being cut between the base. The finish of the sitting room



Section.

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

A Frame House in Worcester, Mass.—Geo. and J. P. Kingston, Architects.

partitioned off into laundry, store room, furnace room, coal bins, &c., all as shown on the foundation plan. The foundation walls were laid dry and well pointed with cement mortar. The underpinning wall is brick laid with an air space as shown in the section of the water table on page 173. With regard to the size of timber employed, we learn from the architects' specifications that the sills are 4 x 7 inches; first and second floor joist 2 x 8 inches, with the joist under partitions doubled and the attic joist 2 x 7 inches. The girder running through the center of the building, under the main partitions, is 8 x 9 inches, resting on 7 x 7 inch square chestnut posts. The wall and main partition studs are 2 x 4 inches, and the cross partitions 2 x 3 inches, all jointed to a width. The rafters are 2 x 6 inches. Blocks are cut between the wall partition studs above and be-

With regard to the interior it will be seen that there are four apartments and a commodious hall on the first floor, the principal rooms being so placed as to be readily accessible from the main hall. Opening out of the kitchen is a good sized pantry, which communicates with the dining room by means of a slide. Another feature of convenience is a rear entry or hall with a place for a refrigerator. The architects state that possibly some may object to the dining room opening directly into the kitchen, but in this case it was so made at the request of the owner. There is a double action door between the rooms, which, always being closed, tends to keep the odors of the kitchen from the other apartments. The opening between the two rooms can be omitted if desired. There is also a rear stairway which gives ready access to the cellar from the kitchen.

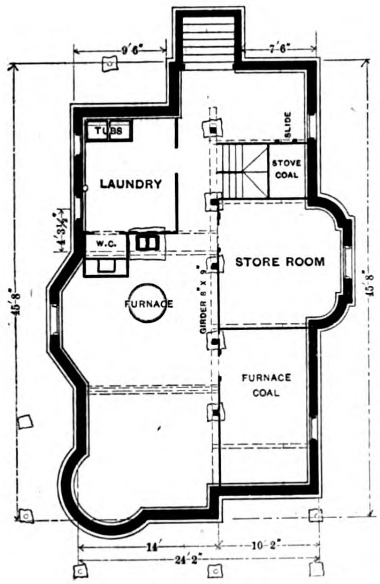
and parlor is in quartered sycamore, that of the front hall, vestibule and dining room in ash, while the remaining portion of the first floor and all of the second floor is in white wood, filled, varnished and rubbed down smooth. The kitchen is wainscoted 3 feet high and the rear hall and bathroom 4 feet high, with narrow beaded sheeting put on vertically with cap molding 3 inches wide. The plastering is carried down to the lining floors on the outside walls and where wainscoted it is back plastered between the studs flush with the inside of the studs. The building is heated by furnace.

A PORTLAND CEMENT concrete arch lately built over the Danube at Munderkingen, Wurtemburg, is said to have a span of 164 feet, which is a very large one for this material.

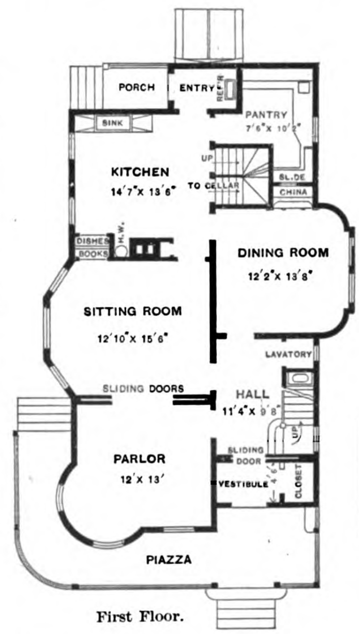
Five-Story House With No Stairs.

A unique house built in Paris for a private gentleman has no staircase in it, and yet it is a building several stories in hight. This sounds like a paradox, says the London *Daily News*, but it is explained in this way: The street in which it is built is the Rue Muller, which has a steep gradient. A large frontage has been secured, extending to the corner of the Rue Lamarck. As the ground rises the floors rise, and there are five gradations, equivalent to five stories. It is in this way that visitors to the house will step directly from the street on to the fifth floor, as all the others.

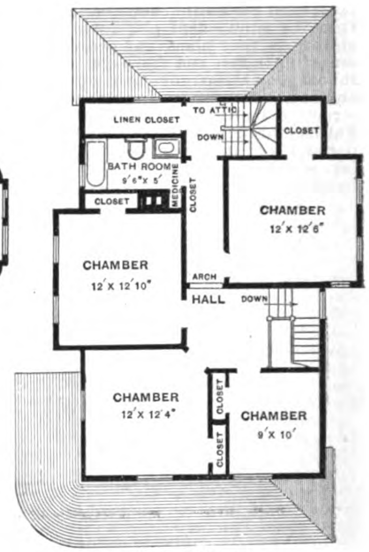
IT IS SAID that King street is richer in old brass knockers than almost any other thoroughfare in New York. There are four still affixed to doors in a single block, and a fifth shines brilliantly on a door in Varick street just off the corner of King. Three of the four have been ruthlessly painted over to save burnishing, but the fourth is always bright. The fifth, in Varick street, is excellent in form, but it has unfortunately been affixed to the door upside down. The fad for the old knocker sometimes brings about ridiculous combinations. A flimsy suburban Queen Anne cottage, with an unlovely door supplied with an unmistakable electric button, bears a fine old knocker, which is so large that no single panel was found big enough to hold it.



Foundation.



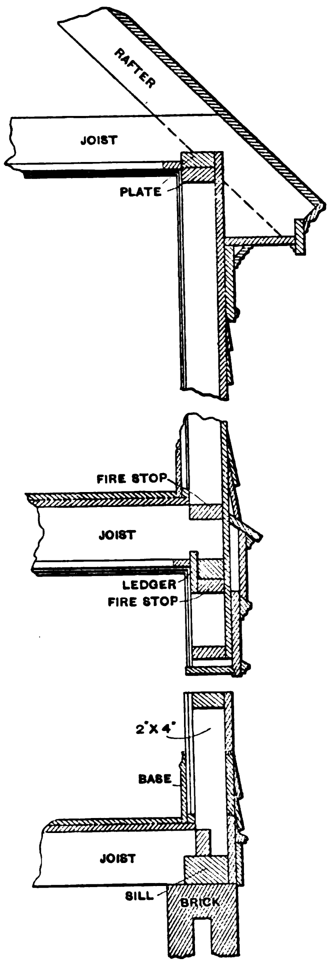
First Floor.



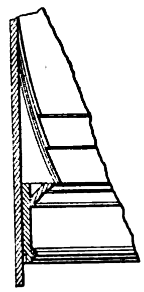
Second Floor.

Side (Left) Elevation.

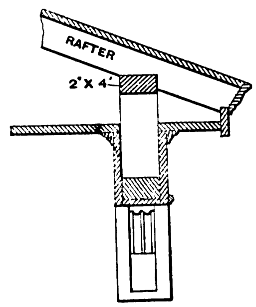
A Frame House in Worcester, Mass.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Elevation.—Scale, ⅛ Inch to the Foot.



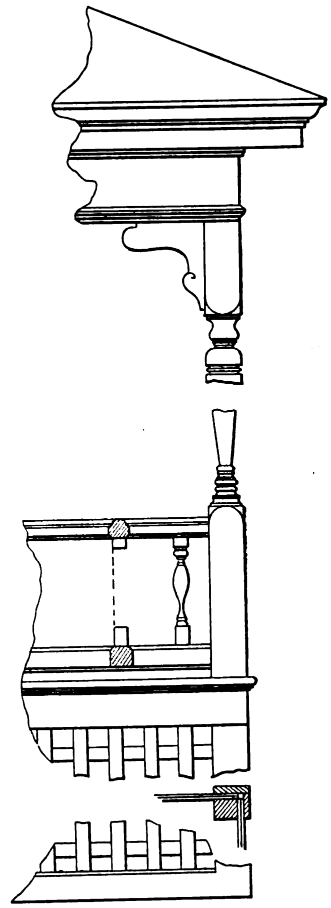
Section Showing Details of Main Cornice, Belt Course and Water Table.—Scale, ½ Inch to the Foot.



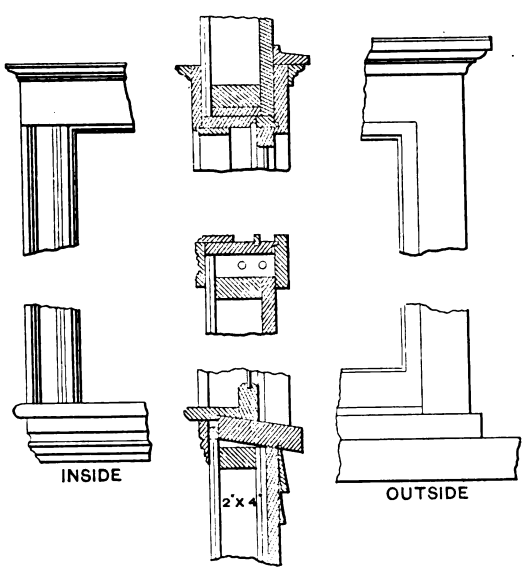
Detail of Belt Course in Gable.—Scale, ½ Inch to the Foot.



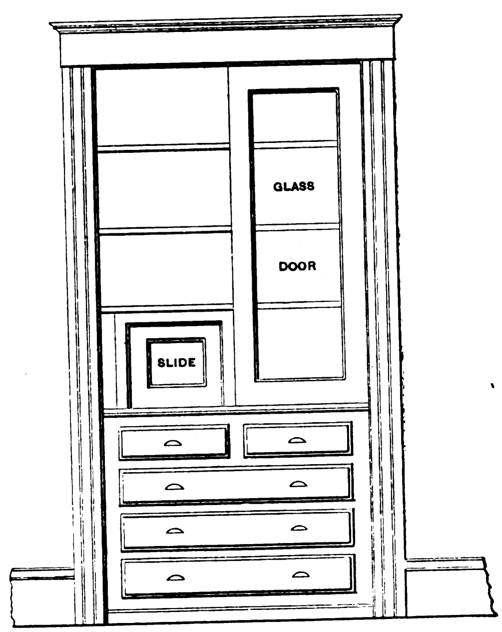
Detail of Piazza Cornice.—Scale, ½ Inch to the Foot.



Detail of Piazza.—Scale, ½ Inch to the Foot.



Details of Window Frame, Showing Inside and Outside Trim.—Scale, ¾ Inch to the Foot.



Elevation of China Closet.—Scale, ½ Inch to the Foot.

Miscellaneous Details of a Frame House in Worcester, Mass.

Hardwood Joinery.

At a recent meeting of the London Architectural Association a paper on the above subject was read by H. W. Barnes, and as it contains much that is of interest to American readers we present the following extracts :

Hardwood joinery may be considered from various points of view, from the elaborate vaulted canopies of a cathedral worked almost entirely by hand, to the simplest domestic fitting, now produced to a very great extent by machinery, but each giving scope, in a greater or lesser degree, for the skill of the workman. For its production, if the work is to be really good, two things are absolutely essential—good workmen and good, well seasoned wood, for it is as impossible for a good workman to produce satisfactory work with bad material as it is for an inferior workman to turn out creditable work, however good the material may be.

WOODS GENERALLY USED.

A short review of some of the hardwoods more generally used may therefore be of interest at the outset. Oak seems naturally to take precedence, and of this there are several varieties—English, Russian, Hungarian and American being the principal; of these English still stands unrivaled for strength and durability under exposure, but it has been superseded to a very great extent for internal fittings by the others, which are easier to work and from their milder nature less liable to twist or crack; English oak trees are usually felled early in the year, when the sap has risen, on account of the value of the bark, which is then easily stripped off and used for tanning leather; but oak so felled takes about two years longer to season than that felled in the winter. In the latter case, however, the bark cannot be stripped off, and is therefore wasted. English oak trees at times produce planks of great width, one cut down some years ago at the scene of your last summer excursion (Diss) yielding perfect ones 5 feet wide. Undoubtedly the finest oak available of late years for interior work has been the variety of Russian known as Riga wainscot, the grain being very fine, close and regular, the wood a good color, and easy to work; but the logs, never very large, are now smaller than ever—in fact, it is very difficult to get them at all, the supply being nearly exhausted. Several other kinds are also shipped from Russian ports; these are principally cut from small trees, the grain is coarse, and, as a rule, they are unsuitable for good work. Hungary produces a very fine variety of oak. The logs are much larger than any formerly shipped from Riga, and at the present time this is certainly the best oak available in any quantity, its great width making it specially valuable for panels. This is shipped at Fiume, in the Adriatic. Hungary, as well as Russia, produces, however, some very inferior sorts. America sends large quantities of oak to this country; but it is not equal to Riga or the best Hungarian. The grain is very open, the color poor, usually with a pink tint, and, generally speaking, is unsatisfactory for high-class work. The silver grain is a distinguishing feature of oak and produces the figure. These lines are absent in chestnut and in many cases form, probably, the only way of distinguishing the two woods. One other point respecting oak is worth referring to—the term "wainscot." This does not distinguish any particular variety or locality, but is applied indiscriminately to all logs cut on the quarter.

MAHOGANY.

Mahogany next claims attention, the different kinds varying considerably, that known as Spanish, coming from San Domingo, being the most valued. In the past this has been extensively used, but is now very scarce, its place being taken by another Spanish variety, found at Cuba, which is very close grained, hard and of good color; but the kinds more generally used at the present time are obtained from Tobasco and British Honduras; Panama and Africa also send mahogany to this country, but the quality of both is very poor. Of walnut, five descriptions deserve notice, Italian coming first, both for closeness of grain and beauty of markings. This is difficult to obtain at the present time, but a variety much resembling it is now imported from Circassia. English is lighter in color and not so richly marked. A totally different kind, known as black walnut, is shipped at Quebec; it is much softer than the others and almost devoid of markings, but can be obtained in large sizes and is not likely to crack. A lighter shade of the same wood is shipped at New York and other United States ports. Teak is imported from Burmah, and is especially valuable for work exposed to sea air and salt water; it is also coming into very general use for hospital floors; a variety is found at Bangkok, but the color is not so good. Many devices have been tried for artificially drying hardwoods in a short time; but all seem open to objection of some kind or other, and allowing the wood to season by the natural action of the air on the boards and planks is, after all, the most satisfactory, although it is a long process.

METHODS OF WORKING.

But it is time to pass from the material to the various methods of working it. Starting at the beginning, the selection of the wood before it is cut to size is more important than appears at first sight, for on this much of the final appearance will depend, and too much care cannot be exercised at this stage, for carelessness in matching will prevent the work ever looking really well, and most likely result in considerable waste. Cutting to length and width is now done entirely by steam saws; afterward the wood is passed through a trying up machine, which planes it to thickness and width, leaving it quite true and ready for molding; mortising and tenoning are also done by machinery, and absolute truth secured. So far machinery is of advantage in every way, and it also relieves the joiner of the very hard labor necessary before its introduction, leaving him free to devote all his energies to the remaining parts of the work, in which a good workman will find plenty of opportunity to display his skill. Up to this point the preparation of all hardwood joinery is practically the same (nor does it differ materially from soft wood work); but as in its further stages the methods diverge considerably, it will be well to consider these under two broad heads. First the simpler forms, in which machinery continues to play an important part, and afterward the more elaborate work, which has frequently to be done almost entirely by hand. Formerly molding were worked either by planes of various shapes or by routers. The latter were of steel, much the same as modern machine irons, but let into a piece of wood and worked backward and forward by hand—a long and tedious process.

(To be continued.)

THE TECHNICAL EDUCATION BOARD of the London County Council, England have arranged for a series of conferences between representatives of the various London industries. The object the board have in view is to elicit from practical artisans useful information as to what kind of trade education is required in each case, in what respects the existing provision is faulty, how it can be improved, and the best steps that can be taken to bring it to the notice of the younger workmen and apprentices.

Law in the Building Trades.

Action to Enforce Mechanic's Lien.

In an action to enforce a mechanic's lien, a finding that the value of the labor and material was, as agreed, a named amount; that a named amount had been paid, leaving a stated balance due unpaid, and that such balance was for work done and materials furnished for the owner's house, sufficiently shows that the materials and work were of the value agreed. Such finding is not open to the objection that the amount found to be due is for a general balance due for work done and materials furnished in the erection of several houses for different persons. —Brigham *vs.* DeWald, Appellate Court of Indiana, 34 N. E. Rep., 498.

Construction of Contract for Joint Building Operations.

Where two parties agree to build houses for sale, one to advance the money and the other to contribute his time and skill as superintendent, each to have half the profits after sale, independently of the question whether a partnership existed between the parties, the superintendent was entitled to maintain an action for an accounting. The party furnishing the money had no right to charge for the land used for building purposes a greater price than its original cost, though it was bought with money furnished by him and the title was in his name. The superintendent was not entitled to have the value of land bought for building purposes but not used brought into the account, since he had no interest in the land, but only in the profits arising from buildings erected thereon. It appearing without contradiction that one was to furnish all the capital, but was not to be allowed interest till the completion of each particular building operation, he was not entitled to a credit for interest on a purchase money mortgage, given by him for land, till the building thereon was completed.—Budd *vs.* Scudder, Court of Chancery of New Jersey, 26 At. Rep., 904.

Rights of Material Men in Building Contract.

Where, under a building contract, a certain amount is to be paid at the completion of the building, and the contractor neglects or refuses to complete the building at the time agreed upon, or within a reasonable time thereafter, and the owner also neglects and refuses to complete it, as by the terms of the contract he has a right to, the holder of such order may file his bill requiring such owner to complete the buildings and compel administration of the funds in his hands among himself and all others interested therein, without the production of the releases and affidavit spoken of in the said supplement, and to that end it is necessary that all persons who have an interest in the fund still remaining in the hands of the owner should be made parties, so that their respective rights may be decreed, and the owner thereby protected from all further litigation.—Bradley & Currier Company *vs.* Bernz, Court of Chancery of New Jersey, 26 At. Rep., 908.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

THE subject of architectural drawing is one of no small interest to the practical mechanic in whatever branch of the building trade he may be engaged. Carpenters, contractors and builders are often called upon to furnish plans, especially of medium and low cost buildings which are not considered of sufficient importance to warrant employing the services of a professional architect. It is in connection with this class of work that a practical knowledge of drawing is particularly valuable to the building mechanic, for he who understands drawing sufficiently to take a rough sketch of a floor plan and draw it up in practical shape, presenting the corresponding elevation with the details necessary to carry out the design in a comprehensive manner, is the man who, as a rule, readily secures and retains the public confidence. The one who understands and can make the working drawings for buildings has a decided advantage over a competitor possessing little or no skill as a draftsman. The ability to draw up a plan after the manner of an architect has the effect to gain for the draftsman the favor and confidence of his patrons in a way that seems to assure them he understands his business, and therefore is the more competent to do the work. Thus in cases where competency is required the lowest bidder does not always stand the best chance in the race to pursue, and, therefore, I say to those who are seeking instructions in drawing, take up the rule, pen and pencil and begin practice at once by making the drawings given in connection herewith as lessons in drawing.

It is not necessary to illustrate and describe all the tools and appliances used in drafting, as this has been done time and again, until every carpenter and contractor is familiar with them; therefore, I will only describe a few of the most essential tools and appliances used in practice. A drawing board, 16 x 24 inches, will be large enough for convenience in making the drawings given as lessons, and also large enough for many other purposes. For be it known that a large drawing board for small work is more or less inconvenient and undesirable. In my opinion it is better to have two or three sizes to meet the varying requirements of large and small work.

Drawing boards should be made of soft wood, with all angles right angles, so that the T square will work properly from any one of its four sides. The T

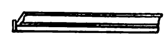


Fig. 3.—Crown Molding and Fascia Drawn to a Scale of ¼ Inch to the Foot.

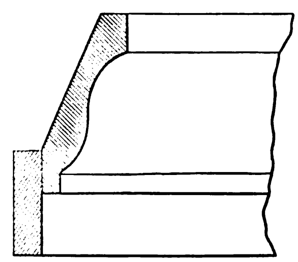


Fig. 2.—Crown Molding and Fascia Drawn to a Scale of 3 Inches to the Foot.

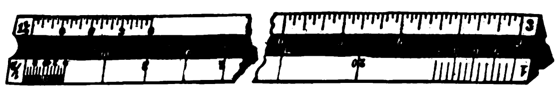


Fig. 1.—Broken View of a Triangular Scale.

Architectural Drawing for Mechanics.—Illustrations Accompanying Mr. Hicks' Article.

square is an indispensable tool in the draftsman's outfit, and it is very desirable to have several sizes. A 20-inch blade will meet the requirements of these lessons, but in practice much longer blades will often be required. The cost of a good T square, 20-inch blade, is not great—say about $1—and in selecting one I would suggest Deane's patent adjustable head. Triangles are very handy and convenient to use in connection with the T square and can be employed to advantage in many ways. Triangles may be had for 25 to 75 cents each, according to size.

In the way of other tools I would recommend a small case of German silver instruments of a good quality, containing 4½-inch dividers, with pen and pencil points and lengthening bar, drawing pen and protractor, the cost of which does not need to exceed $4, although the draftsman can, if he desires, procure a $15 set of instruments.

Drawing rules are among the necessities that go to make up the draftsman's outfit, and of these he should have several at his disposal. The architect's triangular scale is the king of all rules for setting off the scale measurements of drawings, after which they may be finished by drawing the lines with the aid of the T square, triangles, common rules, or straight edges. I do not advocate a general use of the triangular scale with which to draw lines, for the reason that it is a costly rule, very finely and accurately marked, and to make a general use of it in drawing lines would have a tendency to obscure the fine divisions of the rule and thus impair its usefulness in setting off accurate measurements. The rule should never be used in drawing ink lines, but can be used for drawing the pencil lines necessarily required in outlining a plan, if it is desirable to do so. These remarks are more especially to warn the draftsman against the indiscreet use of a costly rule, which might soon impair its usefulness or spoil it entirely. The cost of triangular scales is from $1.50 to $5. They are made in 12 inch and 24-inch lengths, the 12-inch length being the one in general use. Thus, it will be seen that the draftsman's outfit for drawing need not cost more than $7 to $10. The drawing boards, T squares, triangles and straight edges he can make for himself, thus confining the expense to the case of instruments, the triangular scale and common rules. The author began practicing with a 15 cent outfit, consisting of a common rule and lead pencil. By the aid of triangles which I made myself, I was enabled to square drawings from the rule, draw the horizontal and plumb lines and finish up the drawing comparatively easy. I merely mention this so beginners will not get the idea that a costly outfit of tools is required; but to all who can afford it I would say do not retard your progress in drawing by trying to get along without the necessary tools, as it is a waste of time and poor economy.

In reference to the triangular scale, it is necessary that the draftsman should become familiar with the different scales represented. This necessity will not be felt so much in copying the drawings here given as lessons as in the making of original drawings. In this the draftsman will soon discover that mental calculations are constantly coming up, and to compute the distances and set them off readily and accurately on the drawing requires a thorough knowledge of the drafting scales. Before proceeding with the instructions in drawing we will give a brief description of the triangular scale and its uses. By referring to Fig. 1 the shape of the triangular scale will be plainly seen. In shape an end section presents the form of an equilateral triangle, traversed lengthwise with a semicircular groove. This particular shape gives the rule six planes or surfaces, on which the different scales are marked. The shape of the rule permits of the marking being plainly visible to the draftsman, and is specially adapted for making the scale measurements of drawings with the greatest accuracy. On the six planes of the rule are marked 11 scales, which we will take in their regular order. First, one plane is graduated to sixteenths, which, of

for a job. This, and the fact that a knowledge of drawing is necessary to enable workmen to take a set of architects' plans and work from them understandingly, has brought about a desire on the part of many to learn the art of drawing.

A brief and comprehensive treatise on the subject, giving the practical instructions necessary to carry the work to a successful issue, has long been felt to be desirable. Many books and articles have been written on the subject, but for the most part they have been far from meeting the wants of carpenters and contractors engaged in the general building trade. Many have been disappointed in books, partly because they have not been as practical as could be wished, but more especially because the readers failed to put into practice the principles and ideas which the books illustrated and described. In order to obtain the full benefit from a work of instruction on any subject, it is necessary to verify what is taught by practice, and this is assuredly the fact in regard to drawing. Practice is the most essential point toward the advancement and success of the draftsman in the art of drawing, and without it the best books and articles are likely to prove a failure. It will not answer to merely read the instructions and to look at the examples given; a few ideas may be gained by this course, but to acquire the art and become proficient in it will require practice. It is the only successful method

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course, can be used in drafting to represent the scale of 1/16 inch to the foot. The other ten scales are marked on the remaining five planes in pairs and in the following order, 3/32, 3/16, ⅛, ¼, ⅜, ¾, ½, 1 inch, 1½ inches and 3 inches to the foot.

Placing the rule in position for drawing or setting off measurements we very naturally use the opposite edge from the one facing us. This will be plainly seen by taking a rule and placing it in the position of Fig. 1, which will bring the scales of 3/32 and 3/16 in proper position by which to draw lines and set off measurements on the drawing. When in this position the scale of 3/32 inch to the foot will be found figured on the plane from left to right and the scale of 3/16 inch to the foot, which is a multiple of 3/32, will be found figured from right to left, in the semicircular groove just above the plane. The scales each have at their starting point 3/32 and 3/16 respectively, graduated to sixths and twelfths, for setting of fractional parts of a foot, as in representing inches.

Referring to Fig. 1, we find the following scales shown: At the left end, top plane, 1½ inches to the foot; right end, same plane, 3 inches to the foot; left end, bottom plane, ½ inch to the foot, and right end, same plane, 1 inch to the foot. Thus it will be plainly seen that the larger scales are just twice the smaller, and being represented on the same planes the graduations of the smaller scale represent halves of the larger scale and thus work in harmony when properly understood and applied. It will be noticed that the figures of the ½-inch and 1-inch scales appear wrong side up, but when the rule is turned end for end, as it should be used in drawing by these scales, the figures will appear right and as follows: The ½-inch scale will be found figured from right to left on the plane and the 1-inch scale figured from left to right just above the plane in the semicircular groove. Thus in setting off distances by the inch scale, if ½ foot was wanted the draftsman could readily locate it by the divisions of the ½-inch scale figured on the plane. All the other scales on the rule are figured in like manner. The scales being figured differently and in opposite directions the liability of making mistakes or getting the scales mixed is avoided.

In setting off measurements from any of the scales always start from the figure 0 of the desired scale for even feet, and if a fractional part of a foot is wanted, count off such part on the fine divisions of the scale and start from this point, then the figures on the scale will represent the feet and inches. For example, the ½-inch scale has ½ inch graduated as follows: 1. The long lines divide the scale into fourths, which represent 3 inches. 2. The next longest lines divide the scale into twelfths, which represent inches. 3. The short lines divide the scale into twenty-fourths, which represent ½ inches. Thus by this scale the draftsman can carry his scale measurements to a point indicating ½ inches. Now if it were required to set off 6 feet 9 inches by the scale, count off 9 inches from the 0 mark on the scale, which will be the third long line to the right, then start from this point with the measurement and follow the scale marked on the plane to the left to 6, which will give the measurement of 6 feet 9 inches. Proceed in like manner in setting off measurements by any of the scales found on the rule. It is not necessary to describe the graduations of all the scales, as to understand the working of one is sufficient to enable the draftsman to readily become familiar with the divisions of them all as they all embody the same principle and it is just as easy to draw by one scale as the other, with the exception of cases where the fine scales bring lines so close together that they cannot be drawn distinctly.

We will only describe the graduations of the 3-inch and ¼-inch scales to show the contrast and what it is possible to accomplish with the scales. The 3-inch scale will be found graduated as follows: 1. The long lines divide the scale into twelfths, which represent inches. 2. The next longest lines divide the scale into twenty-fourths, which represent half inches. 3. The next longest lines divide the scale into forty-eighths, which represent quarter inches. 4. The short lines divide the scale into ninety-sixths, which represent eighth inches. Thus by the scale of 3 inches to the foot the draftsman can carry his scale measurements to a point indicating the eighth part of an inch, which is as fine as required in ordinary practice.

Referring now to the ¼-inch scale, which is the one generally used in making elevation drawings, we find it graduated as follows: The long line divides the scale into halves, which represent 6 inches; the next longest lines divide the scale into quarters, which represent 3 inches; the short lines and finest divisions of the scale divide it into twelfths and represent inches. Thus by this scale the draftsman can carry his scale measurements to a point indicating the inches in elevation drawings, which is about as fine as it is possible to draw the lines. The architects' triangular scale is calculated for fine work, and with it the finest of calculations in drawing can be made. As previously shown, the fine divisions of the ¼-inch scale graduated to twelfths make it possible in drawing by the scale to represent an inch on the plan. By the division of ¼ inch into 12 parts an inch would represent 48 parts; hence one of these parts is really the forty-eighth part of an inch, and comes very nearly, if not quite, being finer than the ordinary draftsman can distinctly draw the lines. Thus it will be seen that in drawing elevations great care will be necessary to keep all parts in accordance with the scale. For example, to represent the fascia and crown molding of a cornice in its usually limited space requires some fine work. The space usually required for the fascia and crown molding of a cornice on the average dwelling is from 5 to 7 inches. In this case we will call it 6 inches to make it easy for beginners. According to the scale, 6 inches would be represented by ⅛ inch in the drawing. Now we have only ⅛ inch space in which to draw the lines necessary to represent the fascia and crown molding, and as each member of the fascia and molding requires a line to properly show its profile, it would require at least five parallel lines to represent a very plain fascia and crown molding. To draw all these lines in the alloted space is about as fine work as the average draftsman is capable of doing. For example, we will draw the fascia and molding on a scale of 3 inches to the foot in order to distinctly show the different members. Referring to Fig. 2 it will be seen that it requires 1½ inch space to show the profile of fascia and molding. To show all these lines in an elevation in the small space of ⅛ inch is no small task, and this is only one example out of many that arise in architectural drawing.

Fig. 3 represents the fascia and molding drawn to ¼-inch scale. In drawing elevations occasionally a line is left out and slight deviations are sometimes made. This is the reason details drawn to larger scales are necessary, in order that the workmen may be enabled to carry out the design to the true meaning and intent of the architect. In making the elevations to the ¼-inch scale the draftsman should work to the scale and keep the proper proportions as much as possible, and such parts as cannot be properly shown in the elevations should be represented in the details drawn to larger scales.

(To be continued.)

Ancient Japanese Houses.

The allusions to house structure in the *Kojiki*, though brief, are suggestive, and carry us back without question to the condition of the Japanese house in the seventh and eighth centuries, says a writer in a late issue of the *Architect*. Mr. Satow, in his translation of the Rituals, says that the period when this service was first instituted was certainly before the tenth century, and probably earlier. From these records he ascertains that the palace of the Japanese sovereign was a wooden hut, with its pillars planted in the ground instead of being erected on broad flat stones, as in modern buildings. The whole frame work, consisting of posts, beams, rafters, door posts and window frames, was tied together with cords made by twisting the long fibrous stems of climbing plants, such as Pueraria thunbergiana (*kuzu*) and Wistaria sinensis (*fuji*). The floor must have been low down, so that the occupants of the building, as they lay or squatted on their mats, were exposed to the stealthy attacks of venomous snakes, which were probably far more numerous in the earliest ages when the country was for the most part uncultivated than at the present day. There seems some reason to think that the *yuka*, here translated "floor," was originally nothing but a couch which ran around the sides of the hut, the rest of the space being simply a mud floor, and that the size of the couch was gradually increased until it occupied the whole interior. The rafters projected upward beyond the ridge pole, crossing each other as is seen in the roofs of modern Shan-tau temples, whether their architecture be in conformity with early traditions (in which case all rafters are so crossed) or modified in accordance with more advanced principles of construction, and the crossed rafters retained only as ornaments at the two ends of the ridge. The roof was thatched and perhaps had a gable at each end, with a hole to allow the smoke of the wood fire to escape; so that it was possible for birds flying in and perching on the beams overhead to defile the food or the fire with which it was cooked. From the *Kojiki* we learn that ev n in those early days the house was sufficiently differentiated to present forms referred to as temples or palaces, houses of the people, storehouses and rude huts. That the temples or palaces were more that rude huts is shown by references to the veranda, the great roof, stout pillars and high cross beams. They were at least two stories high, as we read of people gazing from an upper story. The peasants were not allowed to build a house with a raised roof frame—that is, a roof the upper portion or ridge of which was raised above the roof proper and having a different structure. This indicates the existence at that time of different kinds of roofs or ridges. Fire places were in the middle of the floor, and the smoke outlet was in the gable end of the roof protected by a lattice, as seen in the Japanese country houses of to-day. The posts or pillars of the house were buried deep in the ground, and not, as in the present house, resting on a stone foundation.

Design for a Seaside Cottage.

The cottage which we illustrate upon this and the pages immediately following has been designed for erection at the seashore, the front facing the water, thus giving a good view of the ocean from the veranda on the first floor, and from the balcony and chamber windows of the second floor. The design is that of Walter P. Crabtree, architect, of New Britain, Conn., and from the author's specifications we learn that the exterior is to be covered with cypress shingles left to turn a silver gray, and all moldings to be painted. The hight of the first floor is to be 9 feet in the clear, the second floor 8 feet 9 inches, and the "nook" in the library 7 feet 6 inches in the clear. The cellar is to extend under the kitchen, hall, library and pantry.

From an inspection of the plans presented herewith it will be seen that on the first floor there are four rooms, consisting of parlor, library, dining room and kitchen, together with a wide hall and commodious pantry. The arrangement is such that any one of the four rooms can be reached directly from the hall, while communication between the dining room and kitchen is established by means of the pantry. In the parlor, dining room and library are open fire places. On the second floor are four sleeping rooms, out of each of which opens a closet of good dimensions. There is also a bathroom equipped with the usual plumbing fixtures, while in the front of the house and opening directly upon the balcony is a small sitting room. Out of this opens a closet, so that the apartment can be used as a chamber if necessity requires. The hall, it will be observed, is directly in the center of the house, thus economizing in space.

With the exception of the pantry and kitchen, which are in North Carolina pine, the rooms are finished in white wood left in its natural state. The house has been designed to cost about $4000 complete, but with some changes could be easily erected for less.

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

Design for a Seaside Cottage.—Walter P. Crabtree, Architect, New Britain, Conn.

Instruction in Roofing and Cornice Work.

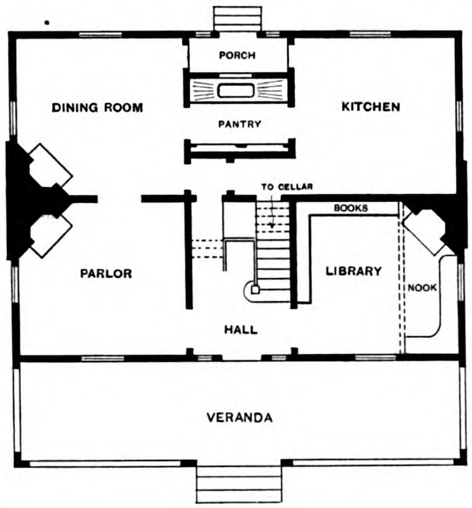
It has been decided by the management of the New York Trade School to establish next season a class for instruction in roofing and cornice work. The demand for such a class has been felt for some time, but it is only now that the trustees have seen their way to adding another to the increasing lists of trades taught. It is believed that the opportunity offered in this class will be much appreciated by the younger members of the trade. The New York Association of Master Roofers and Manufacturers in Sheet Metals have signified their willingness to co-operate in the matter, and they will appoint a trade school committee for the supervision of the work of the class, similar to those appointed by the associations of master plumbers, master painters, master stone cutters, &c. The class will be a day one. It will commence work on January 2, 1895, and will have a course of three months. The course of instruction is not yet definitely decided upon. It will, however, be confined to work directly connected with the roofing and cornice trade, and will probably embrace the laying of simple roofing of various kinds, making and lining of gutters, making rain water leaders, chimney caps, ventilating caps and window caps, with other practical roofing work, together with simple and fancy cornice work. It is also proposed to include pattern drawing and cutting, so far as applies to the roofing trade. Any information in regard to the class may be obtained by application to the New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York city.

Sound Proof Apartments.

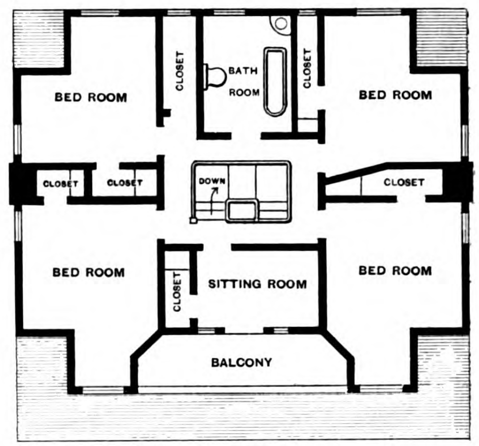
There is occasionally a demand for an apartment which is perfectly sound proof, and we are inclined to think there would be less moving in and out of many of the flat buildings in the larger cities of the country if more attention was given in the construction of floors and walls so as to render them as nearly as possible sound proof. A correspondent of London *Engineering* gives the following method of doing this, but says it is a very difficult as well as costly matter, unless provision has been made in the course of the construction of the building : As regards the floor, a ply of very thick carpet felt underneath the ordinary carpet will to a certain extent effect the object in this direction, but to make it really effectual the proper thing to do would be to lift the floor, and if there is not already a couter flooring between the joists it might answer the purpose to fill in on the top of the laths which hold the ceiling underneath with about 3 inches of silicate cotton, then on top of each joist a strip of hair felt should be laid before nailing down the floor. This will effectually stop the sound in that direction.

As regards the walls, they would require to be studded with vertical studs, say 1½ x 1 inch, spaced 18 inches apart ; these should be either lathed or covered with wire netting, and the spaces between the lathing and the present plaster should be filled in with silicate cotton. It would also make this more effectual if the fronts of the studs were provided with a strip of hair felt in the same way as indicated for the joists. Of course, the walls would require to be replastered.

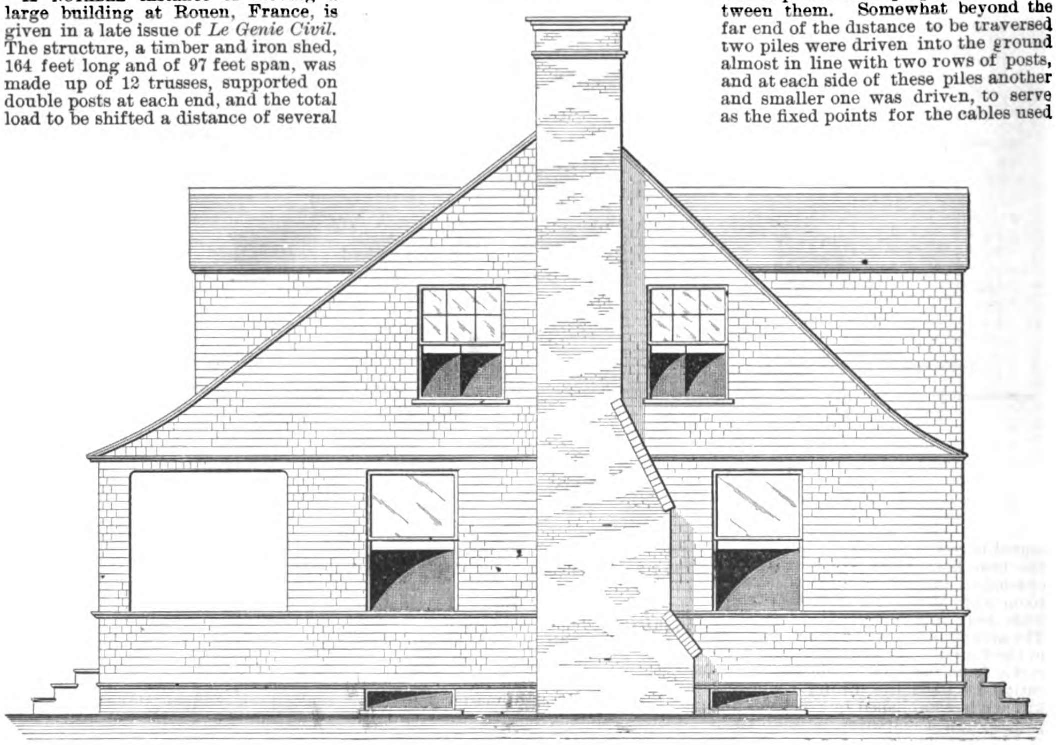
A NOTABLE instance of moving a large building at Rouen, France, is given in a late issue of *Le Genie Civil.* The structure, a timber and iron shed, 164 feet long and of 97 feet span, was made up of 12 trusses, supported on double posts at each end, and the total load to be shifted a distance of several hundred feet amounted to about 180 tons. The crucial part of the undertaking was in the lifting of the 24 supporting posts at one and the same time, and it was indispensable also that this raising should be accomplished in a manner which would not in the least degree alter the relative positions of the posts. One circumstance largely favoring the undertaking was that the slope of the ground over which the shed had to be moved was slight and that the posts, when in their new position, would require raising to the extent of only about 10 inches. The mechanical appliances necessary, therefore, were comparatively simple, comprising only some winches, cables and screw jacks, some strong blocks and the special trucks which had to be built to carry the posts in transit. Rails and sleepers, necessary to complete the outfit, did not add greatly to the expense. The first operation consisted in laying a track underneath each line of posts and then building around each post a truck on to which, subsequently, the posts were lifted. As soon as all the trucks had received their loads they were coupled together by iron rods so as to transmit the traction in the line of the posts and also to preserve the proper distance between them. Somewhat beyond the far end of the distance to be traversed two piles were driven into the ground almost in line with two rows of posts, and at each side of these piles another and smaller one was driven, to serve as the fixed points for the cables used in hauling. The latter, starting from these, passed successively around pulley blocks on the two heavier piles, then around blocks fixed to the leading trucks, and finally were wound on a winch placed inside of the building. A graduated plank was laid down along



First Floor.

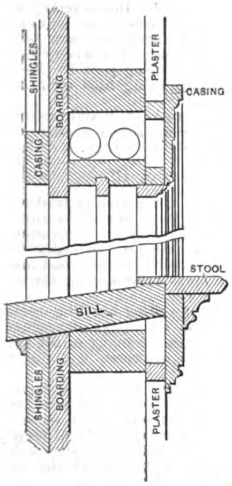


Second Floor.

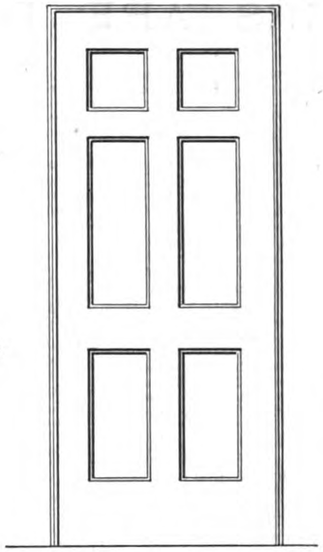


Side (Right) Elevation.

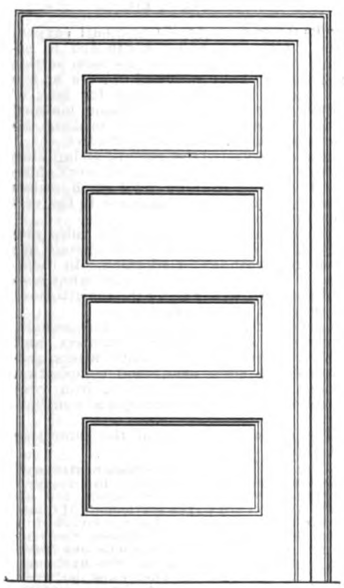
Design for a Seaside Cottage.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Elevation.—Scale, ⅛ Inch to the Foot.



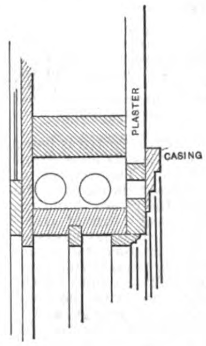
Detail of First Floor Window Frames.—Scale, 1½ Inches to the Foot.



Elevation of Doors on Second Floor.—Scale, ½ Inch to the Foot.



Elevation of Doors on First Floor.—Scale, ½ Inch to the Foot.

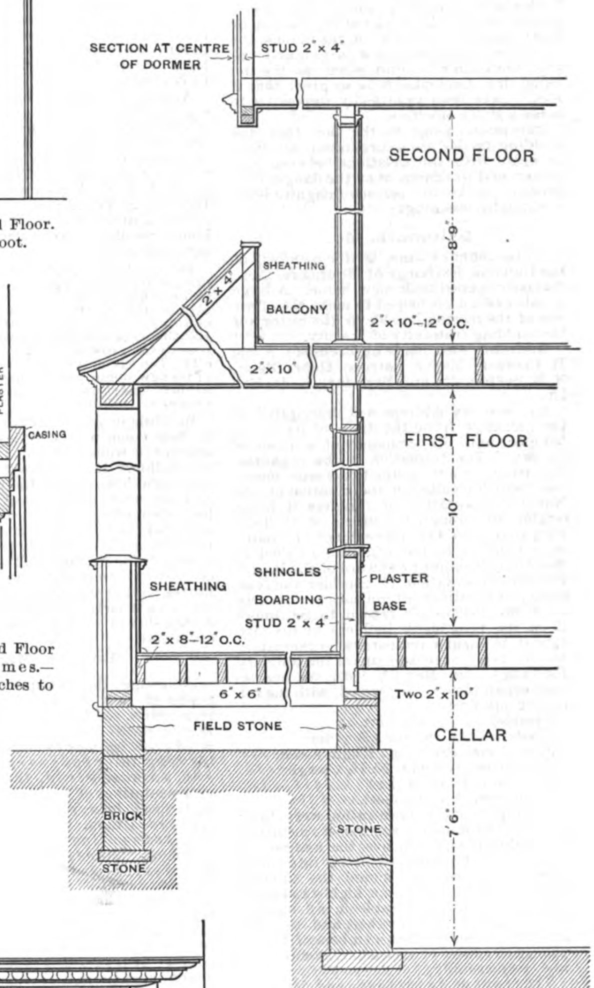


Detail of Second Floor Window Frames.—Scale, 1½ Inches to the Foot.

the whole length of the route to aid in securing uniformity of progression in all the trucks, and the whole operation was carried out expeditiously and successfully.

Building Trades Exhibition.

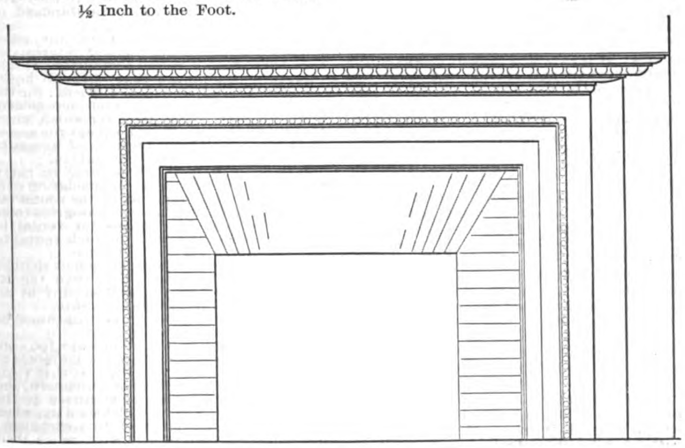
The first annual Chicago Building Trades and Material Exhibition, which recently closed at the Institute of Building Arts, 63 to 69 Washington street, Chicago, was a success in every particular. A large and constant attendance of interested visitors attested the appreciation with which the exhibition was



Section at Center of Veranda.—Scale, ¼ Inch to the Foot.

received by the public, and the 200 exhibitors expressed themselves as very much gratified with the work accomplished. The exhibits covered a wide range of building materials and devices, embracing everything necessary to the health, comfort and convenience of man in connection with the construction of buildings.

EXCAVATIONS in Babylon have brought to light a number of bricks, the stamps on which prove them to be at least 4000 years old. They appear to be as good now as when they were first baked.



Elevation of Parlor Mantel.—Scale, ½ Inch to the Foot.

Design for a Seaside Cottage.—Miscellaneous Details.

WHAT BUILDERS ARE DOING.

THE present outlook in the building trades offers little reason for elation or depression. The total volume of work under way throughout the country seems to be fairly satisfactory in the light of the after effects of last year's panic. Contractors and workmen seem to feel that the amount of work under way is in excess of what was anticipated in the early spring, although it is still far below the average.

The officers of the national organizations of workmen wisely decided not to call out those engaged in trades not directly connected with railroading in support of the strike and boycott by the American Railway Union, and as a result the building trades are practically undisturbed by a general strike. Leaving out the wisdom or unwisdom of the action of the unions, the present would have been a particularly unpropitious time to quit work, as the demand for employment is so great that it would have been practically impossible to make a strike effective.

Indications point to the fact that the building trades are so organized, and have so dealt with the relations between employer and workman, that the danger of a general strike of serious magnitude is continually lessening.

Baltimore, Md.

On the night of June 26 the members of the Builders' Exchange of Baltimore, Md., formally opened their new home. A large number of guests helped to make the affair one of the most enjoyable in the history of the building fraternity of the city.

Addresses were made by President Noble H. Creager, Mayor Latrobe, Henry Seim, S. B. Sexton, Jr., and Secretary E. D. Miller.

Mr. Sexton's address was descriptive of the exchange from the time of its establishment until its occupancy of a home of its own. The formation of the organization was shown to be due to the same movement which resulted in the creation of the National Association of Builders, it being established through the efforts of William Ferguson, who had represented the Baltimore builders in the conference called in Boston by Secretary Sayward of the Master Builders' Association to consider the feasability of a national organization. Shortly after Mr. Ferguson's return to Baltimore 42 of the prominent builders of the city agreed to form a temporary organization for one year under the name of the Builders' Exchange. On May 22, 1888, the permanent organization was formed, with the following officers:

President, E. L. Bartlett.
First vice-president, J. F. Adams.
Second vice-President, Hugh Sisson.
Third vice-president, N. H. Creager.
Secretary, E. D. Miller.
Treasurer, B. F. Bennett.

The objects of the organization were stated as being the mutual benefit of its members, to facilitate and improve the manner of transacting business, to bring into closer relations the contractor and the sub-contractor, and to maintain a high standard of what is fair and honorable in all business transactions with each other, and to guarantee to the public that members of the exchange are men of character, competency and responsibility.

The credit of the exchange and its members is well indicated by the fact that such funds as were necessary to borrow for the erection of the building were secured at a low rate of interest and without difficulty during the money stringency of 1893. The cost of the site and the building approximates $200,000, of which $100,000 has been subscribed by the members.

After the speechmaking was over refreshments were served and a generally informal and good time was had by all.

DESCRIPTION OF THE BUILDING.

The building is one of the handsomest of its kind in the city, and is a decided improvement to the locality. It is of marble and severely plain in its style, fronts 83 feet on Charles street and 75 feet on Lexington street, and is five stories high, not including the basement. The two faces are of Beaver Dam marble, with heavy ornamental trimming of the same.

The first floor consists of two large storerooms on the Charles street front, which have already been leased. These rooms have each two large display windows of plate glass. The entrance to the building is on Lexington street. To the right of the entrance is a fine office room and a room for the janitor. The entrance hall is of Italian marble of beautiful shade.

On each of the second, third and fourth floors there are 11 offices, all large, airy and well ventilated. The front office rooms on all the floors are 19½ x 30 feet. On the fifth floor several rooms have been set apart for the use of the Builders' Exchange. The interior of the building is finished in hardwood and the ceilings are all frescoed. The rooms are lighted from street windows and from a central skylight, which is directly above the stairs.

On each story there is a general lavatory and a lavatory for ladies, and connected with many of the offices there are small private lavatories. A splendid heating apparatus has been placed in the building and back of the entrance there is a hydraulic tank elevator.

Arrangements have been made for lighting the building by gas and electricity. Water has also been placed in every room. The stairway is of iron and especial care was taken to make the building as nearly fire proof as possible. The builders were S. H. & J. F. Adams and the architects Baldwin & Pennington.

Commenting on the exchange and its new home, the Baltimore *American* of June 28 says editorially:

> The Builders' Exchange, which has just opened its splendid headquarters at Charles and Lexington streets, is rapidly becoming one of the most important business associations in Baltimore. It is progressive, and the members of it are valuable contributors to the growth and advancement of the city. The exchange has a right to feel proud of its new home, and we have no doubt that in such quarters the organization will increase in usefulness.

Building in Baltimore is reported as being in fair condition, with nearly an average amount of work on hand. The members of the Builders' Exchange are elated over the successful opening of their new building, and also over the fact that a firm of architects connected with the exchange has been awarded the new Court House out of a competition of 87 architects from various portions of the country. The names of the competitors were not known to the committee having the award in charge, and it seems peculiarly fitting that the successful design should be submitted by Baltimore architects.

Boston, Mass.

Following the example of the building trades of New York, Chicago and other large cities, the Building Trades Council of Boston at its last meeting instructed affiliated organizations to form a board of walking delegates or business agents.

In accordance with these instructions, representatives of the Plumbers' Union, Tin and Sheet Iron Workers' Union, Building Laborers' Union, Carpenters' Union, Marble Cutters' Union, Furniture Workers' Union and Lathers' Union met and elected a permanent board of walking delegates, the members of which will meet every morning, exchange notes and assign members to their duties for the day.

The object of establishing this board is to secure greater unity of action among the trades It is expected that by means of this board every branch of organized labor can be brought into action in support of any demand by any one trade or union. No disturbance of any kind has occurred between the Mason Builders' Association and the unions since the Arbitration Committee and system of apprenticeship were established.

The only case in which the services of an umpire have been required in arbitration matters occurred during the past month. The statement and decision of the umpire are given in another column. The utmost harmony prevailed on either side before and after the decision of the umpire and the decision was accepted by employers and workmen as final.

Secretary Sayward is at work upon a credit system for the Master Builders' Association, the plan being as follows: Each member will be furnished slips on which are printed a number of questions, asking if they have had dealings with the party about whom inquiry is made; if so, when, and with what result, and whether or not they would recommend credit. When a member desires to make an investigation a notice is sent out to that effect by the secretary and the answers are returned, the names of those replying not appearing, each being designated by a number. These returns are tabulated, one copy being sent to the inquirer and another being filed for future reference.

Builders are generally busy and the total amount of work for the season promises to come up fairly near the average.

Chicago, Ill.

The situation in the building trades in Chicago has been very uncertain during the past month. Workmen in all branches were likely at any time to be ordered to strike in sympathy with the railroad men, and a feeling of uneasiness among the employers was general.

Up to the present writing building operations have not been seriously interrupted, and it is the opinion of many of the contractors that their workmen will not be called out

Early in March the lathers demanded $2.50 per day, but were refused, and they worked for a lessening wage until some of the workmen were receiving only $1.60 per day. On June 20 the union men struck for $3, and it is claimed that some of the employers have granted the increase.

The usual number of union strikes have occurred during the month, but nothing of a general character has involved the building trades.

Cincinnati, Ohio.

The strike among the Cincinnati carpenters, which promised a month ago to assume serious proportions, has been settled and the men have returned to work at the old wages. The strike failed for lack of support by the unions, it being claimed that the number desiring to prolong the strike was insufficient to be effective.

The reports as to the amount of building going on show that the total of work done for the season will be very small, unless there is an appreciable increase in the volume later in the year.

The following revision of the rules and regulations of the Builders' Exchange has been recommended for adoption. In defining the intent of the rules, as to what constitutes a contractor under the constitution, these trades were specified:

Carpenters, brickmasons, stonemasons, plasterers, stair builders, painters and grainers, freestone and granite cutters, galvanized iron, slate, metal and composition roofers, plumbers, gas fitters, iron construction, electricians, heating and ventilating.

The recommendations of the committee continue as follows:

> While we believe that the classifications of our membership, as provided in proposed amendments to the constitution, are all right with regard to the settlement of questions affecting interests that are involved in the relations that exist between the employer and employee, yet we believe there are conditions existing in the exchange affecting the relations that exist between members that are of considerable importance, and we therefore beg to submit the following as a means of bettering this relation, and at the same time believe they will have a tendency to raise the standard of our exchange:
>
> 1. The use of the main room for office purposes is inimical to the best interests of the exchange; your committee would therefore recommend that 'Change hours be fixed from 11.30 a.m. to 1.30 p.m., for the purpose of transacting such business as may arise between members, after which hours the room shall be closed, except for access to mail boxes and any business of necessity between the secretary and members.
>
> 2. In order to make it possible to carry out the intentions of recommendation one, we suggest the preparing of the rooms occupied by the late Builders' Congress to be subdivided into desk spaces for rental to members only, the price of such rental to be fixed by the Board of Directors.
>
> 3. The secretary or superintendent shall be provided with an office other than the assembly room, which he shall occupy at all times, except during 'Change hours.
>
> 4. That the annual membership dues be fixed at $25 per annum.
>
> 5. We also believe our rooms are too easy of access to persons who are not members of this exchange, and would suggest that visitors who are non-residents of Cincinnati, and the adjacent cities, may be admitted to the assembly room after 11 o'clock a m., when introduced by a member of this exchange; but no person shall be admitted more than 12 times within one year, except upon approval of a member of the Board of Directors for each admission. All persons in-

troduced must consider themselves amenable to the rules of this exchange, and will not be permitted to transact any business while on the floor. Any violation of this rule will make the member introducing such party liable to a fine of $5 for each offense.

6. The soliciting of money for any object other than as the exchange directs shall not be allowed on the floor.

Indianapolis, Ind.

The building interests of Indianapolis show no increased activity and there is at present but little prospect of increased operations.

The Builders' Exchange has elected the following officers for the ensuing year:

Wm P. Jungclaus, president
Stanton W. Hawkey, vice-president.
Henry C. Adams, secretary.
Levi S. Pierson, treasurer.

The organization is in good shape; the new rooms prove to have been wisely selected and are a decided improvement over the old quarters. Now that the novelty of new quarters has worn off the advantage of the change is manifest.

New York City, N. Y.

The condition of affairs among the workmen in the building trades seems to be about normal in spite of the feeling of uneasiness which has been expressed over the general restlessness which has prevailed.

A mass meeting of the workmen of the building trades was held about July 1, under the auspices of the Building Trades Conference, to protest against the employment of foreign work and materials by architects and owners. It was claimed that discrimination is used against work done in this country. It was stated that 75 per cent. of the decorative work done in the city is given to non-resident workmen. The meeting was a further support to the effort to prevent the owners of fine residences in the city from using foreign decorations of any kind.

One of the most enjoyable excursions which left the city this season was that participated in June 28 by the members of the Building Trades Club and their guests. On the iron steamboat "Cepheus" 500 of them sailed up Long Island Sound to Roton Point. There was music and dancing and lots of fun on the way, the Point being reached about noon. At the hotel a "genuine New England shore dinner," the *pièce de résistance* of which is clams, had been in preparation, and was soon ready and served in attractive style in the big dining rooms of the hotel. Then there was more music and dancing, while some went boating and some went bathing and others just loitered around on the crags under the shade of the trees and watched the more active ones. The return trip produced more music and dancing and sociability, the boat landing her passengers at 7 o'clock, every one refreshed by the trip, and voting the first builders' outing an unqualified success. The affair was managed with consummate skill by the efficient House Committee of the club, and reflected credit upon the organization. While it was entirely a social affair, it gave the members an opportunity of discussing the prospects for the erection of the mammoth building intended for the use of the Building Trades Exchange.

An additional prospectus covering the last steps taken by the exchange, since its formation, has been issued, and extended means for affording all who desire to do so an opportunity to secure stock have been put in operation It is expected that comparatively little will be done to actively push the matter until fall. The success of the undertaking, which was practically assured at the start, is now plainly manifest, and it is only a question of time when the building trade of New York will have a home of its own, commensurate with its size and importance.

One of the organizations founded by the mechanics of New York City, which conducts its affairs with great benefit and little ostentation, is the General Society of Mechanics and Tradesmen. The society was founded in 1785 and incorporated in 1792. From its original purpose, benevolence, it has broadened its scope as its income permitted. In 1820 it founded the Mechanics' School and the Apprentices' Library; in 1833 it started an instructive course of lectures; in 1856 it added reading rooms to its library, and in 1889 instituted free scholarships in the New York Trade School. The indigent members and the needy widows and orphan children of deceased members receive annuities regularly.

The free section of the library contains over 90,000 volumes, circulating 250,000 books anually. Thirty thousand persons visited the reading rooms last year.

The evening classes of the school furnish free instruction to young men in freehand, mechanical, machinery and architectural drawing, cabinet decorations and clay modeling, thus materially assisting them in their daily avocations. To young women, free instruction in stenography and type-writing is given. Each winter a free course of lectures on popular subjects is given, while to encourage young men in acquiring a practical knowledge of some useful trade, the society maintains free scholarships in the New York Trade School. The names of the officers are: John L. Hamilton, president; Warren A. Conover, vice-president; George E. Hoe, second vice-president; Richard T. Davies, treasurer; and Stephen M. Wright, secretary.

Omaha, Neb.

Building is reported as being very dull in Omaha. Such work as is under way has been taken at such low prices that there is no profit in the work. Contractors find fault with the closeness of competition, which seems to be largely due to the willingness of outside bidders to accept work at ruinous prices. The builders are looking forward to the accomplishment of the Platt River Canal scheme in the fall, it being expected that it will result in bringing many manufactories and hence new buildings to Omaha. The carpenters, who have been restless for some time past, have quieted down and no trouble is anticipated. The other trades are working without disturbance, the scarcity of work being a sort of safeguard against trouble.

The eight-hour law has been declared unconstitutional by the Supreme Court of Nebraska.

Philadelphia, Pa.

The general business depression has manifested itself in the building interests of Philadelphia by a reduction of at least 20 per cent. in the amount of work done during the first six months as compared with the same period of last year. In exact figures there have been, between January 1 and July 1, 1894, 5333 operations, costing $11,190,435, while during the same time last year the number of operations was 5944 and the cost amounted to $13,563,587. The effect has been felt all through the building trades and has been manifest in a variety of ways. The efforts of the mason builders to secure from the bricklayers a voluntary reduction of wages during the depressed period is an instance

The following account from the Philadelphia *Record* of a move by the Master Builders' Exchange, to add to the Trade School fund and at the same time provide a day's outing for the builders, shows that in spite of the depression in business there is no depression in the spirits of the members of the exchange:

Arrangements for a strictly-on-its-merits game of baseball between members of the exchange are progressing nicely under the fostering care of President Harris, who believes that a snug sum can be realized for the Trade School through the exhibition. The baseball fever has stricken many members of the organization. A. G. Buvinger and Charles H. Reeves, master plasterers, will probably captain the rival teams, and President Harris, who has absolutely no knowledge of the game, will pose as umpire. Secretary Harkness will be official scorer. The players already signed are Joseph E. Brown, Albert A. Reeves, John Atkinson, George W. Roydhouse, Joseph B. Hancock, John Conway, William Conway, William Airy, William W. Morgan, superintendent of the exhibition department; Allen B. Barber, James Taylor, Franklin M. Harris, Jr., Frank Peverly, Washington J. Gear, Jr., David A. Woelpper and Murrell Dobbins. The list of available substitutes includes nearly the entire membership of the exchange and all of the male clerks employed about the building.

Superintendent Morgan, who has charge of the exhibition department of the exchange, has a project in view for the enlargement of the quarters allotted to the exhibit. A complete change in the front of the building, which is owned, as well as occupied, by the exchange, is contemplated. The present rooms occupied by the exhibition are totally inadequate.

St. Louis, Mo.

The regular quarterly meeting of the Builders' Exchange of St. Louis was held July 11, President Sheehan in the chair, and a large attendance of members. The treasurer submitted his report, showing a balance in the treasury of $6900. Wm. J. Baker, chairman of the Excursion Committee, made a verbal report, stating that all arrangements had been made for the annual excursion, to take place July 25 on the "City of Vicksburg," which will carry the members and their friends to Grand View Island, five miles above Alton. The committee has prepared an excellent programme for the occasion, and a pleasant time is looked forward to by those who will be present. A resolution, offered by Chas. B. McCormick, that the exchange indorse the action of President Cleveland in the labor trouble was adopted, and a telegram was sent to the President congratulating him.

The building interests generally are dull.

Notes.

The plasterers of Fargo, N. Dak., struck early in July for an increase to $3.50 from $3 per day. The helpers wanted $2 instead of $1.50 per day, and also struck.

The Builders' Association of Springfield, Mass., at a recent meeting, made arrangements for opening an employment bureau. This will be located as near the central part of the city as possible, and will be open during the day and evening. The plan which has been followed by the secretary of the Board of Trade will be adopted; a book kept for all applications and an opportunity be given for employers to select skilled employees This bureau, however, will be open only for those in the building lines, namely, carpenters, masons, plumbers, pipers, &c., and no other trades will be accommodated. The trustees of the Builders' Council have the matter in hand and the members hope to get the office ready for applicants by August 1.

Brooklyn, N. Y., is one of the few cities in which the report of the Building Commissioner has shown a steady increase in building operations from January 1 to June 1 over the corresponding period of last year.

A strike of masons occurred in Norwich, Conn., on July 2 to secure a nine-hour day with no reduction in wages from the amount paid for ten hours' work. Comparatively little work is being done, and the masons' object to working ten hours. The men are willing to work nine hours for $3, though masons were formerly paid $3.50 for nine hours' work. The masons say the nine hour system is in vogue in most cities now among brick masons and they ask that it be adopted in Norwich.

Late in June the carpenters at St. Joseph, Mo., struck for 25 cents per hour and eight hours per day. They had formerly been working ten hours per day for wages running all the way from 17½ cents to 22½ cents per hour. The workmen have taken action only against work not yet contracted for, and have allowed the employers to continue without disturbance all work taken at the former wages. The contractors who are opposed to the new schedule claim, on the other hand that if they are forced, in bidding on new work to raise their prices, that outside contractors will get the work and bring in outside mechanics at lower wages, thus working a hardship not only on the home contractors, but on the resident workingmen as well, who will be forced to remain idle and earn nothing at all instead of the wages now paid. Nearly all of the union men who quit have secured work from other contractors, there being only two who did not agree to the union's request for eight hours at 25 cents per hour on all new contracts.

The Builders' Exchange of Bridgeport Conn., seems to be passing through the stage which is familiar to many such organizations. It has a good membership, pleasant and convenient quarters, every facility for usefulness, and yet is without sufficient enthusiasm on the part of the members to make the organization effective. Building is reported as being fair.

Norwich, Conn., is to have a new manual training building attached to the free academy of that town.

THE old Winthrop house at Winthrop, Mass., which was built in 1694 by Dean Winthrop, the sixth son of Governor Winthrop, has been newly shingled and repaired. The grave of its builder in Revere, like the house, has been neglected, but it is now to be put in order and properly cared for.

Heating a Club House.

A society, association or club of some sort is a feature of almost every community in the land, and generally occupies quarters arranged especially to meet specific requirements. In some instances an old building is remodeled, in order to provide the necessary accommodations, while in many cases, particularly in and about the larger cities and towns, new structures are designed and erected to meet the specified requirements, just the same as a man would build a house in which to live. The carpenter and builder is as much interested in the arrangement of the rooms of a club house as he is in the designing of a dwelling, for he is likely to be called upon at any time to construct one. He will therefore be interested in the illustrations given herewith, which, though intended primarily to show how a club house may be heated by steam, afford a good example of the disposition of the various rooms. The plans here shown are those of the home of the Ridge Club, at Bay Ridge, Long Island, New York. The club house is situated on a slope of ground, so that the entrance to the porch and vestibule shown in Fig. 2 is from the ground level, and the floor of the basement shown in Fig. 1 is at the level of the ground in the rear. The rear portion of the club house faces New York Harbor, and has a western exposure. The steam mains for heating purposes are divided into two circuits. From the front of the sectional boiler, which has nine sections, a 3-inch main runs to the back of the house and makes a circuit of one part of the building, and returning drops down and connects with the boiler at the right hand side at the bottom. Another main is 2½ inches in size, makes a circuit of the other part of the building, and returning connects at the bottom of the boiler on the left hand side, as shown in Fig. 1.

A third main, 1½ inches in size, runs to an indirect radiator supplied with cold air from out of doors by means of a 10 x 15 inch air duct, and located beneath a 14 x 30 radiator in the main hall on the first floor, shown in Fig. 2. The return from this radiator is 1 inch in size, and connects at the bottom of the boiler. In the basement at the back of the building is an observation space overlooking the bowling alleys. This is heated by means of a ceiling coil composed of three 1¼-inch pipes, exposing about 80 feet of surface. A separate return is run from this coil to the boiler directly beneath the steam main, following it as it makes a circuit of the building. Risers are taken from the mains to the radiators on the first and second floors, located as shown in Figs. 2 and 3. In every case the branches or risers to the radiators are taken directly from the top of the main. In running the steam mains after leaving the boiler, the pipes are so graded as to have a fall throughout the entire circuit back to the boiler, to return the condensation. Automatic air valves are placed at the boiler to relieve the circuit main of air that may accumulate. The circuit main in the basement is not covered, and serves as heating surface. Where a building is adapted for the use of the circuit system a considerable saving in pipe and labor is made, and there is little danger of trapping the pipes to interfere with satisfactory results. In this case, although the building is exposed to winds from the west after sweeping across the bay, there has been no difficulty in keeping the entire building at a comfortable temperature with the system in use.

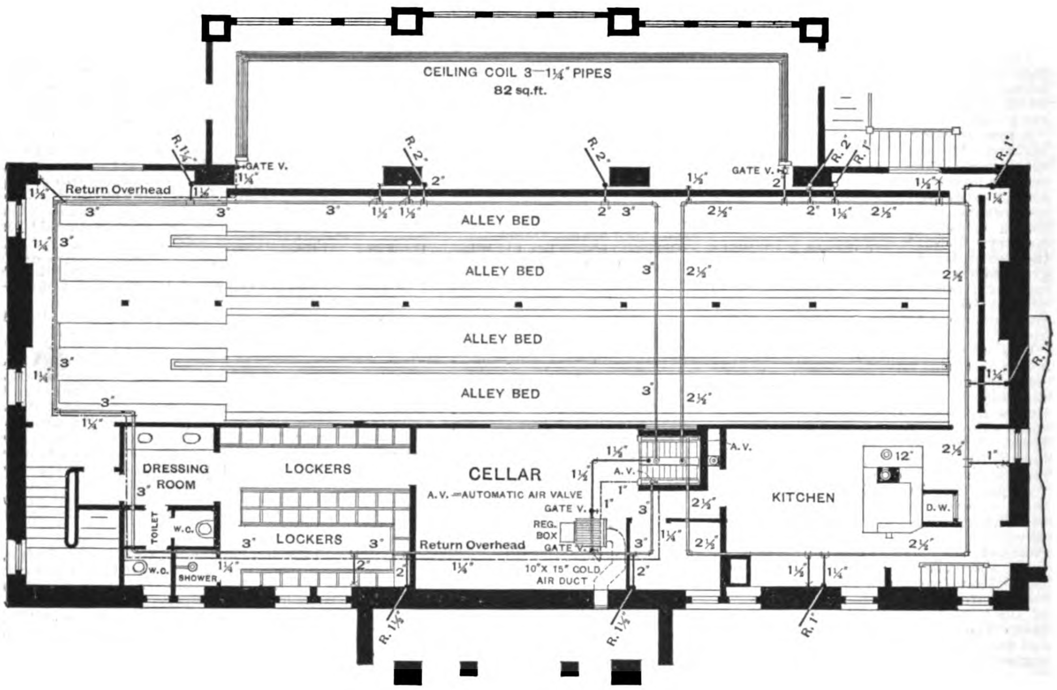


Fig. 1.—Showing Basement, with Boiler and Piping.

Heating a Club House

Brick Verandas.

It is not unreasonable to estimate that 99 out of every 100 brick houses built in this country have wooden porches or verandas if they have any at all. It is even so with many residences of brick manufacturers of whom we have a personal knowledge, says a recent issue of the *Brickbuilder*. Here is an opportunity for improvement. One of the most effective uses of brick is in the construction of arcades. The piers may be of stone or terra-cotta, but they may just as well be of brick, with possibly a terra-cotta capital. Such a feature on a brick house adds wonderfully to its appearance. It is more expensive, it is true, than a wooden construction, but not enough so as to be considered out of the question except in the most economical construction. Often it is desirable to have an uncovered porch, and in such a case, providing the house is brick, there is no reason why the porch railing should not be brick.

The Jerry Builder Abroad.

One of our English exchanges gives the following summary of a recent meeting of the Carlisle Architectural Association, at which C. W. Hill gave an address entitled "The sins of the jerry builder and their effects on the public health." Mr. Hill commenced by defining the meaning of "jerry builder," and where and how he flourishes, and said his victims were, as a rule, the workingman who had saved enough money to buy a house of his own, and was led to believe that he was making a bargain by purchasing his dwelling from such a builder for a few pounds less than a proper house could really be built for. The lecturer pointed out many of the devices practiced by the "jerry builder" to economize in the erection of a house, notably those of bad foundations, hollow walls filled in with earth or rubbish, hollow chimney breasts causing smoky chimneys, no flashings to roof, wall plaster made of road sweepings, &c.; floors laid on the bare earth, and defective house drains, in which the ingenuity of the unscrupulous builder is seen to such advantage by the use of bad pipes and cheap fittings, &c. He emphasized the importance of efficient house drainage and plumbing to prevent the escape of sewer gas, so conducive to illness, and said he was of opinion that not 10 per cent. of the drains laid up to ten years ago would now stand a proper test.

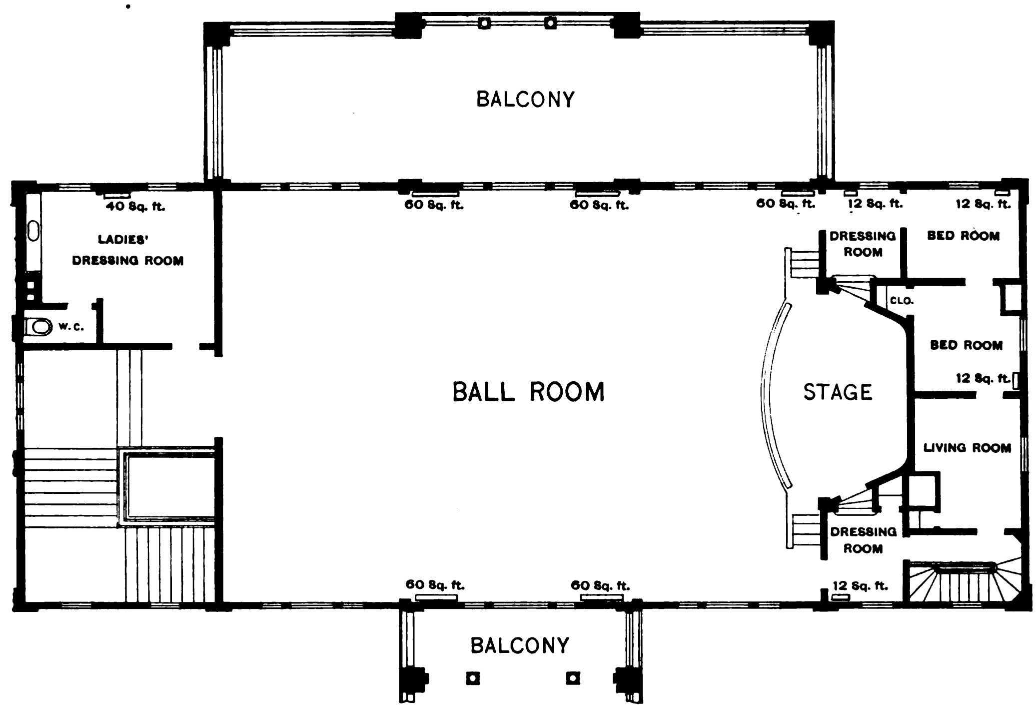


Fig. 3.—Second Floor.

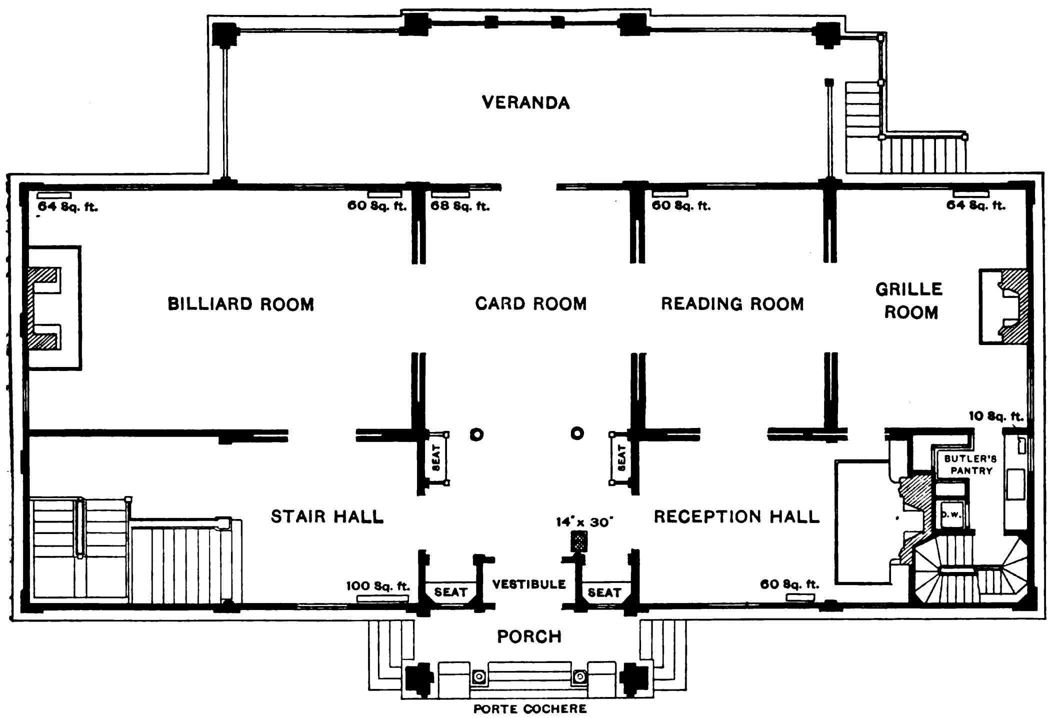


Fig. 2.—First Floor.

Heating a Club House.

CORRESPONDENCE.

Lengths of Braces.

From H. V. S., *Butte, Mont.*—In reply to "J. C. W." of Pine Hill, Pa., whose letter appeared in the September issue of the paper for 1893, I would suggest that for a method of obtaining the length of a brace with irregular run and rise he consult "Hodgson's Steel Square." The brace at B in his sketch extends from beam to beam, or sill to beam; therefore the bevels of both ends of the brace are parallel to each other and cannot be obtained as easily as a brace striking a base and perpendicular. However, when we know how, it is easily done, the same as everything else we have learned and not forgotten. I must confess, however, I am no exception to the rule of forgetfulness, and think it would be just as impossible to retain in the mind all the wrinkles we learn from time to time, as it would be for a lawyer to argue a great criminal case without recourse to his law books; and as law books are to the lawyer so is *Carpentry and Building* to us. At this point I would suggest to all those submitting sketches to the paper to work to a scale and state what the scale is, whether ⅛ inch, ¼ inch or ½ inch, and try to be as accurate as possible. I am sure there is no young mechanic who loves the trade but nurses the idea that some day he will be an architect, and the early establishment of accuracy in drawing to a scale is a practice which will prove of benefit in the future, while the mechanic who works from his plans will bless him and not have occasion to class him with the picture architect who draws attention to the clause in the specification which reads "take all figures in preference to scale measurements." This is not right and contractors should object to it. All proper squares and rules have just as good scales upon them as the architect's, and when the contractor lays his steel square or his rule upon a plan, the measurements ought to correspond with the figures. If they do not the contractor is apt to think the architect has made a mistake in the figures, or else he thinks the 9 is a 7 or the 3 an 8. This raises a doubt in his mind, and as the architect is out of town and won't be back for two days, we can imagine how the contractor acts and what would become of the architect if the contractor's prayer was answered. If the architect had used his scale as the contractor is obliged to use his rule, it would have saved all trouble and both would have been nearer heaven.

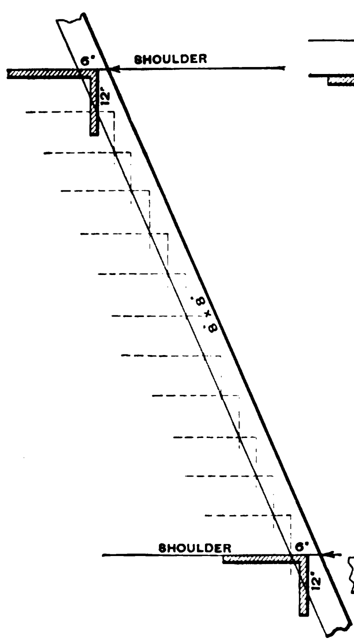


Fig. 1.

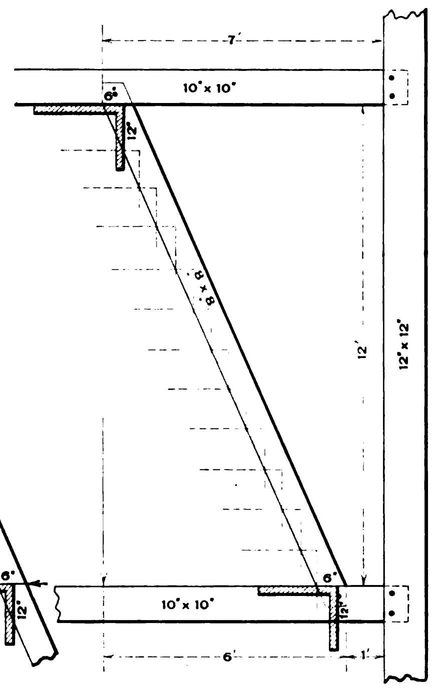


Fig. 2.

Lengths of Braces.—Method of Using the Steel Square as suggested by "H. V. S."

Now let us find the measurement from the upper angle formed by the post and beam where we intend the toe of the top of the brace to rest when in its place. We will say this distance is 7 feet. Now let us find the measurement on the angle formed by the brace and lower beam or sill, to the toe of the bottom of the brace, which proves to be 1 foot. Now we subtract 1 foot from 7 feet, which gives us 6 feet. We then have 6 feet run and 12 feet rise. Now take the steel square and slip upon it our fence, screwing it up tightly at 12 inches on the tongue and 6 inches on the blade. Why do we do this? Because as 6 feet is to 12 feet so is 6 inches to 12 inches. The same as 3 feet would be to 4 feet, 9 inches would be to 12 inches in a 4-foot run and a 3 foot rise, and so on. A little study will make one able to lay out and get any kind of brace, but "J. C. W." may say this brace is not the same as a common brace of 4 feet run and 3 feet rise. He says the shoulders are not the same. That is so; but, as I said before, they are just as easily obtained. The next step is to secure a board, joint it true, and have it the width of the stock out of which the brace is to be made. Lay it upon the horses or bench and place the square upon it with the fence pressing tightly against the jointed edge with the blade to the left. With a knife make a draft along the edge of the blade of the square, and then prick at the 12-inch point on the tongue. Again move the square along the stick until the 6-inch point on the blade comes to the 12-inch mark. Then use the knife again at the 12-inch point, repeating the operation 12 times, as there are 12 feet between the beams. This is indicated in Fig. 1 of the sketches. Now we have obtained the top bevel for the shoulders of the brace by the only draft we have made. But the tongue will not give us the bottom cut. No, but if we move the square along once more, making 13 times in all, until the 6 inches on the blade is brought up to the last point made and then scribe along the edge of the blade, we will have the shoulder for the bottom, and it will be the same as at the top. Now allow for a tenon and the brace pattern is made. The purlin brace is obtained in the same way as the length of a common rafter, with the exception that we use the pitch of the roof for the shoulders against the purlin. "J. C. W." says that at present he obtains his lengths by drafting, but thinks it would be a much better way to work from a square alone. For my part I would rather work out the work complete to a scale of 3 inches to the foot, and when done I am at liberty to answer all questions put to me, and can give lengths and bevels for every stick used in the construction. When doing so I do not have to stand and scratch my head for five minutes before I can answer a question. The sketches which I send clearly show how to obtain the length and shoulders for a brace set up between two beams, but I prefer drafting to obtain it.

Design for a Barn Wanted.

From O. G. C., *Elmdale, Kan.*—I would like to have some of the readers of *Carpentry and Building* furnish plans for a barn about 32 x 36 x 14 feet, balloon or lumber frame, and hip roof, with deck about 10 feet wide. I would like to see something from the readers in the next number if possible.

Note.—We trust those who have erected barns of the character named will forward drawings with descriptive particulars for publication. Pencil sketches, tracings or blue prints to any convenient scale will serve for purposes of reproduction.

Making Blue Prints.

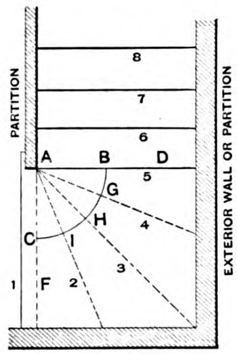
From J. A. H., *Brooklyn, N. Y.*—Will you please publish in *Carpentry and Building* the method used by architects in making blue prints; also, can you tell me how I can print upon ferro-prussiate paper a drawing made on egg shell half imperial paper?

Note.—If our correspondent will refer to the March issue of the paper he will find a somewhat lengthy description of the process of making blue prints as generally practiced at the present day. What is there presented so thoroughly covers the question that it seems unnecessary to repeat a description of the process at this time.

With regard to the second question of our correspondent, we would say that the easiest way of obtaining on ferro-prussiate paper a print of a drawing made on egg shell half imperial paper is to make a tracing of it, and from the tracing obtain a blue print according to the method described in the March number of the paper. It is impossible to make the print direct, as the egg shell paper is too thick to transmit sufficient light to give sharp lines.

Winding Stairs.

From H. D. F., *Easton, Pa.*—I inclose diagram in answer to the inquiry of "B. G.," Williamsport, Pa., whose letter appeared in the issue of *Carpentry and Building* for November of last year. After the partition studs are in place take a pair of compasses and mark a quarter circle, as indicated in Fig. 1 of the sketches. Set one end of the compasses at A and strike the arc from B to C. The circle may be of any diameter; the larger the better. Take the dividers and space the quarter circle into four equal parts, after which take the square and mark the shape of treads by striking from A to G, from A to H, from A to I and A to F. The risers are obtained in the same way as on a straight flight. For a double winder it is necessary to continue the quarter circle, as indicated in Fig. 2 of the sketches. In this case it will be seen that the circle is continued from C to G. This is then divided into equal parts in the same manner as described in connection with the previous figure. If a four-tread winder is desired, divide into four equal parts, while if a five-tread winder is called for, divide into five equal parts, always being careful to make the divisions exact. This rule will hold good in any winder, from two up to any number that can be put in. In regard to the tread below, it is always necessary to allow the thickness of partition and plaster, so that the nosing of the tread will extend beyond the casing after the tread is on.



Winding Stairs.—Fig. 1.—Diagram Showing Method of Laying Out a Four-Tread Winder.

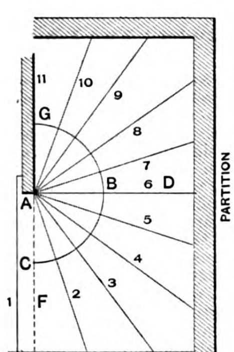
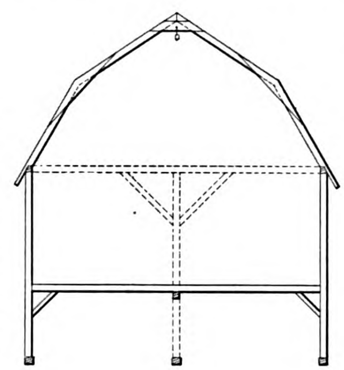


Fig. 2.—Method of Laying Out a Double Winder.

Self Supporting Roof.

From J. B. Y., *Peru, Ind.*—I send herewith a sketch of a self supporting roof of a stock barn. It is in answer to the inquiry of "J. W.," Fort Snelling, Minn., whose letter appeared in the issue of the paper for March of last year. About two years ago I erected a barn 30 x 50 feet, after the style shown in the drawing, and it has proven a grand success. It is not, however, the first of its kind erected in this part of the country. The man who owns the building says if he had 100 barns built every one would be constructed with the form of roof shown in the sketch, which represents one of the intermediate bents. There is nothing in the way of putting in hay from the floor, 8 feet from the sills to within 3 feet of the comb of the roof, except one cross tie and one post. There are braces or clamps fastened to the three joints of each set of rafters. They are 1 inch thick and about 12 inches wide in the widest part. The pieces are fastened on both sides of the rafters, two at a joint, with as many 10d nails driven in as good judgment dictates, in order to make each joint solid and strong. In the building I erected the rafters were 2 x 6 inches, but in "J. W.'s" building, 50 feet wide, they should be at least 2 x 7. All the rafters in my building are 12 feet long, the top ones being one-third pitch, placed 25 feet apart at the bottom. The rule I have is this: The top set of rafters should cover two-thirds of the width of the building and be one third pitch, while the bottom rafters should be of the same length as those above, including the lower end, which projects beyond the building about 2 feet. Each set of rafters is braced lengthwise of the building with 1 inch boards about 6 inches wide and 12 feet long. They cross each other at an angle of about 45°, and are well nailed underneath the rafters. They meet at the bottom and also the top ends of the crosses, making a solid brace the whole length of the building. I tied the center of the plates with a cross beam represented by the dotted lines. There is also a post placed under the center of the tie beam with long braces to keep the center of the building, especially the roof, from wearing sidewise at the center. This post and braces are also shown by dotted lines. I have been told by those who pretend to know, the owner of the barn included, that the tie in the center of the plates is not necessary because the rafters do not have a tendency to push the building apart. I contend that it is necessary, for at least two reasons: 1, the plates should be the same distance apart at the centers as at the ends, and, 2, by placing a post in the center the advantage of long braces is secured. I also claim that the weight of the roof on the longer rafters presses in on the roof of the building as much as the upper set of rafters have a tendency to push outward. The weight of the top section of the roof being tied by collar beams also has a tendency to cause the lower rafters to push in at the top, and as the rafters are well tied together the roof presses directly downward. The end bents have middle posts with upper cross ties within 6 or 8 inches of the plates. There is a middle tie under the cross ties, which runs lengthwise of the building between the center posts. There is, too, a set of ties running lengthwise of the building parallel with the center tie and the same hight from the sills. These three sets of ties support the joist on which the hay floor is laid. All the ties have braces, as shown in the drawing, and there are also braces at the top of the posts with the same run—2 feet.



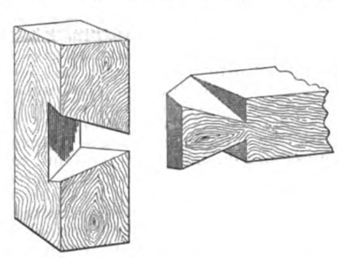
Self Supporting Roof as Constructed by "J. B. Y."—Scale, 1-16 Inch to Foot.

A Dovetail Puzzle.

From J. P. M., *Halifax, N. S.*—I send a solution of the dovetail puzzle given in the last number of the paper. The puzzle was solved by me more than 30 years ago.

From F. S. S., *Sharonville, Ohio.*—In the last issue "M. A. W." of Evanston, Ill., presents a sample of double dovetailing concerning which he possibly would like to convey the idea that it is an invention of his own. This identical puzzle appeared in *Carpentry and Building* for June, 1883, and I made a sample of it, which I have kept. I have been a subscriber to the journal since 1880, and as soon as my eyes met the picture of the dovetail my memory ran back to the time named. I herewith inclose a tracing of the puzzle as it appeared in the June issue for 1883.

Note.—The illustration which we present herewith represents the two parts of the dovetail and will enable those who have been curious as to its formation to see how it is made.



Dovetail Puzzle.—The Two Parts of the Dovetail Separated.

Framing a Complicated Roof.

From F. C., *Junction, N. J.*—In the March number of *Carpentry and Building* "H. I. P." shows the plan and describes the way he would frame the roof for which "W. B. S.," Flemington, N. J., asks for suggestions. The plan looks very well on paper, and would seem to make a straight job, but my humble opinion is that "H. I. P." would have some difficulty in framing the roof as he shows it, unless he is willing to have the rear of the main roof askew. I have found in my limited practice that on intersecting roofs of the same pitch the hips and valleys must run at an angle of 45° to the plate. I hope that "H. I. P." will give us a little more light on the subject, and would also be glad to hear from other readers of the paper.

Power of Different Forms of Hoisting Apparatus.

From W. I., *Mount Vernon, N. Y.*—In answer to "L. H. H.'s" letter in the December number, regarding the respective powers of two different arrangements for raising weights, I submit a diagram which exhibits the powers obtained by the arrangement that he shows, and also of a simple winch with single sheave. It will be noticed by referring to the diagram, Fig. 1, that the power of the arrangement shown in Fig. 2, which is indicated by the heavy solid line, constantly in-

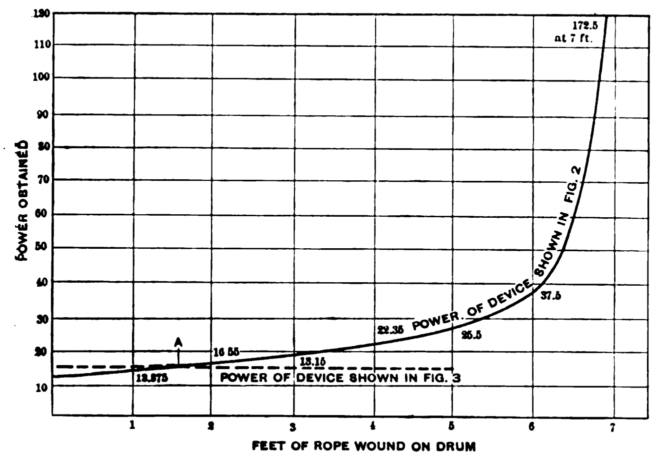


Fig. 1.—Diagram Showing Relative Power of Each Form of Apparatus.

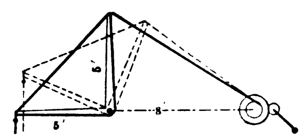


Fig. 2.—Device Suggested by "L. H. H."

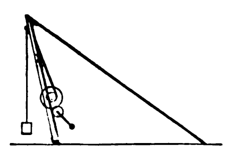


Fig. 3.—Winch with Single Sheave.

Power of Different Forms of Hoisting Apparatus.—Diagrams Accompanying Letter of "W. I.," Mount Vernon, N. Y.

creases as the rope is wound in, while the power obtained by the use of the method shown in Fig. 3 is a constant quantity. It is assumed that the winch in each instance is geared to give a power of 5 to 1, and with the leverage due to the length of the handle, an advance over the load of 15 to 1 is obtained. This advantage of 15 with the winch and single sheave, shown in Fig. 3, remains the same, no matter to what point the load is raised or lowered. Inspection of the diagram shows that at the start the advantage obtained by the device represented in Fig. 2 is less than that of the winch and pulley, Fig. 3; so much so that assuming that a man could lift 270 pounds with the simple apparatus, he could lift at the start only 225 pounds with the more complicated machine, Fig. 2; but as the load was raised his lifting power would become greater, so that when he had wound in 1 foot 7 inches of rope, indicated by the point A on the diagram, Fig. 1, he would have a lifting power of 270 pounds, the same as the single arrangement would give. When 6 feet of rope had been wound he would be able to lift 675 pounds, and at 7 feet 3105 pounds, but it is obvious that these powers obtained in the latter part of the lift would be of no use if he could not start the load—that is, 270 pounds—which he could do if he used the simple sheave. This shows that the apparatus represented in Fig. 3 has the advantage in actual lifting power over "L. H. H.'s" device, although in practice his apparatus might prove the more convenient, owing to its reaching over and afterward conveying the load inboard. It should also be noticed that in one case it is necessary to wind 7 feet 5 inches of rope in order to raise the load 5 feet, while with the simple apparatus 5 feet of winding produces the same result.

Cut Versus Wire Nails.

From F. K., *Louisburg, Wis.*—In regard to the wire nail question discussed in *Carpentry and Building*, I do not see why it is that some of my fellow chips seem to like wire nails better than cut nails. The only thing I can see is that they are a little easier to drive and handle than the cut nails. In my estimation wire casing nails are no good at all, and if used for interior finish and the wood becomes a little damp from the plaster the nails pull out almost before they can be painted. One cut casing nail will hold more than two wire nails according to my way of thinking. My experience is that for laying flooring the wire nail is altogether unsatisfactory.

Tool Chest Dimensions.

From J. L. L., *Waxahachie, Texas.*—In answer to the question of "E. H." of Hewey, Ill., in regard to the inside dimensions of the tool chest in question, I would say that it is made in three sections, the first or bottom section being 11 inches deep by 20 inches wide by 34 inches long. The top sections are the same size, each measuring 11 inches deep by 10 inches wide by 34 inches long. Thus when the box is closed the net measurements are as follows: Depth 22 inches, width 20 inches, length 34 inches.

Binding "Carpentry and Building."

From S. J. H., *Meadville, Pa.*—I have been a reader of *Carpentry and Building* for years and wish to tell what I do with the copies at the end of the year. I commence and glue the supplement plate in place with the description of the building it represents. Then I cut off all advertisements, which I do not care to save, so as not to make the book too large. I then secure a piece of strong cloth and turn to the center of each paper, commencing with January, and sew each number to it. Next I take a piece of cheap muslin and a large piece of drafting paper, which I cut in four pieces the size of the book. I take two pieces and glue them together, putting a piece of muslin between them and the edge of the piece of cloth to which I sew the papers. I then treat the other side in the same manner, after which I take a piece of paper and glue on the cloth, allowing the edges to extend about 1½ inches over the back already made. I have no fine Morocco binding, but for wear and cost my plan is admirable.

Howe Truss.

From M. E. O'C., *Porter's Mills, Wis.*—I notice that one of the correspondents wants to know how to make a Howe truss. I hope some one of the subscribers will give us a working plan of such a truss with explanations of its principles, why it is called a Howe truss and other particulars. I would like to know how to build such a truss myself, and will be thankful for the information.

Design for "Two-Tenement" House.

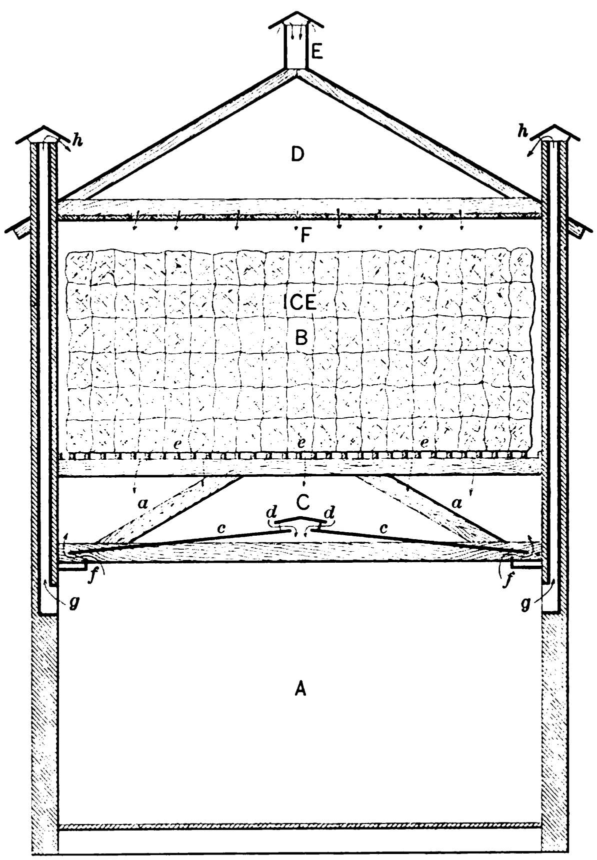
From SUBSCRIBER, *Johnston, R. I.*—I want to build a two-tenement house, but I do not see any which exactly suits me. Will some one please give me a design for a house with six rooms and bath on a floor, the end of the building to front on the street? I would like double doors at the entrance. I do not care so much about the appearance of the outside, but desire to get floor plans for a building about 26 x 38 feet in size.

Note.—Our correspondent does not sign his full name, so we are unable to address him by letter for more specific information touching his requirements. He states that he desires to build a "two-enement" house, but omits to tell what the means thereby. The phrase is apt to be interpreted differently according to the section of country in which the reader lives. In some localities a two-tenement house is understood to mean one having accommodations for two families, but divided in the center so that each family has a separate entrance, and two or more floors, according to the hight of the building. This, however, in certain places would also be designated as a double or twin house. In other localities a two-tenement house is regarded as a dwelling in which one family occupies the lower floor and another family the second floor, but each having a separate entrance, while in still other localities the arrangement is practically the same as this, except that one entrance answers for both families. The latter arrangement is the one which largely prevails in the locality from which our correspondent writes, and we assume that it is the one covered by his inquiry. We present the matter to our readers, with the invitation to contribute drawings to meet the requirements of the case as they understand them.

Cold Storage Buildings.

From M. E. O'C., *Porter's Mills, Wis.* —As I am benefited by the many good things to be found in the Correspondence Department of the paper, I feel as though I ought to contribute something to its interest, and send by this mail a drawing and explanations of a cold storage room asked for in the January number by "A. G. M.," Beaver Dam, Wis. I hope they will be of some service to him, as well as to the great army of readers. Referring to the accompanying sketch, A indicates the cooling room; B, the ice loft; C, the cold air chamber; D, space above the ceiling joists; E, injecting ventilator; F, space between the ice and ceiling; *a a*, framed truss supporting ice; *c c*, water tight floor inclined from the center; *d d*, aperture for heated air to pass to the ice; *e e e*, slatted floor under the ice; *f f*, conductors for melted ice and air apertures; *g g*, openings for foul air, and *h h*, ejecting ventilators.

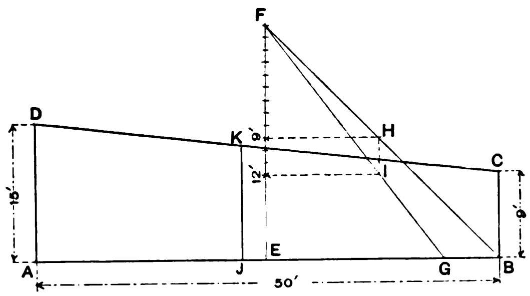
In a general way it may be stated that the atmospheric air passing through E fills the space D. Above the ceiling and between the ceiling joists should be loose shavings, the object being to allow the air to pass in finely divided currents from the space D to F. The distance between the ice and the ceiling, forming the space F, should be 2 feet. The ceiling should be made of common boards, the air passing through the joints. The air on entering the space F comes in contact with the ice, which cools it and then by its density descends through the slatted floor under the ice, then passes through the apertures *f f* to the cooling room A. From this place it ascends to the roof through the passages *g g*.



Sectional View of Cold Storage Building.—Contributed by "M. E. O'C."

Solution of Roof Problem.

From W. B., *Alfred Center, N. Y.*—I send herewith a sketch and description of one way to solve the roof problem proposed by "C. A. J." Many of this class of problems can be solved graphically, and I believe would interest the readers of the paper more than the mathematical formula. Referring to the sketch, A B C D represents the plan of the roof as submitted by "C. A. J.," the dimensions being as follows: Length, 50 feet; width at one end, 15 feet; width at the other end, 9 feet. Now, to find the line J B, divide the area A B C D into two equal parts, bisect A B at E and erect the perpendicular E F. Connect F with B, forming the right angle triangle E F B. Now add together both ends, 15 and 9, which makes 24. Divide this result by 2, which gives 12. Now begin at F and lay off 12 equal spaces on F E, as shown. At the ninth division produce the perpendicular from 9 to H. Now from the twelfth division produce the line from 12 to I and join H I. Draw the line from F through I to G. Bisect the line A G, which will divide the area A B C D into two equal parts.



"W. B.'s" Solution of Roof Problem.

Automatic Ventilation of Dwellings.

From B. N., *Minneapolis, Minn.*—It has always been a source of surprise to me, in looking over the literature pertaining to hot air work, that so little is said by manufacturers and writers in general on the subject of ventilation. My opinion is that if this matter was given more attention there would be less complaint about hot air furnaces, provided, of course, that the furnace had enough heating surface to warm the air. In this locality we are forced to use ventilating devices in connection with hot air furnaces or they would not give satisfaction. Here nearly every house of the better class is back plastered, has matched sheathing and building paper under the clapboarding, is fitted with double windows and provided with storm doors or vestibules. We build as nearly air tight as possible, so that it is absolutely necessary for us to have an exhaust in order to maintain a circulation of air. Believing that what we have been obliged to do may be of benefit to wide awake mechanics in other localities, who sometimes strike knotty problems in heating to be overcome, I will briefly set forth our method of securing automatic ventilation and circulation.

The method of which I write was introduced here some years ago by a Mr. Tilden, and is now used with various modifications by all of the leading hot air contractors. By this system the chimney flue of the furnace is made to serve the double purpose of furnishing draft for the furnace and an exhaust for ventilating pipes. For the purpose of illustration we will take a ten-room house, which is to be heated by a hot air furnace and ventilated. A large sized flue must be constructed for this purpose. It will not work if an ordinary 8 x 8 inch flue is taken. This would only furnish draft for the furnace and nothing more should be expected of it. The flue should be 12 x 16 inches, to make a really good job, in which to build an 8 inch tile stack as a special flue for the furnace. This heats the space around it into which the ventilating pipes are run. A good job, but not so permanent, can be done with a 12 x 12 inch chimney flue, with a 9-inch stack of No. 16 galvanized iron up the center for the furnace, with the ventilating pipes running into the surrounding space. Some very successful jobs have been put in with the ventilation running in the same flue as the smoke, but the flue in that case should be at least 12 x 12 inches, and a damper is required in the main ventilating pipe to shut off the air when starting a fire or when the draft is poor by reason of atmospheric disturbances.

Now, as to the arrangement of the ventilating pipes in the house. These are of tin and are usually 3½ inches in diameter. They run from the baseboard of each room to the cellar, with 4½ x 6½ inch faces at the baseboard. In the cellar they connect with a main pipe which runs to the chimney. This is done when one flue is used for both smoke and ventilating. When the ventilating shaft is separated from the smoke flue, the vent pipes are run independently to the ventilating flue by short connections on each floor. By this arrangement an automatic system of ventilation and circulation is secured, which begins to operate as soon as a fire is kindled in the furnace, creating an upward draft in the chimney.

If the house is built with only an 8 x 8 inch flue for the furnace it should not be used for ventilation. In such a case the ventilating pipes should be run to the attic, connected into one main and run through the roof, because the flue is not large enough to serve for both purposes and the furnace will not heat on account of insufficient draft.

Quantity of Lime or Cement in a Barrel.

From H. C., *Victoria, B. C.*—Will the editor kindly furnish me information regarding the quantity of lime or cement in a barrel, as I am certain it will prove useful to others—especially in my locality? The first question is the number of cubic feet in a barrel of cement; second, the number of bushels in a barrel of lime; and third, the number of barrels or bushels in a load of sand.

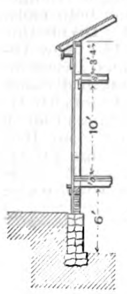
Note.—In many parts of the country, especially in localities somewhat remote from the large cities, lime is delivered in bags, but where barrels are employed the capacity is about 2 bushels. A barrel of cement contains anywhere from 4 to 4¼ cubic feet, while a load of sand is generally recognized as consisting of 1 square yard. In the larger cities the sand is usually delivered in box carts which are so made as to render measurement rapid and easy, owing to the fact that the capacity of a cart is exactly 1 square yard.

Elevations of a Six-Room Cottage.

From G. L. H.. *Torrington, Conn.*—In answer to the request of "Hawkeye" for elevations to floor plan for six-room cottage submitted by him in the December issue of *Carpentry and Building*, I forward the inclosed, which may prove of interest. The drawings consist of front and left side elevations and are of such a nature as to render extended remarks unnecessary.

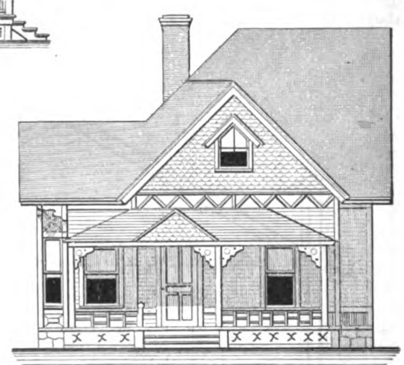
From D. B. C., *Poughkeepsie, N. Y.*—Inclosed I send front and side elevations for the floor plan of "Hawkeye" published in *Carpentry and Building* for December last.

Side (Left) Elevation, Submitted by "D. B. C."

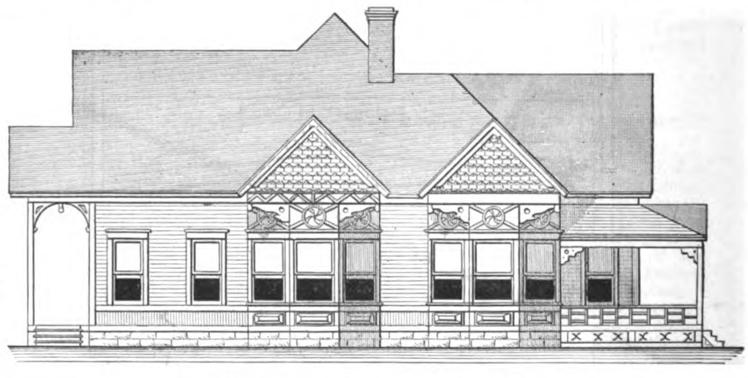


Section.

Front Elevation, Submitted by "D. B. C."



Front Elevation, Submitted by "G. L. H."



Side (Left) Elevation, Submitted by "G. L. H."

Elevations of a Six-Room Cottage.—Scale, 1-16 Inch to the Foot.

A Smoky Fire Place.

From THE MILLER GRATE COMPANY, *Cleveland, Ohio.*—We notice in *Carpentry and Building* for June a communication from "J. A. S.," Fairfield, Iowa, in regard to a fire place which smokes. If "J. A. S." will fill the hollow space of back and sides to top of lower damper we think he will find the remedy for his smoking fire place.

METHODS OF HANDRAILING.

THE SUBJECT of stair building in all its various phases is one of never ending interest to the ambitious, wide awake and progressive carpenter, who takes delight in poring over the literature bearing on the science both past and present and comparing the different methods of executing work. When these methods are presented in compact form, enabling the reader to more readily grasp the salient features of each, their value is correspondingly increased and the profit of the reader augmented in the same degree. In the series of articles commencing with this number past and present methods of handrailing are discussed in a way which we hope will prove alike entertaining and instructive to a large class among our readers, more especially to the younger element who have chosen the building trade for their profession in life. The articles have been prepared by J. V. H. Secor, well known as the author of an important work on stair building and he has handled his subject in a way to command the attention of old and young alike.

The present article is intended to elucidate the principle of hand railing in vogue something like a half century ago, founded on Peter Nicholson's system of resting points and the falling mold, as compared with the present tangent system, about which so much has been said during the last few years.

To draw the ground plan of a rail and the falling mold to accompany it over a semicircular plan with windows, proceed as follows: Referring to Fig. 1 of the cuts, lay down the line of the string *v u w* in the ground plan as a commencement. Determine the diameter of the baluster, in order to find the center of the rail, for the center of the rail must stand over the center of the baluster in the ground plan, or the balusters will not be plumb when set.

Having thus determined the center of the rail, lay off half the diameter each side of the center and sweep with the compass the outer and inner semicircles, which will be the outer and inner edges of the ground plan of the rail *a b c* and *r s*. Add on a short piece of straight wood, say *a x* and *c y*, at a tangent to the point *a* and *c*, and the ground plan will be complete. Now find the stretchout of the convex side, as shown at *k l*; at *l* erect a perpendicular *l z*, equal to six risers, as contained in the cylinders, then at the points 6 and 12 apply the pitch board of the flyers, as shown along the points of the treads and the risers. The directions of the straight rails being determined, draw the indefinite straight line 13 *k*, extended to *j*, cutting the end of the stretchout at *k*, and you will have the general direction of the rail; now put in the easings at the angles *k* and 13 and the under side of the falling mold will be complete; now set off the thickness of the rail above and draw the upper line of the falling mold. Mark the joints at *s* and 6 and the falling mold will be complete.

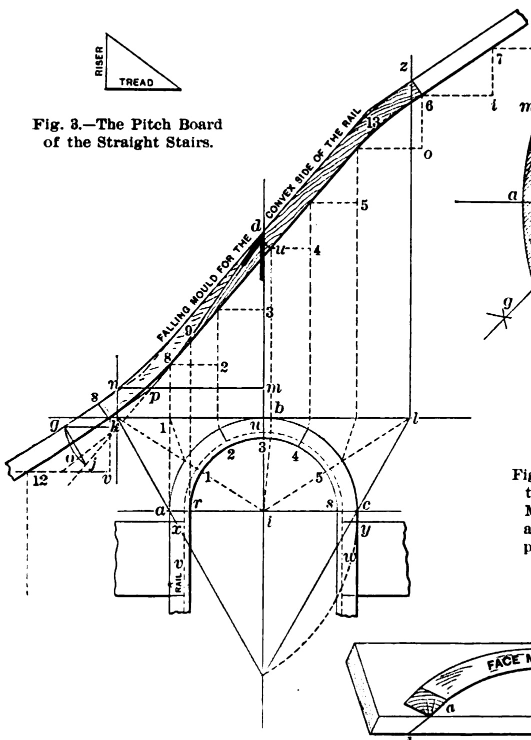


Fig. 3.—The Pitch Board of the Straight Stairs.

Fig. 1.—Plan of Semicircular Stairs, with Elevation of the Risers and the Falling Mold.

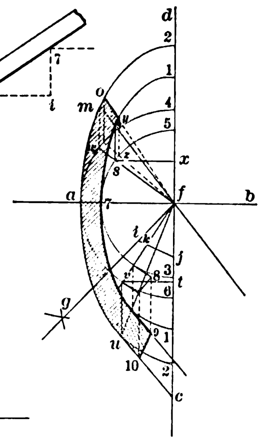


Fig. 2.—Ground Plan of the Rail and the Face Mold for the Wreath, as shown by the shaded portion.

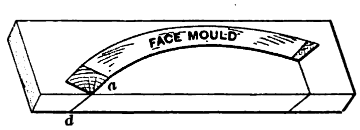


Fig. 4.—Application of Face Mold to the Upper Surface of Plank.

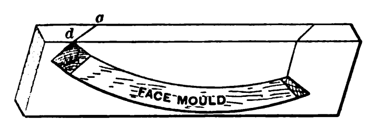


Fig. 5.—The Plank Reversed and the Mold Marked.

Methods of Handrailing.—Diagrams Illustrating Article of Mr. Secor.

REMARKS.

There are various ways of drawing the center joint in the circular part of the rail. Some stair builders divide the angle by a line that the outer and inner falling molds make in crossing each other in the center, and then make the joint at right angles to this line, which equally divides the splice that would be in one side of the joint, if the joint was made perpendicular to the other. This would appear to be the best plan, and may be readily done where there is but one falling mold by taking the stretchout of the other side of the rail and setting up the hight, which will give the under line of the falling mold and divide the angle as aforesaid.

The reader will observe that we have placed the treads and risers underneath the falling mold corresponding to the stretchout of the convex side of the rail, not that they have any business there as belonging to the drawing of the falling mold, but that the reader may see them in connection with the rail, and more particularly to impress upon his mind one fact—that the real hight of the falling mold is not the hight of six risers, but a fraction less, and the falling mold is said to cover from center to center of the joint; and all hights are measured from top to top of the falling mold, as at *n* and *d* measured through the center of the joint.

DRAWING THE FACE MOLD.

Referring now to Fig. 2, draw indefinitely two straight lines passing through the points *a b* and *c d*, making them at right angles to each other and intersecting at the point *f*. Then with the point *f* as a center and with radius of the ground plan sweep the semicircles 6 *a* 4 and 3 7 5. Draw the line *g f*, dividing the quarter circle in two equal parts. One of these parts is, of course, equal to one-eighth part of the base of the cylinder.

Then in the falling mold, Fig. 1, extend the bottom line of the rail 13 *k* to *j* indefinitely, and the angle at *k* formed by these lines is equal to the angle that a full easing would make. Then at any convenient distance from *k* draw the arc and chord *g j* of Fig. 1.

Through the triangle *g j k*, from the point *k*, draw *k o*, cutting the base *g j* in *o* and parallel to the easing *n s*. The points *n* and *s* are the tips of the straight wood. The angle *o k j* is equal to the angle of the departure of the easing *a n*, plus half the angle of the departure of the straight wood.

Take the chord *g j* in Fig. 1 and transfer it across the angle *g f c* in Fig. 2, say from *i* to *j*, making *f i* equal to *f j*. Also, transfer *j o* in Fig. 1, from *i* to *k* in Fig. 2. Then through *k* draw the line *f k*, and extend it to *v*, cutting the curve at *v*. Then set one-fourth of the circle around from *v* to *w*, and *v w* will be the ground plan of the rail that will give the easing required, the position of axis of the ellipses being first laid down.

In order to find the inclination of the transverse axis of the ellipses for the face mold, draw *k n*, in Fig. 1, perpendicular to *k l*, cutting the top of the falling mold in n; from the point n draw a line parallel to $k\ l$, cutting the line $i\ d$ in m; then $m\ d$ will be the hight of the falling mold from n to d. In Fig. 2 draw $v\ t$ and $s\ x$ parallel to $a\ b$; take the distance between these two lines, say $t\ x$, and set it from m to p, Fig. 1, on the line $m\ n$ in the drawing in the falling mold. Then draw a line joining d and p, Fig. 1, which will give the inclination of the transverse axis of the ellipsis to be drawn.

To find the transverse axis of the ellipses of the face mold, draw the lines a 8 and r 9, Fig. 1, parallel to $i\ p$, cutting $d\ p$ in the points 8 and 9; then d 9 will be the semi-transverse axis of the short ellipsis, and d 8 that of the long ellipsis. As $i\ r$ and $i\ a$ are halves of the diameters of the circles supposed to be made by cutting a hollow cylinder at right angles to its axis, it is evident that d 9 and d 8, when the cylinder is cut obliquely to its axis, are halves of the transverse axis of the ellipses standing over these circles.

Having determined the lengths of the transverse axis of the ellipses of the face molds, transfer the distances, d 9 and d 8, in the drawing of the falling mold, from the center f, in Fig. 2, each way on the line passing through c and d, to the points 1 and 2, which give the lengths of the transverse axis, and f 7 and $f\ a$ will be the semi-conjugate axis of the ellipses. Now with trammel or string sweep the ellipses.

Next find the length of the face mold that will cover the ground plan $v\ a\ w$, when the face mold is raised to its proper position. From the tips of the ground plan v and s draw the lines $v\ u$ and $s\ s$ parallel to the transverse axis, cutting the curve of the outer ellipses in u, and that of the inner at s. Then from the points u and s draw lines to the center f, completing the curved portion of the mold. Add on the straight wood v 8, at right angles to $v\ f$ in the ground of the rail, Fig. 2, and equal to $a\ x$ in the ground plan of the falling mold, Fig. 1. Transfer this straight wood to the face mold, as shown at u 10, parallel to the semi-conjugate diameter $m\ f$. This may be found also by drawing from v 8 to u 9, and parallel to the transverse axis. For the overwood necessary to make the center joint, let fall from the tip of the falling mold the dotted line to the ground plane at d. This is to be put on the face mold, as shown at $m\ o$.

APPLICATION OF FACE MOLD TO PLANK.

The first consideration in applying the face mold to the plank is the manner in which the mold can be best applied to save stuff. This will much depend on the judgment of the stair-builder. If the stuff is of medium width, the best plan is to joint and square each edge of the plank, and to these apply the tip of the straight wood to the edge of the plank, keeping the other end of the mold back from the edge, as in Fig. 4, and then reverse the mold and apply it to the other side of the plank, as in Fig. 5. It must be borne in mind that in all cases the exact position of the mold as regards the transverse axis of the ellipses must be adhered to, and the small end of the mold must be kept as far back from the edge of the plank as it would be from a line drawn from the tip of the straight wood parallel with the transverse axis in the drawing of the face mold.

Having found the position of the mold on the plank, apply the down bevel as at d in the elevation of the falling mold, and shown at $a\ d$ on the edge of the plank, Fig. 4. Apply the mold as shown and mark along the edges, then turn the plank over and apply the tip of the straight wood at d, and the small end the same distance back as on the other side and mark where it will be ready to saw out. This is a very tedious operation, and with the waste of material also taken into consideration, it is not strange that it should have dropped out of use by those who are more progressive in their ideas.

(*To be continued.*)

Justinian as a Builder.

Whatever were the views of Justinian, the number of buildings which he erected. even taking into consideration the resources of a long reign, almost exceed belief. And of these architectural labors it has been too harshly said "that they were cemented with the blood and treasure of his people." His pious munificence was seen in the construction of churches, while almost every city in the empire obtained the solid advantages of bridges, hospitals and aqueducts, and he consulted his own ease in the restoration of the palace at Byzantium. There was everywhere, says the *Architect*, a display of magnificence and of the most costly ornaments. But it is in the temple, now the mosque, of St. Sophia, which was originally raised by Constantine, but rebuilt from the foundations by Justinian, that we are to look for all the skill, taste and munificence of the age. It had been twice destroyed by fire, but it was now to rise resplendent on an improved and extended scale. The principal architect was Anthemius, who presided over the imperial works. He formed the design, and it is said that his genius directed the hands of 10,000 workmen. Justinian, clad in a linen tunic, every day surveyed the rapid progress, and six years had not elapsed when he had the happiness to behold its completion, and to assist at its solemn consecration. After some years, however, an earthquake overthrew the eastern part of the dome. The perseverance of the same prince again restored its splendor, and in the thirty-sixth year of his reign he celebrated the second dedication of a temple which, after twelve centuries, remains a stately monument of his fame. Of this celebrated structure, of its aërial domes lightly reposing on its arches, its columns of granite, of porphyry and of green marble, its semi-domes, its walls incrusted with marbles, its various members, admirable by their size and beauty, and all embellished by a rich profusion of jaspers, gems and precious metals, it is not necessary to repeat the descriptions which many authors will supply. But though this venerable pile, which could excite the admiration of the Greeks, even now, as shorn by Turkish fanaticism or the corrosion of time of its more perishable ornaments, continues to furnish a rich repast to the curiosity of the traveler, it is generally agreed that a striking deficiency is often perceptible in the combinations and contrasts of parts, and that Anthemius, had he been content to copy the exquisite models which in his time still adorned the cities of Asia Minor and the provinces of Greece, might have produced a work which would at once have been more sublime and beautiful. But for this a refined nicety of taste was necessary, which was no longer to be found.

TO SHOW how few and simple words may constitute a binding legal contract, the *Australasian Builder* tells the following amusing story: An architect under cross examination in the witness box averred most positively that he could build a house according to the designs exhibited in court for what appeared to be a very inadequate sum—let us say £2000. "You are quite sure," said the presiding judge, "that you can build the house properly for that sum, within a reasonable time—in fact, you are ready to do so?" "Perfectly, your Lordship." "And you would undertake that there should be no extras?" "Certainly, my Lord." "Very well," said the judge, "that is precisely the kind of house I want myself; on the rising of the Court, I will give you a check for the amount; build the house, and let me know when it is ready!"

Philadelphia Trades School Commencement.

On Wednesday evening, June 20, the fourth annual commencement exercises of the Master Builders' Mechanical Trades School were held at the Master Builders' Exchange, Seventh street, Philadelphia. The exhibition rooms of the exchange were lighted up for the inspection of the visitors and the exterior of the building was tastefully decorated in honor of the occasion. The programme was simple, consisting of brief addresses by Franklin M. Harris, president of the exchange; George Watson, chairman of the Trades School Committee, and Stacy Reeves, representing the school. Director of Public Works James N. Windrim then addressed the students in an effective speech, in which he said that the time had now passed when America was compelled to draw upon England, France and Germany for their skilled artisans. The American youth, he said, have now learned how to work, which is the best capital for a young man. He has knowledge which cannot be lost in speculation, which will increase to the exact value the workman himself puts upon it. Therefore, he continued, every young artisan should set himself a high standard of excellence in his work. His aim should be to be the first in his chosen occupation, to be the best workman, to be a master workman. He rejoiced that the trades schools of America, under the guidance and teaching of skilled men, are providing workmen from our own people who will be able to compete with the highest skill of the nations of the world.

Following the addresses, the graduates of the several classes were presented with their certificates. The numbers graduating from the different classes were as follows:

Carpentry	14
Bricklaying	6
Stone cutting	2
Blacksmithing	2
Painting	3
Plumbing	19

The school will commence its fifth session this fall, when a large attendance of pupils is assured. Its success so far has been remarkable. Graduates from the various branches of trade taught have almost without exception obtained remunerative positions, in which they have done great credit to the training received in the trades school.

CLAPISSON, the French musical celebrity, is said to be building a chateau composed entirely of buttons. The walls, the ceilings, the doors, the exterior, the interior, are all ornamented with this novel element of architecture. Buttons of every description, from the very origin of their invention up to those of the present day, have been employed in the arabesques and ornamentation of the walls. Every country has been ransacked, and some curious specimens have been brought to light. Those dating from the lower Greek Empire are of the most curious manufacture.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President, Noble H. Creager of Baltimore.

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

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

LIST OF DIRECTORS.

E. L. Bartlett	Baltimore.
E. Noyes Whitcomb	Boston.
W. D. Collingwood	Buffalo.
William Grace	Chicago.
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Arthur McAllister	Cleveland.
Alex. Chapoton	Detroit.
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Luther H. Merrick	Syracuse.
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Chas. A. Vaughn	Worcester.

The Uniform Contract.

The use of the Uniform Contract is steadily extending as the knowledge of its existence and equitable conditions becomes more universal. The work of the secretaries of the filial bodies in urging the form upon the attention of the architects in their several localities has been fruitful in bringing the document into increased use. Letters which have been received by the secretaries of the New York and Boston exchanges from those in the trade who have made a practice of using the contract, speak in very complimentary terms of the satisfaction it has given, and tend to show the value to the fraternity of the action of the National Association of Builders in urging the local secretaries to keep the form continually before their members and the architects of the different cities. The value of the work and the benefit of the universal adoption of a standard form of contract are self evident.

Code of Practice.

The following code of practice for sub-estimating and sub-contracting, based upon the recommendations of the National Association of Builders, has been submitted to the members of one of the filial bodies for adoption.

This form presents certain improvements over the old code recommended by the National Association of Builders and inasmuch as it embodies the principles advocated by the national body, arranged for use by one of its local exchanges, it is given in full for the benefit of the other filial bodies.

Article X of the by-laws of the exchange to which this code is submitted is as follows:

COMPLAINTS.

If any member of the association be accused by any other member in writing, over his own signature, of acts such as the directors in secret session may decide as acts of a character demanding investigation, the said member may be summoned to appear before a special meeting of the corporation in his own defense, when, upon a fair and impartial hearing he may, by a majority vote of the members present, be acquitted of the charge, or censured, suspended, fined, or expelled from the association. The accuser in such case shall also be summoned to the hearing, and in event of his failing to appear or to show that the charges were honestly made, or to substantiate them in some particular, then he shall be subject to the penalties described for the member accused.

Neither the complainant nor defendant in such cases of complaint shall be allowed to introduce any legal counsel before the meetings of the directors or the corporation, but either of the parties may be allowed the assistance of some other member of the association.

The code referred to is as follows:

OBLIGATION OF PRINCIPAL CONTRACTOR TO SUB CONTRACTOR.

A principal contractor is under obligation to treat upon an equal basis all estimates which he receives prior to putting in his own bid, and estimates must be considered as received when they come into his possession, either by his direct solicitation or by being accepted by him. The opening of a bid, knowing it to be such, constitutes receipt of the same.

A principal contractor is under no obligation to use a bid which he has not solicited, accepted or received, but if he does not wish to use the estimate of a sub-bidder he should decline it if proffered personally or should return it unopened if sent to him by mail or otherwise. The retention of a bid should be construed as a receipt of the same.

All bids should be considered confidential, and a principal contractor revealing any bid received by him to any person whomsoever, without consent of the sub-bidder, should be liable to complaint and discipline under Article X of the by-laws.

A principal contractor when making up his estimate is not entitled to receive bids from sub-contractors if he is at the same time making himself their competitor by figuring their portion of the contemplated work. It is legitimate for a principal contractor to figure all portions of work, depending upon no one for what are usually known as sub-estimates, but it is not legitimate for him to receive bids from others for sub-work if he is himself figuring those portions in competition.

AWARD OF SUB-CONTRACTS.

The principal contractor having been awarded a general contract should immediately award the sub-contracts to the lowest bidder in each branch and notify all other sub-bidders of the award.

CONTRACTS WITH SUB-CONTRACTORS.

The principal contractor, immediately after executing a general contract with the owner, should execute some satisfactory form of contract or agreement with each lowest sub-bidder, for his own protection as well as the protection of the sub-bidder.

PENALTY FOR NOT AWARDING CONTRACT TO LOWEST SUB-BIDDER.

A principal contractor, failing to award a sub-contract to the lowest sub-bidder to whom he is under obligation as previously provided, should be liable to pay damages to the said lowest bidder in amount not less than 10 per cent. of the amount of the estimate.

Payment of such damages should not relieve the principal contractor from discipline as above provided.

PAYMENTS TO SUB CONTRACTORS.

Unless the contracts made with sub-contractors otherwise provide payments during the progress of the work should be made by the principal contractor to the sub-contractors upon the same basis of payment, in relation to amount of work performed, as is prescribed in the contract made by the general contractor with the owner.

Final payment to a sub-contractor should be considered as due at the expiration of 30 days after the completion of his work and its approval, as may be provided for in the general or sub-contract.

OBLIGATION OF SUB-CONTRACTOR TO PRINCIPAL CONTRACTOR.

A sub contractor who gives a bid to and whose bid has been used in good faith by a principal contractor, should be liable to the principal contractor for damages in amount not less than 10 per cent. of the amount of the estimate should he refuse to contract at the amount of his estimate.

Payment of such damages should not relieve the sub-contractor from discipline as above provided.

OBLIGATIONS OF SUB-CONTRACTORS TO EACH OTHER.

Any sub-contractor suspected of unfair treatment of his fellow sub-contractors should be liable to complaint and discipline under Article X of the by-laws.

TRADING SUB-BIDS.

Trading upon sub-bids should be sufficient cause of complaint and discipline as provided for by Article X of the by-laws of this association.

BIDS TO ARCHITECTS OR OWNERS.

When bids for separate departments of work on a building are solicited by the architect or the owner they should be submitted with the understanding that they are direct estimates, for which direct contracts are to be made by the owner with the lowest bidder, and no other disposition of such bids should be permitted without consent of the bidder submitting the same.

SUGGESTIONS.

Envelopes with proper printed indorsements covering the conditions comprehended in this code should be prepared by the association and kept on hand for the use of members.

This code should be printed in large plain type, framed neatly, and hung in a conspicuous place in the Exchange Room, for the information of members.

Members of this association having sub-contracts to let or material to buy should as far as may be consistent with business principles deal only with members of the association, or at all events give their fellow members an opportunity to compete, and then give them the preference, other things being equal.

All bidders should take cognizance of the danger they may be subjected to through the practice, so prevalent in some architects' offices, of making changes in plans or specifications, or in both, during the progress of estimating. Correction of this pernicious practice can only be obtained by refusal by contractors to estimate under such conditions.

Preventive Arbitration.

The following evidence of the satisfactory operation and eminent practicability of arbitration, as advocated by the National Association of Builders, comes with peculiar appropriateness at this time. The "form," which has been frequently commented upon, makes labor disturbances impossible so long as both sides are willing to be fair to each other. By its use grievances, differences, &c., can be adjusted without stoppage of work and without damage to the friendly relations between employer and workmen, which should always prevail.

No more powerful plea for its adoption could be made than the example of its benefit so clearly shown in the following, which explains itself:

DECISION OF UMPIRE OF JOINT COMMITTEE, MASON BUILDERS' ASSOCIATION AND BRICKLAYERS' UNION.

ISAAC F. WOODBURY, Esq.,
Care the Mason Builders' Committee.

DEAR SIR.—I have carefully considered the arguments on each side of the contention between the Mason Builders' Association and the Bricklayers' Union No. 3, of Boston and vicinity, as given at the hearing Wednesday, June 27, and herewith state briefly the points at issue and the conclusion forced upon me.

The members of the committee of the Mason Builders' Association aver that, in consequence of the present depressed condition of business, building has decreased, values have declined, and that, at the former rate of wages and material there is no inducement for owners of real estate to venture on new enterprises. They therefore ask that the reasonable reduction in wages of bricklayers of 4 cents per hour, or about 10 per cent., be yielded from date to January 1, 1895. The present agreement is on the basis of 42 cents per hour and eight hours a day, overtime to be paid for at an added rate of 50 per cent., or "time and half," as it was expressed.

Collateral arguments and instances were adduced, but the above is the chief ground upon which abatement is asked. Selfish interest was disclaimed, and the lessened wage, the builders believed, by stimulating business, would result in more and steadier work for the bricklayers.

To which the members of the committee representing the Bricklayers' Union rejoined:

1. That the gravity of the alleged depression was exaggerated, and they endeavored to show from figures obtained at the office of the Inspector of Buildings, John S. Damrell, that the first four months of 1894 show an increase in the number of completed buildings above the same period of 1893, implying that the hard times had failed to materially injure the building business.

2. A weighty reason why wages in Boston should not be cut was their present low rate as compared with other cities of the country, New York, Baltimore, Indianapolis and Denver paying 50 cents per hour, Philadelphia 45 cents, St. Louis 55 cents and Cincinnati 56 cents, all on a day of eight hours. Buffalo pays 36 cents and St. Paul 45 cents, both on a day of nine hours.

3. The irregularity of work and the large amount of time lost through enforced idleness—not only from cessation of outside bricklaying in wintry weather but from unavoidable delay of material and waiting for other mechanics at all times—really reduces the seemingly high rate of wages to a low average. It was affirmed and not denied that the average workman does not earn over $11 to $12 per week, or about $600 per year.

Other contentions there were, but the three given cover the points deserving attention.

The amicable spirit of both parties and the evident desire to arrive at a just conclusion were manifest. In the same spirit let me consider the points raised.

I agree with the Mason Builders' committee that the present depression is serious; that buildings have been put up on speculation in excess of the demand; that new enterprises are checked, contracts are few, and that the large number of empty houses for sale and the numerous idle bricklayers are sufficient to show the situation. I am not convinced that a small abatement of mechanics' wages will stimulate new business.

The first contention of the Bricklayers' Union committee is baseless and misleading. The increased number of buildings completed in the first four months of 1894 does not disprove the great depression, for it is evident that the initiation of these completed buildings antedates the panic. If the dates of beginning and the length of time occupied in the building were given, the statistics would be found valueless in this discussion.

The second objection urged against the cut of wages proposed is the comparative low price paid in Boston when the other great cities are considered. On its face it is a strong point, but conditions are always found on examination to account for the discrepancy. If there were no counterbalancing advantages in living in Boston over living in Cincinnati, it is safe to say that with bricklayers' wages at 56 cents per hour in the latter place, as against 42 cents here, there would be a hegira of workmen from this city to that. But the fact remains that, instead, bricklayers are drawn to Boston, and, as appeared in the testimony, from cities where the nominal wage was higher.

An agreement of 50 cents per hour in Denver means nothing when building is paralyzed, as at present, and employment in that line practically suspended.

The third reason for leaving undisturbed the current pay has decided force, correcting the unwarranted conclusion that large wages per hour are necessarily large in the gross, as was satisfactorily explained, by unsuitable weather and inevitable delays from causes beyond the bricklayers' control.

I deem it unnessary to elaborate further the arguments or pleas advanced on both sides, and proceed to give the conclusion I have reached.

If the hard times and the dullness in building were caused by excessive wages paid to bricklayers and other similar mechanics, there would be ample reason for granting the mason builders' request. But it is evident that such is not the case and that some undefined cause makes the lot of both parties a trying one. Attempting to curtail the earnings of either cannot, therefore, be effective. Moreover, the mason builders have this advantage, they enjoy opportunities for profits on contracts that may furnish a fund with which to tide over such times as the present. The bricklayers have no chance for exceptional profits, and while their wages may be adequate to support themselves and families in prosperous times, they are in trouble when work fails them.

Again, for the mechanic to raise his wages is a hard and slow process, and if lowered to meet an emergency, involves great exertion to recover them as times improve. They are consequently the last item of expense to be deliberately reduced.

It may pertinently be asked, if wages were fixed at 36 cents instead of 42, who would benefit by the concession! Chiefly the mason builders who have unfinished contracts estimated at the higher figure. It would be a transfer without consideration from the laborer to the employer. New contracts would be figured on the cut rate, and, unless increased building resulted from diminished wages, nothing would be gained.

My own belief is that the primal cause of the cessation of building centers in the excessive and speculative advance in land values (aggravated by the financial distrust of our national credit) and that the return of better times must be preceded by the decline of the prices demanded for land. When they fall capital will again be encouraged to invest in new buildings. Land values are the last thing to decline in a panic, but until they do enterprise is checked and labor waits. The real enemy against whom both builders and employers should unite is land speculation, for he who controls the opportunity controls also the profits of him who uses it.

Convinced therefore that no general gain will accrue to the mason builders by the cut of the bricklayers' wage, and that the amount is too small to signify for the stimulation of business, I therefore decide that no abatement from the current rate be made.

Permit me to express my gratification, in view of the deplorable labor conflict now raging in the West, that you have instituted this fair and reasonable method of adjusting your differences of opinion.

Respectfully,

(Signed) WM. LLOYD GARRISON, Referee.

BOSTON, July 6, 1894.

Copies of the form of arbitration under which this decision was reached, together with rules for the formation of a joint committee, will be forwarded upon application to W. H. Sayward, secretary National Association of Builders, 166 Devonshire street, Boston.

SINCE the burning in the latter part of January of the engineering laboratory of Purdue University, located at Lafayette, Ind., the work of rebuilding has been making rapid progress. Up to the date of latest advices the portion of the building which contained the foundry and wood working shop had been repaired, and all machines and tools originally contained therein replaced, while a new and larger cupola had been added to the equipment of the foundry. The machinery, forge room and steam engineering laboratory were expected to be completed by June 15. The trustees of the university are able to announce that while it is probable that the front of the destroyed building will not be rebuilt at present the working laboratories will be completed and every machine, tool and piece of apparatus necessary to carry on the instruction and practice provided for in the catalogue will be in place for use before September 15.

PROSPECTS in the building trade of Philadelphia appear to be hopeful, if recent reports from that city are reliable. The Philadelphia *Record* announces that Frank H. Rhodes will build 138 houses on Opal and Garnet streets; that John S. Serrill has plans under consideration for the erection of 120 houses on Lehigh avenue; that T. B. Roberts has already started work upon 168 in Twenty-ninth and Master streets, and that James and Charles Maguire have concluded negotiations for a site on which to build 80 dwellings. On the whole, the good building record of 1893 is likely to be eclipsed in the Quaker City this year, if all these plans materialize.

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A TWO-STORY FRAME DWELLING IN WORCESTER, MASS.

GEO. & J. P. KINGSTON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, AUGUST, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

SEPTEMBER, 1894.

American Institute of Architects.

According to the announcement of Secretary Alfred Stone, the twenty-eighth annual convention of the American Institute of Architects will be held in New York City on October 15, 16 and 17. The sessions will be held in the rooms of the Architectural League of New York, at 215 West Fifty-seventh street. The Committee of Arrangements are promised a number of papers on subjects which cannot fail to prove interesting and valuable. We understand that the Building Trades Club has also appointed a committee for the entertainment of visiting architects.

Tearing Down Old Buildings.

The alterations which are being made to the Hoffman House in this city necessitated the tearing down of the building on the corner of Twenty-fifth street and Broadway which had been used as an annex to the hotel, so as to permit of the erection of a new structure. The contractors who pulled down the old building demonstrated the fact that such a piece of work could be carried on in a much frequented neighborhood and upon a fashionable thoroughfare without discomfort or danger to passers-by. It was accomplished by the use of block and tackle for hoisting and lowering baskets on the side street wall. The surplus rope ran down to a man seated at the next lower window who slackened away for the descending basket of brick or rubbish as the man above cast it loose over the parapet. When within 2 or 3 feet of the ground the basket was stopped and a man on the sidewalk seized it, dumping its contents into a waiting wheelbarrow which was trundled up an incline to the level of the loading wagon. Here a man with a hose sprinkled the *débris* as it was turned over, thus preventing the choking dust which usually accompanies such labor. The wagons carted the material away almost as fast as it was lowered and there was no blockade of the street at night.

Clay Working and Ceramics.

Something of a departure in the educational field in this country is the proposed course of instruction in the art of clay working and ceramics at the Ohio State University, Columbus, Ohio. At a recent session of the General Assembly of that State there was authorized by special enactment the creation of a course of practical and scientific instruction in the field mentioned and funds were appropriated to establish and maintain such a course of instruction. According to the prospectus the work during the first year will be wholly preparatory to the actual attack of the subject, comprising elementary instruction in mathematics, physics and chemistry. The second year will be devoted to the continued study of chemistry, with the addition of geology and the theory and practice of clay working. It is expected that in this course the young men who are growing up among the brick works and potteries of the country will be afforded an opportunity of gaining a comprehensive idea of the principal scientific studies touching their craft with comparatively little expenditure of time on other branches of science not so closely related to their work. The special facilities offered for the study of clays and clay work will comprise the typical and common forms of machinery for the preliminary preparation of the clays, the mixing and tempering of clay bodies, and the molding and forming of all classes of wares. There will also be presented models of forms of drying apparatus and kilns, as well as of different types of clays arranged to burn and test brick and pottery to determine the melting points of refractory clay, &c. Candidates eligible for admission must be not less than 16 years of age and of good character. On completion of the course of study prescribed, the university will furnish each student a certificate of work done, duly signed by the president of the board of trustees, president of the university and the director of the department.

Trade Schools.

The antagonism shown by many unions to trade schools indicates a failure to understand the position the graduate is expected to occupy after leaving the institution. Antipathy to the schools seems to be based upon the belief that full fledged mechanics are turned out after a year's instruction, and that journeymen will be compelled to compete with young men who have served no practical apprenticeship. It has been repeatedly stated in these columns that the schools mentioned are intended to instruct the apprentice in the principles of his chosen trade, and that the time thus occupied in being taught shall be deducted from the term of apprenticeship. Journeymen are in no wise reluctant to work with young men who have served an apprenticeship the full time of which has been spent at actual work upon "the jobs," and there is no reason why they should decline to work with a man, one year of whose apprenticeship has been spent in a school. It is a self-evident fact, other things being equal, that a young man who has been correctly grounded in the principles of his trade by a year of careful training, is, after he has acquired the dexterity gained by the balance of his apprenticeship at actual work, a better mechanic than the young man who has been allowed to gather such knowledge as he could pick up during his term of service without careful instruction. The example set by the bricklayers' union of Philadelphia, which co-operates with the Master Builders' Exchange in aiding the Trade School and its pupils is worthy of emulation by every union in the country.

Cantilever Principle in Foundations.

A rather novel use of the cantilever principle has been employed in connection with the foundations of the 13-story annex to the Hotel Savoy, now in progress of erection at Fifth avenue and Fifty-ninth street in this city. The cellar area of the extension was so small that a foundation of masonry capable of sustaining the superstructure to be erected would have left comparatively little room available, so that it was necessary to economize space. This was accomplished by the application of the cantilever principle, and it is said that this is the only building in the city having a foundation similarly constructed. In the first place four piers were built, each consisting of four blocks of granite set in a bed of concrete. On these piers were placed two iron girders weighing about 25 tons each, the ends of the girders extending beyond the piers and resting on the brick walls lining the excavation. At the front and rear of the piers are smaller piles supporting smaller girders in the same manner as described above. The main girders are said to be among the heaviest ever used in a building in this city and in transporting them to the site 20 horses were required to draw the truck.

Figuring for Contracts.

In the midst of what is generally admitted to be a dull business period it is notable that many tradesmen are busy. They are employed in figuring on plans with the hope of securing the contract for the roofing, plumbing or heating. The practice of everybody who has a little or large job to be done is to get figures to a greater extent than ever before, which is partially due to the persevering search for work by contractors. This has brought a great number of plans into the market, and the amount of time spent on the plans will never be paid for by the profit in the work that will be done. As a natural result out of a great number of bids made very few contracts are closed. Some have asked for bids on projected buildings with the hope of getting a greatly reduced figure, as material of every kind is at its lowest price, and have been disappointed at the figures received and the projected work is never carried out. This leads to an unfortunate state of affairs for two reasons: the buyer thinks that the prices are not as low as they should be, and the bidder thinks that some one has underbid him.

Prejudicial Methods.

The need of more equitable motives for the government of associated effort is indicated by a case in Chicago, which shows that organizations in attempting to secure desired ends frequently ignore the rights of totally disinterested parties. A difference between the Amalgamated Society of Carpenters and Joiners and the United Brotherhood of Carpenters and Joiners has been allowed to injure contractors employing members of either organition against whom the workmen have no grievance whatever. The ordering of a strike by one organization against work upon which members of the other were employed solely because of private differences between the two in which the employer is in no way concerned is so manifestly unfair to the latter that there is no excuse for such action. It is to be regretted that differences among the workmen which divide them against themselves should occur; but when they do the principle of trade unionism is violated; and the public is prejudiced when such differences are permitted to damage those in no way at fault. It is sufficiently difficult to define and preserve the true relationships between employers and workmen in matters in which they are mutually concerned without further complications among the workmen being permitted to weaken their position through party jealousy. Effective and harmonious organization on both sides is the only means which will bring about unity of action to a sufficient extent to establish universal benefits and improvements in the conditions to which both are a part. The case above mentioned is one of more or less frequent occurrence, and the thinkers among the workmen should devise means for securing harmony in the ranks rather than permit discord to defeat the purpose of organization.

THE *Plumber and Decorator* of London remarks that in the ventilation of churches and school houses and public buildings generally, a very common mistake is made. Those in charge frequently fail to open all the windows immediately after the buildings have been vacated. The exhalations from the lungs and the emanations from the body, being light, will float for a while in the atmosphere before falling to the floor, and if the windows be opened at once, so that a current of air can cross the hall, many of them will be carried out. If, however, as is usually the case, the windows are not opened for some hours, may be not till the next day, these particles, settling upon the floor, are not carried away, but when the hall is again occupied are by the feet thrown up into the atmosphere and inhaled by the lungs, from which they had been exhaled the day before.

The Lessons of a Strike.

BY WM. H. SAYWARD.

The recent strike among the railroad men of the West offers, perhaps, the best example ever given in this country of the futility of any movement which sets at defiance the inherent principles of right and justice. The old belief that the end justifies the means is obsolete; unjust means cannot justify any end however just that end may seem when once attained. Neither have two wrongs ever made one right. If, for example (which point it is not intended to discuss), the Pullman employees were suffering wrong, the causing of vast numbers of others to suffer wrong by the American Railway Union has not established the right. While the sympathetic strike may seem in theory and in a large number of cases to be effective, it is not founded upon true principles, and therefore can never produce true success. Moral changes or reforms produced by force will only continue while force is applied, but as soon as the force, by which the reform is sustained, is withdrawn the true condition again asserts itself. Even the success of a sympathetic strike would be an anomaly, for in reality it would be a failure. It would be a failure because its apparent success would instantly set in motion action by the defeated side, which would require another sympathetic strike, and so on, indefinitely. The truth of the situation seems to be that no matter what the condition of the workmen at Pullman may have been, the attempt to force certain action on the part of the Pullman Company by a concerted attack upon parties having no connection whatever with that company and against whom no grievance existed is so manifest an injustice that failure was inevitable from the beginning.

REASON OF FAILURE.

The absence of foundation in true principle made the boycott established by the American Railway Union a failure before it was ordered. It is self evident that any structure, whether moral or physical, having insufficient foundation, must fall of its own weight. So it was with the strike and boycott in question. Had it reached greater proportions or been more general the result would certainly have been the same, except that the fall would have been proportionately more crushing. The greater the weight placed upon insecure foundations the greater the fall when the structure overbalances itself. When one party to an economic condition assumes the rights of the other party, injustice results, and any attempt to assume the rights of others must therefore be an effort to establish injustice. Concerted action by any organization of men looking to the compulsion of certain concessions by some individual or other organization presupposes that the desired ends could not be obtained except by force. If the party against whom the force is directed refuses to yield it is because he believes his rights have been invaded, and he proceeds to protect his own at all hazards. Under such conditions the true rights of either are left unconsidered, because one having said "You shall," and the other "I will not," the whole fight is for supremacy, irrespective of the justice of the claim or of the defense.

ACTION BY ORGANIZATIONS.

In a very large majority of cases action by organizations is aggressive and not conciliatory, even when an open breach is not desired. It is the tendency of most organizations to deal in ultimatums, and much of their action reaches those affected thereby in the form of conclusions. It is impossible for any person or organization to satisfactorily conclude all the rights and privileges of a relation so complex as that between employer and workmen without having heard both parties thereto. In the fixing of the conditions which shall exist between the two, both the employer and the workman should be represented. It is just as culpable for the employer to ignore the rights and privileges of the workmen as it is for the workmen to strike for insufficient cause.

It must be admitted sooner or later that the relationship between an employer and his workmen, or between a class of employers and a class of workmen, must be established with the joint consideration and approval of both. Arbitration must take its proper place, and no longer be understood as a makeshift for the settlement of war between the two, by which the weaker side may hope for a better settlement than would otherwise be possible. Arbitration must be recognized as being the best means in existence for preventing such terrible struggles as the recent railroad strike and boycott, and for securing as much justice and equity as is possible under human dispensation. If the same amount of energy were devoted to the inculcation of the principles of true arbitration, as is given to perfecting the fighting qualities of organizations, the necessity for the latter would rapidly disappear. Understanding of the principles which inexorably govern the relationship between employers and workmen is being continually postponed by the development of the fighting instead of the conciliatory qualities of the two. So long as either side prefers to fight, so long will arbitration be compelled to wait before it can take its proper place. Those who prefer to fight first will ultimately realize that they have been defeating their own ends, and postponing, by their action, the inevitable (be it ever so far in the future), which is the settlement of all differences by some form of arbitration.

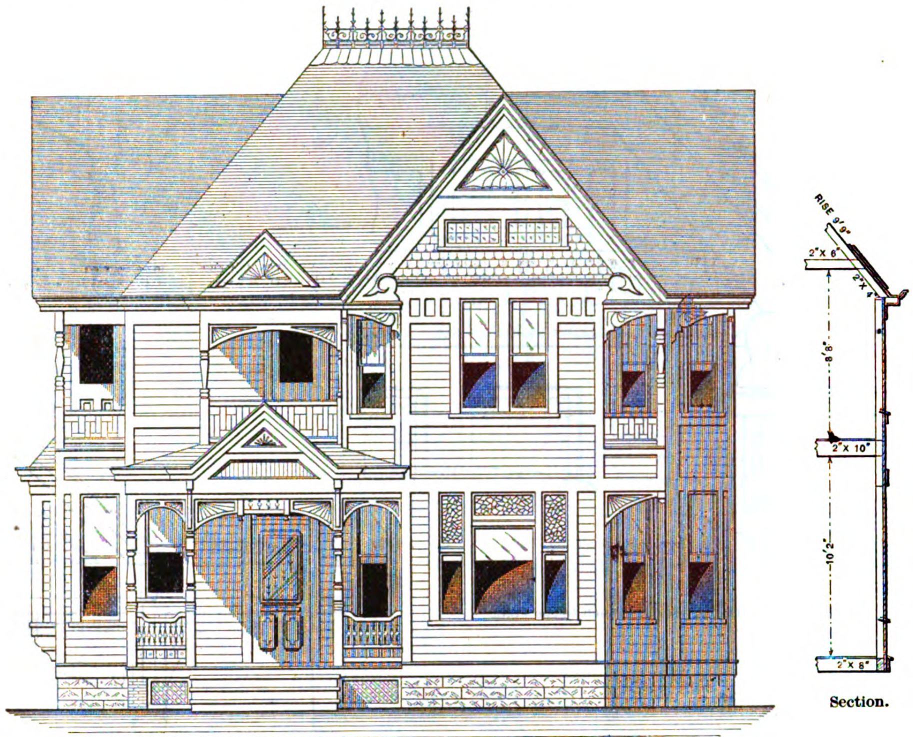
PREVENTION VS. CURE.

The example afforded the world by complications and destruction growing out of the Pullman strike demonstrates with terrific force the need of better understanding of the importance of applying preventives rather than cures. The form of arbitration, together with the method advocated by the National Association of Builders for the establishment of a joint committee of employers and workmen, offers the best means of preventing labor troubles publicly advocated at present. The method of arbitration provides for equal representation by employers and workmen at all meetings and in the settlement of all points at issue. The plan is absolutely non-partisan; it protects the rights of both sides equally, and conclusions reached by its use are free from any possible imputation of unfairness. The operation of arbitration under this form is simple and free from anything perplexing or difficult of comprehension, and in every case where it has been adopted the utmost satisfaction has resulted.

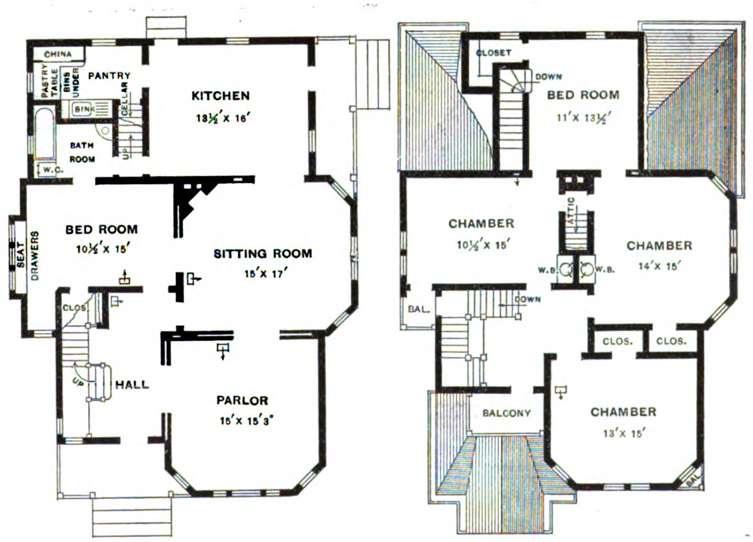
A DWELLING IN ILLINOIS.

WE illustrate in this issue an eight-room dwelling, erected not long since from plans drawn by George W. Payne & Son, architects, of Carthage, Ill. Our supplement plate shows the appearance of the finished structure, while the elevations, floor plans and details presented upon this and the pages immediately following give an idea of the arrangement of the rooms and the general features of construction. From the architects' specifications we learn that the foundation is of stone, and that the exterior frame is sheeted, papered and covered with ½-inch pine siding. The outside is painted with three coats of the best hand mixed materials. There is a cellar under the sitting room, bedroom and front hall, which is reached from the inside by stairs leading down from the pantry and under the flight by which the second floor is reached at the rear. The hight of the cellar is 7 feet, the first story 10 feet and the second story 8½ feet.

The plans show four rooms upon the first floor, in addition to a commodious hall, bathroom and pantry. It will be noticed that the main floor has a sleeping room and bathroom, which is a feature common to houses in many sections of the country, especially in the West. From the front hall the parlor is reached through sliding doors, while access to the sitting room and bedroom is had through single doors. There are also sliding doors between the sitting room and parlor, although this opening can be closed with portières if so desired. The opening between the kitchen and sitting room is closed by folding doors. The rear stairs start from the platform between the kitchen and the bathroom, having a door on each side, and they also make a rear exit for the sleeping room. The kitchen is of convenient size and is intended to serve as a dining room as well. There is space reserved in the pantry for a gasoline stove, where it is intended most of the cooking shall be done. The main stairway is of neat design, having the lower landing extending to the front and forming a sort of gallery which can be used for flowers or other purposes. On the second floor are four sleeping rooms provided with clothes closets, and in two instances with wash bowls. The interior finish of the four front



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

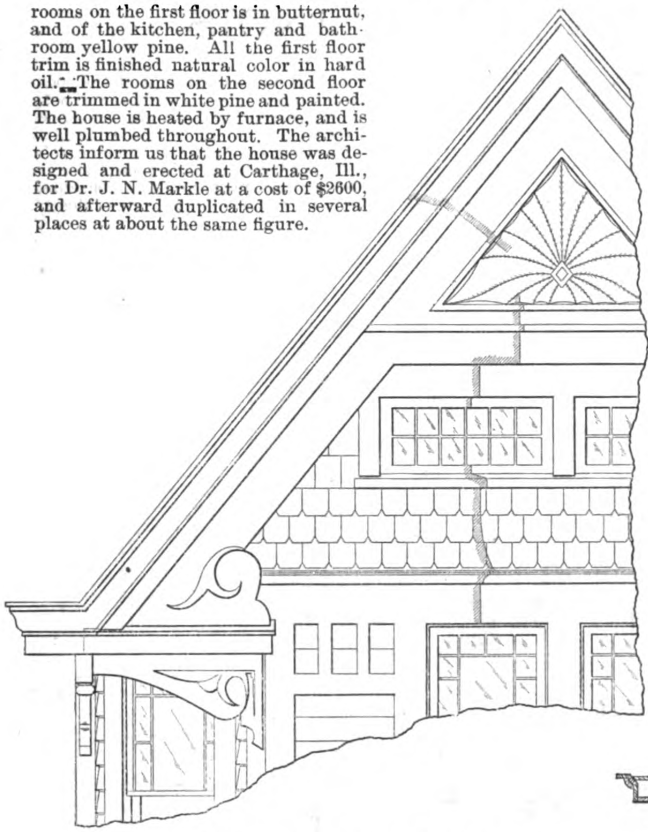


First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

A Dwelling in Illinois.—Geo. W. Payne & Son, Architects, Carthage, Ill.

rooms on the first floor is in butternut, and of the kitchen, pantry and bath-room yellow pine. All the first floor trim is finished natural color in hard oil. The rooms on the second floor are trimmed in white pine and painted. The house is heated by furnace, and is well plumbed throughout. The architects inform us that the house was designed and erected at Carthage, Ill., for Dr. J. N. Markle at a cost of $2600, and afterward duplicated in several places at about the same figure.



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

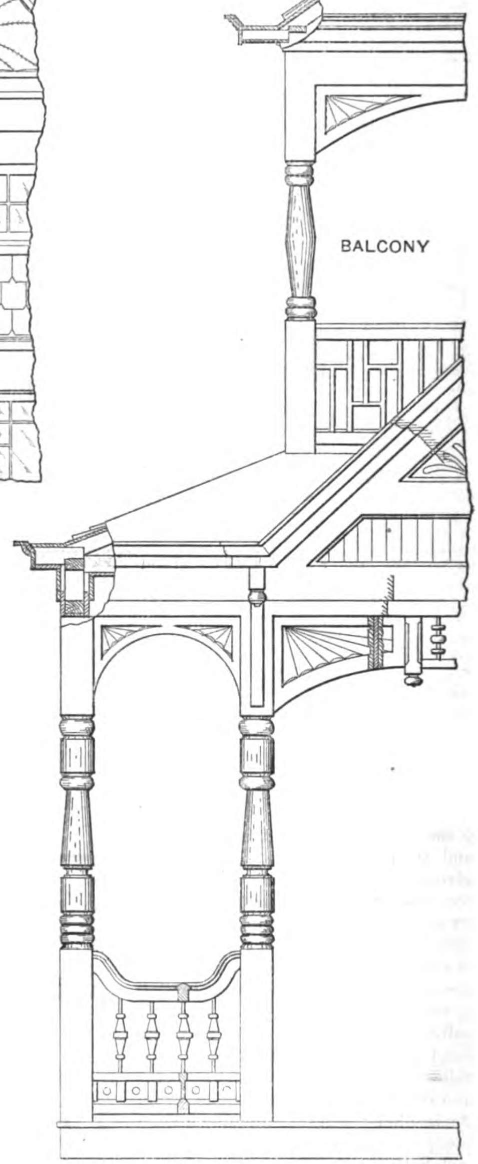
Detail of Right Gable.—Scale, ⅜ Inch to the Foot.

Miscellaneous Exterior Details of a Dwelling in Illinois.

Construction of Scaffolding.

A writer discussing the above subject in a late number of the *Southern Architect* presents the following views:

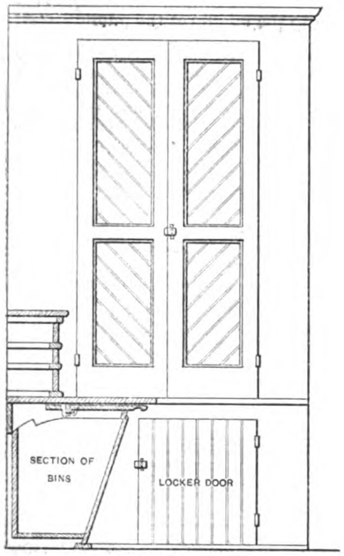
The present mode of scaffolding in itself is all right, but the construction is almost invariably so indifferently and carelessly carried out that it is nothing short of a miracle that any



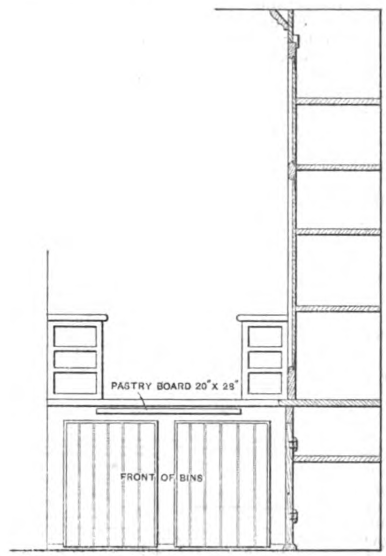
Detail of Front Porch and Balcony.—Scale, ⅜ Inch to the Foot.

building is put up without more or less fatality among the laborers, to say nothing of the people who may be passing underneath. The trouble, or rather carelessness and bad construction, seems to come from the number of decks or platforms that the contractor has to build. There are usually so many to be made as the building progresses that the contractor is often put to it for material, and more often for time in building them, causing him to put in weak putlogs, often with knots extending entirely through them and winding up by badly securing them all to the scaffold poles. It would be impossible to change the method of scaffolding among contractors at once; for, as in every trade, they will long stick to old traditions and customs, and can only be brought gradually into a radical change.

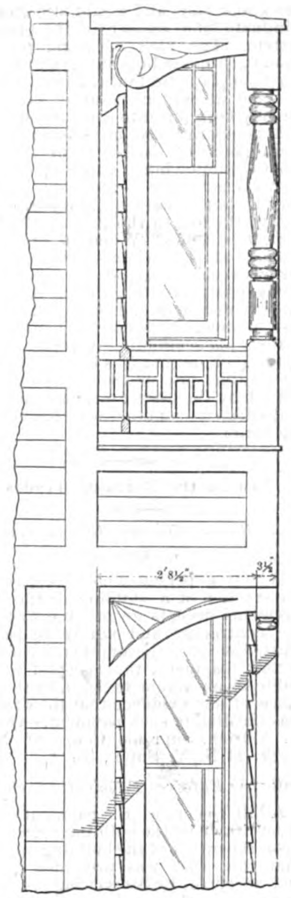
For the benefit of those contractors who carry on business in places where there are no regular scaffolding contractors, as we have in our larger cities, we would suggest that they make decks only at stated intervals, using picked putlogs and allowing the putlogs to extend into the building through windows, where it is possible, and through the walls themselves, where there are no windows, and securely fasten them to a row of inner and outer scaffold poles, the putlog holes to be plugged up as the scaffold is taken down. Lay a sound deck on these putlogs, and by use of portable three-legged bucks, say five feet high, set on these decks, one can build story on story of platforms, placing bucks, one on top of the other, until the next row of putlogs is reached. This would make the adjusting of scaffolds both



Front Elevation of China Closet and Section through Bins.—Scale, ⅜ Inch to the Foot.



Section through China Closet and Front Elevation of Bins.—Scale, ⅜ Inch to the Foot.



Detail of Triangular Flower Balcony Opening from Front Chamber.—Scale, ⅜ Inch to the Foot.

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

A Dwelling in Illinois.—Side Elevation and Miscellaneous Details.

quick and easy, and would also greatly eliminate the danger of the present system. The idea of using pulleys from openings in buildings, and using a portable platform that can be raised or lowered at will in painting, etc., has already been put into use with success and comparatively no danger. The main points of danger seem to come from the following: Flimsy poles, insecurely put together, putlogs having very little purchase in the walls, being badly attached to the poles, and often containing flaws. When an architect looks at all these chances of having a serious accident happen to him when he is compelled to go on a building under construction, and sees the careless manner in which a contractor throws his scaffolding together, he is apt to include that it is high time that either the law or the fraternity, or both, took the matter seriously in hand and effected a long needed change for the better.

Law in the Building Trades.

Liability of Drawee for Acceptance of Order.

Where a person who is to pay for the erection of a building in specified payments accepts an order drawn by the contractor and agrees to pay it when the latter becomes entitled to a certain payment, the acceptor is not liable in an action thereon, in the absence of any evidence that the drawer was entitled to such payment.—Quinn *vs.* Aldrich, Supreme Court of New York, 24 N. Y. Supp., 33.

Bill to Enforce Payment of Order.

A bill to compel the payment of an order drawn by the building contractor upon the owner of the building, alleged that the order was presented to him and accepted, by his writing over his name, "If the work should be approved by myself and the architect;" that the contractor left the work unfinished and departed from the State; that his whereabouts were unknown; that the work necessary to complete the building was slight; that complainant urged the owner to complete the work according to contract, and served written notices upon him requiring him to do so: that such conduct amounted to a fraud on complainant. The contract provided that if at any time the contractor refused to supply material or workmen, the owner could supply the same and complete the work according to contract. The bill sufficiently alleged the fraudulent conduct of the owner. Nor was such bill objectionable on the ground that it failed to allege that he gave the three days' notice required by the contract to the contractor, that he must complete the building according to the contract, and in case he failed to do so that the owner would complete the same; or that he had an opportunity to serve such notice. Nor was such bill defective in that it did not allege that the time had arrived within which the contractor was to finish the contract; nor because it failed to allege that the buildings were completed to the satisfaction of the architect; nor because the contractor was not made a party.—Marcus Sayre Company *vs.* Bernz, Court of Chancery of New Jersey, 26 At. Rep., 911.

Architects Cannot Recover for Plans Accompanying Bids.

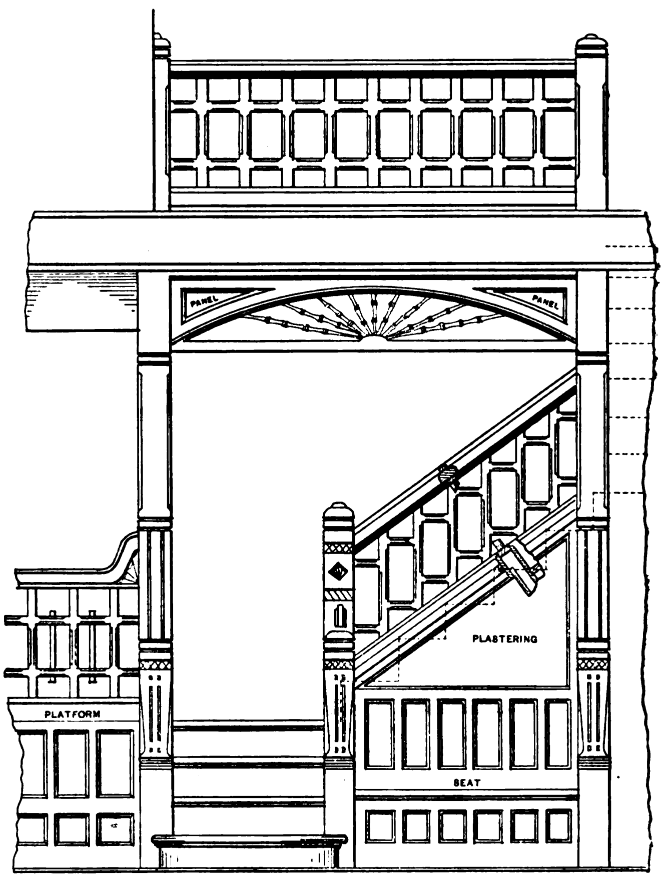
The mere fact that valuable services are rendered does not raise a liability on the part of him for whom they were rendered, even though at his request, if the circumstances are such as to rebut the inference that compensation was expected to be received or paid; therefore, when the service is performed out of motives of kindness, or in the expectation of a possible benefit to result to the person performing it, in the absence of an express contract, no implied contract can be raised. In the case of architects putting in bids for the construction of buildings, or of engineers for the construction of bridges or other works, and including plans and specifications, unless the parties calling for bids expressly agree to pay for such plans and estimates there can be no contract or promise to pay for them implied, for there is nothing in the circumstances that shows that pay was expected to be received or given, except through the possible benefit to the parties performing the service in the acceptance of their bids. Such services are regarded as purely voluntary and gratuitous, unless the plans furnished are made use of, in which event, from their adoption or use, a promise to pay their value would be implied, unless it was provided in the call for bids that such plans or parts of plans might be used gratuitously.

Mechanic's Lien as to Landlord and Tenant.

Under the statutes which give a lien to mechanics for buildings erected under contract with the owner of any lot or piece of land, such lien to extend to an estate in fee for life, for years, or any other estate which the owner may have, a mechanic who does not work on a building under contract with the lessee, whose lease is forfeitable on non-payment of rent, has no lien as against the lessor after the lease has been so forfeited, since a lien on the leasehold estate is subject to all conditions of the lease.—Williams *vs.* Vanderbilt, Supreme Court of Illinois, 34 N. E. Rep., 476.

Right of Abutting Owners to Action for Defect in Sewers.

An abutting owner, whose rights extend to the middle of the public street, may excavate a cellar under the sidewalk, provided he does not thereby violate any ordinance or regulation of the city or interfere with any existing public use. The fact that the cellar wall was not constructed so as to keep out sewage from a defective sewer would not indicate negligence, preventing recovery against the city; there being nothing to show that the owner knew of the defective condition of the sewer. The fact that the premises were not directly connected with the sewer would not prevent recovery, since the liability did not depend on assessment of the premises for cost of the sewer, but upon the injury done. The negligent omission of the city to make safe and tight such a sewer cannot be excused on the ground merely that jurisdiction over sewers, as to how they should be built and in what part of the street, vested with the aldermen; the aldermen not having exercised the power. Damages are recoverable in such case, not only for injuries to the property, but to health and business when specially alleged.—Allen *vs.* City of Boston, Supreme Judicial Court of Mass., 34 N. E. Rep., 519.



A Dwelling in Illinois.—Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

IN THE selection of examples to serve as lessons in drawing we have chosen for the subject the plan of a five-room cottage of medium cost. This selection has been made in view of the fact that the architectural drawing of medium and low cost dwellings is much sought after by the average mechanic. To acquire the art of making these drawings in a practical manner the learner must be shown how to proceed, step by step. To look at a finished drawing the learner may get but a faint idea of the actual work and method of procedure. The full benefit of lessons in drawing can only be fully demonstrated by showing some of the work in different stages of completion, with a proper description of the method of proceeding from start to finish, and requiring the learner to exercise his skill and talent by duplicating the work. The art can never be successfully acquired without practice, and these lessons have been especially designed to supply the much needed practice.

It has been the practice of *Carpentry and Building* to present floor plans to a scale of $\frac{1}{16}$ inch to the foot and elevations $\frac{1}{8}$ inch to the foot. These scales are almost too fine for practical architectural drawing, yet for publication purposes they are more convenient than the larger scales.* Should the floor plans and elevations accompanying these lessons appear to the $\frac{1}{16}$ and $\frac{1}{8}$ inch scales, it is specially requested that in the course of practice the draftsman draw the floor plans to $\frac{1}{8}$ or $\frac{1}{4}$ scale and the elevations to $\frac{1}{4}$ scale, as by so doing he will acquire the art of drawing in a more thorough manner, because he will be compelled to make calculations for himself, and the art of calculating goes hand in hand with drawing. No one can successfully make drawings without calculations. The division and proportioning of the scale to different parts of the drawing are continually going on; therefore to enlarge the drawings to $\frac{1}{4}$-inch scale will in reality give the draftsman better practice than would be derived by copying them line for line by the smaller scales. After the drawings have been successfully made to the $\frac{1}{4}$-inch scale it would be well for the draftsman to draw them to the $\frac{1}{8}$-inch scale, as it will have a tendency to increase his accuracy in measuring and proportioning drawings, while at the same time it will extend his capabilities as a draftsman.

The first practice in drawing should be executed with a pencil, and it is quite as well not to attempt the use of ink until the learner has acquired a fair knowledge of pencil drawing. In the selection of pencils never choose soft ones, as they will not hold a point fit for drafting and the crumbling of the lead is sure to work into the paper, giving the drawing a dirty, grimy appearance. A hard pencil is best, as with it fine clean lines can be made.

In making a drawing the outlines are the first consideration and should be made very light, so that in case an error occurs it can be easily erased. It is very likely, and more than probable, that beginners will make some miscalculations and in drawing lines they are likely to draw past the stopping points or cross lines running on other angles and representing some other part of plan or design. It is necessary that the draftsman watch the work closely and acquire the art of starting and stopping at exactly the right point. This is one important feature in regard to drawing and a very essential one in regard to pen drawing. After the outlines have been correctly drawn the work can then be traced or redrawn, making the lines plain and distinct and completing the drawing throughout in a permanent manner. In regard to paper, it is unnecessary to have any particular kind, as any good quality with a hard, smooth surface will answer for ordinary practice, although drawing paper is preferable.

Having now given a general idea of the essential points in drafting we will proceed with some examples for practice, beginning with the foundation plan of a dwelling. The foundation plan is the plan of the cellar walls, foundation walls, piers, &c., and is usually very easily made. The starting point in outlining a drawing in nearly all cases should be at the front left hand corner as at A, Fig. 4. The draftsman should work around the plan from left to right, although it is not necessary to adhere strictly to this rule. For example, the draftsman has several calculations to make in outlining the plan, particularly the front, which forms many angles. Starting at A, draw the lines to B, representing the front, then from A draw the lines representing the left side, rear and right side as A C D B, which completes the outline of the foundation wall. The next step is to set off the thickness of the walls, draw the inside

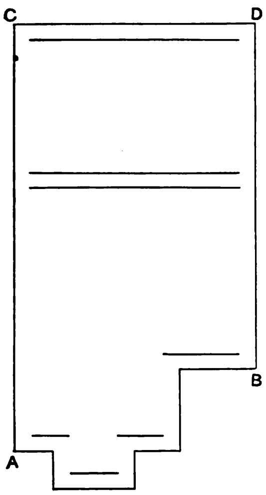


Fig. 4.—Method of Drawing Foundation Plan.—Scale, 1-16 Inch to Foot.

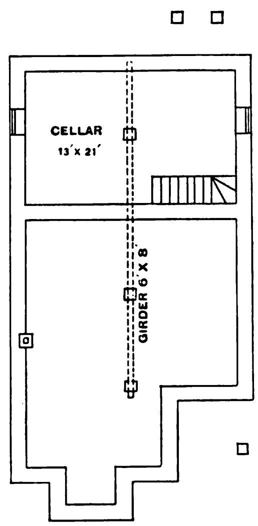
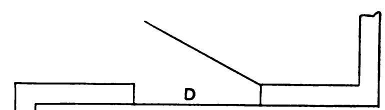


Fig. 5.—The Foundation Plan Completed.



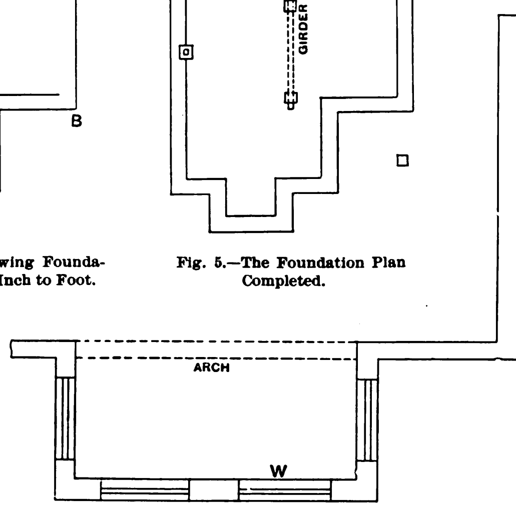


Fig. 6.—Portion of Front of Main Floor Plan, Showing Windows, Doors, Etc.—Scale, ¼ Inch to the Foot.

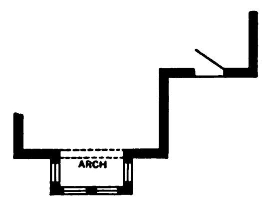


Fig. 7.—Front of Main Floor Plan Drawn to a Scale of 1-16 Inch to the Foot.

Architectural Drawing for Mechanics.—Figs. 4 to 7 Inclusive.

[*In almost every case original drawings submitted for publication in our columns are to a scale of ¼ inch to the foot for elevations, ⅛ or ¼ inch for plans and ½ inch to full size for details. For purposes of publication, however, we reduce them in the process of engraving to the scale we desire to use them.—EDITOR.]

lines and partition walls of the cellar if any are required. The inside lines of Fig. 4 are so plain and easily understood that an explanation is unnecessary. In drawing the inside lines the main point to observe is to first draw all the lines representing the cross walls, making due allowance for thickness of walls so that when the side wall lines are drawn the foundation walls will be complete. As a finished drawing does not show the method of proceeding as well as one partially finished, we will leave Fig. 4 in its present form showing the draftsman how to start, how to proceed and how to calculate the thickness of walls in order to locate the starting and stopping points in drawing the lines. Referring to Fig. 4 it will be seen that to complete the walls, all that is necessary is to draw the lines representing the side walls. We will now proceed to finish by locating and setting off the chimney, piers and girder under floor joists, cellar window frames, cellar stairs and piers for porches. This being done the drawing has the appearance of Fig. 5 and completes the foundation plan. Girders under floor joists are generally represented by dotted lines, as shown. Our floor plan and front elevation show two chimneys, but as one is intended to start from brackets on the partition wall only one will appear on foundation plan as drawn. Great care should be given to locating chimneys, so that they can be built plumb from their foundation to the finish. In many large cities there is an ordinance prohibiting the building of crooked chimneys in any form.

In order to explain a few points in regard to doors, windows, &c., we will present a portion of the front wall of the floor plan drawn to a scale of ¼ inch to the foot. Referring to Fig. 6, windows are usually designated by two lines drawn through the opening, as shown at W ; outside doors are represented by one line usually drawn on the outside wall line, as shown at D. The way a door is intended to swing is designated by a line drawn on an angle, as shown. Inside doorways are represented by open spaces in the partitions, with no lines across. The angle lines are frequently used when the draftsman wishes to specifically indicate which way the doors shall swing. Arches are indicated by dotted lines across the opening, as shown at the bay window, Fig. 6. They are also usually marked "arch," as shown.

To contrast the difference between an architect's working scale drawing and one as usually prepared for publication, the reader is referred to Fig. 7, which shows the front wall of the floor plan drawn to a scale of $\frac{1}{16}$ inch to the foot.

(To be continued.)

Masonry Construction.

The following from an English journal is interesting: The dressing of stone is a most important operation, and generally the larger the blocks the greater the care required in leveling the beds or dressing them in the proper angle or in the squaring. If the beds are irregular, or in winding the bearing is unequal, the stone tends to split and rend at bearing points, which act as fulcrums, and in fact may have to be loaded with an enormous weight. This cannot occur if the beds have been well leveled, as the bearing is then equal throughout the bed. The rent receives rain water, and allows it to lodge, and the structure becomes exposed. often in a dangerous manner, to the effects of frost. If the blocks of stone are fairly and fully dressed, the trouble of laying them will be comparatively slight. Care must be taken that in order to hide or disguise a thick clumsy joint the blocks be not pitched forward on their edges, as they will then be sure to splinter at the edges, from the weight bearing on the angle. To disguise the careless dressing of blocks, and to work them when laid, workmen are apt to underpin large blocks of stone with wedges of wood or splinters of stone, thereby laying the foundation of rents and fissures when the work settles. The setting bed of each course should be brought true and level to receive the next course, which must rest solidly and truly upon it. The face of every stone in a wall may be left quarry faced, or as it comes from the quarry, but each stone should be wrought with a setting margin. The dressing of the beds of large blocks of stone may easily be tested by laying the edge of a straight rod or rule (otherwise a straight edge) along the surface of a block, from angle to angle and from side to side, when any winding or irregularities in the setting beds will easily be seen by parts of the edge of the rule lying close to the stone, while cavities admit the light between the bed and the rule. In building with ashlar or other large stone care must be taken that pebble and small stones be not used in the mortar, as these will act as so many wedges on the beds; but in grouting, or filling in at the back of masonry, there is no objection to splinters being used, and in filling in angles and odd corners in rubble backing they may come in advantageously, not only to save waste of mortar, but because when the mortar sets the work will be better filled. Unfortunately, this is where masons will often not take the trouble to use splinters of stone.

Grinding Tools.

A writer in one of our exchanges says that grinding tools, unless properly done, renders satisfactory work totally impossible, it being a *sine quâ non* that all tools should be well and keenly sharpened. It is generally the condition of the tools which denotes the difference between a professional and an amateur—the former usually paying the greatest attention to the edges of his tools, while the latter concentrates his mind upon the handles. At the outset I must remind my readers that two qualities—often sadly lacking—are necessary in the proper grinding of tools—namely, patience and determination—and they are here especially necessary, seeing that the grinding of tools is a laborious and disagreeable occupation, which is likely to be put off as long as possible. This should not be, and when it is done the grinding should be done properly. In these remarks I shall take one tool—say, a chisel or a plane iron—the method of grinding which will generally serve for almost any other tool. The main object in grinding is to produce a bevel on one or both sides of a tool blade, in order to reduce the metal to a thin cutting edge, and this bevel must not be too short, but be well carried up to the blade, or the angle of edge will not be small enough.

Having procured a grindstone of 18 inches or 2 feet diameter, with treadle and trough complete, selecting a Bilstone stone for preference, and having a drip can above it and a pipe to carry off the water from the trough, as, if the stone is left in soak, it is liable to become soft and thus wear unevenly. The tool must then be held rigidly in one place—*i.e.*, at the same level, being merely gently traversed from side to side, this being especially necessary in the case of small and narrow tools, as otherwise they will cut narrow channels in the stone, and thus do it a large amount of damage, as also to the tools themselves. If the tool is ground with the stone running away as it were from its edge, the stone will appear to lay hold of the tool and pull it away to a higher place up the grindstone. This is what the operator has to resist, and the best way to do so is to place the elbows well against the sides, which imparts a good grip. It has been claimed by some authorities that this is not the proper way for the stone to run, they maintaining that it should revolve toward the workman; but I leave it to individual workmen to adopt the plan which pleases them best. If the tool is not held squarely and level across the face of the stone the bevel will be broader in one place than another, the edge of the tool being accordingly slantwise, and if for only a moment the tool is permitted to slip a fresh surface will have been made by the stone.

Flat-Houses in Washington.

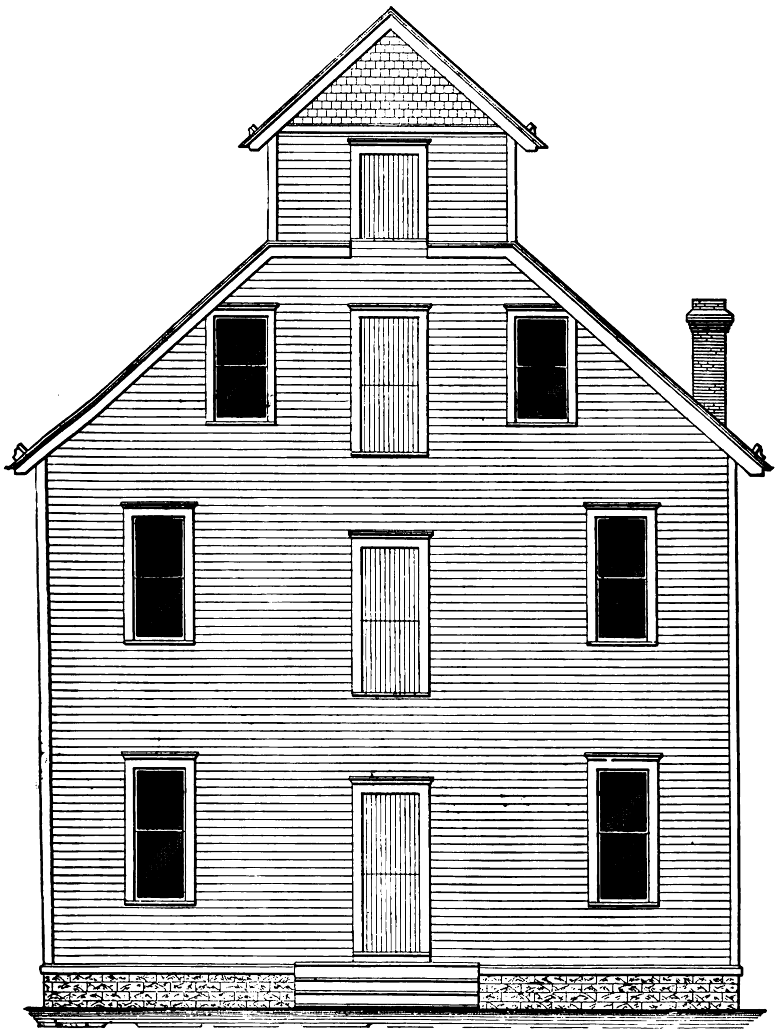
The faith of builders in the future of the flat and apartment house in Washington, D. C., is shown in the huge iron and brick structure now building in the block in Q street between Sixteenth and Seventeenth streets. It is to be 13 stories high and will have a roof garden, which will not only be a novelty in these parts, says a local paper, but will equal any creation of the kind in the country. The plan of constructing a skeleton of iron and inclosing it with brick walls is being followed. The street on which it fronts is unfortunately quite narrow, and the magnitude of the structure does not impress one who views it at close range.

At its present rate of progress this building will be ready for occupation early in the winter. Its builder promises that it will possess every advantage which people who favor apartment houses look for, and he confidently expects that there will not be any vacant suites when the fires are started in the boilers and the elevators begin to run. From the roof garden there will be fine views of the city and surrounding country, and in summer this feature will undoubtedly be one of the main attractions of the house. The experiment which the capitalist who is erecting this building is making is being closely watched, and should it prove successful, another year may see the elevation of other "sky scrapers" which will make New York and Chicago people who visit the capital feel more at home than they do now. It will take a good many such buildings to change the aspect of Washington, and there need not be any fear on the part of the conservative inhabitants that the old time features of the city will be seriously marred.

THE corner stone of the Texas Cotton Palace, which is to be opened in Waco, Texas, in November, was laid the last week in June with appropriate ceremonies. The extreme length of the structure is 306 feet, the width 220 feet and the extreme hight 130 feet. The palace is located in what was formerly known as Padgitt's Park, which comprises about five blocks, and is said to be one of the loveliest spots around Waco. It is shaded by mammoth pecans, walnut, elm and other varieties of trees. In the rear of the palace is a large auditorium, having a seating capacity of 6000. The prime object of the Cotton Palace, we understand, is the development of the South, and an invitation has been extended to all sections to co-operate.

Design of a Grist Mill.

An inquiry appeared in these columns not long since for drawings showing the arrangement and construction of a grist mill of about 50 barrels' capacity, in reply to which we have received from James F. Welliver of Danville, Pa., sketches from which the accompanying illustrations have been prepared. They represent a mill erected not long since having a capacity of 25 barrels every 24 hours, but by the addition of more machinery the capacity can be readily increased to the number of barrels desired. The structure is of frame, with mortised and tenoned corners and middle ties dovetailed. The joist is set on top of the tie, except the first floor joist, which are gained. The studding and joist, with the exception of those of the attic, are 18 inches on centers, while the rafters are 2 feet on centers. The outside of the building is sheeted with hemlock boards and covered with white pine reveal siding laid 4 inches to the weather. The floors are yellow pine, while the cornices, barge boards and casings are of white pine. The roof is sheeted with hemlock boards, on which is a layer of building paper covered with slate. An inspection of the main floor plan will show that the engine and boiler are located in an extension at the rear of the building, but does not appear in the side elevations. The floor plan also has indicated upon the front portion of it the size of the floor joist for the several stories. The illustrations which are presented in connection herewith represent the ground plan, together with front and side elevations, and indicate the general arrangement of the machinery and construction of parts in such a way as to render a detailed description unnecessary.



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

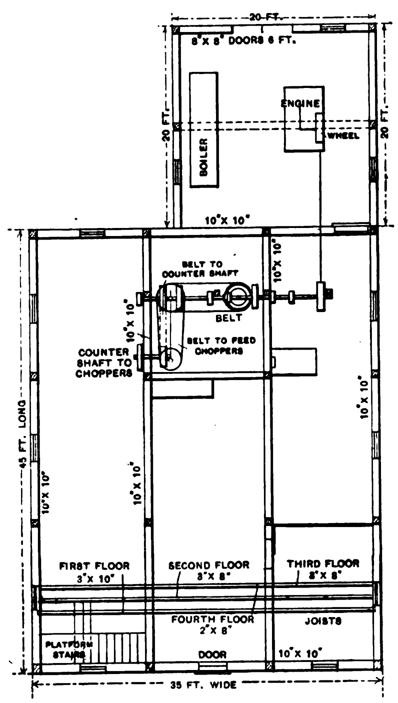
Design of a Grist Mill.—Erected by James F. Welliver, Danville, Pa.

Hardwood Joinery.*

The introduction of machinery has, however, done away with both these methods, so far as the ordinary moldings used for domestic fittings are concerned. In such work the moldings can and should be turned out in such a manner as not to need touching by hand, and when cost is of great importance, care should be taken that the sections are such as can be worked by passing once only through the machine. Before further considering the question of sections, and the important bearing they have, both on the appearance and cost of work, it may be of advantage to call attention to the practice followed of cutting boards and planks to the nominal thicknesses of 1, 1¼, 1½ inches, and so on; but as the saw cut and planing have to be taken out of this, they never hold the full thickness when worked up, 1-inch finishing ⅞ inch, 1¼-inch 1⅛ inches, 1½-inch 1⅜ inches. Therefore (paradoxical though it may seem), it costs more to produce work 1¼ inches thick than 1⅜ inches, for 1½-inch boards must be used in each case, but there will be increased labor in reducing them to 1¼ inches. Planks also finish about ¼ inch less, and wide English oak ones sometimes even ⅜ inch less, as, on account of the greater strength of their grain, the latter are more liable to twist in drying. By keeping this in mind unnecessary waste may frequently be avoided. Cornices, cappings and similar moldings will stand infinitely better if built up, and be far less likely either to twist or crack than if made solid, the result being better work at less cost. Care must, however, be taken that each part is properly tongued or cross tongued.

CONSTRUCTION.

Construction deserves more than a passing notice, for on it very much depends, and every detail should be carefully thought out. It is difficult to lay down any hard and fast rule on the subject, as each work should be considered on its merits; but mortises and tenons are always safe and reliable. In the case of very thick doors, however, it is sometimes desirable to put these double rather than single, to



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

avoid any possible warping of the stiles. Where, however, mortises and tenons cannot be employed, handrail screws may frequently be used with advantage. Dovetails are also very good, but apply more especially to

* Continued from page 174, August issue.

sashes and cabinet making. Wall panelings, dados and skirtings should always be tongued together at the angles and into the floor, otherwise dust will find its way between and underneath them, possibly forming a harbor for the germs of infectious disease. Flooring should be laid in narrow widths and tongued at the joints.

Large columns will never stand if made solid, but will crack and twist out of all shape; if, however, they are made in sections, the difficulty is entirely avoided, the result being very much better work at no increase of cost, but rather the reverse.

When great strength is required, such as an open timber roof, solid wood must, of course, be used.

SYSTEMS OF MITERING.

The various systems of mitering next claim attention. In cheap joinery the work is framed up square and the moldings mitered in afterward on the top of the panels; but this method is open to serious objection, the stability of the moldings depending entirely on nails driven in at an awkward angle, and if these chance to go through the panels instead of into the stiles and rails, and the panels shrink, the result will be an unsightly crack; except in the case of tolection moldings, which can be rebated on to the stiles, &c., and properly fastened, this treatment should never be adopted for good work.

An indefinitely better system, and the one usually employed in high class joinery, is to work the moldings on the solid of the stiles, rails, &c., cutting out the stiles to receive the rails and so forming a miter.

A third method, applied more especially to ecclesiastical joinery, will be referred to later on.

When the work is ready for framing up it is most desirable to put it together, and let it stand as long as possible before actually gluing and wedging, as no matter how dry the wood may be, it is sure to shrink when first worked; in fact, there are well authenticated instances of this occurring when reworking old beams which have been in position for 200 or 300 years.

FRAMING AND CLEANING.

Framing up and cleaning off afterward are two very important matters; shoulders, which in soft woods need hardly be touched after leaving the machine, must, in hard woods, be gone over carefully by hand, otherwise good results cannot be obtained. Miters, too, demand very special attention; for all such work the tools differ very materially from those used for soft woods, the most effective having either metal faces or being entirely of metal. In finishing off these tools are also of the greatest assistance, as glass paper should on no account be used.

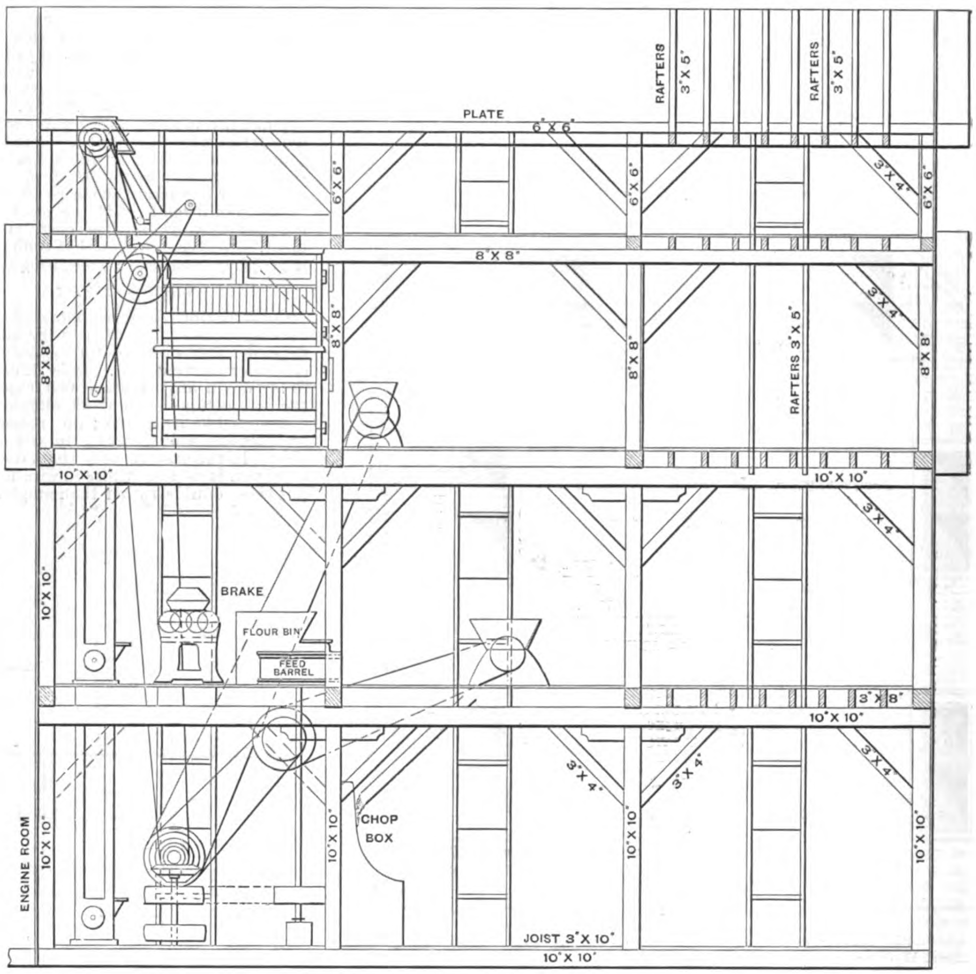
But it is when the more elaborate and intricate forms of ecclesiastical joinery are entered upon that the greatest demands are made on the skill of the workman; ancient work was, of course, all done by hand, and still fills us with admiration for its beauty, variety and general excellence. Evidently in those days time was only a secondary consideration, and nothing was spared to make the work worthy of the high purpose for which it was intended.

CANOPIES.

Vaulted canopies require much care. These if of any size should be built up; if worked in the solid they will crack and twist, utterly spoiling the effect, and in addition be much more expensive; but if the ribs are worked singly to the required sweep and section, rebated for the spandrels, then mitered together, the spandrels filled in afterward and the whole covered at the back with strong canvas well glued, they will stand. Very small and specially elaborate canopies must, of course, be cut out of the solid to a great extent.

MASON'S MITERS.

The third system of mitering—known as mason's miters—now claims attention. It consists in working the returns of the molding in the solid of the stiles, to stop those on the rails and on the rails and sills, and to stop the mullions. The actual working of



Design of a Grist Mill.—Side Elevation, Showing Framing and Location of Machinery.—Scale, 1/8 Inch to the Foot.

these returns is done after the work is glued up. It is of necessity a more costly method than the others but there can be no doubt that in such work as that before you, which will show the system clearly, it is the only proper way, and far stronger than any other.

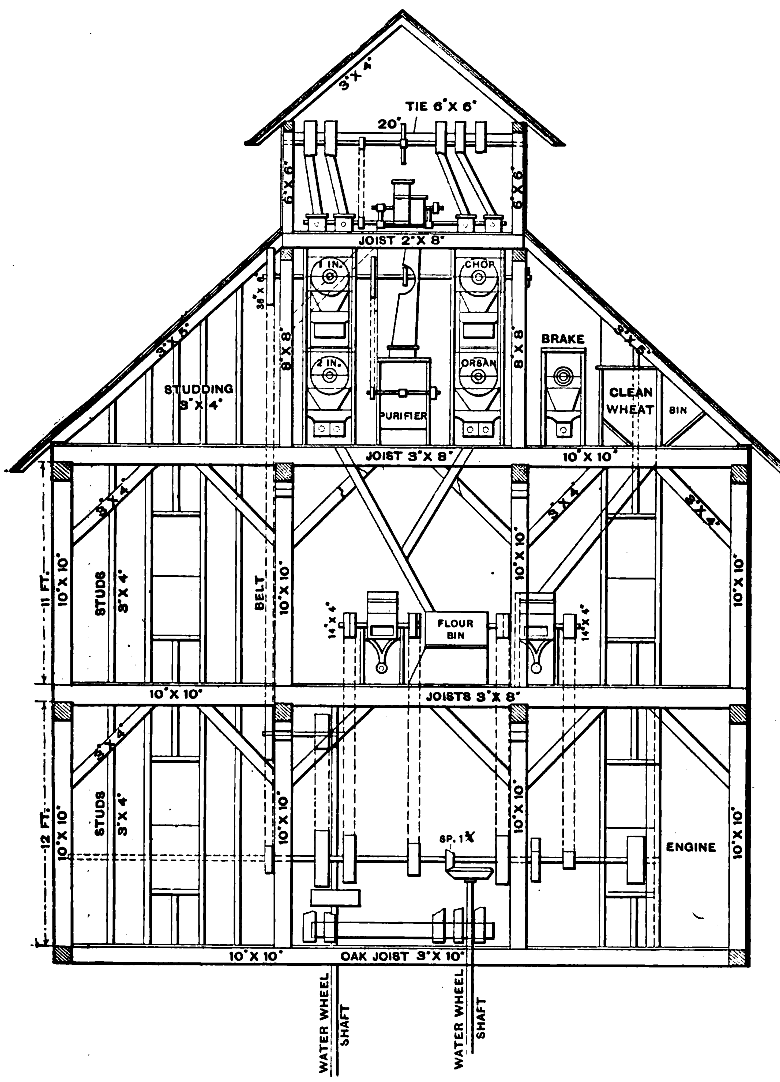
Much old paneling was filled with linen fold panels, which always look well, and several good ancient examples are before you. These, however, seem to have fallen into disuse, which is to be regretted, more especially as they are really inexpensive, considering the good effect produced, the play of light and shade being very pleasing.

In tracery great opportunities occur, but it is only when cut by hand that all its beauty is brought out, and endless variety can then be obtained. When, however, cost is of supreme importance, the aid of machinery can be called in, and by its use the moldings worked, leaving only the angles and pockets to be done by hand, and if the cusp points are simply turned out the cost will be still further reduced; in sunk tracery the various sinkings can also be done by machinery; the least expensive section consists of a hollow, a second member, more especially if it is a bead, considerably increasing the labor.

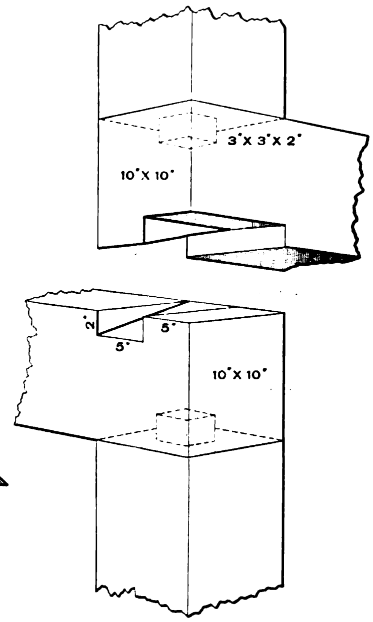
TREATMENT OF FACES.

How to treat the face of hardwood joinery frequently requires much consideration and deserves a passing notice. In the case of oak, the action of the atmosphere would tone it down admirably; but this takes time, and the first appearance of newness is often removed by the fumes of ammonia, which can be regulated to produce any desired shade, and the treatment is a good one when the work is not subject to much handling; where it is, however, beeswax and turpentine are generally applied afterward, as otherwise the damp heat of the hands will leave dark marks; care must, however, be taken that as much of the wax is rubbed off as possible, or the work will very probably turn yellow in time. After this application the oak will cease to darken, as the wax fills up the pores and prevents any further action of the air.

Beeswax and turpentine alone also produce good results on most hardwoods when well rubbed in, and a very pleasant surface is the result, much the same as the slight polish seen on an egg shell. This treatment is also particularly useful for floors; these, however, require periodical attention. Simple oiling is never satisfactory. French polishing is a very general treatment, but is too well known to need any description.



Front Elevation, Showing Framing and Position of Machinery.—Scale, ⅛ Inch to the Foot.



Detail of Framing.—Scale, ¾ Inch to the Foot.

Design of a Grist Mill.—Elevation and Framing Detail.

It is of the most vital consequence to remember that damp plays havoc with seasoned wood work, causing it to swell and warp. It is therefore fatal to put it against damp walls; when it is impossible for these to have time to dry, the wood should be well coated at the back with a damp resisting preparation, and not be fixed close against the wall.

TO OBTAIN the greatest strength in timber beams, joists and rafters, the depth must greatly exceed the width—the greatest strength opposed to the greatest strain. A joist 6 by 3 will bear twice as much if put edgewise as it would if laid flat. If the weight to be supported be in proportion to the length, then, the width remaining the same, the square of the depth divided by the square of the length ought to be the same also—*i. e.*, the depth of a joist ought to be in direct proportion to the length, and for stiffness the width proportionate to the depth. Where the question is of a piece of timber supporting itself, the weight is as the length multiplied by the depth, and we must multiply this again by the length for a divisor. A rod of fir inch square, or a plank 10 by 1 laid flatwise, would keep quite straight with a bearing of 5 feet. A piece of timber 10 inches square would swag very much with a bearing of 50 feet.

IT IS calculated that the tall buildings erected up to date in lower Broadway have added 75 acres to the business area of New York City above the sixth story.

WHAT BUILDERS ARE DOING.

THERE appears to be no change for the better in the condition of the building trades throughout the country. Such new work as is being let creates exceedingly close competition, and the profits are cut to the vanishing point for the sake of work.

The condition of building in the large cities is very dull, and the prospect for the near future does not seem to be flattering. The smaller cities report very little new work of any magnitude under way, with many workmen idle.

Everything is so quiet among the building trades generally that but little specific information is obtainable.

It is evident from the large number of men out of work, and the occasional effort of some unions to keep wages up to the regular scale, that there is much suffering for lack of employment all over the country. In many cases men are reported as working for less than half the regular wages for the sake of employment of any kind, and doubtless many are working for decreased wages in all branches of the trade rather than remain idle.

The likelihood of any general action among the unions in the building trade, such as seemed possible during the strike of the American Railway Union, is past, and shows that such movement was entirely of a sympathetic character, and that no ground of their own, sufficient for such action, appears to exist.

Baltimore, Md.

The following officers of the Builders' Exchange were elected at the meeting held in July: President, James A. Smyser; vice-president, Noble H. Creager; secretary, E. D. Miller; treasurer, B. F. Bennett.

The officers, with the following, constitute the new Board of Directors: E. L. Bartlett, S. B. Sexton, Jr., P. M. Womble, Jr., John P. Lawton, William Ferguson and J. F. Adams.

Boston, Mass.

A meeting of the Commissioners of the Unemployed was held in the Common Council rooms on the evening of August 2, for the purpose of investigating the condition among the workingmen as to the number out of employment, &c. Representatives of various trades were present and testified to the conditions which prevail in the several trades. R. J. Anslow of the Plasterers' Union said that in Boston there were between 500 and 600 plasterers, of whom 285 belonged to the union. He gave 48 cents an hour as the standard union wages. He had heard that $2.50 had been accepted as a day's pay. The plasterers were not troubled by immigration to any extent. Had it not been for the recent depression the plasterers would not now have any special cause of complaint. The situation would not be remedied if the plasterers were to submit to any reduction of wages. Further curtailment of the earnings of the working classes, he claimed, would cause greater depression than has yet been experienced.

Samuel Stewart of Boston, a house painter, told of hard times in his line of business. He had been in Boston employed at his craft for nine years. There were more painters in Boston than there was work to be done. He thought there were as many non-union painters at work as union men. The witness maintained that if painters offered their services for a lower wage than they were now receiving, while capital might be attracted, the condition of the workman would not be bettered.

Charles Wiggin, another painter, stated that the condition of the house painting trade was steadily on the decline. The great depression in this branch of trade was mainly caused by the importation of unskilled foreign workmen.

J. H. Burke, secretary of the Building Trades Advisory Board, said that there was about one-third as much employment this summer as last.

Samuel Chadwick of Boston, speaking for the carpenters, said that in the spring of 1893 business compared favorably with that of 1891 and 1892. After that a falling off was noticeable. Last winter there were probably two-thirds of the carpenters out of employment. This was an unusual number. At present about one-eighth of the resident carpenters are without employment. Mr. Chadwick complained of the cheap carpenters from Nova Scotia, who would take employment for whatever wages they could get. Labor saving machinery also affected the employment of the American carpenter. Another adverse force, he said, was the rushing of work. The bosses were looking now for hustlers.

W. B. Adams of West Quincy, a carpenter, followed in the same strain, and entered his protest against the "floaters" from Nova Scotia. Non-employment was steadily on the increase.

John Keohane of Boston said that during the past winter about two-thirds of the building laborers were without employment.

Chicago, Ill.

Grand Master Workman Sovereign of the Knights of Labor is reported as having called upon the members of his organization during the big strike to quit work. Some 300 carpenters belonging to the Order in Chicago left their positions, but the United Brotherhood of Carpenters and Joiners, which has a membership of more than 6,000, declined to indorse the movement and the men belonging to that brotherhood continued at work.

About August 1 Judge Horton granted an injunction which, on its face, seems peculiar in the extreme. It was on the application of the Amalgamated Society of Carpenters and Joiners, and restrains the United Brotherhood of Carpenters and Joiners and the Building Trades' Council and their officers and agents from interfering with complainant organization or attempting to deprive the members of it of their occupation. This is in the face of the fact that the defendant organizations refused and did not go on strike and that the strikers themselves who petitioned the court for protection were so few as to cut no figure whatever in carrying out the plans of the strike leaders.

The complainant orginazation, in the bill filed, claims to be a branch of an international organization having about 41,000 members, and has paid out since its organization over $6,000,000. This organization, it is admitted, has been partly absorbed by the newer one, and the purpose of the injunction is to secure protection from the latter's growing strength.

The bill of complaint filed says, further, that the carpenters' unions were at one time members of the United Carpenters' Council. The Brotherhood of Carpenters and Joiners drew out of the council and took membership in the Building Trades' Council. When the complainant organization tried to gain admission to the Building Trades' Council it was refused, on the ground that only one organization representing a single trade could be admitted. It is set out further that the members of the complainant organization, who, in reality, belong to the Knights of Labor and went on strike, are being deprived of work because of their not having working cards from the Building Trades' Council.

The following from the editorial columns of the Chicago *Herald* shows the condition of affairs at the time the injunction was granted.

It appears that there are two organizations of journeymen carpenters in this city. One is the Amalgamated Society of Carpenters and Joiners and the other is the United Brotherhood of Carpenters and Joiners.

Both of these organizations are listed among the unions constituting the American Federation of Labor. The Amalgamated Society appears to be also a branch of the Knights of Labor, owing allegiance to Grand Master Workman Sovereign. The United Brotherhood is a branch of the Chicago Building Trades' Council.

The Building Trades' Council has established iron-clad regulations over all branches of labor employed in building. The local carpenters, bricklayers, plasterers, painters and other building trades unions are affiliated, and a member of either union must have a card from the Trades' Council to obtain employment on "union" jobs.

If carpenters belonging to the Amalgamated Society were employed by contractors on "union" jobs the employer was at once notified by the walking delegate that the employee had not a Building Trades' card, and a strike was threatened the same as if a non-union man had been employed. It is a case of internecine war in the ranks of organized labor. There are two labor organizations in the same trade, and the members of one of the organizations are called "scabs" by the other.

New York City, N. Y.

About the first of August the building trades of New York City were probably as badly demoralized as at any time in many years. There are about 45,000 men engaged in these trades when times are good, but not more than one in three of these men—or 15,000 in all—can now find employment. In making a comparison the *Press* says: In good times the members of the building trades can earn very good wages, some say an average of $20 a week each, which figure is probably too high. At this rate, however, these men would receive in wages $900,000 a week, or between $3,500,000 and $4,000,000 a month. It is possible that $800,000 a week, or between $3,000,000 and $3,500,000 a month would be nearer the truth. The shrinkage in value of the total earnings is still enormous. Not only has the number of workingmen been diminished by 75 per cent., but the rates of wages have shrunk at least a quarter—some say more.

For the sake of comparison, say that the 15,000 men at work are earning an average of $15 a week. The aggregate would then be $225,000 a week, or $75,000 over half a million dollars less than the lower amount of $800,000 accepted as the weekly aggregate of earnings in good times. In 12 weeks this deficit would amount to within $100,000 of $7,000,000, a vast sum, truly, and a sum that in good times would not only benefit men receiving it as wages, but business people of every class in New York, for it would, nearly every cent of it, be paid out for food, clothes, comforts, luxuries and pleasure each week as it was earned.

Of all the trades probably the wood carvers have suffered most (owing, it is claimed, to the large amount of ornamental interior work being done abroad), and electrical workers and steam fitters least. These are beginning to feel the hard times like the rest now, however, and many are now idle.

The buiding trades represented in the Board of Delegates are as follows: Carpenters, 5000; painters, 6000; plasterers, 2000; plasterers' laborers, 1500; steam fitters, 700; steam fitters' helpers, 700; electrical workers, 800; plumbers and gasfitters, 1500; framers, 1000; cabinetmakers, 1600; wood carvers, 500; elevator constructors, 300; cement masons, 300; cement masons' helpers, 300; stair builders, 600; tile layers, 500; tile layers' helpers, 500; granite cutters, 500; marble cutters, 600; marble cutters' helpers, 300; marble polishers, 300; blue stone cutters, 300; engineers on buildings, 300; paper hangers, 100; stage carpenters, 400; Italian mosaic marble workers, 800; Italian mosaic helpers, 200; varnishers, 800; tin and sheet iron workers, 400; architectural iron workers, 300.

Just prior to August 1 there was a series of strikes against lower wages paid for work on public school buildings. Although the law says that workmen on public buildings shall receive the standard rate of wages, it is reported that in many cases workmen were being paid as low as $1.50 per day. The Board of Walking Delegates ordered the workmen out from successive school houses, but the movement was far from being as successful as expected. The strike continued for about four weeks, when, on Saturday, August 18, it was declared off.

The Mechanics and Traders' Exchange at its regular meeting in August passed the following resolutions:

Whereas, Since our last meeting the business of the country has been much disturbed in the North and Northwest by strikes in the railroad interests, which in the States of Indiana, Illinois and California resulted in riot and bloodshed as well as doing great damage to property and disorganizing nearly all business affairs in the whole country; and

Whereas, Such misfortunes are always brought on us, as is particularly so in this case, by ambitious demagogues seeking notoriety and always resulting to the detriment of the well intentioned and best elements of society; and

Whereas, In our judgment all such movements, as well as all agitators who are responsible for them, should be discouraged and condemned; and

Whereas, The suppression of this latest uprising of riotous persons was accomplished by the "protecting arm of the National Government," now therefore be it

Resolved, That it is the sense of this exchange in meeting this day assembled, representing as we do the large and important interest of the building industry of this Empire City, that we commend our President of these United States for the prompt manner in which he took in hand and suppressed the insurrection that threatened the good and welfare of our whole country, and be it further

Resolved, That a copy of these resolutions be prepared and signed by the officers of this exchange with our seal affixed thereto, and forwarded to our Chief Executive at Washington, D. C.

(Signed)
ISAAC A. HOPPER, president.
JOHN BRYNES, vice-president.
EDMOND A. VAUGHAN, treasurer.
ELLIOTT SMITH, secretary.

Philadelphia, Pa.

About the middle of July the Philadelphia bricklayers were much exercised by the proposal from the employers that the rate of wages be reduced from 45 cents to 40 cents per hour. The Journeymen Bricklayers' Association is an entirely local organization and has no affiliation with any national body. A standing Conference Committee, composed of a certain number of members from the Employers' Association and an equal number from the journeymen, meets monthly to adjust all difficulties arising between employer and employee. In January of each year the Conference Committee decides on the rate of wages to be paid for the ensuing year. The employers state that this committee failed to fix the rate for the present year, but no reason for this failure to decide on the rate has been made public, although it is said on good authority to be due to inability to come to any agreement. Pending adjustment of a new schedule the rate in force last year has been paid. The employers give as a reason for the reduction that nonunion men are employed by competitors at wages ranging from 30 cents per hour as a maximum down to almost any price. No serious break has occurred as yet, and it is expected that the difference will straighten itself out in time, as there is very little new work being taken.

The members of the Master Builders' Exchange do not assemble during 'Change hour in the large numbers that is usual during the busy season. There are many, however, who would not feel that the day's work was thoroughly done unless they paid a visit to the floor at some hour of the day, if only for a few minutes, to see that no pressing business needed their attention. Every one of these builders reports dullness in the trade.

It has been proposed at the Exchange to take a new step, which will increase the value of that prosperous organization as a medium through which to do and secure business. The scheme is to make the Exchange a headquarters for exhibition as well as for estimating thereon, of all plans and specifications for national, State and municipal work. It is argued that the Exchange, which is up to date in all other respects, should keep the run of public work, some of which would have its interest for local builders, whether they were invited to estimate thereon or not.

The proposition might be enlarged to include copies of the plans of local architects that have special features, or are in any way novel or praiseworthy. Nothing has been done in the matter as yet, but it is to be agitated until the next meeting of the Board, when some action is likely to be taken.

For some unexplained reason boys do not take kindly to painting, stone cutting or iron work. The Master Builders' Exchange maintains a school of mechanical trades, practically at its own expense, and the three classes named have never been popular. The plastering classes had to be abandoned altogether. Blacksmiths, painters and stonecutters are paid far more than carpenters, yet there are ten boys working to learn carpentry to one in all three classes named. Sooner or later this rush to learn bricklaying, plumbing and carpentry will have its effect, and then other classes are sure of patronage. Superintendent Allen has been able to secure apprenticeships for nearly all of the boys who graduated with the last class, and is now enrolling pupils for the next session, which begins September 1.

St. Louis, Mo.

The Builders' Exchange of St. Louis held its annual outing on July 25, and it was an unqualified success The committee in charge had chartered the "City of Vicksburg," and it was proposed to spend the day at the same place which proved so delightful last year. The number of applications for tickets was so great that the "Grand Republic," the largest boat on the river, was substituted in place of the "Vicksburg," and even then the latter steamer was required to accommodate about 1000 picnickers, who could not find room on the "Republic." The trip up the river was enlivened by music and dancing, and the grounds were reached at about noon.

Among the sports indulged in was a fat man's race, for members, 100 yards; open race, members, 200 yards; race, for the wives of members, 100 yards; sack race, members only, 100 yards; egg races for girls and boys, &c. The late afternoon and evening were spent on the river, the last boat arriving in the city about ten o'clock. The whole affair was most successful and was thoroughly enjoyed by all.

The Van Cortlandt Manor House.

Standing on the right hand side of the roadway leading from Sing Sing to Croton Point, N. Y., and just west of the end of the bridge over the Croton River is the old Van Cortlandt manor house, which was erected, it is said, 238 years ago. It is a rather plain looking affair of medium size, and was originally built as a blockhouse to serve as a fortress. On that account it was constructed entirely of massive red freestone, quarried near Nyack, on the opposite side of the river, and brought over in sloops. The chimneys are of brick from Holland, and to-day the whole is as firm as a rock. A person looking at the house from the roadway would not think he was looking at a stone building, for Col. Pierre Van Cortlandt, many years ago, had the entire outside stuccoed, which modernized it to a great degree.

There has also been built around it a massive veranda, with ample stairways leading up to it. The basement story still retains the old embrasures, or portholes, for firearms, and in them, in the time of the Revolution, cannon were mounted and more than once belched forth loads of grape and canister into the face of the enemy. Similar portholes are to be seen on the floor above, and they are in shape very similar to an inverted T. The windows of the parlor and all the other rooms on the same floor are provided with the old fashioned seats and cushions.

RELICS.

In the parlor there is a glass case, in which are kept many old family relics, among them the family seal, now very much broken up. In a mahogany cabinet are kept a string of 32 metal buttons which were on Paulding's coat when he, with his two compatriots, Williams and Van Wart, captured Major André in the woods of Sleepy Hollow.

A glass cabinet of six shelves is filled with Indian arrow heads, spear heads, and tomahawk heads in great variety and style of material, and also some beautiful pottery that had been used by the Indians. These relics have been found in the vicinity. In the library are treasured many interesting autographs and a poem by Mrs. Madison, wife of President Madison. There is also an autograph letter from General Lafayette to Charles King, Esq., another by General Washington, dated April 3, 1797, to Mrs. Clinton. The Van Cortlandt family take an especial pride in keeping this room in the same condition in which it was first known to them.

ANCIENT TRADITIONS.

The immediate vicinity of the old manor house is replete with ancient traditions. From it there is a path leading out on Croton Point. On the narrow strip of land by which this point is united to the mainland, running between a marsh on the north and a salt meadow on the south, once rose the fort of the Kitchawans. The great number of arrow heads and other Indian missiles that are still found there show that the spot was frequently the scene of savage conflict. East of the fort is the "Haunted Hollow," which was near the Indian burying ground.

It was off this point of land that the British frigate "Vulture" rode at anchor, while André, having landed on the opposite shore, spent the night of September 21, 1780, concealed among the bushes and engaged in conference with the traitorous Arnold. Colonel Livingston's artillery opened fire on the "Vulture" and compelled it to drop down the river and out of range.

A RECENT English invention aims to provide security against liability to accident from the slipping of ladders. The remedy in this case is the introduction of a novel form of shoe suitably attached. It consists of a bracket which can be securely bolted to each side of the ladder, formed at its lower edge with a lug through which a hole is bored, a shoe being loosely jointed to this by means of a pin passing through it and the lug, connection being so free that the shoe can easily swing; to the under side of the shoe a corrugated pad of rubber is fixed. The effect of this arrangement is that in whatever position the ladder is fixed there is always a grip upon the ground which prevents slipping, the freedom of the shoe enabling a ladder to be placed almost horizontally without incurring the least liability of slipping. When desired, shoes can be applied to the upper ends of a ladder, thus preventing any damage to the walls or the ornamental work.

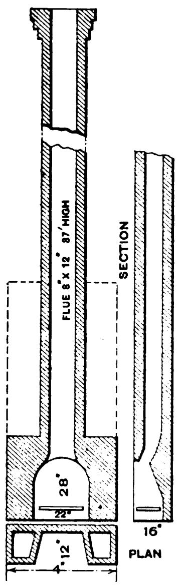
Wind Pressures.

The provision to be made for the effects of wind on bridges and buildings must ever be an important consideration for the civil engineer and architect. The failure of the Tay Bridge is perhaps most intimately associated with this question, for it was held that the utter collapse of that structure pointed very conclusively to a suddenly applied and intense pressure due to some peculiar wind effect. Recently this view has been confirmed to some extent by some observations at Cornell University, where the provision of a new apparatus obtained for meteorological investigations has enabled many important questions to be solved. Among them is the determination not only of the mean horizontal force of the wind, but also its vertical components and the intensity of gusts. These instruments, already at work, show that with winds blowing at the rate of 15 and 20 miles an hour there are occasional gusts or blasts varying between 50 and 60 miles per hour, a fact neither absolutely known heretofore nor generally suspected. The matter is of such importance in structural work as to render it desirable to make special experiments with a view to the clearing up of such debatable points as still exist.

CORRESPONDENCE.

Poor Draft of Chimney.

From G. H., *Narrowsburg, N. Y.*—I have a question to ask in regard to a fire place and chimney which were recently built in this place. The diffi-

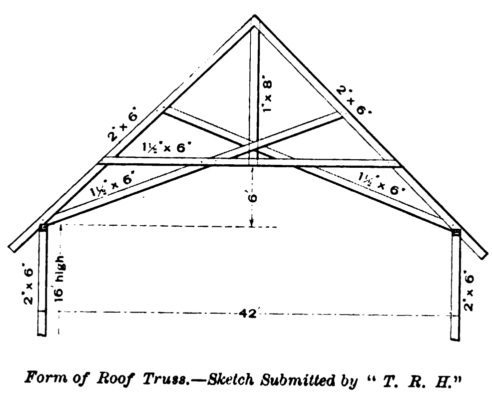


Poor Draft of Chimney.—Sectional Views Accompanying Letter of "G. H."

culty is that the chimney will not draw enough to make a hot fire except on windy days. The building stands on top of a hill, with no obstructions near it. Now, I would like to know what is the matter with it? Is the flue too large or too small, or is the shape incorrect? I send a sketch which represents front and side sections through the chimney flue; also a plan view. The grate used is of the ordinary construction and is intended for burning coal.

Form of Roof Truss.

From T. R. H., *Ironton, Ohio.*—In criticising the roof truss furnished by "C. W. B.," whose sketches marked 1

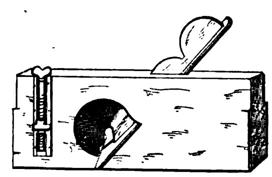


Form of Roof Truss.—Sketch Submitted by "T. R. H."

and 2 were published in the December number of the paper, "A. H.," Sac City, Iowa, condemns No. 1, for reasons given, and would recommend No. 2. Long experience in roof construction convinces me that with a little change in the size of the timbers No. 1 is beyond question the better roof. I am always glad to give the trade the benefit of what I have learned by experience, and am equally pleased to listen, and give consideration, to suggestions from others. Within two squares of my office is a frame church which I erected in the summer of 1892 according to the inclosed sketch. The timber was poplar, and not very well seasoned. Care was taken, however, to put up the work in the best manner. The trusses were put together and bolted before raising. The walls were well braced and in line before any work was put up. The trusses are 16 inches on centers. At each crossing there are two ⅜-inch bolts, these being indicated by dots on the sketch. The work was also well spiked. Every line on the church is as nearly perfect as can be and as we left it. If proper care is taken no better cheap roof can be constructed. The relative cost of the two roofs, when material and labor are considered, is about the same.

Gauge for Rabbet Plane.

From E. S. C., *East Hampton, Mass.*—I submit a sketch of a rabbet plane with gauge, which may prove interesting to other readers of your paper. I have used one, and think it cannot be beaten. I would like to know what



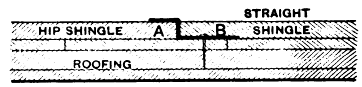
Gauge for Rabbet Plane as Used by "E. S. C."

other readers of the paper think of the matter.

Shingling Hips.

From S. F. B., *Wellington, Ohio.*—I notice by the September issue of the paper for last year that "W. B. W." shingles a hip according to the method I employ, with the exception that I do not bevel the shingles. I send a sketch showing my plan. I take a piece of galvanized iron ⅝ x 2 inches and bend as shown by the heavy line in the sketch. I then lay the hip shingle A, nailing the iron about 1½ inches from the butt with a fine nail. I then lay the straight shingle close up and I have a hip that never coils up. I use straight jawed nippers about as wide as a shingle is thick, and can make the iron fast.

I fully agree with "J. C. W." in that I learn a great deal from *Carpentry and Building*, and am willing to give in return as well as to be jumped on any time. I became used to that years ago, when I was "sat on," as the boys say, owing to my



Method of Shingling Hips Suggested by "S. F. B."

views on the sheeting question. I landed on top, however, when the "cruel war was over."

Specifying Wire Nails.

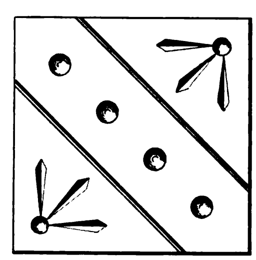
From F. J. C., *Richmond, Ohio.*—I would like to ask "S. F. B." of Wellington, Ohio, to give us some reason why he would not specify the use of wire nails and why they will not answer for use in siding.

Design for a Wine Press.

From P. F., *Erie, Pa.*—Will some one kindly furnish drawings and descriptive particulars of a wine press, to hold about 300 pounds of grapes at a time?

Wood Carving.

From S. E. D., *Pittsburgh, Pa.*—Here is another who would like to have lessons in wood carving. I have had a little experience and would suggest that the start be made with the presentation of some designs to carve, and also mention what particular tools are employed in producing the design. Not that I expect to be a teacher, but I give herewith a design for a corner block, of which I have made and used



Wood Carving.—Design of Corner Block, Contributed by "S. E. D."

a great many, and my friends say the blocks look well. The design is made with a V gouge and the dots with a ⅜-inch semicircular gouge. It seems to me that we could soon learn to carve well with proper instruction and designs for practice. As to the tools to purchase, I think I can answer "S. R. McC." of Washington, Ind. From what little experience I have had, I find the "Adis" brand the best. Do not buy any sets put up in boxes. Some time ago I read instructions in a certain magazine, which also gave some designs indicating the kind of tools to buy. The designs, however, were so elaborate that a beginner would become discouraged. What we want, in my opinion, are simple designs and plain instructions to begin with and we will soon learn to carve. I would like to see designs given for corner blocks, plinth blocks, brackets, door panels, mantels, &c.

Making an Incubator.

From W. S., *Kansas.*—I send for publication a few rough pencil sketches for the benefit of "W. C." of New York City, who asked in a recent issue how to make an incubator. In the first place, construct a box 3 feet square and 2 feet deep, supporting it by legs, something after the manner shown in Fig. 1, which represents a general view of the completed article. Cut a hole in the front of the box for a door, the opening being about 1 x 2 feet in size, the lower edge being 6 inches from the bottom. Now nail cleats on the inside 5 inches from the bottom, and on these cleats fit in boards which will constitute the egg drawer and rack are constructed as shown in Fig. 4 of the illustrations. The triangular pieces separating the eggs are about ¾ inch thick and are placed 2 inches apart from center to center. The two end pieces are heavier, while the sides of the rack are about the same as ordinary lath. The egg drawer is made of pieces of wood about an inch square and placed about 1½ inches apart, which serve for the bottom. Gunny sack is tacked on in such a way that as the egg rack, which is 2 inches shorter than the rack, is moved back and forth, the eggs are turned. A good thermometer is necessary and should be supported in screw eyes with the bulb even with the top of the eggs. A view of the thermometer is shown in Fig. 6. After everything is in position it will be found that there is a space of about 6 inches all around the tank and egg chamber. This should be packed with sawdust or bran and then the top nailed on. Fit the door as tight as possible and have the drawers slide easy. Set the incubator on legs or 2 x

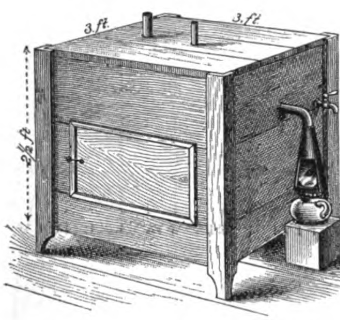


Fig. 1.—General View of Incubator.

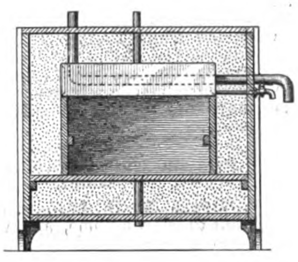


Fig. 2.—Vertical Section.

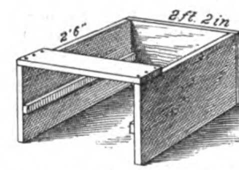


Fig. 3.—Open Box Which Supports the Tank.

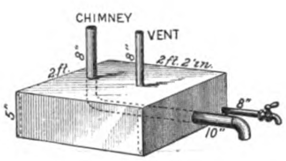


Fig. 5.—Tank and Connections.

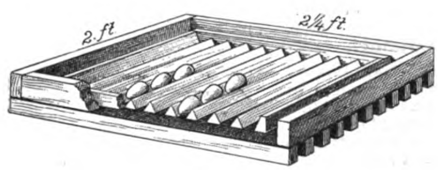


Fig. 4.—View of Egg Drawer and Rack.

Fig. 6.—Thermometer.

Making an Incubator.—Illustrations Accompanying the Letter of "W. S."

bottom of the egg chamber. The space beneath this can be filled with sawdust or bran. Bore a hole through the bottom of the egg chamber and the bottom of the box and put in a tin tube 1 inch in diameter and 8 inches in length for a vent pipe. A good idea of the construction employed can be gathered from a study of Fig. 2, which represents a vertical section taken through the incubator on a line about 6 inches in from the door. In the next place, take a board 1 foot wide and cut from it two pieces, each 2½ feet long, and a third piece 2 feet 2 inches long. Nail these together as indicated in Fig. 3, and then about 6 inches from the top edge nail cleats on the inside, as shown. These cleats are to support the drawer or rack carrying the eggs. Place this in the box with the open end toward the door, as represented in Fig. 2 and nail it in position. Set the tank shown in Fig. 5 on this open box and locate the holes for this pipe and faucet in the side of the incubator. When this has been done fit a piece of board across the open end of the box, as indicated in Fig. 3, this board covering the space which the tank does not occupy. The 4 stuff, so that air can circulate through the pipe in the bottom. The tank and tubes will cost about $4.50. I omitted to say that the tank is of galvanized iron 2 feet square and 5 inches deep. It is fitted with a 1½ inch pipe for the lamp and ½ inch pipe for a faucet. The pipe marked "vent" in Fig. 5 and also shown in Figs. 1 and 2 is about 1 inch in diameter and is intended for use in filling the tank.

Cut vs. Wire Nails.

From G. A. S., *Russell, Ill.*—In the August issue of the paper I notice a communication well worthy of attention on the part of every reader. It relates to cut and wire nails. I agree fully with the views of "F. K.," Louisburg, Wis., and send herewith a newspaper clipping of nearly two years ago, which I would like to see published for the benefit of the readers of the paper.

Note.—The clipping inclosed by our correspondent reads as follows: A series of interesting and valuable tests to decide the much controverted question as to the comparative merits of wire nails and cut nails have been made recently at the United States Arsenal at Watertown. The relative value of these two kinds of nails has always been a subject for many conflicting and confusing claims on the part of competing manufacturers, and it is a matter on which builders and others interested are far from being satisfied. An agreement was recently reached among some prominent manufacturers to submit the matter to a decisive test which should demonstrate the real facts beyond possibility of argument. The use of the Government's testing machine at the Watertown arsenal was secured, and the tests are being made by a committee representing manufacturers in all parts of the country, under the direct supervision of Major J. W. Reilly, commandant of the arsenal.

At the first test the size of the cut nails tested ranged from 11⅛ inches, three penny, 764, to 6-inch spike nails, forty penny and 60 penny, six to seventeen to the pound. Wire nails to correspond as nearly as possible were used. The nails were driven into a well seasoned spruce plank to a depth of precisely 4 inches. The weight of the nails differed only 2 grams, the wire nails 214 and the cut nails 212 grams.

In the first test a force of 733 pounds was required to draw the wire nail and of 836 to draw the cut nail of similar size. The second wire nail was pulled with 673 pounds and the cut nail with 742. The third wire nail required 675 pounds of pressure, the third cut nail 804; the fourth wire, 594; the fourth cut, 964. These were the character of the variations of the fifth and sixth nails. The seventh wire nail was pulled with 879 pounds pressure, but 1200 pounds of force was required to draw out the cut nail of like size. Every care was taken to have the tests strictly fair and accurate. The results from the initial tests were highly satisfactory to the manufacturers and advocates of the cut nail.

From M. L., *Warren, Ohio.*—I notice of late a great deal of discussion about wire nails. I would say that after three years' trial I pronounce them far inferior to the old iron cut nail.

We are using the steel cut nail, which is the best we can get here. The wire nails do not hold like the cut nails and split the lumber much worse.

From A. W., *Madison, Wis.* — I recently had the opportunity of noticing in a surprising degree the difference between a cut nail and a wire nail. Just four years ago this spring I built a porch, and about a month ago the owner of the house came to me to make some changes on the porch. To do this it was necessary to take down a portion of the railing, some of the balusters being secured with 6d cut nails and some with 8d wire nails. The cut nails were almost as good as new, while in the case of the wire nails some were about as large as a sewing needle and others were gone entirely. I must say I was very much surprised.

What Is Two-Thirds Pitch?

From E. A. M., *Port Townsend, Wash.*—In answer to "G. A. L." of South Hanson, Mass., whose inquiry appeared in the December issue as to what constitutes a two-thirds pitch, I will endeavor to explain my understanding of it. I think two-thirds pitch is two-thirds of a square, but I differ with the correspondent named as to the method of obtaining the square. If a building or roof span is

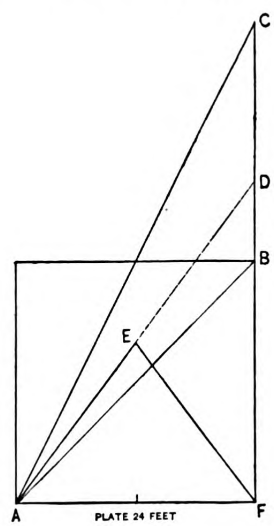


Diagram Illustrating Pitch of Roofs.

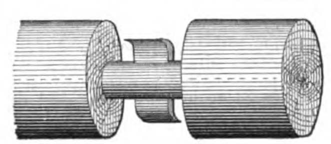
24 feet, the square is 24 x 24, and one-half pitch of that span has 24 feet run and 24 feet rise, and slopes one way, as shown from A to B in the sketch. A full pitch would be twice the hight of one side of the square, or 48 feet rise, and two thirds pitch would be two-thirds of the full pitch, or 32 feet rise, as from A to D. When the roof pitch is both ways to the center the pitch does not change, but the rise is taken from the center of the span, and consequently would be only one-half of the full rise. Thus, in a half pitch to the center the run is one-half width of the span, and the rise is one-half the full rise on one side of the square. Two-thirds pitch, therefore, is either two-thirds of the width of the building or the square, as you like.

Lengths of Purlin Posts.

From J. E. R., *Thurman, Ohio.*—Will some of the readers of *Carpentry and Building* kindly inform me how to obtain the lengths of purlin posts when they are set on an angle? I have been a reader of the paper for more than a year and it has been a great help to me. I am a beginner at the trade and find the rules presented the best of any I have read in any building paper.

One Way of Using a Foot Lathe.

From L. H. H., *Sullivan, Ind.*—I had occasion recently to plow the edges of several long curved pieces of stuff which ordinarily would have taken fully five hours time. I, however, took a piece of 3 x 3 inch stuff 18 inches



"L. H. H.'s" Device for Planing Circles.

long and turned a groove into which I fastened a cutter, as indicated in the sketch which I send. By passing the edge of the circles over the rest and through the groove, I plowed my circles in about ten minutes. The device may be of interest to readers of the paper.

Octagon House with Mansard Roof.

From F. M. D., *Dingers, W. Va.*—I want to build a home, and would ask some of the readers to give me a cheap design for a two-story house, the lower portion being octagon in shape and the upper part a mansard. The dimensions are 16 x 32 feet, with a kitchen at the rear 12 x 14 and one story high. I want a veranda across the front and provision for five or six rooms, the whole cost not to exceed $600 or $700.

Trussing a Building.

From W. E. B., *Clinton, Wis.*—I would like to ask how the readers of the paper would truss a building 40 x 120 feet on the ground and 14 feet high, so as to have neither posts nor trusses in the way of the second story, which is 10 feet in hight. A hall about 6 feet wide runs lengthwise of the center of the building. I desire the correspondent answering my request to give the size of timber to be used. The structure is intended to be occupied as a dining hall on the first floor and sleeping rooms on the second floor.

Packing a Water Filter.

From M. L., *Warren, Ohio.*—I shall be glad if some reader of the paper will tell me through the "Correspondence Columns" how to pack a water filter so it will filter chemically pure. I have an oak filter, 18 inches in diameter and about 30 inches high, with crockery fixtures. I have packed it with gravel and sand about 3 inches at the bottom and the balance of the filter to near the top with pounded charcoal well tamped. The water comes out rather yellow and is off in flavor.

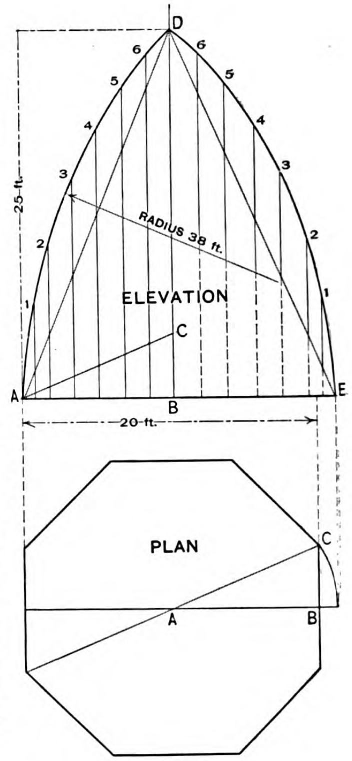
Design for a Bookcase.

From M. F. L., *Belleville, N.J.*—Will some of my brother chips please give me through the Correspondence Department of the paper a few designs for a bookcase, or some kind of a rack in which to keep my papers? I have some three or four years' numbers of *Carpentry and Building*, and desire to take good care of them.

Note.—Our correspondent will find in previous volumes of the paper designs of bookcases adapted to meet varying requirements, and it is possible that some of them may serve his purpose. There have also been described methods which have been employed by various readers for keeping the numbers of the paper year by year. However, the subject of bookcases has been by no means exhausted, and we trust the request of the correspondent above will not be in vain.

Framing an Octagon Roof.

From H. I. P., *Omaha, Neb.*—In answer to "P. A. C.," San Francisco, Cal., I send the following sketch and method of framing an octagon roof. Referring to the sketch, draw the octagon in plan, letting A B represent half the width and, therefore, the rim of common rafter. A C is the diagonal and represents the rim of hip rafter. Now in the corresponding elevation



"H. I. P.'s" Plan of Framing an Octagon Roof.

set off the plan of the common and hip rafter, representing the rim of each respectively as A B C. From the rim of common rafter A B square up the rise B D and connect A D for the work line of the common rafter. With the desired radius strike the circular form of common rafter, shown by the curved line A D. Next divide the run of common rafter A B into any number of parts and draw perpendicular lines extending to the back of the same, as shown. Take the line A C, which represents the rim of hip, and set it off from B to E. Connect D E for the work line of the hip rafter. Divide the run of the hip B E into the same number of spaces, as shown on A C, which is the run of the hip, and shows the exact spacing that must be set off on B E. Draw the lines perpendicular from B E, extending them above the work line of the hip rafter to the same hight as the corresponding lines of the common rafter, as 1, 2, 3, 4, 5 and 6, then the line traced from E to D through the points 1, 2, 3, 4, 5 and 6 will be the required shape of the hip rafter. It will be noticed that the lines 1 and 2 represent narrow spaces. This is done to facilitate tracing the hip, as without the narrow spaces the liability to deviate from the proper shape would be much greater. It will also be noticed that no matter how the spacing is laid off on A B, when the lines cross the rim of the hip A C it gives the exact spacing for B E.

Splicing Timber.

From A. W. W., *Sudbury, Ont.*—I would like to see readers of the paper present sketches showing methods of splicing timber. The drawings I send, Figs. 1 and 2, represent a scarf in timber which I have been using of late. It is very strong when the parts are bolted together with four ¾ or ⅞-inch bolts. The wedges in the center are driven in from each side and are generally of oak. The drawings, I think, explain themselves.

Note.—With regard to methods of splicing timber, we would say for the benefit of this correspondent, and others who may be interested, that in previous volumes of the paper they will find the subject treated at some length, numerous illustrations being presented showing various ways of doing the work.

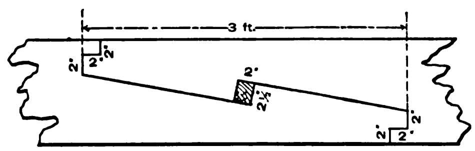


Fig. 1.—Side View.

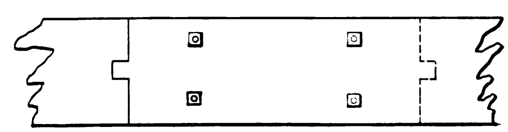


Fig. 2.—Top View.

Splicing Timber.—Sketches Accompanying Letter from "A. W. W.," of Sudbury, Ontario.

Tank for Roof.

From A. A.—I would like to be informed how to make a wooden water tight tank to be placed on a roof and what material should be used.

Answer.—Wooden roof tanks can be made round, with the lower end slightly larger, thus enabling the iron hoops to be driven on and compress the staves so water tight joints will be the result. The bottom of tank can be made of 2-inch pine plank, the edges nicely joined and the outer edge slightly beveled, so as to fit tightly into corresponding grooves cut near the bottom of the staves. The staves can also be made of 2-inch pine planks of convenient width, the edges being properly beveled so as to make a close joint. Such a tank, when properly constructed and of well seasoned materials, should be water tight.

Plan for Skating Rink.

From A. B. C., *Brandon, Man.*—Will some brother reader kindly furnish me with plans and specifications for a skating rink, with the skating room 60 x 150 and with 5 or 6 feet along one or two sides for spectators? There must be ladies' and gentlemen's dressing rooms, also ticket office and a band stand; the roof to be hipped and shingled and the whole job to be gotten up on the cheapest plan possible, and yet have the building strong enough to resist a gale. I desire a detailed drawing of the roof, and to know whether light principals or six tier of 1 x 6 bent around and bolted is the better support for a roof. The amount intended to be expended on this building is $1200, in a locality where lumber costs $14 per thousand and labor is $2 per day.

Durability of Nails.

From G. W. B., *Cincinnati, Ohio.*—For the purpose of illustrating what I meant in a communication last February about the "nails we used to have" being more durable than the cut steel or wire nails we now have, I take the liberty of sending a few samples of nails drawn from the shingle roof of a house in which I was born 49 years ago. I have kept the old house in repair for 27 years, and the nails were in use long before my time at the carpenter's trade. What I am trying to find out is whether modern iron nails are or are not more durable than steel nails for outdoor work. I have not used any iron cut nails for over nine years, as I found they were very easily broken and not so safe for scaffold work.

Note.—The nails sent us by our correspondent are five in number, each measuring 1½ inches in length. They are rusted to a considerable extent for a distance of about an inch from the head, but the remaining half-inch to the point is affected in a slight degree only. In the case of three of the nails the iron at the point has almost the polish and appearance of new nails, while the other two are slightly discolored. Considering the time the specimens before us have done service, the nails are in a good state of preservation. In this connection it may be interesting to state that we had the privilege a few days ago of examining a wrought iron nail recently drawn from the wood in a house at Colchester, Conn., which is said to be 240 years old. The nail was in good condition and capable, apparently, of doing service for many years more.

Questions and Answers.

From A. L., *Mattapan, Mass.*—I like *Carpentry and Building* very much, but think it could be improved in one particular. I refer to the fact that I have seen many questions asked and not answered until months afterward. Now, I think if correspondents would write promptly in answer to questions it would increase the value of the paper immensely.

Note.—We heartily indorse the suggestion of our correspondent and trust our army of readers will adopt it. We would say, however, that in all cases they are not wholly to blame for the interval which frequently occurs between the appearance of the questions in our columns and the replies thereto. Very often the answers to a question are so numerous as to prevent all of them being published at one time, on account of the space at our command being limited; and then again, where it is necessary to make engravings from the sketches, more or less time is occupied, so that delay in publishing is unavoidable. We try to publish the matter in the order in which it is received, so that justice may be done to all. This much said, however, we think if our corrrespondents send in their answers as soon as possible after questions have been published, it will enable the editor to prepare the engravings and get the matter ready for publication at an earlier date than would otherwise be the case. We are always glad to hear from all, even though replies to a question are somewhat tardy, and trust that what we have said will deter none from freely contributing to our columns.

Secret Finishing Interior Work.

From G. P. C., *Smithville, Texas.*—I would like to ask some of the readers of the paper to explain the method of secret finishing interior work, by which the face of the wood is unbroken. I understand the chip nail chisel, or blind nailing tool method, but that injures the face of the finish. What I want is a description of a method of keying or wedging from the back of the casing or of any kind of finish, so as to hold it in place. If some of the practical readers of the paper will furnish sketches I shall be under obligations. I have been an interested reader of *Carpentry and Building* for several years, but have never seen anything on this subject.

A $1200 Cottage.

From E. E. E., *Havanna, Ill.*—I would like to obtain through *Carpentry and Building*, the plans of a six-room one-story cottage, costing in the neighborhood of $1200.

Note.—In previous volumes of the paper there have appeared a number of designs closely approximating the requirements of our correspondent, and if he will take the trouble to look through some of the back numbers he may find that which will answer his purpose.

Back Moldings for Stair Rails.

From D. F., *Philadelphia, Pa.*—I would like to ask "A. L.," Napa, Cal., if he will thoroughly explain the method of obtaining the back moldings and sizes of material required for stair or stoop rails; also the best practical way of obtaining the twist. As I am not up in this branch it will be a great favor to a stone cutter, and I know many others will be benefited by the explanation.

Development of an Ogee Hip Rafter.

From M. L., *Warren, Ohio.*—I notice in the June number of the paper, page 135, under the title "Development of an Ogee Hip Rafter," a letter from "H. D." of New York City in reply to an attack made by "F. H. T." of North Topeka, Kan., on a method of ogee rafter development, by I. P. Hicks. I had noticed the plates on pages 126 and 127 of "Hicks' Builders' Guide" (also page 23 of *Carpentry and Build-*

ing for January, 1893) and thought the method was different from any I had seen or used. I would not make the points 1, 2, 3, 4, &c., on the pitch line of the rafter at right angles to the pitch of the rafter or lines A E and B G, as does Mr. Hicks, but I would make them perpendicular to the base lines A D and B D and take all measurements on these lines to develop the true curve. I have found this method correct in practice. Mr. Hicks is certainly well posted and has given us many good things in his work. So far as I have seen, this is the first thing to which I could take exception.

Laying Out Jack Rafters.

From A. B. CAMPBELL, *Brandon, Manitoba*.—As a constant reader of *Carpentry and Building* I have not failed to take special interest in the various methods of hip and jack rafter cuts presented from time to time. In my opinion all the diagrams I have examined are practical, but my idea is, if one is working to a drawing to do so with as few lines as possible. The letter of " W. W. S.," Placerville, Cal., and published in the September issue of the paper for last year, is practical and simple and exactly my method of cutting rafters. I had charge of a job here this season, the roof of which had no less than five different pitches, most of which I cut before the walls were half up. I send rough sketches of the lines I employ. I will first refer the reader to Fig. 1 of the sketches and ask him to draw a horizontal line twice the run of the common rafter A B. From the center C erect a perpendicular to an indefinite length. Next, measure off on the perpendicular line the rise of the common rafter C to D. Connect D and B for the length of the common rafter. Next measure off on the perpendicular line the length of the common rafter C to E, which is the same length as the line D B. Connect E and A for the length of the hips. Next set off the jacks on the line A C and draw perpendicular lines adjoining the hip. These will be the lengths of the jack rafters and will also give the correct bevel, as shown. The plumb cut of a rafter is always the same as that of the common rafter. This plan shows everything but the cut of the hip rafters and this is always 17 inches for the bottom cut and the rise of the common rafter to the foot for the top cut.

Referring now to Fig. 2, draw all lines the same as in Fig. 1; then measure off on the perpendicular lines the run of the common rafter C to F. Connect F to B for the run on the seat of the hip. Next square up the rise of the hip from F to G and connect G to B for the length of the hip rafter. I have shown in this figure that with the addition of three more lines everything necessary is indicated for setting out a hip roof, no matter what the pitch of it may be.

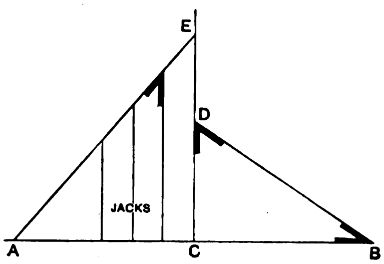


Fig. 1.—Method of Finding Lengths and Bevels of Hips.

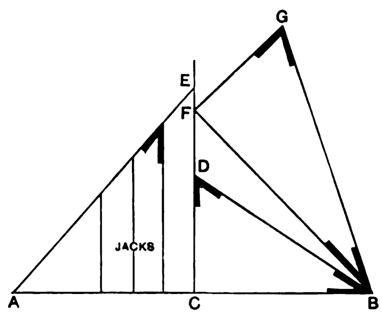


Fig. 2.—An Extended View of Previous Figure Showing the Work More Clearly.

Laying Out Jack Rafters.—Method Employed by Mr. Campbell.

Curious Foundation Repairs.

In the city of Hartford, Conn., when the State Capitol building was under construction 14 years ago, a curious piece of repairing was executed upon the granite piers of the dome tower. Probably very few persons save those who were engaged upon the work, even in that city, knew of it at the time, and the traces of the work can only be found by the closest scrutiny. But Charles H. Fitch, one of the engineers in charge of the work at the time, has written the story of the repairs for the *Engineering Record*, and from the illustrated account in that journal the following particulars are taken: The dome tower has a hight of 257 feet above the ground floor. It was built of heavy masonry, and when the work of erection had reached nearly 200 feet the piers of granite upon the first floor began to give evidence that the load was unevenly distributed. These granite piers, 10 in number, became for a hight of 14 feet (seven 2-foot courses) so spalled and face broken that the interior court soon had more the appearance of a quarry than of a finished granite structure.

The trouble was due to a combination of causes. The joints between courses were very fine exteriorly—from ⅛-inch to practically stone on stone. The mortar used was lime, to prevent staining the piers. The beds of the stone blocks were plane only a few inches from the faces, the rest being plugged out rough and scant and not well filled, so that the great weight of the load came upon the faces of the stones, which might have been compared to double concave lenses.

It was first necessary to explore the condition of the beds. In the lower joint of each stone or pair of adjacent stones two holes were drilled. Usually after penetrating about 2 inches from the face the drills struck into cavity or loose stuff, the mortar having crumbled instead of setting. This was raked out, securing air passage from hole to hole. Strap irons heated red hot were then run into the holes to dry them out. They were then measured. For this there was used a set of poker-like bent rods of different sizes with devices for protracting and scaling sufficient for measuring the spaces, which were not only recorded on drawings, but also shown in a dissected model of the piers to a scale of ½ inch to the foot. The cavities were all filled with type metal, which, by reason of expansion on solidifying, was expected to fill the joints completely and make good bearings. The type metal, melted in a pot over a portable blast fire, was flowed in at one hole, the air escaping at the other. It is probable that the granite area had only about one-third good bearing. Over 12 tons of type metal went into these joints and stayed there.

The scars left on the stones by drilling were carefully cut on the square, and pieces were fitted in jointed with bleached shellac. Upward of 700 of these patches were made, and so cleverly that in most cases they would escape any but the most critical and minute inspection. Being indoors they are protected against the frost and disintegration of exterior exposure. One of the philosophizing stonecutters engaged upon the work was wont to say that ages hence the ruins of the building would be explored by those who would say: " This is another lost art. What strange mortar was employed by the ancients."

Roman Architecture.

When the best period of an art is over and a degenerated and imitative one succeeds it is to be expected that the latter should exhibit a non-comprehension of some and an extravagant use of other of the means employed to affect the imagination in the former and purer time. This was the case with Roman architecture, says a writer in one of our English exchanges. We may discover in it a lively appreciation of the expressional effect of some few Greek details and a tolerable comprehension of the source of that effect, but the Roman architects had no knowledge or feeling of the severity with which the various elements of the Greek art were subordinated to the perfect utterance by the whole of the language, which was spoken more or less plainly by every part. Isolated details, therefore, acquired an independent importance; the colonnade, which in Greek architecture had no significance without reference to the supported entablature, was raised, as it were, for admiration on a series of pedestals; single shafts rose beneath nothing in the places of public concourse, and attempts, entirely and necessarily abortive, were made to reconcile and harmonize certain of the Greek details with the new and contradictory element of the semicircular arch. Circular form was diligently sought for. The Doric shaft became a plain cylinder; the outlines of moldings, in Greek architecture conic sections, became segments of circles; the dome rose behind the pediment, the horizontal entablature was at last wholly relinquished and the arch sprang from column to column, bearing with it the entablature curved, and in this condition of impotence and inconsistence the architecture of pagan Rome was transplanted to Byzantium.

The Rain Bath.

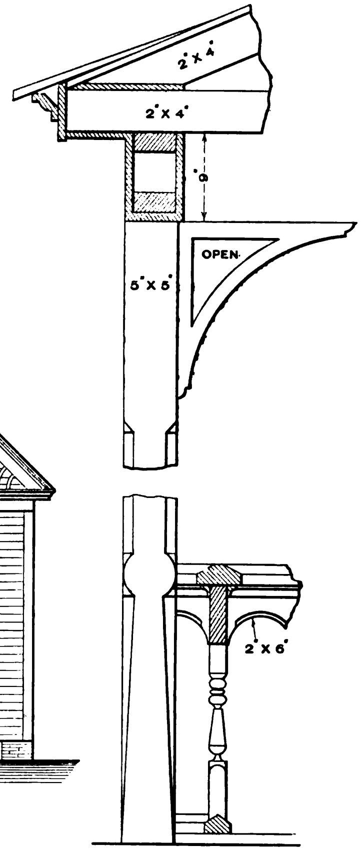
In one of the fine new houses nearing completion in the upper part of this city is a new arrangement of the rain bath. Above the tub is a succession of circles of finely perforated silver pipe, which at a touch release the shower. Encircling this coil is a solid pipe from which depends by rings a rubber curtain, to be drawn about the bather, to prevent the wide scattering of the falling drops.

In another splendid home even greater perfection of this sort of bath is secured. The tub is a shallow marble basin, not more than 4 inches high, in which the bather stands and is pelted from stacks of perforated pipes, arranged above and at each side. The water drains off rapidly, and is thus constantly changed.

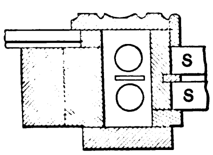
Design of a $750 House.

The five-room house which is illustrated herewith was erected not long since from plans prepared by J. S. Zimmerman of Morganton, N. C., and are furnished in this connection in reply to a correspondent in Indiana who the inquiry, as well as other readers who may be interested, to note the general appearance of the building and the arrangement of the rooms. The material employed throughout is North Carolina pine, with casings, base, head and plinth blocks as shown by the details. The finish is in oil.

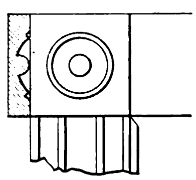
Front Elevation.—Scale, ⅛ Inch to the Foot.



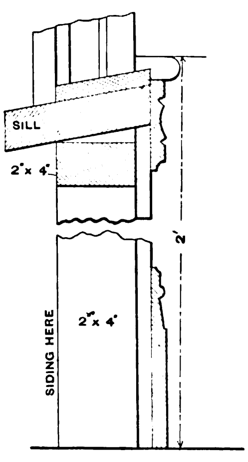
Detail of Front Porch.—Scale, ¾ Inch to the Foot.



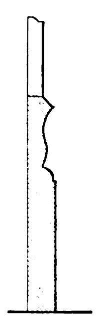
Section through Window Frame.—Scale, 1½ Inches to the Foot.



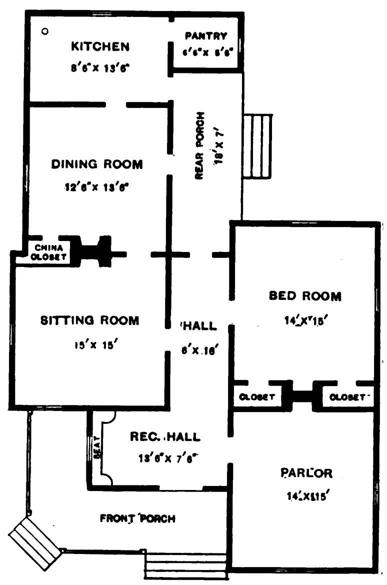
Detail of Head Block.—Scale, 1½ Inches to the Foot.



Section through Base, also through Window Sill, Showing Apron and Stool.—Scale, 1½ Inches to the Foot.



Detail of Plinth.—Scale, 1½ Inches to the Foot.



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

Design of a $750 House.—J. S. Zimmerman, Architect, Morganton, N. C.

asked for drawings of this kind. The front elevation, floor plan and details will enable the correspondent making The drawings so clearly indicate the arrangement and construction of the building that further particulars would seem to be unnecessary. The net cost of the house in the place named was $750.

METHODS OF HANDRAILING.*

By J. V. H. SECOR.

THE TANGENT BOX SYSTEM.

A SYSTEM of tangents and bevels as used in hand railing, known as the box system, consists of an angle box stationary at the angle, or hinged so as to be used universally, and is provided with a stay, such as a quadrant, see Fig. 6, or a strip slotted a portion of its length and held in place at one end by stationary screw, allowing a set screw to work easily in the slot, by which the box is held firmly at the required angle for use.

The blocks used for getting the tangents and the bevels consist of two pieces of wood about 1¼ inches square and about 8 inches long, one having a hole to allow a screw to pass through it easily and then screwed to the other piece so that it will remain at any angle to which it may be set, Figs. 7 and 8. The pencil block used for marking the bevels on the end of the tangent blocks consists of a block 1¼ inches square and 2 inches long. Through the length is a hole and a pencil is put in, with the point projecting ⅛ inch. It is held in place by a screw or wedge, all as shown in Figs. 10 and 11.

In order to use the box draw the line of tangents on the plan, and set the box to conform to it, then apply the pitch of the tangents as taken from an elevation or otherwise obtained, letting the different pitches meet at the angle, as at A, Fig. 6. The tangent blocks are then placed along the lines, keeping the corners to them or parallel with them. When ready the block with the pencil is put up to the end and moved along the face of the box and against the block, Fig. 9. This will give the bevel for squaring the wreath. Now having the angle for the tangents of the mold as the blocks are set, lay them on the board from which the mold is to be cut, mark the tangents and the joints; set off half the width for the rail on each side of the tangents and form the curve by the intersection of lines, as shown in Fig. 12. The bevel is marked on the face of the mold from the end or joint, and then cut to a parallel width. After each pattern is drawn the box and the tangent blocks are cleaned off for future use.* This is done by rubbing white chalk over the lines, which dims the old lines and avoids confusion.

How long this system has been in use I do not know, but in 1846 there was some dispute between two of the leading stair builders as to whom it belonged, each claiming it, yet neither was willing to publish a work on the subject. Four years later, however, a workman in the employ of one of the stair builders above referred to published a work on the system, it being a radical change from the old Nicholson system. To-day, however, the box is still regarded by some of the older members of the craft as the best method of doing the work. One of the best authors on hand railing had published his first work on the surface system and square cut, and in canvassing for it dropped into a shop where the foreman was drawing over the box. After watching him for some time he remarked: "I suppose you keep those lines for use again? As you have a good stock on hand, no doubt any of them will answer your purpose." The lines could be seen through the chalk. This same author could give but one bevel for an offset in his first work, the other he found by sliding the mold. He found the other bevel from the box for his second work. In squaring the wreaths there were some doubts as to their correctness, and then the drum was used as a rectifier for both squaring and jointing. Some men, however, soon overcame this and would make graceful easings and perfect joints, which led to the practice in some shops of having the rails squared up by selected men, who, in turn, would get better pay.

(To be continued.)

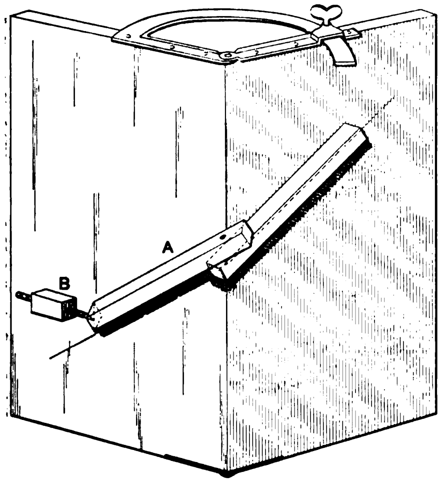


Fig. 6.—Box Set with Tangent Blocks applied at A, and showing the Pencil Block, B, for marking the Bevel.

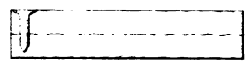


Fig. 8.—Tangent Blocks Closed.

Figs. 10 and 11.—End and Side Views of Pencil Block.

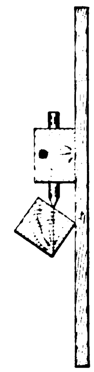


Fig. 9.—View of the Face of the Box and End of Block with the Pencil in Position for Marking the Bevel.

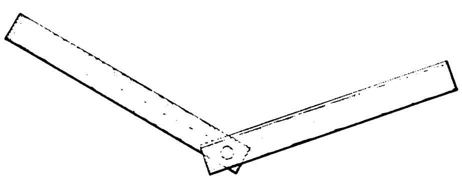


Fig. 7.—Tangent Blocks Open and Set Ready to Mark the Tangents for the Face Mold.

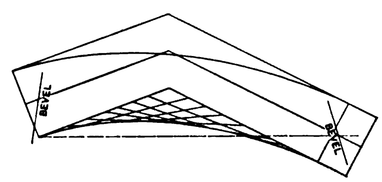


Fig. 12.—The Face Mold Completed.

Methods of Hand Railing.—Illustrations of the Tangent Box System.

* Continued from page 190, August issue.

* While the box was being used the surface drawing was also being developed so that the two went side by side.

Large layers of burning coal tar applied to masonry will render the latter unsusceptible to the action of water and of frost, while a dry dusting of the whole before the last layer is completely dry affords protection from the rays of the sun and from other forms of excessive heat. Heretofore it has been believed, says an exchange, that the use of coal tar in this manner could never be made practicable. Careful experiments have been made, however, with the above results. This would appear an important achievement toward the perfection of building construction, and its sterling value can be appreciated at once. It would be well to add that a coating of this tar does not detract at all from the handsome appearance of a building, but results in a black and very brilliant effect.

Chinese Bricks.

It is certainly not for want of materials that the Chinese have not already acquired a fame for architecture, as probably no country in the world could show a greater amount of building or could surpass it in abundance and excellence of material fit for building purposes, which are similar to those commonly used by other nations—namely, bricks, timber and hewn stones—says the *Architect and Contract Reporter*. Of the first named there are several descriptions, each being suited to a particular purpose. For instance, to construct massive walls such as the walls of their cities, bricks a cubit in length and a span wide are not uncommonly used, while the walls of ordinary houses are built of bricks of much smaller dimensions, some of them approaching the ordinary European standard. The difference in the form and size of these bricks is variable. Some are flat, being about 10 inches long, 5 inches wide and 1 inch in thickness ; others are 14 inches wide and 3 inches thick, while those in most common use are about 7 inches in length, 3 inches in thickness and 2 inches in width. Besides bricks, curved and plane brick tiles are used in roofing common buildings. In Pekin the palaces and some of the temple buildings are tiled with glazed yellow tiles, having a very brilliant effect in the sunshine. Flat tiles are used in flooring their courtyards and houses. Sometimes they are met with as large as 2 feet square, and are exceedingly hard and compact in texture. All bricks and tiles made by the Chinese are of a dull gray color, and hence the somber gray tint of walls and buildings throughout the country. The fuel employed by the Chinese brickmakers is straw and not coal. Nevertheless, Chinese bricks are very durable, hard and compact in structure. Their color is not owing to any peculiarity of the soil of the alluvial plains throughout China, which is not very well adapted for brickmaking purposes, on account of containing lime this is proved by the red tint bricks assume when baked in brick ovens constructed after the European model and heated by coal. Chinese bricks are invariably marked with a stamp, and some of the very ancient ones found in the structure of their temples and other buildings bear the date, the place of their manufacture and more frequently the name of the building they are intended for, in this respect reminding us of the marks on the ancient Egyptian bricks. Being of a very fine even texture, bricks and tiles are easily planed so as to join very closely. They are also easily sculptured to form the great variety of ornamental work found over their doors or inner apartment walls.

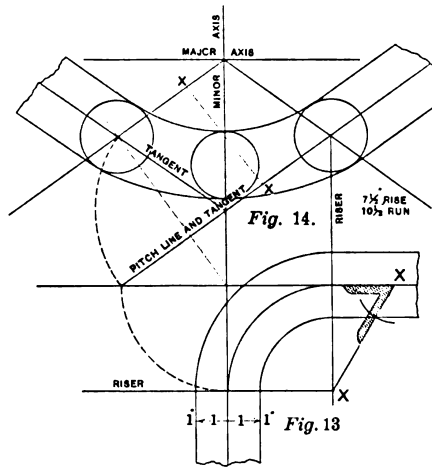
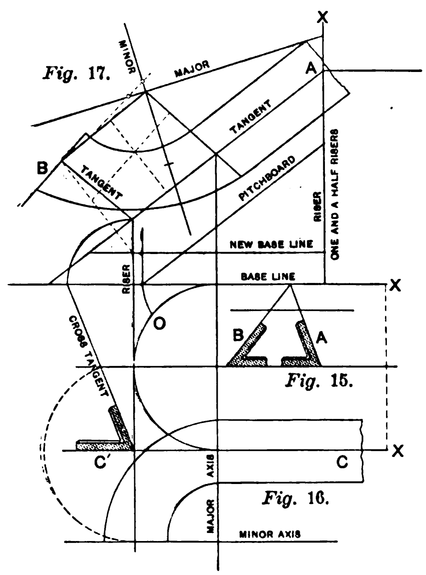


Fig. 13.—Plan of Platform Stairs with the Width of Rail shown at 1 1.
Fig. 14.—Face Mold for Quarter shown in Previous Figure, the Bevel being indicated at X of Fig. 13.



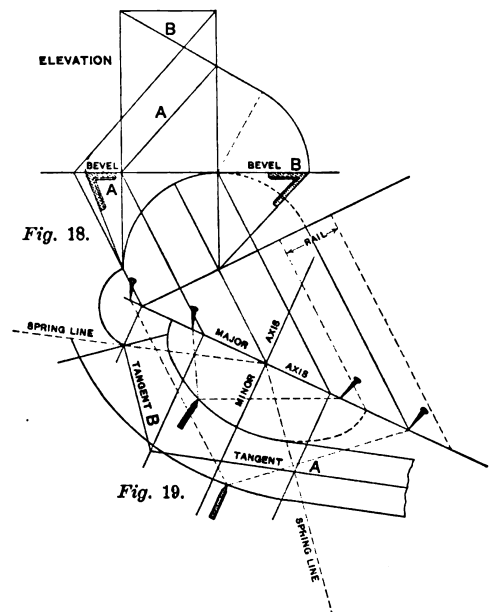


Fig. 15.—Plan of Cylinder with the Landing Riser set well back in the Cylinder, as at O, this Requiring Tangents of Unequal Pitch.
Fig. 16.—Rake and Level Mold for the Landing, the Bevel being shown at C′.
Fig. 17.—Face Mold for the Flight, Showing the Axis by which the Curve is Drawn.

Fig. 18.—Plan of a Quarter with Unequal Tangents, as shown at A B of the Elevation.
Fig. 19.—The Complete Face Mold, the Curves being drawn with String and Pencil, the Pins placed in the Foci and the General Points Marked so as to be easily read.

Methods of Hand Railing.—The Tangent Box System.

ROOF COVERINGS FROM AN ENGLISH STANDPOINT.

THE consideration of a roof depends in some measure upon the standpoint from which it is viewed. The roofing materials used in this country are somewhat peculiar to it, and the same is to be said of any other country. Accordingly, when an English engineer or mechanic visits this country he is very apt to see much that is curious to him in our roofing methods. Again, when one of our roofers goes abroad he encounters many things which are worthy of note and which he is eager to describe to his fellows upon his return. The discussion of roofing theoretically, also the esthetical consideration of the topic, may proceed from as many different standpoints as the consideration of different materials used. In a recent issue of the London *Building News* we find the following article on roofs and roof coverings, written entirely from a London standpoint. It contains much that will interest our readers, notwithstanding that it does not deal to any great extent with those materials with which they are most familiar:

In actual execution the roof, of course, precedes the roof covering; but in working out a design it is frequently the covering which decides the shape of the roof. When once settled, it fixes at least the lower limit for the pitch, and it may even have an influence on the question of hips or gables. In olden times this influence was marked. In many districts hip tiles were scarcely to be had; lead hips were too costly for common use, and hips made up with slates and mortar were both unsightly and insecure. This difficulty has long since vanished. Facilities for transit are, from one point of view, even too great. Materials can be so readily taken from place to place that local peculiarities in building are tending to die out.

One roof covering which is dear to painters, though hardly dignified enough for their architectural brethren, is thatch. The recent destruction by fire of a thatched village in the South of England will not help to commend it, even for cottage roofs, to the practical man. Yet, apart from its pleasant associations and its homelike look, it has merits of its own. Sir Epicure Mammon, in the *Alchemist*, when he is scheming to strip the lead from the churches and turn it into gold, proposes to put thatch instead, and remarks, truly enough, that thatch will lie light upon the rafters. And it is not only remarkable for lightness, but for warmth. In the hands of a clever workman all kinds of forms can be produced in it—gables, hips, valleys, and almost everything but gutters. In the Eastern counties it was brought to great perfection, because reeds were abundant, and were used instead of straw.

OAK SHINGLES.

The use of oak shingles is almost confined to spires and *flèches*, and there they may be made extremely effective. If well seasoned and selected, they are durable; where there is a proper lightning conductor they run little risk of taking fire; and in a certain class of work, usually unpretending, though refined, their color and texture are invaluable. A shingled spire in a freestone county looks, perhaps, a little out of place, though one old example at least, and by no means a bad one, may be found in Lincolnshire. On a wooden turret, however, shingles form an ideal covering. They enable the feature to be completed in the same material in which it is begun, and there is a charm in unity, although fortunate accidents may make even patchiness attractive. Shingles, too, from their smallness, are invaluable in giving "scale." The chief objection to them is their cost. This, when the modern contractor is asked to give an estimate for them, turns out to be surprising. Perhaps the reason is that they are so seldom called for. If a country carpenter here and there, in districts where oak is cheap, would make a specialty of these roofs, he might advance his own interests, and they might be less expensive and less exceptional than they now are.

GRAY SLATE.

The nearest approach in effect to oak shingles is produced by excessively small and rather thick gray slates, such as still remain on a few old houses at Penzance. The architect who has not seen these houses or something like them can hardly imagine how much beauty is to be got out of slating. Here it is used close to the sea for wall coverings as well as for roof coverings. The artistic objections to slating are its even, mechanical surface and its want of tone and texture. In Westmoreland green slating these objections are more or less removed. The slates are thick, to begin with. Then they vary in size, diminishing in courses as they rise from the eaves to the ridge. The color is a pleasant one, and the surface is broken up by the well marked and somewhat rough edges of the slates. The misfortune is that Westmoreland slates are too expensive for ordinary use. But the old cottages of Devon and Cornwall show us how we may get all the artistic qualities of Westmoreland slating, except its color, out of some of the commonest and cheapest slates that are anywhere to be had.

SIZE OF SLATE.

First of all, the size of the slate in general was very small indeed. Next, it often varied in different courses, somewhat as it does in Westmoreland slating. The olden slater took his slates as they came, and they did not come to him all sorted to one size, as they come to his successor of to-day. Neither did he try to reduce them all to the same gauge. He was a man, with such rudiments of artistic talent in him as most men have, or used to have, by nature. He was not a machine, like the typical modern workman, trying to do, by the imperfect aid of hands and arms, things which could be done much better and more regularly by the unerring assistance of wheels and pinions. Hence he put his mind into his slating; he fitted here, and contrived there and considered how this part would look and how that part would keep out the weather. Along with his small slates, a few larger ones reached him. He did not cut them up to match the others, because he had a use for them elsewhere. If his roof had hips, he worked them in there, one big slate ranging, sometimes with two, sometimes with three, or four, or even five of the smaller courses. If his roof had gables, he worked them into the verges just in the same way, and so he was able to make the verges overhang more, and protect the walls from the weather. Again, where his roof abutted against a wall or a chimney, he first tilted it up well, to throw the water off, away from the rubble or the masonry. Then he covered the junction with a carefully executed filleting of lime and hair, or mastic, in lieu of lead, and over this he found a place for some of his strongest and most durable slates of medium size. The use of these was to prevent the water, which was sure to run down the masonry in stormy weather, from finding its way into the house through crevices at the back of the plaster filleting. To accomplish this he built them in like steps, each 10 inches or 12 inches long, and 3 inches or 4 inches in projection, a little way above the raking line which the roof forms against the wall. As the water ran down the face of the work, it reached these stepped slates, and could not pass them. Consequently it either ran over their edges and on to the roof at a safe distance beyond the filleting, or it just dropped from one projecting slate to the next, until it got down to the eaves. This was the old-fashioned substitute in cottages, and sometimes even in parts of churches, for lead flushings, step flushings and soakers. It cost less and lasted longer.

THE USE OF TILES.

The intense ugliness, flatness and monotony of most modern slating have driven our architects to the use of tiles. Now tiles do have some texture, some solidity, some play of light and shade over them, however mechanically they may be laid. With plain tiles the courses cannot be much more than 4 inches wide, and so the "scale" of a building does not suffer by them as it does by slates of the sizes now customary. Plain tiles, too, are not absolutely flat, and their slight curvature gives variety of tone and softness of effect. The modern slater cannot appreciate the beauty of a quietly and delicately diversified surface, and if he is not allowed to do worse, he is likely at the least to put into one mass all the tiles which you are introducing to get a little play of color, so that he can go on with his even, mechanical task, and rejoice at having got rid of them. There are places, of course, where patterns may be welcomed. Here, in England, we seldom find them in such places; though we see them often where they would be far better away. But some of the French churches show what can be done, when that sort of doing is desirable, with both unglazed and glazed tiles of the richest colors.

PATENT TILE.

Ornamental ridge tiles are dear to the speculative builder. Like tile patterns, there is a right place for them; but that place is not where he puts them. Some 25 years ago a crop of patent tiles sprang up. They were on the pantile system, or on various modifications of it, and some of them were clever; but the weak point in all of these was that the roof covering was only one tile thick, so that if there was a crack or a flaw in any tile the water came through at once. For the same reason, roofs covered with them were very liable to injury by workmen, and the result is not only that they are little used in new buildings, but that they have even been removed from older ones. Roman tiles, which have a separate covering piece over the vertical joints, are stronger, and less liable to injury; but English architects have found it difficult to get them properly made. And all these specimens of the pantile type have such a marked and distinctive character of their own that they either jar with or overpower most architectural details.

IT IS reported that a white pine tree which was prostrated by a storm near Merrill, Wis., was found to be 200 feet in length and 45 inches in diameter at the stump. This is interesting in that trees of this kind are seldommore than 170 feet high.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Chas. A. Vaughn......Worcester.

The Boston "Code."

The Code of Practice presented on this page in the last issue was prepared by a committee of the Master Builders' Association of Boston, and has been since adopted without any radical changes.

Article II has been changed so that the principal contractor is not obliged to notify more than the lowest bidder of the award.

The following clause has been added as

ARTICLE VI.

SUBMISSION OF BIDS BY SUB-CONTRACTORS.

Sub-contractors in submitting bids to principal contractors should inclose them in the envelopes prepared by this association and kept on hand for the use of sub-bidders, or should indorse the envelopes in which they are inclosed in such manner that principal contractors may know whom the bids are from, what portion of the work they comprehend, and the particular building they apply to.

Sub contractors who fail to so inclose and indorse their bids cannot claim protection or redress under the first article of this Code.

Article VII has been changed to read as follows:

OBLIGATION OF SUB-CONTRACTOR TO PRINCIPAL CONTRACTOR.

Should a sub-contractor refuse to contract at the amount of the estimate he has given to a principal contractor who has used the said estimate in good faith, he then should be liable to the said principal contractor for damages in amount not less than the difference between the amount of the estimate which was submitted by him and the amount at which the principal contractor may be obliged to contract the work.

Payment of such damages will not relieve the sub-contractor from liability to discipline under provisions of Article X of the by-laws of this association.

The following has been added to the last clause:

Sub-bids should be given only to the principal contractors who are estimating the work in question, and should not be left with architects or owners for the inspection and information of principal contractors. Sub-contractors must understand that bids thus left with architects or owners are in great danger of losing their confidential character, and that if they so leave them they cannot claim protection or redress under the first article of this code.

The code provides for an envelope in which all bids are to be sealed up and presented to the general contractor or the architect. The form on the face of the envelope is as follows:

ESTIMATE ENVELOPE
Prepared by
The Master Builders' Association of the City of Boston.

This Envelope Contains an Estimate from

....

for the...*work*

for building to be built for...

This estimate is addressed to

M...

is intended for.............. *sole use and benefit, and is to be treated in accordance with the Code of Practice adopted by the Master Builders' Association.*

Copies of the full Code will be sent to any exchanges, which may desire the same.

Foreign Methods.

The value of having some form of agreement between employers and workmen for the adjustment of questions at issue between the two is recognized by all, and joint agreement under some form of organization is constantly extending. A copy of the working rules of the building trades of the Liverpool and Birkenhead (England) District shows that much the same conditions prevail as those advocated by the National Association of Builders. The employers and workmen acting together through their organizations fix all the conditions under which building operations are conducted. The rules which went into operation on June 1 for 1894 show the hours of labor for all branches of the trade to be uniform and to be as follows during the various months of the year:

HOURS OF WORK.

The ordinary hours of work for the months of March, April, May, June, July August, September and October shall be 50 hours per week, apportioned as follows: On Monday, Tuesday, Wednesday, Thursday and Friday, from 7 a. m. to 5.30 p. m., less half an hour for breakfast and one hour for dinner, and on Saturday from 7 a. m. to 12.30 p. m., less half an hour for breakfast. And for the four Winter months, viz.: November, December, January and February, the ordinary hours of work shall be 47½ hours per week, apportioned as follows: On Monday, Tuesday, Wednesday, Thursday and Friday, from 7 a. m. to 5 p. m., less half an hour for breakfast and one hour for dinner, and on Saturday from 7 a. m. to 12.30 p. m., less half an hour for breakfast. Where artificial light is not provided no reduction to be made when men cannot see the full time.

The wages for each branch of the trade are fixed in joint agreement the same as are the working rules, and cannot be changed without six months' notice from either side.

In the general rules are certain specific clauses which affect only one branch of the trade, but are included in the regulations which are subscribed to as a whole by the various trades concerned. Apprentices under these rules are given three months' trial before they are indentured and if satisfactory are then bound for a period of five years. The rules affecting the number of apprentices to which each employer is entitled are not included in the working rules.

Those portions of the regulations affecting the creation of boards of arbitration and conciliation are as follows:

PUBLIC COURT OF ARBITRATION.

The Court shall consist of six of the Trade Employers and six Working Tradesmen, who shall have power to come to terms and whose decision shall be binding on both parties; but if unable to agree, it shall be referred to an Umpire who shall have been previously mutually agreed upon, who shall act as sole referee, and whose decision shall be the decision of the Court, and shall be equally binding on both parties.

BOARD OF CONCILIATION.

That a Board of Conciliation be formed, consisting of four employers and four opertives of the trade affected, to whom any question may be referred as to the spirit of these rules, upon their infringement or their interpretation; and that a decision of a majority of such Board shall be binding on all parties concerned.

These working rules are subscribed to by the Master Builders' Association representing all the various special trades on the one hand and by the carpenters and joiners', bricklayers, masons, plasterers, plumbers, painters and plasterers' laborers' societies separately on the other hand. The rules include agreements besides those mentioned, regarding meal hours, starting times, overtime, country jobs, payment of wages, hot water, lock up places, etc., notice of dismissal, time sheets, workmen's responsibility for tools and plant, authority of employers and boundaries.

A Model Warehouse.

A warehouse embodying a number of interesting features, viewed from the standpoint of the architect and builder, is now in progress of erection in Chicago from plans drawn by Frank B. Abbott of that city. The building will be as nearly fire proof as possible and in its make-up the floors consist of steel beams embedded in cinder concrete, which in turn rests upon corrugated iron arches. The concrete is 5 inches deep in the shallowest part and has a Portland cement top, finished like a cement sidewalk. The roof is of the same construction. The building covers an area 118 x 172 feet in size and is 5 stories and basement in hight, built upon isolated piers. The structure has a division wall in the center dividing it into two equal parts, each having its own elevator and stairway shaft.

New Publications.

ARCHITECTS' DIRECTORY FOR 1894. Size, 5 x 6¾ inches; 128 pages; bound in board covers. Published by William T. Comstock. Price, $1.

This little work, as its name indicates, contains a list of the architects in the United States and Canada, classified by States and towns, with the architectural associations to which they belong indicated against each name. The publisher has prepared the list with great care in order to secure accuracy, both of names and locations, and has incorporated in the volume a classified list of prominent dealers and manufacturers of building materials and appliances. In giving architects' names, the membership in the architectural societies is indicated by figures in brackets following each name: 1, indicating membership in the American Institute of Architects; 2, the Architectural League of New York; 3, Architectural Society Engineers, Architects and Surveyors; 4, Architectural Association of Southern California, and so on, there being 37 societies, associations, &c., represented.

KITCHEN BOILER CONNECTIONS. A Selection of Practical Letters and Articles Relating to Water Backs and Range Boilers. Compiled from *The Metal Worker*. Size 6 x 9 inches; 129 pages; bound in cloth. Published by David Williams, 96–102 Reade street, New York. 1894. Price $1.

The title page of this volume clearly indicates the scope of its contents. It is a work that has been called forth more especially by the demands of the plumbing and heating trade. For many years past the correspondents of *The Metal Worker* have frequently asked questions concerning kitchen boilers, and these inquiries have covered the widest range of topics related to this one subject. In addition to the reprinting of the inquiries and answers as they appeared in *The Metal Worker*, have also been added introductory sections, and, where necessary, short articles on the different topics have been prepared so as to make the treatment of the subject complete. The book is divided into two parts: the first on Water Backs and Boilers and Their Connections, and the second on Heating Rooms from Range Boilers. A good idea of the scope of the work may be gathered from the 11 chapter headings, which are as follows: Water Backs and Their Connections; Boiler Construction, Operation and Connections; Circulating Pipe; Multiple Connections; Double Boilers; Difficulties Met with in Everyday Practice; Relief Pipe and Vacuum Valve; Horizontal Boilers; Miscellaneous; Heating Room from Kitchen Boiler; Radiators Heated from Coils in Stoves. The table of contents gives all the different articles in the book, while at the back is a full alphabetical index, so that no difficulty will be experienced in referring to any topic which is treated. The book is well printed, and engravings are found on nearly every page clearly illustrating the different subjects.

HENDRICKS' ARCHITECTS AND BUILDERS' GUIDE AND CONTRACTORS' DIRECTORY OF AMERICA FOR THE YEARS 1894–95. Size 7 x 10½ inches; 709 pages; bound in board covers, with gilt side and back title. Published by Samuel E. Hendricks Company. Price, $5.

This work, as its name indicates, is a directory of the construction industries of the country, and is issued for the use of builders, contractors, manufacturers and dealers in all kinds of building supplies. The work has been compiled with a great deal of care, and while the publishers do not claim it to be absolutely correct, it is probably the most complete directory of the kind now before the public. It contains over 170,000 names, addresses and business classifications, comprising builders and contractors of material and construction in the building and kindred industries. There are also lists of makers of and dealers in everything employed in the manufacture of material and apparatus used in these industries, from the raw material to the finished article and from the producer to the consumer. Some of the larger industries, such as carpenters, contractors and builders, for example, number over 57,000; masons and builders' materials, such as cement, lime and plaster, nearly 3000; common brick manufacturers, over 8000; sash, doors and blinds, nearly 3000; stone producers, workers and dealers, nearly 2000, of which over 800 represent operators of quarries; masons and builders, over 5600; roofers of all kinds, over 4600; brick concerns who manufacture pressed, fire, enameled, paving brick, &c., appear under separate headings and number about 1600; plumbers, gas and steam fitters, over 9000; steam and hot water heating contractors, over 2000; hot air furnace dealers, 2000. A comprehensive index, arranged alphabetically, renders reference easy and shows, among other things, that all trades are well classified, first under a general heading and then each particular kind under separate headings, such as engineers' supplies, boiler makers, heaters of all kinds and heating specialties; plumbers' supplies and specialties; slate of all kinds; cement of all kinds, whether imported or domestic; radiators and radiator appliances; fire proof building materials and specialties; roofing tile of all kinds and shapes; sheet metal goods of every description; glass of all kinds; pumps; art and fire tile, and everything made from iron, brass and bronze which enters into the construction of a building.

IT IS interesting to note that a large Gothic palace is being constructed in Venice, for the reason that no palace of any kind has been built in that city for the last 150 years and no Gothic palace for over 400 years. The work of destruction, however, has been in progress, and since the time of Napoleon it is estimated that 200 or 300 palaces have been demolished. A change seems, however, to have come over the "Queen of the Adriatic," and of late years its property has been advancing in value, and much improvement has taken place in the restoration of old and decaying palaces by private hands and ancient buildings by the Government, and now it is said that not only has a period of restoration set in, but one of construction has commenced. The Gothic palace referred to is pure in style and is located on the Grand Canal, opposite the Grand Hotel. It has a frontage of 118 feet and covers about 1000 square yards, and will cost about $80,000.

CONTENTS.

RESIDENCE OF J. N. MARKLE, M.D., AT CARTHAGE, ILL.

GEO. W. PAYNE & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1894.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

OCTOBER, 1894.

New Home of New York Clearing House.

By the time this issue of the paper reaches many of our readers the corner stone will have just been laid of a structure which, in many ways, will prove interesting to visiting builders. We refer to the new home of the New York Clearing House, which is to occupy a site about 94 x 87 feet on Cedar street in this city. The structure has been designed by R. W. Gibson, and is to be of white marble in the Italian Renaissance style of architecture. The front is to be three stories in hight, the first story being 20 feet, the second story 25 feet and the third 20 feet, with a domed roof of 20 feet more, making the upper cornice about 75 feet from the sidewalk. An interesting feature of the building, from an architectural standpoint, is the treatment of the front. The two lower stories are somewhat on the Corinthian order, and the first story windows extend almost from column to column, with a projecting balustrade cornice. The second story windows are narrower and have semicircular arches upon special pilasters. Over these the main cornice is broken around each column, so as not to obstruct the entrance of light to the rooms within. At the third story are panels separated by statues on pedestals. The panels are broad carvings of the national, city and State coats of arms and mask windows for the ventilation of the third story. The entrances to the building are by porches at each end of the façade. The first floor of the building will be occupied by a bank, the offices including 8000 feet of floor space. On the second floor will be the administration offices of the Clearing House, while the third story, which is reached by a continuation of the principal stairway, will be the exchange or clearing room, 60 feet square, with two wings, making its greatest length 80 feet. The ceiling will be a dome rising 25 feet above the walls. It will be paneled in fire proof stuff in Renaissance style and the walls will have pilasters of the Corinthian order supporting the cornice and dome. At the rear of the clearing room will be a section of the building divided into three stories, one floor containing dining rooms for officers and clerks, the next the kitchen and janitor's dining rooms and the other the janitor's private rooms. Another feature of this building is found in the fact that while located in one of the busiest and most crowed sections of the city it is detached from adjacent structures.

Electric Ventilation.

Properly speaking, this is mechanical ventilation effected by electricity as a motive power. Go where one will, small fan blowers driven by electricity are now a familiar object. These have rendered life in banks, stores, restaurants and even private dwellings far more endurable in sultry weather than was formerly the case. So far, the electric current for driving these fans is for the most part taken directly from wires used for lighting and other purposes. Some, however, are driven by battery power, and as the storage battery becomes gradually improved it will more and more be used for this and similar purposes. The storage battery, while not yet fulfilling the promise it seemed to hold out when first introduced, is yet constantly advancing in usefulness. Electric ventilation, like electric lighting, has come to stay. The heating and ventilating trade, not only by this innovation but also in other ways, is becoming more related with electrical engineering as time advances. By the use of electricity, low pressure steam heating and mechanical ventilation can often be advantageously carried out together. When this is done a skilled engineer may be dispensed with who would otherwise be necessary to attend an engine and boiler for driving the fans.

Trades School at Elmira Reformatory.

The Eighteenth Year Book of the New York State Reformatory at Elmira, which has recently been issued, contains a great deal of interesting and valuable matter relative to the technological department of that institution. Taken as a whole, it is probably one of the largest trade schools yet established and embraces in its various divisions over 120,000 square feet of floor surface. During the year under review instruction was given in 34 different trades, with a total attendance of 1804. Prominent among these trades, in alphabetical order, may be mentioned boat building, bricklaying, cabinetmaking, carpentry, frescoing, hardwood finishing, pattern making, plastering, plumbing, stone cutting, tinsmithing, wood carving, wood turning and mechanical wood working. The school is divided into six groups, in accordance with the character of the studies followed—namely, wood working and finishing, metal working, constructive and fitting, domestic, decorative and liberal and typographical and bibliopegic. The largest class in the school is that devoted to carpentry, it having an average following of some 130 pupils, and occupies a floor space of 10,000 square feet. The course includes 18 numbers, beginning with the use of the saw, plane, carpenter's saw and chisel, and following with instruction in the making of mortises and tenons, halving joints, making miter joints, miter frames, window and door frames, house framing, laying sills, setting studding, bridging floor joists and partitions, setting window and door frames, installation of roofs, laying shingles and putting on cornices. This work is not performed in miniature, but is carried out in full proportions. The carpentry class proper contains 62 working benches, each accommodating two men, and each provided with a complete outfit of tools necessary for the proper execution of the work. The repair shop carries such machinery as the planer, rip and cut off saws, band saws, shapers, boring machines and buzz planer. In the cabinetmaking class there are 48 cabinet benches and some 1100 tools in use. In the wood turning class the uses of the various tools employed first receive attention, and when the pupils become proficient in handling them, they are assigned to work which puts this knowledge into practice. The classes in each branch of trade are described at considerable length in the Year Book, while some of the engravings, made direct from photographs, show the class rooms and pupils at work.

Hot Water Heating.

The hot water method of house heating is undoubtedly growing in popularity, both with the people and the dealers all through the country. Some idea of the extent can be gained from a well defined impression that exists that one half of the radiation turned out by the manufacturers last year was for use with hot water. Preparations in a number of foundries this year have been made to supply a large demand for radiators for hot water use, both direct and indirect. People who have experienced difficulty in heating some rooms readily accept hot water as a means of heating, when it is explained that the radiator will be hot and throw off its heat in the apartment where it is located, no matter from what quarter the wind blows. Though all fitters are not as successful as they would like to be in installing hot water plants, the principle of the circulation of hot water is readily grasped and the details of the pipe fitting can be learned much easier than the apportioning of the proper amount of surface for a given room.

Combination Heating.

From the use of an ordinary pipe coil in the fire pot of a furnace there have sprung many devices for heating water to be circulated through radiators for warming rooms which are otherwise heated by a furnace with difficulty. Some trouble has been experienced in getting the water heater properly proportioned to the air heating capacity of the furnace, or in connecting just the right amount of radiation with it to get a satisfactory quantity of hot air without boiling the water. Such satisfaction has attended the use of these apparatus that this method of heating is growing rapidly in popularity. One of the taking features is that a positive heat is afforded by the radiators and a positive change of air is the result of the constant inflow of hot air from the registers. As in many other branches of domestic engineering the authorities do not agree as to the best methods of installation. Some say that the lower floors of the building should be heated by hot air and the upper floors by the radiators, while others hold that a radiator and register should be placed in each room to secure satisfactory results. With the first method there is some possibility of the rooms warmed by radiators becoming overheated when the furnace is fired strong enough to keep those heated by hot air comfortable. With the latter method strong firing cannot produce such an effect. The installation of the double system is, however, more expensive.

Civic Federation.

An organization known as the Civic Federation has been formed in Chicago for the purpose of promoting reform and improvement in various directions. The organization is described as "A non-partisan, non-sectarian association, inviting the co-operation of all the forces that are now laboring to advance the municipal, philanthropic, industrial and moral interests of Chicago." The membership is composed of the best citizens of the city, and includes in executive positions such names as Marshall Field, Franklin Mac Veagh, Miss Ada C. Sweet, O. P. Gifford, Cyrus McCormick, Mary M. Willmarth, Victor Lawson, A. C. Hesing, and many others. The following standing committees have been formed: Ways and Means, Municipal, Industrial, Philanthropic, Morals, Educational, and Political, and it is proposed to prosecute an active reform in these various branches of the city's need. The Industrial Committee has invited suggestions and advice from persons known to be interested in such matters all over the country. The federation contemplates holding a conference some time in the later fall on the general subjects of arbitration and conciliation. It is proposed that prominent people who have studied these subjects should attend, and that the conference should last two days; the first to be devoted to discussions of such industrial disputes as might be properly controlled by national legislation; and the second day to be given up to discussion by experienced persons representing both employer and workman, as to the best method of arbitrating the differences so frequently arising between the two. All movements of such substantial character as this must result in some good, and the general publicity given to the practical opinions of experienced men on these subjects cannot fail to be beneficial. The officers are: Lyman J. Gage, president; Bertha Honore Palmer, first vice-president; John J. McGrath, second vice-president; Ralph M. Easley, secretary, and Edward S. Dreyer, treasurer.

Organization.

BY W. H. SAYWARD.

The true function of organization is to reconstruct. Notwithstanding the fact that the practical operation of organizations appears in many instances to be destructive, the purpose which underlies it is to improve by doing away with unjust conditions. It is often the case, however, that the conception of what constitutes unjust conditions by those who form organizations is untenable and illogical; but nevertheless the whole object is the betterment of a class or condition, and out of every mistake of policy or action wisdom is gained by which the next crisis is more truly understood and correctly solved. It is self-evident that organization is the result of the conviction of a certain number of persons that conditions by which they are surrounded need improvement, and that they can be most surely improved by united action. If the methods adopted for securing the desired improvement seem crude or inefficient the fact is evidenced that the convictions of the individuals who form the organization are crude and inefficient as to methods of improvement. The methods adopted by an organization are but the expression of the opinions of the individuals of which it is composed. The value of organized effort is unquestionable and plain, for crude though its methods may be, the individuals would never know the crudity of their opinions without giving them expression in operation, and organization offers this needed expression. The individual may have the utmost faith in the truth of his convictions, but, alone, he is unable to put them to the test; community of action enables the test to be made, and the truth or falsity to be demonstrated. Thus, out of the efforts of organization, the individual is furnished the proof of his wisdom or error in matters thus involved. From the united action of one part of a community, all the other parts are given a knowledge of the position and beliefs of those who form the part which has acted in unison. But for organization, all the members of one branch of the building trades, for example, might go on indefinitely enduring conditions which they believed to be unjust, but which they, acting as individuals, would be powerless to correct. The conditions existing in the building trades which need reconstruction are the outgrowth of long years of neglect and half action involving many complex problems, and it is not possible to suppose that they can be reconstructed in a day; for it is only by long, hard experience that the mistakes and errors of belief can be proven and the justice of relationships involved made plain. An organization should be as conscientious in its methods of reconstruction as an individual should be in dealing with his fellows, for proper organization is simply a great composite individual.

UNITED STATES CONSUL-GENERAL PENFIELD, at Cairo, has informed the State Department that the Egyptian Government has issued an invitation to architects in general to submit designs for a museum to be built at Cairo at a cost of $615,000. The successful design will receive a prize of $3150, and $2100 will be divided among the next four designs. It is understood that the Khedive is particularly anxious to get designs from Americans.

The New Planters' Hotel.

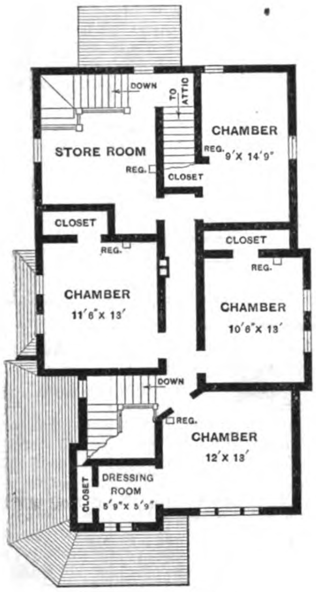
In the latter part of September the new Planters' Hotel, St. Louis, Mo., which was recently completed and furnished at a cost of about $2,000,000, was formally opened for business. The original plans were drawn by H. G. Isaacs, but, before the ground was broken, Isaac S. Taylor was appointed architect of the work. The first step toward building the hotel was taken in March, 1892, so that nearly two and a half years have been occupied in building and furnishing. The structure is fire proof throughout, and contains 400 sleeping rooms. The actual street frontage is 280 feet, but the introduction of two courts increases the actual frontage above the second story to 780 feet, so that nearly every one of the 400 rooms is a front room. The structure is ten stories in hight, with a half story above, which is used for the apartments of waiters and help. The skeleton frame was adopted in the construction of the hotel, and upward of 5,000,000 pounds of iron and steel were used in the framework. There are said to be 140 columns used to support each story, and the entire floors are held up by steel beams and girders. A large proportion of the outside work of the first and second story fronts is in Ohio granite, the remaining eight stories being of light colored granite brick, with cut stone trimming. The summit of the tenth story is 148 feet above the sidewalk, and is finished with a copper cornice. Molded brick are used around the main openings in the fronts, and the rooms on the eight upper stories have oriel windows. The third floor, as well as those above it, consists of three L's, forming two courts, which run 76 feet into the building. Each L is intersected by a corridor running east and west, and they are connected by a longer corridor running some 200 feet north and south. There are 15 private bathrooms on each of the eight upper floors, these being finished with marble wainscoting and tile floors. In the finish of the rooms a different hardwood has been used on every floor, producing a pleasing variety. In the general decoration of the rooms contrast rather than harmony has been studied, and no set of rooms is exactly the same in decoration and color.

Copying Drawings.

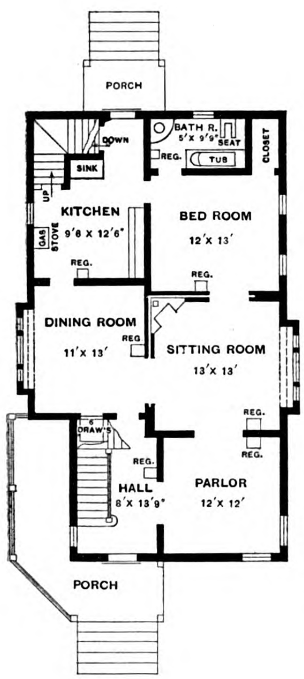
A new method of copying drawings, said to be useful when a few copies only are wanted, has been brought out in Paris. The apparatus consists of a shallow zinc tray, in which is contained a smooth, jelly-like, cream-colored substance, resembling in some degree partially solidified flour paste. The drawing to be copied is made with a special ink. As soon as it is dry it is turned face downward on the contents of the tray. The back of the drawing is then rubbed over with the hand. The sheet is then lifted up, leaving much of the ink transferred to the substance in the tray. A sheet of clean paper now takes the place of the drawing, and by rubbing it over gently with the hand an accurate copy of the original is obtained. With care, as many as 100 copies can be had. When all that are needed have been taken, the composition in the tray is washed with a damp sponge and is then ready for use again. The nature of the composition is not yet known.

COTTAGE AT GRAND RAPIDS, MICH.

AN attractive cottage, so designed as to provide a sleeping room upon the first floor, is illustrated in the engravings which we present herewith and by the half-tone picture



Second Floor.

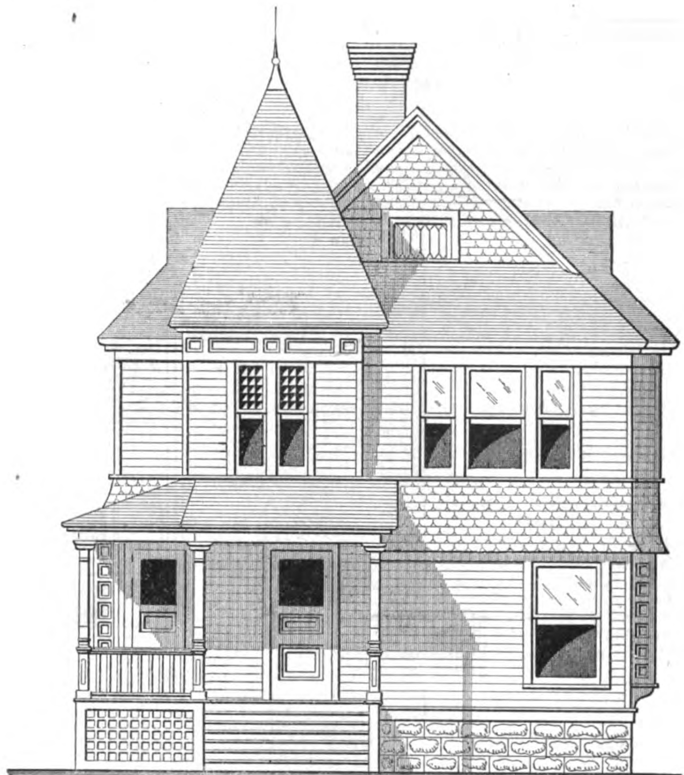


First Floor.

Scale, 1-16 Inch to the Foot.

which this month constitutes our supplemental plate. The drawings were prepared by Andrew J. White, architect, of Grand Rapids, Mich., and the house was erected last year for George W. Burbridge. The plans show five principal rooms on the first floor, in addition to which are a good sized hall and bathroom. From the hall open the parlor and dining room, with both of which communicate the sitting room. Beyond the sitting room is a sleeping room, opening out of which is a closet and the bathroom. The kitchen is directly in the rear of the dining room and communicates with it as well as with the sleeping room. The rear stairway occupies one corner of the kitchen, one flight leading up to the second floor and the other down to the cellar.

On the second floor are four sleeping rooms and what is designated as a storeroom, although in reality it is a rear hall. The front chamber has opening from it a modest dressing room, into which opens a clothes closet.



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

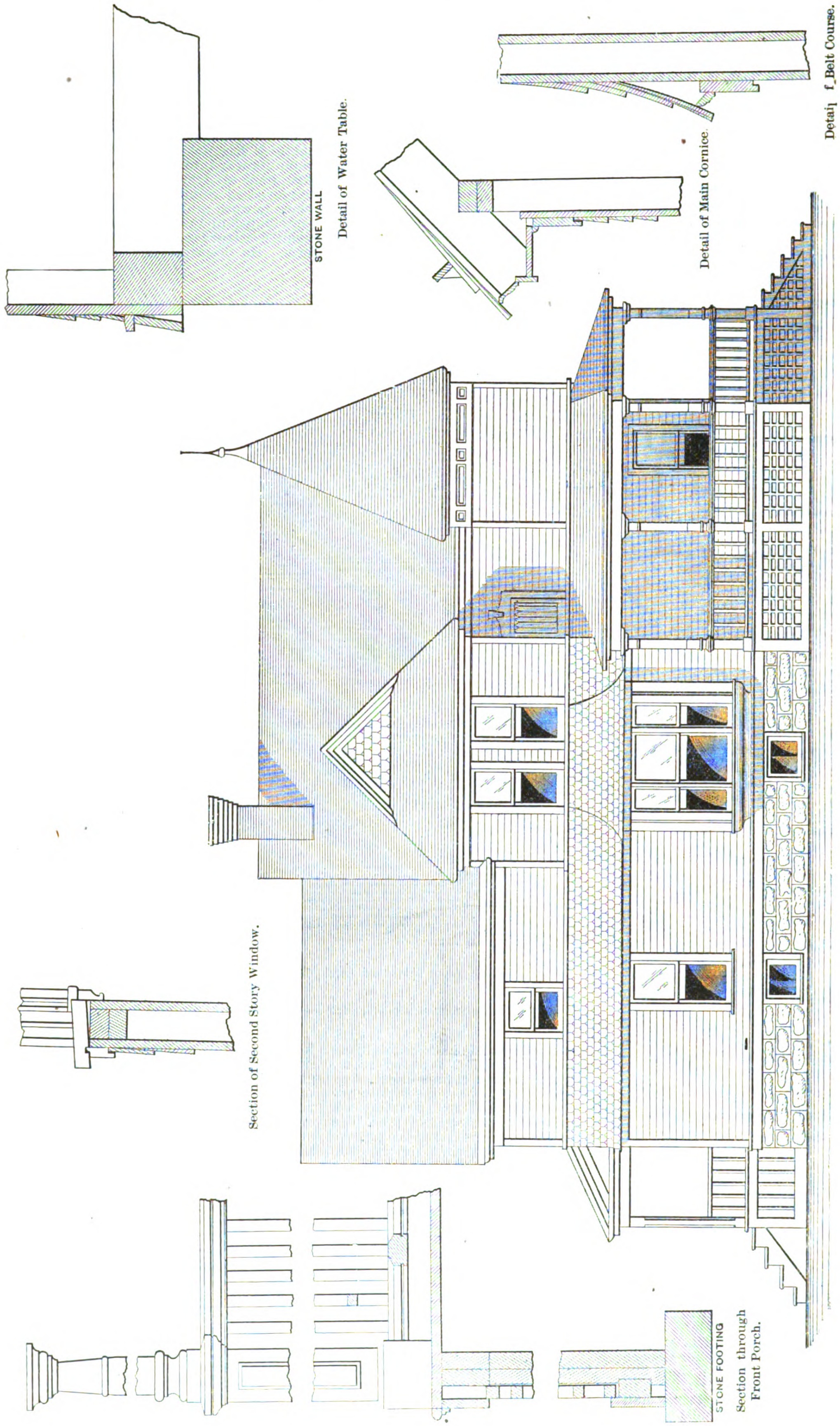
Cottage at Grand Rapids, Mich.—Andrew J. White, Architect.

From the architect's description we learn that the joist and studding are hemlock and the sheeting of pine. The first story joist are 2 x 10 inches, the second story 2 x 8 inches, and the attic joist 2 x 6 inches. The house has a stone foundation and the cellar is 7 feet in the clear.

The first floor, with the exception of the kitchen and the bathroom, is finished in red oak, while the second floor, together with kitchen and bathroom, are finished in pine. The house is heated by a furnace and there is a coal grate in the sitting room. The cost of the structure completed was $2650.

ONE of the most useful machine tools that made its appearance at the end of the eighteenth century, says an English trade journal, was the circular saw. This had been applied to cutting metal on a small scale, as in the cutting engine, ever since the time of Dr. Hooke —if, indeed, these early examples were not more like circular files than saws. Where or by whom the wood cutter's saw was put into the form of a revolving disk has not been recorded. It found its way into this country about 1790, some say from Holland, and was employed at Southampton and elsewhere in wood mills. Bentham greatly contributed to the practical arrangements necessary to give it a convenient form. He describes and claims the bench now universally used, with the slit, parallel guide and sliding bevel guide and other contrivances. Brunel introduced a variety of ingenious and novel arrangements, as well as the mode of making large circular saws of many pieces. Mr. Smart also contrived series of sawing machines for making canteens, cutting tenons, &c.

SEALED PROPOSALS will be received at the office of the Supervising Architect, Washington, D. C., until 2 o'clock in the afternoon of October 12, 1894, for all labor and materials required for the excavation, foundations, basement and area walls, basement columns and I-beams, &c., of the first floor construction, temporary drainage, &c., for the United States Post Office Building at Allegheny, Pa. Copies of the drawings and specifications may be had at the office of the Supervising Architect or the office of the superintendent at Allegheny.



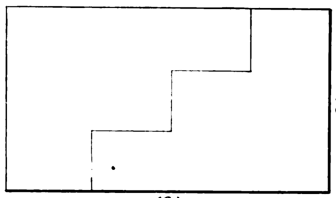
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Elevation and Miscellaneous Details of Cottage at Grand Rapids, Mich.—Scale of Details, ¾ Inch to the Foot.

CORRESPONDENCE.

Repairing a Boat.

From J. J. C., *Rome, Ga.*—A fisherman once discovered a hole in his boat, and in measuring the opening he found it amounted to 12 inches square. The only material he had at the time was a piece of plank 9 x 16 inches, and by sawing it in two pieces he made good the defect, the two pieces exactly filling the hole. I would like to hear from some of the readers of the paper



Repairing a Boat. — Fig. 1. — Shape of Board with which the Leak was to be Stopped.

and have them give a correct diagram showing the way the board is cut.

Note.—The question which our correspondent proposes is such a very old one that we feel sure most of the readers are familiar with it from its presentation in these columns long ago. We, however, give place to it at this time for the sake of those who are not in possession of back volumes of the paper. The piece of plank 9 x 16 inches in size is indicated in Fig. 1 of the diagrams, the irregular line indicating the way in which the piece was cut in order to stop the leak in the boat. The two pieces were then placed together in the manner indicated in Fig. 2 of

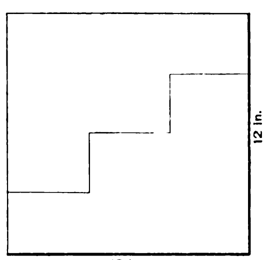


Fig. 2.—The Way it was Cut to Serve the Purpose.

the sketches, which, it will be seen, gives a piece 12 inches square.

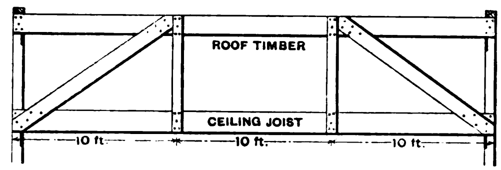
Self Supporting Barn Roof.

From D. P., *Lawrenceville, Ill.*—In another issue of the paper I may make bold to show the readers how a gentleman farmer told me he would construct the roof of a barn if he were to build another one. He said he would adopt such a system of bracing a self supporting roof as to entirely dispense with posts, girders and braces in the second story or hay loft. His object was to have the loft perfectly clear, so as to permit the free and easy use of hay fork or other tools that are used. I would ask my brother carpenters if they have ever had any experience with this novel mode of framing, and if so to let us know the result.

Note.—We trust our correspondent will send us the drawings referred to, as we have no doubt a large class among the readers will be interested in the method of framing mentioned.

Roof Plan for a Store Building.

From G. H., *Narrowsburg, N. Y.*—In the issue for October, 1893, "M. E. G.," of San Anthony, Idaho, asks for the plan of a roof for a store building 30 x 50 feet, the roof to be without support in the center as the upper story is to be used as a dancing hall. I send inclosed sketches, the first of which, Fig. 1, represents the truss intended for supporting the greater portion of the roof and should be placed about two-thirds the distance from the highest point. The remaining portion of the roof can be supported by the truss indicated in Fig. 2 of the sketches.



Roof Plan for Store Building.—Fig. 1.—Truss Intended for Supporting the Greater Portion of the Roof.

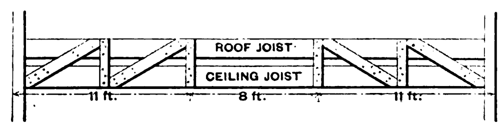
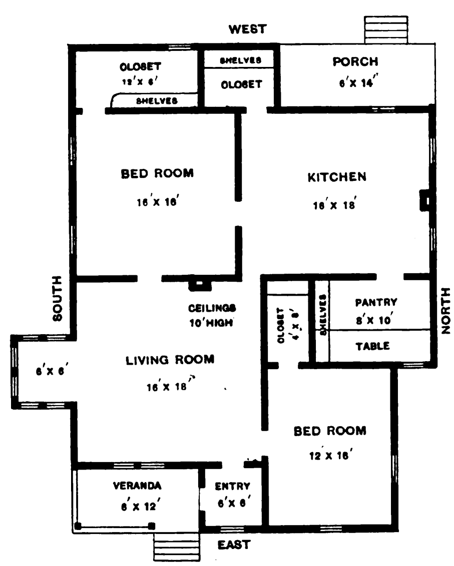


Fig. 2.—Truss for Supporting the Lower Portion of the Roof.

A Woman's House Plan.

From B. T., *Fairfield, Neb.*—Will you allow a woman just a little space to present a statement of her needs? I have the floor plan of the house all right, but I cannot decide on the elevations. I want the entire building, including porch and veranda, under one roof. The sketch which I send shows the arrangement of the rooms, and what I desire is that some of the practical readers furnish a perspective.



A Woman's House Plan.

Boring and Counter Boring.

From W. W. C., *Port Oran, N. J.*—Will some of the readers of *Carpentry and Building* submit instructions as to the best mode of boring and counter boring wood by the aid of the common wood turning lathe, making mention of the tools used and the manner of employing them? Such information, if it could be obtained, would be useful to a great many of the readers of the paper.

Blue Printing Frame and Bath Tray.

From T. F., *Eckhart, Md.*—I have been a reader of *Carpentry and Building* since January, 1894, and find it is a good monthly paper, as it gives designs and details of building and other construction with plenty of good information. I would like it if some of the readers of the paper would give me a design with details of a blue printing frame and a bath tray.

Double Windows.

From D. P., *Lawrenceville, Ill.*—I have been a reader of *Carpentry and Building* for two years, and trust I will continue to read it for several years to come. My appreciation is kept up with every issue. Without attempting to detail the many salient features of the journal, I will say, however, that the Correspondence department is an invaluable aid. Among the late contributions I notice some pertaining to double windows. I would like to know how these are made. If the writer who contributed the article, or any one else, will give a plan, elevation and cross section of double windows and frame, he will confer on me, and I have no doubt on many others as well, a great favor.

A Mathematical Problem.

From WILLIAM COX, *New York City.*—In reply to "Tramp," Denver, Col., I send the accompanying diagram and explanation: Assume the diameter = $A B = A E = B E = 100$ feet. The triangle $A B E$ of Fig. 1 is equilateral; therefore the angle $B A E = 60°$. The area of $A B E = \frac{A B^2 \times \text{sine } 60°}{2} = \frac{10{,}000 \times 0.866}{2} = 4330$ square feet. The center piece = area $A B E$ less area of half a circle with diameter $A B$ = area $A B E - \left(\frac{A B^2}{2} \times 0.7854\right) = 4330 - 3927 = 403$ square feet.

Areas are proportionate to the square of the sides; therefore we have $403 : 130{,}680 :: 100^2 : x^2 = 3{,}242{,}680$, and $x = 1800$ feet = diameter of the circles; then $A O = A C \text{ sec. } C A O = 900 \times 1.1547 = 1039$ feet.

I have not taken decimals into account, but believe the above to be the simplest solution.

From C. A. N., *Ravenna, Ohio.*—In reply to "Tramp," whose mathematical problem appeared in the June number of the paper, I would say that the diameters of the circles is 1800.4657+ feet, and the distance from the centers of the circles to the center of the plat is 1039.4988+ feet. The inclosed diagram, Fig. 2, makes it so plain that any one can work it out and understand the reasons for so doing it. Let x equal the diameters of the circles and also the sides of the triangle

$$\frac{0.866025\ x^2}{2} - \frac{0.7854\ x^2}{2} = 130{,}680.$$

In solving this I use a rule of my own for finding the area of a triangle, and would be glad to know if there is such a rule in mathematics, or if not, if any one else has discovered a way as easy as mine. The diagram shows that two-thirds of the altitude of a triangle is the distance to the common center. I think the person who gave this problem intended the answer to be 1800 feet.

From E. K. F., *Fowler, N. Y.*—In the June number "Tramp" of Denver presents a problem for solution. Given the three circles of equal diameter and the area of the inclosed space a, equalling 130,860 square feet, we are required to find the diameters of the circles and the distance from the center of each circle to the center of the space a. Referring to the diagram, Fig. 3, we have by drawing lines to connect the centers of the circles the equilateral triangle B C D, consisting of the sectors D F G, G C H and B F H plus the space a. The area of this triangle is equal to one-half the area of one of the circles plus the area of the space a. The area of the triangle B C D also equals the line B G multiplied by the line G C. Let x represent the radius of one of the circles and we have the equations:

Area of triangle $= \frac{1}{2}\ (3.1416\ x^2) + 130{,}860$, or

$$= 1.5708\ x^2 + 130{,}860.$$

Area of triangle $= \sqrt{3\ x^2} = 1.5708\ x^2 + 130{,}860$, because in the triangle B G C the perpendicular B G will be equal to the square root of the difference of the squares of the other two sides. The hypotenuse B C = 2 C G, or $(2\ x)^2 = 4\ x^2 - x^2 = 3\ x^2$, and the area of the triangle equals the altitude multiplied by one-half the base in the triangle B C D. Transposing and changing signs we have:

$$1.73205\ x^2 - 1.5708\ x^2 = 130860$$

uniting $0.16125\ x^2 = 130860$

$$x^2 = 810294.57$$

$$x = 900.$$

The diameter of the circle $= 2\ x$, or 1800 feet.

In the triangle B C D the bisectors of the three angles meet in a point and are of equal length; therefore the triangles BaC, BaD and DaC are equal. Therefore the area of the triangle BaC is equal to one-third the area of the triangle B C D, which equals 46753.5. The altitude of the triangle equals the area divided by one-half the base, equals 517.6 feet. The altitude of the triangle B C D, or the line DaH, equals 1558.845 feet.

$$1558.845 - 517.6 = 1041.245$$

which is the distance from center of circle to center of space a.

"Tramp" will need some knowledge of both algebra and geometry for the understanding of this solution, but I see no simpler method.

From E. P. B., *Marion, Mass.*—In reply to "Tramp," in the June number of the paper, I would say if he will find the area of the triangle $B D C$, Fig. 3, in terms of R (radius of circle), and subtract the sum of the areas of the sectors $B H D$, $C H G$ and $D F G$, also in terms of R, we will have a, equals 130,680 in terms of R. From it we can find R. The area of $B C D = D G \times B G$. $D G = R$ and $B G = \sqrt{4 R^2 - R^2} = \sqrt{3 R^2} = R \sqrt{3} = 1.732\ R$ nearly.

Therefore the area is very nearly equal to $1.732\ R^2$. The angle B is 60°, so also is that at D and C, for the reason that the triangle is equilateral. Therefore the area of the sector B F H is one-sixth that of the circle, and the sum of the areas of the three sectors is one-half the area of either of the circles. One half the area of the circle $= \frac{3.1416\ R^2}{2} = 1.5708\ R^2$ and the area of $a = 0.1612\ R^2 = 130680$ square feet. Now R^2 equals very nearly 819669, so that R equals very nearly 900.3, or nearly 900 feet $3\frac{1}{4}$ inches. $B G = 1.732\ R = 1559.32+$ feet, and as the center of the space a is at the intersection of the lines $B G$ and $C F$, and $C F$ cuts $B G$ at two-thirds its length from the vortex of the triangle, the distance from the center of the circle to the center of the space a will equal two-thirds of $B G$, or two-thirds of 1559.32, which is equal to 1039.54 × feet.

Note.—We also have answers to the problem from C. Pollmar, Petoskey, Mich.; "H. D.," New York City; "E. P.," Gloversville; "G. H.," Narrowsburg, N. Y.; "M. E. O'C.," Porter's Mills, Wis.; "J. W. H.," Cleveland, Ohio; "P. P. C." of Jenkintown, Pa.; "G. W. S." of Detroit, Mich., and "C. H. B." of Albany, N. Y.

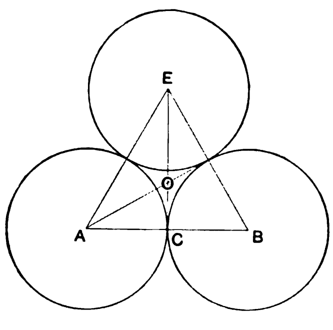


Fig. 1.—Diagram Accompanying Letter from Mr. Cox.

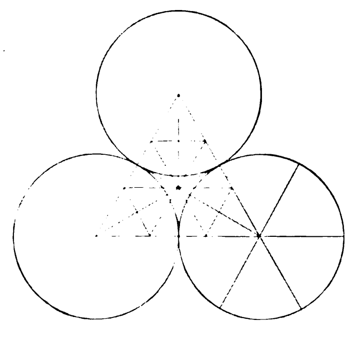


Fig. 2.—Solution Presented by "C. A. N."

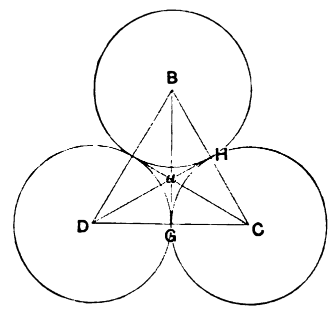


Fig. 3.—Diagram Contributed by "E. K. F." and "E. P. B."

A Mathematical Problem.—Diagrams Accompanying Letters from Various Correspondents.

A Smoky Fire Place.

From EDWIN A. JACKSON & BROTHER, *New York City.*—May we not offer some further suggestions on fire place construction? In the June issue "J. A. S." of Fairfield, Iowa, says that half the fire places of his town smoke. Fully one-half of the fire places in the whole country smoke badly. Now, as to the trouble with the one he illustrates, and describes we would say that in the first place the fire place does not have a separate flue. Very seldom will a fire burn well where the flue does not run separate to the roof.

2. The flue, even though it were separate, is too small. It should be 8 x 8 inches at least.

3. The fire place is too far out, giv-

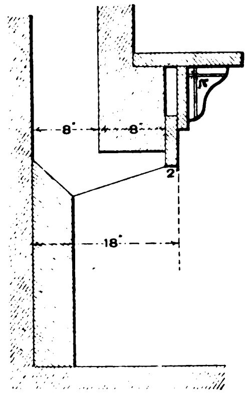
ing the flue too much slant, and therefore too much friction.

4. The throat is a long and tapering one, and is not shaped as it should be. On this point see *Carpentry and Building* for February, 1891; also March, 1894.

5. The grate does not fit the fire place. It is a mistake to have space between the brick work and the grate, as this causes eddies which check the draft and make the grate to smoke.

6. There is too much brick work over the front of the grate. You have here about 9 inches, and smoke striking this curls out into the room. To remedy, or rather help, the matter, it is first necessary to build up the fire place to just fit the grate and cut the brick arch on a slant. It will, however, never work well with the flue construction. Another mistake is the damper over the grate. It is better to have the grate open wide here, at least when a fire is first started.

The question of overhanging brickwork is not well understood, and even Mr. Kidder, whose article appears in

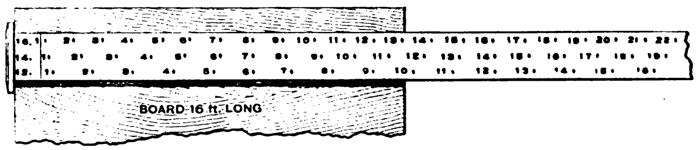


A Smoky Fire Place.—Sectional View at Throat of Fire Place.

the same issue, is wrong here. He says, make your flue 8 x 8 inches or 8 x 12 inches and have a 4-inch wall on the front, increasing this to 8 inches around the fire place. What is the result? The depth of flue 8 inches plus the 8 inches of brick work plus about 2 inches for tiling gives 18 inches, as shown in the accompanying sketch. A grate seldom runs over 15 inches deep and often not over 12. That requires 3 to 6 inch filling on the back of the grate, and over the grate we have 10 inches dead space and 2 to 5 inches of flue. Even where an 18-inch fire place is used we have 10 inches dead space and 8-inch flue. Smoke striking this surface curls out into the room, usually quite as much as into the flue. It is better to have only 4 inches of brick and 2 inches of tile, or a total depth of 14 inches, of which the greater part is open space—the flue. Where 8 inches of brick is used, be sure it is cut on a slant, running down to 4 inches or less.

Lumber Rules.

From W. I., *Mount Vernon, N. Y.*—I notice in a recent issue a correspondent's inquiry as to the signification of the figures on the rules used in lumber yards. I naturally suppose that the correspondent refers to the class of rules known as "board" rules, which when placed across a board give the number of feet, board measure, that are contained in it. A foot board measure is equal to the quantity of lumber contained in a piece 1 foot long, 1 foot wide and 1 inch thick, so it is obvious that in a 1-inch plank the superficial area expressed in square feet is equal to the number of board feet in the plank. For purposes of measurement all boards are assumed to be 1 inch in thickness and the rule is graduated upon this basis, and if lumber is



Partial View of Lumber Rule Submitted by "W. I."

to be measured of thickness other than that for which the rule is graduated, the correct measure is found by multiplying the number of feet as given by the rule by the thickness of the lumber. The rule as generally constructed has three or four lines of figures running the length of it, one for each length of lumber that the rule is adapted to measure, this length being shown in feet by the figure placed opposite each scale under the head of the rule. On referring to the sketch it will be seen that the rule is graduated for 12, 14 and 16 foot lumber, and scales for the measurements of other lengths are generally placed on the opposite side of the rule. The distance between the divisions on any one of the different scales is found by dividing the number of square inches in a square foot by the number of inches in the length of the board. For instance, in the scale for 16 foot lengths dividing 144, the number of square inches in a square foot, by 192, the number of lineal inches in a 16-foot board, gives ¾ inch as the width of a strip 16 feet long that will contain 1 square foot, or 1 foot board measure, assuming the lumber to be 1 inch thick. Thus the divisions on the 16 foot scale should be placed ¾ inch apart, in the 14 foot $\frac{6}{7}$ inch is the proper division, and it will be noticed for 12-foot lengths that the divisions are even inches. When the rule is placed across a board the number on a scale corresponding to the length of lumber measured nearest the edge of the plank gives the number of feet in a piece of lumber. Thus, assuming the length of the board shown in the illustration to be 16 feet, the rule shows that it contains 13 feet.

Development of an Ogee Hip Rafter.

From H. H. P., *Warehouse Point, Conn.*—In *Carpentry and Building* for June, 1894, I notice a letter from "H. D.," in reply to an attack made by "F. H. T." of North Topeka, Kan., on a method of developing the shape of an ogee hip rafter in an article by I. P. Hicks in the January number of 1893. "H. D." says he feels obliged to defend the method and that it needs no one to prove that it is correct. Permit me to say to "H. D." that he is wrong and "F. H. T." is right. The principles of the method are wrong. I cannot obtain the same result with both methods, nor do I think "H. D." can. I would like to have him send drawings to prove that it is correct. I think, however, it is the business of Mr. Hicks to do so, as he, I suppose, was paid for the article in which the method was described, and as the subscribers to the paper have an interest in the matter would like to have him prove the method correct. I would send drawings but think Mr. Hicks should do so, and will wait for him. In *Carpentry and Building* for April, 1893, pages 103-6; also May, 1893, page 136, and March, 1894, page 58, are found the principles for developing the ogee hip rafter, except that better results can be obtained in developing angle curves by dividing the curved line into equal parts instead of the pitch or base line. But as I understand Mr. Hicks' idea was to do the work of drawing and developing on the rafter, the simplest way to develop the pitch line would be as given by "J. A. S. of Portland, Ore., in the issue for April, 1893. When I first read the article by Mr. Hicks I thought the principle wrong, but did not test it until my attention was called to it by the letter of "F. H. T." I think this is a subject that needs airing, and so I will help to do it.

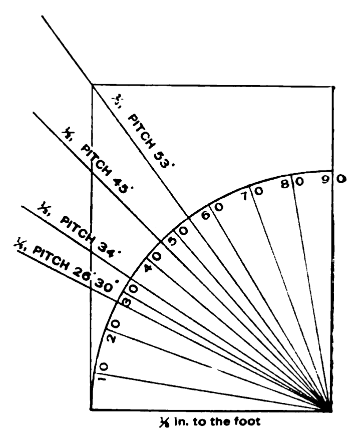
Filing Hand Saws.

From D. P., *Lawrenceville, Ill.*—Why does not some one tell the readers how to file hand saws? The art of saw filing is no mean acquisition, and the saw is surely one of the most useful tools there is. Yet no one says a word for it.

Note.—If our correspondent will take the trouble to refer to the May issue of *Carpentry and Building* for 1892, he will find an article by James Francis on the care and use of saws, in the perusal of which, we have no doubt, he will be interested if not instructed.

Pitch of Roofs.

From W. V. M., *Tucson, Ariz.*—In reading *Carpentry and Building* for May, 1894, I find an article by "H. P.



Sketch Illustrating Pitch of Roofs According to Ideas of "W. V. M."

C." of Prentice, Wis., in regard to the pitch of roofs, in which I claim he is entirely wrong. I inclose a sketch demonstrating my ideas. I make the same claim as "O. L. W.," Dallas, Texas, that the pitch of a roof is a fractional part of the span, or so many inches rise for each foot of run of the rafter. For example, if a building has a 24-foot span, one-quarter pitch would be 6 feet rise, or 6 inches rise to 1 foot of run of rafter. The same rule applies to all pitches. Thus: 6 inches to 1 foot is one-quarter pitch, 8 inches to 1 foot is one-third pitch, 12 inches to 1 foot is one-half pitch and 16 inches to 1 foot is two-thirds pitch. I will say that the reason the degree plan will not work from the horizontal to the perpendicular is this: Pitches of roofs are determined by a fractional part of the span and by inches of rise to the foot of run of the rafter, and the reason that a one-half pitch is an angle of 45° is because the rafter happens to form a right angle, but it does not prove that we must divide the 45° angle to find other pitches. In the sketch which I send it will be seen that only one pitch coincides with the drawing of "H. P. C." Let some other nail driver step in and determine who is right.

Building an Ice House.

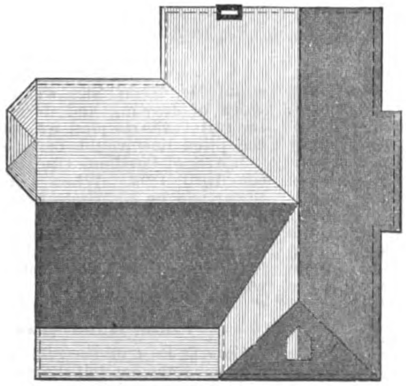
From J. W., *Longmont, Col.*—I would like some of the readers of *Carpentry and Building* to tell me the best way to build the walls of an ice house and what is the best filling. Sawdust is difficult to obtain in this place.

Gauge for Rabbet Plane.

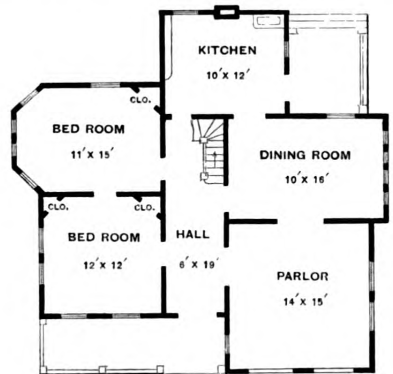
From C. J. W., *Berkley, Va.*—In the September number of the paper I notice a sketch of a rabbet plane contributed by "E. S. C." of East Hampton, Mass. Permit me to say that the gauge is not new, although he may have thought so at the time he sent in his letter. Put a fence on the device and it is the old style of fillister. All the same, it is very handy.

Plans for a Five-Room House.

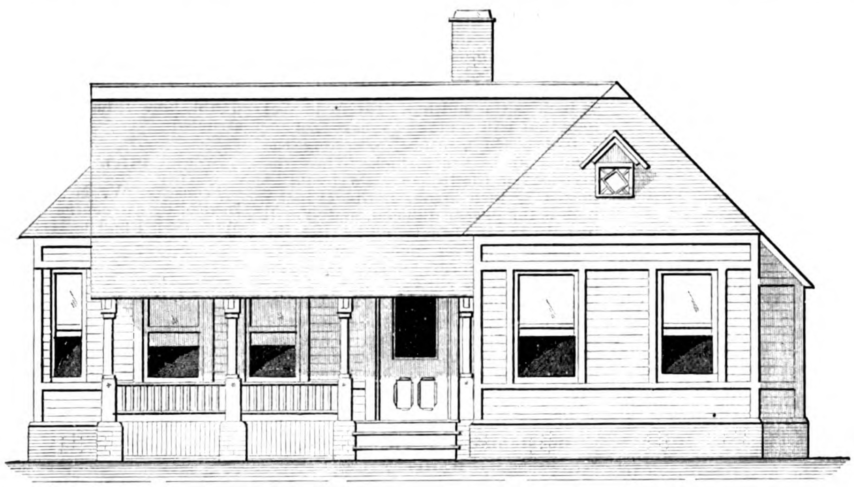
From C. S. FISHER, *Philadelphia, Pa.*—I send drawings of a five-room house in answer to the request of "A. A. N.," Lafayette, Ind., which appeared in the August issue of the paper. In regard to the plans, permit me to state that a closet can be placed under the stairs opening into either the kitchen or the dining room, and a bathroom could be added between the bedroom and kitchen if such changes should appear to the owner desirable. The attic can be used for storage purposes or as a bedroom. An examination of the floor plan will show that every room is accessible from the hall, which extends nearly the length of the house, and that each sleeping room has one or more closets.



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



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



Plans for a Five-Room House.—Front Elevation.—Scale, 1/8 Inch to the Foot.

Design for a Sideboard.

From JOHN HERZOG, *Saginaw, Mich.*—In reply to "L. J. F." of Chartly, Mass., whose inquiry appeared in the April issue of *Carpentry and Building*, I submit a design for a sideboard which may prove interesting. It is intended to be made of quartered oak and it is represented in front and side elevations in Fig. 1 of the accompanying illustrations. A section of the sideboard taken on the line A B of Fig. 1 is presented in Fig. 2 of the engravings. The base has a solid top 66 x 26 inches and 1 inch thick, a plan view being presented in Fig. 2. The top frame is made of $1\frac{1}{8}$-inch stuff with miter joint in the front and dowel grooved and tenoned at the back. The solid ends are constructed as shown in Fig. 2 of the cuts, being made of $1\frac{1}{8}$-inch stock with a $\frac{5}{8}$-inch panel and cove molding in the stiles and rails, as shown. The pilaster is glued inside, flush with the front edge. The columns are turned, and when finished measure $2\frac{1}{4}$ inches. The fluting and rabbeting is done as shown in Fig. 3 of the cuts, it being $\frac{1}{4}$ inch wide and $\frac{1}{8}$ inch deep. The front stile in the base partition is $1\frac{1}{2}$ x 4 inches and molded, as shown in Fig. 8. The cross rails are flush with the front stile on the side where the drawers are located. The bottom frame is made of $1\frac{1}{2}$-inch stuff with miter joints in front cut and molded, as shown in Figs. 5 and 8. The solid bottom is $\frac{1}{2}$ inch thick with a quarter round front edge nailed to the frame. The doors are made of $1\frac{1}{8}$-inch stuff and have a panel $\frac{3}{8}$ inch thick. The rails are $2\frac{1}{2}$ inches wide with cove molding. The two front feet, one of which is shown in Fig. 5, are made of $4\frac{1}{2}$ x $4\frac{1}{2}$ inch stock, sawed both ways, with bracket on two sides and well doweled to the frame. The top part of the sideboard has a glass 34 x 48 inches, the frame being of $\frac{13}{16}$-inch stock, the stiles are of 6 inch material and the pilasters ½ x 3 inches, made as shown in Fig. 9, which represents a plan view of one of the shelves. The top and bottom rails are 3 inches and well dovetailed together. In Fig. 7 is represented one of the turned columns with bracket and ornament between the shelves. The brackets are made of $\frac{13}{16}$-inch stock with miter joints. In Fig. 4 of the cuts is shown a plan of the top shelf and ornament, while in Fig. 6 is represented a detail of the ornamental head piece.

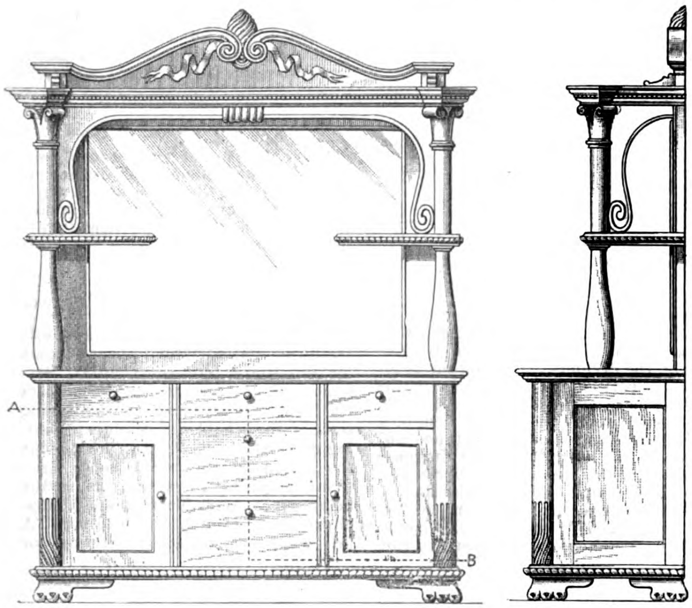


Fig. 1.—Front and Side Elevations —Scale, ½ Inch to the Foot

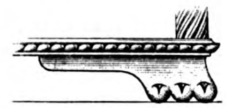


Fig. 5.—Detail of One of the Front Feet.

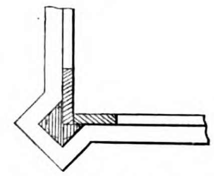


Fig. 4.—Plan of Top Shelf and Ornament.

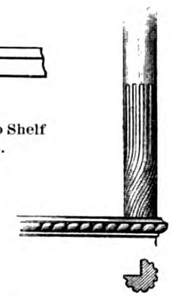


Fig. 3.—Detail of Front Column.

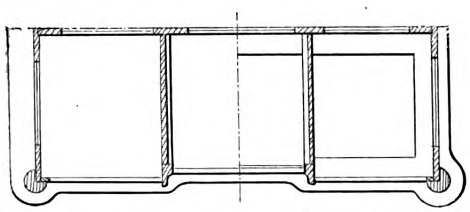


Fig. 2.—Section Taken on the Line A B.—Scale, ½ Inch to the Foot.

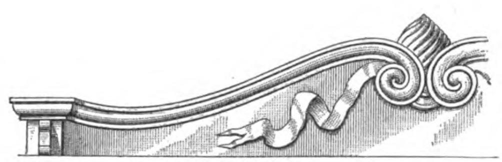


Fig. 6.—Detail of Ornamental Top.

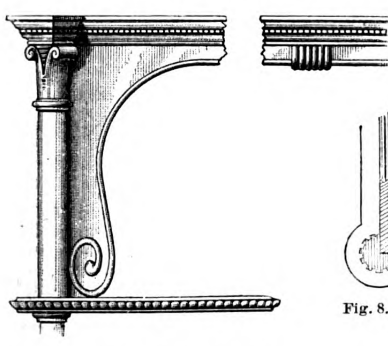


Fig. 7.—Detail of Front, Showing Brackets Between Shelves.

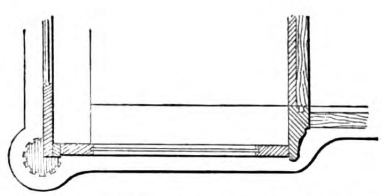


Fig. 8.—Section Showing Construction of Corners and Doors.

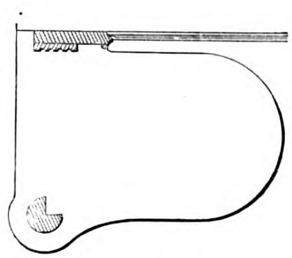


Fig. 9.—Plan of Shelf.

Design for a Sideboard.—Miscellaneous Details.—Scale, 1 Inch to the Foot.

Lengths of Braces.

From F. J. C., *Allentown, Pa.*—I send inclosed sketches in answer to "J. C. W." of Pine Hill, Pa., who desires some information about braces. I will first explain the brace marked B in the sketch of the correspondent named, presented on page 239 of the volume for last year. I take the hight, 12 feet, as the run and the length from the upper end of the brace to the outside of the post as the rise. Deduct 24 inches, the distance the lower end of brace is from the outside of the post. The rise being 7 feet 6 inches, we reduce to inches, which gives 90 inches, minus the 24 inches, leaving 66 inches, as the rise of the brace. Now, to obtain the number of inches rise to the foot run divide 66 by 12, which gives 5½ inches rise to the foot run. Now, take 12 inches on the blade of the square and 5½ inches on the tongue, and mark off 12 times, as shown in Fig. 1 of my sketches, which represents the length of the brace. The tongue gives both the top and bottom cuts. By taking twice the rise, 11 inches, and run, 24 inches, on the square, it will be necessary to mark off only six times. Referring now to Fig. 2 of my sketches, suppose the span of the gable to be 24 feet, with the hight of ridge 8 feet, or one-third pitch. The purlin would be under the center of the rafter. Now, one-fourth of the span is 6 feet and half of the rise is four feet; lay off the purlin post the same as a rafter and gauge a center line on which to lay off the work. Take 8 inches on the tongue and 12 inches on the blade and mark off four times, which is the length of the top of the main rafter. Do not forget, however, to deduct the thickness of the main rafter and purlin plate. To obtain the point *a* of Fig. 2, which is the place to make the mortise, multiply the rise, 8 inches, by 4, which equals 32 inches, or 2 feet 8 inches. Add to this 6 feet, and the result is 8 feet 8 inches, the distance from outside of the plate to the center of the mortise. To lay off the purlin post brace proceed as before explained and mark the plumb cut. Place the square with the 12-inch mark at the top of the cut and 8 inches touching the plumb line. The blade gives the top cut of the brace to fit against the purlin post. By examining Fig 2, which shows the square applied to the different cuts, I hope "J. C. W." will obtain light on the question. It is not always necessary to take 8 and 12 on the square in marking off the top cut of the purlin brace. If desired, any fractional part of 8 and 12 may be taken, as 4 and 6, or 2 and 3, the longest side giving the cut.

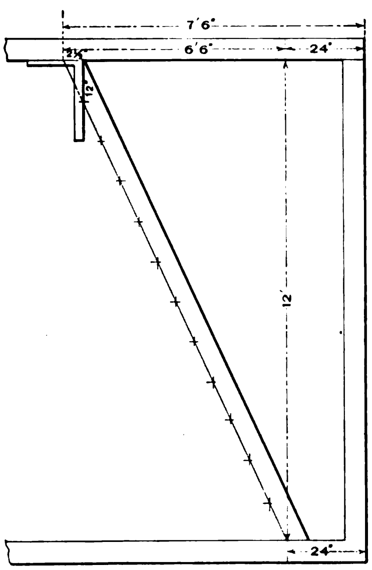


Fig. 1.—Method of Using the Square in Getting Length of Brace.

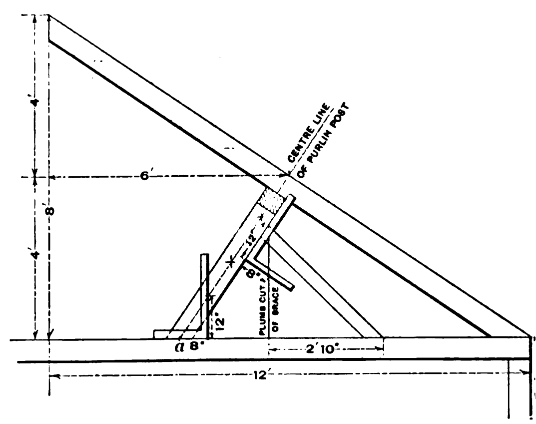


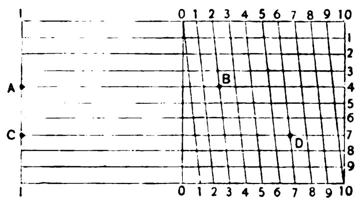
Fig. 2.—Method of Applying the Steel Square to the Different Cuts.

Lengths of Braces.—Sketches Submitted by "J. F. C."

Decimal Diagonal Scale.

From J. J. D., *Cornwall, Cal.*—Will some of the readers of *Carpentry and Building* give a diagram of the diagonal scale that is on the steel square, showing the way in which the hundredths of an inch run, and also show how to take off with the compasses 0.7 and 0.24 inch?

Note.—The diagram which we present herewith represents a scale of 2 inches, one of which is divided into ten equal parts, represented by the figures 1, 2, 3, 4, 5, &c. Diagonal lines are also drawn from top to bottom, as shown in the sketch. The horizontal lines which divide the width of the scale into ten equal parts represent hundredths of an inch. If it is desired to take off with the aid of compasses 0.7 inch, as suggested by our correspondent, it is only necessary to place one leg of the dividers at 7 on the top line and the other leg at the vertical line 0, when the space between will represent the measurement named. In the case of 0.24 inch we run down



Decimal Diagonal Scale.

the diagonal line marked 2 until we reach the horizontal line marked 4, at B, which is the point desired for one leg of the dividers. Placing the other on the vertical line 0, we have the space between equal to 0.24 inch. Take still another example: Suppose it is desired to lay off the distance 1.67 inches. We run down the diagonal line 6 until we come to the horizontal line 7, as shown by D in the sketch. The distance from this point to the vertical line 0 represents 0.67 inch, and the distance from the vertical line 0 to C being 1 inch, we have, by placing one leg of the dividers at D and the other at C, a distance of 1.67 inches. In the same way any tenth or hundredth of an inch may be ascertained and transferred with the aid of the dividers.

Cut vs. Wire Nails.

From B. F. M., *Pana., Ill.*—I have been a reader of *Carpentry and Building* for about three years, and I enjoy the Correspondence department very much. I notice the readers are discussing cut and wire nails. My experience leads me to prefer the wire nails, as I consider them nicer to handle and they will last as long as steel cut nails. About seven years is the life of a cut shingle nail, but the wire nail will last longer than that. "M. L." says they split the lumber worse than a cut nail. I consider the wire nails will hold better after they are driven long enough to corrode a little. Let us by all means have the wire nail.

From C. J. W., *Berkley, Va.*—I am very much interested in the cut and wire nail experience meeting. The best nails I ever saw or used were some chisel pointed nails in Canada several years ago. I never saw but the one keg that I used, but it was *the* nail. I have often wondered why nail manufacturers generally did not adopt the idea.

Design for an Office Desk.

From W. H. A. K., *South Byron, N. Y.*—I am a constant reader of *Carpentry and Building* and learn a great deal from its pages. I would like very much to see published plans for an office desk suitable for store purposes.

Franklin Institute Drawing School.

The drawing school of the Franklin Institute, Philadelphia, opened again for the winter term on Tuesday, September 18, the term ending on January 10, 1895. On January 15 the spring term of the school will commence, lasting until April 25, 1895, on which day the closing exercises will be held. Each term comprises 15 weeks, instruction being given every Tuesday and Thursday evening, from 7,15 to 9.15 p.m. A full course comprises four terms, for each of which a tuition fee of $5 is charged. At the end of the course certificates are awarded to such students as have shown the requisite attention, industry and progress. The Franklin Institute Drawing School offers complete instruction based upon the most modern and approved practice in mechanical, architectural and free hand drawing. The classes are progressive and include a junior, an intermediate and a senior mechanical class, in which methods, technicalities and styles of drafting and designing engineering work are instilled, commencing with the most elementary work and proceeding to the more complicated machinery drawing. The other two classes are for architectural drawing, in which designs, plans, elevations and details of buildings, &c., are taught, and the free hand class, in which drawing with pen, pencil and crayon from the flat and from casts is treated.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

As the draftsman has now been given an explanation of the primary principles and method of drawing plans, we will presume he is ready to advance another step in the art, and we will proceed to the floor plan in full. Referring to Fig. 8, first draw the outside wall line, set off the thickness of walls, locate the joining partition walls, and draw the lines, as shown. Having the wall lines drawn, the next step is to locate the doors, windows, chimneys, &c., which are represented by the short marks across the partitions. It will be noticed that in drawing the partition lines they have been drawn across the door openings, and also some of the lines cross at the junction of partitions where they ought not to. The advantage of drawing them this way in outlining will be plainly seen, for by having the outlines of all the partitions in sight the draftsman is better able to make calculations and locate doors, windows and chimneys in the most desirable manner. It should be remembered, however, that the outlines are to be drawn lightly with a pencil, then when we are ready to finish we can easily erase all superfluous lines, thus showing just where to start and stop when drawing permanently with the pencil or pen. This can be done a great deal easier and quicker than to make all the calculations before drawing the outlines; besides there are often several doors and partitions in succession to cause confusion in locating exactly the points of starting and stopping.

We will now take Fig. 8, and erasing the lines across the door openings and joining partition walls will finish permanently, when it will have the appearance of Fig. 9. By comparing Fig. 8 with Fig. 9 the draftsman will be able to note the change that has taken place in the lines better than words can express it. In addition to the change made by the openings we have drawn a few more lines, finishing the stairs, sink, &c., and indicating the shelves in pantry and closets, making the plan complete.

In Fig. 10 is shown the method of drawing the roof plan. The inside lines represent the outside line of wall plate and should be drawn first. Next set off the width of the cornice and draw the outside lines. Locate the hips, valleys, ridges and chimneys, and finish complete, as shown.

(*To be continued.*)

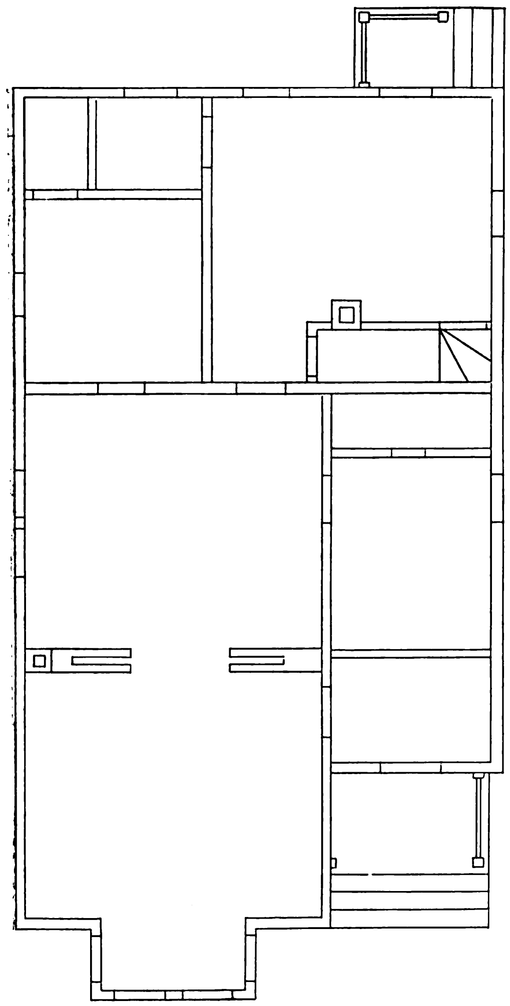


Fig. 8—Method of Outlining the Floor Plan.

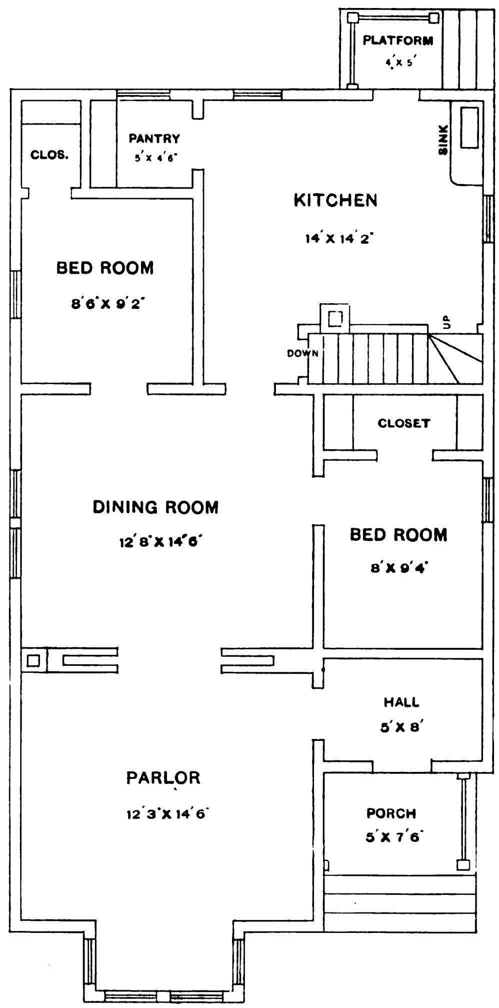


Fig. 9.—Appearance of Floor Plan when Completed.

Architectural Drawing for Mechanics.—Floor Plans.—Scale, 1/8 Inch to the Foot.

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Bricks Made of Cast Iron.

"While I was in Germany last year," said W. L. Burgess of New Haven to a representative of the St. Louis *Globe Democrat*, "I came across several walls surrounding some of the public institutions that were constructed out of cast iron bricks. These bricks certainly have many advantages over the old fashioned clay bricks, though they may not prove to be superior in all respects. In form and size these bricks resemble our ordinary bricks, but they are composed of cast iron and hollow. The shell is so thin that the brick weighs less than one made of clay. A wall is built of such material without the use of mortar, and no skilled labor is required in laying them. The upper and the lower sides of the bricks are provided with grooves and projecting ribs, which fit into each other easily and perfectly, and form a wall of great strength. There are also two large circular openings in the upper side of each brick, arranged so as to receive projections on the lower side of the brick that is to be placed above it. One of the projections is hook shaped, which secures a solid hold. A wall of these bricks is put together very quickly. After the wall is built it is covered with paint. This closes all the cracks, rendering the wall air tight, and prevents the bricks from rusting. The bricks are very durable, and a building constructed of them would be practically fire proof."

Moisture and Masonry.

Water is the most destructive agent to construction. There is no quantity so small which, if repeated, is not ultimately fatal. The softest as well as the hardest material must yield to its insidious attack. No adage more true than "*Gutta cavat lapidem.*" Our forefathers knew the connection between moisture and decay in soft material. Hence in the buildings of the districts where the soft stones prevail, says a writer in an English journal, the bottom courses of the walls will frequently be found to be formed of a hard and impervious stone, the strata of which are called by the quarrymen foundation stone. Walls always above or always below water may, under certain circumstances, be laid without mortar. When between wind and water they never should.

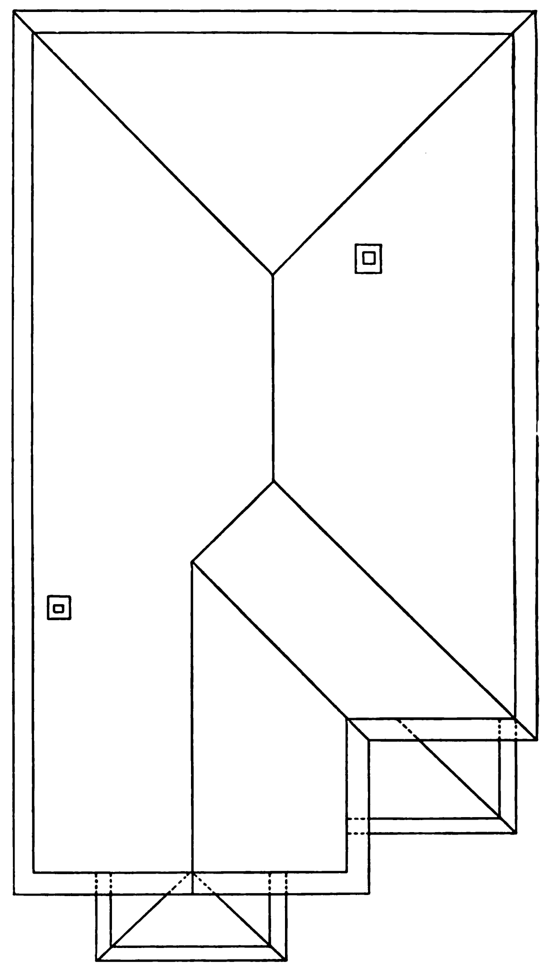
Foundations of Venetian Buildings.

A correspondent of the *Scotsman* writing in a recent issue relative to the foundations of the buildings in the city of Venice says:

Visitors to Venice are always interested in the foundations of its houses, for how these are formed to support massive buildings rising out of the water is a puzzle. As I saw the foundations of a new palace laid, perhaps I may be allowed briefly to describe the process. First, a strong cofferdam was constructed to keep out the water of the canals. Next, into the bottom thus laid bare were driven wooden piles. The work of driving these is one of the unique sights of Venice. Strong men raise with their arms a heavy hammer that slides on an upright beam, and let it fall on the top of the pile. The leader of the gang meantime keeps singing an old Venetian song, to the tune of which the hammer is raised and allowed to fall. The work is very deliberate, as two whole lines are sung while the hammer is in the air, and other two before it is raised after it has fallen. It looks to be very slow work, but the men continue thus at it many hours without fatigue. The piles used in this case were beams of oak from 12 to 14 feet long, and a little less than 3 feet in circumference. Of these 3000 were used, which were driven, not close together, but leaving irregular intervals between them. Then into these interstices was poured a mixture of cement and stones and water, which formed a solid mass, solid as stone, in the course of 24 hours. The palace is 70 feet high, and the width of this foundation was 9 feet. On this, to the hight of 6 feet or so above the level of high water in the Grand Canal, was raised a massive wall of Istrian stone, gradually diminishing in width.

THE WALLS.

Above this were raised the walls, which were of brick, dipped in a solution the invention of the *capo-mastro*, Signor Marco Torres, which makes them resist damp and the weather. These brick walls gradually taper until at the top they have a width of only 1½ feet. The whole façade thus becomes to a certain extent a great buttress. In the construction of the old palaces no cement was used, but the piles were driven in one close to another. Had this old method been pursued in this case, instead of 3000 15,000 piles would have been used. The Church of the Madonna della Salute adjoining stands on not less than 1,500,000 piles. In the old foundations, too, piles were not of oak, but of poplar, pine and various kinds of wood. Away from air and light they do not readily decay. Whole forests of wood are buried beneath Venice, as every building, with the exception of a few side walls of some, stands on piles. The foundations are the most expensive part of a building in Venice, and in the case of this palace they cost about 60,000 francs ($12,000), those of the façade on the Grand Canal costing 20,000 francs alone ($4000.) The cost of building space on the Grand Canal is at present about 30 francs ($6) a square yard, but elsewhere in Venice only from 5 francs ($1) to 5½ francs ($1.10) a square yard. Of course, there is hardly an inch of clear building ground in Venice (exclusive of garden ground, of which there is a very large amount), and as was the case in this building site, inferior or ruined buildings have first of all to be removed. This palace is not yet finished for occupation, and its erection has taken more than a year.



Architectural Drawing for Mechanics.—Fig. 10.—Showing Method of Drawing the Roof Plan.—Scale, ⅛ Inch to the Foot.

FLOORS AND CEILINGS.

I may add that, as in all buildings in Venice, the floors are laid with a kind of concrete peculiar to the city, which consists of cement and marble broken into small pieces and of different colors. This is afterward polished and oiled or waxed, when it presents a clear, smooth and solid surface, shining like a mirror, but a little slippery to walk upon. The ceilings are left unplastered, and show magnificent beams of wood, partly carved, from 40 to 60 feet long, cut from the great giant forests of the Dolomite Alps, which are able to supply Venice now, as they have done for hundreds of years back, with timber for her fleets and palaces.

WHAT BUILDERS ARE DOING.

The condition of the building trades throughout the country seems to be more irregular than it was a month ago. Builders in the Eastern States have found that the actual volume of business has been steadily increasing in spite of the fact that the majority continue to cry "hard times." The increase in work has been brought about by imperceptible degrees, until the present condition of affairs is much more satisfactory than was either understood or expected. Wages in the East have not been seriously affected, and the number of workmen regularly employed in the building trades who are out of work is much smaller than is generally believed. The Middle Atlantic and Western States seem to be still waiting for a revival of the normal activity in building operations, and there appears little reason to suppose that average business will be restored before next year. Some of the more important cities west of the Mississippi River are suffering for lack of work. Few labor troubles of any kind are reported, and none that seem to threaten any serious disturbance.

Baltimore, Md.

In spite of the general business depression the number of building permits issued by the building inspector of Baltimore has exceeded the number issued during the corresponding period of 1893. The present reduced cost of construction has resulted in the improvement of much vacant property, both in the business and residence parts of the city. In speaking of the relatively satisfactory condition of the building trades, and particularly with reference to the quality of the cheaper houses now being built, Building Inspector Oster is quoted as saying:

"Dwellings are now designed with much greater regard for the comfort and convenience of the occupants. Formerly the architect and builder provided few of these conveniences for houses costing less than $3000. They did not seem to cater to the wants of a man who wished to pay less than that amount for a house. Now houses costing from $800 to $1000 usually have all modern conveniences, such as gas fixtures, baths, closets, sliding doors and roomy halls. The staircases and planning of rooms now are arranged in many different ways, economizing space and making a small house comfortable and bright."

The regular quarterly meeting and supper of the Builders' Exchange was held September 4 at their new building, northeast corner of Charles and Lexington streets. President Noble H. Creager was in the chair, with E. D. Miller as secretary. President Creager laid before the association the suggestion made some time ago that efforts be instituted to have the scope of the Polytechnic Institute enlarged so as to include instruction in all the building trades. It is probable that the exchange will this fall appoint a committee to bring the matter to the attention of the School Board, as well as the City Council.

Secretary Miller reported that the exchange was in good financial condition. He urged upon the members the importance of making the rooms their place of business, the same as the members of the Corn and Flour Exchange do at their exchange, by assembling every day during the "exchange hour," from 11.30 a.m. to 12.30 p.m.

Mr. Miller also said that the exchange ought to take an active and deep interest in the Baltimore Centennial Exposition for 1897. This question will come up at the next meeting. Next year the National Association of Builders meets in Baltimore in October.

The exchange was visited by the Taxpayers' Association during the meeting and remarks were made by Messrs. Sigmund and Brady.

Boston, Mass.

A review of the amount of building done in Boston this season up to the present time develops the fact that in spite of the general depression and feeling of hard times the total compares very favorably with the average of ordinary years. The amount of work on hand has steadily increased throughout the season and is at present very satisfactory, with an excellent prospect for the coming year. The number of workmen regularly employed in the building trades who have been out of work has been comparatively small, although considerable distress was felt in the early part of the year. There have been no labor troubles of any magnitude during the year and there is little prospect of any disturbance in the near future.

Buffalo, N. Y.

The members of the Builders' Association Exchange took their annual outing on Labor Day, and as usual the event was a pronounced success. No one but members were allowed to participate, and all expenses were paid directly from the treasury of the organization. The day was spent in a visit to Navy Island, the use of which had been generously furnished by the lessee, Isaac Scott. A boat chartered for the occasion left the wharf at 9.30 a.m. containing the members and, incidentally, a caterer who provided refreshments of various kinds. The entire day was spent on the water, the boat touching for short periods at various resorts and at Navy Island. Everything passed off pleasantly, and every one had a good time. The committee which had the matter in charge, consisting of H. Rumrill, Jr., George W. Carter and John Lannen, is deserving of great praise for the efficiency with which its duties were performed.

The building business appears to remain in about the same condition that has been reported for the past two months, no change for either better or worse seeming likely to soon occur. The bricklayers' union in the latter part of August began a crusade against the city authorities for allowing workmen in the city's employ to work more than eight hours. Resolutions were adopted calling upon the Board of Public Works to conform to the law making eight hours a day's work. No public report of the result of this action has been received, although the business agent of the union was instructed to employ counsel and to proceed against the city if necessary.

Chicago, Ill.

There has been little change in the condition of the building trades in Chicago from that reported last month. The amount of building being carried on has not perceptibly increased and the season's work is not yet near enough the end to be felt now. The difference between the two carpenters' unions which promised to assume serious proportions has not been felt as a hindrance to work. Very little open trouble has yet resulted from this cause. The cornice workers and their employers are at odds, and the trouble combines the characteristics of both strike and lockout. About the middle of September the unions composing the Building Trades Council voted to support the cornice workers to the extent of striking if necessary. It was thought at that time, however, that a general strike of any size would not occur.

The official investigation of the Pullman boycott, so-called, has been steadily proceeding, and the finding of the commission will be awaited with interest.

Cincinnati, Ohio.

Building interests in Cincinnati remain in *statu quo*, everything seeming to be unchanged so far as any increased activity is concerned. The lack of work has been felt seriously throughout the entire season. At a recent adjourned meeting the members of the Builders' Exchange voted upon the important question as to whether the active membership of the exchange should be limited to the "contractor builders" or include with them the "material men" This question is one submitted by the report of the committee not long ago appointed to revise the rules and regulations of the exchange, by whom it was recommended that the members engaged in actual contracting should have the voting power, and those who make and furnish the material for building be admitted as contributing members, with all privileges, except the right to vote.

It is claimed by the contractors that the material men have not the same interest in the working and government of the exchange as they, on account of the relations sustained between the contractors and the laboring interests, which require consideration at the hands of the central employers' organization which could not be accorded by material men if they were in charge. The material men, on the other hand, claim that they have as much to do with the laboring classes as the builders; and even though the name and rules of the exchange describe it as a "Builders' Exchange," it is as much an organization of mill men, quarry owners, paint manufacturers and brick men as it is of the men who simply build from these materials furnished.

President G. F. Nieber, who is also chairman of the Committee on Revision, presented the report in extended remarks as to the intention and scope of the change proposed, and was followed by J. Milton Blair, S. D. Tippett and Messrs. Rohan, Belleville and Colter. The measure was thoroughly discussed and a motion to lay it on the table was voted down.

When the vote was taken there were but 11 who voted in favor of delivering over the running of the exchange into the hands of the contractors and 16 who favored the continuance upon the present grounds. After the vote the session adjourned. This is regarded as a settler by both sides of the question, that has been hanging and waiting for settlement since the first of the year, when the report was made.

If the decisive defeat that met the first clause of the extended report presented by the committee does not settle the possibility of the consideration of the rest of the articles, another very important proposal will come up at some future meeting in the recommendation for a superintendent. As the exchange is conducted at present there is not a permanent executive officer whose sole business is to look after the interests of the body. It is now proposed that the exchange have a superintendent, whose duties shall correspond to those of the superintendent of the Chamber of Commerce, with a salary for his exclusive services.

Indianapolis, Ind.

Wm. P. Jungclaus, president of the Builders' Exchange of Indianapolis, who has been doing some large contracting in Maine, is authority for the statement that the builders of his city have little fault to find with the amount of work done this year. While the volume of building has not been as large as that of some recent years, considered in comparison with the amount of business done in other pursuits the result is very satisfactory. The amount of building done in Indianapolis, it was thought, would compare favorably with any other city of its size in the country. The Builders' Exchange was reported as growing steadily in numbers and importance as an organization, and as being in good financial condition.

New York City, N. Y.

The building trades of New York City have been considerably agitated during the past month by a concerted action upon the part of the carpenters' unions to abolish what is known as the "lumping system" of carrying on work. "Lumpers" is the term applied to contractors in the building trades who contract with the owner or principal contractor to furnish labor only; to provide workmen to nail up, trim, hang doors, sash, &c.—in fact, to put in place all finishing work after the white mortar is completed. It is a branch of the building business which has been much abused; work is frequently poorly done, and in many cases less than the union scale of wages is paid. "Lumpers" at times sub-let parts of the work to others, thus making it hard to place the responsibility for inferior or rejected work upon the proper person. The practice of "lumping" has been strongly condemned by the carpenters' unions and a strong effort has been made to do away with it entirely. It is claimed by the workmen that the system cannot be followed without cutting down their wages, as it implies the reletting of work at a figure below that upon which the original contractor, using the union wage scale as a basis, is awarded a contract It is reported that many non-union men have joined in this strike in order to help defeat what they consider to be an oppressive system. The union scale for carpenters is $3.50 per day, and lumpers have been paying $2.50, and even less in some cases There is said to be about 4000 union carpenters in New York City and about 1500 have been affected by the strike up to the hour of writing.

Growing out of this trouble several meetings were held the latter part of September by employers in the building trades with a view to forming an organization for the better protection of their interests. The later meetings were well attended by representative firms and individuals and the following resolutions were unanimously adopted :

Whereas, The interests of all engaged in the building business, both employers and employed, have been sadly injured by the lack of intelligent co-operation, and the result has been a tendency to array the employers against the employed and *vice versa*, and knowing full well that the present lack of system has resulted in great injury to all, therefore be it

Resolved, That the interests of the mechanic and employer are mutual and there should be between them a most cordial feeling, and be it further

Resolved, That for the protection of our mutual interests we band ourselves together in an association, which association shall be known as the Employers' and Builders' League of the Building Trades of New York City. In this body all reputable employers and builders shall be welcome. They shall adopt such rules as shall be for the best interests of all, and by careful conservative action preserve the interests of the owners, contractor and journeyman, and by arbitration avoid all necessity for liens, strikes and lockouts, references, &c.

A committee of seven was also appointed to draft a constitution and enroll all those who were willing to join the organization. As we go to press another meeting is called for September 24.

The Building Trades' Conference is still at work trying to prevent the use of prison made materials, in competition with that produced by free labor. It is claimed that the competition is most injurious to the workmen, as of necessity wages must be depressed to meet the competition of material in the production of which the question of wages is so small as it is in that of prison made goods.

The strike upon the public schools ended upon the adoption of the following resolutions at a meeting of contractors at which a committee from the Board of Walking Delegates was present. The resolutions were deposited with the Superintendent of Construction for reference and are as follows :

Resolved, That it be the sense of the contractors of public school work that all contractors doing such work shall pay the prevailing rate of wages in accordance with the law, and that all contractors shall be responsible for all sub-contractors.

Resolved, That the prevailing rate is the union rate.

Resolved, That all contractors present will hereafter pay the said union rate on all work done by them.

These resolutions were unanimously passed by the contractors and submitted to the committee of the Board of Delegates, who unanimously approved the resolutions and submitted a proviso to the contractors that all men who went out on strike should be reinstated and union men be employed hereafter, and these terms being acceded to by the contractors the strike was declared off.

Omaha, Neb.

Building is reported as being very quiet in Omaha, and competition is very close for all work offered. Outside contractors have been bidding very low for work, with the result that little if any profit remains to the builder. It is stated, however, that upon such work as is being done the union scale of wages has been largely maintained. The workmen are reported as having caused little or no trouble during the season, and have presented their side of any questions that have arisen in a fair and amicable spirit. The prospect for work during the rest of the year is poor, and the outlook for the coming season is based upon the needs of the city rather than upon any appreciable amount of speculative building. Every one is hoping for an improved condition of affairs next year, and it is thought that new manufacturing interests may be attracted to the city by the inducements being offered in various ways.

The following from the Omaha *Bee* shows the esteem in which the Builders and Traders' Exchange is held :

The organization known as the Builders' and Traders' Exchange of Omaha has now become one of the fixed institutions of this city, and the information to be gained by frequently visiting the rooms on the second floor of the New York Life Building and reading over the publications on the tables is certainly valuable to any person. The president of the Builders' and Traders' Exchange is Richard Smith, one of the substantial brick contractors of Omaha, and W. S. Wedge occupies the secretary's desk. Mr. Wedge is a very pleasant gentleman and is always full of information that entertains. The aims and objects of this organization may best be understood by quoting Article 3 of the Articles of Incorporation, which reads as follows :

"The purposes for which said corporation is organized and the general nature of the business to be transacted thereby are the encouragement and protection of the building interests of the city of Omaha; the inculcation of just and equitable principles of trade; the establishing and maintenance of uniform commercial usages in said city; the acquirement, preservation and dissemination of valuable business information the adjustment of misunderstandings and controversies arising between individuals engaged in building and kindred industrial pursuits; all to the end that membership in said corporation may be, to the public, an assurance of skill, honorable dealing and responsibility."

A board of seven directors has the general direction of the business of the exchange, and all of the members are called to meet when business of importance requires the presence of all. The exchange is on a solid financial basis and promises good returns to its members.

Philadelphia, Pa.

There is a continuance of the quiet condition of the building trades of Philadelphia, with little prospect of any marked change for the better this fall. The members of the Journeymen Carpenters' Association are endeavoring to have their employers adopt the form of arbitration advocated by the National Association of Builders, with the view to preventing stoppage of work in cases of difference between the two, and to establish a greater harmony in all their relationships.

The Master Builders' Exchange is considering the advisability of increasing the earning capacity of its building by enlarging the same.

The new building laws are constantly causing complications with builders who are not thoroughly familiar with their provisions. Consequently, Secretary Harkness is transformed into a bureau of information and is constantly called on to straighten matters out. Of late there have been many inquiries for a blank form of certificate, in which shall be set forth the strength of new buildings or of structures altered or added to. The new laws have a provision requiring such a certificate from the architect, which should plainly state the exact strength of each floor and the weight it can safely carry. No blank forms are to be had, however, so Mr. Harkness has decided to get out such a sheet as is needed, and has been in active consultation with Chief Haddock of the Bureau of Building Inspectors on the subject.

Depression in the building trade has not deterred the usual number of pupils enrolling themselves for the fifth successive term of the Master Builders' Mechanical Trade School, which opened September 4. There were about 70 in attendance, for the departments of carpentering, bricklaying, stone cutting, plumbing, blacksmithing and painting. The plasterers' trade does not appear to be an attractive one, as there are no entries in that department.

The school is situated in the basement of the Builders' Exchange Building, and the class nights are on Monday, Wednesday and Thursday of each week. Mr. Allen, the superintendent, speaking of the work of the school, stated that the depression in the trade made the work of placing apprentices from the school a somewhat difficult one. But he added that as soon as business picked up there would be a demand for those lads who had served nine months in the school, and who thus started out well equipped to learn a trade. The system at the school varies from that of the Manual Training School, as the pupils give their entire attention to but one trade during the entire term.

Ex-Councilman William W. Morgan has tendered his resignation as superintendent of the exhibition department to the directors of the Master Builders' Exchange, and it has been accepted. Secretary Harkness, it is understood, is temporarily filling the vacancy.

Providence, R. I.

The following account of the annual outing of the Providence and Worcester Builders' Exchanges is taken from the Providence *Telegram* of August 23 :

The annual union excursion of the Builders and Traders' Exchanges of Providence and Worcester took place to-day, about 100 members of each exchange participating, with a large number of friends, making a jolly company. The Worcester party left that city at 7.30 o'clock this morning and arrived in this city shortly after 9 o'clock. The party proceeded to the local exchange on Custom House street. Several took advantage of the opportunity to see what sights are afforded in the center of the city. The visitors were entertained while waiting for the boats by their Providence brethren.

Shortly after 10 o'clock the party made its way to the wharf on South Water street at the foot of Crawford street, where the company boarded the steamer "Planet." The morning was a beautiful one on the water, and all enjoyed the sail, the Worcester people being particularly delighted.

The keen air whetted the appetites of the excursionists, and when they disembarked at Pleasant Bluff they were in a mood to make havoc among the select and bountiful quantity of clams which was soon set before them. They did as others have done before them, enjoyed the Rhode Island clam which figures so prominently in a shore dinner at the plantations.

After dinner the steamer "Planet" was again boarded and the party went on a sail down through the bay. The islands afforded picturesque scenery, which the visitors drank in to their heart's content Coweset Bay, Mount Hope Bay and Bristol harbor were visited, and as the day was an ideal one, the party enjoyed a rare treat.

The steamer took a roundabout course in coming back, reaching Providence after 6 o'clock. The services of a caterer were enlisted and a lunch served on the boat on the return trip, affording the visitors no delay in taking train for their return home.

The local committee in charge of the arrangements was composed of C. L. Richards, M. Goldrick and Sec. W. F. Cady. The Worcester Committee of Arrangements consisted of George W. Carr, F. H. Goddard and Secretary C. C. Brown. The Worcester party was headed by President O. L. Kendall.

Notes.

The builders of Lawrence, Mass., and Springfield, Ohio, are at work trying to build up exchanges, as advocated by the National Association. Correspondence has been had with the National Secretary seeking advice and information, and it is expected that permanent organizations will be established in both cities.

The twenty-fifth annual convention of the Master Car and Locomotive Painters' Association of the United States was held in Buffalo, September 12, 13 and 14. About 170 delegates were present, representing the leading railroads of the country. The meeting was characterized by interesting debate and instructive speeches, and the entertainment features were most enjoyable. Secretary Orr stated in his annual report that there had been a gratifying increase in the membership, especially among the younger car painters. In his financial statement he said the total receipts were $230, making a total of $464.40. The disbursements amounted to $401.30, leaving $63.10 on hand. The following are the officers elected for the ensuing year: President, William T. Leopold of Savannah, Ga.; first vice-president, C. E. Copp of Lawrence, Mass.; second vice-president, George R. Cassie, Adrian, Mich. Robert McKeon of Kent, Ohio, was unanimously re-elected secretary and treasurer.

The various building trades of Cleveland have combined in an effort to establish a universal eight-hour day in that city. The workmen say that they do not intend a strike, but will endeavor to persuade the employers of the desirability of a uniform working day of eight hours.

At the meeting of the bricklayers' union, St. Joseph, Mo., during the week of September 1 resolutions were unanimously adopted calling on the school board to arrange matters so that the $100,000 to be used in erecting a new High School can be expended at once. The petitioners say they are out of work and want the money disbursed as early as possible.

The Portland (Ore.) bricklayers, who are working nine hours per day, and for union wages of $5, are trying to have the employers reduce the working time to eight hours with no reduction in pay. It is said that a majority of the contractors are opposed to the change.

Union workmen of Saginaw, Mich., are taking steps to form a central council in which all unions can be represented. Building interests are reported as being very dull.

Design of a Double House.

The front elevation, floor plans and details which are presented herewith relate to a double dwelling erected last summer for J. C. Dick from plans furnished by A. C. Moore, architect, of 128 Winslow street, Pittsburgh, Pa. The design provides accommodations for two families, each of which has three rooms on the first floor, three sleeping rooms and bathroom on the second floor and two sleeping rooms in the attic. The cellar is excavated under the entire area of the house, that portion under the kitchen being used as a laundry.

The framing is of hemlock and the dressed lumber of white pine. The joists of the second and third stories are 2 x 10, placed 16 inches on centers; the joist supporting partitions being doubled, as is also that around chimneys and stairways. Each span of joist has one line of lattice bridging of 1 x 2 inch stuff well secured at top and bottom. The partitions in other walls are built of 2 x 4 inch studding, placed 16 inches on centers. The door and window studs are doubled, as are also the corner studs. The rafters and ceiling joist are 2 x 6 inches and placed 2 feet on centers. The roof is sheeted with hemlock boards 10 inches wide and nailed to every rafter. The walls are covered with No. 1 white pine coved siding about 5½ inches wide, tongued and grooved. The mansard roof is covered with Pennsylvania slate. The tin work is well soldered and has two coats of oxide of iron and linseed oil paint. The outside wood work also has three coats of pure white lead and linseed oil. The same may be said of the interior dressed wood work of the laundry and cellar.

The first and second story floors, as well as the balcony, are covered with No. 1 pine about 3½ inches wide. The vestibule has a tile floor resting on a 2-inch concrete bed supported by a counter floor. The kitchen and bathroom are wainscoted with Virginia yellow pine 3 inches wide and finished with a molded cap. The wainscoting in the kitchen is 3 feet high, and in front of the sink is 5 feet high. It will be noticed that there are fire places in the principal rooms, all of which have slate mantels with tile and grates complete. The kitchen, laundry, bathroom, &c. are provided with the usual plumbing fixtures and connections and installed in conformity with the rules and regulations of the city named. The house is piped for gas, both artificial and natural. The building is also wired for electric lighting, there being four lights of 25 candle power in the parlor and dining room, while in the kitchen and bedrooms are two lights, each of 16 candle power. The cost of the double house here shown is said to have been $6000.

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

Design of a Double House.—A. C. Moore, Architect, Pittsburgh, Pa.

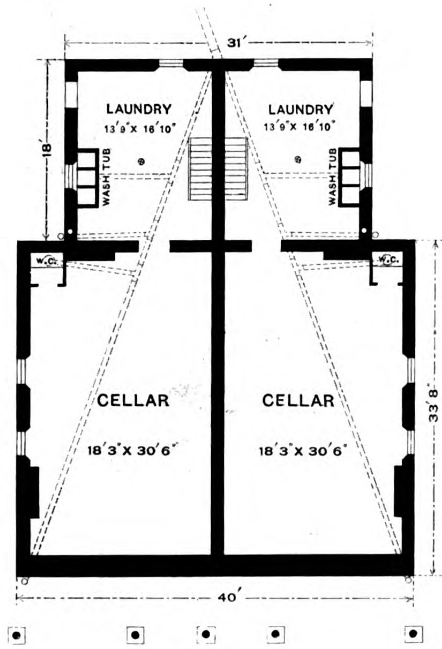
Builders' Apprentices.

At a meeting of the Builders and Contractors' Association of Tasmania, held not long since, a paper was presented by D. Williams on the subject of "Builders' Apprentices," in which, among other things, he said:

In reading a paper on the "Apprentice Question," it is far from me to pose as a guide or dictator on the subject, but simply to point out a few improvements that I think could be made, which would be beneficial to the master and lads alike. The paper, I can assure you, will be very short and to the point, and I hope will lead to and aid discussion on various heads. The first thing I would bring forward, then, is by asking a question: Should the lad be bound by indentures or not? It might seem a strange question to ask, seeing that I am heading this paper as the "Apprentice Question," and as the word "apprentice" means one bound to another to learn a trade, &c., but still as there are many lads who spend a number of years learning a trade under one master who have never been "bound apprentices," you will please allow this wandering away from the strict interpretation of the word "apprentice." The question is, then: Should the lad be bound or not? I contend, gentlemen, that he should, and there are several reasons why. I can speak from experience, as I have had lads bound and others not. 1. It gives to the lad a feeling of manliness when he knows that the indenture paper has been signed, in looking forward to the time when he shall have completed his term of apprenticeship —that is, if he is a lad of the right stamp—when his master shall say to him: Well done; you have served your time faithfully and well; you have been honest, industrious and painstaking as a lad; I will now employ you as a journeyman. But on the other hand, I have found several cases where the lad was not bound that it led to much dissatisfaction and loss. You will find some parents are averse to binding their boys, telling you that if you give a list of wages to be paid that is all that is required, but after the lad is with you for two or more years and is becoming useful, it often happens that the parents get dissatisfied with the amount of wages paid and demand more or threaten to take the lad away, or it may be that the lad is of a fickle mind and longs for a change and leaves you to join another master as an "improver," thus causing oftentimes a lot of inconvenience and trouble to the master, and with, perhaps, little advantage to the lad. Thus we find many lads going from place to place learning but very little, and this is anything but a credit to themselves, and often helps to fill up the ranks of the unemployed.

NUMBER OF APPRENTICES.

The next point to be considered is, How many apprentices should be taken at one time? And this opens a wide gate for discussion. In the first place, by having too many lads at one time you do them an injustice, for it is next to impossible to teach them or get them properly taught. In my opinion a lad "bound" as an apprentice should be looked upon as a son for the time, and so treated as a son, and as such you should teach him all you could as regards his trade, and not study how much you can make out of him, but rather how best you can fit him for his future as a tradesman. By having too many lads at one time you cannot properly do this, consequently a part of their time is lost, and often lads have passed through their term of apprenticeship and, through no fault of their own, they are sent forth inferior tradesmen. In the second place, it is an injustice to the men. It tends to bring down the wages, and leads to inferior work being executed by the speculative and unprincipled contractor. The question might be asked, What, then, must be done with the boys if you do not allow them the privilege of learning the trades? This, I would say, is outside this paper. But I must still maintain that to employ too many lads is an injustice to



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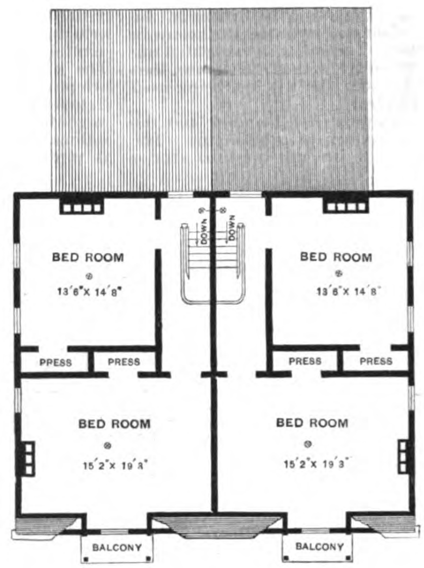
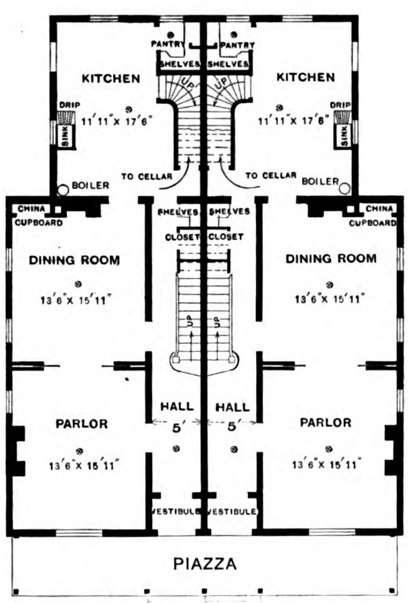
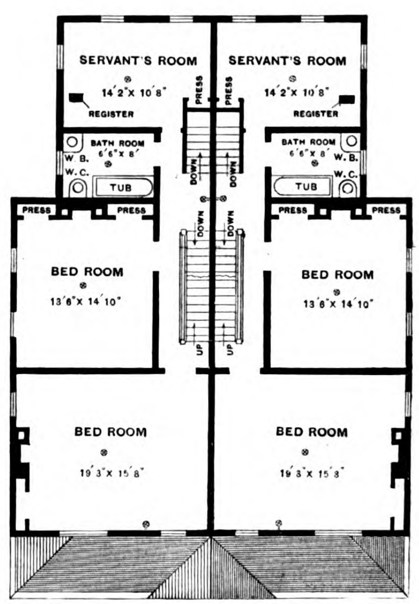


Third Floor.



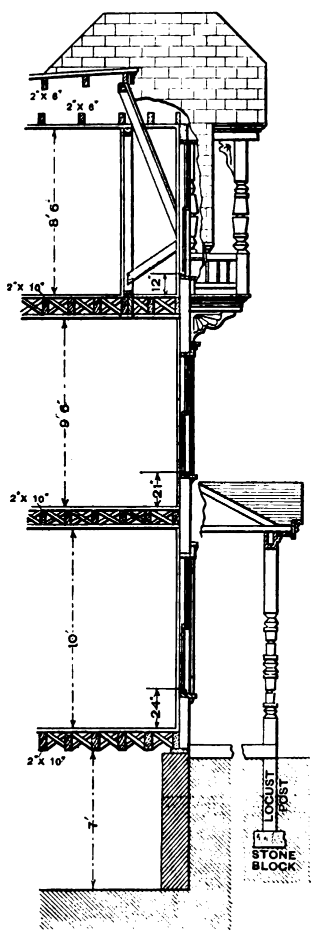
First Floor.



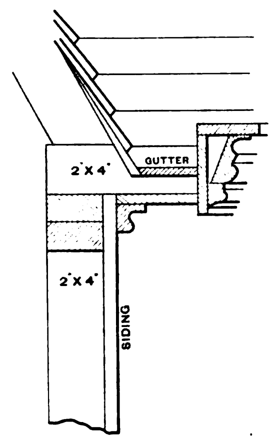
Second Floor.

Design of a Double House.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

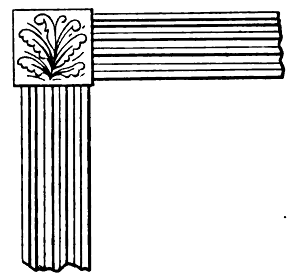
the men. Take, for instance, the plastering trade (I trust that I will not be giving offense in alluding to this trade in particular, for what I say will apply to all trades). You are all aware that in the plastering trade a great number of boys are employed —many more than there ought to be. The consequence is that it does away with the journeymen labor, lowering the wages, and is a cruel injustice to the lads themselves, as I believe that if an analysis were made as to the number of lads that have finished their time a large majority would be found anything but good tradesmen, for the simple reason that the amount provide cash for tools; then comes the trouble of borrowing from the journeymen or fellow apprentices, which often leads to disagreeableness and loss of time. For my own part I never bind a lad unless he can be properly provided with tools of the best description. The tools, as well as the lad, will want looking after, as you are aware they will get out of order. I often inspect the lad's tools, and if I find them not in good order I endeavor to impress upon the lad's mind that to be a good tradesman he must learn the a, b, c of the trade, and that is to keep his tools in proper trim. Of course, it cannot be expected that he will get all fees are small and the advantages are great, and it assists in a great measure to make the lad intelligent. An architect, in speaking of a good tradesman, once said to me, "A good tradesman should pick up a plan from the bench and be capable of finishing the job without further explanation." It might have been possible in his day, but some of the plans and specifications that are supplied to us require a "Philadelphia lawyer" to make them out; but technical education is of real value to the young men, if not carried too far. I mean, to be a good tradesman he must always bear in mind that as a tradesman he can be as good and



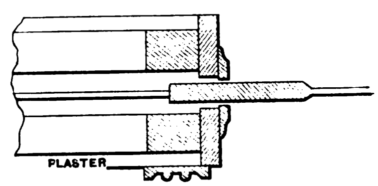
Section through Front Wall and Porch.—Scale, ⅛ Inch to the Foot.



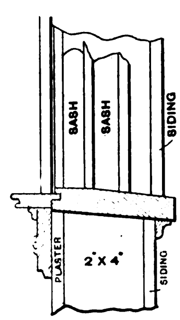
Detail of Main Cornice.—Scale, 1 Inch to the Foot.



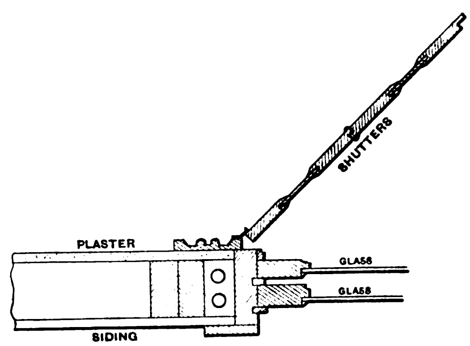
Detail of Window Finish.—Scale, 1 Inch to the Foot.



Detail of Sliding Doors.—Scale, 1 Inch to the Foot.



Section through Window Sill.—Scale, 1 Inch to the Foot.



Section through Window Frame and Shutters.—Scale, 1 Inch to the Foot.

Miscellaneous Details of a Double House.

of work has not been sufficient to allow each lad the opportunity of acquiring a proper knowledge of his trade; whereas if there were but half the number they would have had a better chance of learning, as the men would have taken a greater interest in teaching them, and the lads themselves would have taken more interest in learning.

TOOLS.

Tools are another matter of much importance to an apprentice. If a lad starts his career as an apprentice with a bad and insufficient set of tools, you may be sure that he has no pleasant days before him, for after he has started you will find, in a great many cases, that the parents will not care to the tools he will require at one time, but it is essential that he should obtain them year by year, or as he progresses in the trade, then he will have a proper set to start with when he arrives at a journeyman's status. Nothing is worse, in my opinion, than an inferior and insufficient kit of tools, and, like the phrenologist who judges the character by the bumps of the head, so can an employer judge the mechanic by glancing at his tools.

TECHNICAL EDUCATION.

Technical education is a clause that I would like added to the indenture forms of all apprentices, no matter in what trade. I consider that the lad should, for at least two years, attend the classes at the technical school. The smart a one as regards his work and ability, but not so good as to be above carrying his own tools, or own that he earns his livelihood by the sweat of his brow. You know, gentlemen, what I mean, for unfortunately there are some of this class, but I trust not many.

Punctuality is another quality that must be taught, for if the lad is allowed to come to work two or three or five minutes late, he will probably stretch it to 15 or 20 minutes; not only that, but if he finds that you are not strict on this point, he will in all probability take advantage in others; but if you can impress upon him the necessity of being punctual to time, the habit will soon grow, so that he will not only be to time, but will be punctual in many other ways. I myself have gained a name of being a terror for punctuality among the boys and men that I employ, and they soon find this out, for if they come late to work they will also be short of wages on Saturday. If I find a lad or man turning up late for two or three mornings I put the time together on Saturday and deduct the value of this lost time from their pay; no doubt they think it mean, but they soon learn to come at the proper time. I am also of opinion that a lot of the lost time, want of interest and carelessness is due to the carelessness of parents. Boys are allowed to waste too much time, which of an evening is often spent at the street corners and in company not of the best, while the parents often think more of the few shillings of wages than of the lad's welfare.

HOLIDAYS.

This is a question I think should be taken into consideration by employers as a whole, and I merely mention it in passing. At the present time I give all public holidays, but I think that apprentices after the first three years should be put upon the same footing as journeymen. I know of one firm who work under this arrangement, and who after the third year stop payment for lost time.

There is another thing that would be of great advantage to lads and employers in an indirect way—that is, encouraging lads to make models of joiner's work, or other work of the various trades. If the employer cannot afford to give the necessary materials, let him supply them at the lowest rate, and thus encourage the lads to make models of doors, sashes and frames, stairs and various joints, scarfings, &c., all to a scale (say 3 inches to the foot), for by learning to make models in a proper manner, and by studying from drawings at the technical school, he should soon be able to turn out work as a tradesman which his employer and himself would be proud of. I have often found some lads of a very inventive turn of mind. I think that should an employer find such a lad, he should encourage him by taking notice of and encouraging him in his inventions, and even go so far as to reward him should the invention be of sufficient merit. Many such things as these might, perhaps, induce the lads to think more of their trade than they do at present. I would also suggest that masters offer prizes, say, for the best kept tools, for the most punctual, and for the best general improvement. The prizes could be books on the trade, and the value of each need not exceed 15 shillings or 20 shillings for the three prizes. I am sure the lads would enter into the spirit of the thing, and thereby be encouraged; and in conclusion, I say that they want encouraging, for if things go on as they have been going for the last few years joinery will become simply fixing. I am now speaking of joiners and carpenters, for you will remember, gentlemen, when you were boys you had to work your own moldings, small or large; the skirtings; your doors and sashes had to be made; your flooring had to be dressed; your sashes, frames, fascia boards and all that belongs to the work of a joiner had to be prepared by manual labor. But to-day what do we find?—that these things can be got at the timber yards prepared by steam machinery. And what about the plasterers? In a few years their skill and ingenuity will have given way before the zinc ceilings, the fibrous plaster center flowers and cornices, and the walls will be covered with lincrusta and other materials. The stone mason, or rather cutters, will find that the patent made stone cornices, moldings and other work that require the skilled labor of a stone cutter, will have passed away to a large extent. The giant steam, with the aid of machinery, will have worked wonders, and the artisans will simply become fixers in building construction.

Law in the Building Trades.

Implied Contracts.

The effect of assent where there is no request may be a recovery for services rendered by one for his benefit, even when there is no request or promise to pay, but the relations of the parties must be such and the services rendered under such circumstances as preclude the idea that they were rendered gratuitously, or at the request or upon the responsibility of any other person. Thus, if A is erecting a house and employing his own workmen, and B, without any employment from A, but with his knowledge, labors upon the house under such circumstances as indicate an employment, A cannot shield himself from liability to B for the value of his services upon the ground that he did not employ him; knowing the facts he is bound to discharge him from the work, or ascertain his expectations as to compensation, or the law will imply a request and a promise to pay the value of his services. So if A should see B engaged in painting his house, and he had made no arrangements with any other person to do it, and he should allow him to go on without question or objection and complete the work, he would be liable to B for the value of the labor and materials, as from his acquiescence the law would imply a request and promise. But if B, without the knowledge of A, had performed the work he could not recover, however beneficial to A in point of fact the labor might be, because no man is bound to be benefited against his will, and under such circumstances the labor would be treated as a gratuity, and A might, if he chose to do so, maintain an action of trespass against B for having done it. Nor could B recover even if A knew that he was performing the labor and made no objections, if A had employed another person to do the work, and did not know that B was not performing the work under the employment of such other person. The rule may be said to be that if services are rendered for another who, knowing all the facts, stands by and makes no objection, the law implies a request and a consequent promise to pay. But this must be understood as subject to the qualification that the party sought to be charged stood in such a relation to the subject matter of the services that he was legally chargeable for the same. That is, he must have stood in such a relation to the matter that he knew that the work was being rendered for his benefit, and upon an expectation that he would pay for the same.

Agreement that Fixtures Shall Remain Chattels.

One who has sold fixtures by bill of sale may be estopped to claim afterward that they are parcel of the realty. Thus the owner of a brewery in selling it conveyed the real estate by deed and the stock in trade and fixtures by bill of sale, and took back a mortgage of the real estate to secure the payment of a portion of the purchase money. The purchaser afterward executed a chattel mortgage of the fixtures. In a controversy between the mortgagee of the realty and the mortgagee of the fixtures it was held that inasmuch as the deed, bill of sale and mortgage of the realty were executed at the same time and were parts of the same transaction, each should be held to have been designed by the parties to perform its appropriate office in consummating the sale, and that as between the former and the latter the property included in the bill of sale should be regarded as personalty. But the fact that personal property in its nature, and not incorporated with the realty, has in transmission of title to the mortgagor passed by a deed of the land, and that there has been a long existing localization of such property, does not destroy its character as personal property. Of course, an effectual mortgage of such property can only be made by delivery of it or by a chattel mortgage duly recorded.

Liability to Third Person for Indemnity.

Since one who blasts rock on his land with due care is not liable to his neighbor for inevitable damage caused thereby, nor for the carelessness of a sub-contractor, his neighbor cannot sue his contractor as indemitor, on a contract to be answerable to the owner for any damages to the property of a neighbor during the work, for damages done to her property by the blasting operation of the independent sub-contractor. —French *vs.* Vix, Court of Appeals of New York, 37 N. E. Rep., 612.

Stone Carving in Paris.

A writer in a late issue of the *Architect and Contract Reporter* says that the London carver of stone rarely works from a model, more often from a sketch, and not infrequently without either, while the Parisian always has a model. The Londoner, with plumb bob, rule and compasses, generally makes an approximate copy of his model when he has one; the Parisian, by means of a mechanical contrivance called a pointing machine, makes an exact copy. The Parisian system no doubt has its advantages, but from the English workman's and from an artistic point of view, the Londoner's method is far the best, throwing the workman on his own resources and developing whatever individuality and artistic feeling he may possess. It has also the not unimportant merit of being the quicker method. The material used in Paris is a cream colored soft stone, somewhat resembling Bath stone but apparently freer in working. In London every variety of stone is used, from the soft Corsham to the hardest of Portland among the limestones, and from the softest of red grits to the hard yellow grit stones of the North of England. This has developed a more useful pattern of tools than those in use in Paris. The hard stone and marble tools are similar in both countries, but the French soft stone tools would be thought useless in England. The block of stone is chopped with axes as near to the size required as can be safely done, and the carving is then produced with wooden handled tools and iron hammers, the English pattern of wooden mallet and mallet headed tools being unknown. It is then scraped over with tools known in England as scrapers and finally finished with a variety of rasps called "rifflers," or "rifflœur râpes." These rifflers are, though seldom required, unobtainable in England of native make comparable with the French, being generally so badly shaped as to be almost useless, and this applies not only to the riffler rasps as made for soft stone, but to the riffler files as made for marble, a foreign variety known as Roman rasps being far superior.

LAYING ZINC ROOFS ABROAD.

THE following description regarding the manner in which zinc roofing is laid abroad has been received from Theodore Philipp, Silver City, Idaho, and will be found of interest to many readers of the paper:

In answer to an inquiry in *Carpentry and Building* some time ago, in regard to and the only change noticed was in the color, which was then black, caused by smoke and effects of the atmosphere.

When a zinc roof is to be put on, and the gutter is in the roof, as shown in Fig. 1, we would first place the gutter in position, bending in the inner edge 1 inch, as shown at A, and fasten to dicated in Fig. 4. The lower edge of sheet is hooked over the tin strip, as at D, and the upper end turned over and cleated to the roof, as shown in Fig. 5, the cleats being about 8 inches long. This leaves the end ready to receive the next sheet, which is formed as above described and turned ½ inch for

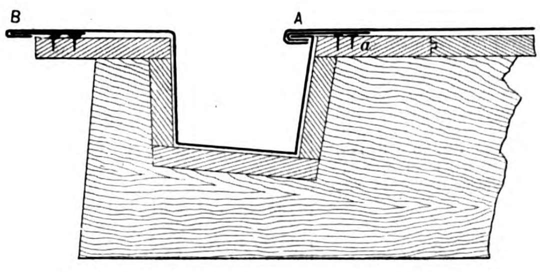


Fig. 1.—Method of Securing Roof at Gutter and at Eaves.

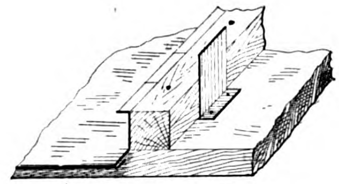


Fig. 9.—Cleats Placed Against Batten.

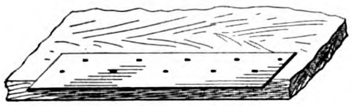


Fig. 2.—Strip of Tin Nailed at Edge of Roof.

Fig. 5.—Cleat Applied at End of Sheet.

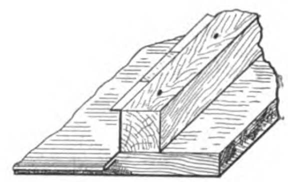


Fig. 8.—Batten Put in Place.

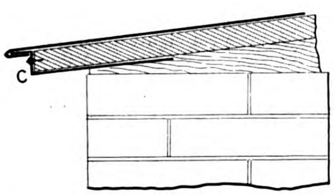


Fig. 3.—A Method of Securing Roof at Eaves.

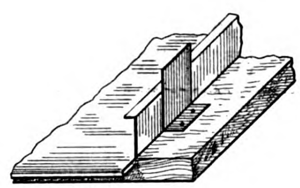


Fig. 6.—Cleat Applied to Zinc Sheet and Roof.

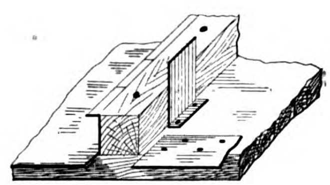


Fig. 10. Second Strip of Tin Nailed at Edge of Roof.

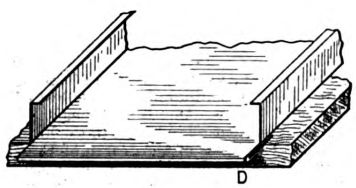


Fig. 4.—Sheet of Formed Zinc Applied to Roof.

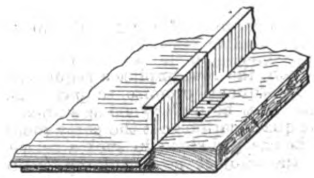


Fig. 7.—Cleat Bent Over Edge of Zinc.

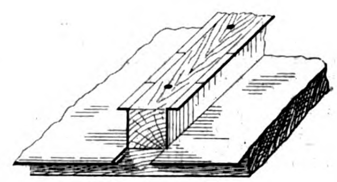


Fig. 11.—Second Sheet of Zinc on Roof with Cleats Bent Over.

Laying Zinc Roofs Abroad.—Sketches Illustrating the Letter of Mr. Philipp.

the method of laying zinc roofs abroad, I will give the readers a description of the same that, it is hoped, will be of practical use. In 1872 I was working for a firm in northern Germany, and in the town were 84 other tinshops, nine being at the head. In two years the firm I was with put on 16 zinc roofs for the Government and railroads under a guarantee that the roofs should not leak for three years. I had been working on a number of these roofs from start to finish, and had the fortune in 1881 to examine some of them. Although laid for some eight years, the roofs showed but a few small buckles, the roof by means of bent tin cleats 1½ inches wide, and nailed to the roof as at *a*. The finish at eaves can be made by nailing on strips of tin 2½ or 3 inches wide and any convenient length, allowing the strips to project over 1 inch, as shown at B in Fig. 1 or in Fig. 2. Over this strip the zinc can be bent as shown. Another method for securing the roof at eaves is shown in Fig. 3 at C, where the bent strip of tin extends under the roof boards. With the roof secured as shown at B and C hanging trough can be used.

The sides of zinc sheets are bent up 2½ inches and then over ½ inch, as in- cross seams. Cleats are then nailed at the edge of sheet, as shown in Fig. 6, allowing them to extend 1 inch above edge of sheet, and bent over the edge, as in Fig. 7, thus securing sheet to roof without any nails being driven through it and so as to allow for expansion and contraction. Proceed in this manner until the first row of sheets is laid. Two-inch square battens are then placed against the sheets, as indicated in Fig. 8, and secured to roof by means of screws or nails, as may be desired. Cleats are then placed against the batten and nailed to roof, as shown in Fig. 9, and a strip of tin nailed to roof

board, as in Fig. 10. If so desired the tin strips can be placed first, and thus under battens, being convenient for fastening to when ends of battens are covered, by soldering over square zinc caps bent over battens to facilitate soldering. The second lower sheet is then laid on the roof, being placed against the batten, hooked over edge strip, and cleats turned over edge, as shown in Fig. 11. After the sheets have been laid, and soldered if necessary, the 2 inch perpendicular seams included, take strips of zinc—say 4 inches wide by 3 feet long—and turn the edges over, as shown in Fig 12, one edge being bent over and the other at right angles. The strips are then placed over the battens, as shown in Fig. 13, each strip being allowed to lap over the other at ends, so the joints can be soldered if desired. The edges of strips are then to be turned over, as indicated in Fig. 14, using the square stake and mallet for the purpose, when they can be double seamed, as shown in Fig. 15. By this method a tight roof can be put on, and one that with good workmanship and material can be guaranteed for five years with safety. No. 12 zinc should be used, although lighter may answer under some circumstances.

Fig. 12.—The Cap.

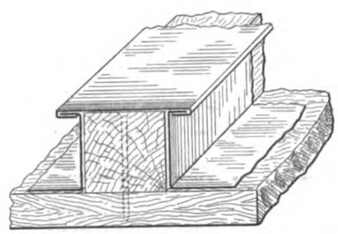


Fig. 14.—Edge of Cap Turned Over for Seaming.

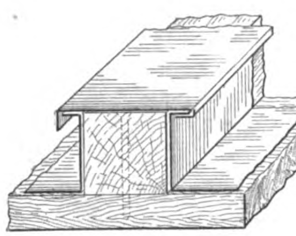


Fig. 13—Cap Slipped in Place.

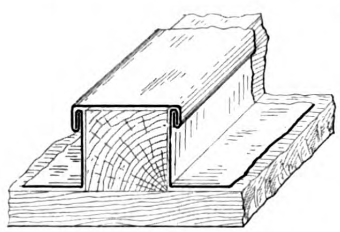


Fig. 15.—Cap Seamed Down at Sides.

Laying Zinc Roofs Abroad.—Sketches Illustrating the Letter of Mr. Philipp.

Finish for Cabinet Work.

A well informed writer on the subject contributes the following to a recent issue of the *Cabinetmaker*: Woodwork should be in the finest condition, perfectly clear, smooth and even. In the varnish department it is given one coat of wood filler. Wood filler is usually in a thick paste form. It should be reduced with turpentine to thickness of paint, so it will apply readily with a varnish brush. After this application, and while the filler is wet, use a piece of cork about 3 x 5 inches and 1 inch thick, and rub the filler thoroughly into the pores of the wood. On carvings and moldings, where the cork cannot be used conveniently, use a piece of felt or close woolen cloth, thus filling the pores thoroughly. A perfectly even and solid surface is thus created to receive the varnish. Finishers used to use one or more coats of scraping varnish for filling the pores. After these coatings were thoroughly dry the work was scraped with a steel plate, removing all the varnish on the surface, but leaving the varnish which settled and filled the pores intact, thus giving an absolutely even, solid and flat surface for the varnishing process. It is from this process that we have the name scraping varnish. After this, the finish of a piece of work was done the same as it is done at the present time with the filling process.

After the work is thoroughly clean of all surplus scraping varnish, or in the case of filled work of all surplus filler, allow the work to stand for 24 hours or more, thus thoroughly drying the coating and laying a good, solid foundation, without which you will not obtain a first-class, durable finish. After the foundation work of filling, some furniture finishers use over the filler one coat of a pure alcohol and gum shellac varnish. I recommend this, although it is not absolutely necessary. The shellac coating, after it dries, should have a good sandpapering with the finest quality of sandpaper. The varnish, to be applied afterward, being absolutely transparent, would, in case the surface showed fine scratches, bring the same to a particular prominence of imperfection, which would have to be overcome by additional labor.

NUMBER OF COATS.

Cabinet work, according to the firmness of finish and durability to be obtained, receives from two to three coatings of varnish in addition to the scraping varnish or filling process and shellac coating aforementioned. For all coatings of varnish for the finest work I recommended the use of a good polishing varnish only, but very fine and most durable work can be done by using for the first half of the varnish coatings a first class rubbing, and for the second half or last of the coatings a fine polishing varnish. Some have learned that a good rubbing varnish will also give a good polish, and consequently take the risk of using nothing but rubbing varnish from the beginning to the end of their work. I can assure them that the varnish manufacturer can give them nothing but intrinsic value, and they themselves, after the finish of the work, can give to their buyers no higher intrinsic value in turn. As to thickness of the coatings, I recommended that the varnish should not be applied too heavy, and each coating of the same thickness, medium body. This I think will give the most durable work. The manufacturer will run less chances of cracking in doing so than when using, as some do, thin coatings first and very heavy coatings last.

VARNISHING.

Varnishing, on which depends to a certain extent the selling of cabinet work, to be of a durable character, should be done in a temperature of 65° F. or more, from the beginning of the work to the finishing of the same, day and night included. A higher temperature, if not over 125° F. will not harm fine varnishes ; in fact, will turn out nicer work than in a lower temperature and will enable a manufacturer to turn out work in a much shorter time. In a temperature of but 65° to 75° F., I advise from four to six days between coatings, as I know this will give good and unfailing results. In 125° F. the same good results can be obtained in one-half the time. Varnishing departments, outside the filling and rubbing rooms, should be kept absolutely clean. The filling and rubbing rooms should be kept as clean as possible.

After cabinet work has received one-half the varnish coatings and the varnish is perfectly dry, rub the surface with pumice stone and water—use a piece of felt—to a smooth, even surface. Allow the work to stand 24 hours, and then begin the application of the last half of varnish coatings, giving the same time between coatings. After all the coatings are perfectly dry, go through the same rubbing process. A perfect, smooth surface for polishing will be the result. Leave the work stand for 24 hours after this rubbing, then start polishing by moistening a fine piece of cloth with water, dipped in powdered rotten stone, thus moistening the same also, and begin to rub the surface of the work with a steady hand and evenly, in order to remove with this fine rotten stone the fine scratches, if any, which are generally caused by the rubbing with the pumice stone. This accomplished, continue the rubbing with the palm of the hand instead of the cloth, using moist rotten stone, and rub the work until the fine polish required is obtained. The rotten stone then generally falls off the hand and you work in a dry dust. Wash the surface clean with water, using a fine sponge and chamois. Allow the polished work to stand 24 hours, then oil the same off with a light oil and a very soft rag or cotton bat. Take another fine rag or cotton bat and remove all the oil by rubbing or wiping the same gently, but absolutely clean off the polished surface. To be sure this is accomplished, moisten the cloth or cotton bat with alcohol. The polish, if everything is done correctly, will then be finished.

I have given this recipe for the finish of the very best, finest and most durable work. I know, however, that cabinet work is finished to the satisfaction of manufacturers in half the time and with half the labor and cost of material.

THE HOWARD HOSPITAL and Home for Incurables have applied for a permit for a new $20,000 building on their grounds, on the southeast corner of Broad and Catharine streets, Philadelphia, Pa. The building will be built of brick, two stories high, and will be heated by steam.

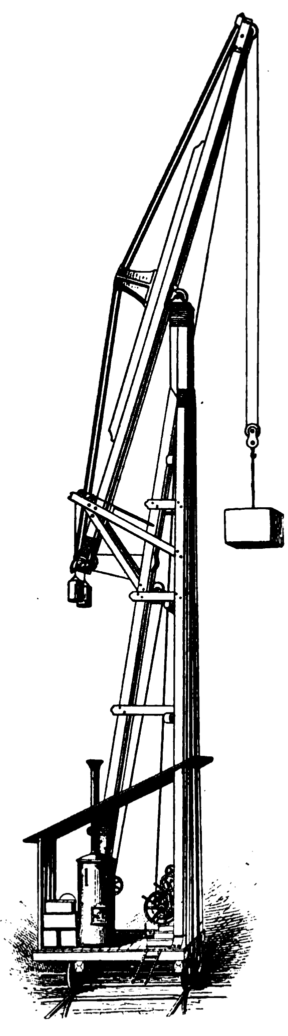
The Garfield Block, Cleveland.

A structure which will rank among the notable buildings in Cleveland, Ohio, is the Garfield Block, which has just been completed. One of the special features of interest in connection with this building is the interior finish, which throughout is in selected oak. The entrance is through a magnificent archway, finished on the outside in electro-bronze, this being the finish of the front of the first two stories. The floor of the main corridor is of white marble mosaic, the walls being wainscoted to five feet from the floor with English veined marble. Pilasters, also of marble, rise at intervals to meet the groined arch roof above. The panels between the pilasters and above the wainscoting are beautifully ornamented by hand carving. The first floor is occupied as a jewelry store, while the floors above are intended for office purposes. The basement will be occupied by a safe deposit vault company and by the engine rooms and machinery of the building. The heating will be done by the one-pipe system, steam being forced to the top of the structure through a 10 inch main, and thence distributed through 325 radiators. Electricity will be used for lighting purposes. There are 246 rooms in the building, exclusive of basement, closets, &c. There are four passenger elevators operated by hydraulic power and one freight elevator run by steam. There are said to be 20,000 square feet of marble in the building, the blocks for the main wainscoting for each floor being sawed from one large slab and set in such a way that the veins perfectly match. The mosaic covers 20,000 square feet of space, involving the use of over 5,000,000 of the little marble blocks. The architect of the structure is Henry Ives Cobb of Chicago, and the general contractors Reaugh & Hunkin Company.

Hoisting Apparatus for Builders.

In the construction of buildings of any considerable size, more especially in the larger cities of the country, the means employed for hoisting heavy materials into position is usually some form of derrick placed at the highest floor level as the work progresses, and near enough to the front or rear wall to allow the boom to project beyond the wall line. The motive power is generally an engine at the ground level, and by this means wooden and iron beams, girders and joists, as well as heavy blocks of stone, are easily and rapidly raised into position 15 or 20 stories above the sidewalk. When the building is located on a busy street, along which there is an immense amount of traffic, both in the way of pedestrians and vehicles, the sidewalk in front of the structure is covered at the proper hight with a roof composed of heavy timbers, upon which rest one or more thicknesses of planking. This makes a substantial platform, upon which the stone for the face of the building can be unloaded from the trucks, and one from which the blocks of granite can be raised to the place required without danger to the people passing along the sidewalk below. Neither does this arrangement interfere to any extent with the street traffic, and the work of constructing towering buildings goes on with an ease and rapidity which, to the visitor, is in no small degree surprising.

There are, of course, places where it is more convenient to make use of other arrangements for accomplishing the same end, and where the derrick at all times rests close to or upon the ground. A hoisting apparatus of this kind, which has been used in connection with some of the most important buildings in France and Belgium, is the derrick illustrated herewith. It embodies recent modifications and has a horizontally balanced arm at its top, the whole being mounted upon a movable platform. It is constructed almost wholly of wood, and consists of two 12 x 12 inch uprights 63 feet high, firmly buttressed on either side and behind by wooden uprights of the same section, the whole being solidly bolted together and strengthened by means of horizontal wooden bars fastened to the uprights. The apparatus rests upon a rolling platform, which also carries a portable engine to furnish the motive power. On the top of the uprights is pivoted what may be designated as a balance arm, turning on two iron cushion bearings fixed to the top of the center uprights. The balance arm is formed of two 10 x 10 beams, about 50 feet in length, trussed and kept 2 feet 4 inches apart from each other by means of a series of iron bolts at equal distances. The balance arm is further strengthened toward the center by two beams supporting an iron rest, to which are attached the iron bars bolted to each end of the arm. The balance arm, which may take any angle from the vertical to the horizontal, supports the pulleys, over which pass the steel ropes or chains for lifting purposes, and also those allowing the arm to lower or rise. In order to avoid any shock on the return of the balance arm to its vertical position, the lower end is made to pass between two beams projecting at an angle from the lower frame work and coming into contact with a cross beam supporting two compensation weights, which, being automatically raised by the return of the balance arm, avoids any shock or strain.



Hoisting Apparatus for Builders.

Chains from the power wheels of the engine pass over the system of pulleys, lifting the required burden and bringing at the same time the balance arms to the necessary angle, thus raising it by means of the arm to the distance required for laying. The steam engine, by means of an endless screw, may at the same time bring the derrick along the rails to the required position before the building. In some cases a platform pivoted on a vertical axis is employed to carry a number of blocks of stone or other burden along with the derrick. This platform is turned by the engine and brings the blocks of stone, &c., immediately under the lifting chain in many cases. The dimensions of the rolling platform are about 10 x 17 feet, running on rails 10 feet apart.

It is stated that this form of hoisting apparatus has been made from 45 to nearly 100 feet in hight, and that the lifting power is 10 tons when the balance arm is nearly vertical and about 2 tons when in a horizontal position.

Protestant Episcopal Diocesan House.

Operations have recently been commenced on the northeast corner of Twelfth and Walnut streets, Philadelphia, Pa., for the erection of a four-story and basement Protestant Episcopal Diocesan House, which, it is expected, will be completed by August 1 of next year. The type of the architecture will be that of English Gothic of the Tudor period, the pointed windows Bishop's bay windows, and the entrance doorway with appropriate carving giving it an ecclesiastical character. It will be built of Indiana limestone with slate roof and gray terra cotta cresting. The basement with concrete foundation will be 12 feet deep and will extend under the sidewalk. The first floor will be divided into several rooms, while on the second floor will be the assembly hall with accommodations for 250 people. There will also be the chancel, robing room and organ loft, bishop's room and secretary's, treasurer's, board and committee rooms. The third floor will contain the ladies' auxiliary, a room with accommodations for 150 people, together with various committee rooms. The fourth floor is designed for the purpose of the church club, with large meeting and conversation room and special meeting rooms. The first floor will contain the tanks, ducts and steam coils for ventilation. The main stairs, which encircle the elevator, will be of iron. The building will be as nearly fire proof as possible, the floors being of steel beams and hollow brick arches. A large portion of the floors is to be supported on iron columns, so as to relieve the outside walls of the floor weight. The plaster will be laid on metal lath and the finish in hard wood throughout. The building will be lighted by electricity and heated by steam—a direct indirect system with fresh air inlets from the outside walls to each radiator.

METHODS OF HANDRAILING.*

BY J. V. H. SECOR.

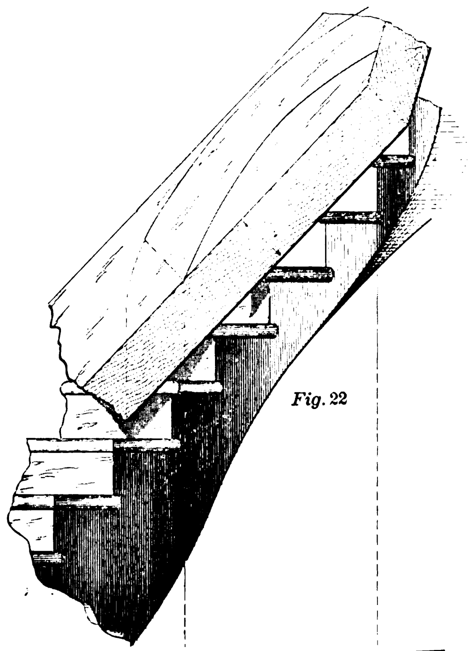
OGLING AND CHOPPING SYSTEM.

AT THIS TIME, when the box and the old way of working were having a race, as it were, to see which of the two systems would triumph, there was a unique method employed by some, which consisted in placing the plank from which the rail was to be cut upon the stairs and marking the curve line and the plumb, the two sides being marked with a peculiar kind of a gauge, shown in Fig. 20. It will be seen that this way of working was closely allied to the quadrant cut box, but was more cumbersome. The joints, as in the latter case, must be made on a drum or stairs. The latter way was generally employed by men of high repute as mechanics, and several instances of the kind come to mind at this time. A self supporting stairs—that is, stairs built independently of the wall—would be elliptical in plan, and have a framed carriage supporting the finished work, which was of mahogany, built in the best manner. The stair builder, however, had no knowledge of lines by which to get out a handrail, and when asked how he would execute the work would say: "Oh, I will chop and fit until it is right," and he did, fitting joints and easings on the stairs, and when complete it was a very credible job and pleasing to the eye. From the above facts I take the name for this system.

While some were groping in the dark, as the above method may be termed, others more advanced were out in the clear sunlight of science. The diagrams in Fig. 23 are so plainly marked that the method will be easily understood. The risers are numbered from 12 to 18, and are shown by the spaces in plan and elevation marked C D E F G. Two methods are here shown by which to draw the face mold for the plan B B, including the bevels. This is a square cut system—that is, the plank is sawed square through, and the easings are formed to suit the eye.

(*To be continued.*)

*Continued from page 212, September issue.



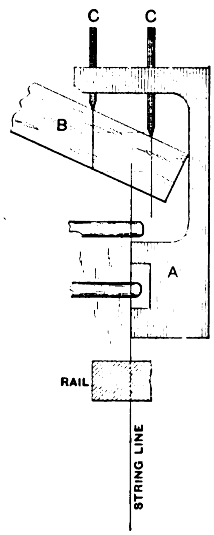


Fig. 20.

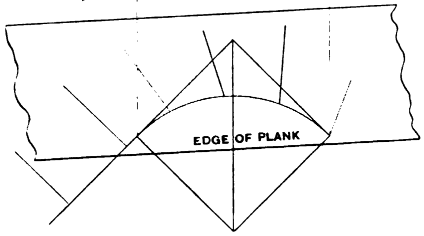


Fig. 21.

Fig. 20.—View Showing the Gauge A, the Pencils C C and a Section of the Plank B Resting on the Stairs and Marked as Indicated.

Fig. 21.—Plan of Quarter Cylinder, Showing the Edge of the Plank as it Crosses the Quarter.

Fig. 22.—Elevation of the Quarter, with the Plank Resting on the Nosings and the Sawing Lines Marked.

Methods of Handrailing.—Ogling and Chopping System.

Early English Gothic.

The general appearance of the Early Gothic styles, whether English, French or German—the glorious buildings of the thirteenth century—is truly magnificent, and this is generally known and acknowledged to be the finest period of the building art that the world has ever seen. The marvelous skill of the construction of the vaults, and the piers and buttresses to carry them, has long been admired as wonderful. A mere skeleton is built, and the wall between the buttresses may be as thin as possible, and even may be entirely of glass, as was discovered afterwards in the large windows of the decorated and perpendicular styles. Although there are local characteristics in each country and each district, the general style of the thirteenth century is the same all over the north and west of Europe, says the London *Architect*. One place may be a generation in advance of another in the introduction of the new style, but it spread very rapidly in England and France; in Germany the fine Romanesque style of the Rhine churches lingered for half a century, but in general the progress was nearly simultaneous. That St. Hugh's choir at Lincoln is the earliest pure Gothic building in the world may be said to be now a matter of demonstration; the course of St. Hugh has been traced from his birth to his death, and all the buildings with which he was connected have been examined, and it is now clear that he was not an architect, and did not bring either architect or masons with him from Grenoble, which was, on the contrary, very much behind England at that period. The name of the architect is French, but his family came over to England with William the Conqueror, and settled in Lincolnshire, where it is still one of the county families, and there is little doubt that Geoffrey de Noyers (now called Dunoyer) was a Lincolnshire man, and that district was then in advance of any other either in England or France. Of the present building, the south aisle was built first, and in the eastern bay of that is the only vestige of Norman work in the whole building; the billet ornament occurs on the rib mouldings of the vault in that bay only; the side wall is the one where the outer wall was erected first and the inner wall built up against it, which can be distinctly traced as before mentioned.

Egyptian Architecture.

The Egyptians of all nations seemed to have built and planned with the most exclusive regard to permanence, says one of the London architectural papers. They designed to make antiquities. A dim bewildered instinct, a yearning after immortality was the *primum mobile* of all their undertakings. They preferred an unconscious existence in the form of hideous mummies to utter dissolution; they feared that the bodiless spirit might lose its personal identity, and expected, or wished, after the expiration of the great cycle, to find all that they had left exactly as they left it—the same bodies, the same buildings, the same obelisks pointing at the same stars. Strange faith—that the soul, after all varieties of untried being, would return to animate a mummy. The Greeks built for beauty, the Romans for magnificence, the Orientals for barbaric splendor (the Chinese, indeed, for fantastic finery), the Gothic nations for the sublimity of religious effect or martial strength, a Dutchman builds to please himself, a sensible Englishman for convenience, others of that nation to show their wealth or their taste. But the Egyptian built in defiance of time, or rather propitiated that ruthless power by erecting him altars whereon to inscribe his victories over all beside.

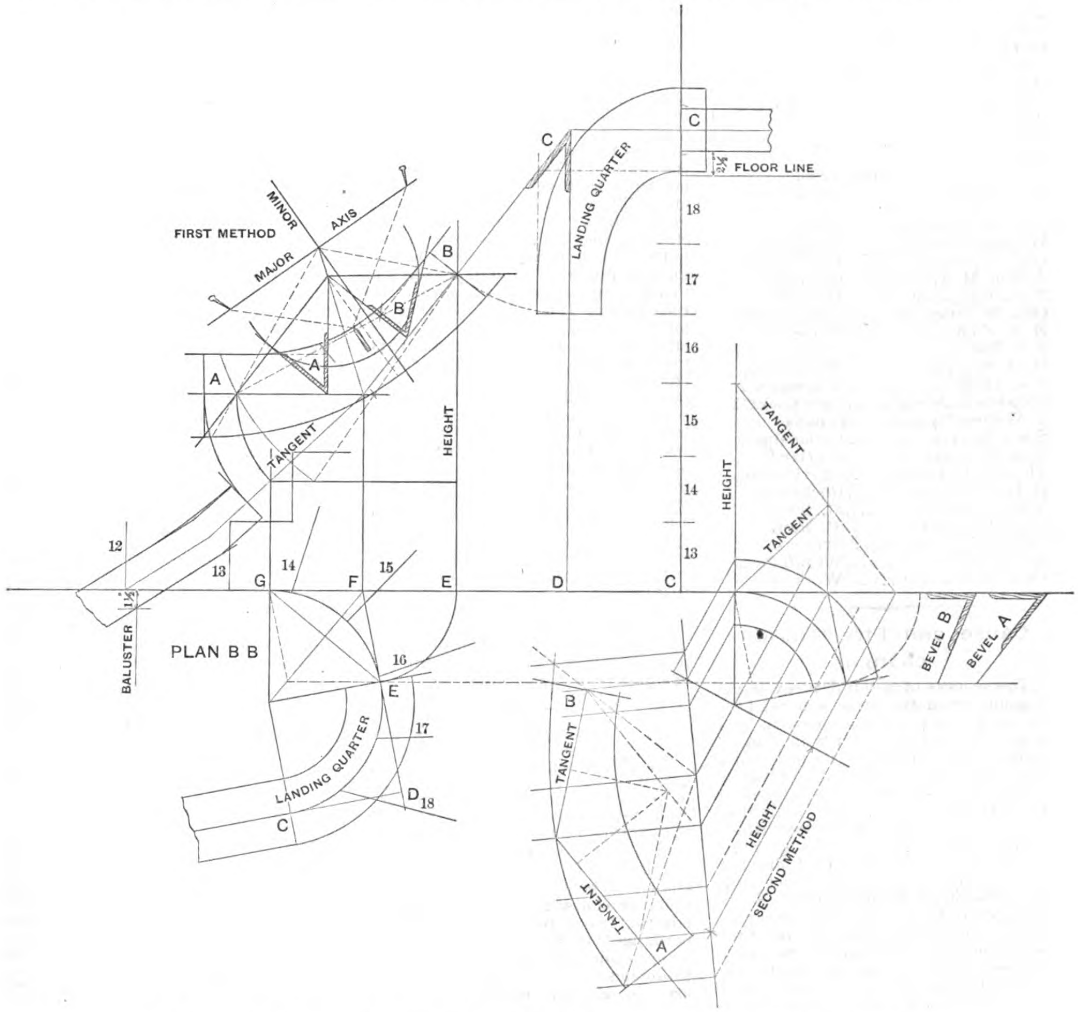


Fig. 23.—Diagrams Showing Two Methods of Drawing the Face Mold for the Plan B B, also the Bevels.

Methods of Handrailing.—Ogling and Chopping System.

Joists and Roofs.

A writer in a recent issue of the *English Mechanic* presents the following views touching the subjects indicated above :

The first point is as to the best form of an ordinary fir joist. Supposing we have a room, say, 16 feet square, the floor of which is to carry a given load per superficial foot, then evidently there must be some particular disposition of the joists as to size and distance apart which will do the duty with the smallest quantity of timber. The strength of a timber beam to resist fracture varies as the square of the depth, but its resistance to deflection varies as the cube of the depth ; so here we have not merely to consider the strength, but the stiffness of the floor, which latter ought also to be made as great as possible.

Again, take three joists, respectively 9 x 3, 10 x 2½ (more exactly 10 x $2\frac{7}{16}$) and 11 x 2. If we multiply the square of the depth by the breadth, we find that all three sections have practically the same strength, but the stiffness differs considerably. The sectional areas, and therefore the quantity of timber in the floor, would be in the proportions 27, 24½ and 22, so that apparently the 11 x 2 is the most economical. This, however, is affected by two other conditions—viz., the greater number of joists required if their distance apart in the clear is to remain unaltered, and the necessity for more lateral support by the "herring bone" trussing. The latter, perhaps, is more theoretical than real, as probably the same amount of trussing would be employed in either case.

Another matter connected with joisting has often struck me as being wrongly proportioned—viz., that of "trimmers." Take an ordinary chimney breast of about 5 feet 9 inches or 6 feet wide, then there may be as many as four joists carried by the trimmer, which again is carried by the two joists into which it is tenoned ; thus, each of these latter, in addition to its own share of load, has to carry the load of two other joists. Nor is this all, for the trimmer joist has to support half the weight of the hearthstone and of the brick arch on which the stone rests, and this extra load is also borne by the two floor joists, as before.

What provision, then, is made for for extra strength in these two bearing joists, weakened as they must necessarily be by the notching and tenoning into them of the trimmer? I am afraid, as far as my own observation goes, the answer is, none at all. The empirical rule is to add ⅛ inch to the breadth of the joist for each joist trimmed into it. Thus, the 9 x 3 inches would become 9 x 3¼ inches, or an addition to its strength of $\frac{1}{12}$ inch, which seems very inadequate, even though it is the case that the extra load is carried near the end of the joist.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

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Cause and Effect in Exchanges.

The success of a builders' exchange depends upon the same general principles which govern success in business. The purposes for which an exchange is created must be prosecuted with the same tireless and persistent energy that the individual applies to his business affairs. The individual cannot secure business success without constant effort, and an exchange might be likened to a composite individual whose success exists in direct ratio with the effort to produce it. No exchange can be a success by simply existing, and when members find fault with their organization for its lack of success they are finding fault with themselves for their own lack of effort to make it successful. An exchange must have some object in life, and the more important are its objects the more likely are its members to value its existence, and the more they value its existence the harder will they work for its support. All the forces which go to make success in an exchange act and react upon themselves. The individual recognition by the members of the need of the exchange creates the motive for its support, and, once established, the force of united action demonstrates the value of acting in unison. The individuals make the exchange, and the exchange benefits the individual by making his position infinitely stronger than it was when he acted as an individual only.

An exchange may be established with the most laudable objects and yet be comparatively valueless; but if it does, it is only because the members do not believe its objects sufficiently valuable to work for them. An exchange established for the purpose of filling some minor place in the business life of the builder necessarily occupies a subordinate place in his mind, and therefore receives but little attention or support. To secure the daily and earnest support of the builder the exchange must fill a daily and important need, and the existence of this condition depends entirely upon the builder himself. The exchange might hold the most valuable opportunities for facilitating and improving the builder's business, but if he did not know that it did the fact would be an indifferent one to him. When he understands the benefits of an exchange, the builder will support it with his energy and money; but not until he does can he be depended upon to act except as he is pursuaded for the time being. It is a fact, however, and all builders will recognize sooner or later that an exchange conducted upon the general lines suggested by the National Association is the greatest safeguard and benefit which can be established for the protection of the individual, and, therefore, the whole fraternity. Co-operation of all branches of the trade for the purpose of defining and establishing the general principles which should govern the whole, and for defining and establishing the specific rules which should govern the separate branches in their relations with each other, cannot fail to produce that which does not now exist—the harmony of all the parts. A well organized exchange conducted on business principles and for business purposes is a necessity to every community of builders in the country.

Query.

The following query has been suggested to the National Secretary, and is given here in order that the principle involved—that which underlies the addition of a percentage by general contractors for assuming the liability of the sub-contractor—may be discussed. The addition of a percentage upon sub-contracts by the principal contractor has rarely been done in accordance with any clearly defined rule or principle, and such questions as the following should be carefully considered by all contractors, in order that what is right in the premises may be plainly established. Expressions of opinion upon the subjoined example are solicited from builders everywhere. In considering the example it should be borne in mind that the principle only is under discussion, for general practice is usually so devoid of universal methods that local action may be greatly at variance. The establishment of uniform practice is the ultimate aim in view.

THE EXAMPLE.

In cases where a general contractor is required to do work additional to a contract, how far does the principle of adding a percentage to sub-work extend? For instance: The general contractor would properly be entited to a percentage upon every portion of subwork for which he makes a separate contract with a sub-contractor, but if one of these sub-contractors has again a sub-contractor under him, would the sub-contractor to the general contractor have the right to add a percentage on his sub-contractor's esti mate and then the general contractor have the right to add a percentage on the combined figure which is submitted to him? As an illustration: Suppose a carpenter-builder acting as a principal contractor is asked to do additional work which comprehends besides his own work (carpentry) mason-work, \$1000; iron work, \$1000; plastering, \$1000 and painting, \$1000, for which he receives separate estimates. He would be entitled undoubtedly to a percentage on each, which we will call for the sake of illustration 10 per cent. That would give the principal contractor the right to add \$400 as his proper percentage for assuming the risk of those portions of work, and would make a total in his estimate of \$4400. But if, on the contrary, his sub-bidder for the masonry includes the iron work and plastering and painting in his bid, and on the same theory adds the per cent. to each one, making his bids \$4300 to the principal contractor, would the principal contractor then be justified in adding ten per cent., which would make his bid \$4700, instead of \$4400, as under the other conditions?

Glasgow Builders' Exchange

The following is a portion of an article which appeared in a recent issue of the Glasgow (Scotland) *North British Daily Mail* and is a most excellent indication of the scope of operation of the force exercised by the National Association of Builders. Other printed matter direct from the exchange mentioned shows that the organization is patterned after the plan advocated by our association. The principal work in the formation of the Glasgow Exchange was done by its President, Col. R. J. Bennett.

The Building Trades' Exchange of the City and District of Glasgow, Limited, at 30 Gordon street, was formally opened yesterday by Lord Provost Bell. Sir William Arrol, honorary president of the Exchange, occupied the chair, and among those present were: Colonel R. J. Bennett, president; ex-Councillor John Paterson, Messrs. Andrew Gray, Alex. Muir, Wm. Anderson, Robert Scott, John Porter, Wm. Lightbody, John Craig, John Keppie, Robert Wylie, R. A. McGilvray, J. R. Christie and Wm. M. Cunningham, secretary.

The chairman said the institution of a Building Trades Exchange was quite a new thing in this country. He had never heard of anything of the kind on this side of the Atlantic, but some Glasgow gentlemen who had recently visited America had been greatly impressed with the usefulness of such institutions there. One important purpose served by a building exchange was the reducing of friction between the various sections of the building trades, and if that end could be achieved in Glasgow the opening of that institution would be a very good thing for all concerned. The exchange was not got up for the purpose of combination in any shape or form. It was for the purpose of enabling those connected with the building trades to meet and discuss matters, and all members, from the man who employed one or two workers to the man who employed four or five thousand, would be on the same level. Another object was to afford a guarantee that a member of the exchange who undertook to do a certain piece of work would honorably do so according to specification, and in the event of his failing to perform the work in that way it would fall to the Exchange Committee to deal with him. The premises are neatly arranged and include a room for the secretary, a private room for members, sample room, &c.

An exhibit of building materials, such as exists in connection with the Master Builders' Exchange of Philadelphia, is contemplated. The secretary has through the secretary of our National Association invited correspondence from American brethren interested in exchange work.

Exchange Privileges.

The following definition of the use and abuse of exchange privileges has been made by the Master Builders' Association of Boston, and plainly shows that outsiders who visit an exchange for the purpose of seeing such of the various members as they may have business with are usurping the rights of membership. This restriction does not affect the presence of non-members in the lobby, who are there by appointment of some member, but only such persons who use the exchange as a means for seeing all at once such indiscriminate members as they may happen to have business with. The action of the Boston Exchange on the subject is as follows:

LOBBY PRIVILEGES.

Frequent complaint has been made to the Committee on Rooms and Rules by members of the association to the effect that parties whose applications for admission to the association have been refused are often present in the lobby at "'change hour," and, by sending in for various members whom they wish to see, secure the benefits and convenience of a common rendezvous almost as completely as if they were members of the association.

On the other hand, members of the association argue that their membership entitles them to the privilege of having any one entertained in the lobby who may desire to see them, and that their rights are improperly abridged if the calls of such parties are not recognized by the gatekeeper.

It is evident to the committee that the rejection of an applicant for admission means something and that such parties must in some degree be restricted in the use of the privileges and conveniences of the exchange rooms, and they therefore decide that parties whose applications for membership or exchange privileges have been refused cannot be indiscriminately entertained in the lobby; but if members of the association wish to be summoned to the lobby whenever such parties may call for them, they must notify the secretary to that effect and the gatekeeper will be instructed accordingly.

A list of rejected applicants can be seen upon application to the secretary.

Trade Education Abroad.

Most of the European countries have been ahead of the United States in providing trade and technical education, as distinct from mere manual training, for their youth. Very generally the subject has been recognized as having such an important bearing on the national prosperity that trade schools have been established either directly under government auspices or else with the aid of the State. The latter condition prevails in Great Britain, where so-called technical schools—which generally embrace what are in this country regarded as trade schools pure and simple—are springing up on all sides. In Germany, France, the Netherlands and Switzerland the governments are also paying considerable attention to the subject. Recent consular reports to the State Department from the two last named countries contain notable testimony to the efficacy of the system of training thus given in turning out an intelligent and educated class of craftsmen.

SWISS SCHOOLS.

The Swiss, in particular, are famed for their manual dexterity, and their country is noted for its educational advantages in general. Probably no nation, in proportion to its territory, has so many industrial and technical schools. They receive both national and private assistance. The federal government, we learn, gives subsidies to not less than 157 of these institutions, more than $330,000 having been thus paid out for their support during the past seven years, while municipal and private subscriptions have raised the total to above $1,500,000. Thus the Swiss expend nearly $300,000 a year to aid their boys in learning a trade, and this, with a total population of only 3,000,000. Above 17,000 young Swiss are attending these trade schools at the present time. The result, as it has been said, is that "young men now learn trades in Switzerland with zeal, looking for the same honor and the same reward that is anticipated from the adoption of professions. The basis, however, on which they build is more solid, the aim more elevated than ever before." The Swiss special training has elevated the trades and raised the mechanic in the eyes of the world as well as in his own eyes. A Swiss who has gone through a full trade school course understands his calling perfectly and has no trouble in securing employment at the highest wages.

In Holland there are 18 genuine trade schools. The manual training school, which aims only to impart to the pupil a general manual facility withour reference to his subsequent vocation, such as is so largely in vogue in the United States, is there virtually unknown. The one purpose of the Dutch trade schools is to "train efficient mechanics." Employers of skilled labor are the most pronounced advocates of the schools, which, they assert, improve the grade of skilled labor, making it not only more profitable to the employer, but more marketable. All the schools were established and at first maintained by private enterprise, but all except one are now sustained in whole or in part by municipal or governmental subsidy. The exception is the trade school at Breda, which was founded by one of the earliest and most ardent advocates of the trade school idea in the world, Dr. Van Cooth, who at his death left a sufficient sum of money to endow it handsomely. With a population of only 22,000, Breda sends regularly 120 or more pupils to the school. The result in Holland has been, in the words of the report, that

"Employers agree in testifying that the work of the boy trained three years in the trade school has a higher marketable value than the work of the boy who, deprived of the school privilege, has been compelled through poverty to learn his trade in the shop. One is an all-round mechanic, who has learned the 'why' of things; the other, a drudge, without resource of adaptiveness, whose work is, and always will be, purely perfunctory."

A BELGIAN SCHOOL.

At Charleroi, in Belgium, is an important trade school, which was established by the Provincial Council in 1865, which has an annual government subsidy of $2605. The average attendance at the school is 934, and among the trades taught are joinery, blacksmithing, boiler making, masonry, molding, steam fitting, &c. Belgium also maintains other schools of a similar nature, all of which have been found to be of the greatest benefit to the country at large.

TRADE EDUCATION IN AUSTRIA.

In Austria the system of trade schools has been brought to a very high state of perfection. The Gewerbe Schools (the purely industrial or technical schools of the country) impart instruction in various branches of trade, and, as we learn from a European technical journal, especial attention is devoted to such branches as may form a distinct specialty in the district in which each school is located. The pupils are, it is stated, scientifically prepared for their special manual calling far more satisfactorily than if an apprenticeship had been served in some ordinary workshop. Whatever the art in which the pupil is receiving instruction, whether in metal work, in engineering, or in carpentry, carving, molding or building, every effort is made "to impart to him a full knowledge of the why and the wherefore of what he is doing and the best means of doing it." The consequence is that the pupils, thus trained, become masters of the trade they have studied in much shorter time and more thoroughly than could be the case under the old apprenticeship system.

The general consensus of opinion among those who have studied the question of trade schools, as illustrated abroad and in this country, points to the conclusion that such a means of definite industrial training is an absolute necessity under present day conditions if the American mechanic is to keep up to the high standard he has hitherto maintained.

Measuring Brick Work.

Not long since there appeared in one of the issues of the *Clay Worker* an article by J. A. Reep on the subject of the measurement of brick work. This topic is one in which many readers of the paper are more or less interested and for their benefit we reproduce the article herewith:

It is curious to note how the method of measuring brick work varies in different parts of the country.

There is almost invariably a feeling of antagonism between the bricklayers and their employers. I do not mean by this contractors, but the owner of buildings, who hired the mason, or was compelled to pay for the building of the brick walls. The owner or firm proposing to erect a house or store building is obliged to put up a brick structure. As a matter of economy, he begins to make an estimate on the amount of brick required, as upon this must depend the size of building. He first asks a brick mason how many brick will be required to lay a cubic foot of wall, and receives for an answer from one man 21, from another 22, and still another says 20. He looks around, secures the brick and builds up a cube to represent a cubic foot, and learns that 20¼ bricks are sufficient.

With this as a guide, he carefully estimates the walls and foundations of his proposed building. He measures all the openings and deducts them from the contents of the wall, and arrives at what he considers an approximate amount of brick required.

Masons and contractors bid on the brick work at a stated price per thousand. The contract is awarded and the work goes on happily until completion. Then a dispute arises as to the amount of brick used in the walls. The mason asks that he be paid for the walls counted solid. He also counts twenty-one brick to the cubic foot. The proprietor makes a careful estimate of the wall, and inquiry elicits the fact that there has been many thousands of brick delivered in amount less than in the mason's estimate in wall measurement. The proprietor feels aggrieved that the mason should ask pay for that which he has not furnished. The custom of measurement adopted by masons is a matter which does not concern him, and is frequently left for the courts to determine.

There is no uniformity in the size of brick, therefore the size of a wall which a given number of bricks will produce is uncertain. The mason is fortified in his demands by a custom long established and defended therein by the Bricklayers' Union, which makes the rules governing the size and amount of brick in the cubic foot, as well as the price per thousand for laying in the wall.

STANDARD OF MEASUREMENT.

There is great need of some well established standard for the measurement of brick work, made to conform with the standard size of brick, as adopted by the N. B. M. A. At present the rules governing measurement vary considerably in different parts of the country. Some contractors measure by the rod. Again you will come across others who insist on measuring by the perch. If they were asked to define the difference between the rod and perch, the answer would be, "A great deal of difference. A rod is 16½ feet and a perch is 25 feet or very near it."

The old rule of our arithmetics taught us that 16½ feet make 1 rod, perch or pole, and we supposed that it would always remain at that. But the stone mason in measuring his work measured double faced wall, 1 foot in thickness by the rod, and all that was below the surface with single face as 18 inches thick, and designates each 16½ feet as 1 perch. There is in reality 24¾ feet (cubic feet) in each rod of face measure, but for convenience in counting, the one-fourth of 1 cubic foot was added to the perch and called 25 feet. As foundation work came to be built more extensively of brick, the measurements were designated as by the rod or by the perch, thereby becoming confused. We believe a rod, perch or pole, is 16½ feet, whether applied to linear measure or to 16½ cubic feet of brick or stone wall; and if a brick mason or stone mason measures the superficial surface of a wall it is reckoned in rods, perches or poles, and any fractional part of a foot in thickness is part of a rod, perch or pole.

The cubic foot is perhaps the best method in use to measure brick work, as the brick are made to conform rapidly to the space occupied by a cubic foot, and do not vary but little from 20¼ brick to the foot.

Ordinary brick are about 8 inches in length, and with the mortar joint about half that in width, so that each brick on the flat will give a horizontal surface of about 32 square inches, or 4½ brick to the foot square.

Brick, as usually laid, require 9 courses in hight to each 24 inches, or 4½ courses to each foot in hight; 4½ courses, with 4½ brick to each course, gives 20¼ brick to the cubic foot. Waste, cutting and closer joints will easily require an allowance of ¾ of a brick to each cubic foot, and 21 brick will be found a very convenient figure for estimating the number of brick required for a wall of a given size and thickness. This is based on the standard size of brick.

To lose ⅛ inch in each course of brick is a loss of 1 inch in hight of the wall in every 8 courses, or 1 foot in hight in every 20 feet. This is made evident in facing up with pressed brick fronts. Both the brick and mortar joint being thinner than in the wall back of it, it can only be bonded together and only partially then, at each recurring sixth, seventh or eighth course, depending entirely upon the thickness and thinness of the two different kinds of brick.

This, at first sight, may look like a small item, but if it is practiced on both the hight and girth of the wall by shortening the bricks, then the loss is twofold. But there is another side to the subject. The brick mason or contractor sometimes lives in a section where building sand is much cheaper than brick, and with no regard to the size of the brick he is using, he mixes his mortar as lean as he dare with small allowance of sand, and where brick work is built by wall measurement, then his object is to save his brick at the expense of the mortar. He, with a heavy mortar joint, makes a gain correspondingly as great as the small brick is in favor of the brickmaker.

STRENGTH OF WALLS.

The brick walls with large mortar joints are weaker and liable to be crushed or cracked. Lean mortar is not a good cement, and is subject to decay or disintegration by the effects of the weather, thereby rendering the wall weak or unsightly.

The loss of ⅛ inch in each eight courses on a wall 60 feet high, with the five walls, foundation, inside walls and chimney, &c., of an ordinary store building, would be about 550 cubic feet, or 11,550 bricks, counting 21 to each foot; or if the gain of ⅛ inch can be made by the selection of the right man to run up the leads or corners, it is just as desirable to do so in his own favor that way. The contractor furnishing brick, scales up one side. The brick mason laying by the 1000 scales down on the other, and, as before remarked, it is the frequent cause of dispute between owners of buildings and the builder.

My experience in the trade for a number of years confirms me in the opinion that many men are deterred from using brick for their dwellings because of this.

THE pit floor of the Covent Garden Theater, London, was constructed on an ingenious principle and one which permits of the raising or lowering the floor at convenience. On such occasions as public dinners, *bal masques*, &c., the advantages of possessing such a facility are especially obvious. It was accordingly resolved to support the floor on trussed timber beams 2 feet 3 inches deep, resting on cast iron columns, the latter having split heads, resembling a musician's tuning fork. By the adoption of this form the trussed floor beams can be lowered into the columns their own depth whenever required; and if it be desired to retain the beams at any particular hight, the cavity in the top of the column can be fitted up with a number of packing pieces.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

NOVEMBER, 1894.

Tall Buildings.

During the annual meeting of the American Institute of Architects in this city the third week of October, a number of important papers were read by prominent members of the profession. One of the contributions which attracted more than usual attention in view of the rapid increase in the number of tall office buildings in New York, Chicago and some other places, was a paper entitled "High Buildings and Good Architecture," by Thomas Hastings of this city. The author urged that there should be rational limitations of hight for all buildings constructed solely for revenue, and that it was discouraging to spend one's energies upon 50 or 100 feet of an avenue or street when, however good the result in itself might be, a blot was being made upon the general line of buildings considered as a whole. In the discussion of this paper representatives of New York and Chicago took an active part. George B. Post, whose opinion is entitled to consideration in a matter of this kind, expressed the view that a tall building is only a tower as a problem of design, and that New York was likely to become a city of towers, unless a check was placed upon it by the Legislature. He also considered that the life of buildings constructed in the form of steel cages imbedded in masonry would be short, and although he might not live to see it, others present would witness the tearing down of many of what might be designated as sky scrapers. He stated that he had removed beams that were cased in solid brick on account of the rusting of the surface of the beams. A view of the question directly opposed to this was held by W. L. B. Jenney of Chicago, who stated that he had seen steel in Rome 500 years old which showed no effect of rust, and that a bar of iron taken from the obelisk in Central Park, New York, was found to be in good condition.

The Apprenticeship Question.

Prof. George C. Sikes of the University of Chicago has prepared a descriptive treatise, issued in pamphlet form, of the apprenticeship system in the building trades that will be valuable to both employers and workmen. The writer has investigated methods existing in many localities, and has presented the results of his studies in such form as to greatly assist all persons who are desirous of bringing about an improvement in the conditions by which the apprentice in the building trades is surrounded. Various data, illustrative of forms of apprenticeship which exist in the United States, are shown in such concise form as to be readily available for use in defining just grounds upon which an apprenticeship can be based. Action taken by the National Association of Builders and other bodies of a generally similar character upon the apprenticeship question has been commented upon in such a manner as to bring out inherent values in the methods advocated, and to place the reader in possession of facts which will help to make clear the need of reform in this much neglected portion of the building trades.

Arbitration and Conciliation.

The Civic Federation of Chicago, to which reference has previously been made in these columns, have put their plans into form and shape which promise to result in one of the most valuable and intelligent conferences upon the subject of "Conciliation and Arbitration" which has ever occurred in this country. The matter has been taken up in a thorough and business-like manner and the speakers who have been engaged to handle the various subdivisons of these subjects are in every way qualified to deal with the matter in a broad and non-partisan spirit. Such speakers as have been invited to attend the convention have been chosen without regard to place or locality and represent nearly all the different fields in which the relation of employer and workman exists. The meeting is to occur on November 13 and 14 in the city named. We present the programme in another column.

Trade Papers and Books.

The mechanic who does not take a paper devoted to the interests of his own trade and read it thoughtfully falls far short of profiting by all his opportunities. Such a paper puts him in touch with other men of like tastes, gives him a chance to compare their methods with his; in fact, makes him more independent of his immediate surroundings and fits him for a larger sphere of usefulness. It is thus that some bright young mechanics climb so rapidly above their fellow men perhaps of twice or thrice the direct experience and assume greater responsibilities. Beyond the time spent in reading the daily and the trade papers, every mechanic may, if he will, still find a few moments each day to devote to either interesting or instructive literature. A boy who was brought up on dime novels cannot in a day learn to enjoy Scott or Dickens, but there is nevertheless an ample store of good fiction, intensely interesting, and, in many instances, decidedly instructive. History is told in such pleasing manner by many of our able writers that one hardly appreciates what he is reading, while the simplicity of some of our greatest scientists has enabled them to lay before us in intelligible language a large store of the most valuable scientific knowledge. The practical universality of the modern free public library removes all excuse for not reading because of nothing to read, and to-day, merely for the asking, the mechanic may freely enjoy such books as his father never thought of reading, because he could not afford to purchase them.

The New York Buildings.

The site occupied for so many years by the New York Hotel on Broadway, this city, will soon be covered by four immense structures rising 12 stories above the sidewalk and extending two below. The site has a frontage of 184 feet on Broadway, extends 148 feet on Washington place, 200 feet on Waverley place and 92 feet on Mercer street. The architect of the new building is R. Maynicke, for over 25 years associated with George B. Post, who is well-known from his connection with many of the important edifices in New York City. The planning has been such as to make the buildings an harmonious whole, the central structures being distinguished from the end ones by difference in color. The division walls will be of brick, 4 feet 8 inches at the bottom, and tapering to a width of 16 inches at the top. Cast iron columns will sustain the masonry of the outside walls as well as the weight of the floors. The two lower stories of the buildings are to be of stone, and those above of brick, terra cotta and iron. The base of the buildings will be the two lower stories treated as one, with an *entresol* above. The main body of the buildings will consist of six stories, above which will be a cornice containing another story. An attic above this cornice will contain two stories, which will be surmounted by a balustrade and cornice. There will be two passenger and two freight elevators in each building with a driveway for vehicles from Washington place. The lower portions of the buildings will be differently treated, the corner ones having porches with entrances to the stores in the middle, while the central ones will have large show windows with entrances to the stores on the sides. The structures and land will represent an investment of about $3,000,000, and it is expected that the buildings will be ready for occupancy within a year.

English Trades Unions and Trades Schools.

The attitude assumed by British organized labor toward the trade and technical schools lately introduced in the United Kingdom is illustrated in a resolution adopted at the annual Trades Union Congress, held not long since at Norwich, England. The resolution was to the following effect: "That this congress, while admitting that great and good work has been and is still being done by the establishment of technical classes in various localities throughout the United Kingdom, with a view of assisting in the better education of our handicraft and artisan work people, is of opinion that no others than apprentices and work people who are working at the various trades taught should be allowed to attend such classes." This means that, in the opinion of the labor leaders, the benefits offered by schools of trade instruction should be confined to those young artisans who are already under the direction of the trades unions. The schools are State aided and therefore supported by the public at large, but could this resolution be made operative their advantages could not be secured by any young man who is desirous of learning the theory and practice of a useful trade, unless he be already working at the special trade he wishes to study.

Legal Aspect of Ventilation.

In times past the quality of ventilation has been determined by the desires of those who directly introduced or controlled it, but to-day legislative action is gradually leading from desires or whims to laws. It is no longer a question as to what a man thinks is good enough or cheap enough in the way of ventilation, but rather what the law says he must do regarding it. The State of Massachusetts began in 1888 a serious consideration of this subject and passed certain laws, requiring "proper" ventilation, but wisely not further defining as to the exact amount of air to be supplied per person, appointing furthermore State inspectors, independent of local boards of health, who should enforce the law. Lack of specific requirements for proper ventilation under the law threw upon them the burden of determining what should be understood by the term "proper ventilation." And wisely again, rather than attempt an extremely radical departure, they adopted the standard of 30 cubic feet of air supply per minute per person as necessary to fulfill the requirements of the law as they proposed to enforce it. This, while well in excess of the degree of ventilation then being secured in most buildings, was reasonably simple of accomplishment.

Laws Defining Air Supply.

Slight changes have since been made in those laws, and last year in the new building laws of the city of Boston an attempt was made to clearly specify the exact amount of ventilation by requiring 50 cubic feet per head for each occupant and for each gas light. But, through the clerk's or the printer's mistake, a certain ambiguity exists in the law that practically makes it a dead letter—at least in certain known cases the inspector-in-chief has so chosen to consider it. This example of the State of Massachusetts may well be followed by others that have as yet given no consideration to the subject. Although there was at first some opposition to the law in Massachusetts, its judicious enforcement has brought about good feeling and a readiness to comply with it that has been the best evidence of its success. It is a work that must be done gradually, the people must be educated up to it and the standard raised by degrees, until results may be assured that will fulfill the requirements of the most ardent supporters of the laws demanding "proper ventilation."

American Institute of Architects.

The twenty-eighth annual convention of the American Institute of Architects was held in the Fine Arts Building, 215 West Fifty-seventh street, New York City, on October 15, 16 and 17. There was a large representation of architects present, including some of the most prominent members of the profession. President Daniel H. Burnham of Chicago delivered an annual address, in which he spoke of the beneficial influence exerted by the institute on the profession and on professional work. He also referred to the bill now pending before Congress for the appointment of a commission of five men, three of them architects, for the examination of designs for Government buildings, and expressed the hope that, if passed, architects would not refuse to serve on such a committee. An interesting report from the Committee on Education was read by Henry Van Brunt and one from the Committee on Conservation of Public Buildings was read by R. M. Upjohn. There was also a paper by Russell Sturgis entitled "Modern Style Founded on Ancient Greek Architecture."

SECOND DAY'S PROCEEDINGS.

The second day's session was largely devoted to the consideration of the report of the Committee on Competition, which was read by Chairman George B. Post. The report suggested the adoption of a progressive rate of compensation for preliminary plans submitted in competitions, and named a schedule beginning with $550 for buildings costing from $50,000 to $75,000 and increasing gradually to $5000 for buildings valued at $4 000,000 or $5,000,000. The report also suggested that selection by competition be given to the architect whose plans give promise of ability to develop his studies into the best solution, instead of the plans of the architect coming nearest to a preconceived solution of the problem. Various other features were covered by the report, which was discussed at considerable length by Messrs. Post, Hastings, Yost and Carrère. The latter gentleman suggested that in all important competitions the general plan and programme be discussed by competitors, professional adviser and jury, and that competitors be allowed on a majority vote to make changes, subject to the approval of the jury and professional adviser. This was accepted and the whole matter referred to the committee in order that a suitable code might be prepared. During the session L. H. Sullivan of Chicago read a paper on "Emotional Architecture as Compared with Classical." Thomas A. Fox of Boston presented "A Short Study of Greek Detail;" Thomas Hastings of New York read a paper on "High Buildings and Good Architecture," and Secretary Stone read a paper prepared by T. M. Clark on "Protection against Fire." There were also papers by Prof. C. A. Cummings of Boston, Frank M. Day of Philadelphia and R. W. Gibson of New York.

THIRD DAY'S SESSION.

The last day's proceedings were devoted to a consideration of the report of the Educational Committee and the adoption of the scale of compensation for preliminary plans submitted in competitions as outlined in the previous day's discussion. The directors were instructed to substitute the new schedule in place of the old one. Papers were read by E. L. Ransome of Chicago on "Concrete Construction as a Protection to Wrought Iron and Steel," and by George Edward Harding on "Electricity as Applied to Elevators."

The officers elected for the ensuing year were:

President, Daniel H. Burnham of Chicago.

First vice-president, George B. Post of New York City.

Second vice-president, William S. Eames, St. Louis, Mo.

Secretary, Alfred Stone, Providence, R. I.

Treasurer, Samuel A. Treat of Chicago.

The directors elected to serve three years were: L. H. Sullivan, Chicago; George C. Mason, Jr., Philadelphia; T. C. Link, St. Louis; Samuel Hannaford, Cincinnati; Charles A. Cummings, Boston; Edward I. Nickerson, Providence; W. L. B. Jenney of Chicago and Wilson Eyre, Philadelphia.

After luncheon at the Fine Arts Building the delegates were grouped on the outside steps and photographed. They then visited the Metropolitan Museum of Art and inspected the large scale models of famous edifices and the castings collected by the Willard Architectural Commission. In the evening an inspection was made of the new building of the Metropolitan Life Insurance Company, and later a reception was tendered the delegates at the Building Trades Club, 117 East Twenty-third street. The next convention will be held at St. Louis in the autumn of 1895.

Construction of Smoke Flues in Buildings.

The municipal authorities of Atlanta, Ga., have just passed an ordinance regulating the building of stove flues within the city limits, which might be followed with advantage by some other places in the country. The law is to the effect that all stove flues hereafter built in the city of Atlanta shall be constructed of hard burned or fire clay brick, lined inside with fire clay pipe, and so placed as to rest on iron or other non-combustible material, no wood whatever being placed in them. A section of the city code is amended so as to render any owner, builder or contractor violating the provisions of this section of the ordinance liable on conviction to a fine not exceeding $100 or imprisonment for not more than 30 days for each offense. In commenting upon this ordinance the *Southern Architect* states that the law is of vastly more than local interest, as it shows a disposition to improve methods of building, and with better methods of construction will be sensibly lessened the fire risk to life and property.

THE New York Theater is the name by which will be known the new place of amusement to be erected on Seventh avenue and Forty-second street, New York City. A special feature of the structure, which will cover an area of 100 x 200 feet, will be a roof garden. Active operations will be commenced next month, and it is expected to be ready for occupancy next summer.

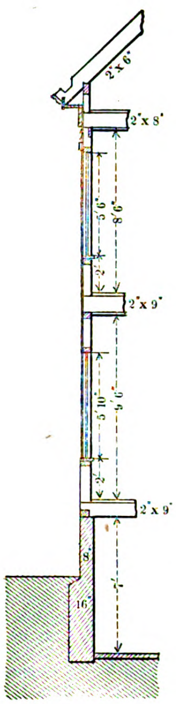
HOUSE IN NEWARK, N. J.

IN the northern portion of the city of Newark, N. J., in that section known as Forest Hill, is a row of attractive cottages, one of which forms the subject of our illustrations and supplemental plate this month. The half tone engraving is made from a photograph taken while the buildings shown at the left were in a state of incompletion, the one with which we have to deal being that in the foreground of the picture. It is the property of Mr. A. S. Van Sant and was erected from plans prepared by H. Galloway Ten Eyck, architect, of Market and Broad streets, Newark, N. J. The floor plans which we present herewith show the general arrangement of the rooms, the elevations give an idea of the exterior finish, while the miscellaneous details show the construction employed.

The foundation wall is of brick, 12 inches thick below grade and 8 inches thick above, the exposed parts being faced with selected brick, pointed with red mortar. The cellar has a concrete bottom. The timber for the frame is hemlock, with sills, ties, plates and posts, 4 x 6 inches; the first and second floor beams, 2 x 9 inches; the third floor beams, 2 x 8 inches, and the rafters, 2 x 6 inches. The sheeting is 1-inch hemlock boards, upon which are laid 6 inch white pine clapboards. The roof is covered with cypress shingles.

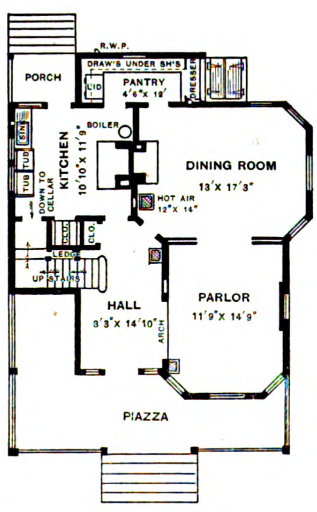
The flooring of the house is North Carolina pine, while the trim is of white pine, the staircase being of ash. The interior is finished in natural wood and the exterior has two coats of paint. The plastering throughout is three-coat work, the last coat being hard finish. The plumbing fixtures are of the most approved pattern, and the work is executed in a first-class manner. The house, which cost $3000 to build, is heated by means of a hot air furnace.

An inspection of the floor plans shows three rooms and a large hall on the main floor and four sleeping rooms and a bathroom on the second floor. The main hall is of such size that it can readily be used for reception purposes, and from it the kitchen, dining room and parlor can be entered without the necessity of passing through any other room. The position of the pantry is such as to afford a ready means of com-

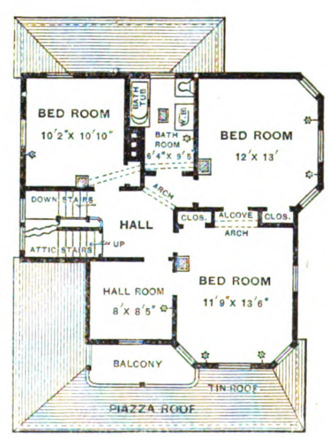


Section.

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



First Floor.

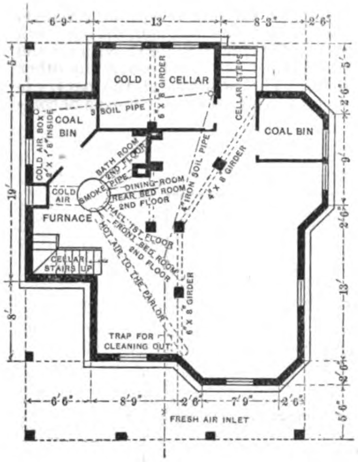


Second Floor.

Scale, 1-16 Inch to the Foot.

House in Newark, N. J.—H. Galloway Ten Eyck, Architect, Newark, N. J.

munication between the kitchen and dining room, and is fitted with conveniences which cannot fail to be appreciated by the housewife. There are sliding doors between the parlor and

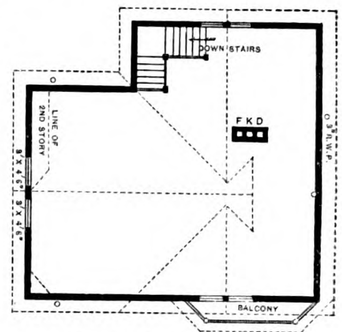


Basement.—Scale, 1-16 Inch to the Foot.

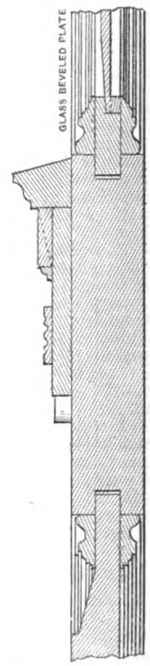
ing 4,000,000 feet, was brought into Bay City, Mich., a few weeks ago, being laid down in that port at a lower price than the Michigan lumbermen can get their home product to the same place by way of the railroads and rivers. The Michigan lumbermen say that wages for logging will have to go down considerably before they can continue their business at any profit under the new duties.

Mottled Brick for Ornamentation.

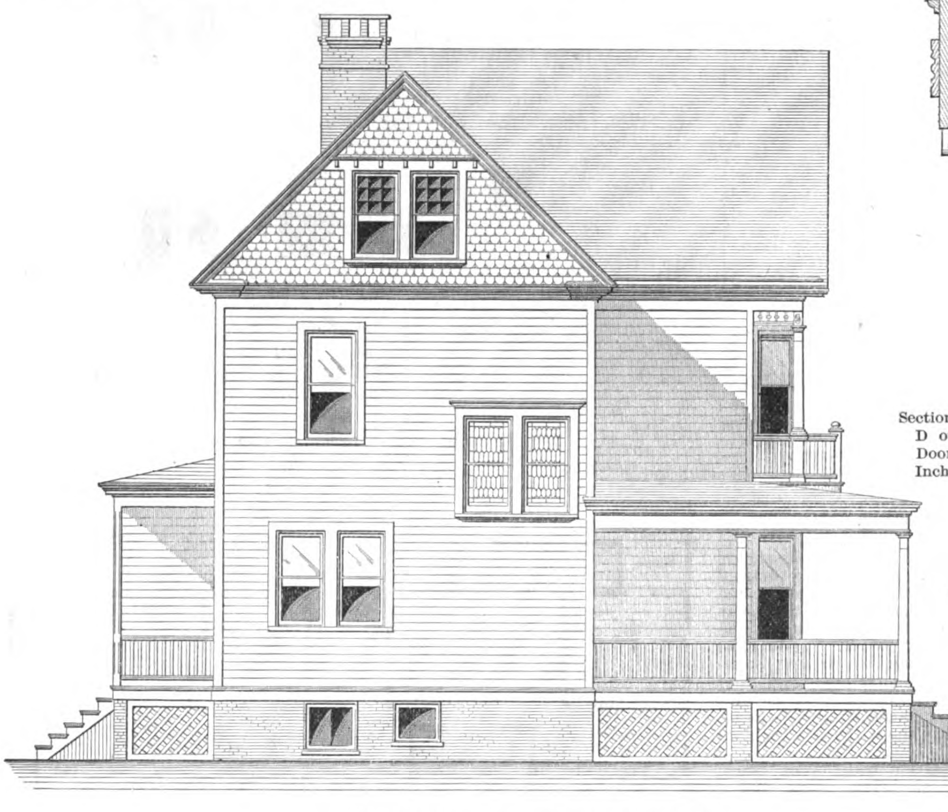
In the use of mottled brick, ornamental work of small scale is almost always a failure, says a writer in the *Brickbuilder*, yet we constantly run across buildings in process of erection where this mistake is being made. For large work, as, for instance, a corbeled cornice, where there are broad and deep shadows, mottled brick are quite as effective as any other, but in small details, such as belt courses and arches, we have yet to see them effectively used. In designing such details recourse must be had to the projection of parts producing shadows, which really form the design. The projection can never be enough to throw a broad shadow, or the work will become heavy and coarse, and, therefore, to make a small shadow count it must not have



Attic.—Scale, 1-16 Inch to the Foot.



Section through C D of the Front Door. — Scale, 3 Inches to the Foot.



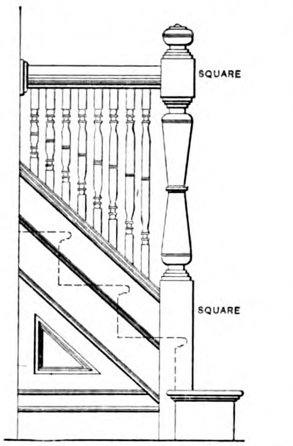
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

House in Newark, N. J.—Plans, Elevation and Detail.

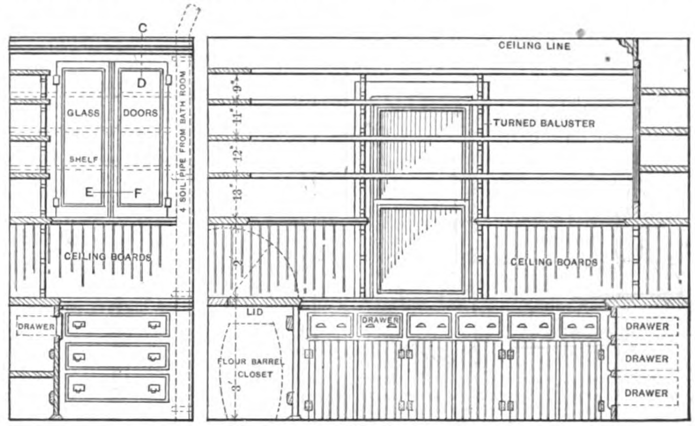
dining room, so that the two can be readily thrown into one when desired. The position of the stairs is such that very little space is occupied by the hall on the second floor, while from it every room can be entered direct.

THE FIRST CONSIGNMENT, under the new law, of Canadian lumber, compris-

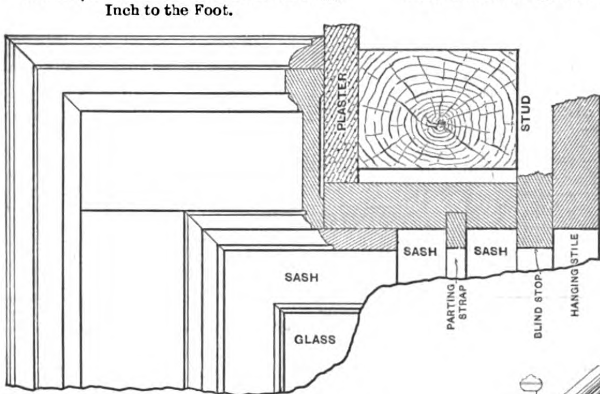
the competition of local color. The mottling constantly brings dark spots where they destroy the outlines of shadows, and as a natural consequence confuse the design, which depends upon the clear delineation of these shadows. In speckled brick the spots are so small as to make little difference, affecting only the general tone and texture of the brick; but when the broader effect of a mottled surface is desired small ornament is better omitted. The value of mottled brick is almost entirely restricted to broad surfaces, which from their very size must be given some variety of color to relieve them from the smooth painted appearance which is so disagreeable.



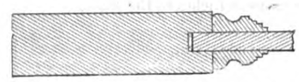
Elevation of Newel Post and Rail.—Scale, ½ Inch to the Foot.



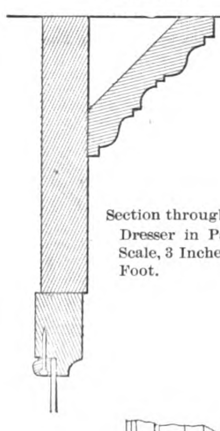
Details of Shelving, Drawers and Flour Bin in Pantry.—Scale, ¼ Inch to the Foot.



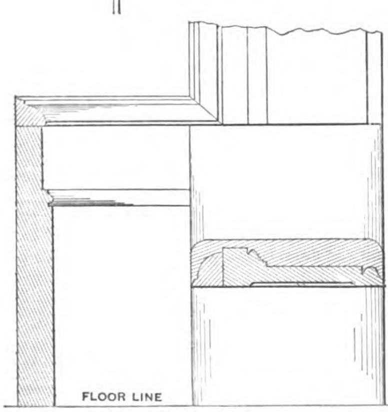
Detail of Window Head and Trim.—Scale, 3 Inches to the Foot.



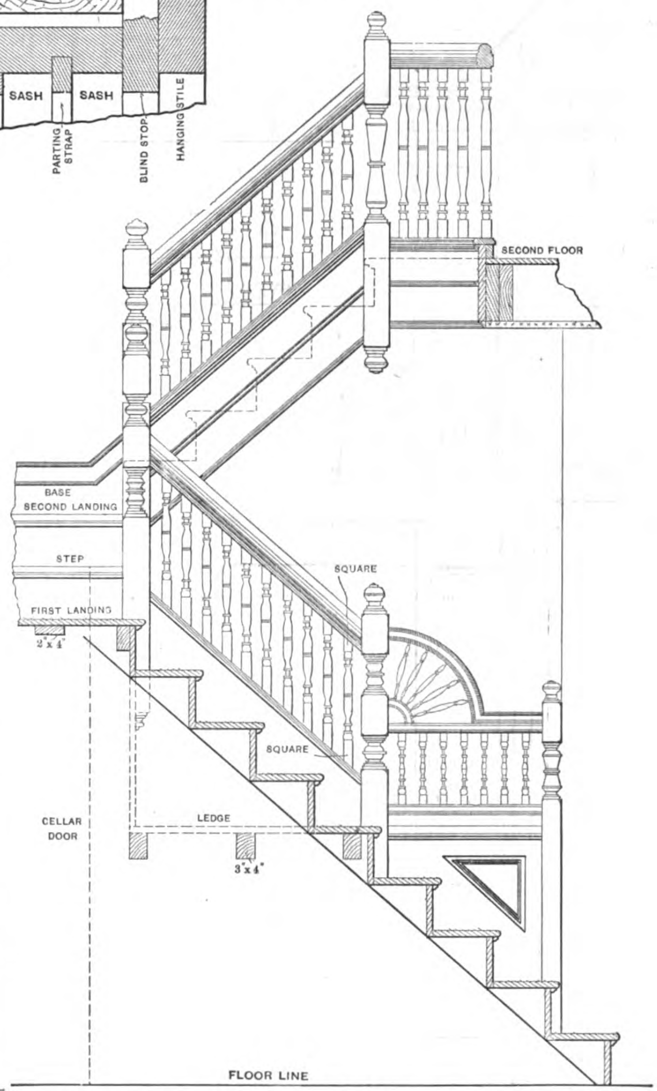
Detail of Inside Doors.—Scale, 3 Inches to the Foot.



Section through C D of Dresser in Pantry.—Scale, 3 Inches to the Foot.

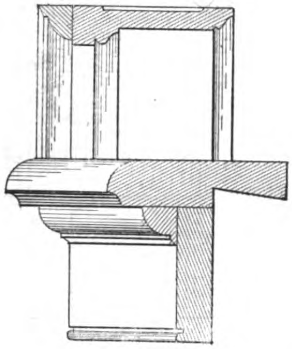


Details of Base Board and Corner Block.—Scale, 3 Inches to the Foot.

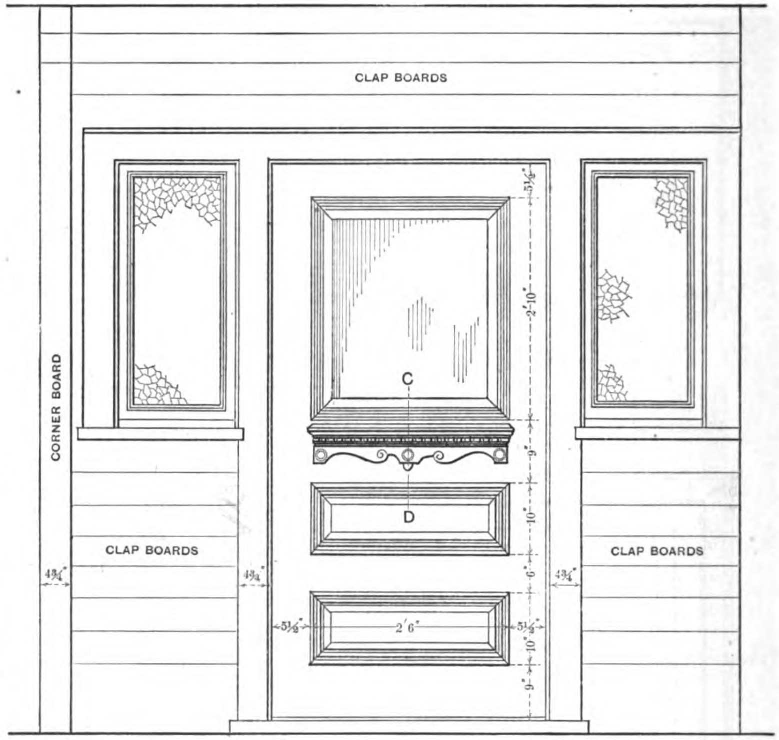


Section of Main Stairs Looking Toward the Kitchen.—Scale, ½ Inch to the Foot.

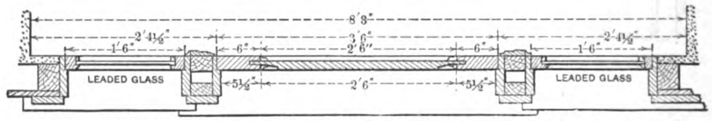
Miscellaneous Details of House in Newark, N. J.



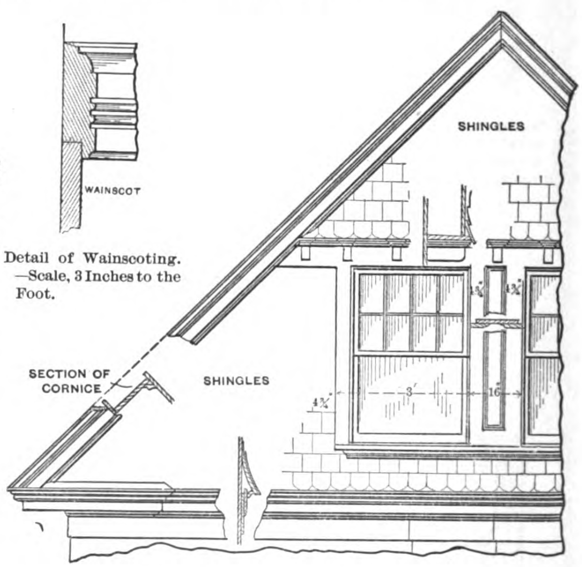
Detail of Nosing and Apron for Windows.—Scale, 3 Inches to the Foot.



Elevation of Front Door and Hall Windows.—Scale, ½ Inch to the Foot.

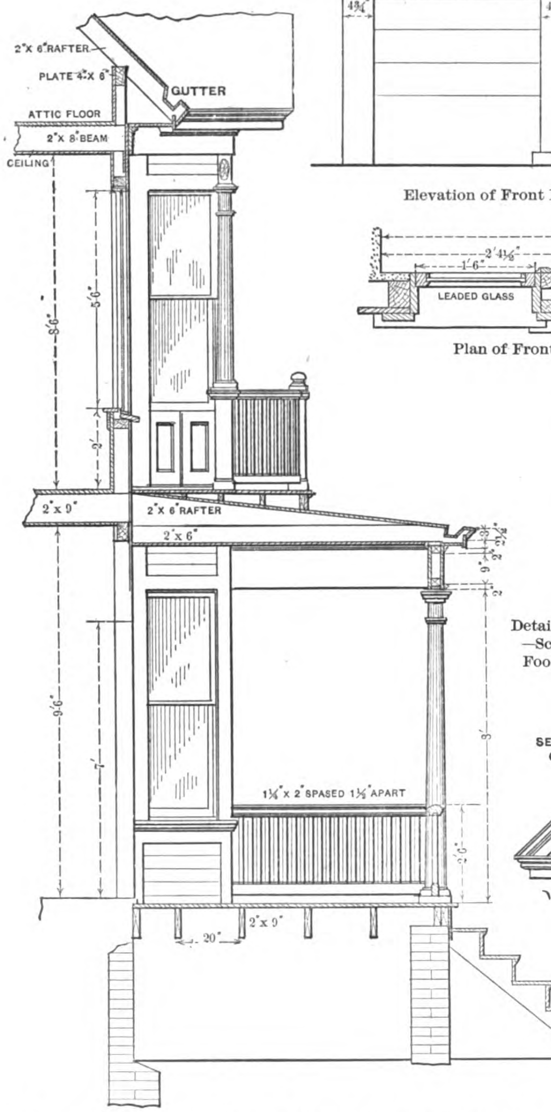


Plan of Front Door and Hall Windows.—Scale, ½ Inch to the Foot.



Detail of Wainscoting. —Scale, 3 Inches to the Foot.

Details of Front Gable.—Scale, ¼ Inch to the Foot.



Section through Piazza and Balcony.—Scale, ¼ Inch to the Foot.

Miscellaneous Details of House in Newark, N. J.

WHAT BUILDERS ARE DOING.

INDICATIONS which have appeared during the last 60 days showing the general condition of business in the building trades to be somewhat better at the close of the season than was at first anticipated are substantiated by more recent reports. Throughout the East, especially in the larger cities of New England and the middle Atlantic Coast, this seems to have been a very satisfactory year, when the general depression at its commencement is taken into consideration. The area of greatest depression seems to be west of the Mississippi River, and in that portion of the country builders and their employees are suffering more keenly from stagnation of business than elsewhere. Reports from the Rocky Mountain district and the Pacific Coast are far from encouraging. In cities where trades unions are sufficiently well organized to practically control hours of labor and wages, these have not been seriously affected, although of course the total volume of work has been much less than usual. In many cases, however, the unions have been unable to keep the wages up to the regular scale, and non-union men have been found who were willing to work for almost nothing for the sake of securing employment.

No general disturbance in the field of labor connected with building has occurred during the past month. The situation in the larger cities, such as New York, Chicago, Philadelphia, &c., is fairly satisfactory, and such differences between employers and workmen as have occurred have been confined to individual cases, the trade not having suffered serious hinderance. Builders are already beginning to look forward to the coming year with anticipations of improved business, and it is expected that the total volume of next year's work will probably be up to the average.

Baltimore, Md.

Present indications are that the coming building season in Baltimore will probably be up to the average existing prior to 1893. Considerable new work is already projected, and it is expected that more will come into the market during the winter. No trouble has been experienced with the workmen during the past month, and none is expected in the near future. The Builders' Exchange entertained the secretary of the National Association of Builders at a meeting on the 18th called for the purpose, and Mr. Sayward made one of his characteristic addresses on organization and the various phases of administrating the affairs of an exchange. The exchange has been most active recently in advocating the addition of three new branches—carpentry, plumbing and bricklaying—to the Baltimore Polytechnic Institute. Lieut. John W. Saville, superintendent of the institute, is a strong advocate of the addition of the courses mentioned. In speaking of the matter Lieut. Saville says: "I think the additions of the courses asked by the Builders' Exchange are not only wise, but necessary, if it is intended to keep the institute on a footing equal with those of a similar character in other cities." But little would be required to be added to the equipment of the school, as facilities for teaching these branches have already been considered. In the event of its proving impossible to secure to the institute the addition of classes in the building trades, a private school for the purpose is contemplated. The subject of trade training under the auspices of the Polytechnic Institute was presented to the Federation of Labor at a recent meeting by Lieut. Saville, and was cordially received. The delegates to the various sub-organizations of the Federation were requested to lay the invitation before their respective bodies, and their co-operation will doubtless be secured.

Boston, Mass.

The prospect for the coming year in the building trades of Boston appears at this time to be better than it has been for several years past. A number of large contracts will soon be placed upon the market, and there is sufficient projected work in the hands of the architects to insure an active season in 1895. The summary of the year's work up to the present time has proved that the amount of work done largely exceeded what was anticipated at the beginning of the year. In spite of the fact of last year's panic, and the comparatively dull opening of the season, the total of work in the market has steadily increased and has been of a substantial and satisfactory character. No trouble of any moment has occurred between employers and workmen, everything seeming to be at the present time on a sufficiently satisfactory basis to warrant the assumption that no general disturbance will occur for some time to come. The lathers of Boston and vicinity, who have been working nine hours per day during the past six months, have begun agitating the question of reducing the time to eight hours. The Central Labor Union has undertaken to gather statistics relative to the management of municipal contracts by the various prominent cities of the country, with the view to establishing, if possible, some sort of control which shall result in the employment of union men only on city work.

Cincinnati, Ohio.

Building business in Cincinnati remains in about the same condition as reported during the past two or three months, and the prospect for the coming year has not yet been sufficiently defined to warrant the belief that a very radical improvement in the volume of work will be experienced. Comparatively little new work is now in sight, and such of the larger contracts, with but few exceptions, as are now on hand, will probably not last through the winter.

There was a warm discussion at the regular monthly meeting of the Builders' Exchange over the provisions of the present lien law of the State. As the law is now the general contractor upon a building has to give bond that it will be completed free from any incumbrance in the way of a lien that may have been given by the general contractor himself or any of the sub-contractors. In other words, when the building is turned over to the owner completed, it is with the understanding that none of the workmen or the building material men have a lien upon it for any part of the material used in its construction or for any of the work that has been put upon it.

If such is not the case and some one of the under contractors has given a lien upon his part of the work to secure the payment of any of these things, the general contractor must be held responsible for it. Exceptions were taken to this provision by President George F. Nieber, and also to the provision allowing the owner of the completed building four months before settling for the work that he may find the building as contracted for in every particular.

This stand was taken exceptions to by Mr. Hancock, who declared that his attack upon the latter part was unjust and out of reason; that the time allowed the owner was not too great, and that but few contractors would ever think of taking exceptions to it. A somewhat heated argument between the two gentlemen and several others followed until broken in upon by A. Colter, president *pro tem.* He stated that it was a fact that the general contractor was held for the entire work of all the sub-contractors, and in his opinion, unjustly so; but that the discussion upon the other matter was out of place and entirely unnecessary between the two gentlemen.

After some spirited talk upon the part of the members at large it was decided to postpone any action that was desired upon the question by the members, and it is understood that at the next meeting of the exchange, to be held in a month, a committee will be appointed to draw up a form of desired changes in the law and submit them, through the exchange, to the Legislature. The entire time of the exchange was taken up in the discussion of the matter, and no regular business of importance came up for consideration.

Chicago, Ill.

The amount of building being carried on in Chicago keeps up to about the average which has been reported during the past few months. Various minor strikes have occurred, but none of sufficiently general character to prove a serious hinderance to business. Such disturbances as have occurred have affected only individual contractors, and the general trade has been free from obstruction to its progress since early in the season. An exceedingly curious way of doing business is indicated by the following description taken from a local paper of the methods of a speculative builder named Brown. It seems that Mr. Brown is erecting nineteen houses at Forty-seventh street and Calumet avenue, and while there is nothing particularly strange about this, the peculiar methods of paying the men who were doing the work has resulted in a general strike, called by the Building Trades Council. Several weeks ago Mr. Brown advertised for workmen, and to each applicant he offered employment, providing a lot was purchased by him in the town of Harvey. Work was scarce at that time and Mr. Brown had no trouble in inducing a large number of skilled workmen to agree to pay him $450 for a lot, payments to be made by deducting a certain amount from each employee's wages each week.

At first Brown only paid the carpenters 30 cents an hour, half cash and the other half applied on the lot. Complaints were made to the carpenters' union, and he agreed to pay 35 cents an hour, 25 cents of which was retained by him as payments on the lots purchased. No applicant was given employment who refused to purchase a lot. Officers of the carpenters' union investigated the value of the lots and claim that they are not worth over $150. Brown gives each employee a contract in which he gives a clear title to the lots after $150 has been paid. Each pay day the workmen receive in their envelopes a certain amount of cash and a receipt. One of these receipts is as follows:

Received of Frank Galburg, $12.60.
W. M. BROWN.

The receipt does not state for what purpose the money is retained. A carpenter receiving 35 cents an hour and working eight hours would pay $1.60 a day. If he had steady employment it would require nearly two years to pay for the lot with interest added. The houses on which the men are working will be completed before Christmas. After the workmen are thrown out of employment Brown can foreclose and again secure possession of the lots purchased by the employees.

On October 11 the Cornice Workers' Union effected a settlement with their employers, and the strike which has been so long kept up was declared off. Mutual concessions were made in the new agreement. The journeymen will continue on the old schedule of wages—35 cents an hour and eight hours for a day's work. The contractors agree to hire none but union men, while the latter agree to work only for members of the contractors' association. The new agreement expires January 1 instead of September 1, which was the time the old agreement expired.

Detroit, Mich.

Reports from Detroit state that the building business is in a fairly active condition, and that an improvement over the present year is expected in 1895. The amount of work done during the past year as compared with previous years is now estimated as being considerably below the average although an improvement over 1893. The relations between employers and workmen seem fairly satisfactory and little or no trouble has been experienced for some time. The plasterers' union is seeking to secure to all plasterers in the city the payment of union wages. It is stated that some of the men have been working for as low as $1.50 a day.

The Builders and Traders' Exchange is reported as being in excellent condition, with a steadily increasing membership. A recent step in advance has been taken by the establishment in connection with the exchange of a trades school for apprentices in plumbing. The matter is under the direct charge of the plumbers, and the undertaking has begun auspiciously and with satisfactory promise of the future. It is hoped that the class in plumbing will prove the nucleus of a trades school similar in plan to the one conducted by the Philadelphia exchange which embraces classes in all branches of building. The movement is spoken of with hearty commendation by the members of the exchange.

Lynn, Mass.

The Master Builders' Association of Lynn is reported as being in good shape, and the secretary is making an effort to secure the consideration and, if possible, the adoption of the form of arbitration advocated by the National Association of Builders by all organizations of employers and workmen in the city.

The carpenters' union of Lynn has decided to establish the eight-hour day on and after November 1, without further attempts to meet the bosses. The hours for work until April 1 will be between 7.30 a. m. and 4.30 p.m., then from April 1 to November 1 from 8 a. m. till 5 p m., with dinner between 12 and 1. A schedule of wages requiring $2 50 per day for first-class carpenters and $2.25 for second-class was adopted. The carpenters made an amicable agreement with the bosses when the nine-hour day was inaugurated three years ago, and it is believed they will have no difficulty in shortening the time.

Milwaukee, Wis.

The Milwaukee *Evening Wisconsin* is authority for the following: The members of the Milwaukee Builders and Traders' Exchange will inaugurate a series of arbitration rules that will be of interest to builders all over the land. The arbitration plan, which was suggested by the National Association, will be in the nature of a special provision in the articles of association providing for the submission of all matters of dispute between contractors and owners to a committee of arbitration. This, it is understood, will apply only to cases where there is no suggestion of fraud or a conspiracy to deceive either party. It will hold good in disputes arising between individual owners, and also towns, counties or corporations.

For years past it has been a most deplorable circumstance in the accepting and letting of contracts that when differences of opinion arise regarding some obscure point there has seldom been any means of settlement except resort to a court of law. This has involved the waste of much time in costly litigation and the result in the end has been far from satisfactory. The projectors of the new system of arbitration claim that the legal profession was naturally very deficient in the practical intricacies of building operations and was often compelled to devote weeks of time to the study of mechanical points involved in such suits. With the board of arbitration which it is proposed to create and which will undoubtedly be organized on the same plan as that at present existing between the contractor and employees, the exchange will appoint at the beginning of each fiscal year three of its members to serve on the Arbitration Committee for a certain period. When a dispute arises the owner is to be given permission to secure three men whom he shall authorize as his arbitrators and then the committee of six has the authority to appoint one on whom all can agree as referee. In case the committee cannot settle the disputed point the testimony shall be laid before the referee and after he reviews it, he shall announce his decision and this will be considered final.

Of course when the owner of a new building refuses to arbitrate there is no compulsion, and recourse must be had to the law. In case fraud or conspiracy to cheat is shown, the arbitration board will be powerless and the court will take hold.

New York City.

The fight inaugurated by the trades unions of New York against the "lumping system" is still being carried on, although it is claimed that the practice of lumping has already been seriously affected.

A large number of contractors have organized for the purpose of mutual protection, in order to have some recognized course of action in dealing with the workmen. The following resolutions give a succinct idea of the character of the organization:

"*Whereas*, The interests of all engaged in the building business, both employers and employed, have been sadly injured by the lack of intelligent co-operation, and the result has been a tendency to array the employers against the employed and *vice versâ*, and knowing full well that the present lack of system has resulted in great injury to all, therefore be it

"*Resolved*, That the interests of the mechanic and employer are mutual, and there should be between them a most cordial feeling, and be it further

"*Resolved*, That for the protection of our mutual interests we band ourselves together in an association, which association shall be known as the Employers and Builders' League of the Building Trades of New York City. In this body all reputable employers and builders shall be welcome. They shall adopt such rules as shall be for the best interests of all, and by careful, conservative action preserve the interests of the owner, contractor and journeyman, and by arbitration avoid all necessity for liens, strikes and lockouts, references, &c."

The principal features of the constitution are as follows:

Section 2.—The purpose of its formation is that by careful, conservative action we may preserve the interests of owners, contractors and journeymen; also, by arbitration and discussion, avoid all necessity for strikes, lockouts, liens and disputes.

Sec 4—As we recognize the fact that the interests of the employer and the employed are mutual, the cardinal principle of the association shall be equal justice to all.

Sec. 5—The officers of the association shall consist of a president, first and second vice-presidents, secretary, assistant secretary, treasurer and board of directors, which latter shall consist of three representatives of each of the different crafts actively engaged in the building trades, and this body shall have the general supervision of the affairs of the association.

The directors may nominate, appoint and remove when expedient four journeymen in each craft, who shall be representative conservative men, to be known as master stewards, and these men are to be the recognized medium of communication between the board of directors and the journeymen.

The membership roll was signed by 58 employers, consisting of: Builders, 26; carpenters, 19; roofers, 1; plasterers, 1; painters, 3; stair builders, 3; plumbers, 3; electrical workers, 1, and masons, 1.

The officers elected were: John P. Leo, president; Francis J Schnugg, first vice-president; Richard G. Platt, second vice-president; Arthur Gorsch, secretary, and C. A. Dubois, assistant secretary.

Headquarters have been established at 287 Fourth avenue.

A meeting of the State Board of Arbitration was held early in the month at the Building Trades' Club to settle the difference between the Electrical Contractors' Association and Union No. 3 of the Brotherhood of Electrical Workers. A decision was reached with but little difficulty through mutual concessions on both sides. Such moves as these under such auspices are calculated to show the value of all organizations such as the club mentioned. A recognized headquarters where meetings can be held and where workmen or others connected with the building trades are assured of courteous treatment do much to bring about a harmonious relationship and to foster temperate and beneficial consideration of all subjects mutually affecting the two.

During the meeting of the American Institute of Architects, held in the city on October 15, 16 and 17, the Mechanics and Traders' Exchange extended the delegates a reception at the Building Trades' Club which proved to be a most enjoyable affair. A large number of builders and architects from outside the city participated, and the National Association of Builders was represented by its secretary and other prominent members from adjacent cities.

Omaha, Neb.

Building business in Omaha is reported very dull. Collections are slow on such work as is now in course of construction, and builders find that competition is so keen as to practically eliminate all possibility of profit. The exchange is making an heroic effort to improve general business conditions in the trade, but finds it uphill work. The effort which was reported some time ago to bring to the city new manufactories by offering certain inducements in the way of land, &c., is still being pushed with some promise of success, and it is hoped by the beginning of the next season things will take a brighter turn and business will assume a more nearly normal condition.

Philadelphia, Pa.

Building is in about the same condition as was reported last month. There are considerable small operations under way, but nothing of a large nature is in sight. There are very few invitations sent out to the builders for estimates. Owing to this dullness the gathering of the members of the Master Builders' Exchange is assuming large proportions. The exchange is pursuing its usual progressive methods and is reorganizing its exhibition department under the supervision of Secretary William Harkness, the former manager of the exhibition having resigned. The exhibition department has steadily increased in volume and character since it was established, and has for a long time been the most complete exhibit of building materials in the country. Taken altogether the exhibition is one of the best object lessons of materials entering into the construction of houses to be found in the United States, and is free to the public. The committee having the matter in charge proposes to encourage even greater general interest in it. The exchange was thrown open to the visiting factory inspectors during their meeting in the city.

The last regular meeting of the exchange was made the occasion of a reception to John S. Stevens, one of its ex-presidents, an ex president of the National Association of Builders and a newly appointed member of the Public Buildings Commission, who has just returned from a two months' trip to the "Land of the Midnight Sun." While in London Mr. Stevens was banqueted by the National Association of Master Builders, of which he is an honorary member, and which organization he addressed on building topics relative to our country.

There is some talk of making an innovation in the matter of conducting business on the floor of the exchange. As it is now the 'change hour is devoted more to social intercourse than business. It is suggested that the business hour be conducted in a manner similar to that on the Stock Exchange—president and secretary to be present every day, and the announcement of all work that is required to be made from the chair. In other words, instead of notifying the various general contractors and sub-contractors by postal card, to make the announcement on the floor. This, it is claimed, will cause a better attendance and will give the members of the exchange a chance to bid for work in their line.

The added duties which have devolved upon Secretary Harkness have necessitated his being given larger quarters, and one of the offices in the building has been fitted up for his entire use. The prestige of the exchange as an organization steadily increases, and it stands in the front rank of bodies of a similar character in Philadelphia and is consulted upon all matters of general or municipal interest.

St. Louis, Mo.

Business is reported as picking up and has an excellent prospect for the coming year. The total amount of work done during the season has proved much more satisfactory than was thought possible at the opening of the season. No trouble of any serious character has been had with the workmen and there seems little likelihood of any transpiring this fall. At the regular quarterly meeting of the Builders' Exchange, held October 9, President Jeremiah Sheehan in the chair, Thos. H. Rich, treasurer, submitted his quarterly report, which was received and filed. It showed a balance, of $5,910 75 and a membership of 230. Henry Fuerbach of the Justice of the Peace Committee made a verbal report, saying that the committee held several meetings with committees from other exchanges, and the result would be, he thought, the nomination of good men by both political parties for Justices of the Peace in the various districts under the Devoy law.

The following resolution was adopted:

Resolved, That it is the sense of this exchange that we co-operate with the Lumbermen's Exchange for the enactment of a national law which will prevent the terrible forest fires, which are not only a great loss to our country, but also a useless waste of timber, which should be by all means preserved.

Secretary Walsh read several communications from the Merchants' Exchange in relation to the Transmississippi Congress, which meets in that city November 26, and also in relation to the launching of the new steamship "St. Louis," at Philadelphia next month. The president was instructed to appoint five delegates to the congress. The Board of Directors were authorized to act in the matter of a subscription for colors to be presented to the steamship "St. Louis."

Notes.

Recent advices from San Francisco, Cal., are to the effect that there is a perceptible revival and increase of building activity, as shown by the number of recorded contracts. The number of small structures being erected is on the increase, which is taken for a good indication among builders. There are rumors of large improvements contemplated, but these show an inclination to hold off for the present.

The business people of Tacoma and Seattle, Wash., are cheering up considerably on account of a brighter outlook. For several months saw and shingle mills have reported an increase in business, and now many sash and door factories are experiencing a larger amount of work. Many large factories are again running with good forces of men.

DESIGN FOR A BRICK SCHOOL HOUSE.

THE brick school house which we illustrate herewith is the design of S. W. Smith, architect, of Durango, Col., and provides two school rooms, each 20 x 26 feet in size. In the arrangement of the building more than ordinary consideration has been given to the subject of light and the directions from which it strikes the desks of the scholars. It is well known that the best results are secured with the light coming from the left or preferably over the left shoulder, and the author of the design has placed the desks and windows with this in view. The partition dividing the two rooms is a rolling screen, which can be raised when desired, throwing the two apartments into one. From the entrance hall open cloak and coat rooms, and from it descend the stairs which lead to the basement. The building is heated by a furnace, the floor plans showing the position of the registers and flues. From the architect's specification we learn that the underpinning is of stone, well bedded in good mortar, and faced on both sides. The water table, entrance steps, rail and newels, as well as the arch in the front gable, are of cut stone with bush hammered surfaces and tooled margin draft. The walls are of brick, with discharging arches to take the weight of the walls from the lintels over the windows, doors and other openings. The first floor joist are 2 x 12 inches, the ceiling joist 2 x 6 inches and the rafters 2 x 8 inches, all spaced 16 inches between centers. The joist are bridged with 2 x 2 bridging, while the studding is bridged in two rows. The joist is doubled under all partitions and all stringers and frame headers around openings, chimneys, hot air pipe and stairs are also doubled. The roof is covered with matched sheeting on which are laid pine shingles 4½ inches to the weather. The inside finish is in pine, the hall, closets and class rooms being wainscoted, as shown in the engravings. The walls and ceilings are plastered with the best three-coat hard finish plaster. In the dry climate of Colorado the plaster is put on the brick walls without furring. Blackboards are provided in the class rooms on all available wall space. The interior and exterior is painted with two coats of best lead and oil. The square lights of the window at the stair landing and the transom of the front door are glazed with opalescent and jewel glass in artistic design and pattern. The house is estimated to cost in the locality in which the architect resides, practically $1500; the more important items of which are stone work, $305; brick work, $263; lath and plaster, $155; rolling partition, $70; painting, $60; dimension lumber, $40; finishing lumber, $40; flooring, $45; sheeting and lining, $48; shingles, $63; framing and laying floors, $50; roofing, $60; doors and windows, $60; hardware, $45.

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

Design for a Brick School House.—S W. Smith, Architect, Durango, Col.

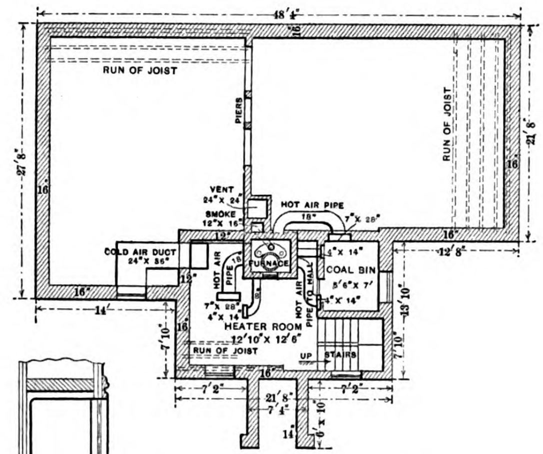
Hollow Brick Walls.

A correspondent of an English paper writing on the subject of hollow walls expresses views which are likely to interest members of the building profession on this side of the water. Among other things he says: Ordinary brick dwell ng houses, however small, are now commonly built with hollow walls. For instance, a house with five living rooms, instead of having 9-inch solid exterior walls, is with preference, and rightly so, constructed with two 4½-inch walls and a cavity of 2 inches between them, making the total thickness 11 inches. This cavity wall, besides keeping the house inside at a comfortable temperature, saves the cost of battening the walls. But in larger houses 11-inch walls are not strong enough. I would make them 16 inches thick, the 16 inches being a 9 inch inner wall built in English bond, an outer wall of 4½ inches built in stretching courses, and a 2½-inch cavity. All 16 inch hollow walls in houses which have been erected under my supervision are constructed in this manner; the 9-inch wall performs the duty of carrying the floors and roof; the outside wall I have always regarded as merely a skin or covering to protect the main wall from the effects of weather, and for that purpose have found it answer very well.

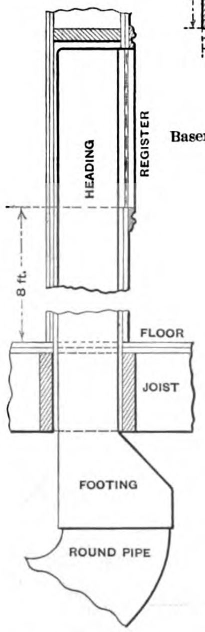
A friend of mine, who invariably builds the 4½-inch wall inside, attempts to persuade me that my construction is wrong. He says that the 9-inch should be outside, for the better resistance of the weather; but I fail to see that a 4½-inch wall is not strong enough—that is, supposing it to be well bonded to the main wall by iron ties. He also asserts that the inside 4½-inch is quite able to bear the floors, the roof being supported on the 9-inch outside wall. This I don't deny, but I think his floors must be more subject to vibration than mine.

This is a subject which might be discussed to advantage in the Correspondence department of the paper, and we trust those of our readers having the matter at heart will write us their experience with work of this kind.

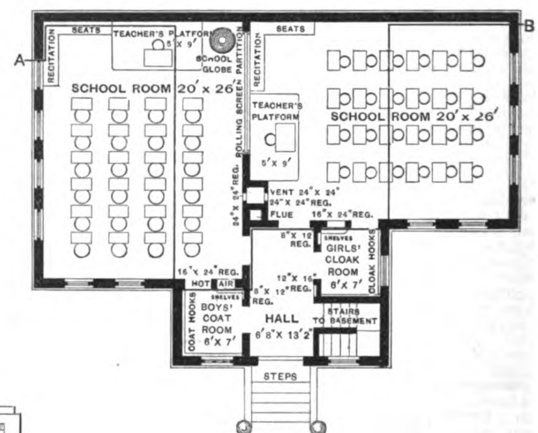
THE Cincinnati *Commercial Gazette* of September 30, in reviewing the local labor situation at the close of the month, remarks as follows: "A careful *résumé* of the condition of the labor situation locally admits of the belief that at no time during the past year have the conditions been more favorable and the indications for a general improvement in the immediate future better than at the present time. The ranks of the unemployed are gradually but surely being reduced, and a most thorough investigation fails to reveal the fact that there is, at present, any severe suffering from lack of work, though there are still many persons throughout the city who are still out of work. Reports from a number of mills and factories of different kinds indicate that the working forces in many will soon be increased and there is a general feeling of hopefulness."



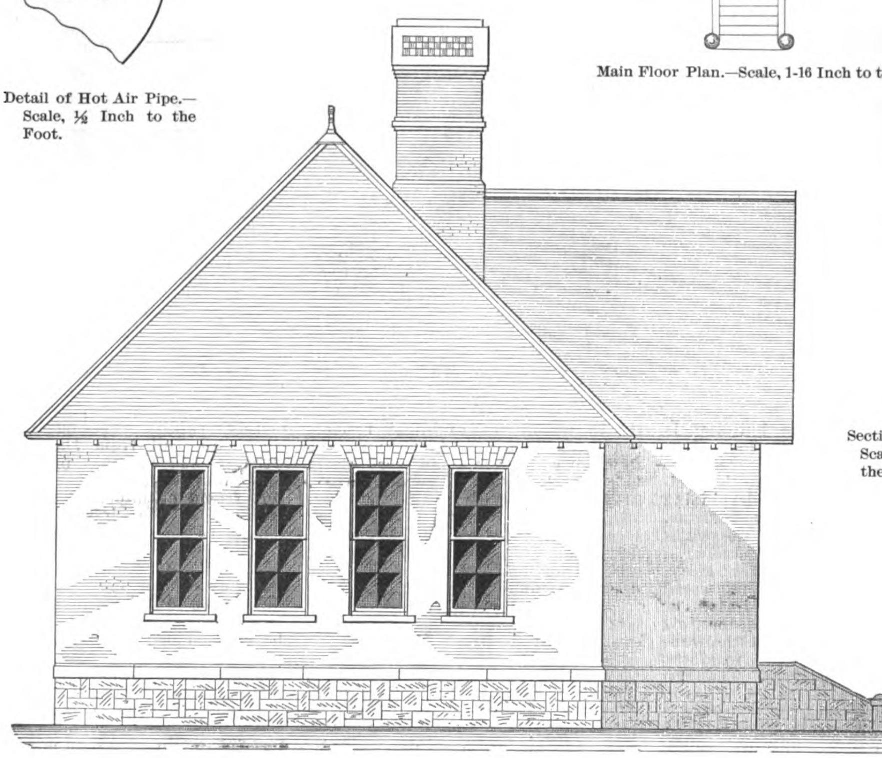
Basement Plan.—Scale, 1-16 Inch to the Foot.



Detail of Hot Air Pipe.—Scale, ½ Inch to the Foot.



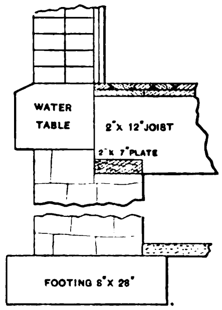
Main Floor Plan.—Scale, 1-16 Inch to the Foot.



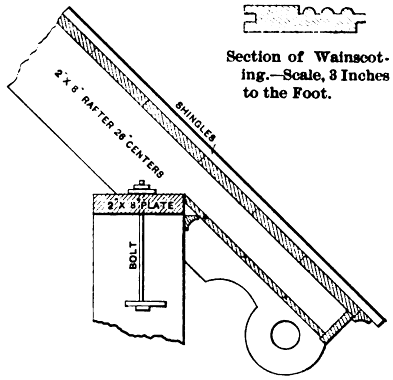
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Section of Trim.—Scale, 3 Inches to the Foot.

Design for a Brick School House.—Elevation, Plans and Details.

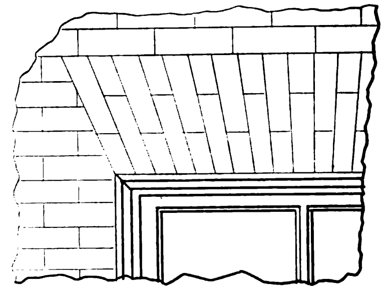


Detail of Water Table.—Scale, ⅛ Inch to the Foot.

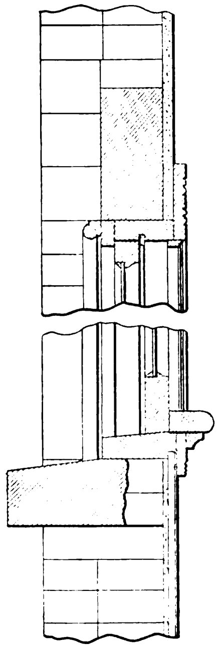


Detail of Main Cornice.—Scale, ¾ Inch to the Foot.

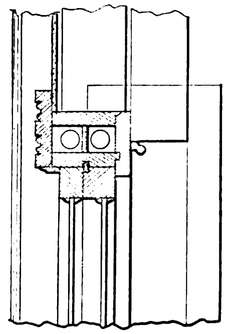
Section of Wainscoting.—Scale, 3 Inches to the Foot.



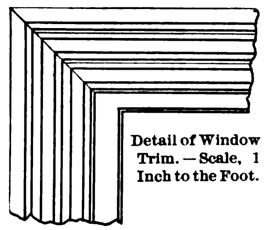
Detail of Top of Windows.—Scale, ¾ Inch to the Foot.



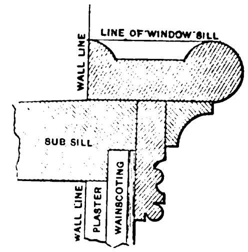
Section through Window.—Scale, 1 Inch to the Foot.



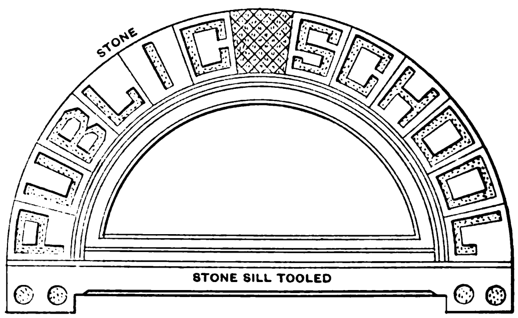
Section through Window Casing.—Scale, 1 Inch to the Foot.



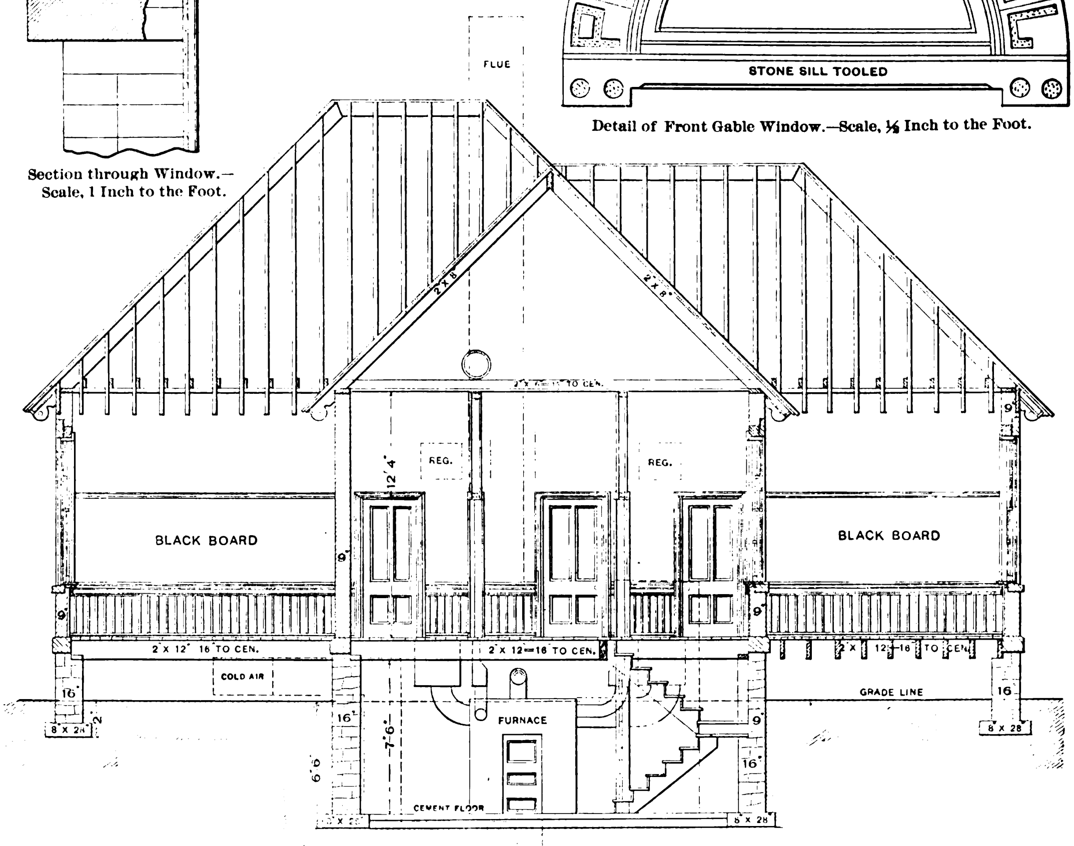
Detail of Window Trim.—Scale, 1 Inch to the Foot.



Detail of Wainscot Cap and Chalk Tray.—Scale, 3 Inches to the Foot.



Detail of Front Gable Window.—Scale, ⅛ Inch to the Foot.



Vertical Cross Section through Building Taken on the Line A B of the Floor Plan.—Scale, ⅛ Inch to the Foot.

Miscellaneous Details and Section of Brick School House.

Compulsory Arbitration and Prices Fixed by Law.

Carroll D. Wright of Washington made an interesting speech before the Union League Club of Chicago on compulsory arbitration. Mr. Wright is quoted as having said:

The settlement of labor controversies by arbitration involves many considerations. Some of these reach to the vital questions of the usefulness and control of private property. The very sacredness of private property is involved. Heretofore the discussion of these questions has been limited to the settlement of controversies. But there are also underlying ethical and economical questions that must be considered, and the conclusions drawn from these considerations determine whether arbitration must be compulsory or voluntary. The first great question is, "Shall a man have a right to do what he will with his own?" This question was asked in the Bible when the men employed in the vineyards at the eleventh hour received as much pay as those who had borne the heat and labor of the day. The men struck and the employer said: "Is it not lawful that I do what I will with mine own?" This ended the strike. No one questioned this right then. To-day we do question it. We say now, "No, he may not, if what he wishes to do with it is likely to injure the property or health of his neighbor." A man must submit to the wishes of the community in regard to his own property.

A third limitation is likely to be added to the answer of to-day. The answer will soon be, "No, not if you injure the standard of living of your neighbor." How then shall this last answer be met when it comes, so that industry shall not be killed by its consequences?

No way has yet been devised to prevent strikes. The most that can be done is to reduce them in number and severity. Arbitration cannot prevent them, although voluntary arbitration seems a logical answer.

COMPULSORY ARBITRATION.

I pass to compulsory arbitration. The advocates of this say that, 1, both parties to a dispute must be compelled to come into court; and that, 2, when the court issues its decree it must be enforced as any other decree would be enforced. Let us see how this will work. A is a manufacturer who pays his men on an average $2 a day. Owing to some cause he finds he cannot pay this any longer and reduces wages to $1.80. The men oppose this. They say they cannot live on less than $2. The employer says he cannot pay more. The matter is taken before a compulsory court of arbitration. Suppose the court says the men must take the $1.80. How can this be enforced? Say there are 5000 employees. Who can make them work? The constable, the sheriff, the *posse comitatus*, the military forces may all be called out. But none can make them work. The decree is dead from the beginning.

Suppose the court says the manufacturer must pay the $2. But if he really cannot afford to do so, what must happen? The employer must do one of two things. Either he must adulterate his goods to make up the difference, or he must combine with other employers in a trust to keep up the prices. The law will have compelled one of these things.

There is also an economic question to be considered. If the State says the employer must pay a fixed price for work it has practically fixed the price of the commodity. The law can fix the price, but it cannot compel the consumers to buy at that price.

A PENAL OFFENSE.

The next logical step is to make it a penal offense not to buy at the price. Then why not let the law fix the prices of everything directly? It would be cheaper to do this directly than through the cumbersome machinery of compulsory arbitration. The workman would be a slave under compulsory arbitration. He has little "freedom of contract" now. He must submit to the ruling prices. But compulsory arbitration will destroy what little he has left. It will establish the prices at which he can sell the only commodity he possesses—that is, his labor. He must accept $1.80 or not work at all if the court tells him to do so, even if the actual cost of living is $2. On whatever side we look at it compulsory arbitration means the death of industry and the enslavement of labor.

There may be some modification of the general principle developed in the future, but I do not know it now. There should be a protest by the community against it. Few labor organizations indorse it. A few scholars and thinkers are almost the only ones who really indorse it. To adopt it would be to go back to the ages from which we have been divorced. It would be going back to a worse barbarism than we have ever had on this continent. There would be no life, no survival of industry under it.

Union Railroad Station at St Louis.

The Union railroad station recently completed in St Louis, Mo., is without doubt the largest in the world devoted exclusively to passenger service, and is used by more than 20 different railroads. The main structure, or head house, as it is termed, with the train shed covers an area of more than 11 acres, the power house, tracks and connections about 20 acres, so that the total number of acres covered, including the storage yard for cars, the connecting tracks, &c., is a trifle more than 42 acres. Some idea of the immensity of the station may be gained from the amount of materials of various kinds used in its construction. The station proper required 150,000 roof tiles, 100,000 cubic feet of cut stone, 10,000,000 ornamental brick, 60,000,000 common brick, 3,000,000 pounds of steel, 2,000,000 lineal feet of lumber, 1,000,000 square feet of plaster, 6,000,000 nails, 100,000 square feet of fire proof floors 60,000 square feet of tile floors, 100,000 square feet of glass, 1,000,000 square feet of painting. The train shed required 5,500,000 pounds of steel, 110,000 square feet of glass, 400,000 square feet of tin, 10,600 lineal feet of piling, 1,500 cubic yards of concrete and foundation, 1,000,000 feet of lumber, board measure, in the shed roof, and 900,000 feet of lumber in the platforms between the tracks.

Comparing the train sheds of the important railway stations of the world we have the following:

	Feet.	Square feet.
St. Pancras Station, London	240 x 700	168,000
Grand Central Station, New York	200 x 750	150,000
Pennsylvania Station, Jersey City	256 x 653	167,168
Reading Station, Philadelphia	360 x 800	288,000
Union Depot, Frankfort, Germany	552 x 600	331,200
Pennsylvania Station, Philadelphia	306 x 647	197,982
Union Station, St. Louis	606 x 700	424,200

The total cost of the station at St. Louis with tracks, storage yards, power station, switch system, &c., was about $6,500,000, of which the station proper cost $900,000; the train shed $750,000, and the site $1,000,000.

Fooling Without an Architect.

The ideal suburbanite has no time to fool with an architect; he supervises the construction of that house himself, writes Robert J. Burdette in an exceedingly humorous article on "Making a Suburban Home," in a late issue of the *Ladies' Home Journal*. A laudable and loving ambition, for is it not his home? The workmen are pleased with this arrangement; it takes them about five minutes to ascertain just how much less than nothing it is possible for a man to know about house building, and yet be able to distinguish an auger hole from a mortise. When he speaks of "jice" as "joists," they take his measure, and when he calls "studd'n" "scantling," he is up to his knees in the *consommé*, and getting in deeper at every step. But blessed be the placid bliss of perfect ignorance, he does not know it. He is serenely happy. He prowls about that house, getting into trouble at every turn. He falls through the first floor "jice" and abrades his happy shins. He looks up to see what is the matter when the down-trodden sons of toil on the second floor shout, "Look out below!" and catches a hatchet handle in his eye. He walks under the scaffolding when the plasterers are at work, and gets gouts of mortar on top of his new hat and down the back of his neck—but what of that? The mocking laughter of the busy "mud wasps" disturbs him not; he joins in it, merriest of them all. Is it not his own hat and his own neck? And oh, bliss of the blistered, is it not his own mortar?

Centering for Groins.

It is obvious that in forming the ribs for each vault the outer curve must be the arc of a circle or ellipsis within the curve of the vault, and distanced from it toward the axis equal to the thickness of the boarding. In making the groined center, says an English writer, it will be necessary to find the place of the angles on the boarding of the large vault, in order to ascertain the place of the ribs and boarding of the transverse vault. This may be done by three different methods. First, let two straightedges be placed vertically at the angles, and a third straightedge, or an extended line, be made to touch the surface of the boarding, and marked at all the points of contact, keeping the latter straightedge or line always upon the edges of the two vertical straightedges. The defect of this method is that the place of the angles at the bottom can never be found, since it would require the cross straightedge or line to be of infinite length, and the vertical ones of infinite hight. A more eligible method, therefore, where there is room is, secondly, to fix two ribs in the transverse part, and direct a level straightedge upon their edges, so that the end may come in contact with the boards, and mark the boarding in this place; find a sufficient number of points for the purpose, in the same manner, and draw curves through the points, which will give the curves for fixing the end of the filling-in ribs, otherwise called jack ribs. In constructing groins to be finished with plaster the angle ribs must be first fixed, then straight longitudinal pieces parallel to the axis of the groin fixed, either flush with the under side of the angle ribs, or their under sides a little below those of the angle ribs, so as to admit of their being nailed together; this is the most eligible method of constructing plaster groins.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

IN the usual course of architectural drawing the elevations come next, and very naturally they are the most complicated of all to make and appear as an insurmountable difficulty to beginners in the practice of drawing. As a rule, all things become easy or comparatively so when we know how to proceed, and with proper instructions we hope those who desire will be able to readily master the difficulties usually met with. We will now start on the outlines of the front elevation, Fig. 11. Some may prefer to start from bottom of the foundation and build up, but we have found it more practical in drawing elevations to take the bottom line of the sill as a starting point from which to make the required calculations. It is always easier to calculate hights in an elevation from bottom of sill up, especially frame buildings, and for the hight of foundation it is no trouble to calculate lines can be drawn lightly with a pencil and in full to the points D, E, F, and the part where the lines cross can be erased before finishing. This is a good way to do, as it shows the draftsman just where to start and stop when inking or tracing the drawing permanently. The points D, E, F are also the points from which to calculate the roof elevation, the amount for projection being added on at the bottom, as shown. After drawing the outline of roof, locate and draw the outline of the chimneys. The latter can always be readily located from the floor plan; for example, the front chimney passes out the roof by the side of the left wall plate, while the kitchen chimney passes out the roof about 7 feet from the outside line of the right wall plate, which locates it where shown. Chimneys that do not come out the highest portion of a roof should always be constructed somewhat taller than

The next step will be to outline the porch, which in all cases should be done before drawing the outlines of any doors or windows that appear under cover of the porch, because it very often happens that a portion of a door or window frame is partially concealed from view by some portion of the porch; hence the only proper method is to draw the porch first. Then, when the frames are drawn it will be plainly seen just what portion, if any, of them will be hid from view, and there will be no occasion for crossing lines. In most cases the bottom of the porch frieze hides the view of the head casings of frames that appear under cover of the porch. This feature is noticeable in almost every elevation of house design, and there seems to be no available remedy for it. The only plan would be to make the porches higher, and this cannot always be done for lack of space, and, again, extremely

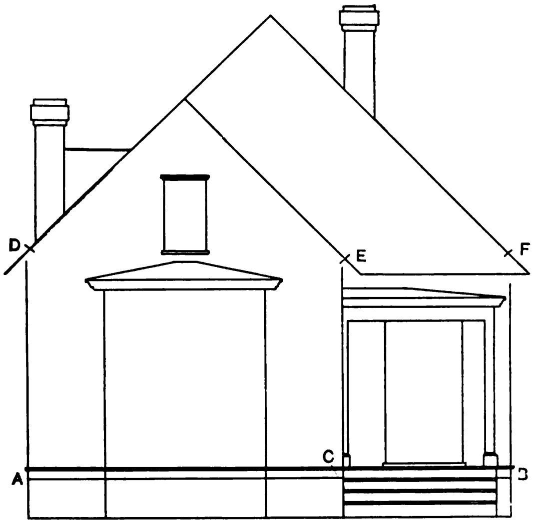


Fig. 11.—Method of Outlining Front Elevation.

Fig. 12.—The Front Elevation Partially Finished.

Architectural Drawing for Mechanics.—Elevations.—Scale, ⅛ Inch to the Foot.

from the bottom of the sill to any hight it is desired the foundation should show above the ground line. Hence we will take the bottom line of sill as a starting point and draw the line A B. Set off on line A B the width of front gable, as A C. Calculate the entire hight from bottom of sill to top of roof line, as shown by the scratch marks D, E and F, and draw the perpendicular lines A D, C E and B F, representing the main corners, but do not draw them quite to the points D, E and F, as these were calculated to the top of roof line, and the lines of the cornice must come below these points. It is easier and more practical to finish drawings from the top down, and when the lines representing the cornice are drawn they will intersect the perpendicular lines of the main corners in the elevation. This will be readily seen by comparing the unfinished work of Fig. 11 with the finished part of Fig. 12. It will be noticed that if the perpendicular lines were drawn full to the scratch marks we would have to cross these lines to finish the cornice, which of course would not be a proper thing to do. For convenience in outlining, the

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the ordinary chimney to insure them a good draft, and also for the protection of the roof against fire. It sometimes happens that roofs affect the draft of chimneys, hence the top of a chimney should be nearly as high as the roof through which it passes. Observe that the front chimney top is about on a level with the front gable roof and the kitchen chimney a little above the comb of the main roof. Chimneys which extend above the roof much more than the ordinary hight should have an anchor rod put in, as shown. The next step is to set off the width and hight of bay window from bottom of sill to lower edge of fascia. Set off width of crown molding and fascia, pitch of roof, and draw the lines as shown.

Next set off the outlines of the small window in the gable. In setting off the outlines of a window or door compute the extreme width and length, including casings, sill and cap, and draw the outside lines as shown. It is more practical to finish a frame from the outside, working toward the center, than any other way. The drawing of doors and windows will be more fully illustrated and explained in the details.

high porches look out of proportion and are equally as bad, if not worse, than hiding the head casings with the porch frieze. In the elevation the porch frieze covers the head casing, as will be plainly seen by referring to Fig. 12, which shows the work in a more finished state. The next step will be to set off the hight of foundation. Draw the ground line, space off the number of risers required and draw porch steps. The three parallel lines full length indicate the base and water table, which extend around the elevation on a line with the porch, as shown.

Trusting that a fair idea has now been given of the method of outlining and starting the elevation, we will next proceed to carry the work on to a more advanced stage of completion. Having made the outlines as in Fig. 11, proceed by drawing the gutter on the roof and finish off the hips. Next draw the lines representing the crown molding and fascia of the main cornice. Draw the gable ornaments, then the line representing bottom of frieze, and finish corner casings down to water table line, as shown. Next finish the attic window. The bay window will be next in order. Finish the lines of the crown molding, fascia and frieze. Draw the corner and middle casings down to water table line. Set off and draw window sills and finish by drawing window casings, sash and panels under windows.

Next we will take the porch and front door. Draw the lines representing the crown molding, frieze and columns, and finish the door frame, as shown. We will omit some of the details of the porch and bay window finish in this drawing, leaving the balance of the work for the drawing as it will appear when finished. It is better for beginners to see the work at different stages of completion, as it gives far better ideas of the method of proceeding.

The next step will be to show the work in a finished state by taking Fig. 12 as we have just left it and proceeding step by step to the finish, when it will have the appearance of Fig. 13. In finishing begin at the top and work down. Chimneys are usually the uppermost portions of drawings, although there are many exceptions in this particular. In this case finish the chimneys down to the roof line to represent the brick. It is not necessary to accurately scale every course of brick unless the chimney is of some special artistic design, in which case it would be necessary to have a detail drawing of it showing its entire construction. On common chimneys the size and total hight are observed in the drawing, the architect puts in a few lines to indicate the brick, and that usually finishes a chimney. We will now finish the roof. Begin at the top and make parallel lines to represent the roof. It is not necessary to scale the lines to represent the exact number of courses of shingles. It is usually understood and specified that the shingles shall be laid a stated amount to the weather. If there are any belt courses of ornamental shingles, then there should be a detail of the roof drawn to a suitable scale. Next finish bay window and porch roofs and finish down to the foundation, putting in the brackets and all ornamental finish, as shown. The siding comes next and should be spaced according to the scale as nearly as practicable what it is to be laid to the weather. If possible always space to come out even at bottom and top of frames. In drawing the lines considerable care will have to be given the work in order not to draw across casing lines, porch columns and other parts of the finish. Drawing the siding lines is good practice; it aids very much to insure accuracy in starting and stopping at just the right points.

The next and last step is to finish the foundation down to the ground line. In this case we have drawn the foundation of stone, which is usually represented by somewhat irregular lines, as shown. We have now finished the front elevation, giving it the general appearance of Fig. 13.

(*To be continued.*)

Finding the Value of Building Stone.

In determining the value of any description of stone for building purposes the inadequacy of tests by chemical analysis is pointed out in a recent paper by a British architect, and as concerns the more detailed examinations resorted to, the crushing strength, he states, is nearly always in excess of requirements, and is, therefore, to be considered relatively unimportant. The absorption test, however, gives a fair indication of the power of a stone to resist frost, and in stones of the same class is also a criterion of the crushing strength, which appears to be higher the less the percentage of water absorbed. Still more satisfactory results are obtainable by subjecting the stone, while thoroughly moist, to a freezing temperature, repeating the operation several times and ascertaining the weight lost from the block. Another inaccurate assumption mentioned, says an exchange, is that the specific gravity of a stone is proportional to the strength; and still another is the conclusion that the higher the proportion of silica the more durable the stone—the incorrectness of this latter assumption being manifest, inasmuch as it would involve the assertion that all sandstones are better than limestones, or even than granite.

Law in the Building Trade.

Agreement to Arbitrate for Change in Building Contract.

Where a building contract stipulated that if alterations were ordered, as to the proper method of constructing one needed by them in their work, is not negligence on his part, rendering a master liable for injuries to a servant caused by the negligence of any person in his service intrusted with and exercising superintendence.—Burns *vs.* Washburne, Supreme Judicial Court of Massachusetts, 36 N. E. Rep., 199.

Parol Evidence as to Construction of Contract.

In an action on a written contract to "do all the mason work and furnish all the building stone" for a building at a certain price, the estimate to "include all brick work," parol evidence is admissible to show that defendant was to furnish the bricks.—Streppone *vs.* Lennon, Court of Appeals of New York, 37 N. E. Rep., 638.

Liability for Negligence in Excavation.

Where a building is being constructed on a city lot, and the excavation in the sidewalk is not protected as required by ordinance, the owner of

Architectural Drawing for Mechanics.—Fig 13.—Appearance of Front Elevation when Completed.—Scale, ⅛ Inch to the Foot.

and their value disputed, they should be valued by two competent persons, and these might chose an umpire, whose decisions should be final, the builder could not sue for extras without an attempt to arbitrate. Since the contract provided for alterations which might reduce the contract price, the last installment of said price, which was to be retained by the owner till 35 days after the work was completed, to cover liens of damages, would be subject to reduction, and could not be recovered until its amount was fixed by the arbitration provided for.—Bell *vs.* Aoud, Supreme Court of Oregon, 537 Pac. Rep., 70.

Liability for Defective Ways.

A temporary staging erected by a building contractor on the land of a third person, and used by the masons in their work on the building, is not a part of the contractor's ways or works, within the meaning of the statutes, which renders a master liable for injuries to his servant caused by a defect in the ways or works used in his business. The failure of the superintendent of the erection of a building to give instructions to the masons accustomed to build their own stagings, the lots is liable to persons falling therein, though the work is being done by an independent contractor.—Spence *vs.* Schultz, Supreme Court of California, 37 Pac. Rep., 220.

Insufficiency of Notice of Claim for Mechanic's Lien.

The statute requires the statement for a mechanic's lien to be essentially true. A notice of lien was insufficient where it stated that the claim was for labor and materials, while only labor was furnished. Where the complaint and claim of lien states that the work is done for an agreed price, and the evidence shows no price was agreed on, there is a fatal variance.—Wagner *vs.* Hamson, Supreme Court of California, 37, Pac. Rep., 195.

What Constitutes Estoppel.

A creditor of a vender is estopped to assert that the sale was fraudulent where, with knowledge of the purchaser's claim of title, he makes a contract with the latter to do certain work on the property for the benefit of the purchaser, for which he is paid.—Geller *vs* Littlefield, Common Pleas of New York City and County, 23 N. Y. Supp., 869.

CORRESPONDENCE.

A Correction.

In the September issue of the paper we printed a communication relative to the framing of an octagon roof, in connection with which occurred a very annoying typographical error. In the article the word "run" was misspelled so as to read "rim," thus impairing in a large measure the sense of the entire description, especially with those unfamiliar with the terms usually employed in connection with roof framing.

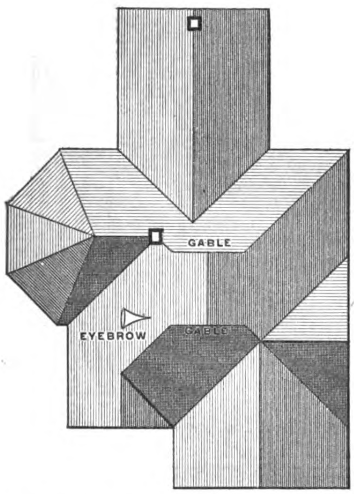


Fig. 1.—Roof Plan Submitted by "F. B. D."

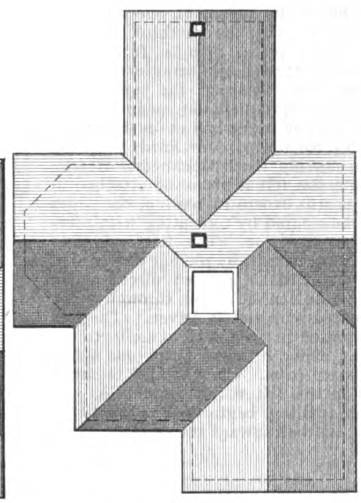


Fig. 2.—Plan Suggested by "J. L."

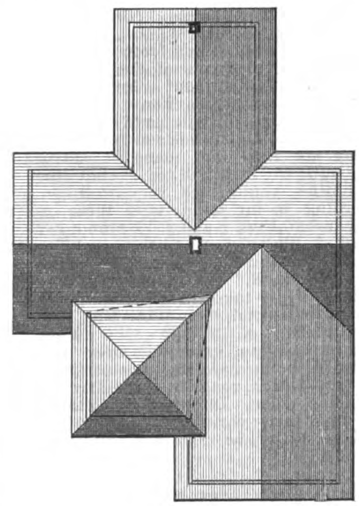


Fig. 3.—"R. B.'s" Idea.

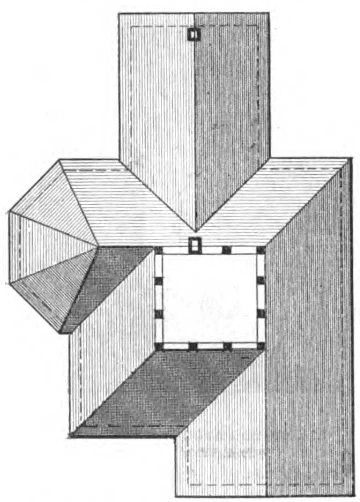


Fig. 4.—Plan Contributed by "G. L. H."

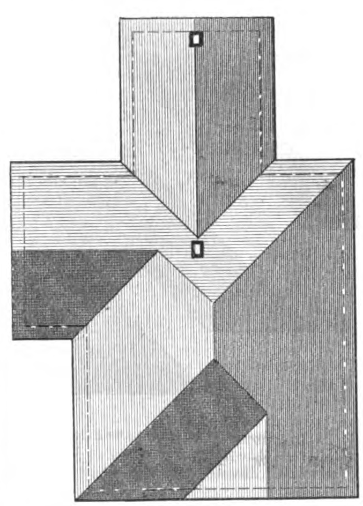


Fig. 5 —"C. B. B.'s" Method of Arranging the Roof.

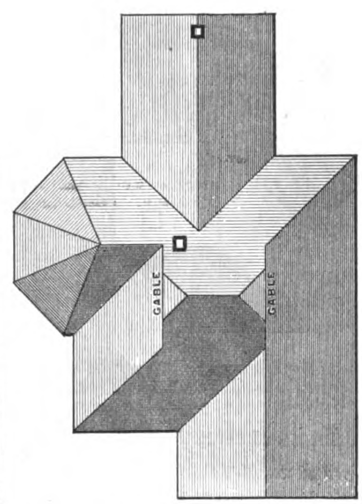


Fig. 6.—Roof Plan of "H. C. C."

Roof Plans for "E. K.'s" House.—Suggestions of Various Correspondents.

Roof Plans for "E. K.'s" House.

From F. B. D., *Princeton, Ind.*—In reply to the letter of "E. K.," Upper Tract, W. Va., I send a diagram, Fig. 1, of a roof for a two story cottage, a plan of which appeared in the February number of the paper. I have not placed a tower over the vestibule, because it would make a bad valley between the tower and the roof, and also because it would fill up with snow and might leak.

From J. L., *Flatbush, L. I.*—I send a roof plan, Fig. 2, which I think will give a neat and attractive effect and prove of interest to "E. K.," of Upper Tract, W. Va., who asked in the February number for a design suitable for his house.

From R. B., *Meriden. Conn.*—In the February issue of *Carpentry and Building* I noticed a floor plan from "E. K.," Upper Tract, W. Va., for which he wants a variety of roof plans. As I like the tower very much in architecture, I submit for publication a roof plan which is indicated in Fig. 3 of the sketches. I have tried to make the drawing so plain that further explanation would seem to be unnecessary.

Note.—A plan similar to that shown in Fig. 3 is also contributed by "W. R. L." of Pittsburgh, Tenn.

From G. L. H., *Torrington, Conn.*—Looking over the February issue of the paper I saw the request of "E. K.," Upper Tract, W. Va., for a roof of a two-story cottage, and in reply to it I send the sketch, Fig. 4, for his consideration. Judging from the location of the cottage I think the style of roof shown, with a suitable railing around the deck, will give a neat and attractive effect.

Note.—A plan similar to that shown in Fig. 4 is also contributed by "H. G." of Westfield, Pa.

From C. B. B., *Newark Valley, N. Y.*—The roof plan, Fig. 5, sent herewith is in answer to the request of "E. K.," Upper Tract, W. Va., which appeared in the February issue of the paper.

From H. C. C., *Apollo, Pa.*—I herewith send a sketch, Fig. 6, of a roof plan for "E. K's" house in Upper Tract, W. Va. I think this will make a neat roof for the plan shown in *Carpentry and Building.*

From J. C. H., *Chicago, Ill.*—In reply to "E. K.," Upper Tract, W. Va., I send the plan, Fig. 7, of a roof with tower, which I have drawn to $\frac{1}{16}$-inch scale. To my way of thinking this will make a very neat roof.

From J. C. M., *Oregon, Ill.*—As "E. K." of Upper Tract, W. Va., desires a variety of roof plans from different persons I will be one of the number and send a few without a tower. I do not like a tower on a house, unless it be very large, so I will leave it to some one else to fill the bill on towers. I may not have the plans expensive enough to suit "E. K.," but the building would look very well, according to my mind, with those indicated in Figs. 8 and 9. I cannot say that I like Fig. 10 very well. The plan shown in Fig. 8 is with the plates where "E. K." has them in his floor plan. Fig. 9 takes in the front porch with the second story projecting over it, while Fig. 10 shows the second story and roof extending over both front and rear porches. It also shows where a deck could be formed or run up to a ridge. In fact there could be a great many variations. I think "E. K." could, if he does not obtain any which exactly meets his taste, change these plans to suit him. For instance, he could make a full gable if he likes in any place, or put on a "mulley"—that is, the gable hipped a part of the way down. In the plan shown in Fig. 10 I place the back part of it 2 feet to the right, so that the roof will connect. It also brings the chimney straight up through the ridge in that portion, and is not so liable to get close to a valley. The inside lines parallel with all the sides represent the plates. I trust "E. K." will know how they will look without side views.

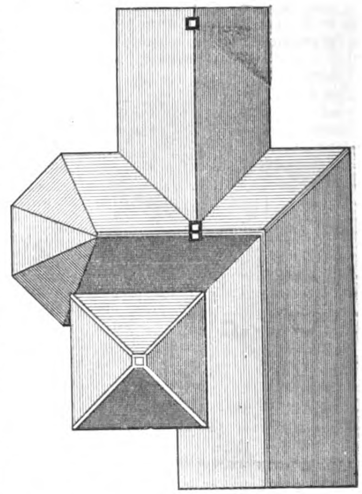


Fig. 7.—Roof Plan Favored by "J. C. H."

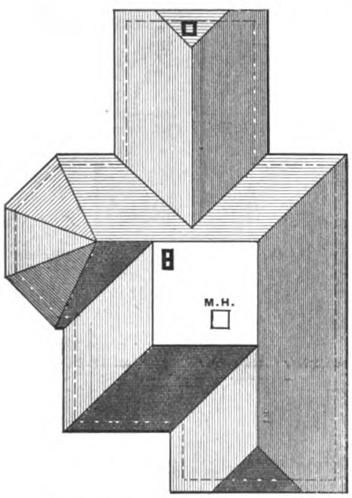


Fig. 8.—Arrangement Suggested by "J. C. M."

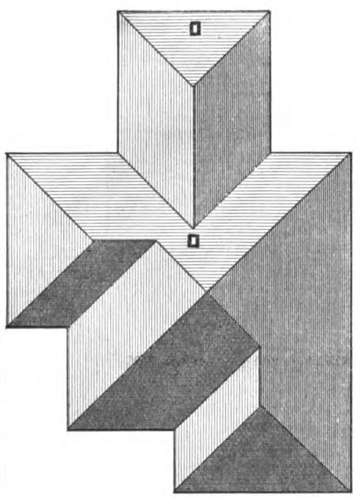


Fig. 9.—Another Plan from the Same Source.

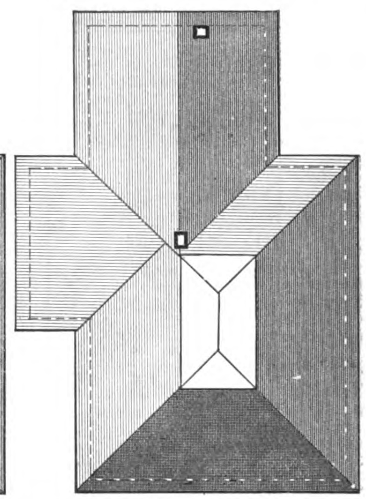


Fig. 10.—Still Another Arrangement.

Roof Plans for "E. K.'s" House—Suggestions of Various Correspondents.

Laying Gravel Roofs.

From J. A., *Chicago*—Will *Carpentry and Building* kindly publish directions for laying a gravel or tar roof, and the amount of material required. Also tell how to repair an old roof of the same composition. I am located 18 miles from the business center, and there are a number of gravel roofs to be laid in this neighborhood. When there is any of this kind of work to be done here it is customary to employ regular roofers. With a little information on the subject I think I could do all such work.

Answer.—For a gravel roof, the boards should have a slant of at least 1 inch to the foot, and the roof boards should be of a good quality of matched flooring. Commence at the eaves to lay the felt, by cutting off one-third of a strip, first laying the one third, then the two thirds piece, then a full width sheet, the three edges being even at the eaves. The finish at the top of the roof is made in a similar manner. The roof is then to be laid as in shingling, laying each sheet one-third exposed, thus making three thicknesses of felt. While the felt is not to be attached to the boards except by nailing, the edges can be secured by cementing with roofing composition. The felt is held to the roof boards by roofing tins, which are punched or pressed pieces of tin with a hole in the center, through which a barbed wire nail is driven. The tins are put on in rows at right angles to the eaves, about 8 inches apart, and 4 feet between rows. Care should be taken to lay the felt without wrinkles, and when nailing, begin in the center of roof and nail toward the edge.

For a finish at eaves or other edges of the roof use lath, which can be secured with barbed wire nails. For a finish about fire walls, chimneys or skylights, the felt should extend up the sides about 1 inch, with lath or triangular strips of wood firmly nailed over the edges. When finishing about chimneys and skylights it is well to use an extra thickness of felt. The roofing composition is to be applied hot, and for the purpose of heating same it is usual to employ an iron kettle of suitable size. Commence at the top of the roof to apply the composition, which can be done by means of a mop. As one man applies the composition, another pushes the gravel into it, this being done while the composition is hot. For the ordinary gravel roof coal tar is used, which is thickened with rosin, this being done while the tar is heated. Clean, dry gravel should be used, such as is free from sand and loam. For one square of a three-ply roof there is required about 50 pounds of felt, 100 pounds of composition and $\frac{1}{5}$ cubic yard of gravel. For a four ply roof, 60 pounds of felt and the same quantity of composition and gravel.

To repair leaks in an old roof, sweep off all gravel and dirt about the leak and remove the old composition. Apply three thicknesses of felt with composition between. Then nail the felt about the edges, using roofing tins and barbed wire roofing nails; then cover with composition and gravel. To recoat an old roof, the loose gravel and dirt should be removed, using shovels and heavy brooms. Repair any leaks that may be found, when the composition and gravel is to be applied as above directed. While gravel roofers may use a compound of coal tar and rosin, dealers in roofing materials have a roofing pitch distilled from coal tar that is recommended as superior to coal tar and rosin. There are also various kinds of prepared roofing that can be applied without gravel. The felt is of suffi-

cient strength and thickness so that only one thickness is required. The edges are joined by means of cement and nails, the whole being covered with composition, sand and some fire proof compound.

Problem in Board Measure.

From E. P., *Gloversville, N. Y.*—I inclose a problem for some of the readers of the paper to solve. Suppose the length of a board exceeds the breadth by 8 inches. If the length is increased 8 inches and the width decreased 2 inches the board will still contain the same number of square inches. What are the dimensions of such a board?

Design for a Pulpit.

From J. F. W., *Danville, Pa.*—In answer to "H. W. W.," Washington, Ind,, who recently asked about a design for a pulpit, I send sketches which may serve his purpose. The drawings so clearly indicate the general construction that very little descriptive matter seems to be necessary. Fig. 1 shows the elevation and Fig. 2 the plan of the top. The pulpit can be given a very attractive appearance by making it of walnut, oak or ash, and then oiling and varnishing it. If pine is used I would suggest that it be painted. The top is 3 feet long and 22 inches wide.

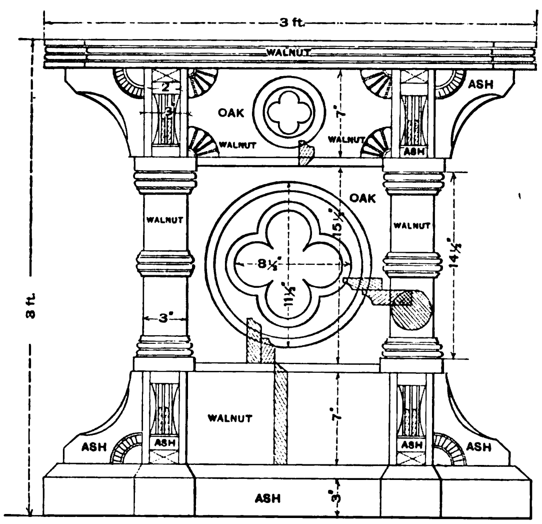


Fig. 1.—Front Elevation.

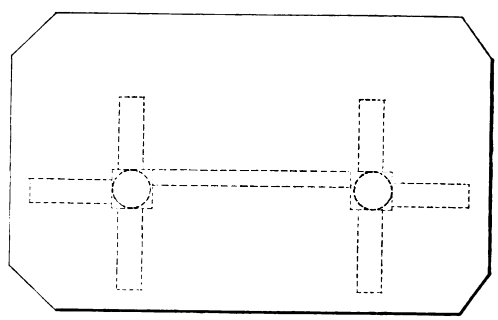


Fig. 2.—Plan of Top.

Design for a Pulpit, Contributed by "J. F. W." of Danville, Pa.

Pitch of Roofs.

From E. P., *Gloversville, N. Y.*—In the October issue of the paper "W. V. M." of Tucson, Ariz., wants some nail driver to determine who is right on the question of the pitch of roofs. According to my experience his method is correct. A quarter pitch is one-quarter of the width of the building, one-third pitch is one-third the width, one-half pitch is one-half the width—that is, the rise of the rafter from the center of the building up to the top of the rafter.

Mr. Hicks Replies to His Critics.

From I. P. HICKS, *Omaha, Neb.*—In the September issue of *Carpentry and Building* I find in the Correspondence department many questions which need attention, but being a very busy man and not wishing to discuss the subjects at length, I will try and briefly state the points. With regard to the development of an ogee hip rafter given by "I. P. H.," and which has been criticised more or less at different times, I wish to state that an error did exist in the first plates which accompanied that article. It was not discovered in time for correction before the first edition of "The Builder's Guide" was printed. The lines 1, 2, 3, &c., should be drawn perpendicular to the base line, as are shown in the subsequent editions of "The Builder's Guide."

The method of laying out jack rafters described in the communication from A. B. Campbell, Brandon, Man., is identical with the plan given by I. P. Hicks in *Carpentry and Building* for January, 1891, and the explanation is copied almost word for word. The cuts are also practically the same. This plan may have been known before I was born, but if the enterprising and enthusiastic readers of *Carpentry and Building* can trace it back to any former publication I would be pleased to see the facts produced. It gives me great pleasure to state that I am the happy possessor of a copy of every number of *Carpentry and Building* from its first appearance, and as a journal of practical experience it covers the entire field of building construction. In its hundreds of pages of useful information can be found answers to almost every question that comes up, and if not to be found in the volumes of the paper it is useless to look elsewhere for it. Again, if any one advances poor methods or erroneous ideas they are sure to be pointed out by some of the able correspondents of the paper.

Development of Ogee Hip Rafter.

From H. D., *New York City.*—Since the correspondent "H. H. P." of Warehouse Point, Conn., has come out so boldly in stating that I am wrong in regard to the method of ogee rafter development as shown by Mr. Hicks in his "Builders' Guide," and which method I have been defending, I have suddenly discovered that while "H. H. P." and "F. H. T." have been referring to the issue of *Carpentry and Building* for January, 1893, in which the article in question was published, I have been referring to the method shown in "Hicks' Builders' Guide," pages 126-127. The article published in the paper for January, 1893, differs materially from the method presented in the "Builders' Guide." The former is wrong, while the latter is correct. How these two articles, which are meant to convey the same idea, happened to be so different in so far as the illustrations are concerned is beyond my conception. The reading matter is nearly the same, except that they differ in one word only. Mr. Hicks probably discovered his error and rectified it before the book was printed, and a few words from Mr. Hicks will probably straighten things out. I have taken this means of justifying myself in defending the method shown in "Hicks' Builders' Guide," and I hope Mr. Hicks will let us hear from him and explain how the illustrations happened to be dissimilar in what was supposed to be the same subject.

Note.—The letter which we publish from Mr. Hicks will show our correspondents where the trouble occurred and will readily explain how both sides were correct from their respective standpoints.

Copying Drawings.

From W. H. W., *Lancaster, Pa.*—In the October issue of the paper I saw an article about copying drawings or letters, and in answer to it I send for the benefit of those who have occasion to use it, without waiting on Paris, a recipe for making a very handy and cheap pad or hektograph, which I have used to good effect, employing copying ink for the purpose. The recipe is to take 1 ounce of gelatine and 6¼ fluid ounces of glycerine. Soak the gelatine in cold water over night. In the morning pour off the water from the gelatine, add the glycerine and heat in a water bath to about 200° F. Continue the heating for two or three hours, then pour in a shallow pan and allow it to harden. Use the same kind of a pot for heating that is used for glue. Place the drawing on the hardened mixture in accordance with the description given. The ink can be obtained at any book store.

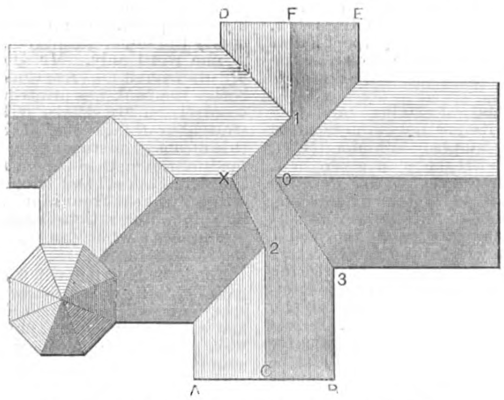
Drying Rooms in Laundries.

From S. E. B., *City Island, N. Y.*—Will you kindly tell me through the columns of *Carpentry and Building* if there has ever been an article published in the paper pertaining to drying rooms in laundries? If not, will some reader kindly inform me what temperature is required, and other information relative to construction, &c.?

Note.—There has been no article published in the paper in recent years covering the construction of drying rooms in laundries, and, as requested by our correspondent, we submit the inquiry to the readers for attention.

Framing a Complicated Roof.

From F. H. T., *North Topeka, Kan.*—In the March number of *Carpentry and Building* three methods of framing a complicated roof are shown.



Framing a Complicated Roof.—Fig. 1.—Plan View.

The methods of "S. B. C." and "W. C. W." are practical, and each has merits of its own, but the way "H. I. P." would do the work is entirely beyond my comprehension. I inclose a copy of his explanation and a projection of the right side lettered and figured for reference. How he would bring the side C B F E on the same plane by changing the pitch of the hip and valley of which he speaks, or by any other means, is a geometric conundrum that gets away with me. Referring to the plan and elevation, Figs. 1 and 2, the letters on the elevation refer to points on the plan designated by similar letters. The gable A B C is represented by the full lines and the gable D F E with the valley on the left side by dotted lines. The lozenge shaped portion shows the divergence of the side C B F E from the true plane between the points 1 X 2 3 of Fig. 1.

Various Forms of Roof Coverings.

From H. B. W., *Aurora, Ill.*—I always find something of interest in *Carpentry and Building*, and while I often read of different methods of cutting roof timbers, &c , I have wished that I might see something about covering roofs with shingles, slate and tile. What advantages do each of these materials possess over others, and how long will each last? I would also like to see something about putting on slate and tile, with the difference in their cost.

Note.—Here is an opportunity for our readers to describe the different forms of roof covering employed in the sections in which they live, and also to tell which gives the most satisfactory results A discussion of this kind cannot fail to prove instructive as well as interesting to a large number in the trade.

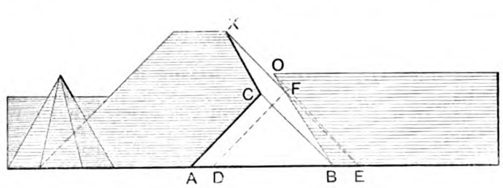
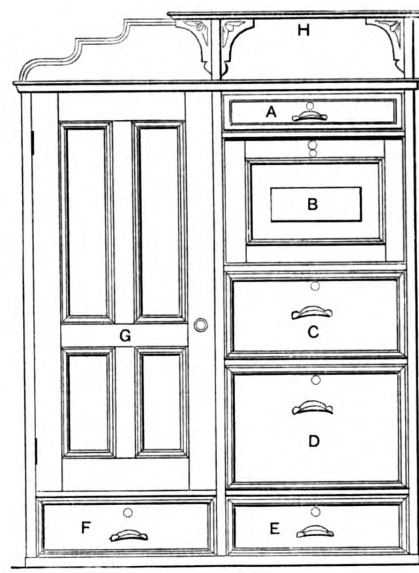


Fig. 2.—Elevation of Roof.

Design of a Combination Bookcase.

From S. J. H., *Meadville, Pa.*—Inclosed I send a sketch of what I call a book cupboard that I recently built for myself. It is of solid oak and solid built panels. It is 3 feet 9 inches wide, 4 feet high, the back being 17 inches higher than the front. The depth is 17 inches. A is a shallow drawer for keeping private papers, B represents a door which drops down making a writing desk. The interior is fitted with pigeon holes for stationery, ink, pens, &c. The drop door is held in a horizontal position by brass chains, fastened to screw eyes. The letters C, D, E and F represent drawers for papers, magazines or other things according to taste. The four-panel door G closes the apartment for books, which is fixed with movable shelves. H represents a shelf 8 inches wide and 2 feet 3 inches long. I worked all the material, including the stiles for doors and panels, by hand in preference to loafing on the corners. I am more than pleased with the piece of furniture, it being both convenient and attractive. All the drawers are fitted with No. 1 drawer locks and pulls, while the door has a wardrobe lock.



Design of a Combination Bookcase Contributed by "S. J. H."

House Built in a Day.

From T. P. Gheer, *Bellwood, Pa.*—I have been a reader of *Carpentry and Building* for the past 12 years and do not remember ever having seen an account of the building of a house in a day. Of this the little mountain town of Bellwood can boast, and we challenge your host of readers to beat it. Last summer a gang of carpenters commenced upon the stone foundations of a six-room house and before darkness of the same day we had it completely finished, plastered and painted. The house was balloon framed and weather boarded, with a neat veranda at the front. All the material and labor was equal in quality and workmanship to any house of its kind, and was a wonder in home building. Believing the readers of the paper will be interested in an account of this job, I send tracings of the floor plans and front elevation, together with a few particulars, which will give a correct idea of the house that was "built in a day."

This house was erected according to the plans here shown on August 8, 1893. The project was under consideration for some time and every preparation had been made to insure the success of the undertaking. The house is 18 x 26, weather boarded and floored with worked hemlock lumber. The roof of the house and veranda are covered with white pine shingles. The inside walls and ceilings are plastered with adamant. The inside casings are of 4-inch linwood molding, the same kind of wood being used in the washboard of all the rooms except the kitchen, which is wainscoted with white pine.

The frame of the structure was started by a selected gang of carpenters, who in one hour were reinforced by a sufficient number of men to quickly prepare for the plasterers. The lathers were at work at 9 o'clock, and while they were busy the roofs were put on, the outside trimmed up and the flue built. At 2 o'clock the lower story was plastered and the work was pushing hard on the upper stories. The various parts of the work slipped into their respective places with marvelous rapidity. During the morning hours the painters had been glazing and painting outside and were ready to follow the carpenters inside, so that as soon as the last nail was driven the work was under the painters' brushes. At 6 o'clock the carpenters had finished, and at 7 o'clock the painters completed their work and the house was ready for the owner.

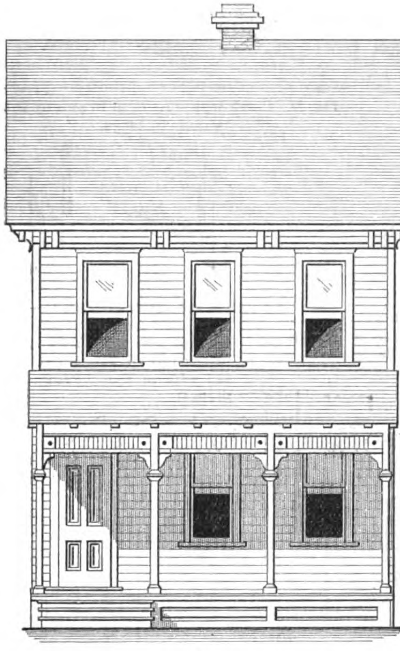
The day was remarkably fine and the scene animated beyond description. The workmen of all crafts were on their mettle, and their movements showed their power to succeed. Not a moment was lost. The comments of the bystanders were amusing. All day long the vacant lot adjoining was thronged by the curious. Early in the day the skeptical were loud in their predictions of failure, but as every hour increased the chances of success they began to vanish, and before the day was over it was remarkable how many "knew it could be done." The house was built for Dr. W. Y. Levengood, and cost between $700 and $800.

Design for a Tank House.

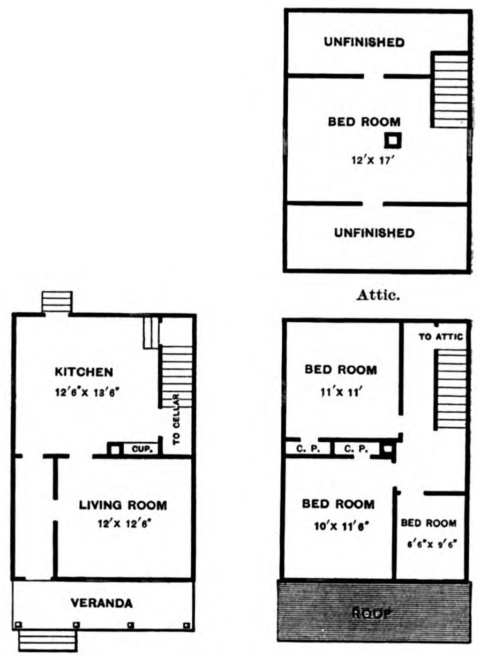
From J. J. D., *Cornwall, Cal.*—Will some of the readers of *Carpentry and Building* furnish a drawing of a tank house, the perpendicular hight of which is 24 feet, the base 16 feet square and the deck 12 feet square? The corner posts are to be 6 x 6 inches and stand 1 inch out of plumb for every foot in hight. The joists, braces, plates, &c., are to be suitable for the purpose. I desire the correspondent furnishing the drawings to tell how the corner posts are set up, as well as the method of doing the rest of the work when only one or two men are available to put it up. I would also like to know how to lay off braces where inches and fractions of inches are used. Suppose, for example, the run on the plate is 4 feet 7½ inches, and on the studding 6 feet 5⅜ inches. I want to know how to lay off the braces. I have been a reader of the paper for nearly two years and am deeply interested in all its pages.

Mysteries of the Slide Rule.

From J. B. H., *Sheldon, Iowa.*—Not long since an advertisement of a treatise on the slide rule attracted my attention, and as I am still puzzled about this rule I would like to tell my trouble. In the first place, I thought I would like to increase my power of calculation by machinery or any other way, as I knew it would be to my advantage. I therefore sent for the book, studied it a little, and then undertook to get a rule. The hardware-men of the place had none, but one of them said there would be a traveling man along in a few days and then he would order one. I trusted to him and finally secured a rule. It seemed to be what the book described, so I began to study it. I tried a sum or two in multiplication, thinking it would help me to remember the multiplication table, but every time I got 100 or so by actual count too many, so I let that go. Then I tried square root. I knew how to calculate rafters, so this came easier, and I felt encouraged. But the next thing I struck was mean difference. I hardly knew what that was. I thought I would cipher it out, though, and after sitting up all night and nearly missing my breakfast next morning, I concluded to get help. First I went to an ex-school teacher. He said if there was any algebra in it he was out, but I assured him there was not, so he looked at it, then muttered something about 10 horse-power glasses, took his knife and set the slide very carefully and exactly according to the book, but neither of us could find the answer. Then he suggested the priest. I went to the priest. He looked at the book, then at my feet, which are rather large, and said something about purgatory, after which I concluded that I would not bother him. I then dropped in on the Baptist parson. He looked at the book and rule and said that the best way to go to heaven was to be very careful what I drank and avoid alcohol. I then went to a lumber dealer (he also sells coal), who wanted to send and get me a reckoner that would need no setting. But, you see, I wanted to know something about the slide rule, so I went back to the hardwareman, who got his start in the pine woods. He explained that mean difference of a pine log is that point where you can cut it in two and have the same amount of lumber in both ends. This theory looked O K to me, but I tried the rule with the same success as before. I have either been swindled or else the rule should be longer and have more construction about it. I wish some one would write a little about the slide rule and the editor publish it in the Correspondence department of the paper. I think it would be a good thing for all hands.



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



Attic.

First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

House Built in a Day.—Drawings Accompanying Letter from T. P. Gheer.

Two-Story Cottage with French Roof.

From A. J. D., *St. Johnsbury, Vt.*—Will some one furnish, through the Correspondence department of the paper, the design of a two-story house with a French roof and a tower at the right hand corner? I want a balcony in the roof and a piazza at the right side, starting at the tower. If some one can furnish drawings of such a house I shall be greatly obliged.

METHODS OF HANDRAILING.*

BY J. V. H. SECOR.

THE QUADRANT CUT BOX SYSTEM.

THIS is a short way to get out a rail by the plumb cut. In this case the use of a pattern or mold is dispensed with, as the lines are marked on the plank from which the rail is to be made. The sawing is done by hand in the same manner as the Nicholson system, the joints being made on the drum. Fig. 24 is a view of the box, showing the openings E E, the strip C and the stay B for holding the box when fastened with the set screw D. At the angle of the box and openings are pinned two strips, ¼ inch by 1 inch, extending over the openings. These when set at the required inclination and held in place by a small nail are ready for the strip to be passed through. This strip will represent the plank as it shows the plane. Fig. 25 is a plan of the box with the strip passing through the openings. The strip just mentioned is marked along its surface and the edge at the face of the box, these lines being then transferred to the plank. C is the strip 1 x 2 inches and as long as the case may require. To work by this system it was necessary to construct a drum of sufficient length to have all the risers contained in the plan of the cylinder. This must fit the inside face of the rail as at Fig. 28. The lower line of the rail is then marked and the hight is taken. This inclination or pitch is put on the box or the strips set to it, and then the strip for marking is put in place, A, Fig. 24, and the lines transferred to the plank. Those on the face are put on the face of the plank and those on the edge to the edge of the plank. If the strips are set at different angles then it will cant the plank at the angle of the box. This will be found by applying a bevel at the inside angle of the box and crossing the face of the strip as at B, Fig. 25, and in elevation Fig. 30. This is then applied at the edge and the distance marked on the lower side of the plank as in Fig. 31. The inside curve is drawn by the intersection of lines on both sides of the plank and is then ready to cut out. This was no easy task, and was generally done by a man and boy, the latter sitting on the bench with the plank on edge in the vise and a frame saw guided by the latter standing in front. It was then push and pull, the boy getting the blame for all miss cuts. After this they were fitted to the drum, the joints made, then bolted together and the falling mold laid on and marked. Dressing up to a thickness was then in order. This way of working a rail would consume very much more time than is now taken to do the work. This, however, was an improvement on the Nicholson system, in that it had all the elements of that system in the strip with the lines marked on, these being so few that any one who chose could get a rail out by them. But very few, so to speak, could master old

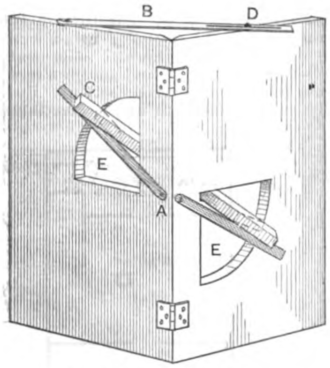


Fig. 24.—Box in Position.

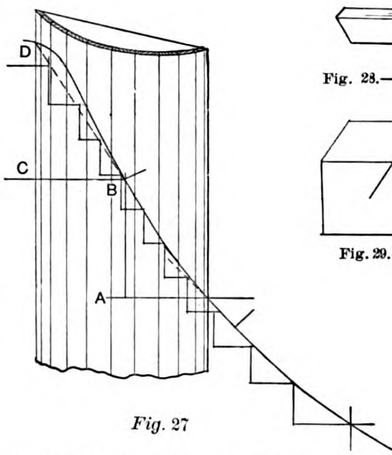


Fig. 27.—Elevation of Treads and Risers Over a Drum for Getting the Hights, as shown at A B and C D at the Lower Line of the Rail.

Fig. 28.—Strip with the Lines Marked for Transferring to the Plank.

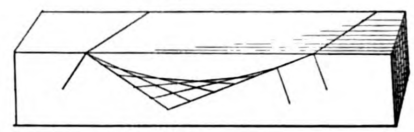


Fig. 29.—Plank with the Curve Drawn by Intersection of Lines.

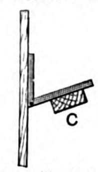


Fig. 30.—Bevel Applied from the Inside Angle of the Box over the Face of the Strip C.

Fig. 31.—Application of the Bevel to the Edge of the Plank.

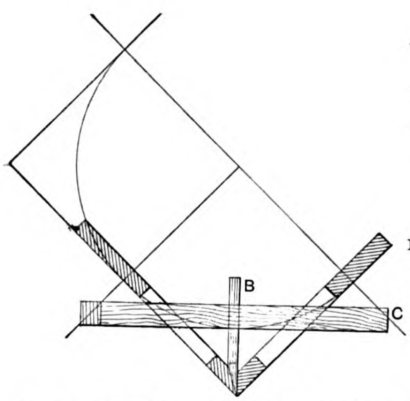


Fig. 25.—Plan of Box, showing Strip as it Passes through the Openings E E; also the Bevel B.

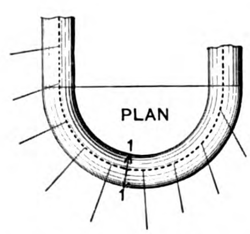


Fig. 26.—Plan of the Cylinder, Showing the Risers and the Width of Rail I I.

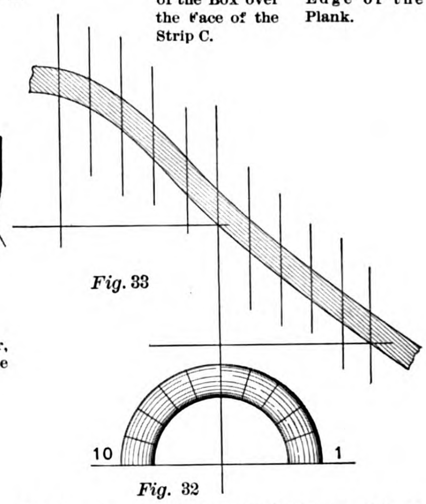


Fig. 32.—Plan from which the Radial Lines and Spaces are Taken for Drawing the Falling Mold.

Fig. 33.—The Falling Mold for the Outside Easings of the Rail as taken from the Spaces in Fig 32, namely from 1 to 10.

Methods of Handrailing.—The Quadrant Cut Box System.

* Continued from page 238, October issue.

Nicholson so as to work by his system of lines. And yet, how long it was thought to be the very best way! Even now we hear some say that it is ahead of the tangent system. I am sorry for such, as there is a mote somewhere. The waste of material was very great, and in some shops the accumulation of pieces took up valuable room, and yet they were too costly to burn.

The square cut system was just then being introduced in a shop which I call to mind by a workman who drew his molds over the tangent box. This caused much joy as well as profit, as each worthless piece left by the old way was brought into use by the new system. This good news spread like wildfire from shop to shop, and the man that could teach the system was looked upon as a benefactor to the trade. Some would insist, however, on using the falling mold in connection with it, but this soon fell into disuse, as it was found to be a difficult matter to apply the mold when the wreath had been cut square through the plank. The falling mold was drawn in the manner shown in Fig. 32. A plan of the rail and the cylinder was divided into any number of equal parts, and radial lines drawn, giving the divisions for the inner circle. These several divisions were then sawn off and perpendiculars erected as in Fig. 33. The hight was then marked, and the line for the ramp or the straight rail, as the case may be, drawn up to the chord line of the cylinder. The line for the lower edge of the rail marked the entire length, giving the casings, this being cut from thick paper and made to a parallel width. This was then applied to the outside after the rail or wreath was taken to a width. Some, too, would make a mold for the inside, but one in most cases was all that was used, as a try square and the eye would get the inside to line up.

(To be continued.)

MOVING INTACT THE FRONT WALL OF A BUILDING.

WE have occasionally referred in these columns to the methods employed in moving buildings of various description, but in almost every instance the work has involved the changing of the location of the entire structure. There has, however, recently come to our notice a case in Reading, England, in which for the purpose of widening the street at a certain point, the front wall of a building was raised from its foundation and moved back several feet, so as to occupy a position at any angle to the one originally held. The building was occupied as a glass and china warehouse, and the proprietor was anxious that there should be as little delay and interruption to his business as possible. It was at first intended to tear down the front of the structure and erect a new wall in the proper place, but the engineer in charge of the work devised a plan by which the original front could, without injury, be swung back to its new position. The site at first occupied by the wall and its final position together with the timber work and jack screws are indicated in Fig. 1 of the illustrations, while in Fig. 2 is a sectional elevation through the front, showing the method of bracing employed. From a recent issue of the *Building News*, we take the following particulars descriptive of the manner in which the undertaking was carried out:

The plate glass shop front and the window sashes were removed and the floors and roofs were shored up and cut back to the extent of the intended setting back of the front wall. Five strong trestles were constructed beneath and across the girder supporting the front wall, and sliding pieces were placed on these trestles. The sliding surfaces having been well lubricated with soft soap and tallow, the weight of the wall was transferred to the sliding pieces by driving oak wedges between those pieces and the girder supporting the wall. The front wall was then cut away from the surrounding walls and from its supporting brick work and columns. Screw jacks were then applied to the slides, and the wall was pushed back into its new position. To prevent the wall from falling forward into the street, should it show a tendency to do so, four sets of Tangye's differential chain blocks were attached to the wall and to suitable points in the building, these chains being kept just taut. To prevent any falling inwards of the wall, struts, consisting of stout scaffold poles, were butted on suitable parts of the building. These struts were constantly shortened as the wall moved back, so that, while never touching the wall, at no time was there a greater distance than 1 inch between the moving wall and the end of the strut. The actual moving was performed in about two hours and a half, under the immediate direction of the local engineer. The contractor, assisted by his foreman, executed the necessary work in such a way that business was carried on as usual throughout its progress. The building is three stories high and has a basement. The wall moved was 30 feet long, 28 feet high above the second floor and 18 inches thick, including plastering, &c. The front was stuccoed. The east end of the front was moved back 3 feet 6 inches; but the west end was not moved as it was already fair with the adjoining building. The weight of the wall was about 88 tons.

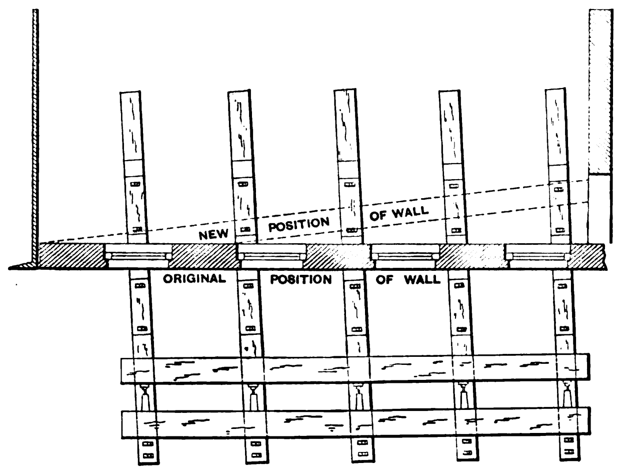


Fig. 1.—Plan View, showing Position of Old and New Wall, together with Trestle and Jack Screws.

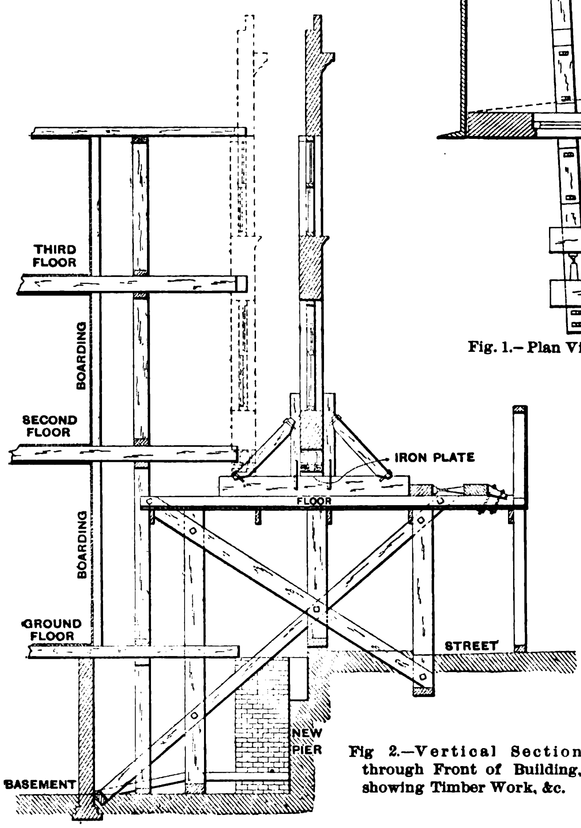


Fig 2.—Vertical Section through Front of Building, showing Timber Work, &c.

Moving Intact the Front Wall of a Building.

MASONRY AND STONE CUTTING.*

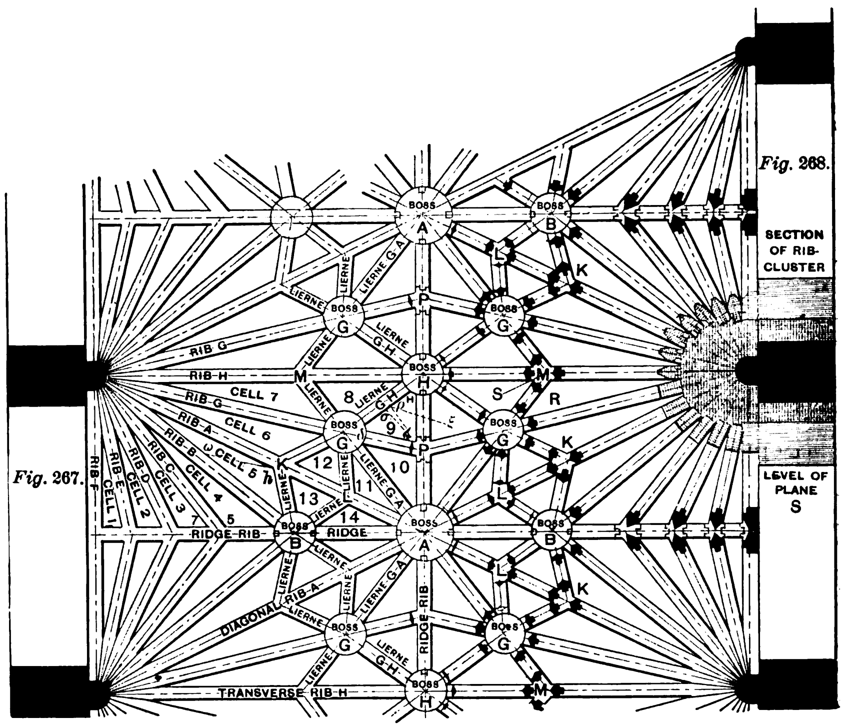
STAR-GROINED CEILING WITH LIERNES, MOLDS FOR RIBS, BOSSES, AND CELLS.

IN continuation of the remarks which appeared in the February issue of this paper it may be stated that in order to obtain a neat finish at the springing, the ribs are all made of the same section—viz., 8½ inches wide by 1 foot 6 inches deep from the face to back. This section is shown in Fig. 266. The front molding, whatever its shape may be, will be contained within a chamfer, A B, as shown in the figure. At the back of each rib rebates C D are cut out to receive the slabs which form the cells. The angle C is called the shoulder. Wherever possible, these rebates are to be 5 inches high from C to D, and 2½ inches deep; but the chamfers or moldings which form the nib of the ribs must necessarily be the same for all the ribs that start from the same shaft, and they cannot be made to miter with the moldings of the ridge rib. It is for this reason that the meeting of the ribs with the ridge rib is often disguised under some ornament or small boss. But the intersection of the ribs and ridge can be neatly worked, however irregular the line of intersection may be.

The liernes which connect the ribs together so as to form the star pattern are made to miter with the ribs on which they impinge. To avoid the awkward predicament of having to produce a lierne the moldings of which should have to vary from one end to the other, it should always be provided that each lierne abut against a boss, at least at one end. Then the moldings of the lierne will have to be drawn so as to miter with the rib on which it impinges without the interposition of a boss.

To draw the side elevations of the ribs shown in Fig. 269, take for the ground line of the elevation the center line of the diagonal rib A, then draw the outline of the rib A, as shown in the February issue. Draw the back, the shoulder and the arris of the chamfer concentric with the face. To draw the other ribs, B, C, D, E, F, G, H, revolve the vertical planes which contain them round the center line of the shaft until each rib is placed in the plane of the diagonal rib. Then draw the face line of each rib, as shown in the previous article. Draw also the backs and the arrises of chamfers for each rib concentric with the face of the ribs. In the original drawing all the ribs were drawn starting together as described above, but in this case the ribs are shifted so as to separate them from one another. To draw the shoulders of these ribs we must consider, firstly, the points where the sides of the ribs clear from one another at the springing. It is evident that all these points will be on a vertical cylinder, the basis of which is a circle of radius O I, drawn round the center line of the shaft. On the elevation the side of that cylinder is the vertical line II′; it cuts the shoulder of A in the point 1; then it follows that the shoulder of B next to A must start at the same level as point 1 of A. The shoulder 1 of B is concentric with the face of the rib, because it finishes above on the boss B, and therefore is free to reach any level at the upper end. But the other shoulder of the rib B next to C is bound to reach certain levels, both at the springing and at the top. The point 2, from which the shoulder starts, should be as near as possible at the same level as the point 1. As to the upper part, 3, it is governed by the shoulder of the ridge rib. The ridge rib between the bosses A and B has the same section as the diagonal rib A; but it will be observed that if that section was maintained for the ridge rib between the boss B and the wall, then the shoulders of some of the ribs, especially of the wall rib F, would have to be inconveniently high at their upper ends. To meet this difficulty the shoulder of the ridge rib between the boss B and the wall is somewhat lowered. The level of this shoulder has to be settled after trials with all the ribs B, C, D, E, F, so as to get a medium level which suits best all the ribs. This settles the level of 3, the upper point reached by the second shoulder of the rib B. The outline of the shoulder between the points 2 and 3 is merely a matter of taste; but it will be found practicable to use between these points the curve of the rib itself. The same operations have to be repeated for the shoulders

Fig. 266.—Section of Rib.



Figs. 267 and 268.—Plan Views.

Masonry and Stone Cutting.—Star-Groined Ceiling with Liernes, Molds for Ribs, Bosses and Cells.

it will be seen that in most cases the hight of the shoulder has to be determined by geometrical construction. Wherever two ribs meet together—as, for instance, at the springing—or where the rib meets the ridge rib or a lierne, then the shoulders of both ribs must meet at the same level; otherwise it would not be possible to fit a cell resting on both ribs. This settles the hights of the shoulders at the ends of each rib, and it will be found that in several ribs the outline of the shoulder is not concentric with the soffit of the rib.

Wherever several ribs meet together a boss is intercalated, so as to avoid having to produce the intersections of the ribs in the point of meeting. The ribs that finish against bosses are the diagonal rib A, see Fig. 267, the cross rib H, and the auxiliary ribs B and G. On the other hand, the ribs C, D, E, F have to miter with the cross ridge rib. The ribs C, D, E, F are those for which it will be necessary to determine the levels of the shoulders.

*Continued from page 47, February issue.

of the ribs C, D, E, F. It is to be observed that as the points 5 and 7 of the shoulders of the rib C are at the same level, and as 5 is further on the plan than 7, it follows that the deflection of the shoulder 4 5, next to the rib B will be greater than for the shoulder 6 7, next to the rib D. The two shoulders of the same rib are therefore not concentric. The same question will arise for the upper part of the rib G where it abuts on the main ridge rib; but the difference between the level of the shoulders will be very slight.

As for the shoulders of the liernes, they will have to be deviated wherever they intersect a rib or meet a boss in the same point as a rib. But where the lierne abuts against a boss at some distance from the neighboring rib, the shoulder may be drawn concentric with the face, unless it is found to affect too much the surface of the cell.

The fact that the shoulders of the ribs are not concentric with the face of the ribs is, no doubt, a blemish; but as the ribs are seen from below, it is a blemish which is not perceived if kept within moderate bounds.

Up to the level where the ribs clear from one another, they are constructed as forming simply surface details of one solid block of masonry, constructed with horizontal courses.

The highest point of the rib cluster will be a horizontal plane, S, Figs. 268 and 269, finished at the edge by bevels prepared for the reception of the ribs, so that the ribs have a square abutment.

In the sections, Fig. 269, it will be noticed that the shoulder of the wall rib F meets the clearing line at a higher level than those of the other ribs; and, therefore, if we take the last joint of the rib cluster at the level where the rib F clears, it will also be high enough for the other ribs.

To settle the level of the joint plane S, proceed as follows: From Y, where the shoulder of the rib F meets the clearing line, draw a joint at right angles to the rib. Where that joint cuts the back of the rib F place the level of the plane S. Then draw on the plan, Fig. 268, the projection of the section of the rib F by the joint plane. For the other ribs prolong the plane S, and, wherever it meets the back of each rib, draw on the section the joint of that rib, then project on the plan. Thus is obtained the outline of the upper joint of the last course of horizontal stones, of which the plan is shown in Fig. 268.

To work this course, produce first a prism according to the outer outline of the stone on the plan, Fig. 268. Then draw on the vertical faces of the prism the levels of the front arrises of the rib joints. And on the plane itself of the joint S draw the back arrises of the rib joints. This done, work off the plane of the abutment of each rib, as shown on the left hand side of the pier. The lower joint of the course is given by a horizontal section of the vault at the level of that joint. Draw this lower section on the lower plane of the stone, work between the two joints the soffits of each rib with templets cut to the curves of the ribs. If the course of stone is narrow, this will suffice to work the bevels and the rib moldings; but if the course be wide, then some intermediary horizontal sections of the vault will have to be drawn, the templets from which will be applied on the outside of the stone. It is to be remembered that the intersections of the ribs above the plane X of Fig. 269 will be slightly irregular; but below the plane X the moldings meet one another, forming a perfect miter between each rib.

The parts of the ridge rib where the ribs C, D, E, F abut are made of single stones, as shown in Fig. 268, bearing short pieces of the ribs. To produce these, at the upper part of the elevations of the ribs, Fig. 269, the projection of their intersections with the ridge rib should be shown, and the upper joints of the ribs be drawn, after which the upper and lower arrises of that joint should be shown on the plan. In one plan, Fig. 268, the projections of the joints are shown. The abutment stones will have to be cut as vertical prisms, with the plan as base, and with a hight sufficient to take the whole of the stone, as shown by the elevations. Then, guided by the upper plane of each stone, fix the molds of the portions of ribs comprised in the ridge rib, and work same progressively until their intersection with the moldings of the ridge piece be obtained.

The same operations are done also for working the bosses; but as these receive also the abutments of lierne ribs, we must begin by drawing the elevations of the liernes.

Each lierne, Fig. 269, is projected on a plane parallel to itself. When the lierne meets a rib without the intervention of a boss, as in the points K, L, M of Fig. 268, then the section of the lierne may be modified so as to miter exactly with the rib from which it starts. To find the section of the lierne M G, for instance, cut the rib H by the miter planes M S and M R, Fig. 268, then draw these intersections on the elevations of the liernes, and this will give the points from which will start the shoulders and the arrises of the chamfers. Both the hights of the shoulders and the chamfers will be different on each side of the lierne. To draw the elevation of the lierne, it must then be remembered that the shoulder starting from the miter section R of Fig. 268 will have to meet the shoulder of the rib G on boss G. The lierne may be curved or straight. To determine the outline of the lierne we should endeavor that the shoulder of the lierne M G be tangent at its starting points to the same planes as the ribs H and G. In our drawing it will be seen that the lierne A G is curved at its upper end so as to be tangent to the same plane as the diago-

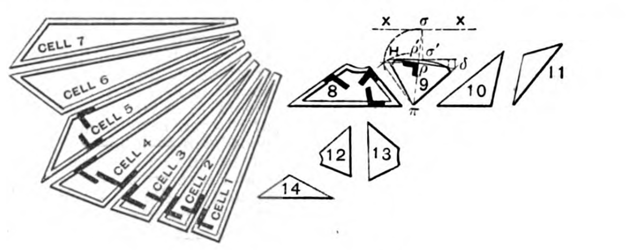


Fig. 270.—Obtaining Shape of Cells.

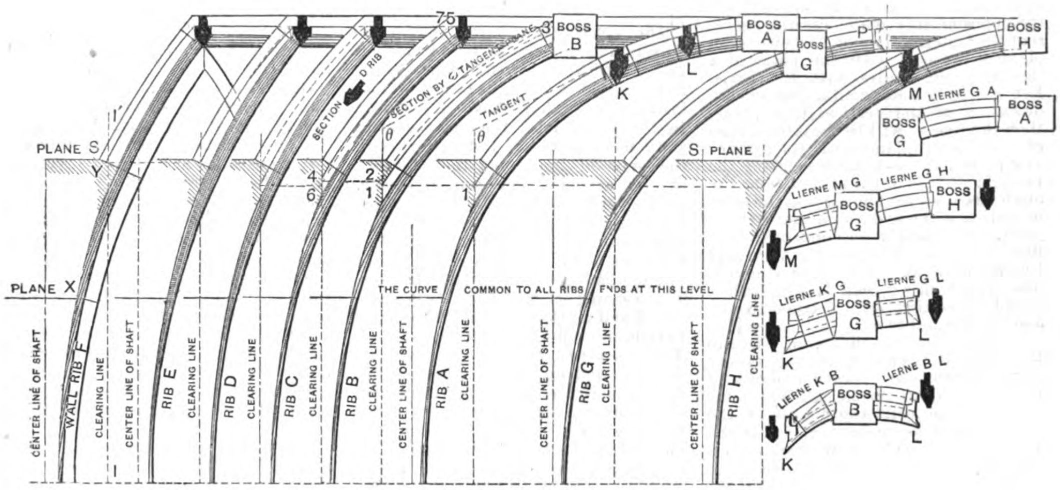


Fig. 269.—Side Elevation of Ribs.

Masonry and Stone Cutting.—Star-Groined Ceiling with Liernes, Molds for Ribs, Bosses and Cells.

nal rib A where it meets the boss A, whereas the lierne N G is practically straight.

We have made the liernes, like the ribs, lie in vertical planes, because it simplifies very much the geometrical problem of setting them out and the practical problem of fixing the arch which forms the lierne. The appearance of this vertical arrangement is also not bad, although it would seem at first sight that the liernes should lie at right angles with the surface of the vaulting. If this be desired, a cross section of the lierne mold would have to be produced in which the center line would be at right angles with the line connecting the arrises on the opposite shoulders.

The cells are made of single slabs of stone. To work a triangular cell like No. 5 between the ribs A and B of Fig. 267, produce an operation plane through its three corners. To get this triangle, the real lengths of each side are obtained from the elevations of the ribs and liernes. Then as the joints of the slabs will have to be vertical when fixed, we must find the angles which these joint planes make with the plane of the slab.

The construction is shown for getting the bevel (square section) of the arris of cell 9, shown in Figs. 267 and 270, resting on lierne G H. The real shape of that cell has been found according to the method described above. Referring to Fig. 270, from the corner π draw a line $\pi\ \rho$ at right angles with the opposite side which would represent the intersection of the operation plane of the slab with the plane of a saw at right angles with the arris. Let $\times\ \sigma \times$ be a horizontal line on the elevation of the vertical joint plane, then the line $\rho\ \sigma$ will be the intersection of that joint plane with the former saw plane; the bevel for working the vertical surface of the slab will be the angle between the lines $\pi\ \rho$ on the soffit operation plane and $\rho\ \sigma$ on the vertical joint. If σ and π be connected by a line, we have a triangle of which only the length of the side $\sigma\ \pi$ is unknown. The length of $\sigma\ \pi$, cell 9, Fig. 267, is found by setting off $\pi\ \xi$ equal to $\sigma\ \sigma^1$, and $\sigma\ \pi$ is equal to $\rho\ \xi$.

With the bevels shown in Fig. 270 the vertical planes of the joints are worked from the operation planes of the cells. Then, on the vertical joint planes of the cells the curves of the ribs and liernes are delineated and the surface of the cells is worked with a straightedge between these lines.

The direction of the straightedge must be such that the surface of the cells be continuous without any sudden fold or arris. For the cells 1, 2, 3, 4, it suffices that the two ribs be divided in an equal number of parts and the straightedge be made to connect the opposite points of that division. This will also do for the cells 7 and 6, where the third sides formed by the liernes M G and K G are straight; but the construction will not be available for the cell 5, where the third side, the lierne K B, is curved. For directing the straightedge in forming the soffit of cell 5, a plane must be drawn through the two tangents, starting from h, the one the tangent to the rib A, the other to the lierne K B; then find the point w where this plane cuts the rib B; then $h\ w$ of Fig. 267 is the direction to be given to the straightedge in that point; the rest of the surface is then easily worked smooth.

There is another solution to this question. We may decide beforehand where the straightedge laid from the angle h shall reach the rib B; say let it be at a point higher than w of Figs. 267 and 269; then we shall give to the lierne K B a sharper curve, in order that the tangent may reach the boss B at a higher level.

The structure we have been studying is a real rib and cell Gothic vault, but this is not the case with most of the existing work which has the same appearance as our model. Most often rib and cell are cut out of one block of stone. The apparent construction is a sham and may be considered as a mere panel decoration of the same description as that of the Renaissance vaults.

Care of Grindstones.

A grindstone, says an expert, should be true on its face; if it is not so, broad, flat tools are liable to be spoiled. The remedy for a grindstone that has lost its evenness is to place a flat iron bar with a sharp edge on the supporting beam in such a manner that it will strike the uneven part of the stone at every revolution until the desired form is regained. It is necessary that a stone should be kept wet when in use, or it would draw the temper of the tools after a few revolutions, but it is not a good plan to allow the lower portion to be in water when at rest. The water soaks that portion and softens it, and it soon gets out of true, and thus commences a course of troubles which is pretty hard to either remedy or stay.

The Baron De Hirsch Trade School.

The committee of the Baron De Hirsch Trade School, established at 225 East Ninth street, New York, have caused a reorganization of that institution. They have introduced fresh blood into the management and a new system of instruction, with the view of improving the efficiency of the school. The school course, which was formerly an indefinite one—its duration depending for each individual student on the amount of progress made by him—has now been limited to a regular course lasting six months. The evening classes have been abandoned and all the energies of the school have been confined to the day classes. The class rooms have also been rearranged and enlarged. The machine shop, the carpentry and wood turning shop and the plumbing shop, which were formerly much cramped for room, each now occupies a whole floor of the building, giving them much better accommodations and more light and air. The class in painting has been provided for in an adjacent building. The committee have also expended considerable money in new machinery and appliances, so that the scholars have every facility for learning their respective trades under the most favorable conditions.

The school is a free one founded by Baron De Hirsch for the young Russian and Polish Jews who come to the United States without a trade on which to rely, and it has already proved of great assistance to this class of people. Just at present, owing to the lessened emigration of the past 12 months, the classes are not as well filled as they might be, but it is expected that additional scholars will present themselves after the current term.

The course, under the new *régime*, began September 1, and will last until the end of February, when another six months' course will be commenced. At the end of the course the scholars will be examined by committees from the different trade organizations, as is the case in the New York Trades School. They will be granted certificates of proficiency accordingly. The system of instruction followed is molded on the pattern of that established in the New York Trades School. When the scholars are graduated, they are presented with a kit of tools, and every effort is made by the school authorities to place them in situations where they can immediately begin to earn their living.

The classes are held on five days of the week. Saturday being the Hebrew sabbath, no work is done on that day. The hours of session are from 8 a.m. to 6 p.m. Trade instruction is given until 4 p.m., and during the last two hours the scholars of each class are taught English—of which language they are on joining the school entirely ignorant — and mechanical drawing. Once a week the instructors give a lecture to their pupils bearing on the trade they are learning.

Arbitration and Conciliation.

Much interest is being taken in the forthcoming Congress of Arbitration and Conciliation, which will meet in Chicago on November 13 and 14, under the auspices of the Civic Federation of that city. The following programme has been prepared:

Historical View.

a. "England and the Continent."

b. "Australia and New Zealand," Prof. E. A. R. Gould, Johns Hopkins University.

c. "America," A. H. Walcott, Massachusetts Board of Arbitration; D. J. Ryan, Ohio Board of Arbitration.

General Principles:

a. "Distinction Between Compulsory and Voluntary Arbitration."

b. "Distinction Between Compulsory Arbitration and Public Investigation of Labor Disputes."

c. "Distinction Between Adjudication of Past Contracts and Settlement of Future Ones," Carroll D. Wright, United States Department of Labor.

d. "Distinction Between Arbitration and Conciliation," Mrs. Josephine Shaw Lowell, New York.

"Ethics of Arbitration," Archbishop Ireland, Felix Adler, Washington Gladden.

"Economics of Arbitration," Prof. Henry C. Adams, University of Michigan.

"How Far Can Arbitration Be Made Compulsory Without Infringement on Private Rights?" George R. Peck, C. S. Darrow.

Interstate and *quasi* Public Business:

a. "Railroads," A. F. Walker, receiver of Santa Fé Railway; Marvin Hughitt, president of Northwestern Railway; P. M. Arthur, Brotherhood Locomotive Engineers; F. P. Sargent, Brotherhood Locomotive Firemen.

b. "Mines," Charles Ridgely, P. J. McBride.

c. "Springer Bill," Representatives Springer, McGann, Tawney.

State Jurisdiction and Private Interests:

a. "Relation Between Employer and Employed," Chauncey M. Depew, T. V. Powderly. 1. "Building Trades," W. H. Sayward, secretary National Association Builders. 2. "Manufacturing," Martin Fox, Iron Molders' Union of North America; Charles A. Pillsbury, Minneapolis; N. O. Nelson, St. Louis.

b. "Necessity for Mutual Organization," Samuel Gompers.

c. "Sliding Scales and Kindred Methods," M. M. Garland, president National Iron & Steel Workers.

Closing address and recommendations, Joseph D. Weeks, editor *American Manufacturer*.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

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To Local Secretaries.

The National Secretary would recommend to the officers of the various filial bodies that they take up the articles published in *Carpentry and Building*, and in the *National Bulletin* for consideration and discussion at the regular meetings of their organizations. Anything that will tend to bring out criticism or expressions of opinion as to the value or otherwise of these recommendations is of the utmost importance.

Local secretaries are requested to forward to the National Secretary all available information as to action either taken or suggested which tends to benefit the builder in any of his relationships either with other builders, architects, owners, or his employees. Everything of this character, no matter how unimportant, is of great value in making up the sum of experience of builders everywhere. Local Secretaries are urged to correspond frequently and at length with the National Secretary.

Quality vs. Quantity.

Organizations are apt to make the mistake of thinking that numbers indicate the amount of strength of which they are possessed.

Numerical strength is not of necessity indicative of organic strength, and because an organization may have a large membership is no assurance that it may be a powerful organization. Unless careful discrimination is used in selecting a membership it is likely to become unwieldy and incapable of carrying out the purpose for which it was established, by reason of the impossibility of securing harmonious action when it is composed of merely numbers, rather than men of clearly defined and harmonious purpose. If a careful selection is not made in choosing a membership the very object which the organization seeks to accomplish may be lost sight of through the inability of securing united action. An organization may become weak rather than strong by the indiscriminate admission of applicants who desire to ally themselves with the best elements of the fraternity, but who have nothing to give in return.

The membership of a builders' exchange should only be large enough to take in the best representatives of the building interests in its particular community, whether they be relatively few or great. Too much quantity is more than apt to reduce the quality, because in acquiring the undue quantity it is almost impossible to suppose that the quality will not suffer. Therefore an exchange which seeks to take in every builder in the community, irrespective of his business ability or moral standing, is almost sure to disintegrate from lack of the cohesive qualities to bind it together, for it cannot be expected that the good and bad can produce harmonious effort.

Architect and Builder.

One of the most satisfactory evidences of the benefit of a decided stand by builders' exchanges for better business methods that has come under the notice of the National Secretary is indicated by the following letter from a firm of architects to the secretary of one of the local exchanges. If such efforts as the following were made by architects to ascertain what the builders would consider honorable practice in the relationships between the two the strained condition which exists in many cities would rapidly disappear. The architects here mentioned compose one of the most prominent firms in the city in which the instance occurred, and yet an effort to learn just what had been defined by the builders in their code of practice was considered in no wise beneath their dignity. Such a spirit as this does much to foster a feeling of fraternity between the two, who have so much in common, and its effect cannot be overestimated. Builders and architects both, in their dealings with each other would very much improve their mutual relationship if they but evidenced the fact that each would be willing to go half way in any movement for the establishment of a common ground.

The letter, from which names are omitted, is as follows:

DEAR SIR: We write to ask you to kindly instruct us just what recommendations to make to the B High School Building Committee in getting certain cuts made from the figures which we believe you know were publicly advertised for.

Must we advertise again, and let all bidders come in, in order to make the small cuts suggested, or shall we take three or four, or even five of the lowest bidders and ask them to revise their figures?

Also, we should like to know just what position we must take toward those men who handed in figures on different parts of the work, like mason work, plastering, iron work, roofing, carpenter work, painting, gas piping, electric work, many individual bids on each being received. As the committee is to have a meeting at once, it would be a great favor if you can give us a reply to this to-morrow.

The Individual and the National Association.

The National Secretary, among other requests for information regarding the "McNeil case" has recently received one from Paso Robles, Cal., which shows clearly that distance has nothing to do with the operation of the work of the National Association of Builders. Indeed, it is plain that the general principles which govern business at one end of the country largely prevail at the other, notwithstanding the fact that differences of detail seem to indicate radical difference of method. One of the exchanges formerly identified with the National Association of Builders, which is located in a California city, gave as one of the reasons for its withdrawal, in addition to the amount of expense necessary to membership, that it was too far away from the headquarters of the National Association and from the majority of its filial bodies. One member of the exchange mentioned alone derived from the work of the National Association through publicity given to this same "McNeil case" sufficient benefit in actual money that amounted to more than the dues of the exchange in question would have been in ten years, and now from another little city in the same State comes an indication of the fact that distance has nothing whatever to do with the work performed by the National body. While the National Association seeks to raise the standard of building all over the country, and therefore needs support in its most remote parts, it never as an organization attempts to establish arbitrarily any of the reforms it advocates. It simply endeavors to formulate methods for the improvement of business into such simple and practical shape that they can be immediately applied to the affairs of builders anywhere, and when it is considered that the same general principles govern humanity, and therefore builders, there is no question of the availability of reforms or methods suggested, irrespective of locality or seemingly different conditions. The "McNeil case" furnishes an excellent example of the truth of this statement because the precedent established in Massachusetts has been available to builders all over the United States irrespective of the fact that different business methods seem to obtain in the several localities.

The practicability of other recommendations of the National Association are as equally available for the benefit of the builder, no matter where he lives, as is the precedent as to his rights in the matter of the lowest bid which has been placed in his possession through its efforts. Builders everywhere are urged to familiarize themselves with the specific methods and forms advocated by the National Association and the principles upon which they are based.

Printed matter relative to all these various recommendations will be gladly supplied to any inquiring builder upon application to the National Secretary, 166 Devonshire street, Boston, Mass.

New Publications.

THE SQUARE ROOT DELINEATOR IN THE ART OF FRAMING. By Alfred W. Woods. Size of chart 18 x 28 inches; mounted on rollers. Price $3. Published by the author.

This is a chart carrying a diagram showing the carpenters' square full size. Lines are drawn from the tongue to the blade of the square and there are given 58 pitches for braces, common rafters and their corresponding hips and valleys, together with their lengths; also that of their jacks, runs, rises, contents of board measure and the degrees of pitch. The author claims that the lengths of all rafters are given to less than $\frac{1}{16}$ inch, and that all the figures that give the same cut or bevel are presented. The chart or delineator, as it is called, contains a great deal of information of interest in this connection relating to hopper cuts, polygonal and curved roofs, bevels for tank staves, &c. The delineator or chart measures 18 x 28 inches and is mounted on wooden rollers so that it may be suspended upon the wall. The instructions on the chart are sufficient for the intelligent mechanic, but in order to render the matter clearly understood by all, the author furnishes with each chart a little pamphlet illustrating the terms used in roof framing and giving full instructions in connection therewith.

A Wood Harder than Ebony.

Now that the excitement over the alleged invention of "bullet-proof cloth" is flagging, if not practically dead, says *Invention*, the reported discovery of a fire and steel proof wood may have a chance of attracting some attention. Several species of iron wood have long been known and widely used, on account of their extraordinary weight and hardness, in the manufacture of such articles as axles and plows. It is claimed, however, that these are entirely surpassed by a certain tree found in the Northern Transvaal, regarding which M. Basiaux, at present traveling in South Africa, has transmitted a note to the Geographical Society of France. The wood is a sort of ebony, and so excessively hard that it cannot be cut in the ordinary manner except when green. When mature and dry it resists every known tool, and blunts or breaks the finest tempered steel. It is, apparently, almost impregnable against fire, as it required a fortnight's constant burning to reduce the trunk of one of the trees to ashes, and, although heavy, it is said to be considerably lighter than steel or iron.

Quoins.

Quoins of buildings and walls should always be carefully protected in the foundations, and well bonded in the superstructure. At the angles unequal settlement most frequently shows its effects, but when quoins are well supported they will keep up a weak wall. The Gothic architects were well aware of this; hence the immensely projecting buttresses at the angles of their lofty towers.

A BEAUTIFULLY executed crayon portrait of the founder of the New York Trade School has been recently placed in the office of that institution. The late Colonel Auchmuty was always averse to having his likeness taken and no recent portrait of him was in existence at the time of his death. The present drawing is therefore copied from the only likeness available—a photograph taken several years ago—and presents him as younger in appearance than he was when known to the majority of our readers, who saw him only in his trade school days. Nevertheless, the likeness is said to be excellent of the man as he was in his early prime. The portrait was presented to the trade school by Colonel Auchmuty's widow. Mrs. Auchmuty keeps up a lively interest in the affairs of the institution which absorbed so large a share of her husband's interest and affection.

Hospital Construction.

In a lecture delivered not long since before the Architectural Department of the University of Pennsylvania, Mr. Addison Hutton discussed in a very interesting manner the planning of hospitals, the object being to suggest to his student hearers the possibility of an improvement in hospital construction. After touching upon various phases of the subject, including the area, form, site, spacing of wards, heating and ventilating of the building, he described the structure itself, as follows:

The foundations should be laid with stone and cement, and there should be a damp proof course of asphaltum or slate at the ground line. In some soils the foundations should be drained with tiles; in those of sand or gravel this is not necessary.

So far as is ascertained there is no better material for walls than brick. All interior partition walls ought to be brick. The weather barriers should be formed of two 9-inch walls with 2-inch air space, well bonded at all jambs and corners. An excellent alternative is an 18-inch solid wall with hollow lining of terra cotta, whereon the wall plaster is laid. Either of these devices will insure dryness of the internal wall surface.

A principle to be followed as carefully as possible in hospital building is to leave as few cavities in the construction as consistent with the conditions of integrity and endurance.

Every surface should be solid and smooth as practicable, and thus easily and freely cleansed and kept clean.

When floors are constructed in the usual manner the intervals between joists may be filled with mineral wool. This helps to deaden sound, leaves no harbor for rodents or any other offensive thing. Still better, where the appropriation of funds will permit it the floor should have beams of iron or steel filled in with bricks; the nailings of the surface floor will thus rest on a bed of iron and burnt clay. Again the mineral wool comes into play between the railings or sleepers. The surface floors must be hard wood; nothing is better than the Southern yellow or pitch pine, which, when cut and dressed to show the edge grain, makes a handsome and most serviceable floor. A good, tight, smooth, well finished floor is most important; paraffin and soluble glass are recommended as coatings. The joining to the wall is best with a neat wooden core, the usual high wooden bare skirting being omitted. In fact, only such inside wood work as is absolutely necessary is recommended in the best hospital construction. The window jambs and heads may be rounded or chamfered in plaster, and the window sills rubbed slate.

The floor and parts of the walls of the water rooms are lined with pottery tiles, and all angles give place to curves, concave or convex.

It is best that stairs shall have iron construction, and if slate treads come within the appropriation they are to be preferred to wood.

The plastering of the walls and ceilings should have great care bestowed upon it. The surface should be left with what is known as hard finish, composed of lime, sand and much labor. Where lath are commonly needed, such as on ceilings, &c., stiffened wire netting should be substituted.

At all internal points, and in all materials, whether stone, brick, wood, pottery, plaster or metal, constant attention should be given to the avoidance of open joints, sharp corners, quirks and creases.

CONTENTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

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

DECEMBER, 1894.

Carpentry and Building for 1895.

General Remarks.

The effects of the late panic are passing away, business is slowly but surely recovering from the severe depression which has existed for many months, and people in all sections are taking a more cheerful view of the future. Under such conditions, and on the eve of a new volume, it seems both fitting and proper that we should direct the attention of our army of readers to some of the more important features which will characterize the issues of *Carpentry and Building* for the year 1895. No efforts have been spared to make these attractions fully up to the standard of excellence already established, and in every way render the paper the exponent of practical matters for practical men engaged in the building and allied industries. Among the various matters which we shall offer from time to time are special articles on different mechanical and architectural subjects, prepared by practical writers of long and varied experience, making the contributions of more than usual interest and value. In addition to the features enumerated below are many other matters now under way, which will be brought out as rapidly as circumstances will permit. The illustrations will be of a character best adapted to the purpose and will include perspectives, elevations, plans and details of brick and frame dwellings, business blocks, churches, school houses, &c. So far as possible, the buildings illustrated will represent work already completed or about to be erected.

Hints on Wood Carving.

The long winter evenings which are now at hand afford a good opportunity for the young mechanic to turn his attention to many things which will aid his progress in the trade he has chosen as a means of livelihood. It is the season when he can devote more or less time to the study of works relating to his trade and execute with his tools many little jobs suggested by his reading. He is interested in ornamental as well as constructive features, and will, we are sure, find much that is of value in the serial article on wood carving which begins in this number, and which will constitute an important feature of the earlier issues of the new volume. The manuscript has been prepared by one who has had long experience in his profession and who handles his subject in a masterly style. In the introductory chapters the subject of chasing is taken up in a way to interest and instruct the reader, after which wood carving proper is treated. The matter is accompanied by numerous illustrations, covering both simple and intricate designs adapted for use in a variety of ways and executed in the highest style of the art. The serial is of such a character as to constitute an important contribution to the literature of the subject.

Shoring and Needling.

A feature of building operations in most of the larger cities and towns is the constant tearing down of old structures to make room for new and imposing ones, which shall give increased capacity for business purposes and render the site more productive in the way of revenue. In preparing for the new buildings it is often, if not always, necessary to carry the foundations to an equal or greater depth than those of the adjoining structures in order to accommodate the increased weight which will have to be supported. In doing this there is more or less danger of the old walls settling or bulging, and the contractor or builder is called upon to take precautions which will prevent such a happening. How this is done is told by a practical mechanic in a very interesting article, which we shall present under the title given above, in an early issue of the volume for the new year. The article is illustrated with several engravings prepared from sketches made from actual work, and it cannot fail to prove interesting and instructive to all having to do with matters of this kind, whether they be located in the city or country.

Supplement Plates.

The series of half-tone engravings which have been issued as supplemental plates during the past few years, and which have proven so popular, will be continued as an important feature of the seventeenth volume of *Carpentry and Building*. No expense will be spared to make the plates which will be issued with the various numbers of the paper indicate in a large degree the progress which is being made in the art of engraving, and it is felt that with the subjects now in hand the results obtained will be eminently satisfactory. We have ready for publication a varied assortment of designs, and these will be reproduced in the highest style of half-tone engravings. The subjects represent buildings, both brick and frame, lately erected in different sections of the country, and these will be treated in a way to render them of value to our readers. In connection with the supplemental plates will be published elevations, floor plans and constructive details, all drawn to a convenient scale, and accompanied by brief descriptive particulars. In addition to these will be numerous designs of buildings of cheaper construction, adapted to erection in the smaller towns and villages and running as low in cost as $600. We shall be glad to have architects and builders forward for publication drawings and photographs of attractive structures which they have lately erected, to the end that all localities may be represented, and enable members of the trade in one community to study types of buildings peculiar to sections remote from that in which they live.

Methods of Handrailing.

The articles dealing with past and present methods of handrailing have been the source of no little interest to readers of the paper, and especially to the younger element in the trade who are giving particular attention to stair-building problems. The serial is drawing to a close and the final chapters will be published during the first half of the coming year.

Correspondence.

This department will continue in the future, as in the past, to be the medium for the exchange of ideas between mechanics in all branches of the building trades. Communications will receive careful editorial attention, and no trouble or expense will be spared to prepare engravings from the sketches which may accompany the letters of our correspondents. The department is one of the most valuable features of the paper, and it is one in which all should take an active interest. We invite our readers, in whatever branch of the building trades they may be engaged, to contribute to its columns, either by asking questions, answering inquiries submitted by those seeking information, discussing topics of trade interest, describing jobs of peculiar work which they have executed, or in some other way adding to the value of the department. It is open to all alike and the more diversified the topics discussed the greater the benefits which will result.

What Builders Are Doing.

The monthly bird's-eye view of building operations in the leading centers of the country, which has formed such an interesting feature of the paper for the past few years, will be continued on the same lines during 1895. This presentation of what carpenters, builders and contractors are doing is based upon reports of secretaries and prominent members of local building exchanges, and is of such a nature as to show the reader, almost at a glance, the condition of affairs as it exists from time to time in the principal cities of the country. This reference to various ways of doing work, arranging with laborers, settling differences between employer and employed, securing a uniformity of methods, &c., has constituted a feature which has been of the greatest interest and value to the readers of the paper, and its popularity is growing. We invite builders in every section to keep us advised of all local happenings likely to interest members of the trade.

Architectural Drawing for Mechanics.

This series of articles, which has been running through recent issues of the paper and which has attracted wide attention on the part of readers, is rapidly approaching completion, and the final installments will be given in the first few numbers of the new volume.

The Builders' Exchange.

During the year 1895 *Carpentry and Building* will continue to be the medium of official communication between the officers of the National Association of Builders and the various exchanges affiliated with it. On the page entitled "The Builders' Exchange" we shall present the official utterances of the secretary touching meetings, suggestions, recommendations, &c., besides giving such other matters as pertain strictly to the National Association. In other parts of the paper will be published reports of the annual meetings of the association, together with articles of current interest from the pen of Secretary William H. Sayward.

Miscellaneous.

The miscellaneous matters to be presented in the volume for next year will be of a diversified character. In one of the early issues we shall give a short article on the Howe truss, prepared by a practical engineer and illustrated with several engravings. The author deals with the subject in a comprehensive manner, and while not entering into an exhaustive analysis of the properties of the truss, he presents in as simple a style as possible several well established facts, together with the results of his own experience. Another feature of the volume will be an explanation of what is, to the average mechanic, a most puzzling device —the slide rule. This article has been written by an expert on the subject, who is thoroughly familiar with the rule in all its various applications, and who, in his treatment of the tool, gives a few simple examples showing how it is employed to secure practical results. The slide rule has been the topic of more or less discussion in the past, and a number of inquiries have lately been received concerning its use in everyday work. The article in question is of undoubted interest and value to all, and will enable the reader to obtain a clear idea of its application. We shall continue to keep our patrons informed of all that is new and important in the roofing and cornice trades, as well as in other lines of building, presenting from time to time illustrations of special work, diagrams of construction, &c. In one of the early issues of the new year will be published the details of an iron roof of 32 feet span, together with brief letterpress, while a description of some of the systems of zinc roofing employed in various parts of the world will constitute another feature of the paper in this department of miscellaneous matters. The latter article is illustrated with numerous diagrams showing how the work is done, which in connection with the letterpress forms an interesting contribution to the literature of the subject. Still other features of the new volume will be found in the shape of an illustrated article describing the construction, under Government supervision, of a water tank and trestle, at Fort Logan, Col., and an account of the method of building a timber foot bridge, accompanied by numerous sketches showing details of the various joints.

The New York Theater.

The plans for the New York Theater, to be erected at the corner of Seventh avenue and Forty-second street, this city, have been drawn by Architect John D. Allen of Philadelphia, Pa. The structure is to have a steel frame, will be four stories in hight and surmounted by a roof garden 92 x 112 feet, which can be inclosed by sides and roof of glass. The exterior walls will be either Indiana limestone or Ohio sandstone, while the upper stories will be of white brick, relieved with terra cotta trimmings and white tiles. The seating capacity of the theater proper will be 1700 persons, while on the roof will be room for 500 persons, including the space occupied by the tables. On the first floor will be a large ladies' parlor, and on the balcony floor a lounging room. There will be 30 exits, of which 22 will be operated by means of electrical openers and the most modern self-acting bolts. The gallery will be so arranged as to dispense with all posts except those on the first floor behind the last row of seats in the orchestra circle. The main entrance to the theater will be at the junction of Forty-second street and Seventh avenue, and will be modeled after the entrance and foyer of the Grand Opera House in Paris. The main staircase will be of white marble, with balustrade of bronze. The proscenium opening will be 34 feet wide by 38 feet high, and the stage proper 75 feet long by 40 feet deep, with a rigging loft 65 feet in hight. There will be 15 dressing rooms, carpenter shop, &c., isolated from the stage in a fire proof building. All the interior wood work on the first floor and balcony will be finished in cream-color enamel and gold.

Exhibition of the Architectural League.

The tenth annual exhibition of the Architectural League will open in the galleries of the Fine Arts Society Building in New York City on the 15th of February next. The exhibition will, as usual, consist of architectural drawings, cartoons for stained glass, models, carving in wood, stone and bronze, examples of designs in mosaic, glass, fabrics and furniture, together with sketches and paintings of architectural and decorative subjects. The jury and hanging committee will consist of the officers of the league, together with the members of the sub-committee on Architecture and Decoration and the chairman of the Catalogue Committee. All works submitted must be delivered not later than February 5. The subject of the eighth annual competition for the gold and silver medals given by the league is the "Main Stairway of a National Library." The competition is open to residents of the United States under the age of 25 years.

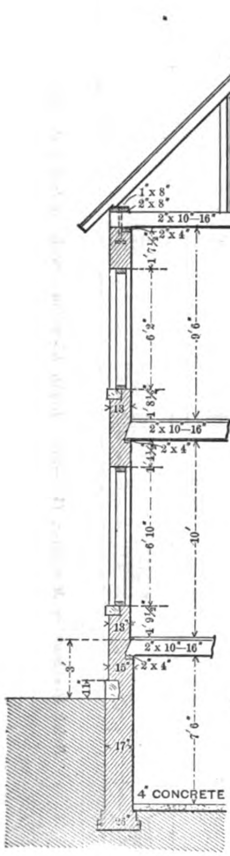
Franklin Trade School Delayed.

The establishment of the Franklin Trade School in Boston hangs fire. Some doubt appears to exist as to whether the trustees of the fund left to the city of Boston by Benjamin Franklin a century ago for the benefit of the young mechanics of the city can be legally used to found a trade school. It will be remembered that this fund, which has grown during the interval of 100 years from the time of the testator's death from $1000 to $131,000, was voted by the trustees to be applied to this purpose. These trustees comprise, under the terms of Franklin's will, the pastors of three of the oldest Boston churches and the Selectmen of the city. The successors of the latter have been considered to be the Board of Aldermen, and as such they have served on the board of trustees. But the Selectmen were the executive of the town, while the Aldermen are the legislators; and the Mayor, being the executive, is by some considered the proper representative of the city on the board of trustees. The present Mayor of Boston appears to favor some other disposition of the money than the establishment of a trade school. Hence the matter was referred for advice to the corporation counsel, and the scheme has been left in abeyance for the past year. The corporation counsel now gives it as his opinion that the trustees could not legally establish an endowment fund to carry on the school with the money that is left after erecting the necessary buildings and equipping them with machinery, &c. His advice, however, is not regarded as sound, and it is thought probable that a friendly suit will be brought to determine the exact status of the trustees and their powers and prerogatives. A strong feeling is said to exist in Boston in favor of the utilization of the Franklin Fund for the purposes of a trade school, as being an object more directly in line with the distinguished donor's well-known ideas than any other of the alternative schemes that were proposed. The usefulness of such a school to the city of Boston, and its benefit to the class Franklin desired to aid, is beyond question.

ONE of the largest logs of mahogany ever brought into the United States arrived on the White Star freight steamer "Cufic," which reached her dock from Liverpool on October 29. The log was 45 feet in length and about 4 feet square in cross section. It weighed $7\frac{1}{2}$ tons.

BRICK RESIDENCE IN MONTCLAIR, COL.

THE architectural subject which forms the basis of our supplemental plate this month is the brick residence of T. J. Anders, erected about two years ago at Montclair, Col., from plans prepared by Grodavent Brothers, architects, of Denver, in the State named. The dwelling is situated on a corner lot giving an eastern and southern frontage. Its arrangement of rooms is clearly indicated in the floor plans, presented herewith, while the details show in a comprehensive manner many of the features of construction employed. It will be seen from an inspection of the engravings that the house occupies a site considerably larger than the average city lot, but the design is one well adapted for a suburban residence. The contracts for the brick work, cut stone, mill work, heating, &c., were let separately, the idea being to have the work executed under day's labor by purchasing the material and hiring the necessary mechanics to do the carpentry, plumbing, painting, &c. The foundation walls are built of hard burned brick 17 inches thick, with brick footings 26 inches wide. They are constructed solid and at the grade line is a cut stone base course 11 inches high, cut with a 1 x 2 inch wash. The foundation walls below grade are plastered. The exterior of the house is faced with golden red pressed brick, laid in mortar colored with Lowe's red mineral. The face is laid in plumb bond and blind headers. The roof is covered with Oregon cedar shingles laid $4\frac{1}{2}$ inches to the weather, and the valleys and gutters are lined with tin. The exterior wood work is treated with three coats of paint. From the architects' specification we learn that all dimension timber is of Texas yellow pine. The floor joists are 2 x 10 inches, the rafters 2 x 6 inches, the hips and valleys 2 x 8 inches, the studding 2 x 4 inches, doubled at openings, all placed 16 inches on centers. The porch sills are 6 x 6 and 6 x 8 inches, the joists 2 x 8 inches at the front and 2 x 6 inches at the rear, placed 20 inches on centers. The porch rafters are 2 x 6 inches and the ceiling joist 2 x 4 inches, also placed 20 inches on centers.



Section.

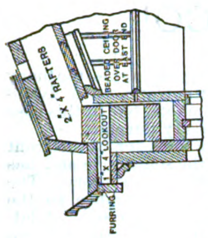
Front Elevation.—Scale, ⅛ Inch to the Foot.

Brick Residence in Montclair, Col.—Grodavent Bros., Architects, Denver, Col.

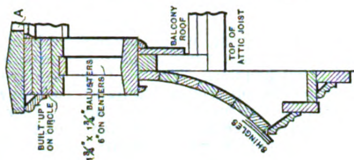
The cellar, which extends under the entire house, is divided as shown, and has a concrete floor 4 inches thick. An outside cellar entrance door is placed at the grade with the cellar stairs inside of the building, this arrangement being now much employed in the section named, as it does away with the old plan of having the stairway outside covered with hatchway doors. An outside door is also provided at the dining room for convenience in passing to the yard or stable, or for reaching the carriage way which extends along the north side of the house. As a rule, too many outside doors or entrances to a dwelling are objectionable, but in this case all serve a necessary purpose.

A broad porch runs across the front of the house at the south side and has an entrance to the conservatory. The rear porch gives an entrance to the kitchen or to the sitting room. A latticed porch at the rear of the kitchen has the strips put on horizontally and vertically, with No. 30 wire netting of 12 mesh placed between the strips. At the rear is also a balcony from which is obtained a commanding view of Rocky Mountains, the noted points to be seen being Long's Peak, Pike's Peak and others.

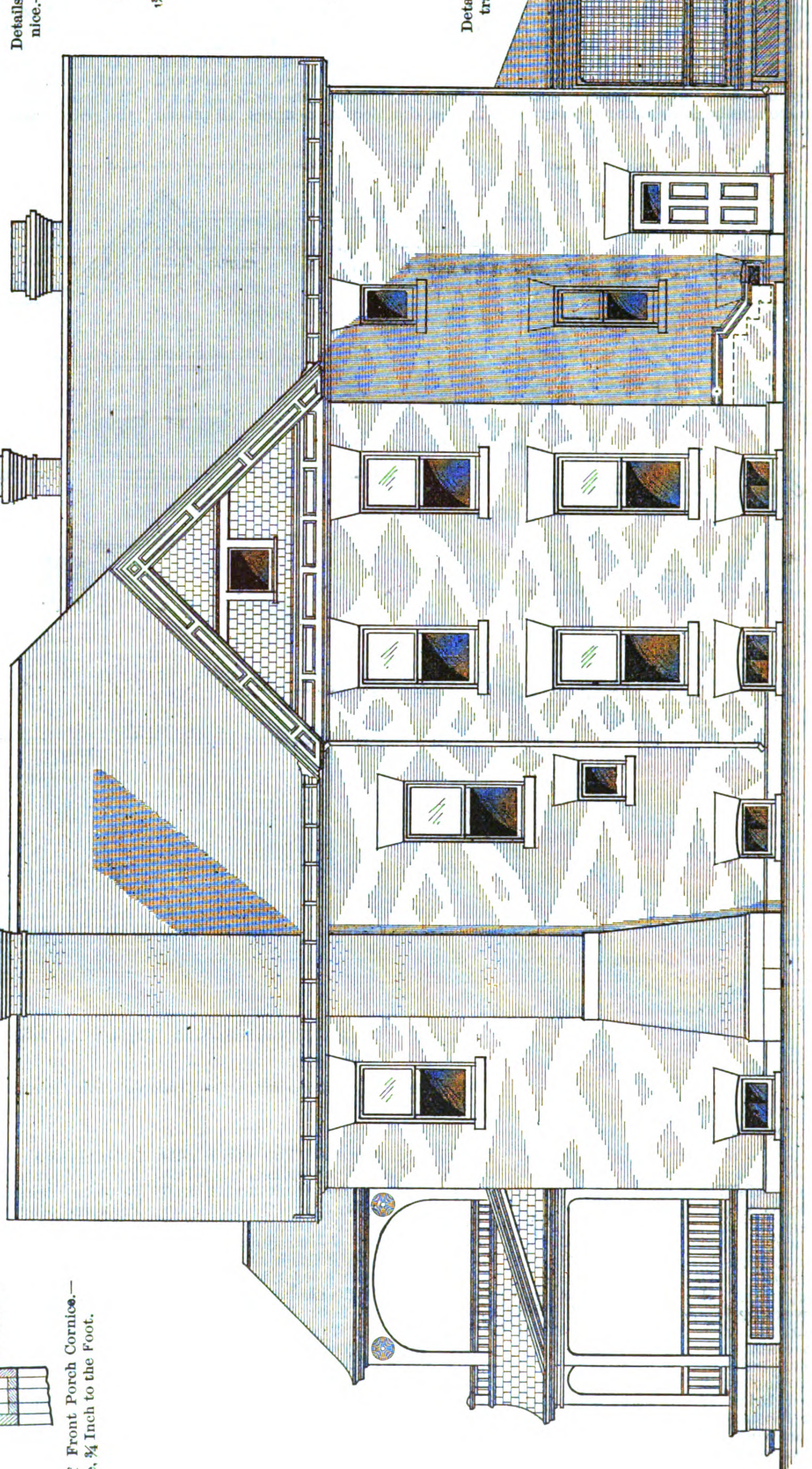
A feature of the outside work which will interest many of the readers of the paper is the canvas flooring employed in connection with the balconies. The architects describe the method, which has given entire satisfaction, as follows: First lay a floor with well seasoned mill matched strips free from loose or black knots or other imperfections, and not to exceed 4 inches in width. Dress to a smooth surface at completion. Cover with 10-ounce duck canvas. When laying the canvas it should have a heavy coat of white lead on both sides; the under coat to be applied directly to the wood flooring and the upper coat as the canvas is laid. The canvas should be stretched tight



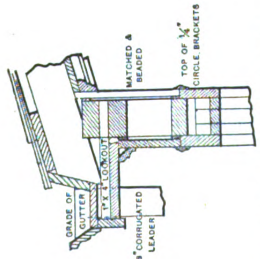
Details of Conservatory Cornice.—Scale, ¾ Inch to Foot.



Details of Cornice and Balustrade of Circular Bay Window.—Scale, ¾ Inch to the Foot.



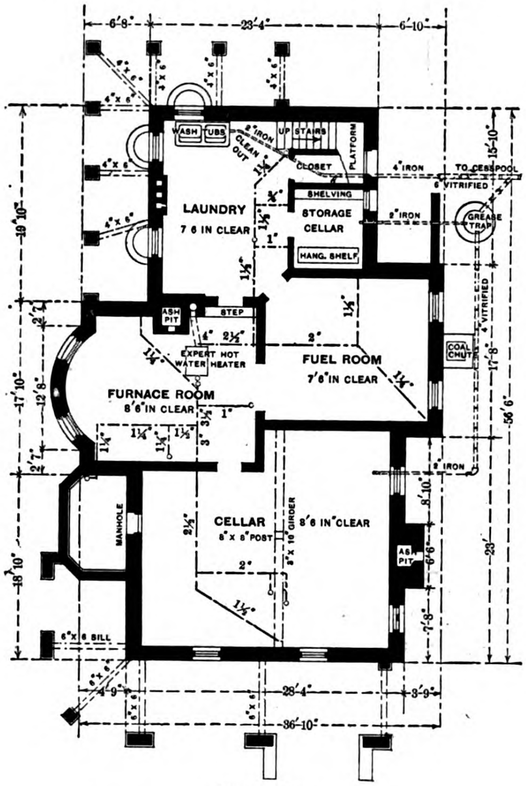
Brick Residence in Montclair, Col.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.



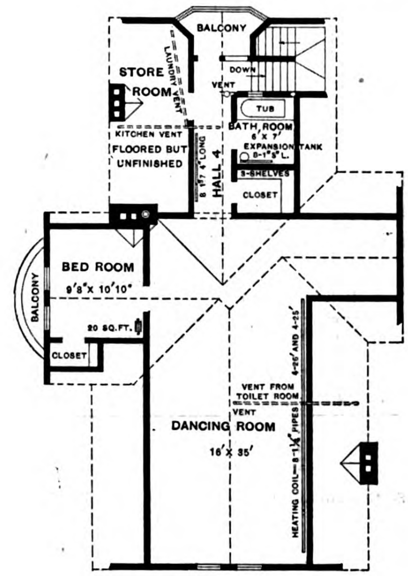
Details of Front Porch Cornice.—Scale, ¾ Inch to the Foot.

and all joints lapped about 2 inches. The canvas should extend 6 inches behind all wood work as a flashing and be carried the same hight at brick walls and over-flashed with 3-pound sheet lead let into the joints of the brick work and pointed up with cement. The canvas should be nailed with 8 ounce copper tacks placed about one inch on centers, and after the lead paint has dried the canvas should be given two coats of asbestos paint. Walking on a canvas roof of this kind does not affect it, and being water proof makes it one of the most desirable roofs for balconies.

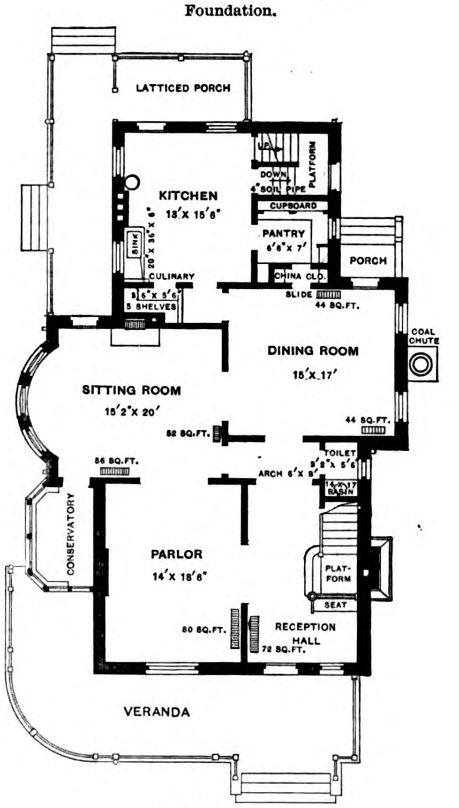
The finish of the reception hall, sitting room, parlor and dining room is in black ash, stained with a little umber to bring out the grain of the wood, which is finished in a dead polish. The dining room has paneled wainscoting,



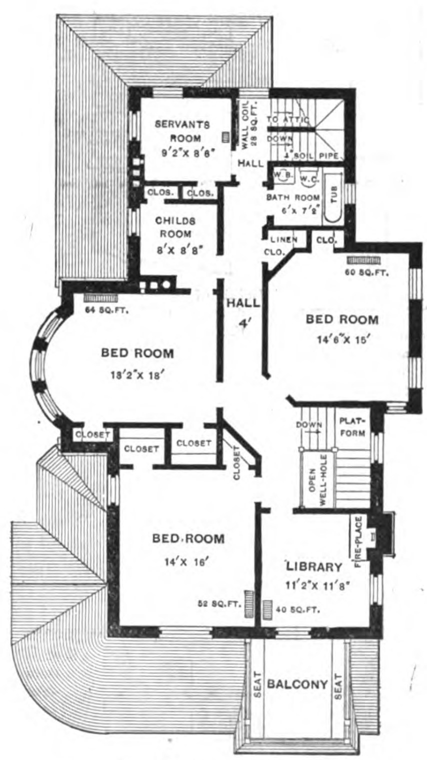
Foundation.



Attic.

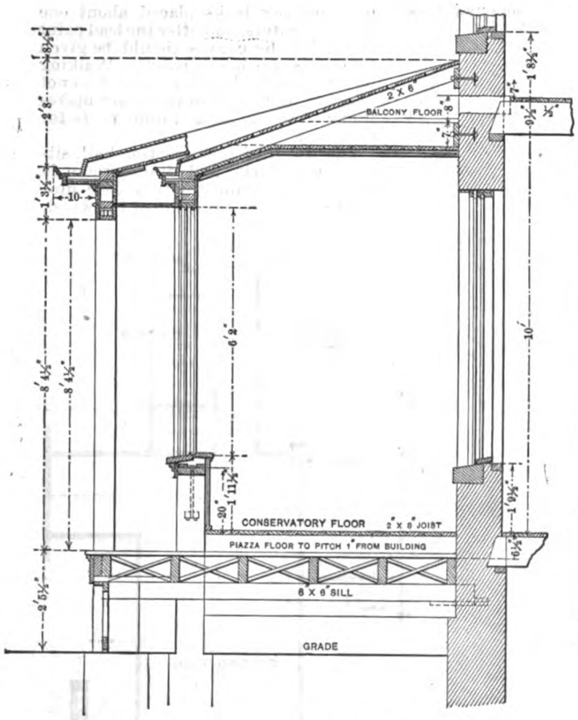


First Floor.



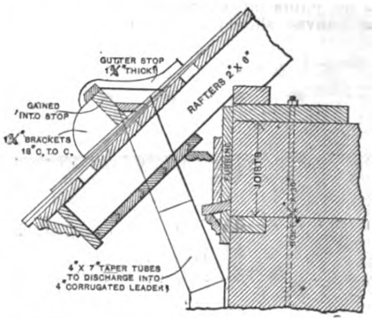
Second Floor.

Brick Residence in Montclair, Col.—Floor Plans.—Scale, 1-16 Inch to the Foot.



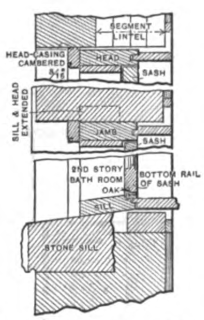
Section Through Conservatory and Front Porch.—Scale, ¼ Inch to the Foot.

Section of Conservatory Door. —Scale, 3 Inches to the Foot.

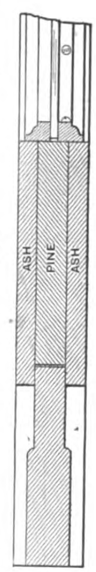


Detail of Main Cornice.—Scale, ¾ Inch to the Foot.

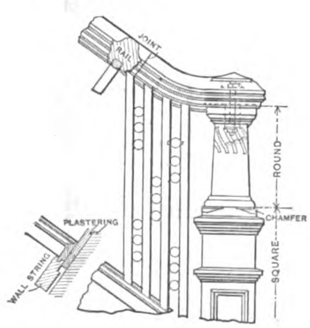
Detail of Kitchen and Bathroom Wainscoting. —Scale, 3 Inches to the Foot.



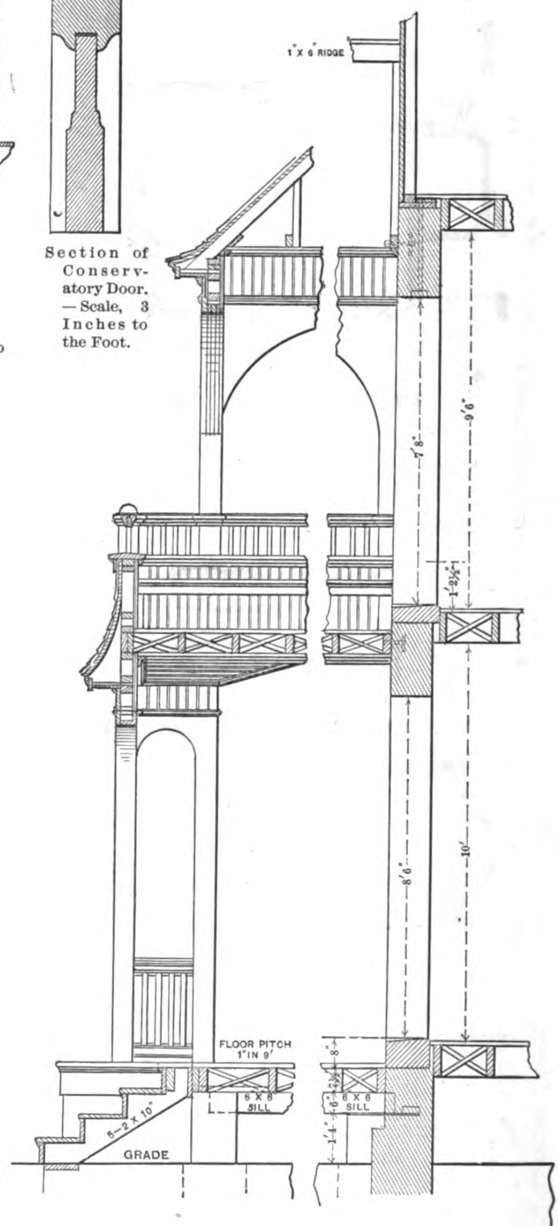
Detail of Bathroom Window. —Scale, ¾ Inch to the Foot.



Section of Library Door to Balcony. —Scale, 3 Inches to the Foot.

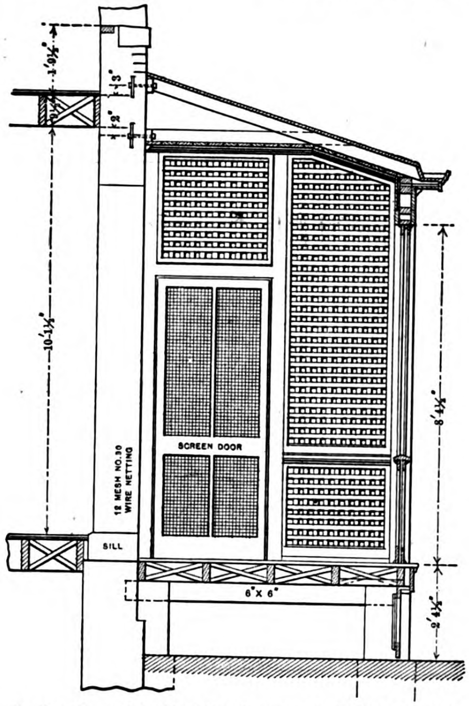


Detail of Main Stairs and Top of Newel Post.—Scale, ¾ Inch to the Foot.

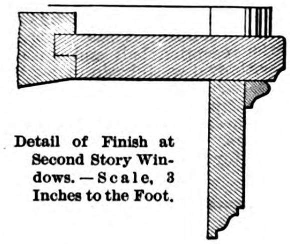


Section of Front Porch and Balcony.—Scale, ¼ Inch to the Foot.

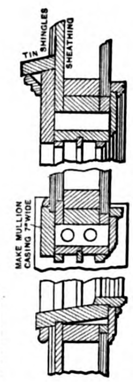
Miscellaneous Details of Brick Residence in Montclair, Col.



Section through Latticed Porch.—Scale, ¼ Inch to the Foot.

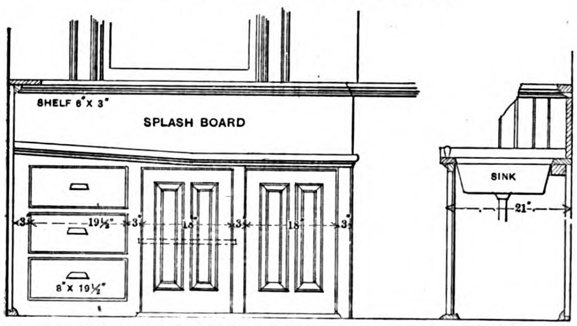


Detail of Finish at Second Story Windows.—Scale, 3 Inches to the Foot.

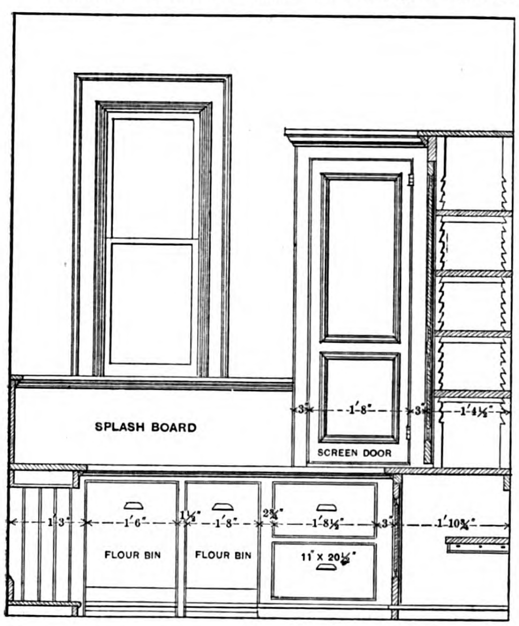


Details of Windows in Front and Side Gables.—Scale ¾ Inch to the Foot.

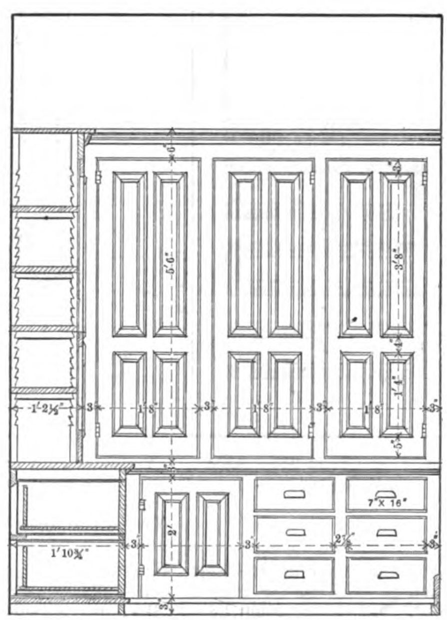
Elevation of Front Stairs, Looking Toward the Dining Room.—Scale, ⅜ Inch to the Foot.



Elevation and Section of Kitchen Sink.—Scale, ⅜ Inch to the Foot.



Elevation in Pantry, Looking Toward the Window.—Scale, ⅜ Inch to the Foot.

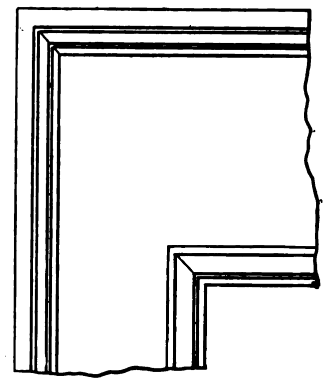


Elevation in Pantry, Looking Toward the Dining Room.—Scale, ⅜ Inch to the Foot.

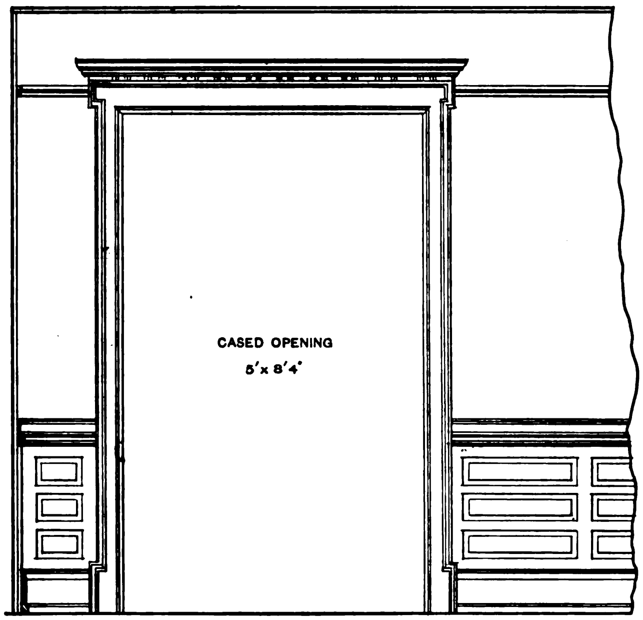
Miscellaneous Details of Brick Residence in Montclair, Col.

the construction of which is indicated in the details. A seat is provided in the reception hall and a toilet room with oval wash basin under the front stairs. The reception hall and the principal rooms on the first floor are connected by wide openings without doors. The rooms on the second floor are for family use, except the one over the dining room on the north side, which is reserved for guests. The library over the reception hall is Mr. Anders' "den," and for special comfort a fire place has been provided. The balcony from this room is large and ample for the entire family and has a seat placed on each side. The rooms are provided with ample closets, while the bathroom is fitted with the usual conveniences. The finish of the second floor is natural white pine. The third floor, or attic, is completed in a way to give a large dancing hall. In the ceiling of this room are placed extra timbers and rings for gymnasium purposes. A bathroom with tub only is also provided on this floor, as well as a storeroom and a sleeping room with closet. The wood work in the attic has three coats of paint.

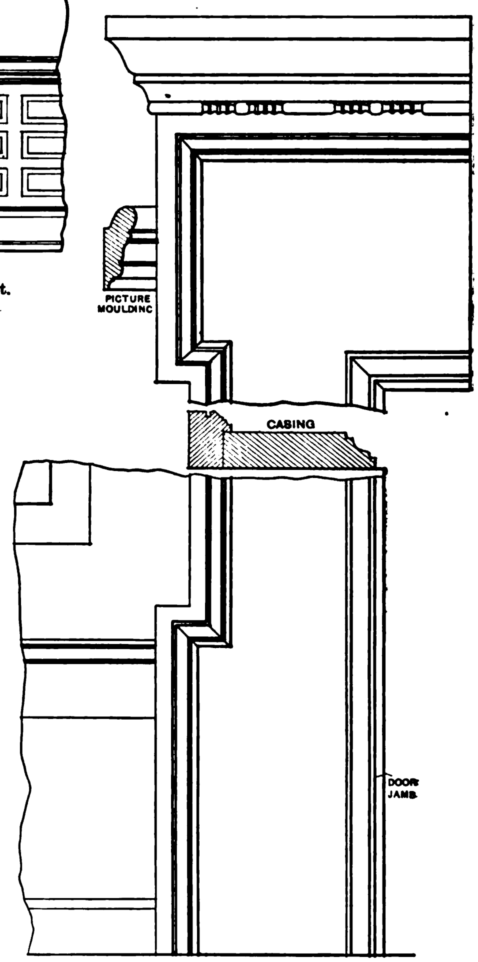
In the case of the hardwood finish the wood was first filled with Felton, Rau & Sibley's Model liquid filler, after which it was treated to three coats of "Brilliant flowing varnish," the second coat being rubbed with pumice stone and water, and the third rubbed to a dead finish with rotten stone and oil. The pine finish was treated to two coats of similar varnish

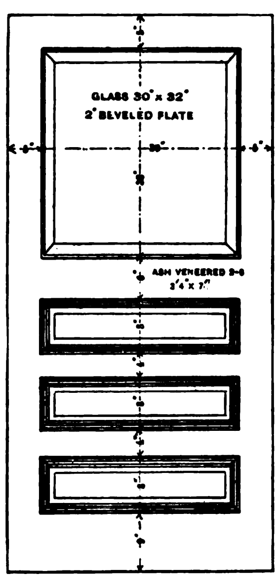


Detail of Head Casing for All Pine Finish.—Scale, 3 Inches to the Foot.

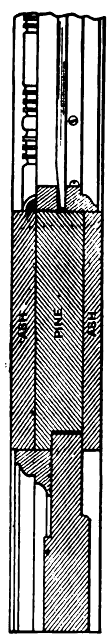


Elevation Showing Dining Room Finish.—Scale, ⅜ Inch to the Foot.





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



Vertical Section of Front Door.—Scale, 3 Inches to the Foot.

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

Miscellaneous Details of Brick Residence in Montclair, Col.

finished to a dead polish, the same as the hard wood on the first story. The house is wired for electric lights, the system having the following switch loops: Piazza light at front hall, balcony light at library, attic light at rear hall, second story; reception hall light at reception hall and laundry light at kitchen.

The plumbing fixtures are first-class throughout the house, the copper boiler in the kitchen having a capacity of 52 gallons. The bathtubs on the second and third floors are 5½ feet in length, made of 14-ounce planished copper. Extra heavy cast iron soil pipe is used throughout the work, and all fixtures are trapped and ventilated. A brick cesspool, 4 feet 6 inches inside diameter and 18 feet deep, receives the waste water from the house. The plumbing fixtures in the yard consists of a Murdock anti-freezing hydrant near the stable and four street washers for lawn sprinkling. The house throughout is heated by hot water and 776 square feet of direct radiation. The radiators are 38 inches high, each fitted with quick opening and air valves and finished in bronze. The pipes in the cellar are covered with asbestos paper, ¾ inches of hair felt and finished with canvas.

The building cost a trifle under $13,000, not including the architects' fees. Some of the more important items are lumber, glass, &c., $3,343.19; carpentry work, $2,771 80; brick work, $2,222.05; plumbing, $955.20; painting, $841.28; plastering, $390.30; hardware, $292.58; mantels and grates, $236; cut stone, $170; concrete, $61.95; electric bells, $52.20; tin and galvanized iron, $157.85, and heating, $985.50.

There was built in connection with the dwelling a stable with three stalls, carriage room, outhouse, coal room and a cow shed at one end of the building. The stable was of brick, 20 x 37 feet, with walls 16 feet 8 inches and a shingle roof.

Trimming Joists.

The efficiency of single flooring is materially affected by the necessity which constantly occurs in practice of trimming round fire places and flues and across openings. Trimming is a mode of supporting the end of a joist by tenoning it into a piece of timber crossing it, and called a trimmer, instead of running it on or into the wall which supports the ends of the other joists generally. A trimmer requires for the most part to be carried or supported at one or both of its ends by some of the joists, which are called trimming joists, and are necessarily made stouter than if they had to bear no more than their own share of the stress. Commonly it is found enough to make trimmers and trimming joists from ½ inch to 1 inch thicker than common joists. In trimming tusk tenons should be used, and the long tongue or main body of the tenon should run not less than 2 inches through, and be draw pinned and wedged, moreover, if it do not completely fill the mortise in the direction of the length of the latter. The principal objection to single flooring, says a writer in an exchange, is that sound readily passes through, the attachment of the boards above and of the ceiling below being to the same joists throughout. Another objection is the necessity of making the joists so thin, not to injure the ceilings, that they with difficulty receive the flooring brads in their upper edges without splitting. A partial remedy for both these disadvantages is found in a mode sometimes adopted of making every third or fourth joist 1 inch or 1½ inches deeper than the intervening joists, and to these ceiling joists are notched and nailed, or nailed alone. This, by diminishing the number of points of contact between the upper and lower surface, for the ceiling joists must be carefully kept from touching the shallower joists of the floor, is less apt to convey sound from one story to another, and allows conveniently thin joists to be used for the ceiling without affecting those of the floor. It clearly, however, involves the necessity of cogging the deeper joists down so much more on the wall plates on which their ends rest.

The Strike Commission.

The commission appointed by the President after the Pullman strike, to investigate the conditions surrounding employer and workman, which permit the outgrowth of strikes and lockouts, has made as thorough a study of the field as was possible under the powers granted it, and the result is well set forth in the following summary, which takes the form of recommendations:

I.

1. That there be a permanent United States strike commission of three members, with duties and powers of investigation and recommendation as to disputes between railroads and their employees similar to those vested in the Interstate Commerce Commission as to rates, &c.

a. That, as in the Interstate Commerce act, power be given to the United States courts to compel railroads to obey the decisions of the commission, after summary hearing unattended by technicalities, and that no delays in obeying the decisions of the commission be allowed pending appeals.

b. That, whenever the parties to a controversy in a matter within the jurisdiction of the commission are one or more railroads upon one side and one or more national trades unions, incorporated under chapter 567 of the United States Statutes of 1885–86, or under State statutes, upon the other, each side shall have the right to select a representative, who shall be appointed by the president to serve as a temporary member of the commission in hearing, adjusting, and determining that particular controversy.

(This provision would make it for the interest of labor organizations to incorporate under the law and to make the commission a practical Board of Conciliation. It would also tend to create confidence in the commission, and to give to that body in every hearing the benefit of practical knowledge of the situation on both sides.)

c. That during the pendency of a proceeding before the commission inaugurated by national trades unions or by an incorporation of employees, it shall not be lawful for railroads to discharge employees belonging thereto except for inefficiency, violation of law or neglect of duty; nor for such unions or incorporation during such pendency to order. unite in, aid or abet strikes or boycotts against the railroads complained of; nor for a period of six months after a decision for such railroads to discharge any such employees in whose places others shall be employed, except for the causes aforesaid; nor for any such employees during a like period to quit the service without giving 30 days' written notice of intention to do so; nor for any such union or incorporation to order, counsel or advise otherwise.

2. That Chapter 567 of the United States Statutes of 1885–86 be amended so as to require national trades unions to provide in their articles of incorporation, and in their constitutions, rules and by laws, that a member shall cease to be such and forfeit all rights and privileges conferred on him by law as such by participating in or by instigating force or violence against persons or property during strikes or boycotts, or by seeking to prevent others from working through violence, threats or intimidations; also, that members shall be no more personally liable for corporate acts than are stockholders in corporations.

3. The commission does not feel warranted, with the study it has been able to give to the subject, to recommend positively the establishment of a license system by which all the higher employees or others of railroads engaged in interstate commerce should be licensed after due and proper examination, but it would recommend, and most urgently, that this subject be carefully and fully considered by the proper committee of Congress. Many railroad employees and some railroad officials examined and many others who have filed their suggestions in writing with the commission are in favor of some such system. It involves too many complications, however, for the commission to decide upon the exact plan, if any, which should be adopted.

II.

1. The commission would suggest the consideration by the States of the adoption of some system of conciliation and arbitration like that, for instance, in use in the commonwealth of Massachusetts. That system might be re-enforced by additional provisions giving the board of arbitration more power to investigate all strikes, whether requested so to do or not, and the question might be considered as to giving labor organizations a standing before the law, as heretofore suggested for national trades unions.

2. Contracts requiring men to agree not to join labor organizations or to leave them, as conditions of employment, should be made illegal, as is already done in some of our States.

III.

1. The commission urges employers to recognize labor organizations; that such organizations be dealt with through representatives, with special reference to conciliation and arbitration when difficulties are threatened or arise. It is satisfied that employers should come in closer touch with labor, and should recognize that, while the interests of labor and capital are not identical, they are reciprocal.

2. The commission is satisfied that if employers everywhere will endeavor to act in concert with labor; that if when wages can be raised under economic conditions they be raised voluntarily, and that if when there are reductions reasons be given for the reduction, much friction can be avoided. It is also satisfied that if employers will consider employees as thoroughly essential to industrial success as capital, and thus take labor into consultation at proper times, much of the severity of strikes can be tempered and their number reduced.

Dutch House Building.

Life in Holland is much mitigated by moisture. The land is sand, but it is not, remarks a contemporary, for that reason dry as the desert, because, when a foundation of 3 feet is dug for a house, it is filled with water in the course of a few hours, and a solid basis is obtained only by driving in piles very closely together. The king's palace, in Amsterdam, though built of marble. rests on 70,000 wooden piles, and it is as square and true as if it stood on a stone bed. This is matter for wonderment, because everywhere, especially in the old cities, the houses are all awry in all sorts of ways; many of them lean over toward the street in the most threatening manner for the foot passengers, while others, perhaps, lean the other way, with equal threatening to the navigators; for, if there is a carriage road on one side of a house, there is sure to be a canal on the other, although often the canal and the drive and the avenue run together, and the housewife goes to a ship or a boat to buy fish or potatoes, instead of going to a shop or having them genteely delivered from the tradesmen's carts. The land is literally full of water, and should the useful windmills cease to turn, it would become one vast swamp, and on the polder land all life would soon be destroyed by consuming inundation. It is nevertheless true that the people enjoy good health.

FOR filling up the pores of the wood before commencing to polish. For white wood, equal portions of whiting and plaster of Paris, thinned to a paste with turpentine and rubbed well into the grain of the wood. If for mahogany, add rose pink, or whatever the color of the wood is, and dry color to match up to same.

HINTS ON WOOD CARVING.*

By CHAS. J. WOODSEND.

In recent issues of the paper I have noticed inquiries from correspondents expressing a wish for a few designs suitable for carving and also for instructions how to execute them. In response to these requests I will endeavor to present a few remarks, accompanied by sketches of designs which may prove of interest to many besides those asking for the information. What I shall first treat will be not wood carving proper, although it is called such, but "chasing" and the tools required for the work. Carving may be, and frequently is, sunk below the surface, but it is always raised or is in relief from the background, while chasing is sunk into the surface which, in this case, forms the background. Chasing is the simplest form of carving, and any one with the proper tools may, in a short time, be able to cut the designs with neatness and good effect. The tools at first required are gouges of different sizes, those marked on the catalogues "medium" and "quick" being the most useful to begin with; veiners, parting tools, slips suitable for sharpening the different sizes and shapes of tools, round headed punches, some thin cardboard and a flexible leather strop. Veiners are gouges but are deeper, as indicated in Fig. 1 of the illustrations, the gouge being shown in Fig. 2 Parting tools are shaped like a V, one being represented in Fig. 3. The round ended punch, Fig. 4, can be readily made from a short piece of wire or small iron rod. After it has been filed round it can be polished with fine emery. The handles of the tools may be any shape desired, but I would say let them be plain, as fancy shaped handles for carving tools are all a snare. Have the handles sufficiently large to hold the tools firmly, for sometimes there is considerable pressure upon them, and small handles are likely to cramp the hands when held for any length of time.

In grinding the tools let them be as near the shapes shown as possible. It will be noticed that the veiners and parting tools are ground back so that the surface of the work is cut first and the bottom last. This prevents the grain of the wood from tearing and leaving an unsightly place. The gouges, Fig. 2, on the other hand, are ground semi-circular at the end, and are so ground for the same reason that the veiners and parting tools are ground sloping backward. The use of the gouge, however, is different, but the end in view is the same. In purchasing tools buy a few at a time and as required. In this way there will not be a lot of useless tools on hand. Do not buy any of the so-called "sets" of carving tools, but purchase of a reputable dealer and see that the maker's name is plainly stamped upon them. I have had an experience of 35 years with wood working tools in three countries and upon two continents, and I have always found that American tools are equal, and in most cases superior, to tools of foreign manufacture.

For slips for sharpening tools I would advise procuring the best Arkansas stones. At all events, they suit me better than any other that I have used. There is one thing that I wish to impress strongly upon the mechanic, that is, that the tools must be kept sharp. Grind them thin with a long basil or bevel. Of course, it must not be overdone, but I say, grind them with as long a bevel as they will stand. A little practice will soon enable one to obtain the correct shape. Carving tools are required to be kept sharp and in as good order as one would keep a razor, otherwise do not attempt carving for it will be a miserable failure.

Assuming now that the tools are in good order the mechanic is ready for the first lesson. Before trying to cut any special design I would advise obtaining a piece of board free from knots, but rather hard grained. The harder and more cross the grain the better the practice will be, because in regular work one cannot always choose the stuff, but very frequently must take it as it comes. As a consequence if one can make a true and clean cut in cross grained stuff he will have little trouble with the straight and soft grained. Commence by cutting curves of all kinds and shapes imaginable, or which the fancy may dictate. Go at it boldly, holding the tools firmly with both hands. Cut at random, but try and cut of equal depth and width each line that is made. Use the veiners and parting tools until they are familiar and a curve or scroll can be made which is equal in depth and width throughout. After this has been done try straight cuts, still cutting at random—that is, without lines. By practicing as described a boldness of execution will soon be acquired which would not be the case if an attempt was made at first to cut to lines. Have the work secured to the bench and learn to work right and left handed, as in practice it will be found of great advantage to be ambidextrous. Learn to make the cuts clean throughout at the first stroke. There is no cleaning up permissible in chasing. Make every cut tell and the first cut finish that portion. I would also recommend practice in cutting round holes, using the gouges until one can cut a nice round hole circular

Fig. 1.—General View and Section of a Veiner.

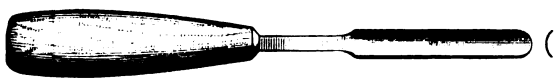


Fig. 2.—General View and Section of a Gouge.

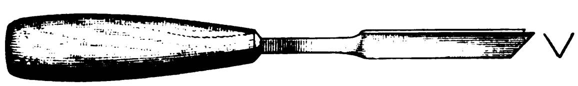


Fig. 3.—General View and Section of a Parting Tool.

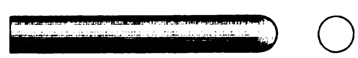


Fig. 4.—General View and Section of a Round End Punch.

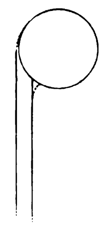


Fig. 5.—Showing How to Cut the Hole at the End of a Line.

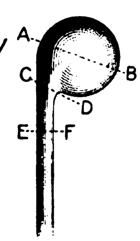


Fig. 6.—The Finished Work.

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

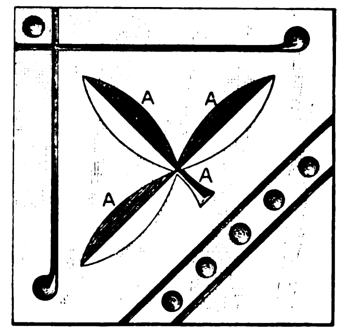


Fig. 10.—Design for a Corner Block.

Fig. 7.—Section on Line A B of Fig. 6.

Fig. 8.—Section on Line C D.

Fig. 9.—Section on Line E F.

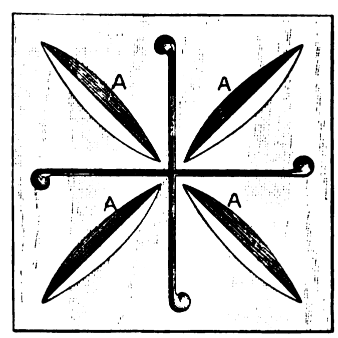


Fig. 11.—Another Design for Corner Block.

in plan and semi-circular in cross section. It is necessary to stand the gouge on end, bearing down and rotating it. As it sinks into the wood throw the handle out gradually until the piece is successfully detached from the work. It will be found to require considerable practice at first to make neat and clean cut holes, but perseverance will succeed. Do not remove the gouge until the hole is properly finished. Practice the foregoing faithfully and it will be found that what is to follow will be comparatively easy.

In the illustrations presented will be found a few simple designs suitable for corner blocks. There is nothing hard or difficult about cutting any of them, and with a few directions I think those interested will be able to succeed very well. In cutting the holes at the end of a line, either straight or curved, that is when the hole is placed on one side, let it be in a position similar to that indicated in Fig. 5. Then take a gouge and cut on the dotted lines shown, so as to make the result similar to Fig. 6. One gouge answers for both sides, using the convex side for one and the concave side for the other, inclining the handle so that the cut will meet nearly in the center. This is shown in Fig. 8, which is a section taken on the line C D of Fig. 6. Be careful and allow the bottom of the cut to be on an incline from the lines cut with the veiners to the bottom of the hole. This is to avoid leaving any abrupt places either at the beginning or at the end, the idea being to gradually merge one into the other. Now, take a round ended punch, the same size as the hole, and with a few light taps of the hammer clean and perfect the bottom and sides. A punch makes the holes more nearly perfect in size and shape than a gouge alone, but be very careful and not depend too much upon the punch, or some day there will be trouble when least expected.

Draw the design upon cardboard, although heavy paper will answer. Then cut it out so as to form a stencil, using a pencil in place of a brush or pad for marking purposes. It will be necessary to omit small portions of the design here and there in order to keep the stencil together. These portions can be added to the work, or the worker may cut by guessing as he may elect. All that is required is the proper size and distance and a suggestion of the design. With a little practice it will prove surprising how little is really needed.

Referring now to Figs. 10 and 11, those portions marked A are cut with a parting tool, the balance of the design being cut with a veiner. Those portions of Fig. 12 marked B B B are cut with a large veiner. Starting in at the large end and cutting toward the small one, finish by cutting the small end down square by means of a small, medium sweep gouge. In Fig. 13 the parts C C C are cut with a medium sweep gouge, they being too small to be properly cut with a parting tool. The most difficult design to cut in the series thus far given is shown in Fig 14. One may, if he choose, just outline it with a small veiner, but the most effective way is to cut it as shown. For cutting the part A B use gouges of the proper sweep, taking care not to cut too deep, but making it as shown in section A B of Fig. 15. Run a small veiner on the lines marked E E of Fig. 14, then take a medium sweep gouge and shave from other lines as shown in section C D of Fig 16. Now in cutting these designs, and in fact any design, cut boldly, not too deep nor yet too shallow. Bear in mind the effects of light and shade, for they constitute a very important part in carving of all kinds.

I have here given about the right proportions, so that the reader will have something of a guide with which to start, but practice and perseverance will teach more than can be taught upon paper. Cut all the angles sharp, not rounding out. Let everything be what it is represented to be. If it is a straight line, let it be straight; if a curved line, let it be curved. There is no royal road to carving. It is made up of small details, but all are necessary and none are so difficult as to deter any one with a little application from mastering it *

(*To be continued.*)

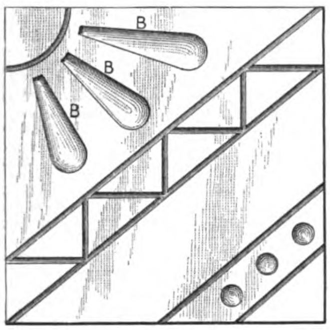


Fig. 12.—Design of a Different Character.

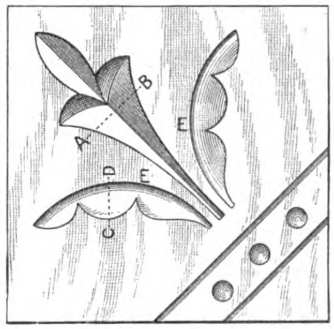


Fig. 14.—A Rather Difficult Design.

Fig. 15.—Section on Line A B of Fig. 14.

Fig. 16.—Section on Line C D.

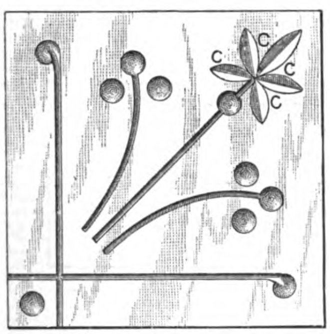


Fig. 13.—Another Variation.

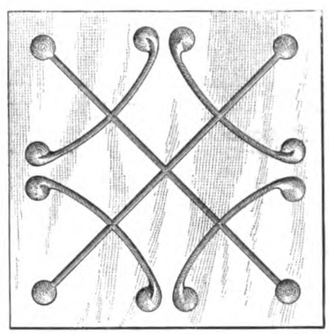


Fig. 17.—A Novel Design for Corner Block.

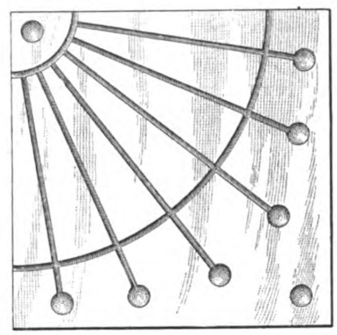


Fig. 18.—A Fan Shaped Design.

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

Imitating Ebony.

A correspondent of one of our exchanges gives the following directions for making various woods present the appearance of ebony :

To imitate black ebony, first wet the wood with a solution of logwood and copperas, boiled together and laid on hot. For this purpose 2 ounces of logwood chips with $1\frac{1}{2}$ ounces of copperas to a quart of water will be required. When the work has become dry wet the surface again with a mixture of vinegar and steel filings. This mixture may be made by dissolving 2 ounces of steel filings in $\frac{1}{2}$ pint of vinegar. When the work has become dry again sandpaper down until quite smooth. Then oil and fill in with powdered drop black mixed in the filler. Work to be ebonized should be smooth and free from holes, &c. The work may receive a light coat of quick drying varnish, and should then be rubbed with finely pulverized pumice stone and linseed oil until very smooth.

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

CONSTRUCTION OF A BUILT-UP TIMBER GIRDER.

THE INTRODUCTION into our large cities and towns of stringent building laws has had the effect of enormously increasing the demand for iron beams. All buildings of any prominence are put up on the principles of fire proof construction, consequently timber work of a very heavy nature may soon be a thing of the past. The only place one is likely to see it is perhaps in connection with some work of a temporary character, such as the centering of a large arch, the false works of a bridge, or in the construction of docks, ferry houses, &c.

The construction of a built-up timber girder is, therefore, a subject which will no doubt interest the younger readers of the paper, being intended for the benefit of those whose daily labors are of a routine character and who have not the opportunities of easily obtaining that general knowledge and experience which contribute so largely to success. When a girder is required of greater strength than any single timber at hand a way of uniting several pieces in such a manner as to bring about the desired result must be devised. There are several ways of doing this, but the present article will only deal with a single method.

If two timbers of the same length and cross section are placed one alongside of the other, it is manifest that they will sustain only double the load that one is capable of carrying; whereas if one be placed on top of the other their strength will be increased much more. If again they be firmly united in such a manner that they will act as one continuous piece, the result will be a very satisfactory timber.

It is a well-known fact that when a beam is loaded the upper fibers are in compression and the lower are in tension, while somewhere between the upper and lower edges there is a layer of fiber which remains unaffected. This is along the line of the neutral axis. In joining the separate parts of the girder the object sought is to prevent the pieces from sliding past each other and to connect the whole in such a manner as to act as nearly as possible as a single timber. This can be done as follows: Having determined the depth of the girder it will be necessary to have timbers of $\frac{6}{10}$ of this depth.

As will be seen by referring to Fig. 1 the girder consists of three distinct pieces. The lower piece runs the whole length, whereas the two upper pieces are butted together in the middle of the span at a' a''. The lower piece is then made to conform to the following dimensions which are also shown in the sketch: In the middle, six-tenths of the total depth, and at each end four-tenths of the total depth. The lower piece is then bent about one-sixtieth to one eightieth of the total length and must be kept in this position throughout the entire manipulation. Parallel to the upper edge and at a distance of one-tenth of the total depth the line x y, Fig. 2, is drawn, and on this line the points 1, 2, 3, &c., are laid off symmetrically from the middle to the right and left. The distances 1 a, 2 b, 3 c, &c., are usually made equal to the total depth of the girder, or a trifle less. Perpendicular to the lines 1 a, 2 b, 3 c, &c., draw the lines 1 b, 2 c, 3 d, &c., and when this is done the superfluous wood is to be cut away. It is absolutely necessary that this portion of the work should be executed with the greatest accuracy.

Referring to Fig. 2 it will be noticed that the lower piece of the girder is still six-tenths of the depth in the middle at a a' and only four-tenths at each end, as at x x', this being caused by the cutting away of one-tenth, which is the depth of each tooth. The two upper pieces of the girder are to be prepared in the same manner as the lower one, after which they are placed in proper position.

At the butt joint, a' a'' Fig. 1, a lead plate is sometimes placed between the ends of the two upper pieces to prevent the end fibers from being crushed. The whole is then strongly bolted together with bolts placed from one to one and a half times the depth of the girder apart. The girder may now be released from its bent position, and if the workman has done the job as it should be the girder will vary very little from its bent position. As the ends of the teeth will be pressed together when the girder is loaded a crushing may take place when the girder is built of soft, fibrous wood. This is obviated by the introduction of hard wood wedges as shown in the left half of Fig. 1, or the wedges may be made of metal if more convenient.

In cases where the girder is to be of considerable length and the lower piece can no longer be made in one, it is necessary to resort to the arrangement shown in Fig. 3. The only difference between this and the previous one is found in the middle piece, which has the teeth cut in opposite directions, thereby insuring a thorough interlocking of all five members.

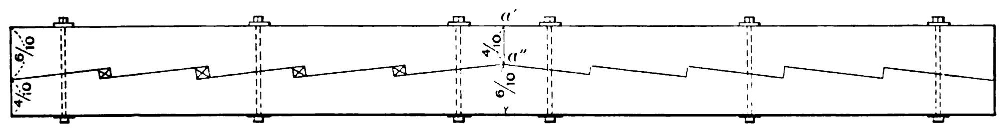


Fig. 1.—Girder Consisting of Three Pieces.

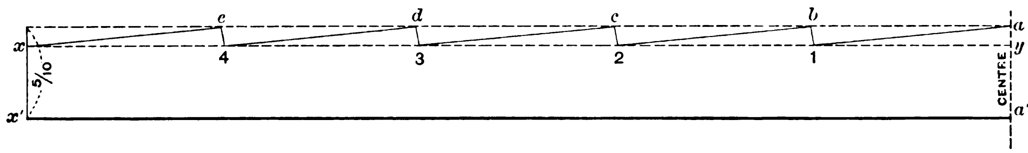


Fig. 2.—Showing Manner of Obtaining the Cutting Lines.

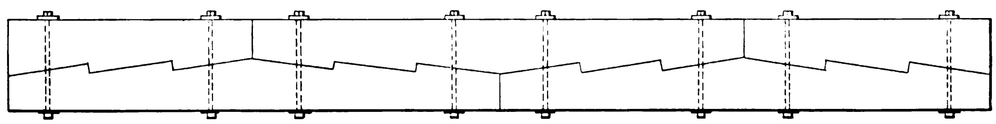


Fig. 3.—Girder made up of Five Pieces.

Construction of a Built-Up Timber Girder.

Japanese Lacquer.

In an article on rustless coatings for iron and steel, a writer in the *American Machinist* says: The adaptableness of this natural vegetable product to the preservation of metallic surfaces, as well as those of wood, paper and other fibrous bodies, has never received the attention of engineers that the industrial importance of this method of coating and protecting surfaces demands. The general idea that its application is one of art, and is only adaptable to bric-a-brac, is wholly erroneous. The Japanese use it for an infinite variety of purposes—acid tanks, coating the keels of ships, highly finished coach and decorative panels, and articles for domestic use, resisting hot water, soap and alkaline solutions. It may be truly said that were it not for the bamboo and lacquer trees, life for the Japanese would hardly be worth living. There is no reason why the lacquer tree should not thrive in this country. Its sap, which is used as the material for all lacquer work, is a natural essence, and vastly superior to any varnishes used here. Unlike even copal, which is an artificial mixture of resin, fatty oils and turpentine, Japanese lacquer is a ready made product of nature that hardens into a mirror-like smoothness, never splits or cracks, and is of great durability.

WHAT BUILDERS ARE DOING.

REPORTS from various sections of the country show the total of the work done in the building trades to be in excess of what has been stated during the past few months. The recovery from the stagnation of the panic of last year has been surprisingly rapid in the East, more so than in any other section of the country. All the larger cities of the Eastern States, north of and including Baltimore, report a volume of business largely in excess of that of the same period in 1893, and compares favorably with previous years. As was stated last month the amount of work done has been much greater than was anticipated in the earlier part of the season. The territory lying midway between the Eastern States and the Mississippi River seems to have recovered more slowly. Cincinnati and other cities report business quiet and the prospect for the coming year not yet sufficiently defined to warrant prediction. Chicago and St. Louis report business good, especially the latter city. In the Northwest, including St. Paul and Minneapolis, everthing is reported dull with little prospect of any increased activity before spring. From Omaha to the Pacific Coast the recovery of normal activity has been slower than elsewhere, many of the more important cities of that section having done very little business as compared with what would have been done had the financia lcondition been less uncertain.

In the January issue a report will be made of the condition of business during the past year in all the principal cities of the country, showing the relative amount of work done, and as far as pertinent the general conditions prevailing in the building trades.

Baltimore, Md.

The effort to secure the extension of the scope of the Polytechnic Institute, by the builders of Baltimore, to include classes in the building trades is still being pushed with vigor and with increasing promise of success. The matter is being urged upon the City Council for action, and the following portion of an editorial from the Sunday *Herald* of October 28 shows the position taken by one of the daily papers of the city:

The education of the artisan should keep step with the advancement in theoretical branches. This necessity is recognized in the passage of municipal ordinances imposing certain intellectual requirements upon plumbers; in other words, requiring them to pass an examination before a competent board. While this is done in the interest of health, it has elevated the craft and resulted in superior workmanship.

So apparent are the advantages of technical instruction to men engaged in the building trades that the project of the exchange has received the earnest support of the Federation of Labor. Schools like that which it is desired to establish here exist in other cities. They are mostly the result of private enterprise, but the builders very justly argue that if it is proper for the city to erect, equip and maintain colleges wherein young men may get a start for a professional career it becomes a duty to give those who desire to become adept mechanics an equal chance.

The unerring logic of this proposition cannot fail to impress itself upon the City Council and favorable action is confidently looked for. The mechanics and artisans of Baltimore are the most intelligent in the country, and they are to be numbered among our most valuable and useful citizens. All that tends to the broadening, elevating and bettering of their vocations deserves the serious consideration of those who are entrusted with the educational wants of the people.

Boston, Mass.

The amount of business in the building trades which has been reported for the past three months or more still continues, and the outlook for next year is very satisfactory. A summary of the year's business, it is expected, will show the total to compare favorably with other and more satisfactory years. There has been during the past two months considerable agitation of the subject of establishing a trades school in the city which shall give instruction in the building trades. The matter is being taken up by those interested in the application of the "Franklin Fund" to such an end, and by others identified with the interests of better trade education, and it is expected that some project will be given definite shape in the near future.

The Associated Charities are studying a plan for public labor exchanges through which the unemployed may be provided with work at all times. It is proposed if this can be brought about to have the State provide the buildings, but the exchanges otherwise to be conducted on purely business principles in order that they may be under neither charitable nor political management. The Building Trades Council is also advocating the establishment of institutions of this character.

The secretary of the Master Builders' Association has recently appeared before several meetings having for their object the improvement of the relationship between employers and workmen, and has expressed the views formulated and recommended by the National Association in regard to arbitration and trade schools.

The lathers of the city started in on November 1 to establish the eight-hour day with an excellent prospect of success.

The Master Builders' Association is steadily increasing its membership as well as its influence as a power in the business community of the city. Many members of the association have identified themselves with public affairs and the following notice is an indication of the interest taken in matters effecting the welfare of the citizens:

The Board of Directors have made arrangements with the Massachusetts Anti-Double Taxation League, so that every individual connected with the Master Builders' Association may become a member of the League, and thus assist in the effort to defeat the attempts that are being persistently made to enact laws which will result in improperly and doubly taxing the citizens of this Commonwealth.

Chicago, Ill.

The convention of the Civic Federation of Chicago, called for the purpose of considering arbitration and conciliation between employers and workmen, has proved to be a most important meeting. It is the first ever held here of sufficiently extended character to embrace the interests of the whole country. The matter has been most carefully treated and a full report of the convention will be valuable in setting forth the conclusions reached by those who have given the matter effective and earnest study.

A reception and smoker, which was a very enjoyable affair, was tendered by the Builders and Traders' Exchange on the evening of November 15 to the secretary of the National Association, who was in the city at that time for the purpose of delivering an address on "Arbitration in the Building Trades." The secretary made a short address on the subject of arbitration and touched upon the relationship of exchanges to the National Association. There was a large attendance and everybody appeared to have a good time.

Social gatherings of this character are always productive of greater intimacy and fraternal feeling among the builders, and result in their being bound together more firmly than would be possible under ties of a solely business character.

The state of building in Chicago during the past month has been about the same as was reported for October. There have been few strikes of sufficient importance to be mentioned, the most serious being an old difference over non-union electrical workers on the Marquette Building. It was reported early in the month that the union men had virtually placed the building in a state of siege. The work has been carried on with considerable difficulty, the general contractor claiming that he had no control over the electrical workers, the contract of that portion of the work being apart from his own.

Cincinnati, Ohio.

Building operations in Cincinnati are not very active just at the present time, and a large proportion of carpenters is said to be idle. The situation is tersely described by a correspondent, who under recent date writes as follows: "The trade here is very dull, and more than half the carpenters are out of work. Daily wages have been reduced fully 50 per cent., so that mechanics have not money to purchase much of anything."

Lynn, Mass.

The Master Builders' Association is reported as being in excellent condition and continuing its effort to establish arbitration as the means for settling disputes between employers and workmen in all branches of the business. Since November 1 the carpenters have worked but eight hours per day. About 60 of the contractors have signed the agreement as to the hours. The following is the schedule: From November 1 to April 1, work from 7.30 a.m. to 12 m. and from 1 p.m. to 4.30 p.m.; from April 1 to November 1, work from 8 a.m. to 12 m. and from 1 p.m. to 5 p.m. The wages for a day's work shall be \$2.50 per day for first-class men and \$2.25 per day for second-class men, until April 1, 1895. Business in the trade is reported as very encouraging, there being but very few, if any, idle carpenters. The agreement provides that citizens of Lynn shall be given the preference on all jobs. The outlook for the future is most encouraging, judging by the building permits that have lately been issued.

Milwaukee, Wis.

The Builders and Traders' Exchange is still earnestly at work perfecting its plan of arbitration for adjusting matters in controversy between architects and employers, and between contractors. The following from the *Evening Wisconsin* shows the action taken up to the present time:

At a well attended meeting of the members of the Builders and Traders' Exchange the matter of adopting a resolution embodying a plan of arbitration to be pursued in controversies arising between contractors and owners was presented, and after a very animated discussion had been held, in which the sentiment was mainly for the adoption of the resolution, it was finally decided to appoint a committee of three to draw up rules and regulations to be presented to the next meeting. The committee appointed is composed of Garrett Dunck, C. G. Forster and James J. Quinn. It is stated that the plan outlined will undoubtedly be adopted, as it met with general favor among the contractors present at the meeting.

New York City.

The carpenters' unions are still opposing what is known as the "lumping" system, but it is claimed that less than 100 men are now on strike against the employment of lumpers in this industry.

The journeymen plasterers have settled their differences with their employers, and strikes in that trade have been called off. The plasterers' laborers will receive \$2.75 per day in the future, and wages will be paid every week. The plasterers' strike promised to be a more or less serious affair, and the Mason Builders' Association endeavored to do what it could to establish harmony between the Contractors' Association and the Union. The action of the mason builders is indicated by the following resolutions, which were adopted and put into effect:

NEW YORK, October 19, 1894.

Resolved, At a meeting of the Mason Builders' Association, "that the members of their organization recognize the position of the Employing Plasterers' Association in the present difficulty with their employees, and they recommend and urge all members of the Mason Builders' Association to be as lenient as possible with their plastering contractors pending a proposed settlement by arbitration.

And, be it further resolved, "That our committee 'On Organizing the Employing Plasterers' Association and the members of the Operative Plasterers' Association' are instructed to offer their services to both organizations to adjust the present difficulty by arbitration.

And it is further resolved, "That a copy of the above be sent to each member of this association, to the secretaries of the Employing Plasterers' Association and the Operative Plasterers' Association, and also to the members of the American Institute of Architects."

The secretary of the United Tin and Metal Workers' Union is credited with the following statement made about November 1 relative to the condition of affairs in the building trades.

Connected with the various branches of the building trade, such as masons, bricklayers, tin roofers, painters, lathers and plasterers there are, I should say, out of employment to-day in New York City, according to the rough estimate I can furnish, as subjoined:

Unemployed men	15,000
Wages per day (average)	\$3.50
Daily loss in wages	\$52,500

This estimate includes the unions merely. I have, of course, not the remotest idea as to how many non-union mechanics are out of work, but I should say quite a number.

I have seen it stated there are altogether

100,000 persons idle in the city, which is, I consider, a very conservative figure. There are probably more. The police this time last year furnished returns and the Central Labor Union later on, but I don't think any of them were complete.

The Builders' League, of which a description has been presented in these columns, is reported as being in good condition with steadily increasing membership. The Mechanics and Traders' Exchange still holds its own, and the project for the erection of a building by the Building Trades Exchange is being constantly pushed.

Notes.

The Builders' Exchange of Oakland, Cal., held its first annual banquet on October 28, and the reports show it to have been a brilliant success. The Board of Directors and officers of the exchange at present are as follows: William Winnie, president; J. C. Bassett, first vice-president; H. E. Jones, second vice-president; A. C. McTavish, secretary; E. H. Lake, treasurer; P. J. O'Leary, A. M. Boyden, A. Kendal, P. A. Cameron, Charles Sturm, W. W. Tucker.

At Jacksonville, Fla., on October 30, all union bricklayers in the city struck for $3 per day for nine hours' work. They had been working ten hours at private terms. Contractors on a number of prominent buildings were not disturbed in the least, being sanguine that they can fill the men's places with ease. There was no trouble in connection with the strike and none is expected.

C. L. McDonald who has been secretary of the Builders and Traders' Exchange of Kansas City ever since its formation, and who was principally instrumental in its establishment, has resigned from his position for the purpose of engaging in mercantile business. Mr. McDonald left the exchange with the best wishes of all its members, to whom he had endeared himself by his conscientious labors in their behalf and in behalf of the organization which he so long and ably represented.

The Scranton, Pa., *Truth* of October 16 describes the condition among the builders of that city as regards their relation to each other and the prospective business for the coming season as follows:

"The first of a series of semi-monthly meetings, which the Builders' Exchange will hold during the fall and winter months, was largely attended. These gatherings are held to increase the membership and bring out the social feeling. At the meeting the various branches of the trade and those closely connected therewith were discussed. The evils existing in the building trades and the means to overcome them if possible were thoroughly discussed. It was concluded that through the hearty cooperation of the members a large portion of these obstacles could be eradicated. This would result in untold benefits to the contractor and the workman. The outlook for fall and winter business was considered, and the prospects were regarded as fair. Prices for work were considered about the same as last year, but competition seemed greater owing to the large growth of our city, and a larger influx of workmen in the building line. Among those in attendance were Luther Keller, John Colligan, George D. Brown, Sykes Bros., M. W. Finn, C. N. Lord and H. A. Kaufold.

The Builders' Exchange of San José, Cal., has moved its headquarters to 36 South Second street. The new rooms are well lighted and ventilated, are central and in every way convenient for the business of the exchange. A large number of mail boxes have been fitted up for individual contractors of all kinds and in the rear are tables and chairs and all the necessary appurtenances for making estimates. On the membership roll of the exchange are found the names of nearly all the prominent contractors in the Garden City.

The protracted struggle between the contractors of Portland, Ore., and the local branch of the International Bricklayers' Union has been ended by a decision of the men to work nine hours at $5 per day. The bricklayers long held out for $5 and eight hours, claiming that this was the rule in other important cities, and that it ought to be the same in Portland. At a meeting of the union representations were made by agents of intending builders that, if the union would give up its fight and remove the danger of any labor trouble, important building work would be started immediately. The union concluded that it was standing in its own light, and took the desired action by an almost unanimous vote. The bricklayers' troubles have been in progress during almost the entire past building season, and the union men have seen their places filled with non-union men and with deserters from their ranks. They say they do not blame the men for taking their places. Times are hard and bread must be earned. They say they have found out it is a poor time to stand out on a question of principle.

Two members of the Carpenters' Union of Ithaca have gotten themselves in an extremely unpleasant position. A few days ago a non-union carpenter hired out to Jenks & Lambkin, builders, of that city, and was sent to work on a job where two union men were working. Said the union men: "If you want to stay on this job you will have to join the union." The newcomer thereupon walked straight to the District Attorney's office and entered a complaint against the union men. The District Attorney assured him that he had a plain case against them, and would have them indicted for conspiracy at the next session of the grand jury under the following provisions of the penal code: "A determination by workmen that an objectionable person, a scab so called, shall be driven away and prevented from working in a district, large or small, is a conspiracy pronounced by law to be criminal and punishable by imprisonment."

Andrew J. Campbell, one of the prominent members of the Mechanics and Traders' Exchange of New York City, has been elected to Congress from the Tenth Congressional District, which is a part of New York City Mr. Campbell has been one of the foremost men in the building trades of the city to advocate pacific measures in the settlement of differences between employers and workmen, and has been a power for good in the various organizations connected with the building trades of which he is a member.

Law in the Building Trades.

Breach of Building Contract.

Where the contract provided that the contractor should erect a building before a certain date for a specified price, to be paid in four installments, each payment to be made when certain work had been performed, and that if the contractor failed to furnish at any time sufficient material or workmen, the owner after three days' notice might proceed with the work and deduct the expense from the contract price, the fact that the contractor was dilitory in the work from the beginning did not entitle the owner to refuse to pay the second installment when the same was fully earned, and afterward terminate the contract as for a breach thereof by the contractor where the owner had acquiesced in such delay up to the time when such installment became due.—Smith *vs.* Corn, Common Pleas of New York City and County, 23 N. Y. Supp., 326.

Priority of Mechanic's Lien.

Under the statute which gives a lien to every person who performs labor or furnishes material to be used in the construction of any building for the work done or materials furnished by each, respectively, a material man can claim a lien only from the time he commenced to furnish material for the building; and if such time is subsequent to the creation of a mortgage lien, of which he has notice, his claim for material is subject thereto, though the building was in process of construction when the mortgage was executed, and though the contractor's lien may, perhaps, be prior to the mortgage under the statute, which provides that mechanic's liens are preferred to any lien, mortgage or other incumbrance which may have attached subsequent to the time when the building was commenced, work done or material commenced to be furnished.—Mechanic's Mill & Lumber Company *vs.* Denny Hotel Company, Supreme Court of Washington, 32 Pac. Rep., 1074.

In a suit to foreclose a mechanic's lien where other incumbrances by answer deny the facts necessary to create the lien, it is necessary for the mechanic's lienor in order to establish his lien as prior to such other incumbrances to prove such facts, including the time of commencing labor or of furnishing material.—Henry & Coatsworth Company *vs* McCurdy. Supreme Court of Nebraska, 55 N. W. Rep., 261.

Redemption from Mortgage Foreclosure.

A subsequent lien holder cannot be deprived of his right to collect his debt by redemption to the extent of the value of the property over the amount paid to redeem by the interposition of the liens of fraudulent and simulated securities. But if thereby prevented from redeeming, his damages would not exceed the amount of his debt. In a case where a lien creditor redeems from a prior lien holder and redemptioner, and the property is ample security for all the liens, the court will not at the instance of such subsequent lien holder undertake to inquire into the validity of the amount due on prior liens in order to enhance the value of the property in the hands of the last redemptioner.—Parker *vs.* St. Martin, Supreme Court of Minnesota, 55 N. W. Rep., 113.

Custom and Usage in the Meaning of Words.

Evidence tending to prove a particular custom to treat the word "cord" in the measurement of cedar posts as comprising 256 cubic feet is so inconclusive that the verdict of the jury to the contrary should be sustained.—McManus *vs.* Louden, Supreme Court of Minnesota, 55 N. W. Rep., 139.

Foreclosure of Mechanic's Liens.

The fact that a State statute gives an action at law to enforce a mechanic's lien will not deprive the Federal courts of jurisdiction to enforce such liens by bill in equity, for the question whether legal or equitable remedies shall be adopted by the Federal courts is determined not by the State practice or legislation, but by the nature of the case, and the foreclosure of a mechanic's lien is essentially an equitable proceeding.—Sheffield Furnace Company *vs.* Witherow, 13 Supreme Court Rep., 937.

Claims for Extra Work on Building Contract.

Where a person employed to construct sheds for a certain price is put to extra labor in laying the foundations through failure of the owner to properly grade the location, as he is required to do by the agreement, he may recover for such extra labor.—Becker *vs.* National Prohibition Park Company, Supreme Court of New York, 23 N. Y. S., 300.

Mechanic's Lien Upon Severable Contract.

Where one agreed to sell a vacant lot and to build a house thereon, both agreements were written on the same paper, but the consideration for each was separate and payable at different times. The house was built and a deed of the property given. As the agreements were several the owner was entitled to a mechanic's lien on the property for the amount due him for building the house.—Fulmer *vs.* Poust. Supreme Court of Pennsylvania, 26 At. Rep., 543.

METHODS OF HANDRAILING.*

BY J. V. H. SECOR.

IN the article last month reference was made to Peter Nicholson's system of handrailing, and now we shall illustrate an improvement that was generally accepted and published 40 years ago, known as the square cut ordinate system. Referring to the plan of rail, Fig. 34, from D as center describe the concave and convex lines of the rail in plan, as 1 8 and *a d*. Now draw the tangents A B and C B. From B, and at right angles to A B, erect the perpendicular B E J indefinitely. Draw E A as the inclination of one tangent. From B as center and B E as radius describe the dotted arc. From B erect the perpendicular B E at right angles to the tangent C B. Let C G be the full hight to which the face mold is to be drawn. Connect F G for the length and pitch of tangent. From C draw C I indefinitely and parallel to A B. Draw C H indefinitely and parallel to B J. From C as center and C G as radius describe the dotted curved line G H. From H draw a dotted line parallel to the pitch line E A, cutting the line C I at I. From I draw a line through A. extending it to J; then I A is the directing ordinate. Now, at any convenient place draw the seat line at right angles to the ordinate as R K. From C draw C L as an ordinate, and set up the full hight K L equal to C G. Connect L R. Now draw any number of parallel lines from the outer line of the rail terminating at the line R L, as shown by *x x x x*. Draw lines from these intersections at right angles indefinitely. Now with the compasses take the distance from the line R K, and to the several points along the curve in plan, as 1 0 and 2 0, &c., until all are transferred to *x a* and *x b*, giving the points through which to draw the curved line of the mold. From R as center and R A as radius describe the dotted curve line A S. Let V W of Fig. 35 equal U B and L Y equal K C. Connect S W and W Y for the tangents, and mark the joints at right angles to the tangent. Now complete the mold by drawing the curve through the several points from *a* to *g*. The other line will be found in the same way.

To find the bevels for squaring the wreath, proceed as follows: From B of Fig. 34 as center, and B P as radius, draw the curved line P Q, and connect Q J, then the angle at Q is the bevel to square the end at S. At any convenient point draw Z N, parallel to the pitch line G F. From C as center and C N as radius describe the curve N O; connect O T, then the angle at O will be the bevel to square the wreath at Y.

Referring to the plan of a full casing shown in Fig. 36 from E as center describe the lines of the rail E A and E C as the chord and joints in plan. Draw the tangents A B and C B. From B set up to D the full hight as contained in the wreath, and connect A D for the pitch tangent. Now as the tangent C B remains level, E C must be the seat line. From A draw A F G indefinitely at right angles to the seat line E C. Let F G equal the hight B D; connect C G. Now draw any number of lines as ordinates, in this case four. Let these terminate at the line G C, as at 0 0 0 0. From C as center and C B as radius describe the dotted curved line B I. Let G H of Fig. 37 equal F A of Fig. 36. Connect H I and I C for the tangents. Let 0 1 equal *x* 1; and in like manner all points for both edges of the mold. Draw the curve through the points thus established. At H mark the joint square with the tangent.

For the bevel to square the wreath at C take the angle at G. From B as center and B J as radius draw the arc J K; connect K L, then the angle at K is the bevel to apply at the joint H.

(To be continued.)

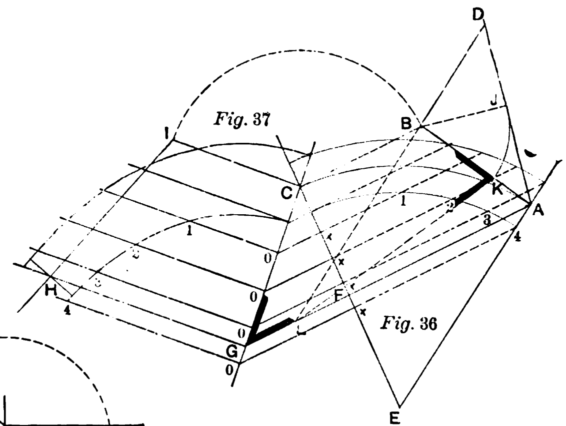


Fig. 36.—Segment of a Circle, Giving a Full Easement for Either a Starting or Landing of Circular Stairs.

Fig. 37.—The Face Mold for Wreath, as Drawn by Ordinates to Cover the Plan in Previous Figure.

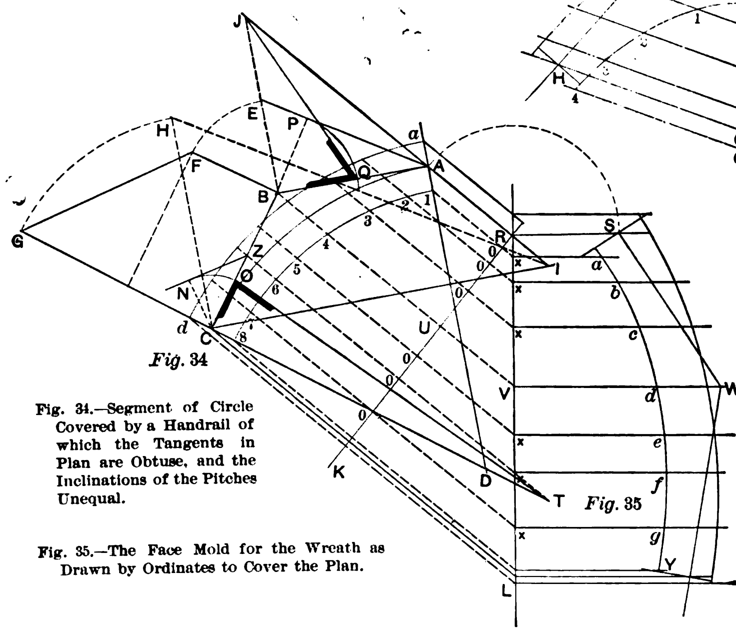


Fig. 34.—Segment of Circle Covered by a Handrail of which the Tangents in Plan are Obtuse, and the Inclinations of the Pitches Unequal.

Fig. 35.—The Face Mold for the Wreath as Drawn by Ordinates to Cover the Plan.

Methods of Handrailing.—The Square Cut Ordinate System.

*Continued from page 263, November issue.

Cork as a Building Material.

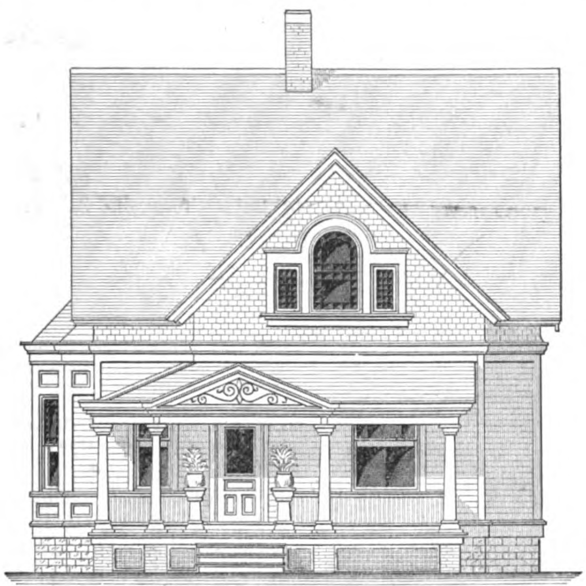
A writer, by the name of S. Campolo, in a late issue of a London paper, calls the attention of architects and engineers to the value of cork waste for building purposes. With a cement of plaster of Paris, dextrine and sesquioxide of iron, which may be made water proof by oxychloride of zinc, the pulverized cork may be formed into bricks which, while resisting compression, retain the peculiar properties of the cork. Such bricks, which have been already made and tested in France, only begin to crack under a pressure of 190 pounds per square inch. As a non conductor of sound, cork concrete has been tested in Paris for a hall ceiling to protect tenants overhead from troublesome noise at night. The cork composition is so elastic as to have an important effect in reducing vibrations due to the running of machinery; and as a lining for walls and partitions in a gunpowder factory, it has so resisted the force of an explosion that only a harmless shower of cork fragments fell upon the workmen. Cork bricks are very light, only about half as heavy as ordinary porous bricks. While not strictly fire proof, they do not spread fire, but carbonize very slowly, giving out smoke, but no flame.

IN some experiments conducted by the German Government on steel and iron girders the soft steel girder proved 22 per cent. stronger and the hard steel girder 66 per cent. stronger than the iron girder. The strength of steel girders appeared to be about the same for the two flanges, if made alike in sections.

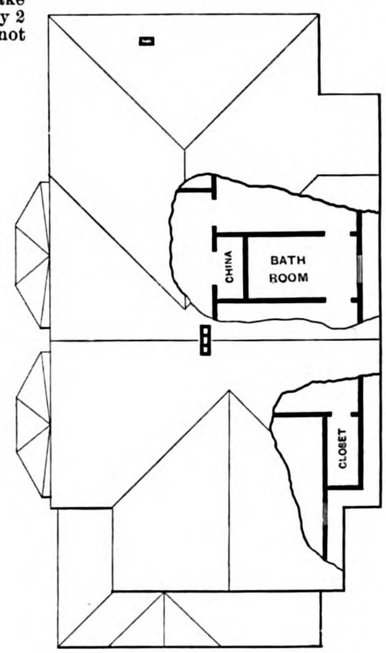
CORRESPONDENCE.

Elevations for a Six-Room House.

From GEORGE BARKMAN, *Hamilton, Ohio.*—I send herewith drawings in answer to the request of "Hawkeye." The heavily shaded lines on the roof plan indicate suggestions which I beg leave to make for the purpose of obtaining more room. By doing away with the closet which "Hawkeye" shows opening out of one of the bedrooms and making of it a china closet I secure an enlarged bathroom and a more commodious china closet than that shown by the correspondent named. I also place a closet opening out of the bedroom, as shown, for the additional reason that it gives a better shape to the roof. I have made use of 14-foot studding, securing thereby a good attic and giving a nice playroom or an excellent place for drying clothes. I purpose placing a cellar under the kitchen only. This house, built in a first-class manner, including plumbing and gas fitting, would cost in this locality from $1300 to $1500, much depending upon the finish and the grade of bathroom fixtures.



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



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

Elevations for a Six-Room House, Submitted by George Barkman, Hamilton, Ohio.

Concrete Foundations.

From G. Z., *Buffalo, N. Y.*—I would like to make a concrete foundation and desire to know the proportions of the ingredients used and whether it is profitable to make the foundation hollow. I would also like to know the cost.

Note.—Our correspondent does not intimate in his inquiry for what purpose concrete foundations are to be employed and as the mixture used varies with different circumstances and contractors, we cannot do more than answer in a general way. One authority suggests that, using the best brands of cement, the concrete be made up of one part Portland cement, three parts clean, sharp sand and five parts broken stone in sizes not exceeding 2 x 1½ x 3 inches. With these proportions one cask of cement will make a bed of concrete 6 feet square by 2 feet deep. When the cement is not of the best quality more should be used with the other materials than mentioned above. In some cases one part of cement to two of sand and three of broken stone give satisfactory results. Mr. Kidder in his "Architects and Builders' Pocket Book" favors the above proportions, and states that in mixing the concrete the stone, sand and cement should be thrown into the mortar box in the order named, and while one man turns on the water two or more should rapidly and thoroughly work the material back and forth with shovels, when it should be immediately carried to the trenches. Concrete should be deposited in layers not over 6 inches thick and each layer well rammed. If one layer dries before the next is deposited it should be well wet on top just before depositing the next layer.

Another writer on the subject of concrete in foundations suggests a barrel of high grade Portland cement to a yard of stone and sand, the latter being in such proportions as to make a compact mass. Still another combination is one part of cement to two parts of screened sand and two of stone, the latter being broken to a size to readily pass through a 2-inch iron ring in any direction. The proportions, however, are liable to change according to circumstances and every mechanic has a method of his own for doing the work. With regard to the cost of concrete experience has shown that a cubic yard ranges in price all the way from $3 to $7. While giving the above as bearing in a general way upon the subject of concrete foundations we trust our readers will take up the matter and give their experience for the benefit of the correspondent making the inquiry.

Construction of a Drawing Table.

From R. B. W., *New Orleans, La.*—I have been a reader of the paper for four years and am asking my first question in the Correspondence department. I want to know if some of the readers will submit for publication drawings showing the construction of a drawing table?

Plastering Brick Walls.

From H. B. W., *Aurora, Ill.*—I desire to ask the readers of the paper if it is necessary to lath the exterior walls of a brick house when the walls are built with a hollow space, or can plaster be placed directly on the brick?

Note.—If our correspondent plasters directly on to the brick walls it is very likely that in a short time the latter will have a spotted appearance, showing the heading courses. In some sections it is possible to plaster in this way with good results on account of the dryness of the atmosphere, but we are of the opinion that our correspondent will meet with much better success, all things considered, if he takes the trouble to furrow out and lath. This, of course, may be a trifle more expensive than plastering directly on to the brick, but we think he will find it cheaper in the end.

Making a Capstan.

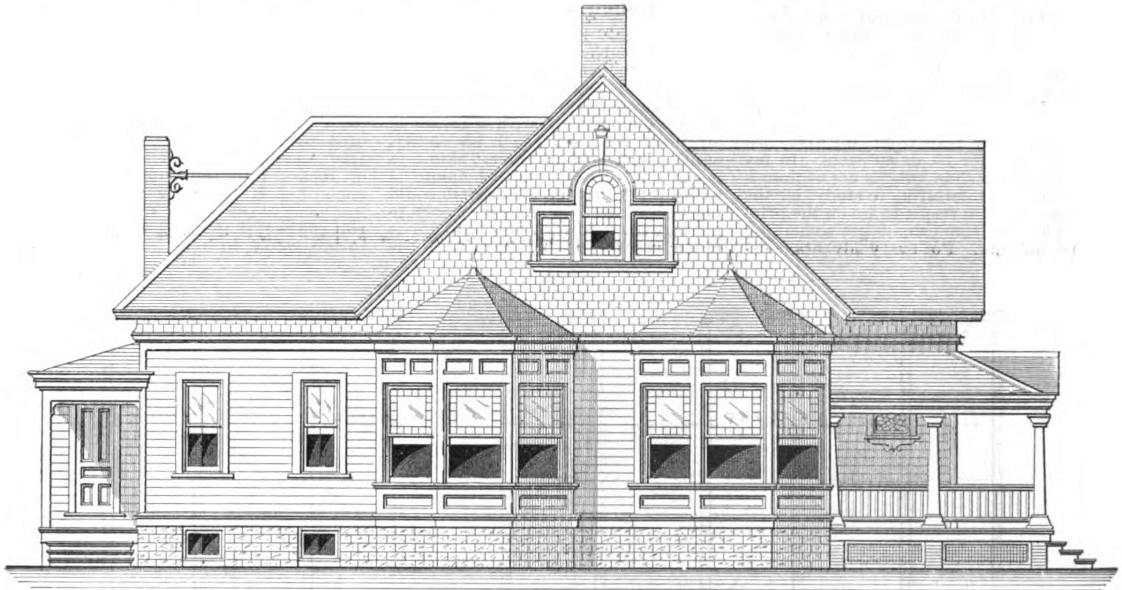
From A. O. C., *Milan, Minn.*—Will some reader kindly furnish for publication directions for building a capstan for moving frame building?

Why He Does Not Specify Wire Nails.

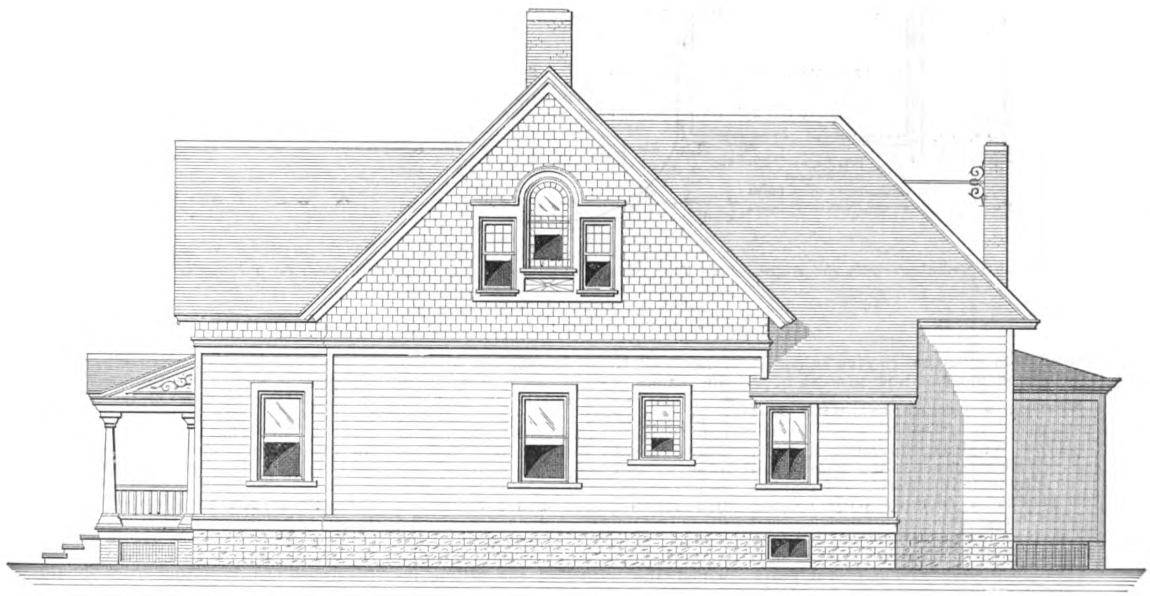
From S. F. B., *Wellington, Ohio.*—In a recent issue of the paper "F. J. C." of Richmond, Ohio, asks why I would not specify wire nails. In answer I will say I see nothing to recommend them. I used them on one job and the warping of the siding pulled them out and the work had to be done over with cut nails. My opinion is that wire nails will split work quicker than cut nails. "F. C. F." La Porte, Ind., is just about right, and so is "G. W. B." Something like 12 years ago we built a wing on the school house and a sixpenny cut nail was used for putting on the ridge roll. Three years ago I repaired the slating and used a sixpenny wire nail, putting a patch of tin over it. Yesterday I repaired the roof again and took out the two nails. The cut nail was all right, but the wire nail was not as large as a knitting needle. I go back on wire nails first, last and all the time.

also be undertaken with a view to its being a help to the better understanding of the science of arithmetic, but not as a substitute for it, as we can only intelligently solve by its means such problems as we are able to work out by the usual arithmetical methods.

because $4 : 8 = 8 : 16$. Further, it must be distinctly understood that addition and subtraction cannot be performed on the slide rule; it deals only with multiplication and division, or perhaps to speak more precisely, with proportion, every operation on it being reducible to this form of mathematical expression. The obtaining of the arithmetical mean is therefore clearly impossible with the slide rule.



Side (Left) Elevation.



Side (Right) Elevation.

Elevations for a Six-Room House.—Scale, 3-32 Inch to the Foot.

Mysteries of the Slide Rule.

From WILLIAM COX, *Stapleton, N. Y.*—In answer to "J. B. H.," Sheldon, Iowa, I would say that the study of the slide rule, like that of any other science, requires that its elementary principles be thoroughly mastered before attempting to comprehend its deeper mysteries. Its study should

With these ideas in mind, let "J. B. H." note that in arithmetic there are two "means"—the arithmetical and the geometrical. The arithmetical mean of two numbers is half their sum, while the geometrical mean is the square root of their product. Thus, in the case of the numbers 4 and 16, the arithmetical mean is $\frac{4 + 16}{2} = 10$, whereas the geometrical mean is $\sqrt{4 \times 16} = 8$. The geometrical mean is also called the mean proportional,

In conclusion, I would advise "J. B. H." to take up his book again and to commence at the beginning and master each page in order, assuring himself that he clearly understands the arithmetic of the problems which he is endeavoring to solve by means of the slide rule, and to pass over no single statement until he has fully grasped its import. If he will do this, light will soon begin to dawn upon him, and the further study of this ingenious and useful instrument will become a pleasure.

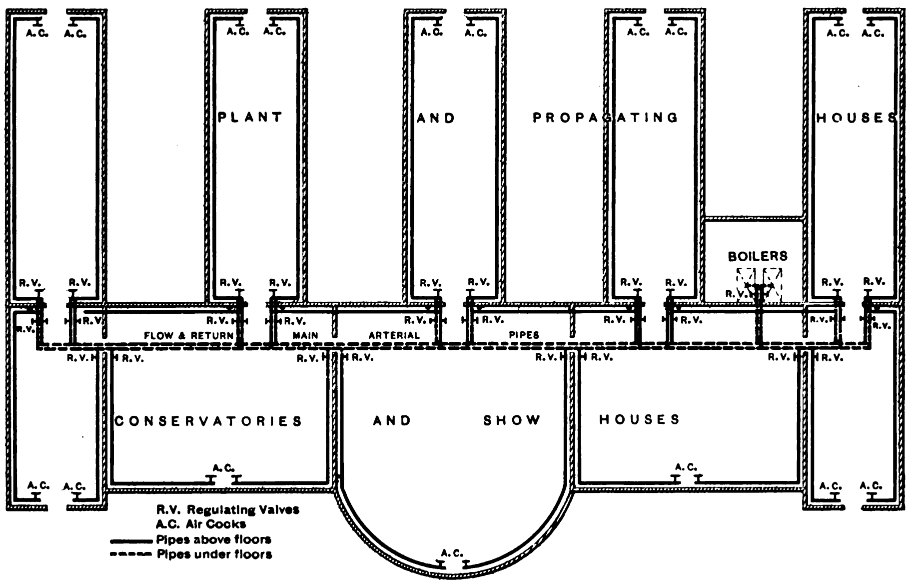
From W. W., *New York City.*—In answer to "J. B. H.," concerning the slide rule, I would say that he can get a small but complete work on the subject, published by Crosby, Lockwood & Co. of London, and called "The Slide Rule and How to Use It." There is a cardboard rule supplied with it which is a *fac-simile* of the ordinary carpenter's slide rule, which can be obtained by mail from any first-class tool store for 35 or 40 cents. In my opinion the slide rule is not as practical as it is interesting to study, for the reason that it seems to go on the principle that you cannot get something for nothing. For every advantage derived from it one has to give an equivalent in memory of how to work it.

Gates for Stock Pens.

From R. B. C., *New Orleans, La.*—Will some of the readers submit designs of gates ranging from 18 feet to 10 feet in width for stock pens?

Hollow Brick Walls.

From J. J. H., *Nanaimo, B. C.*—Under the above heading I notice an article in the November issue of *Carpentry and Building*, in which the writer advocates the construction of a 16-inch hollow wall, with 9 inches of an inner wall, a $2\frac{1}{2}$ inch air cavity, and $4\frac{1}{2}$ inches of an outer "skin," as he calls it, to keep out the damp. I really think that his designation could not be improved upon, as it appears to me that the "skin" would be about as much use to the building, were the inner wall found insufficient to bear the whole weight, as a man's skin would be to him should his flesh become so reduced as to leave nothing but bones underneath. In other words, a wall built in this fashion might as well be a 9-inch wall, or very nearly so, as far as stability goes, particularly so should such a thing as a sill or belt course of stone occur in the *façade*. However, I am afraid I am somewhat perverting the meaning which the writer of the article intended to convey by the word "skin." He looks on the outer wall as "merely a skin or covering to protect the main wall from the effects of weather." To follow up the illustration: It is not a man's skin which protects him from the effects of damp and cold, but a healthy circulation of the blood underneath the skin, and rheumatism and similar ailments are often accompaniments of poor circulation in a damp climate. In a somewhat similar manner one must have a free circulation of air in the cavity of a hollow wall, from basement to attic, in order to obtain the best results and have the inner wall thoroughly dry. A brick "skin" is just as porous as the human skin, particularly a $4\frac{1}{2}$ inch brick "skin," and if the damp is not sooner or later to attack the inner wall the cavity must be ventilated. Seriously speaking, I do not agree with the writer of the said article, and think that the main wall should always be on the outside. There are several reasons I could give for my opinion. For one thing, the weight of a building should be as evenly distributed on the walls as possible. When the thin wall is outside it carries nothing and depends for support on the inner wall; but when the $4\frac{1}{2}$-inch wall is inside it carries the joist, not necessarily altogether, as is implied in the article, but partly, for the weight can be distributed by extending the ends of the joists across the cavity a couple of inches into the outer wall, and anchoring in the outer wall. Again in the case of stone sill courses or belt courses, it is impossible, or next to impossible, to have good construction with a 4-inch outer skin, unless the stone is bonded into the inner wall, in which case there can be no ventilation of the cavity from basement to attic. Four inches is too narrow a bed for a belt course unless there is solid backing behind it. Another objection which to my mind presents itself, is that with the 4-inch wall outside one is bound to have nothing but stretching courses, which give the building away as a sham. It is not in accordance with the fitness of things that brick should be laid course after course without bond. Of course we all know that they are anchored with hoop-iron, wire anchors, tin, or some such rubbish, and those who know nothing about it think it looks very pretty. Far prettier, more appropriate and in accordance with the first principles of art, which ought certainly to influence the architect, is good Flemish bond, which cannot be executed unless the 9 inch wall is outside. Again, when the 9-inch wall is inside one cannot so easily ventilate the cavity and at the same time make a good solid job of the roof framing, whereas when outside, the $4\frac{1}{2}$-inch lining may stop at the ceiling joist, and the outer wall be carried up a foot or 18 inches above that level, being capped with a wall plate to receive the rafters. This



Heating a Greenhouse with Hot Water.—Plan View, Showing a System of Low Pressure Heating for a Range of Horticultural Buildings.—Scale, 1-16 *Inch to the Foot.*

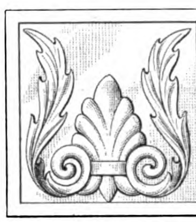
Heating a Greenhouse with Hot Water.

From W. McD., *Stapleton, S. I., N. Y.*—With reference to the diagrams in the May issue illustrating the manner of passing a doorway with heating pipes in a greenhouse, I herewith send a sketch illustrating the plan of a well arranged low pressure system in a range of houses, which several years' experience has shown me to be the best. The idea is to have one or two saddle boilers and flow and return arterial pipes, with check valves for regulating. From these, at each side of the house, branch pipes are taken to the stand, these also being provided with regulating valves. Air cocks or air pipes are taken from the highest part of each branch to allow the air to escape. The expansion box is placed in the boiler house at a sufficient hight above the boilers to regulate the supply of water and is joined to the return pipe to the boiler. The pipes are preferably 4-inch cast iron, with rust joints, or the joints may be made with either red lead or Portland cement. A grating placed over the pipe below the floor level allows the heat in the arterial pipes to be utilized.

affords an excellent opportunity of anchoring each rafter by means of a piece of scantling running up the inner face of outside wall and securely fastened from the ceiling joist to each rafter. The radical difference between the two methods of construction is simply this: That, whereas in the case of the inner wall being the thick one the outside wall performs no other function than keeping out the damp, and certainly does not materially help the stability of the building ; in the case of the inner wall being the thin one, the outer wall more effectually keeps out the damp, it being twice as thick, and both inner and outer walls carry the weight and mutually support each other. In other words, in the one case a wall of one brick in thickness represents the stability of the building, whereas in the other case a wall of a brick and a half in thickness represents the stability.

Designs for Corner Blocks.

From A. S., *Easton, Pa.*—In response to the request of "S. E. D." for designs of carved corner blocks, I



Designs for Corner Blocks.—Fig. 1.—Design Suitable for Carving with a Single Tool.

take the liberty of inclosing herewith two suggestions. Fig. 1 can be carved entirely with a single tool—a 1/8 No. 11, or better known as a liner. Fig. 2 can be carved with three tools consisting of a 1/8 No. 11, a 1/2-inch No. 5, and a 1/8 inch No. 3, the tool No. 5 being used to cut the notches and No. 3 to dig them out. Fig. 3 represents a bracket which, to be effective, should be sawed out (that is, the carved part of it) of 1/4-inch wood and glued on.

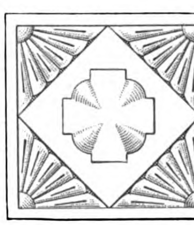


Fig. 2.—Design to be Carved with Three Tools.

As this, however, may be a little too difficult for a beginner the best way will be to line it the same as described in connection with Fig. 1 of the sketches.

Jug Shaped Cistern.

From M. L., *Warren, Ohio.*—In the July number of the paper I noticed a request from "A. V. H.," Hillsboro, N. D., for the plan of a jug shaped cistern. I inclose a sketch of a cistern as I understand his requirements. It is built of brick and cemented, and will hold about 40 barrels. Referring to the sketch, A represents an inlet of 3-inch pipe, B an overflow of 3-inch pipe with a trap at C, and D is a depression in the bottom of the cistern for sediment. The bottom should

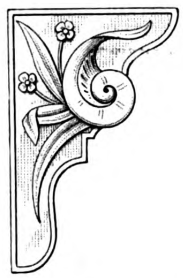
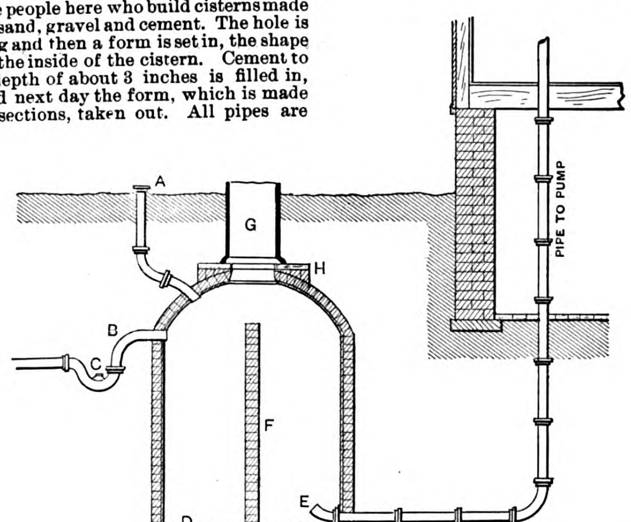


Fig. 3.—Design for a Bracket.

grade down to this point in order to make easy work of cleaning the cistern. E represents a 3-inch sewer pipe, turned up at the end to prevent the entrance of any sediment. It is cemented into the bottom of the cistern, carried through the wall into the cellar and up to the under side of the floor. All joints are thoroughly cemented. F represents the filter partition, made of sandstone, and is 5 inches thick. It should be built slightly on a curve, bulging toward D. The mouth of the cistern G, 20 inches in the clear, is made of sewer pipe and is 30 inches high. H is a flagstone, 4 x 4 feet in size and 3 inches thick, with an opening the size of the sewer pipe. It will be observed that the top of the cistern is 2 feet below grade, and the sewer pipe projects far enough above the grade to prevent any slush or dirt getting in at the top. It is fitted with a neat cover, which should be ventilated by means of small holes, but not of sufficient size to allow toads to enter. This plan admits of using a straight galvanized iron pipe on the pump, thus doing away with all lead pipes. The cistern being set well in the ground keeps the water cool in summer. The filtering partition F is sometimes built of red brick, but I think coarse sandstone better. There are people here who build cisterns made of sand, gravel and cement. The hole is dug and then a form is set in, the shape of the inside of the cistern. Cement to a depth of about 3 inches is filled in, and next day the form, which is made in sections, taken out. All pipes are

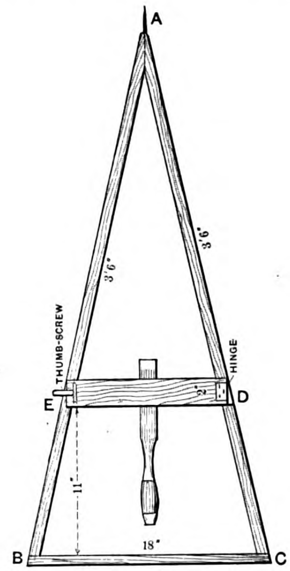


Sectional View of Jug Shaped Cistern Accompanying Letter of "M. L." of Warren, Ohio.

set and the inside given one coat of cement, first covering tight. In a day or two the cover may be opened a little to dry slowly. The water can be let in after a lapse of about three weeks. The cost is about $1 a barrel.

Frame for Grinding Tools.

From M. B., *New York City.*—I am greatly benefited by the many good things to be found in the Correspondence department of the paper, and I feel as though I ought to mention something of interest to the readers. I have a frame for grinding tools which I hold in one hand over the grindstone, turning the latter with the other hand.



View of Under Side of Frame for Grinding Tools as Made by "M. B."

I will describe it as briefly as possible. I rip a 2-inch board into two pieces, each 3½ feet long. These are for the sides, designated in the sketch as A B and A C. I take another piece 18 inches long, represented by B C, for the end. I then take two pieces, one of which I nail in 11 inches from B C and parallel with it. The other piece I hinge to the frame with a 2 x 1¾ inch hinge as shown at D. At the other end of the piece I use a small thumb screw or clamp, E, which holds the tool being ground in place between the two pieces. At A I drive in a nail, allowing it to project about 2 inches. I file off the head, giving a sharp point. I have my grindstone standing near a fence and stick the point of the nail into the fence, thus bringing the frame over the grindstone. I then proceed to sharpen my tools. In the sketch the frame is shown bottom side up with a chisel between the pieces at E D ready for sharpening.

Tools for Cleaning Chimney Flues.

From JAMES F. HOBART, *Brooklyn, N. Y.*—In one of the issues of *Carpentry and Building,* "Cæsar" of Louisville, Ky., describes his method of testing chimney flues and also tells about a weight and rope business for cleaning flues that may have become stopped or partially closed by swallow nests or brick dropped in by the masons when the chimney was constructed. "Cæsar's" weight and rope will do the business when half a dozen brick have become lodged, or when a colony of swallows may have preempted the location, but how would the weight and rope work when a foot or two of the chimney had been dislodged by lightning or by a tempest, and when about half the brick and mortar had fallen into the chimney and stuck there? I have had this thing happen several times, and the only way I could get around it was to cut a hole in the chimney on a level with the obstruction and then remove the brick. The trouble, dirt and muss which such a job makes are bad enough without speaking of it. After cutting out several obstructions of this kind I set my wits to work and constructed the device shown in Fig. 1 of the sketches. This did the business in fine shape. The tool is nothing but a large pair of blacksmith tongs in combination with a rope and pole. A hole was burned in one end of the pole, a ferrule driven on to prevent its splitting, and then one leg of the tongs was driven into the hole. The tongs were of such a size that they had a throat large enough to receive a brick the 2-inch way. The free leg of the tongs was bent outward to form a slight hook, and then the rope was spliced or tied on, after which it was passed through the screw eye A, as shown. In Fig. 2 is represented the manner in which the tool is used. The pole is let down into the chimney until the tongs rest on the obstruction; the bricks are pried about until the tongs get hold of one as shown; then the rope is pulled very tight and kept so until it is raised, bringing with it a brick.

In small chimneys difficulty was found in opening the jaws of tongs far enough to get hold of a brick. This was due to the fact that the long free handle struck against the side of the flue. The difficulty, however, was overcome by cutting off one leg very short and forming an eye in the end of the stump, as shown in Fig. 3. The screw eye then had to be put on the remaining leg, and then when the rope was slackened the tongs could open much wider than when the whole length of leg was employed. A number of times I found it necessary to knock one or more brick out of a chimney when they had become lodged after falling into it. To knock a hole through such obstructions I took a 4-inch stone drill, as represented in Fig. 4, a drill of this kind being used for making 4-inch holes in stone for setting iron fence posts. There are two cutting edges at right angles to each other, and these corners soon cut and break up the brick against which the drill may be churned. As stated, however, the drill business will only do when the obstruction is tight. It is better to use tongs and pick out all the brick possible before attempting to drill through. If the stoppage is close to the top of the chimney, within sight, a pretty stiff pole will work well to carry the tongs, but if down a long distance and the chimney has bends in it, then a slim pole of hard wood must be used so that it will readily pass through a crooked flue.

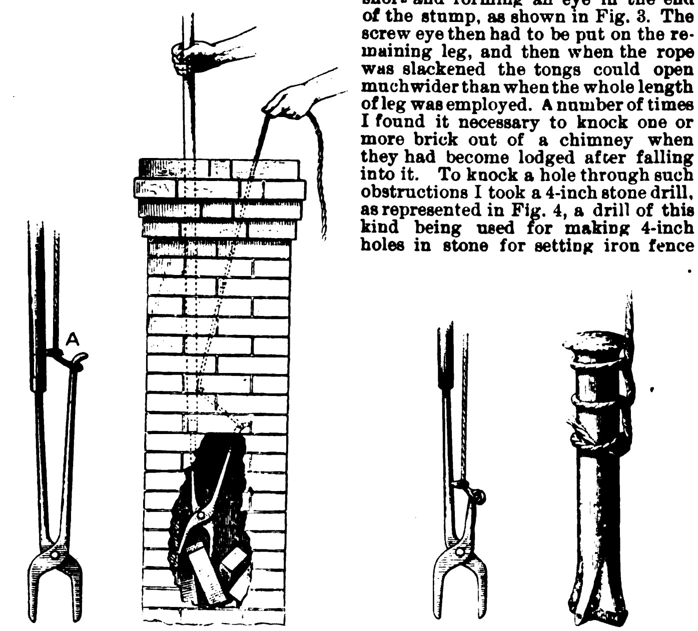


Fig. 1.—Tool for Clearing Chimney Flues. Fig. 2.—Showing Method of Operation. Fig. 3.—Tool for Small Flues. Fig. 4.—Stone Drill.

Tools for Cleaning Chimney Flues.—Illustrations Accompanying Letter of Mr. Hobart.

Protecting Plate Glass.

From J. T. K., *Belmond, Iowa.*—Will some one please tell me if there is any way of protecting a plate glass front from a fire on the opposite side of the street. I do not see anything of the kind advertised, but think something in the way of a large curtain which could be rolled up on the outside would serve a good purpose.

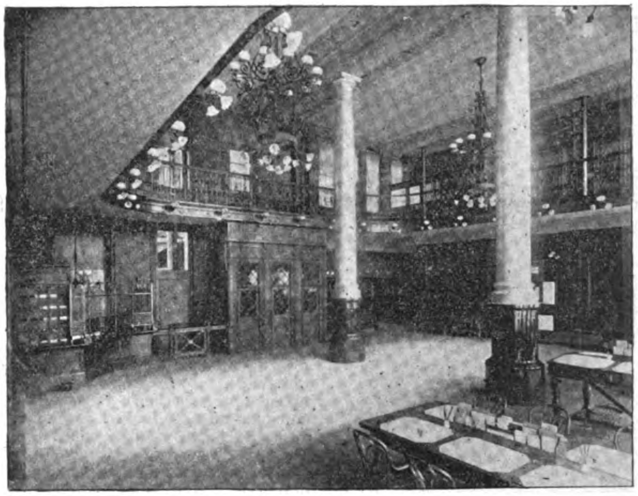
Note. — It is probable that canvas painted with a fire proof paint and employed as a curtain before the plate glass windows would offer some protection against fire in such a case as our correspondent mentions. Even if the canvas was not painted, but kept wet during the progress of the fire, it is likely it would do some good. In the large cities where plate glass show windows are very common, rolling iron shutters are frequently employed for their protection, although the buildings are seldom of a character to burn out unless the fire is so great as to render a painted canvas curtain on the opposite side of the street wholly inadequate for any such purpose as indicated by the correspondent above. We lay the matter before our readers for the attention of those who have had experience in this direction, and trust they will give it full discussion.

Laying Gravel Roofs.

From F. G. BUTLER, *West Hartford, Conn.*—In the reply to "J. A.," Chicago, giving directions for laying gravel roofs, you have gone over the ground pretty thoroughly. Having experience with roofs which I have laid and watched for years, I beg to say that I have found the pitch mentioned—1 inch to the foot—just twice too much. If the roof pitches only ½ inch to the foot it is ample. If the pitch is more the sand washes off and wears the roof, requiring coating oftener. The roof boards cannot be too well seasoned and should be planed on one side and matched. Always lay the dressed side up. Cover first with two-ply felt laid across the edges of the boards, lapping 2 inches; tack them just enough to hold in place and dust with fine, clean sand; then commence at the lower edge with the outside felt of four ply, if you can obtain it, as it costs but little more than three ply; nail at the edge and unroll to the top or highest point of the roof; commence at the bottom with another roll, lapping the edges about 2 inches and nailing about 2 inches apart. Now cut strips of felt 4 inches wide and roll them. Use a thin, sharp butcher knife, dipped in kerosene oil occasionally, for cutting the strips, and it will be found much easier to cut on a slight bevel. Commence at the bottom and unroll the strips exactly over the 2-inch lap. Have a man precede you with a brush and hot roofing composition so that you will unroll the strips into the hot coating. Now, have another hand follow nailing each edge of the strip. No water can get through this seam. The advantage of the sanded surface between the two ply and the outside four ply is apparent. No outside felting should ever be stuck down to the roof boards, for no matter how well these are seasoned there will be more or less shrinking and swelling, producing cracks in the roof. I have laid roofs that never leaked a drop, and outlasted any tin roof, at half the cost. Having once had occasion to chop a hole through one of these roofs for the purpose of running a chimney through it, I found it was more like chopping through boiler iron than anything else to which I could compare it. I prefer a broad headed tack, about 1 inch long, to the wire nails with tin washers, because the heads sink down level, and cover smoothly with the roofing preparation, and wire nails soon rust off in roof boards. A clean coarse sand is preferable to gravel, and I have found the old style farmer's grain separator, or fanning mill, admirably adapted to separating out just the right size for use. If the sand is dry it will work all right and blow out all the dust and shake out all too coarse.

BOSTON BUILDERS' EXCHANGE.

THE description of the Master Builders' Association of Boston and its building, which we give herewith, is an exemplification of the possibilities which are inherent in every properly organized association of builders in any of the larger cities of the country. While many of the buildings erected by other exchanges, which have been described in these columns, may exceed in elegance, convenience and utility the one in question, it is a fact that the Boston association was the first organization of builders in the country to own a home of its own, and has demonstrated with steadily increasing force and clearness the benefit and profit of such an ownership.



Boston Builders' Exchange.—Fig. 1.—View in the Assembly Room.

A brief statement of the conditions from which the association originated may properly precede a description of the building which it now owns and occupies. Somewhat more than 50 years ago an association was founded in the city of Boston by persons engaged in the building trades, under the name of the Mechanics' Exchange. The purpose of the organization was not clearly defined by its founders, indeed there is no record extant of its original ideals, aims, or functions, but it is evident that its principal object was to furnish a method and means by which those engaged in the various branches of building work might have convenient and frequent access to each other for the transaction of business. In those days as well as now there was especial necessity for congregating at a certain time in the day, for in the conduct of work those who needed to see each other frequently were often so widely scattered that it was difficult to consult together.

This original exchange flourished and languished alternately for many years, never wholly losing its identity but often becoming very weak through mismanagement or lack of management. The originators of The Master Builders' Association were members of the Mechanics' Exchange who had become discouraged in their attempts to reorganize the exchange so that it might represent the best and most responsible element among contracting builders, and at the same time be effective in securing a better order of things in the building fraternity.

These dissatisfied members of the old exchange finally perfected plans for the creation of an association which should represent higher ideals than it had been possible to realize under the old *régime*, and on February 17, 1885, they, to the number of 68, united in forming the present Master Builders' Association.

The purposes of the new organization were announced to be to make membership in the association a reasonable assurance to the public of the skill, honesty and responsibility of its members; to provide methods and means whereby members may secure fair dealing among themselves and between themselves and the public; and also to secure uniformity of action on such general principles as may from time to time be decided upon as best for the welfare of all concerned.

From that beginning the new organization was steadily advanced, until now it is one of the most respected organizations of business men in the city. Its membership has increased from 68 to 275 firms, while many applicants for admission have been refused as undesirable. The work it has done cannot here be described, for even if it were proper to introduce the story, space would not permit. Suffice it to say that through the persistent efforts of its members to make skill, honor and responsibility the test of membership, and to keep in touch with the best interests of the community, the organization is now accepted as one which can be relied upon as a safeguard and guide not only to and for those who are themselves engaged in building pursuits, but for those who have dealings with builders. It has come to be so regarded by the State and city authorities as well as by the community at large, and its members are sought for and appointed to fill offices of public honor and trust.

At the time the association was formed apartments for exchange purposes were rented in the same building where it is now located. Even at the outset the importance of owning a building was strongly urged, and the purchase of the property in which apartments had been secured was almost decided upon, but the necessary vote failing by an adverse majority of two the purchase was not made, but a lease was taken for three years. At the end of the lease the members became convinced that it would be wise to purchase, and so voted. The price paid ($250,000) was $50,000 more than the property would have cost three years previous, but even at this advanced price the purchase has proven a most advantageous one for the association.

Extensive alterations have been made since the property came into the possession of the association at a cost of over $80,000, which with the addition of the sums spent from the beginning for furniture and fittings swells the improvement account to nearly $100,000, making the total investment nearly $350,000. The funds necessary for improvements were secured as loans from members of the association, which loans have been reduced from year to year until now the totol debt on these loans is only $60,000. The original mortgage on the building has also been reduced $20,000 since the purchase

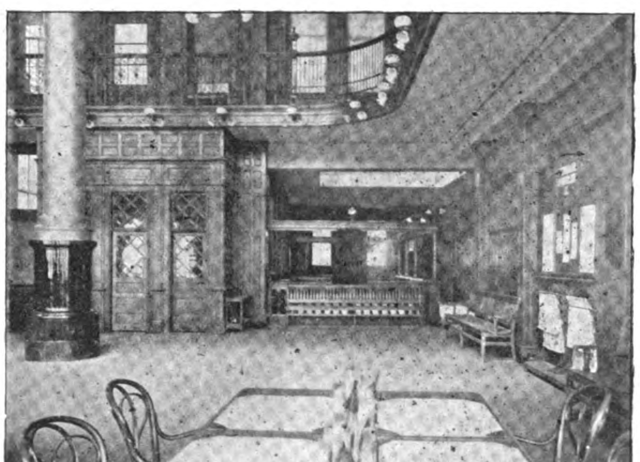


Fig. 2.—Another View in the Assembly Room.

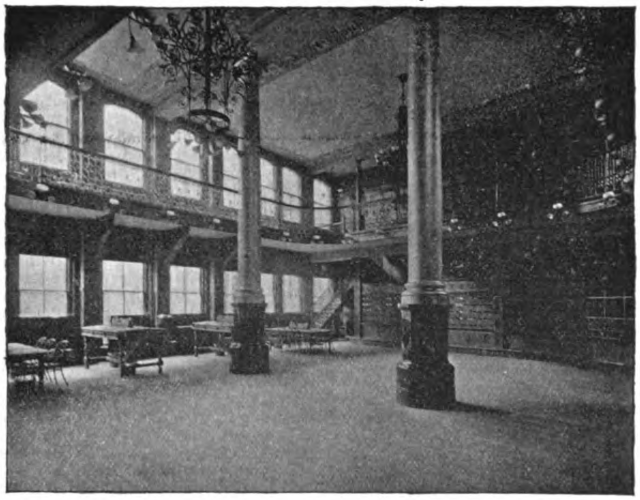
The ability to own and manage a

building with success is amply demonstrated by the figures above, and if any further testimony of the sound financial condition of the association be needed it may be found in the last annual exhibit of the treasurer of the association, which shows that the surplus, estimating the property at cost, and furniture and fixtures at one-quarter cost, is $51,000, an increase of $13,000 since the previous annual exhibit. It further shows that the resources of the association are sufficient to extinguish the debt (due to members) in the limit of the term it is to run (ten years), to reduce the first mortgage in three years to the amount fixed as a permanent loan, to pay 10 per cent. annual dividends on the capital stock and have a cash balance at the end of the ten years of over $50,000, and a total surplus of over $200,000, without allowing any increase in value of the property above original cost. This increase in value is already very great.

In view of the fact that this venture of the association was originally looked upon with distrust by enough members to defeat the plans for purchase at the time of organization, and also in view of the fact that an advance of $50,000 was paid when the property was finally purchased, it may be claimed that remarkable results have been obtained without great exertion, and that other organizations which have started out upon the same lines may be greatly encouraged by this success. The experience of the Boston Exchange certainly demonstrates what has been so often and persistently urged—namely, that builders' exchanges properly organized and liberally and progressively managed may own and successfully operate their own buildings, gaining thereby much in public esteem and largely in financial standing, besides furnishing them with power and means to pursue and patronize measures and methods for the benefit and advancement of those connected directly with them as well as the community generally.

The outside of the structure remains nearly the same as when the building was purchased. One story in hight has been added, but the general appearance of the two façades is the same as when it was wholly used for mercantile purposes, and the style is far from modern. The total area of the building is 6,660 square feet. The principal entrance is on Devonshire street, and is not wholly satisfactory, but the best has been done with it that existing conditions would permit. The first floor is occupied by three tenants: one apartment as a stationery store, one by terra cotta and tiling manufacturers, and the third as a *café*. Through the last named a rear entrance to the building is had from Federal street.

The whole of the second floor is devoted to exchange purposes and provides a large assembly hall, corporation and directors' room, in which is also the secretary and treasurer's department; there are also liberal toilet rooms and ample public lobby accommodations. In the general assembly room there are provided desk and table conveniences for writing, mail boxes for members, in which are assorted by the assistants such mail as is delivered by carriers, five or six times per day. There are also private lockers where members may place coats, umbrellas, plans and other small articles for safe keeping. In the engravings here presented Figs. 1, 2 and 3 represent views in the assembly room, while Fig. 4 gives a glimpse of the directors' room. Five telephones are in service. The exchange rooms are open from eight in the morning until five in the afternoon, and three attendants are always on duty to wait upon members and others who may need their services. The "'Change Hour" is from 11.30 a.m. to 1.30 p.m., and during this time no one is admitted to the exchange floor unless he be a member or guest of a member. Persons calling for members must wait in the public lobby until the member is summoned, when he has the right to invite them upon the floor, but they are expected to retire after transacting their business with the member so inviting them. In this way improper use of the exchange privileges is guarded against. The third, fourth and fifth floors of the building are devoted to offices, all of which are occupied by members of the association.



Boston Builders' Exchange.—Fig. 3.—Still Another View in the Assembly Room.

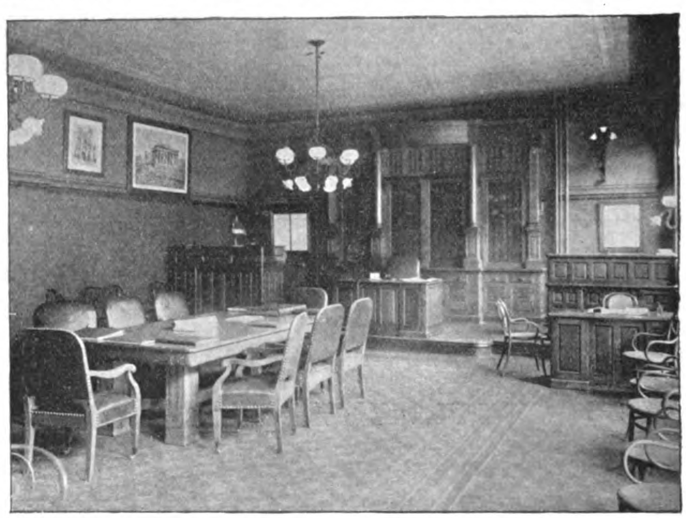


Fig. 4.—View in the Directors' Room.

Meissonier's Residence.

Recent advices from Paris are to the effect that Meissonier's house, erected after his own designs in the Place Malesherbes, is being demolished in order to make room for a six story structure. In commenting upon this destruction of a famous dwelling a writer in one of the London architectural papers says: Meissonier's house was somewhat in the style of the Renaissance. It was unlike any modern house, and was neither eccentric nor conspicuous. It looked the abode of an artist and a wealthy man, but not assertively so. Its windows toward the street, scarcely more than loopholes, suggested inner windows opening on a court which, judging from the exterior, must be a Renaissance cortile. This gave an impression of indifference, perhaps slightly contemptuous, of the outer world and of a comfortable seclusion not so much of the hermit as of the satisfied bourgeois Meissonier hoped that his house would become a museum. He wrote: "My hotel was built for a museum. This is apparent to any visitor. My descendants might live there as tenants and curators." Another time he wrote: "I hope that the treasures of art in my studio will never be sold. I hope that my son will give them to the state. I believe this is his wish, as well as my own. I am sure that he will feel too much love and respect for his father's work ever to disperse it. I trust he will turn this house into a little museum." The hope, however, was not to be fulfilled.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

WE present in the next illustration, which is Fig. 14, a sectional view of the house, showing the size of timber, manner of framing, hight of cellar, hight of foundation above grade, hight of main story and attic. This drawing is so plain and easily understood that only a brief description is necessary. Taking A as a starting point, draw the bottom line of sill, then computing the hight of cellar and hight of frame to top of plate, draw the outside wall line from bottom of cellar to top of plate. Set off and draw outline of rafter from the plate. Next set off thickness of timbers and draw in the following order: Sill, outside wall studding, rafter, ceiling joist and cellar beam. Set off the thickness of the cellar wall with proper footing, hight above ground line, and draw the lines as shown. Mark the hights of cellar, ceiling, attic and of headers to window openings, as shown in the outside wall. The front elevation was given at considerable length, showing every detail from start to finish, but we do not intend to go into the matter so thoroughly in regard to the side elevation. We have given the method of proceeding, and now present Fig. 15, showing the side elevation as it would appear in a finished state, hoping that those of the readers who may be considered as students in drafting will accept it as an example for practice and draw it to the best of their ability after the manner described in connection with the front elevation.

To aid the draftsman in making the side elevation we have just a little in the way of information to offer. After having the paper fastened on the drawing board, place the front elevation on it and to the right, so that the T square will reach across both drawings. The result of this is that it establishes the hights for many parts of the side elevation and they can be transferred without making so many measurements. For example: The hights of porch, bay window, foundation, roof, chimneys and many other parts will all appear the same whether we look at the front elevation or the side elevation and consequently certain parts may be more accurately transferred in the manner above described.

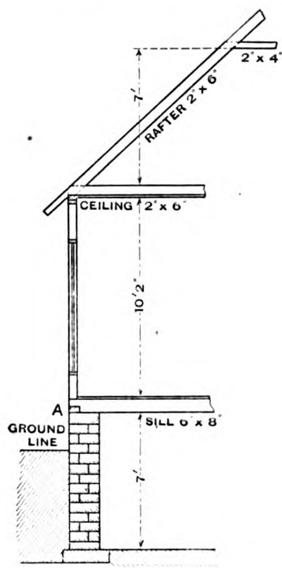


Fig. 14.—Sectional View of Framing and Foundation.—Scale, ⅛ Inch to the Foot.

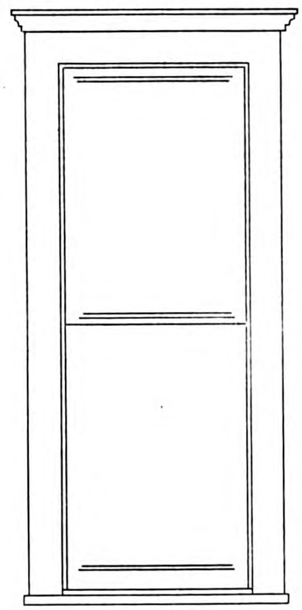


Fig 16.—Outline Indicating Method of Drawing Window and Frame.—Scale, ½ Inch to the Foot.

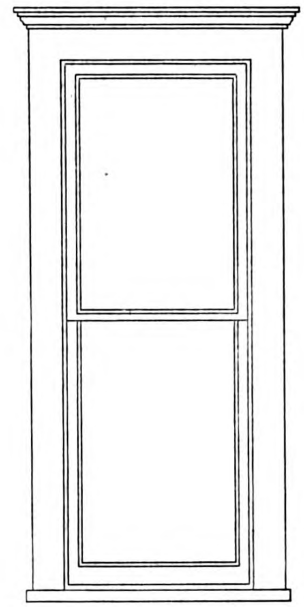


Fig. 17.—The Window and Frame Completed.—Scale, ½ Inch to the Foot.

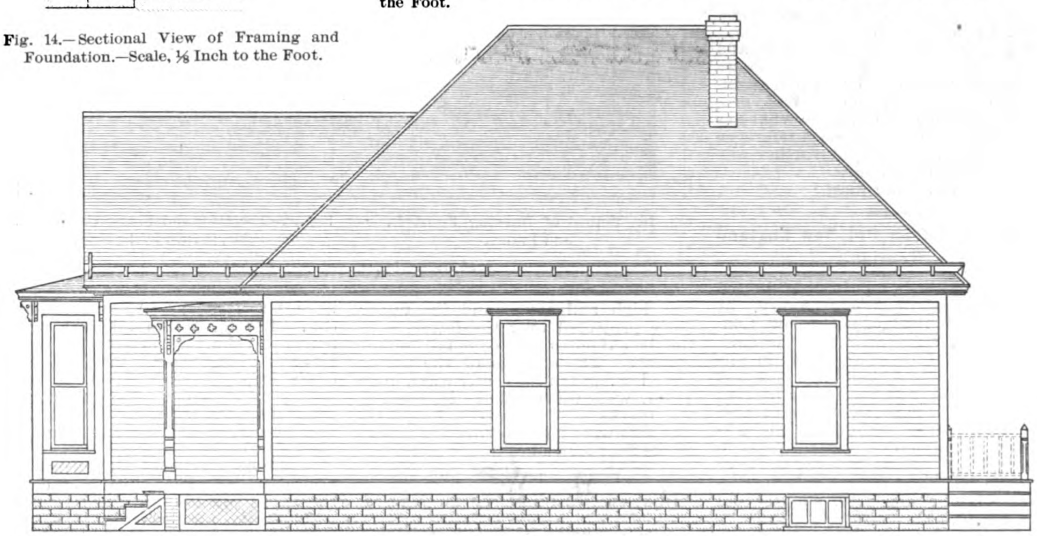


Fig. 15.—Appearance of Side (Right) Elevation Completed.—Scale, ⅛ Inch to the Foot.

Architectural Drawing for Mechanics.

* Copyrighted, 1894, by I. P. Hicks.

The next lessons for practice will be with the details, which are portions of the elevations drawn to larger scales to aid the mechanic in carrying out the design, and are usually such parts as cannot be properly shown in the elevation. Some of these details will serve as the very best of lessons for practice, therefore it is to be hoped that the learner will give his best attention to the instructions that follow. We will now consider the details of a window frame for a two-light window, 24 x 36, casings to be 5 inches wide, with molded head casing and cap, scale ½ inch to the foot. Referring to Fig. 16 we first draw the outlines, then set of the thickness of the sill, width of molded cap and the casing lines.

The parallel line which extends around the inside of the frame next to the casing line represents the blind stop, and at the bottom of the frame it is the subsill Next set off the thickness of sash, as shown. The two narrow inside lines represent the glass and putty lines. The division line of the sash extends across the frame from the blind stop lines. We have left Fig. 16 partially finished in order to show more clearly the manner of proceeding. It will be noticed that the perpendicular lines of the sash have been omitted. This has been done in order to show that after the outlines of the frame are made the next thing in order is to draw all the horizontal lines, or at least all that can be conveniently drawn, finishing the perpendicular lines last. Fig. 17 shows the frame as it appears in a finished state. It would be impossible to correctly represent all the lines of this drawing in an elevation drawn to ¼-inch scale, and in elevation drawings the fine lines are usually left out. The blind stop lines are frequently drawn, but not necessarily required in the elevations. In Fig. 17 we have drawn all the lines to show how a frame and window should appear when correctly completed.

Fig. 18 represents the front door and frame partially drawn. Fig. 19 shows the work finished. The drawings indicate so plainly the method of proceeding and being similar to what has already been described, with reference to Figs. 16 and 17, that further description is unnecessary.

(To be continued.)

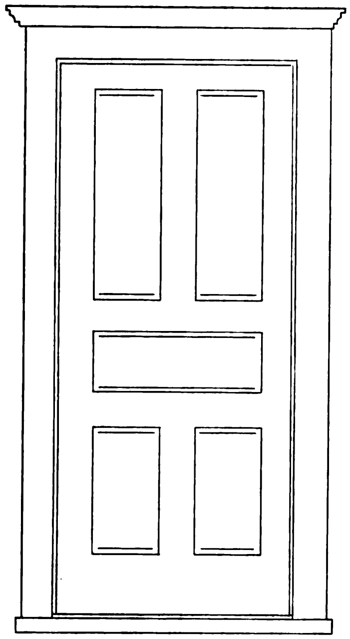


Fig. 18.—Method of Drawing Front Door and Frame.

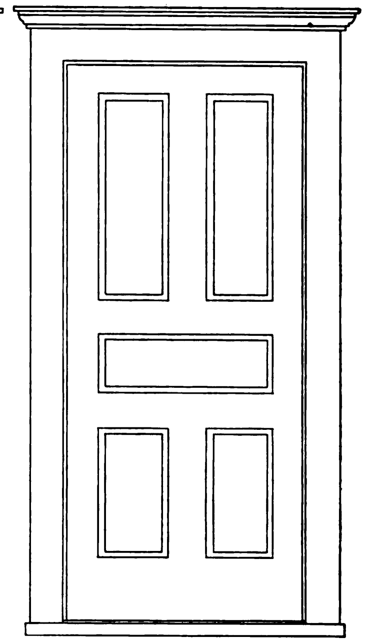


Fig. 19.—The Door and Frame Completed.—Scale, ½ Inch to the Foot.

Architectural Drawing for Mechanics.

Destruction of an Old New England Mansion.

The recent burning of the celebrated gabled house of James Avery, at Poquonnock Bridge, near New London, Conn., removes one of the most interesting of colonial homes in this country. The old rambling house was built in 1656, and received additions until it had 24 corners. It was painted red with white trimmings, and was a noted landmark. Its nearness to the railroad tracks was the cause of its destruction, as a spark from a locomotive ignited the roof, and the old pile was quickly consumed.

The loss of the house is an irreparable blow to the collectors of ante-revolutionary relics in that part of the country. The old house was a Mecca for thousands of curiosity loving persons every summer, and many men of wealth have sent architects to visit it for the purpose of copying its style and plan of construction. The burned dwelling was in excellent repair, with its timbers as sound as when the first of them was cut in the forest by James Avery in 1656.

James Avery came from Massachusetts in 1650. The house has always been in possession of an Avery, being handed down from oldest son to oldest son, the present owner being of the ninth generation.

The original Avery attended church in New London until 1684, says a local writer, and then, having become so old that he did not feel able to walk so far, he purchased for £6 ($30) the building used by the New London settlers for a watch tower and meeting house, which was offered for sale to make room for a larger one. He took it to pieces, transported it across the Thames, and set it up again as an addition to his house, forming that which became the southern portion. The great room he left just as it had been, and held public services in it every Sabbath during the remainder of his life. It was thus used for 200 years.

From time to time additions were made to the house until it became one of the best specimens of colonial architecture extant. It was ballasted by two heavy stone chimneys; its frame was of white oak, heavy enough to furnish six modern houses; its roof was high and steep, and the upper story projected over the lower, as in the blockhouses of colonial Indian warfare. The ceilings of the parlor were low, and in the center was a huge beam, whitewashed and still bearing the marks of the hewer's broadaxe. The sills were placed above the planks of the floor instead of under them.

Hints on Building Farm Houses

In a recent issue of the *American Agriculturalist*, a correspondent writing under the name of Dola Fay contributes the following suggestions relative to the construction of farm houses: The first consideration in building a house is comfort. Every farmer's wife needs and appreciates a large, commodious cellar. Unless the house is very large, it is poor economy not to have the cellar under the whole house. Divide the cellar off into two apartments, one for vegetables and one for milk, butter, canned fruit, &c. A cellar bottom should be cemented with cement concrete to the depth of 2 or 3 inches. A firm, solid cement for flooring a cellar can be made from the following recipe: Take any receptacle and fill loosely with sand, measure the water and pour on the sand till the receptacle is full. Mix with the wet sand as much Portland cement as it took of water to wet the sand; then add water enough to work nicely. This will make a good solid floor.

Have an outside cellar door to prevent dirt from being tracked through the house while vegetables, fruit and other things are being carried through to an interior cellar way. Unless it is perfectly convenient do not make the cellar stairs under the chamber stairs. Better make a closet under the chamber stairs and let the cellar stairs go down from the pantry or some place in the kitchen where they will be convenient to use regularly. A stairway having a landing is preferable to a long flight of stairs, unbroken by a landing, as the danger of falling is lessened.

By all means have a pantry and have it as large as you conveniently can. Let it contain all the conveniences you can. If the kitchen serves also as a dining room it may be more easily kept presentable if a large pantry is at hand. Very much depends upon the location of sink, cupboards, &c., so as to make the least work for the housewife.

In planning a house closets are too often left out. Have plenty of closet room. In planning a closet have it wide enough for a trunk at one end. In the same end put a broad shelf at a convenient hight for surplus bedding. One corner of a room may be cut off for a space of 3½ feet on each side. This can be treated as a solid wall with a doorway cut in. This arrangement will not detract from the appearance of the room.

Nothing but well seasoned wood should be used for flooring, especially in rooms which are not to be carpeted. In selecting flooring, no matter what the wood is, choose fine grain; avoid wavy grain. Knotty places are apt to scale off.

A pleasant appendage to the farm house is a shady back porch, where the tired housekeeper may sit and rest on a warm day.

The Congress of Arbitration.

The Congress of Industrial Arbitration and Conciliation, given under the auspices of the Civic Federation of Chicago, was held in that city on November 13 and 14. The title of the meeting is indicative of its character, and the subjects were treated from different points of view by speakers chosen from the whole country.

The congress was opened at 10 o'clock in the morning with an address of welcome by the chairman for that session, Lyman J. Gage, who explained the purpose of the meeting. The first speaker was Prof. E. R. L. Gould of the Johns Hopkins University, who gave a careful and thorough history, past and present, of arbitration and conciliation as practiced in Europe. Statistics for France, given through the labor bureau, show the effect of the method adopted in that country for the ten-year period 1879 to 1888, inclusive. The average annual number of cases was 41,028. Sixteen thousand two hundred and thirty-one of these cases were successfully mediated and 8982 were withdrawn before a decision was announced. The proportion conciliated was thus 66 per cent. The arbitration section dealt with 11,948 instances annually, or 88 per cent. of those which had failed of conciliation in the branch below. Of these 11,948 cases 6722, or 56 per cent., were voluntarily withdrawn; 4061, or 34 per cent., were decided finally, and 988, or 8 per cent., were disposed of, but were susceptible of appeal. The record of appeals shows that 110 judgments, or 45 per cent., were affirmed; 78, or 32 per cent., were reversed, while the remainder, 56, or 23 per cent., were amicably arranged. It is noteworthy to find that less than one-fifth of the cases susceptible of appeal ever came up for rehearing. A description of the methods existing in England and elsewhere seemed to indicate that both employers and workmen should be organized before equitable relationships can be established. In closing, the Professor said: "A ready made, perfectly adjusted, inelastic method or agency for settling collective industrial difficulties, embodying at the same time ideas of abstract justice, cannot be devised."

Joseph D. Weeks, editor of the *American Manufacturer and Iron World*, who was the next speaker, maintained that the settlement of labor disputes was impossible unless the two sides met face to face, like men, and earnestly endeavored to get at the true relationship of one to the other. Arbitration, he stated, should be utterly separated from any power on the part of the state to govern its conclusions or enforce its findings.

AFTERNOON SESSION.

The afternoon session was devoted to a discussion of the "Springer bill." Mr. Springer, United States Representative from Illinois, whose name the bill bears, believed it the duty of the government to provide speedy, inexpensive and effective means for the enforcement of the rights of all its citizens, no matter how humble they may be. The only thing that will end labor troubles is the belief that justice will be done them. There is no settlement of controversies between employers and workmen that is not based upon principles of right and justice, man to man. Congressman Tawney of Michigan further discussed the bill, and it seemed to be his opinion that no law providing for arbitration passed by the government would accomplish its desired end unless the people were convinced that it would operate to the protection of their rights. The general plan contemplated in the bill has been approved by many of the leading men among the unions of railroad employees.

The subject of arbitration in railroad affairs was presented by James Peabody, editor of the *Railway Review*, and L. S. Coffin of the Brotherhood of Railroad Trainmen. Extended remarks were made by Judge Tuley on the general subject of the relation between employer and workman, with particular reference to the need of means for settling differences between them, and his opinion might be epitomized by the statement of his approval of a plan of adjustment identical in essence with the form advocated by the National Association of Builders.

EVENING SESSION.

At the evening session Josephine Shaw Lowell defined the difference between arbitration and conciliation by stating the latter to be the effort to produce amicable and harmonious conditions between two sides having different interests in one end, in order that settlement of points at issue may be effected without friction; arbitration as the means by which the settlement is reached.

Prof. E. W. Bemis spoke on the ethics of arbitration. The substance of Professor Bemis' remarks was that to-day the disputes between employer and workman involved much more than on the surface appears. Our whole social fabric is so interwoven that what affects one affects all.

Second Day's Proceedings.

On the morning of the 14th the first speaker was J. D. Weeks, and the subject "Mutual Interest in Production." M. M. Garland, of the Amalgamated Association of Iron and Steel Workers, discussed the question of the "Sliding Scale of Wages," occupying the remainder of the session.

In the afternoon Hon. C. D. Wright, U. S. Commissioner of Labor, considered the questions at issue under the following three heads: "Distinction between Compulsory and Voluntary Arbitration," "Distinction between Compulsory Arbitration and Public Investigation of Labor Disputes," "Distinction between Adjudication of Past Contracts and Settlement of Future Ones."

Colonel Wright's position in regard to arbitration was defined in these columns in the issue of April, 1894. His address was exceedingly logical in its conclusions against the possibility of compulsory arbitration, and when printed will be a valuable addition to literature bearing on the subject.

Col. Wright stated in the beginning that "the labor question reduced to concrete form simply means the struggle for a higher standard of living." The speaker repeated his objection to so-called compulsory arbitration, demonstrating clearly the fallacy of such an intermediary between the present condition of affairs and more harmonious relationships between employers and workmen.

Professor Adams in discussing the economics of arbitration ably presented the need of understanding of the inherent rights which belong to the employer and to the workman by saying:

> Before a labor contract between incorporated labor and incorporated capital can be effected there must be a general consensus of opinion respecting some of the fundamental rights of the contracting parties, and crystallized into a common law of industry through cumulative precedents. In this manner point after point may be taken out of controversy because settled through controversy. A labor contract making provision for arbitration cannot be entered into with an employer who denies that there is anything to arbitrate. But if, on the other hand, it is clearly conceived that ability to control the conditions of one's life or to have a voice in their control is an essential condition of personal liberty and that the irresponsible exercise of any power whatever, whether political or industrial, is the chief obstacle to the possession of that liberty there opens up the possibility not only of an adjustment of labor difficulties but of a period of progress in all social and industrial affairs.

Judge John Gibbons maintained the possibility and efficacy of compulsory arbitration, citing examples of Grecian history to prove its successful operation.

EVENING SESSION.

The first speaker of the evening was William H. Sayward of Boston, secretary of the National Association of Builders. In speaking for the work done by the association the secretary stated that no other organization in the country had taken a more unbiased stand in regard to the relation between employer and workman, nor in the recommendation of arbitration had proceeded so far along the path of successful operation. The relation between the two is one of business and upon that basis the subject must be considered. By business is not meant the narrow and shortsighted policies of those who do not look beyond the poor returns of to-day, but rather the larger vision which includes the whole horizon and in providing well for to-day provides well for the future, and which seeks to avoid the shocks which the blinder policy invites.

"The National Association of Builders declares that not only are organizations of workmen right and proper, but that they have the elements, if wisely administered, of positive advantage and benefit to the employer, and that it is his duty as a practical business measure to take advantage of them as a proper means for a proper and wise end. We further claim that wholly wise administration by organizations of workmen cannot be effected without the co-operation of employers through their associations, and, therefore, employers have little ground for complaint if they fail to do their share as partners in a common cause, to correct evils and complete the hitherto half-developed deficient machine, so that it may do its true and proper work.

"Our theory, therefore, is that the best interests of the individual employer and the individual workman are conserved by joining with others of the same trade or calling, with the purpose of discovering through united consideration the best policies to govern the action of the individual, in affairs where individual opinion cannot be safely relied upon because the prosperity or business welfare of others is concerned, and that with associations of employers and associations of workmen so established we have the best possible agencies fitted and ready for reasonable service in directing these two vast armies, each member of which has individual interests, but though individual, still bound to, influenced by, and dependent upon, the interest of the others.

"Whether it is arbitration or conciliation, or whatever it may be called, that is to bring about better relations between employer and workman, the need of to-day is that we begin at the beginning and discover some course to follow which will do away with the need of arbitration or conciliation, and establish the relation upon such ground that there will be nothing to arbitrate and no aggrieved persons to conciliate. We must search for some method of conducting those affairs which mutually concern the employer and workman, upon a basis which will substitute primary agreements for contest and thus intercept arbitration and leave conciliation without wounds to heal."

P. J. McGuire, secretary of the United Brotherhood of Carpenters and Joiners, was next on the programme. He opposed compulsory arbitration and earnestly advocated getting at the bottom of the true relationship that should exist between employers and workmen. He was followed by Samuel Gompers, president of the American Federation of Labor, who made a speech in which he objected to compulsory arbitration and expressed himself as believing in the power of organization as the means for securing desired reform.

Hints on Estimating.

The following suggestions for the young builder are taken from a recent issue of the *Illustrated Carpenter and Builder*, and while written from the English standpoint, are not without interest to mechanics in the same line in this country:

The first thing a young builder should do before commencing to make an estimate will be to provide himself with a list of items requiring to be done on the proposed work, and the styles, qualities, and amounts of materials of all sorts necessary to complete the work. Having them on his memoranda, and a goodly supply of catalogues and price-lists within reach, he may then commence work at once.

Excavating for foundations will be the first thing to consider, and in order to get at the cost of the work closely he should know the character of the ground, whether clay, gravel, sand, or other material; then he must know what it will cost per yard to remove this and where the surplus is to be dumped. Drains will next require his attention; the number of feet, size and style of drain, cost per foot laid in place and covered, including all traps, joints, angles and connections. A survey of the site—which the estimator may make himself—will give a correct idea of the grades and the amount of digging to be done, which should be accurately measured and charged up.

Next comes the stone work, including the preparations for the footings, which may be piling, concrete or simply rammed. In either case the time and material must be considered and provided for. Cost of footings and putting in place should be a separate item. The stone walls follow, including all dwarf walls, buttresses, piers and separate foundations for chimneys, fire places, &c. Remember, in stone work the mason measures the outside girth which gives him the benefit of one thickness of wall at each angle. Provide for damp course between stone and brick, which may be of slate, lead or asphalt, as the specification may direct. Do not overlook relieving arches over all openings both in stone and brick work, as they require more time to construct than the ordinary wall. Openings in rubble stone work should be charged up solid, as cutting and waste costs as much as though the wall had no break to it. One cord of stone of 128 feet will measure in the wall scant 100 feet. It is better always to allow 96 feet of wall for every cord of stone. This, of course, means 96 square feet. Worked stone measures the same in wall as on the ground.

The foregoing merely gives an outline of the course to be taken by the estimator. Commencing with the excavating, he should continue until every item required to complete the structure in every particular has been provided for; bearing in mind all the time that the smallest thing about a building costs money, and if he should overlook any item, by a loose system of estimating, he will find at the close of the work that his profits will be cut down in proportion, as the architect or proprietor will justly demand that the overlooked items be furnished at the contractor's cost. It will not do to lump the small items, as is frequently done by unsuccessful or careless estimators, for the lump sum may be greatly in excess of actual cost and fair profit, and may cause the estimate to be too high, or it may be too low, thus causing a serious loss.

The successful estimator generally has on his desk, when figuring on a piece of work, what is technically called a "tickler." This may be a small book or it may be a series of cards on which are written all the varieties of labor, skilled and otherwise, required upon any style of building, with prices by day or by piecework, when such is available. Also the prices of materials of all sorts and sizes, including lumber in all states, stone, brick, hardware, glass, plumbers' goods, roofing, paints, oils, &c. Having a list of this kind before him, with prices attached, the estimator will not be likely to overlook any item in the proposed building he may figure on.

The items in the "tickler" should commence with: Laying out the ground for foundation; digging drains; excavating for cellar and foundation; drain tiles or pipes, foundations, walls; then all the items required for this work, including concrete and cement for cellar floors or brick paving, if such is used. The superstructure should follow, with windows, doors, floors, furring, partitions, stucco work and plastering, &c., and every particular in connection with the work.. Then comes the carpenters' and joiners' work, including putting down floors, putting up trim, building stairs, hanging and trimming doors, putting in sashes, weights, pulleys, &c. Painters' and finishers' work follow, including all necessary materials and labor. Then follow heating, bell hanging, lighting, &c.

National Association of Manufacturers.

A committee of the Manufacturers' Association of Cincinnati and Hamilton County, Ohio, consisting of W. T. Perkins, Frederick Pentlarge, B. W. Campbell, H. C. Yeiser and Chas. F. Thompson, have issued a call for a conference to be held in the city of Cincinnati on January 22, 1895, for the purpose of general interchange of views looking to the formation of a national association of manufacturers, which shall embrace among its purposes: 1. The advocacy of carefully considered legislation to encourage manufacturing industries of all classes throughout the country. 2. The discussion of ways and means whereby trade relations between the United States and foreign countries may be developed and extended. 3. The establishment in South American capitals and other desirable points of permanent expositions for the display of American products. 4. Such other topics as may be agreed upon by the convention. It is desired that this convention shall be non-political, non-partisan and non sectional. The invitation extended is without limit as to number of attendants, and is cordially extended not only to accredited delegates from organized exchanges representing manufacturing interests, but to any individual manufacturer who may have the promotion of the general good by organized efforts sufficiently at heart to be willing to meet with them.

Comparative Strength of Materials.

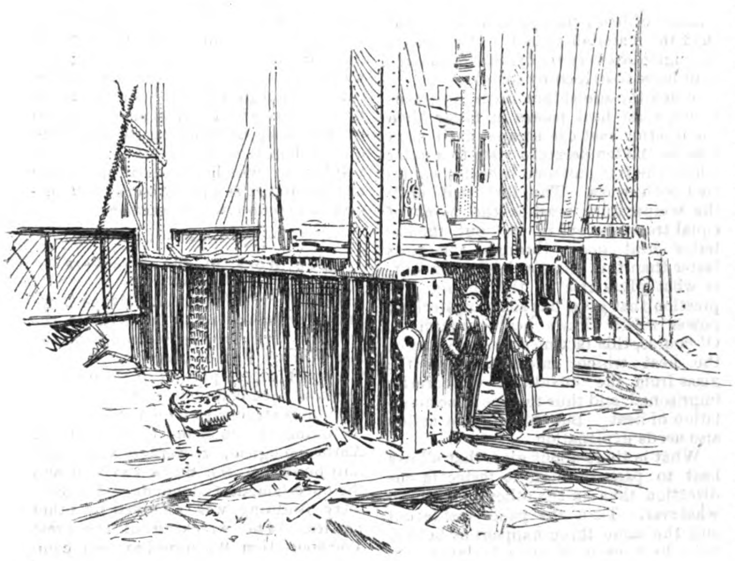
In discussing the comparative strength of materials a writer in the *Railway Review* says: Cast iron weighs 444 pounds to the cubic foot, and a 1-inch square bar will sustain a weight of 16,500 pounds; bronze, weight 525 pounds, tenacity 36,000; wrought iron, weight 480, tenacity 50,000; hard "struck" steel, weight 490, tenacity 78,000; aluminum, weight 168, tenacity 26,000. We are accustomed to think of metals as being stronger than wood, and so they are, generally speaking, if only pieces of the same size be tested. But when equal weights of the two materials are compared, it is then found that several varieties of wood are stronger than ordinary steel. A bar of pine just as heavy as a bar of steel an inch square will hold up 125,000 pounds; the best ash 175.000 pounds, and some hemlock 200,000 pounds. Wood is bulky. It occupies ten or twelve times the space of steel. The best steel castings made for the United States Navy have a tenacity of 65,000 to 75,000 pounds to the square inch. By solidifying such castings under great pressure, a tensile strength of 80,000 to 150,000 pounds may be obtained.

Plaster Cornices.

Cornices are either plain or ornamented. In order to execute a cornice according to a given design it is necessary to prepare a mold of several members, which mold is usually made of sheet brass, iron or steel, indented so as to represent exactly the forms and projections of the said members and fixed into a wooden handle. If the projection of the cornice exceeds 10 inches, it is requisite to fix up wooden bracketing to sustain it. This consists of pieces of wood fastened to the wall on which the cornice is to be formed, about 1 foot a part, to which lath are to be nailed. The whole is then covered with a rough coat of mortar, allowance being made for the thickness of the stuff necessary to form a cornice, for which about 1¼ inches is generally sufficient. To run a cornice properly two workmen are necessary, who must be provided with a pail or tub of set or putty and a quantity of plaster of paris. Previous to using the mold they gauge a straight line or screed on the wall or ceiling, formed of putty and plaster and extending so far on each as to answer for the top and bottom of the cornice to be formed. On the screed thus formed on the walls, one or two slight pine straightedges are nailed, and a notch or chase being likewise cut in the mold, forms a guide to run upon. When all is so far ready the putty is to be mixed with about one third of plaster of paris and rendered of a semi-fluid consistency by the addition of clean water. One of the workmen then takes two or three trowelfuls of the prepared putty on his hawk, which he holds in one hand, while with the other he spreads the stuff on the parts where the cornice is to be worked, the workman occasionally applying the mold to see where more or less of the material is required. When a sufficient quantity has been put on to fill up all the parts of the mold, the latter is worked backward and forward, being at the same time held firmly to the ceiling and wall, by which means the superfluous material is removed and the contour of the cornice completed to the form required. Sometimes it is necessary to repeat this operation several times in order to fill up such parts as are deficient in the former application.

FOUNDATIONS FOR TALL BUILDINGS.

THE foundations completed a few weeks ago in connection with the new 20-story building of the American Surety Company, at the corner of Pine street and Broadway, this city, constitute one of the most interesting specimens of work to which the attention of builders has ever been directed. The nature of the soil was such that by reason of the massive Equitable Building just across the narrow street on the north of the site, and the eight-story brick Schermerhorn Building on the east and south, the only feasible method of safely sinking the supporting piers was by means of caissons. Of the latter there were 13, which had to be carried down through 12 feet of coarse sand, under which were 16 feet of quicksand, 5 feet of clay, 9 feet of mixed clay and sand and 20 feet of very fine sand, with a mixture of clay, until solid rock was reached about 70 feet below the level of the sidewalk. The caissons were located so that their centers corresponded with the center line of the front wall and row of steel columns, thus giving a central bearing. Probably the most difficult work was along the walls of the Schermerhorn Building, which had to be supported while the foundations on that side of the excavation were being put down. At the central portion of the east wall a 22 x 24 foot caisson was placed with double rows of piles beside it. Huge needles were then run through holes in the wall and supported at their inner ends upon blocking far within the line of the Schermerhorn Building. The outer ends were supported on blocking placed upon the piles. To support these over the caisson, a big timber truss was built. This rested upon jack-screws upon the outer needles and held up the others with rods of steel. All together they supported that section of the wall. As the caisson was sunk walls were built upon it to keep the earth in place above. A row of sheet piling was driven inside the Schermerhorn Building to keep the earth in place there and then the old foundation wall was torn out. As the bottom of the caisson proper reached the rock its top was just about at the tidewater line. Constant bracing and cross timbering kept the sheet piling in place inside the Schermerhorn Building, and more piling, with like bracing, was driven, and the earth taken out under the wall between the caisson masonry and the piling. This was to give space for a broad bed of concrete which was to be laid at the tidewater line to form the new foundation for the Schermerhorn Building. Upon this were laid blocks of granite, which in turn supported pillars of granite and brick, which finally reached to the second wall of the building above, between the needles. Between two of the granite blocks in each of these pillars steel wedges were driven, until the pillars took the weight of the wall above from the needles. Meantime the masonry on top of the caisson was built up until it was nearly to the hight of the cellar floor and was ready to be capped and to carry its part of the weight of the building. No two caissons could be sunk together near each other, but one after another was put down, until the whole of the two walls was supported. Between the pillars brick work was built up to fill the walls.



Foundations for Tall Buildings.—Fig. 1.—View of a Portion of the Excavation for the American Surety Company's Building, Showing the Girder Construction.

The next feature of interest was the placing of the great cantilever girders to carry the outer walls of the new building where it meets the two walls of the adjoining structure on the east and south. The upper view presented upon this page, for which we are indebted to the *Sun*, shows a portion of the excavation with several of the massive girders. The new building will be 303 feet from foundation to cornice, and above the fourth or fifth floor the walls will be supported upon cross girders hung to the main steel columns of the structure. On the two street sides the caissons were sunk with enough projection to give a central bearing for the columns and walls. The caissons could not be sunk except within the lines of the new building on the other two sides, and to set up columns or walls upon the outer edges of the 55-foot foundation columns would prove disastrous, as the pressure to be carried upon them is very great. The cantilever beams take these great weights upon their ends, close up to the walls of the adjoining building, and transfer them to a fulcrum placed back upon the caisson pier. This weight is balanced upon the longer, inner end of the lever by the weight of floors above, carried by another steel column resting upon that end.

In order to get a level surface in the preparation of the beds for the cantilevers a ¾-inch plate of cast iron was first bedded in cement on top of the masonry. Over that, side by side, were laid 24-inch deep steel I-beams until there was a square of them at either end of the masonry, the outer parts of which were 20 feet apart. Over these again, and crossing them, was another grillage of 20-inch steel beams. Over the latter and parallel with the first row of beams were laid nine 4-inch square steel billets. Upon these rest the cantilever truss, consisting of two and sometimes three solid webbed

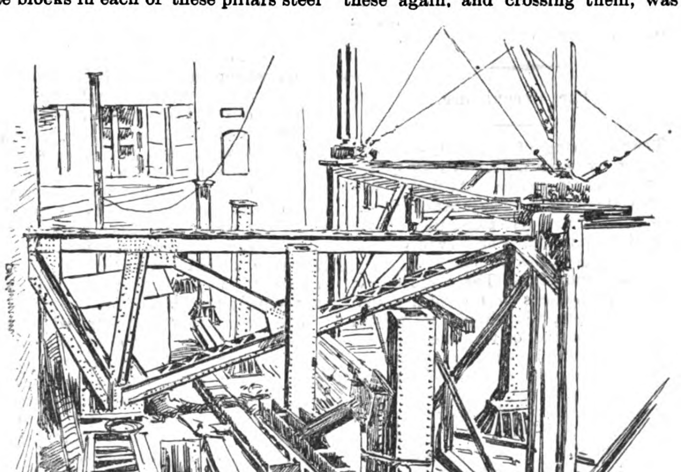


Fig. 2.—View of One of the Cantilever Trusses Employed in the Foundations of the American Tract Society's New Building.

girders 76 inches deep and 25 feet long, there being nine sets of these, seven having two girders in them and two having three girders.

Another interesting piece of foundation work is that of the American Track Society's Building, the site of which is surrounded by such massive structures as the *Tribune*, *Times*, Morse and Potter buildings. Here piling has been employed to sustain the 28-story structure which is in progress of erection. The tops of the piling were driven below the water level, there being 1783 put in for the foundations. These were put in groups, where each main pillar stands, along the wall line and in the interior. It was a difficult job to get down to cut off the tops below the water line, and to fill in between the pile heads with the foot of concrete which the law requires. Each group was treated separately. While the hole was dug around it the sides were lined with sheet piling, and special braces were put all around to prevent the moving in of either of the street walls. When the final depth was reached a shovelful of concrete was kept ready to replace each shovelful of dirt removed. Over the piling was first laid a 10-inch granite cap, then 7 feet of brick work, and finally another granite cap 12 to 18 inches thick. In places cast iron column bases have been set, and some columns are in place. A view of a part of this excavation, showing the form of cantilever employed, is presented in the lower engraving on page 295. For this cut we are also indebted to the *Sun*. In this building cantilever trusses are used to support the walls adjacent to those of the two buildings on the sides of the lot. They are of a form very different from those of the Surety Company's Building, as they are scalene triangles of open work, with the apex resting upon the fulcrum blocks. The base of these girders is 40 feet long, and the short arm of the lever they form, about 5 feet long. They are 12 feet deep, arranged in pairs and fastened to three lines of columns back of those supporting the upper walls. The walls will be self-supporting up to the thirteenth floor. From there to the top they will be carried on girders resting on the steel work.

The Greenhouse.

The sheltering of plants from severe weather by what are known as greenhouses is an old device. At first it was practiced merely as an adjunct of luxurious living. In modern times the cultivation of flowers, fruits and even vegetables under glass has become a large and important industry. There are many, however, who assist in the construction of greenhouses, who supply them with heating apparatus, or who use them for pleasure or profit, who do not understand the principles that are in this way made to play a part in supplying the wants of mankind. In the first place, there are many who, if asked to explain the uses of glass in a greenhouse, will answer: "It gives the plants light and draws heat." When asked to explain how glass draws heat, they will reply, substantially, that on sunny days a greenhouse does not require so much heat to warm it to the required temperature as the same sized building would need if built of brick and provided with the usual number of windows; and, as the sun shines upon brick buildings and glass houses alike, it proves to their satisfaction that glass really does draw heat.

HEAT REQUIRED.

Now in this attempted explanation both the premises and the conclusion are wrong. In no case does a glass house require less heat to warm it to a given temperature than an equally impervious brick building of the same size, exposed to the same weather, whether the day be dark or sunny. Glass has no more power to "draw" heat, in any sense of compelling heat to pass through it, than has wood, stone, or even ice. In fact, glass, like wood, stone or ice, is obstructive to the passage of heat, though to a less extent than the materials named. Heat passes through glass very freely, but its passage is in no wise helped by the glass.

When the sun shines upon a greenhouse, solar heat passes in faster than the interior heat can escape until such time as the temperature rises to a point where the transmission becomes equalized both ways. The fact that until the temperature reaches the point of equal transmission in and out, the exterior heat goes through the glass faster than the interior heat goes out, is what gives rise to the popular impression that glass has some mysterious power which draws heat through it. Of course, this fact means that some of the heat which enters through the glass from the outside is temporarily imprisoned, and thus there is an accumulation of heat. But this curious action also needs explanation.

What is there about glass that allows heat to pass through it faster in one direction than in the other? Nothing whatever. Turn the panes inside out and the same thing happens as before. Solar heat, even on a cloudy day, passes into a greenhouse more rapidly than the heat thus admitted passes out, even though the total outward transmission of heat derived from the heating apparatus be much greater than the heat derived from the sun; but the reason sought is not to be found in any peculiarity of the glass. All white glass is alike in this respect. The reason is found in the quality of the heat itself.

QUALITY OF HEAT.

It is a curious fact that the quality of heat varies much according to the source whence it comes. In the facility of its passage through different materials radiant heat from a luminous source like the sun, or a mass of metal heated to whiteness, far exceeds that of heat obtained from a non-luminous source, and when it has been absorbed by non-luminous bodies, that is to say, when the latter have been warmed by it, this heat, in passing off, is no longer heat from a luminous source. It, therefore, gets out through the glass much more slowly then it got in.

The action may be illustrated somewhat by a large tank containing molasses into which, through a small hole, hot molasses is allowed to flow. If a hole be bored in the side of the tank, having the same size as that through which the hot molasses runs in, a less quantity of liquid will escape from this hole than runs in. The molasses is molasses all the same, but in the tank it becomes thicker by cooling, and it flows through the same size hole less freely. In other words a change of condition has produced a change in action.

A popular lecturer, in speaking of windows, once made use of the expression "glass is a hole to heat." In the sense which this lecturer intended, all substances are holes to heat; that is, heat passes through all substances without distinction, but it passes at different rates through different bodies; heat from luminous sources and heat from non-luminous sources have each their own "tricks and manners" in this respect.

But a far more important function of glass in greenhouses than admission of solar heat is the admission of light. Too much solar heat may be injurious to plants in greenhouses. To lessen its force the panes are coated with a wash of whitening which obstructs the passage of heat, while yet a sufficiently free passage of light is permitted. Plants can no more thrive without light and air than men or animals; and a successful constructor of greenhouses cannot disregard these points. In all greenhouses artifical heat must be relied upon to keep up temperature to the required point in cold weather; and the manner in which this heat is applied and regulated is a prime element of success in greenhouse management.

The Work of the Wreckers.

The World's Columbian Salvage Company have make rapid progress in the work of wrecking the buildings of the late World's Fair at Chicago. The entire southeastern portion of the grounds has now been completely cleared of the numerous structures which stood there, including the Shoe and Leather, Dairy, Anthropological, Sewerage and Sawmill buildings, the Stock Pavilion and the once famous Colonnade. The Forestry Building was removed by other parties. The wrecking of the great Transportation Building has been completed. The Fisheries and Woman's buildings and the Choral Hall have been leveled. The handsome dome of the Horticultural Building has been carefully taken down, to be re-erected at some point in Ohio. The Government Building is the only large building which has not yet been dismantled. The Manufactures and Liberal Arts, Electricity, Mines and Mining, Administration, Machinery and Agricultural buildings and the Terminal Station were all burned in the great fire on the grounds, and nothing remains of them but the iron and steel, which aggregates about 25,000 tons, now being sheared and prepared for market. The two Service buildings have been allowed to remain standing, as they are needed by the Salvage Company for office purpose.

Repairing a Famous Steeple.

The famous steeple of the Old South Church, in Boston, is being repaired, says a recent issue of one of our Eastern contemporaries. The man who is doing the job has worked at the business 17 years, and has climbed most of the tall steeples in the country, and has even worked at a dizzy altitude on Bunker Hill Monument. One of his greatest feats was the repairing of the chimney at the Charleston Navy Yard, which is 247 feet high. He mounted it on 30-foot ladders, each ladder being secured and hauled up by himself. The Old South steeple on which he is now at work is 165 feet in hight. It is cracked in places and the vane moves only in a strong wind. The vane will be taken off its iron spindle, lowered to the ground and regilded. When it is set up again the spindle will be greased with a piece of beef fat, which is expected to do its work for six years, or until 1900, when somebody will have to climb up and lubricate it again.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Second vice-president, James Meathe of Detroit.
Secretary, William H. Sayward of Boston.
Treasurer, George Tapper of Chicago.

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Arthur McAllister ....Cleveland.
Alex. Chapoton........Detroit.
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J. S. Pool...............Lynn.
H. J. Sullivan ... .Milwaukee.
Geo. Cook.............Minneapolis.
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Stacy Reeves..........Philadelphia.
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H. H. Edgerton........Rochester.
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Luther H. Merrick....Syracuse.
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Isaac A. Hopper ....New York.

Exchange Work Abroad.

An item in the *Glasgow* (Scotland) *Evening News* of October 30 shows what can be accomplished by a builders' exchange based on lines advocated by our National Association, irrespective of the country in which it exists. As has been stated in this department, the Glasgow exchange was founded upon the general principles advocated by the national association and demonstrated by the successful exchanges in this country. The success of the Scotch exchange offers an excellent example to builders in this country who have allowed their organizations to lapse into a condition little better than useless. The principles advocated are true, and their adoption assures success whenever and wherever builders recognize the value of enforcing them. The clipping is as follows :

The first annual general meeting of the shareholders and subscribers was held in the exchange rooms to-day, Colonel Bennett presiding. Mr. Cook, secretary, read the report, which showed that the balance at the credit of the association on September 30 was £411. 8/3. There were 63 shareholders, holding 244 shares, and 153 subscribers on the roll; 13 approved applicants were now waiting for admission. The Arbitration Committee had only once been called upon to act. Twenty-eight exhibitors have rented space in the rooms, representing an annual rental of £130. The preparation of the catalogue had been somewhat delayed. It was being drawn up as much as possible as a book of reference, and advertisements to the amount of £150 had been secured for publication in its pages. The chairman complimented Mr. Cook on his report, and called on Mr. Laird to move its adoption. Mr. McGillivray, in seconding the report's adoption, claimed that the plasterers' laborers' strike was now at an end, and that the victory which the masters had achieved was due in great part to their connection with the exchange.

Government Contracts.

The following copy of an act of Congress to secure payment to persons furnishing labor or materials to contractors having contracts with the Government is printed for the benefit of the members of the various exchanges. This act is virtually a substitute for a lien, as it provides means for compelling the payment by contractors for all materials and labor entering into the contract; but it has the advantage over the ordinary lien law of placing the liability where it belongs—upon the contractor who bought the labor or materials—and not upon the owner, who may have paid the contractor therefor, and who should not, in equity, be liable under the usual forms of conducting the building business.

[PUBLIC—No. 188.]

An act for the protection of persons furnishing materials and labor for the construction of public works.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter any person or persons entering into a formal contract with the United States for the construction of any public building, or the prosecution and completion of any public work or for repairs upon any public building or public work, shall be required before commencing such work to execute the usual penal bond, with good and sufficient sureties, with the additional obligations that such contractor or contractors shall promptly make payments to all persons supplying him or them labor and materials in the prosecution of the work provided for in such contract; and any person or persons making application therefor, and furnishing affidavit to the department under the direction of which said work is being, or has been, prosecuted, that labor or materials for the prosecution of such work has been supplied by him or them, and payment for which has not been made, shall be furnished with a certified copy of said contract and bond, upon which said person or persons supplying such labor and materials shall have the right of action, and shall be authorized to bring suit in the name of the United States for his or their use and benefit against said contractor and sureties and to prosecute the same to final judgment and execution: Provided, That such action and its prosecutions shall involve the United States in no expense.

SECTION 2. Provided that in such case the court in which such action is brought is authorized to require proper security for costs in case judgment is for the defendant.

APPROVED, August 13, 1894.

The Eight-Hour Day.

At the recent Indianapolis Convention of the United Brotherhood of Carpenters decisive action was taken to secure the more general adoption of the eight-hour work day among carpenters in every town and city in every section of the entire country. It is to be pushed forward so as to avoid strikes or any possibilities of labor disturbances.

The sentiment of the convention was opposed to any course of action that would embarrass the employers in these stringent times, or that would occasion any greater distress or uncertainty to the building trades.

After a long discussion and the report of a committee, which was favorable to securing a general work day of eight hours, the following resolutions were unanimously passed :

Resolved, That it is the sense of this convention that no strikes other than those for the establishment of an eight hour day shall be sanctioned or entitled to strike benefits. This shall not debar eight-hour cities from entering into trade movements whenever they may so decide.

Resolved, That the general office be instructed to use every effort toward promoting this sentiment, and the G. E. B. instructed to govern themselves accordingly.

Resolved, That as soon as the business outlook throughout the country shall warrant such action, the G. E. B. shall take proper steps and make such preparations so that they can inaugurate a simultaneous, concerted movement on a fixed date in every city all over this country where the eight-hour day has not yet been established.

New Publications.

PRACTICAL STAIRBUILDING AND HANDRAILING. By W. H. Wood. Size, 7¼ x 10¼ inches; illustrated with 32 plates. Published by Spon & Chamberlain. Price $4.25.

This work has been prepared by the author to assist those desiring to familiarize themselves with what he considers the "most practical and systematic methods adopted in the execution of stairbuilding and handrailing." The volume discusses the square section and falling line system, and while some of the details may appear tedious and monotonous, the aim of the author has been to keep steadily in view the absolute necessity of treating very fully the elementary parts. The work is divided into two sections, the first of which considers stairbuilding and the second handrailing. The text relating to each of the 32 plates forms a short chapter by itself, and is presented on the page facing the plates so as to render reference easy. The author states that he has practically tested the methods delineated upon the plates, and suggests to the student that plates 12 and 13 should be thoroughly understood before proceeding with handrailing, as the diagrams showing problems in solid geometry have been carefully selected bearing directly on the subject.

THE SANITARY ARRANGEMENT OF DWELLING HOUSES. By A. J. Wallis-Tayler, C. E. Size, 7½ x 5 inches; 196 pages. Published by Crosby, Lockwood & Co.

The book begins with some hints on the selection of a site for a residence, and then briefly outlines the plumbing system required for a sanitary system. The explanation of different manufactured articles used in house plumbing then takes up the remaining pages, giving illustrations of intercepting traps, fresh air inlets, various soil pipe joints, methods of testing different styles of water closets, latrines and earth closets, gully traps, grease traps, flush tanks and ventilators. An appendix contains the Public Health act of London of 1875 and of 1891, the Model By-Laws and the Metropolis Water act of 1871. The book also contains a well arranged index.

Preventing Tools from Rusting.

A correspondent, in a recent issue of the *American Machinist*, gives the following directions for preventing tools from rusting: "I wish to add a little to the discussion relating to preventing the rusting of tools. It is very aggravating to find, upon taking a fine tool from a box or drawer, that a coating of rust more or less thick has formed owing to dampness or humidity of the atmosphere, or moisture in the tool box, wet tools, &c. In some localities, particularly in the Southern Atlantic and Gulf States, it is almost impossible to keep tools bright by ordinary means, and some machinists have been driven to the necessity of thickly covering tools with vaseline before laying them away.

There is a way by which tools may be kept bright while in the tool chest, and they may be stored for years and keep perfectly clean, with only an occasional looking at. In fact, there are two methods. One is by the use of quicklime, the other by the use of sulphuric acid (oil of vitriol). Both substances have so great an affinity for water that they will extract it from almost any substance containing it with which they may be brought in contact. Even air gives up its percentage of moisture when confined to the presence of lime.

A box of lime placed in a tool chest will then, by virtue of its affinity for water, extract every particle of moisture from the air confined in the chest. The lime will also gather in all the moisture that may be on the tools themselves. It is only necessary to use a comparatively small piece of lime and to renew it occasionally. Secure a 2-quart Mason jar, such as is used for canning fruit and berries. Fill the jar with pieces of good, hard lime. The pieces may be about as big as eggs, and a large lump of lime can he easily hammered into shape. Pack the jar full of lime, screw the cover down tightly upon the rubber packing, and the lime will keep indefinitely.

Rig up a little brass or iron box and fit it with a wire-cloth cover. Drop a bit of lime into the box, put cover on firmly, and pack away among the tools. If the lid of tool chest is kept shut the lime will capture all the moisture—and hold it, too. Stir up the lime once in a while, and occasionally replace by another bit from the fruit can. A box of air-slaked lime kept tightly covered is better than a box of sawdust to put tools into when they come back to the shop from being out in the rain or on a wet job. Throw the tools right into the lime, shuffle them around in it, them wipe of the lime and the tools are well dried.

Sulphuric acid also picks up all the loose moisture that is laying around. A lead cup and the acid may be substituted for the lime box in the tool chest. The acid is the most powerful and works best in such cases; while for general use the lime box is best, owing to the freedom from damage should the contents be spilled among the tools.

Battersea Polytechnic, London.

Among recently established technical schools in London is the Battersea Polytechnic Institute. It has lately issued a prospectus for its second session, which opened on September 24. The instruction offered in the institute covers a very wide field and includes subjects suitable for both men and women, the number of classes being no less than 133, in 71 different subjects. The instruction in all technical and science subjects is associated with laboratory or workshop work, the institute being fortunate in possessing laboratories for chemistry, physics, mechanics, and electrical science; and workshops for engineers, carpenters and joiners, plumbers, bricklayers and masons, plasterers and painters, and well fitted cookery schools and laundry.

Among the special features in the prospectus are the formation of "courses of classes," with a view to encouraging continuous and co-ordinated study, the offering of special afternoon classes for apprentices, and special classes in manual training and in science for teachers only. Numerous scholarships are open to the students.

The institute is State aided, under the act of Parliament passed a few years ago for the purpose of promoting trade and technical education. Since the passage of this law, the growth of trade and technical schools throughout England, and especially in and around the metropolis, has been very satisfactory, notwithstanding the disfavor shown them by the trades unions and the oppositions offered by these organizations.

WHAT IS UNDERSTOOD to be the heaviest and the largest log of wood that has ever been shipped by sea was landed recently at Liverpool, England. It was brought from the West Coast of Africa, and weighed no less than 15 tons.

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