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ARCHITECTS AND BUILDERS EDITION.

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THE QUEEN OF ENGLAND'S COTTAGE AT CANNES.

Her Majesty, with Princess Beatrice and Prince Henry of Battenberg, lately passed four or five days at Cannes. Her Majesty resides at the Villa Edelweiss, which has been placed at her disposal by Mr. Savile. Cannes has been frequently described, and recent letters have given some account of its social life among the numerous English visitors, including many persons of rank and fashion, and of the visit of the Prince of Wales to that place, which, happily, was spared all serious injury from the earthquake that disturbed and damaged several other towns of the Riviera. It is a town of 15,000 people, including the average number of visitors, 120 miles from Marseilles, 79 from Toulon, and 20 from Nice. Its situation, extending four or five miles along the shore of the Gulf of Jouan, Cape Croisette, and the Gulf of Napoule, affords a variety of delightful sea views, and the valley of Le Cannet, and other sheltered parts, enjoy complete protection from cold winds, at least from the northerly and northeasterly winds, being shielded by the Esterel and the Maritime Alps, the hills rising there, on three sides, 800 ft., 1,500 ft., and 2,000 ft. in height. The latitude is nearly the same as that of Florence, and the sun has great power even in winter, the average temperature at that season being ten degrees higher than in England, with no fog or damp, and with little rain. The air, however, is bracing and stimulating, and proves beneficial to many invalids. Until 1834, Cannes was little known to foreigners, but in that year Lord Brougham, then our lord chancellor and a personage of great political importance, chose it for his annual winter residence, and his example was largely followed, and there he died, in 1868, ninety years of age. The accidental death, as it must be considered, of the late Duke of Albany at Cannes, on March 28, 1884, has rendered the place more interesting to the English royal family, and to all who cherish that esteem for the memory of the lamented prince which is now perpetuated by the erection of St. George's English Church, opened a few weeks ago in the presence of his royal brother the Prince of Wales. It is not unlikely that the Queen's present visit to Cannes may have been prompted by a desire to see for herself this permanent memorial of a sad event in which the affectionate feelings of a mother must always be deeply concerned.—*Illustrated London News.*

THE QUEEN OF ENGLAND'S COTTAGE AT CANNES.

Making Roads.

Few people know how easily a good and properly macadamized road can be made, or understand how excellent and enduring such a road is. A man who thoroughly understands the system, and sees it carried out properly, will make a better road with a few inches of broken stones than others will make with three times the quantity of material, not to mention useless labor. Macadam cared very little what sort of a bottom he had to deal with, if it were not an absolute morass, and he was not often deterred by that. "For a road," he says, "it is not necessary to lay a foundation of large stones, pavement, etc., as it is a matter of indifference whether the substratum be hard or soft, and if any preference is due, it is to the latter." These statements look like heresy compared with much that we have read on road and walk making, but the great road maker was right, nevertheless. First of all, whatever the bottom was like, he took care to see that the ground had evenly settled before the stones were spread upon it, that there might be no subsidence in any part afterward to cause inequalities, a matter which is often overlooked. When the roadway had to be cut and leveled, large stones dug out of the ground, or any inequalities to be made up, the ground was afterward left to settle before proceeding further with the work. In putting on the stones, quite as much care was exercised.

The hardest stone in the district was procured—granite, flint, or whinstone; next, it was broken to the regulation size—in pieces about an inch in diameter, though a rougher size will do; and, lastly, the stones were not laid on the road, but spread shovelful after shovelful to the depth of from 6 inches to 10 inches, which was considered sufficient for general highway traffic. The road was made slightly higher in the center than at the sides, to throw off the water, as the object was to form an impermeable crust that would keep the water from percolating to the bottom, thereby rendering it soft and causing it to work up, the necessary drainage being, of course, secured in the usual way. This is macadamizing in the proper sense of the term, a system which has nearly superseded every other, but it is the attention to trifles in carrying it out that makes perfect work. For example, many people would attach little importance to the stones being broken or angular, and be quite as indifferent about the mode of spreading them on the road; yet these are two of the most important points. The use of water-worn stones of the same size will not make a solid crust, because they yield to pressure, their round surfaces offering little or no resistance; but it is different with broken stones, which when of uniform size, and clean, and properly spread on the ground, set fast on the same principle as that of an arch. I have seen roads made on an extensive scale on this system, and had to make such myself, and I have never seen anything to equal them.

Walks, which are often cut out deep and filled in the bottom with large stones, may be made on Macadam's principle with far less trouble and with much better results. Broken stones, to the depth of 2 inches or 3 inches, will be quite sufficient, and they should, after being spread on, be beaten even on the surface with broad wooden rammers. This sets the crust effectually at the beginning. Afterward a thin coating of clean gravel should be spread upon the surface to hide the stones, but no more. Such a walk is smooth and firm, and comfortable to the feet in all weathers; rain only washes it clean, and frost has not the least effect upon it if the bottom be drained. The material holds no moisture to freeze; it is the accumulation of soft gravel on the surface of walks that freezes and renders them so muddy and uncomfortable afterward. With us the stones are broken by a machine to any size we want them.—*J. S., the Garden.*

A COAT of boiled linseed oil rubbed over the iron scale beams used in damp cellars in which large quantities of salt are used in curing hides, and allowed to dry, is a good preservative. As the oil gets rubbed off, rub the parts again with the oil upon a cloth.

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THE

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ARCHITECTS AND BUILDERS EDITION.

$2.50 a Year. Single Copies, 25 cents.

This is a Special Trade Edition of THE SCIENTIFIC AMERICAN, issued monthly—on the first day of the month. Each number contains about forty large quarto pages, equal to about two hundred ordinary book pages, forming, practically, a large and splendid **Magazine of Architecture**, richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans, Specifications, Costs, Bills of Estimate, and Sheets of Details.

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MUNN & CO., Publishers,

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CONTENTS

Of the May number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

Building Plans and Specifications.

In connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied.

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USEFUL HINTS RELATING TO HOUSE BUILDING.

We continue our remarks from February number. A good size for the lot for a house to cost about $5,000 is 60 × 150 ft.

If a stable in the rear is needed, the lot should be not less than 175 feet deep. This point, and those mentioned in the February article, are the most important to be considered concerning the *lot*.

The next subject to be settled upon is the plan and specifications for such a house as your limit of cost will cover. This is a most difficult undertaking, and often ends in disappointment, usually because *too much is expected for a given sum of money.*

If style of interior and exterior is required, the *size* must be curtailed. If the rooms must be spacious and numerous, then the style and finish must be plain and unpretentious, both within and without.

Of one thing be assured—everything cannot be obtained for $5,000 at the present cost of labor and materials.

This point fully understood, the writer has found that the quickest and best way to get the plan desired is to *look at houses already built* in the immediate neighborhood or adjacent towns, which approximate to the cost named. Among the many which are now to be seen in all our suburban towns, there will be no difficulty in finding a house which will entirely satisfy the requirements. No mistake can then be made in the *cost,* for the builder himself is near at hand to duplicate for you, for a definite sum, the house you may select.

Disappointment in architectural effect will not happen—because you can see beforehand what an appearance the *finished* house will present.

It is far better to go to an architect with *ideas well defined* of what is wanted, and to ask of him to add to these his own taste and skill, than to go (as many do) with nothing settled in the mind but the *cost*, and to require of him to produce something entirely original in design and finish. His effort to fill such an order is generally a failure, not from any want of skill on his part, but rather because of his inability to grasp the intangible and indefinite ideas which may be in the mind of another. He must have some standard to work up to besides simply the *cost.*

If the architect succeeds in his effort as to the plan, you may consider that you have made a fortunate beginning.

The specifications come next. As for these, let them be most carefully drawn, leaving nothing open, indefinite or obscurely stated, and to this end you could not do better than to read over the several specifications published by this paper, selecting therefrom the best points in each. Above all, have them so drawn that they cover everything you want. Otherwise you will have extras, which are always very costly.

It is a remarkable fact that anything *taken from* the specifications, after the contract has been signed, you can get no allowance for; but anything added to them greatly increases the cost. Why this should be so, only the contractor can tell you, and he generally *will not,* You may imagine, however, that the reason is, because, when the contract is once signed, he (the contractor) *don't want* to make any allowances, and *does* want to make all he can out of extras. Hence you must plan beforehand so as to avoid them. Or, in the pithy words of the late Rev. Henry Ward Beecher, "First think out your work, and then work out your thoughts." This applies pre-eminently to building operations.

COLD ROOM FOR EGGS, ETC.

To make a cold room or ice house that is dry or as free as possible from sweating, for preserving eggs, fruit, etc., make the room itself in any manner most convenient, but thoroughly insulated in regard to keeping the walls impervious to circulating air currents or crevices for interchange of cold and warm air, except under control, for the necessities of ventilation, which should be small.

A frame lined upon the inside with heavy paper and varnished with shellac, then ceiled and floored with matched pine, ⅝ or ¾ thick. Varnish the entire inner surface. Before putting down the paper lining and floor, fill in between the framing dry sawdust and pulverized charcoal mixed. Board up the outside with tightly matched boards, filling in as you board up with the saw dust and charcoal, as well as every part of the top, with the exception of the door for putting in the ice, as described further on.

The door for entrance to the room must be made to shut against broad jambs and angular closures like an iron safe, so that it cannot stick by swelling. It should be made by framing and packing with sawdust and charcoal, in the same manner as the room.

In the ceiling of the cold room frame an opening large enough to let in a galvanized sheet iron box of sufficient size to hold as much ice as you may wish to store, or about one-tenth of the capacity of the whole room. The ice chamber should be fitted into the opening tight, with a flange all around the top. It may be made of No. 18 or 20 galvanized sheet iron. To the bottom attach a coil of galvanized iron or lead pipe, running two or three times around the room, hanging on hooks or brackets, just below the level of the ice box. Pass the end of the coil through to the outside of the room and terminate in an inverted siphon, so as to retain the water within the coil up to a level just below the bottom of the ice box. This is for the purpose of economizing the cold from the waste water by circulating it around the room. From the cross beams of the ceiling, as bearing for the weight of the ice, place two or three straps of square iron of a size sufficient for carrying the weight of the ice you intend to put in. Let them hang upon the inside of the galvanized iron box to within an inch of the bottom. Upon these traps lay a hardwood grating. Make a galvanized iron cover to fit tightly upon the ice chamber, and a wooden one to close over the iron one.

To prevent the water that may be condensed upon the outside of the ice chamber from dripping down upon the goods, make the bottom of the ice chamber bulge a little downward, so that the condensed drops will run to the center, or one side, where a small pan may be hung, with a small pipe leading to the outside of the cold room, and a siphon attached to prevent ingress of air. The ice chamber may now be charged to its full capacity with ice, and if a very cold room is required, sprinkle a layer of salt between each layer of ice. Salt is seldom used for such rooms.

The principle upon which this cold room is constructed is that there shall be no communication between the ice with its moist vapor and the air of the cold room. Any moisture made by the cooling of the air, and which is precipitated upon the iron surface of the ice chamber, is at once conveyed out of the room by the drip pan and its pipe. Hence there is no need of any special ventilation, more than what will naturally occur by the use of the door and the small leakage through its closing crevasses.

The ice chamber requires no ventilation, hence economizing the ice to the best advantage, while the water from the melting ice is turned to the best account by circulating round the room in the waste pipe.

The best temperature for eggs and fruit is about 34°, or any temperature below 40° and above freezing, where this kind of stock is often changing by sale. If stock is to lie for a considerable time, 34° should be obtained if possible.

NEW WAY OF BUILDING CEMENT WALLS UNDER WATER.

Concrete made with hydraulic cement will set or harden under water in the most perfect manner, at any most depth, but a difficulty has heretofore been experienced in depositing the concrete at the spot required without exposing the concrete to injury by washing when passing down through the water. This difficulty has been overcome in a very simple and effective manner by Mr. John C. Goodridge, Jr., C.E., of this city. He incloses the concrete in paper bags, and by means of a wooden chute or slide sends the concrete down by gravity to the spot required. The bags break open on reaching the bottom, and the concrete thus reaches its destination without injury from the water. This method was recently employed by Mr. Goodridge in repairing the great dam at Holyoke. About sixty thousand cubic feet of concrete wall were in this way built under water. The concrete was composed of Portland cement 1 part, sand 4 to 5 parts.

THE NEW LAW COURTS, BIRMINGHAM.

Her Majesty the Queen, on March 23 last, laid the foundation stone of the new Law Courts at Birmingham, of which we give an engraving from the *Illustrated London News.* Its principal front, in Corporation Street, will be executed in terra cotta, which is considered to be a material likely to resist, better than stone, the damaging effects of a smoky atmosphere. The architects are Mr. Aston Webb, of 19 Queen Anne's Gate, Westminster, and Mr. Ingress Bell. The style is Tudor Gothic, enriched with many ornamental details in harmony with the general composition, and the central main entrance, with its circular doorway surmounted by a pediment containing sculpture, the balustrade rising to an angle beneath a projecting turret, flanked by two lower turrets with cupolas, will have a good effect. The central part of the facade, with its grand windows, the dominant oriel in the roof, also the towers, and the gables of the wing buildings, equally well bear out the character of this architectural design. The interior will contain a fine hall, 80 ft. long and 40 ft. wide, the large windows of which are to be filled with stained glass, a Queen's jubilee memorial, representing some events of her Majesty's reign, two large assize courts, with rooms for the judges and the juries, and a bar library, three borough courts, and a coroner's court, with offices and waiting rooms. Above these will be grand jury rooms, and other apartments. In the basement will be a police station, with cells for prisoners. The whole building, which will cost £78,000 ($390,000), is to be constructed at the expense of the Birmingham corporation.

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A RESIDENCE AT ORANGE, N. J.

The colored plate and supplementary detail sheet of this issue illustrate a house recently built at the corner of Tremont Avenue and Center Street, Orange, N. J., for Mrs. E. C. Raphel, from designs by Joseph A. Stark, Esq., the distinguished architect, of 12 Chambers Street, New York City.

The house forms a very commodious and complete family residence. It shows many original features of design, and its plan is remarkable for convenience. The house is very substantially built. The internal trim is plain, in oil finished white pine, but there are window backs throughout the first and second floors, and plaster cornices in all rooms except on third floor. The stairs are in hard ash, also the inside shutters and the front entrance door. The plastering is three coat work, with very best hard finish in all stories.

The cost of the house, complete, including all work enumerated below, and also including mantels, tiles, and fittings of three fireplaces of first floor, and mantels and tiles of two bedroom chimney breasts, also hot air heating, electrical service, and stained glass—in other words, the house ready for occupation—was $7,000.

The grading and laying out of the grounds, also bluestone flagging on streets, and fences and gates, are not included in these figures, neither is the architect's commission.

This residence was planned with the view of having a maximum space on each side of the house, and it is, in consequence, somewhat narrow and deep. The three reception rooms follow one behind the other, but each has access to the principal hall. The smoking room and gentlemen's lavatory, on the north side, are a feature of this house, and stamp it as a first-class residence. An inspection of the plans will show many other points of merit, especially in the plumbing department. The large front room of the third floor, which is marked "billiard room," and which would also make a capital nursery, is a great point. It must not be forgotten that this floor is a full 9′ story. It has hot air in every room, and in the rear there is a water closet and wash bowl. The house throughout, from cellar to top, is uncommonly light and cheerful, all stairs and hallways are wide, and the floors are high.

The exterior design shows a substantial structure, well proportioned, symmetrical in parts, and, withal, picturesque. There is much interesting detail at various points. The sides are clapboarded, and there is a belt of shingles. The main roofs are slated. The piazza and balcony roofs are shingled, for color effect. The external chimney stack of south elevation (see supplementary sheet) looks very fine. The piazza is wide and airy. The double Mansard roof adds breadth and importance to the house.

Following is an outline of the main items of the specifications:

The cellar walls are 18″ quarry stone, laid up in cement mortar, and topped with an 8″ brick wall, faced with Hackensack bricks. The cellar walls are cemented on the outside, and the floor is of concrete, with cement face. The plastering is three coat work, hard finished, and there are cornices and ceiling centers to all rooms of first and second floors. The floor timbers are shown on section. The frame is of usual studding, sheathed, papered, and clapboarded or shingled. The roofs are slated, underlaid with felt.

Trim throughout in white pine, stained and hard oil finished.

Floors all white pine, except hall, which is yellow pine.

Sliding doors are five panels, others four panels, 1½″ pine doors, with brass bolt locks.

Front door is executed in ash to design.

Sashes all have double thick glass.

All windows have paneled backs.

Inside ash shutters are provided as indicated on plans.

Other windows have outside blinds.

All rooms have picture mouldings.

The closets are all fitted up, and the pantry has two glass cases.

The outside of house is painted two coats.

All windows and doors have ash mosquito screens.

The principal stairs, from first floor to top, are of handsome design ash posts, rail, and balusters.

The range is Boynton's No. 8 Prize range, 40 gallon galvanized iron boiler.

Cast iron kitchen sink and slop sink. Planished copper pantry sink, 16 oz.; 16 oz. 6 bath tub.

Two marble top wash bowls, two Triplex wash-out closets, one spring seat hopper closet, one enameled iron wash bowl, two wood laundry tubs, are among the items provided.

Pipe for hot and cold water, A A lead, with wiped joints, and all faucets, stop cocks, traps, and plumbers' and tinners' work generally of best quality.

Electrical service is provided to principal rooms.

"Economy" hot air furnace, with supply to all rooms; Tuttle & Bailey's registers.

The soil pipe has a disconnecting trap, with fresh air inlet pipe, and the cesspool has three overflow branches.

The materials and workmanship are of the best description, and the house is substantially and completely finished in all its minor details, and is giving great satisfaction to the occupiers, and is very generally admired.

The contractors were as follows:

Carpenters—P. B. Fairchild & Co.
Masons—P. Coyne & Co.
Plumbers—M. & T. Chalmers.
All of Orange, N. J.

A COTTAGE (SHOWN IN APRIL NUMBER) AFTER ENLARGEMENT.

In our last issue we gave drawings, etc., of a small cottage, specially designed by Mr. Christopher Myers for future enlargement. We now represent the house as it appears after the alterations and additions have been made.

By a careful examination of the plans and elevations given in the supplementary sheet, and a comparison with those given in our last number (April), it will be seen that the object of providing a house which could be afterward enlarged without waste of material has been very successfully attained. For the purpose of comparison, the ground plans of the house, both before and after enlargement, are printed side by side on the detail sheet of this issue.

It will be observed there is practically no waste of material. All that is done is slightly to alter one wall, remove certain windows and doors and place them in new positions. All the remainder of the work consists simply of the additions necessitated by the enlargement. The sheathing and all other material is utilized in the new building, so that it may be said that there is no waste whatever.

As altered and now represented, the house would form a very desirable and convenient residence, with well arranged rooms and a pleasing elevation. The design is one which is, at the same time thoroughly economical.

Below is the specification for the alterations and additions, as well as two separate bills of materials; one for the alteration, and the other for the complete erection of the house in its form as now represented. This and our last number taken collectively, therefore, provide for (1) the erection of the smaller house, (2) the alteration and enlargement of the same, and (3) the erection of the larger house. When it is desired to erect the larger house at once, the drawings and bill of quantities will be taken from this number, and the specification (which answers for both houses) from the last, excepting that the plumber's specification, printed below, must be added.

The design was specially drawn for the SCIENTIFIC AMERICAN, and we shall be glad to give our readers any further information they may desire in respect to either house.

SPECIFICATIONS FOR THE ALTERATION AND ENLARGEMENT OF COTTAGE SHOWN IN APRIL NUMBER.

MASON'S WORK.

Excavating.—Do all necessary excavating for the cellar, depth to be 3″ lower than the present cement bottom. Excavate for all piazza piers, stoop stones, cesspool, etc., complete, and remove the earth where directed.

Stonework.—Build foundation walls as shown, with stone to match those of present foundation, laid up with good sharp sand and cement mortar, flush pointed inside and all that portion exposed to view on the outside to be pointed to match that of the other wall, the side of the old wall which will be exposed in the new part to be neatly pointed up and the wall made perfectly secure, the wall to have a footing course underneath, 4″ deep, made of grouting.

Brickwork.—Do all the brickwork as shown on the plans, the outside piers to be started on a good, solid foundation and laid up true and plumb. Build the kitchen jambs and fireplace with pressed brick, this fireplace to have a trimmer arch, and the pressed brick laid in red mortar. Furnish and lay a rubbed bluestone hearth and rubbed bluestone shelf.

Plastering.—Plaster the entire first, second, and third stories of new part, three coat work, hard finished; the closets and attic may be laid, the mortar to lie at least one week before using.

Cementing.—Cement the entire cellar bottom with Rosendale cement, at least 3″ thick, and to come even with that in the old part.

Doorway.—Cut a doorway from old to new part, smoothly done, and neatly pointed up.

Bluestone.—Put bluestone sills to all cellar windows, 3″ thick, and as smooth as the market will afford. All this work is to correspond with the work it adjoins.

Cesspool.—Build a second cesspool, same size as present one, and in the same manner; connect together with a 4″ cast iron pipe, with end turned down in existing one. This pipe is intended to carry off the liquid from first to second. These cesspools to be as close as practicable.

Cistern.—Build a second cistern, to correspond with the present one, and built in same manner. Connect these with drain tile 4″ in diameter, at bottom of cisterns. These placed as close together as practicable.

CARPENTER'S WORK.

All the work to be done in a good, substantial, and workmanlike manner, to the true intent and meaning of the plans and these specifications.

Size of Timber, etc.—Sills 3″ × 8″, first and second tier of beams 2″ × 10″, third tier 2″ × 9″. All 16″ on centers. Rafters 2″ × 6″ × 24″ on centers. All studding 2″ × 4″ × 16″ on centers.

Frame the building in the strongest manner, in accordance with the drawings. All the joints fitted together, and the frame tenoned and mortised. Extend the piazza as shown on the plans; columns, brackets, rails, etc., to match those in their immediate vicinity.

Sheathing.—Sheathe the entire building diagonally with rough hemlock boards, nailed in each and every nailing. On this sheathing lay heavy building paper, well lapped and worked under the door and window casings and corner boards.

Roofs.—Form the roofs as shown on the elevations to match with the present house. Cover the roof with slates of size and color to match those of present house, the end cornice to be taken off and used as far as it remains good.

Tinning and Flashing.—Do all necessary tinning and flashing whatsoever to gutters, valleys, piazza roofs, etc.

Shingling.—Do shingling as shown. The old shingles may be used as far as they remain sound and good, and to particularly match those on the present house.

Window Frames.—Make all necessary new window frames, corner boards, etc., the same as those in present house. Take out the old frames, and these to be used in places provided for same.

Floors.—Lay the floors of white pine, those of first and second stories to be 4½″ wide, those of attic 9½″ wide, all well driven together and blind nailed.

Doors, etc.—For number and size see plans. Those of rooms to be 1½″ thick, and those of closets 1¼″ thick. The old doors taken out and used in their respective places on new part, hung and locked complete. Hardware to correspond with that of present house. Put in sliding doors where indicated in the old wall of house, these to roll on 4″ "Hatfield's" patent sheaves, and to have astragal face sliding door locks and flush handles, stop and brass track complete.

Architraves.—Trim all the doors and windows with trimmings, jambs, stop beads, bases, etc., to match those of present house.

Shelving.—Shelve all the closets as indicated on the various floor plans; the pantry to have five shelves 14″ wide. Bed room closets to have two shelves each, and to have strips underneath; each strip to have proper quantity of wardrobe hooks screwed thereto. This shelving to be supported on rabbeted cleats.

Bath Room.—Fit up the bath room as indicated on the plans, with ash, the tub to have casing on top and ceiled on the faces; the water closet fitted up with seat and riser; seat to have hinged cover. This water closet to be put together with screws, so it can easily be taken apart by the plumber for repairs; wainscot bath room with 2½″ ash beaded ceiling, 4′ high all around, and finished on top with nosing and cove finish.

Patching.—Do all necessary patching of every description to make the job complete.

Painting.—Paint the whole of the new part with white lead and linseed oil paint. Shellac all knots. Sap before priming coat is applied. Putty up all nail holes and over nail heads, cracks, etc., of every description, after priming is done; the color to match that of the present house. The tin work and leaders to have two coats of "Prince's" metallic paint.

PLUMBER'S WORK.

Drain Pipe.—Furnish and put in where shown on the plans, a 4″ cast iron drain pipe, to run from inside of building. The drain pipe to be trapped inside of the cellar wall, and to be supplied with fresh air from the outside of the building, with iron pipe run through the foundation, and to have a perforated cover as directed by the architect. In every case use Y branches for all iron pipe connections.

Soil.—Furnish and connect with the drain in cellar a 4″ cast iron soil pipe, and run same size up and out of roof, at least 4′, and cap the same with the Smith's patented ventilating cap. Use Y branches for all waste connections. Coat the iron pipe with asphaltum, and in the cellar insert a 4″ cleaning cap.

Calking.—The joints of all iron pipes are to be thoroughly calked with oakum and molten lead, and fastened into position with iron hooks; all joints between iron and lead pipes to be made with brass ferrules, to be calked into iron pipe, and lead pipes soldered to it with wiped joints.

Boiler.—Furnish and put up where shown on the plans a 35 gal. galvanized boiler and provide with draw cock for emptying the boiler, and shut off cocks for shutting the water off from second story, and provide for circulating pipe complete. Connect boiler draw cock with the sink waste. Put in a combined safe and vacumn valve on pipe at top of boiler. Boiler to have the Lockwood stand.

Exhaust.—Run from the highest point in hot water

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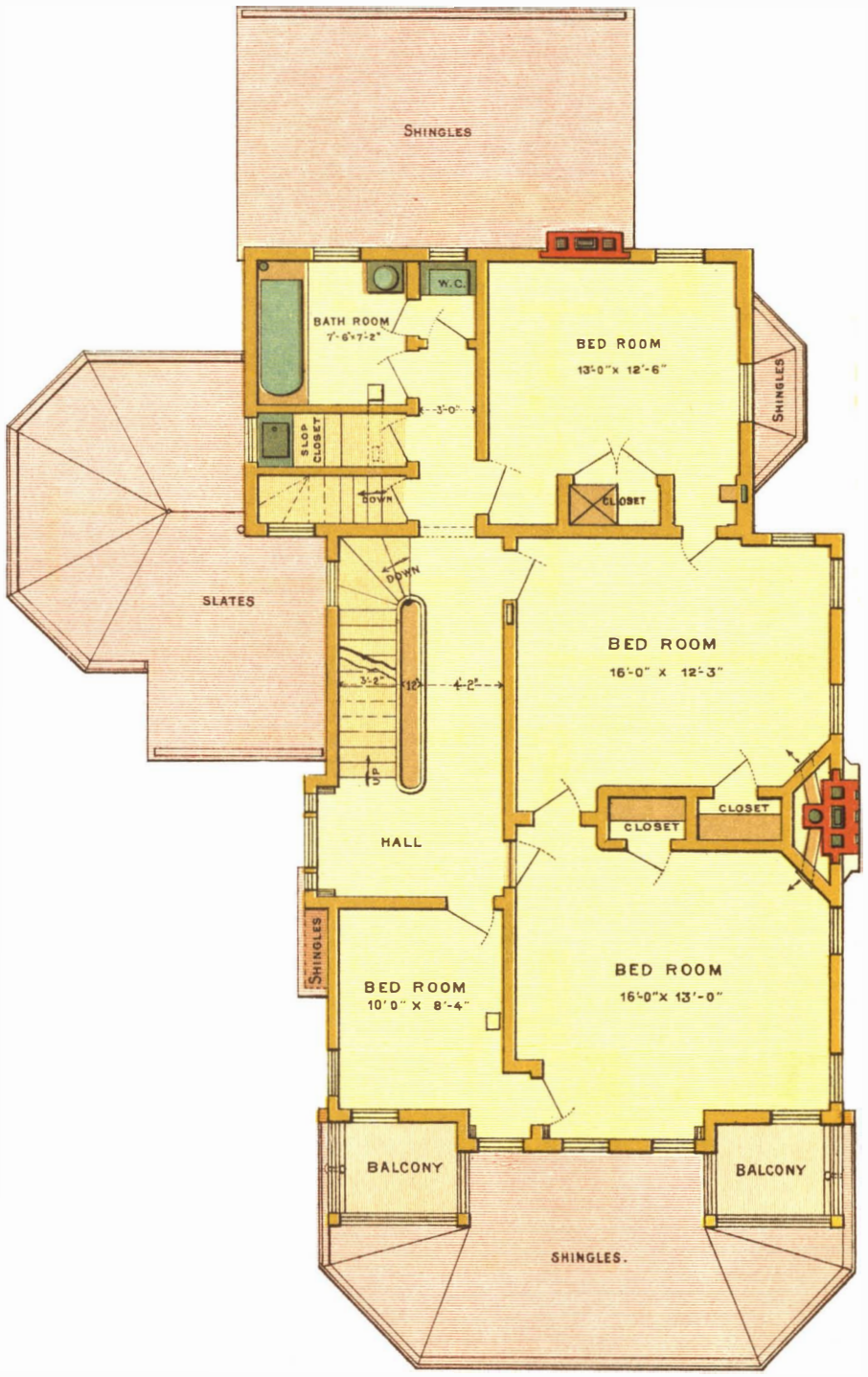
A DWELLING AT ORANGE, N.J.

Plan of First Floor.



Plan of Second Floor.

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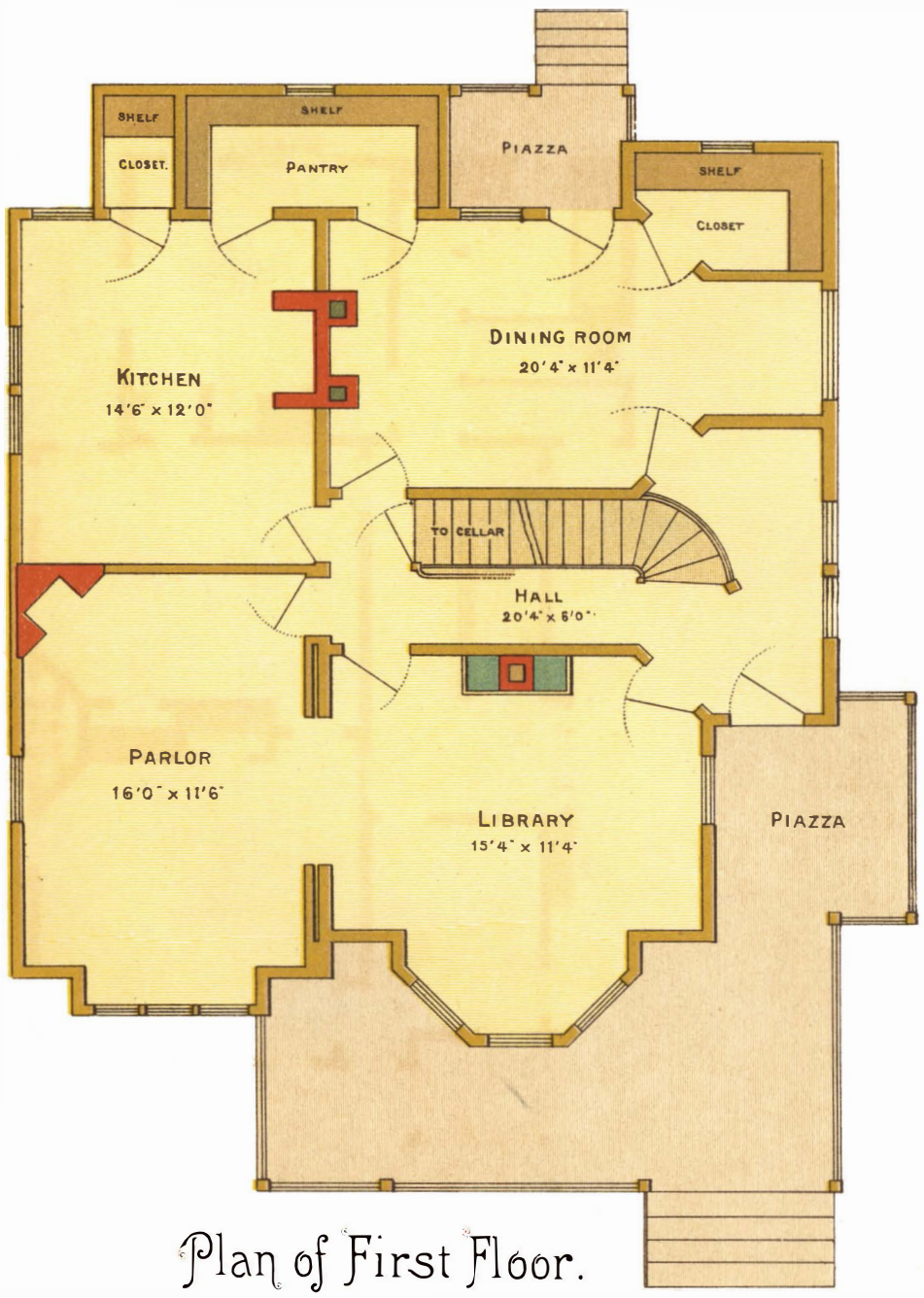
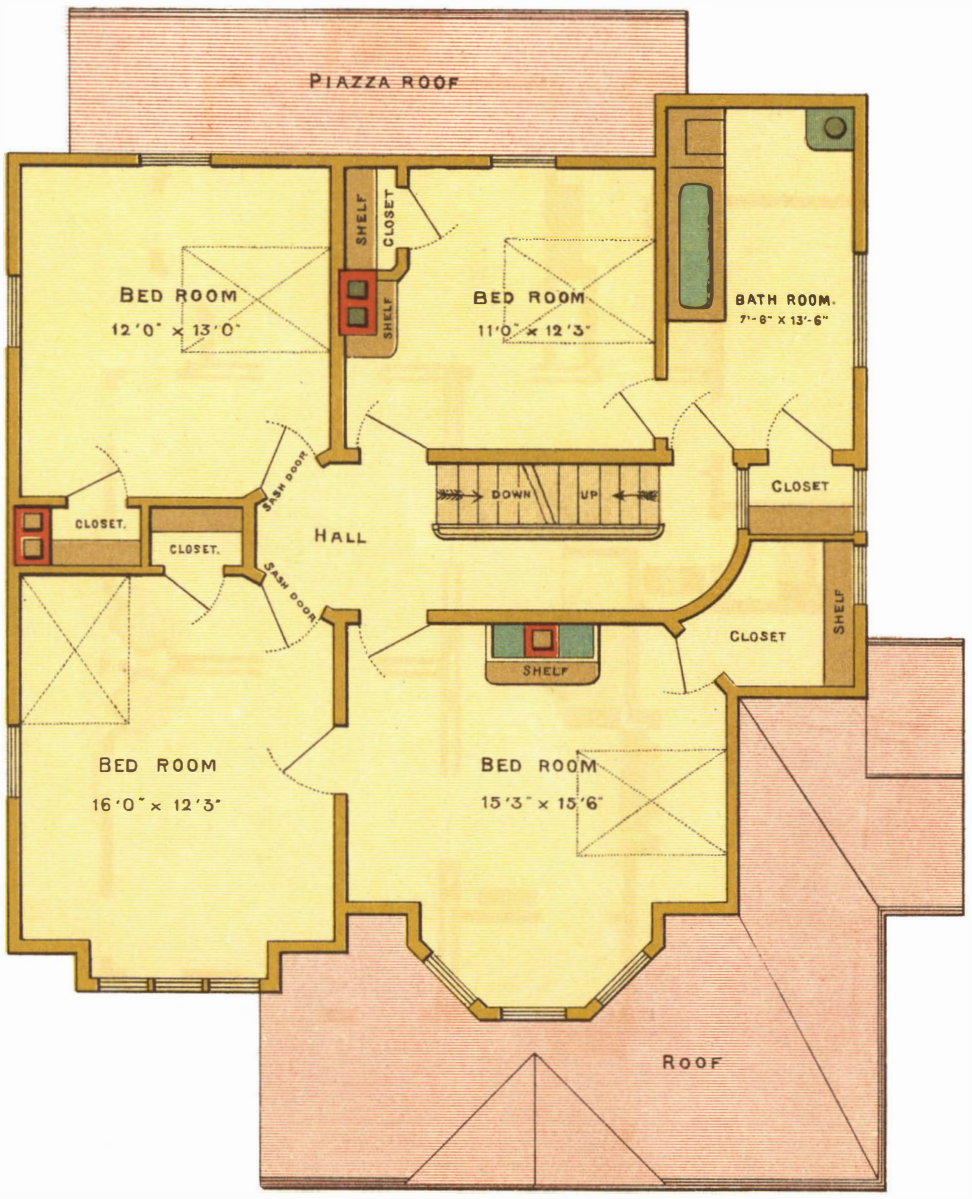
THE COTTAGE (SHOWN IN APRIL NUMBER) AS ENLARGED



Plan of First Floor.

SCHUMACHER & ETTLINGER, NEW YORK.



Plan of Second Floor.

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pipe a ½″ lead pipe to carry same one foot above tank top, and bend over.

Pump.—Furnish and set in kitchen where shown on plans a No. 2½ Douglass horizontal double acting suction and force pump. Fig. 23, *b*, brass lined and connected to a 1¼ B lead suction pipe. Insert an aircock to prevent pipe from freezing in cold weather.

Supply.—From the pump carry a 1″ A lead pipe to enter bottom of tank, the same to act as a house supply. Place a 1″ finished stop with waste on the pipe in bath room. Provide a check valve near pumps, so that cold water over sink must be drawn by pumping. Hot and cold supply all through the house to be ⅝ A lead pipe, and all pipes are to be graded so they will drain perfectly dry. Control each floor separately by ⅝ finished stop and waste.

Sink.—To be an 18″ × 30″ galvanized iron, with two front legs, trapped with 1½″ trap and lead waste of 1½ C, connected with 2″ iron soil under floor, also insert a cleaning cap at the point. Sink to be supplied with hot and cold water through ⅝ A lead pipe and through "Peck's" improved lever handle bibbs. Flash the woodwork back of sink with 3 lb. sheet lead 15″ high.

Bath.—Furnish and put up where shown on plans or as directed a 16 oz. tinned and planished bath tub, 5½′ long, supplied with hot and cold water through ⅝ A lead pipe, and to have a nickel plated combination compress iron bath cock, with rubber hose and sprinkler. Waste through a 1½″ trap and 1½″ C lead pipe properly connected to main soil. Furnish the nickel chain and plug.

Bowl.—Furnish and set where shown on plans a 14″ patented overflow wash basin, of best Italian marble, with countersunk marble slab 22″ × 30″, and back 10″ high. Supplied with hot and cold water through ½″ A lead pipe and Peck's improved nickel plated basin cocks; to have 1¼ D lead waste pipe, trapped with a 1¼ trap and properly connected to main soil. Furnish nickel chain, plug, and fancy chain stay.

Air Chamber.—Place no cocks on end of pipe, but extend pipe at least 6″, so as to provide an air chamber.

Water Closet.—Furnish and set in bath room where shown on plans an "Inadora" all porcelain wash out closet with drip tray, also set up a painted iron cistern, with flush tank attached. Supply cistern through ⅝ A pipe from main tank. Cistern to supply closet through 1¼ D pipe. Ventilate the closet trap with a 3″ lead pipe, calked into main soil. Insert the nickel cup and pull in the seat.

Safe Pans.—The bath tub bowl and water closet are to be provided with 3 lb. lead safes turned up 2″ all around, and to have a ¾″ D waste pipe running to cellar.

Wash Trays.—Supply the wash trays with hot and cold water through ⅝″ A lead pipe, and brass tray bibbs with flange and thimble.

Provide a 1½″ lead waste, connected to main soil, and to be properly trapped. Provide necessary chains and plugs of brass.

Every trap to be placed as near fixture as possible.

Every trap in the house to be separately ventilated the same size as trap, and to either connect with main soil above bath room fixtures or run independently to 4′ above the roof line and there cap.

Range.—Furnish and put up a Newport No. 8 range and connect with boiler. The hot water pipe from range to boiler to be ¾ A.

Tank.—Line the tank as given on plans with 16 oz. tinned sheet copper, and leave complete, with overflow and inlets.

Gas Pipes.—Put up gas pipes with outlets where shown on plans, and according to the rules of the Gas Light Co. All outlets are to be capped, and all pipes tested. All side lights are to be not less than 5′ 6″ from floor. All drop lights are to be hung plumb. All the fittings for the bath room to be located as directed.

Bill of Quantities for Alteration of House.

MASON'S WORK.

		At	
70	yards excavating	$0 25	$17 50
17	perch stone work	45	76 50
	Cement bottom	..	15 00
2	piers in cellar	3 50	7 00
1	chimney breast	..	75 00
5	cellar window sills	80	4 00
375	yards plastering	40	150 00
	Additional cesspool and connection	..	25 00
	Extra drains	..	5 00
	Additional cistern, etc	..	50 00
	General patching	..	60 00
	Total		$485 00

CARPENTER'S WORK.

No. of Pieces.	Size.	Description.	
1	6″ × 8″ × 22′	=	88 feet.
2	3″ × 8″ × 13′	=	52 "
3	4″ × 6″ × 22′	=	132 "
6	4″ × 4″ × 16′	=	126 "
4	" × 13′	=	68 "
2	" × 18′	=	48 "
5	2″ × 10″ × 15′	=	125 "
52	2″ × 10″ × 13′	=	1,144 feet.
26	2″ × 9″ × 13′	=	507 "
14	2″ × 6″ × 21′	=	294 "
7	" × 16′	=	112 "
6	" × 24′	=	144 "
1	3″ × 6″ × 22′	=	33 "
1	" × 12′	=	18 "
1	" × 20′	=	30 " = 2,921 feet, per M	$28 00	$81 79
200	2″ × 4″ × 12′	=	1,600 feet, per M	24 00	38 41
550	ft. hemlock boards, put on, per M			20 00	11 00
550	" slate, per sq. ft			7	38 50
550	" hemlock sheathing, put on, per M			22 00	12 10
650	" siding, put on, per M			35 00	22 75
30	" main cornice, per ft			30	9 00
10	" band, per ft			20	2 00
30	" water table, per ft			10	3 00
50	" piazza cornice, gutter, plate, etc., per ft			30	15 00
4	columns front piazza, turned, each			2 25	10 00
35	ft. rail front piazza, per ft			30	10 50
8	brackets for front piazza, each			25	2 00
225	ft. piazza floor and ceiling, complete, per ft			25	56 25
1,000	" first and second story floors, per ft			5	50 00
500	" third story floor, complete, per ft			4	20 00
	Stoops and lattice			7 00	7 00
3	cellar windows, each			1 75	5 25
4	first story windows, complete, each			8 00	32 00
3	second story windows, complete, each			7 00	21 00
5	third story windows, complete, each			5 00	25 00
7	first story doors, complete, each			5 50	38 50
6	second story doors, complete, each			5 00	30 00
4	third story doors, complete, each			4 50	18 00
250	ft. surbase, per ft			4	10 00
5	closets, complete, each			3 00	15 00
1	pantry			12 00	12 00
	Jobbing for other trades, including tearing away old work			..	75 00
	Extra sheathing, siding paper, and sliding			..	86 80
	Incidentals			..	40 00
	Finishing square bay			..	75 00
	Total for carpenter's work				$872 85
	Painting all new work as specified				50 00
	Plumbing, without sink and extra cutting				325 00
	Range				25 00
	Furnace, complete				170 00
	Mason's work as above				485 00
	Total cost of alterations				$1,927 85

Bill of Materials for the House Complete, as Represented in the Present Issue.

CARPENTER'S WORK.

No. of Pieces.	Size.	Description.		
1	6″ × 8″ × 20′	trimmer,	=	80 feet.
1	" × 22′	"	=	88 "
3	3″ × 8″ × 12′	sills,	=	72 "
2	" × 13′	"	=	52 "
1	" × 16′	"	=	32 "
1	" × 24′	"	=	48 "
1	" × 14′	"	=	28 "
1	" × 30′	"	=	60 "
11	4″ × 6″ × 22′	post,	=	484 "
2	" × 20′	"	=	80 "
9	4″ × 4″ × 16′	plates and ties,	=	192 "
3	" × 14′	"	=	57 "
1	" × 24′	"	=	32 "
6	" × 12′	"	=	96 "
2	" × 19′	"	=	50 "
4	" × 13′	"	=	69 "
2	" × 18′	"	=	48 "
20	2″ × 10″ × 16′	beams,	=	540 "
36	" × 21′	"	=	1,260 "
5	" × 15′	"	=	125 "
52	" × 13′	"	=	1,127 "
10	2″ × 9″ × 16′	"	=	240 "
18	" × 21′	"	=	567 "
26	" × 13′	"	=	503 "
34	2″ × 6″ × 21′	rafters,	=	714 "
26	" × 16′	"	=	416 "
6	" × 18′	"	=	108 "
6	" × 24′	"	=	144 "
1	3″ × 6″ × 16′	"	=	24 "
2	" × 22′	"	=	66 "
1	" × 12′	"	=	18 "
1	" × 20′	"	=	30 "
	Equaling			7,450 feet spruce timber, per M	At $28 00	$208 60
625	2″ × 4″ × 12′	rafters = 5,000 ft. hemlock, put up, per M			24 00	120 00
1,350	ft. hemlock boards, for roof, put on, per M				$20 00	$27 00
1,350	" slate, put on, per ft				7	94 50
2,550	" sheathing and paper, put on, per M				22 00	56 00
2,150	" siding, put on, per M				35 00	75 25
600	" shingles on sides, put on, per ft				6	36 00
230	" cornice, per ft				30	69 00
110	" band, per ft				20	22 00
160	" water table, per ft				10	16 00
100	" piazza cornice, gutter and plate, per ft				30	30 00
2	back piazza columns				..	3 00
1	short column				..	2 00
10	ft. rail balusters, back piazza per ft.				20	2 00
13	" filling, back piazza, per ft				30	3 90
6	columns, front piazza, turned, each.				2 25	13 50
1	short column				..	2 00
48	ft. rail front piazza, per ft				30	14 40
14	brackets for same, each				25	3 50
325	ft. piazza, floor, ceiling, and tin roof, per ft				25	81 25
2,800	" first and second story floors, per ft				5	140 00
1,400	" attic floor, per ft				4	56 00
	Stoops, lattice, etc				..	25 00
10	cellar windows, complete				..	17 50
17	first story windows, complete				..	136 00
14	second story windows, complete				..	98 00
9	third story windows, complete				..	45 00
	Front door, complete				..	10 00
14	first story doors, complete				..	77 00
12	second story doors, complete				..	60 00
8	third story doors, complete				4 50	36 00
2	flights stairs				..	75 00
	Cellar stairs				..	4 00
550	ft. surbase, per ft				4	22 00
1	pantry, complete				..	12 00
11	closets, complete				3 00	33 00
	Jobbing, etc., for other trades and incidentals				..	120 00
	Finishing square bay				..	75 00
	Total					$1,921 40

MASON'S WORK.

		At	
162	yds. excavating, per yd	$0 25	$40 50
60	perches stone work, each	4 50	270 00
	Cement bottom in cellar	..	30 00
4	piers in cellar	..	14 00
7	outside piers	..	21 00
2	stoop stones	..	8 00
3	chimneys	..	150 00
10	cellar window sills	..	8 00
	cellar steps and coping	..	20 50
1,100	yds. plastering	..	440 40
	Cistern, complete	..	50 00
	Cesspool, complete	..	40 00
	Drains	..	25 00
	General patching, etc	..	60 00
	Total		$1,177 40

SUMMARY.

Painting	$200 00
Plumbing	320 00
Range	25 00
Furnace	170 00
Carpenter	1,921 40
Mason	1,177 40
Total cost of house	$3,813 80

Removing Paint.

When ordinary soda is exposed to the air, it has the property of absorbing, to a certain extent, the carbon anhydride from it, and especially is this so when the atmosphere is moist, the carbonic anhydride forming, with the moisture of the soda, carbonic acid. Soda being an alkaline substance, is, as we have already seen, the opposite to an acid, and when these two substances combine, a neutral salt is formed. Now, when soda is in combination with carbon, which we may often see by the whitish incrustation on its surface, or when it is in combination with any other substance, its facilities for entering into combination with a second substance are lessened to the extent of its combination with the first. This being so, we have to ask ourselves the question, How can we remove the carbon from the soda, so that it will enter more freely into combination with the oxidized oil of the paint?

Quicklime is a substance which has a greater affinity for carbon than soda. In slaking quicklime with soda, the lime enters into combination with the carbon of the soda, and by that means leaves the soda chemically uncombined with it, while it is chemically combined with the lime, forming carbonate of lime. The soda now forms a mechanical mixture with the carbonate of lime, and is ready to enter more freely into combination with the paint. The lime, or the carbonate of lime, has no action on the paint, any further than that the heat assists in driving apart more free y its molecules. The action of lime and soda on dry or wet paint is to form the whole into a soluble soap.

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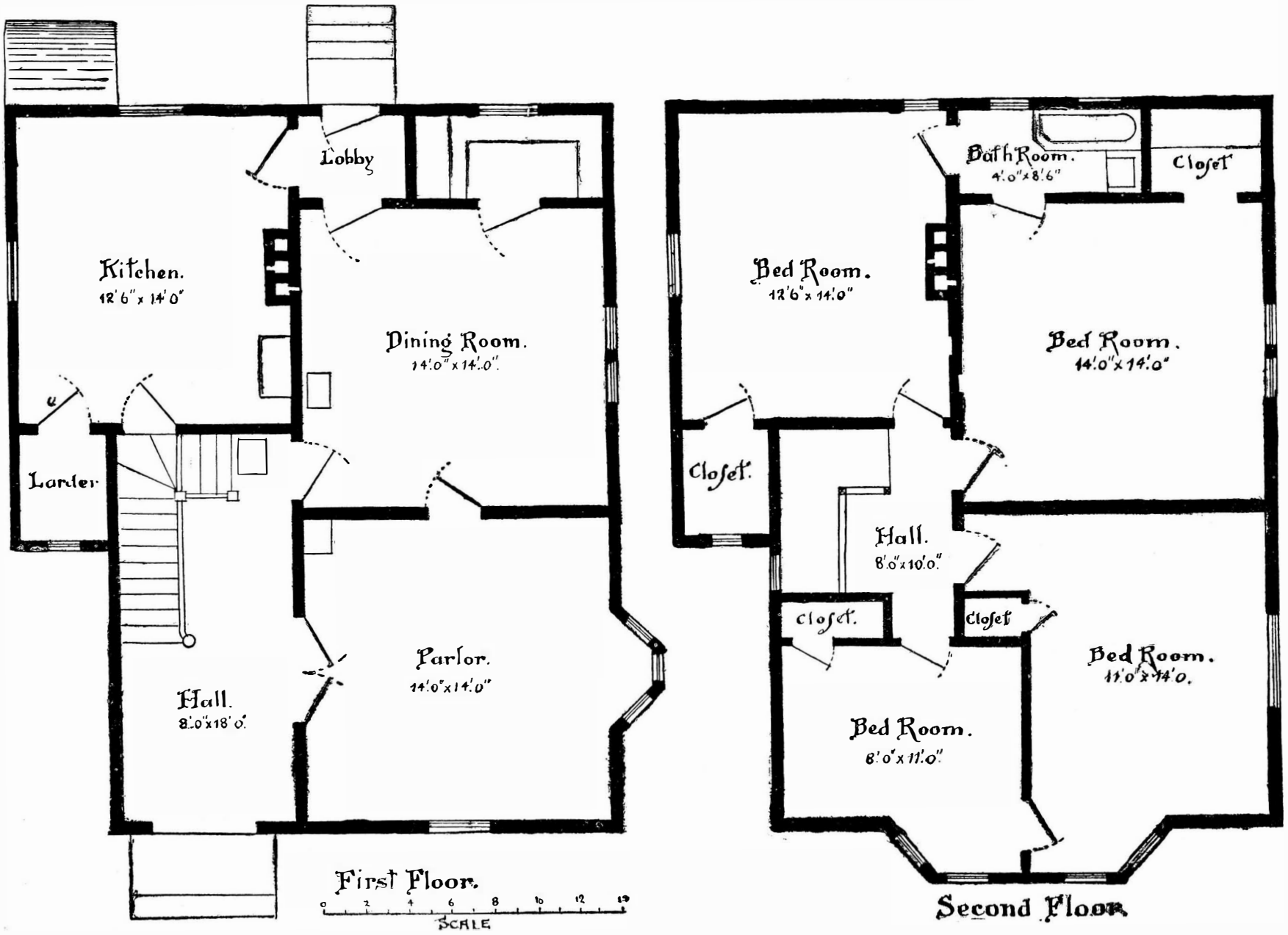

A TWENTY-FIVE HUNDRED DOLLAR COTTAGE.

[For description see page 100.]

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A TWENTY-FIVE HUNDRED DOLLAR COTTAGE.

This convenient little dwelling was built for Mr. Amos C. Barstow, on a lot near Olney Street, Providence, R. I., under the superintendence of J. A. Bucklin, architect, of Providence. The cost, excluding a long fence, erected for the purpose of inclosing the lot, was $2,500.

SPECIFICATION AND CONTRACT.

Description.—The house is to be 23′ 6″ front, 33′ 6″ on side, with an addition 20′ 6″ × 4′ 6″ on the east side, making the rear of the house 23′, with a bay window on each story, with all the pediments, dormers, and ornaments, as shown by the drawings. The height of the stories to be as follows: The basement to be 8′ from top to top. The first story 10′ 6″ top to top. The attic story to finish 8′ in the clear between the floor and plastering. The plates on the sides are to be 4′ and on gable ends 2′ 6″ above the attic floor. Finials to be on peak and dormers.

Materials.—All the materials required to finish the contract are to be provided at the sole cost of the contractor, and to be of the kinds and qualities herein specified, but if not particularly enumerated, then they are to be of the first quality.

Works.—The contractors shall execute and perform, fully finish and complete, all the several works agreed upon as shown, indicated, or implied from designs and plans and working drawings made and to be made by James A. Bucklin, all to be done in the most workmanlike manner, under the direction and to the satisfaction of the said J. A. Bucklin as architect and superintendent of the said building.

Progress.—The building is to be immediately commenced and constantly prosecuted until completed, which shall be on or before the first day of July next ensuing.

Excavation.—The loam is to be taken off the lot the size of the house and embankments, and left in a heap where directed. The earth is to be excavated for the cellar and all foundations, drains, and cesspool, and left on the lot. All rubbish is to be carted away, and the premises left broom clean.

Cellar Walls and Foundations.—The outside cellar walls are to be built up the height to receive the brick underpinning, of good building stone, laid dry, the wall to be in no place less than 16″ thick. The underpinning to be of first quality Croton, or equal thereto, brick, the walls 8″ thick. The front and west side to be 7′ high. The east side and rear 4′ high. The cellar partition and chimney to be of first quality common brick. The top of the chimney, where seen, to be of the Croton brick, first quality. The partition walls to be 4″ thick. The cellar partition at the stairway and water closet is to be of studs lathed and plastered both sides.

Drain and Cesspool.—A cesspool 5′ diameter at the bottom and 8′ deep, built 20′ from the house, covered with a flat stone under ground, and to have 6″ drains leading from the sink and water closet pipes.

Chimney.—The chimney is to have three flues, and in each room is to have 6″ cast iron pipe collars built in. Two rooms are to have marble shelves, supported by iron brackets.

Plastering.—The whole interior of the first story and attic is to be lathed and plastered, and all overhead to be stuccoed. All sides to be skim coated suitable for paper. The laundry and cellar stairs and water closet in the cellar is to be lathed and plastered, the partitions on both sides. All the stone walls must be pointed, all the brick walls must have the joints struck smooth, and all the cellar sides and overhead must be whitewashed two coats.

Concrete.—The cellar floors are to be covered with concrete 3″ thick, composed of one part cement, one part gravel, and two parts sand, and leveled off smooth.

Timber.—All the timber is to be of spruce, of the following dimensions: sills 6×6, floor joint 2×8, placed 16″ from centers, studs 2×4, placed 16″ from centers, partitions 2×3, placed 12″ from centers, trimmers for chimneys and partitions to stand on, and stairs, 4×8, plates 6×6, girts 2×6, let into the studs, plates to partitions 4×6, rafters 3×7, placed 2′ from centers, attic ceiling joist 2×8, spiked to each rafter. All to be framed in a proper manner and fitted to both.

Boarding.—The sides, roofs, and floors are to be boarded with sound, seasoned square edged hemlock boards, planed to a thickness, laid close and well nailed, and the sides and floors to be covered with felting paper, the joints to lap 2″.

Shingles.—All the roofs and the sides of the attic story are to be shingled with first quality custom sawed cedar shingles. The pediments and sides of the addition and window caps are to be ornamental shingling, as shown by the drawings.

Tin Work.—The eaves gutters and valleys in the roofs of tin, and the four conductors, 3″ in diameter, are to be of galvanized iron.

Clapboards.—The sides of the first story are to be covered with first quality sap clear white pine clapboards, nailed with fivepenny nails, driven not over 7″ apart in each clapboard.

Dressings.—All cornices, window frames, fascias, corner and bottom boards, and other outside ornamental work are to be of sound, seasoned white pine lumber, clear of sap and large or loose knots.

Furring.—All overheads that are to be plastered are to be cross furred with 2″×1″ furs, nailed to the joist 12″ from centers.

Flooring.—The top floors of the kitchen and the kitchen and dining room closets, and the bath rooms, are to be of 3″ wide Southern hard pine boards. All other floors to be of 4″ wide spruce, all thoroughly seasoned and clear of loose or large knots, to be planed and jointed, laid in streaks, keyed up close, and well nailed and smoothed off with the smoothing plane. The outside steps and platforms are to be of seasoned 2″ white pine, the platforms of 4″ wide, tongued and grooved together. All to be clear of loose or large knots or sap. Lay single floor square edge in upper attic.

Windows.—The cellar window frames made of plank, with sash 1⅜″ thick, hung with butts, and fastened both when shut or opened, and all to be cased as directed. All other windows are to have frames with parting slips and slip boards, the sash to be 1⅜ inches thick, and to have spring fastenings of the best quality to both upper and lower sashes. All to be glazed with second quality French glass. All to have outside blinds, properly hung and fastened. The top sash of all the windows are to be glazed with colored cathedral glass. See drawings, which will show the size of light. The scuttle is to be a heavy frame, with a plate of Hammond glass, 18″×18″.

Doors.—The outside doors are to be 1¾″ thick, built in form as shown by the drawings, with top lights and colored glass, hung with 4½″ butts, and fastened with a Nashua front door mortise knob lock, with night keys and bronze knobs and escutcheons. All other doors to be 1⅜″ thick, hung with 4″ butts and fastened with a Nashua mortise knob lock.

The inside cellar doors may be good batten doors, properly hung and fastened. The trap door below the scuttle to be hung and to have weights attached. Size of trap door, 3 ft. × 4 ft. The folding doors in the front hall are to be glazed with enameled glass, and the doors in the upper and parlor halls are to be glazed with ground glass. The locks will be furnished by the owner and put on by the contractor.

Casings.—All the doors and windows are to be cased, as shown by the working drawings, with seasoned white pine, clean of large or loose knots or black sap. There is to be a roof scuttle, hung and fastened with a hook, and to have a step ladder leading to it.

Base Boards.—Base boards are to be put to all the rooms, stairs, entries, and closets. The kitchen to be ceiled up 3′ high with tongue and grooved clear white pine 3″ wide.

Stairs.—The front stairs are to be built of clear white pine lumber, as per drawings, with turned posts and balusters of ash. The cellar stairs are built under the front stairs, between plastered partitions. All turned work polished in lathe.

Closets.—The closets are to be fitted with shelves, cupboard drawers, and pins as desired, the drawers not to exceed ten in number. In the kitchen closet is to be a cupboard for a flour barrel, with a trap in the dresser. In the kitchen and laundry are to be iron sinks, with a closet under them. The bath rooms are to be finished in the usual manner, by casing the tubs and water closets, and ceiling the rooms 3′ high. All to be done with ash.

Plumbing.—There is to be furnished, and set where shown on the drawings, two water closets, one iron one in the basement and one Bartholomew in the attic. One bath tub of iron in the attic. A close-head tinned copper boiler, to hold thirty gallons, placed at the range. In the laundry and in the kitchen are to be iron sinks, with all the necessary pipes for the supply of Pawtuxet water, and all waste pipes and soil pipes leading to the sewer, and from the sewer to the roof, for ventilation; and also pipes for hot water leading from the boiler at the range to the sinks in laundry and kitchen and bath tub, with all the necessary and desired faucets and traps and other fixtures to make a complete job. All supply pipes to be of sufficient strength to sustain the pressure of the Pawtuxet water. The water will be brought into the front of the house by the owner.

Gas Pipes.—Gas pipes are to be put into the house, to all the rooms, entries, closets, and laundry and furnace room, the outlets not to exceed sixteeen in number. All the pipes to be according to the Providence Gas Co. standard.

Bells.—A bell is to be placed in the kitchen, with a bronze pull at the front door.

Painting.—All outside, except the main roof shingles, and all the inside woodwork, except floors, is to be painted two coats with white lead and linseed oil, of such colors as desired. This is to include all the ornamental shingling on the sides and pediment.

Sundries.—All cutting, casing, mending, and patching on account of plumbing, gas piping, registers, and furnace, must be done by the contractor.

Fences.—The lot is to be fenced with a board fence, planed and painted on both sides. The length to be 172′, like the other cottage.

CONTRACT.

This agreement, made this.....day of..... by and between.....of the first part, and Amos C. Barstow, of the second part, both of Providence, R. I.,

Witnesseth:

The party of the first part, in consideration of the sum of two thousand five hundred dollars, to be paid ..... by the party of the second part, hereby agree to furnish the above specified materials and labor, and build and complete a dwelling house on a lot near Olney Street, in Providence. The whole of said work is to be performed and the materials furnished in conformity with the drawings and the above specifications, which are to be considered as forming part of this contract. The said party of the first part further agrees that the work aforesaid shall be immediately commenced, and constantly prosecuted until completed, which shall be on or before the first day of July next ensuing. The party of the second part, in consideration of the materials being furnished and the work performed as above required, hereby agrees to pay to the party of the first part the sum of $2,500, in payments to be made from time to time as the work progresses, upon a certificate from the superintending architect certifying that there is fifteen per cent more of the work done and materials furnished than the whole amount received and asked for, the last payment to be made in thirty days after the whole has been completed and accepted by the superintending architect.

Embossed Wood.

To produce upon wood at moderate cost the effect of carved work has been a difficult problem, says the *Furniture Trade Review.* There are many imitations of wood carving, but every one knows at a glance that they are imitations. The texture which is peculiar to all types of wood, and which in the fancy woods is so delicate and attractive, cannot be imitated. Hence, the ornaments in plaster, papier-mache, or some of the other plastic materials have fallen short of what was aimed at, because in effect they were lifeless and abortive.

Mr. C. W. Spurr long ago learned that wood was flexible, and when he saw what an important part embossed leather was assuming in decorative art, he determined that some such treatment should be applied to wood. It was said to be impossible, because the fiber of the wood, under the great pressure necessary to emboss it, would break. After seven years of experiment, however, the tentative efforts have resulted in the most perfect embossed wood examples, which are to all intents and purposes carved upon the surface of the wood. There is the fiber of the wood in a perfect condition, while upon the surface are designs of ornament in relief which only a carver can produce. How it is done would require a scientific article to describe, although a cursory glance at the process may not be without interest.

The process of Mr. C. W. Spurr, of this city, is as follows:

An engraver produces a design from which a mould is taken and an iron die cast. The layers of wood, with the grain so arranged that any defect is supplied by the under layer, are cemented together with a backing of canvas and placed under the die in a press which has the capacity of several tons. One would expect to see the life crushed out of the wood, but as it is flexible, and as its flexibility has been calculated upon, when the press is released a beautiful panel of embossed wood is found, which is as tough and flexible as the virgin wood. The ornament may be repeated to any extent, and it is in this reproduction that the value of the discovery consists.

By means of this process one may use wood hangings as an upholsterer would tapestries. He may begin at the front door, upon which he will hang the costliest woods, and thence go into the entrance hall, and so from one apartment to another, decorating them with the richest treasures of the forest, and in the most economical manner.

It is the costliness of carving which makes it so rare; but by this process, once the design is produced and the die made for it, there is merely the cost of labor and material.

The application of this invention is unlimited and the product is invaluable wherever decorative effect is sought. For panels of bedsteads, sideboards, chiffoniers, cabinets, pianos, organs, and a thousand and one articles where attractive effects are desired, embossed wood will be in great favor. It has been said that it bears the same relation to carving that lithography does to oil painting, but it seems to us that the comparison halts, as embossed wood and carving are identical, while lithography has a distinct surface from the artist's canvas.

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MATTHIAS' DESIGN FOR THE GRANT MAUSOLEUM.

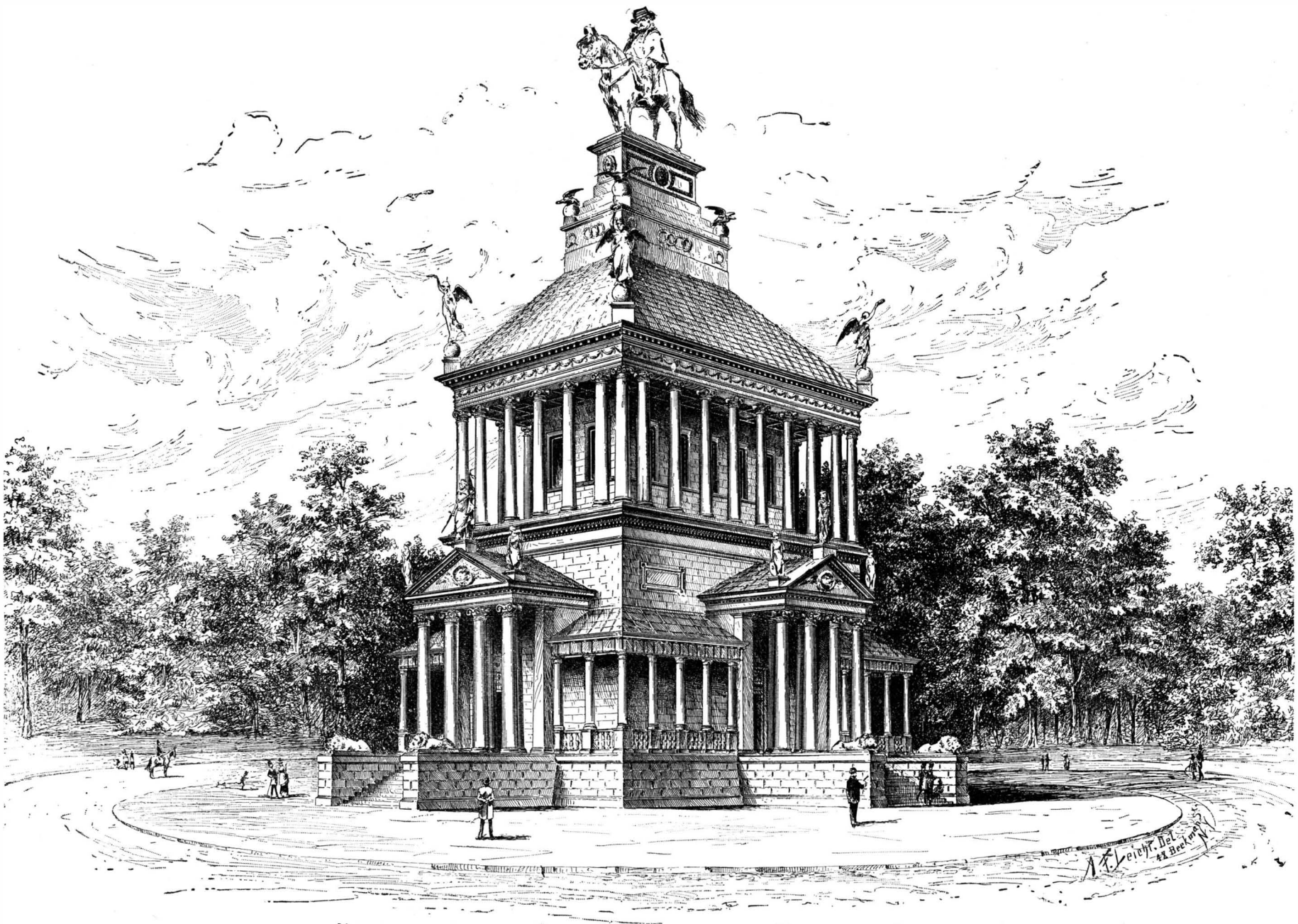
This design for a Grant mausoleum well deserving of public attention has been prepared by Mr. George Matthias, architect, of New York. Mr. Matthias has adopted for his design the Grecian form, which, for its simplicity and elegance, is unsurpassed by any other style of architecture. The total dimensions of the structure are 134 feet long, 120 feet wide, and 128 feet high. The material is intended to be granite. The main roof, as well as that of the porticoes, is also meant to be covered with granite tiles, while the statues are to be of bronze. There are four porticoes and steps leading up to them from three sides, while in the rear the steps are leading down to the vault underneath the rear end of the memorial hall.

This hall is entered through three richly paneled bronze doors, directly from the porticoes, which are connected by covered galleries. The walls and ceilings inside are to be finished in colored marble. Two sarcophagi of white marble, and a statue of the same material standing on a pedestal between them, are to be placed on a raised platform in the rear of the hall, inclosed by a railing. The figure between the sarcophagi to hold over each of them in outstretched hands a wreath of laurels. The ceiling of the hall to be laid out in richly ornamented panels. Six columns in the center of the hall carry the structure above, which is to let in the light through a stained glass skylight, worked into the marble panels of the ceiling. This latter structure supports also the pedestal, which is carried over the roof to receive a statue of General Grant. The statue is supposed to represent the great hero while making observations of the opposing army.

It seems to us that this part of the structure is excellently arranged. The statue is raised up sufficiently to be seen from the Hudson as well as from the surrounding country for many miles. The eagles at the foot of the pedestal, high up in the air, seem to be in their real element, and form an excellent feature of the design. So do the figures on the four corners of the main cornice. These statues represent the goddess of victory holding up in one hand the wreath of victory and in the other the palm of peace, thus well expressing to the popular mind what the valor of the great general accomplished for the nation. For he brought us peace and victory, the blessings which endeared him so much to the hearts of his countrymen. The figures on the porticoes represent the goddess of liberty, sword in hand, holding up the flag, while a goddess of war on each side stands ready to assist in upholding it.

Sleeping lions are placed at the four entrances, and remind the visitor, on entering the mausoleum, of the strength and courage of the great soldier who is supposed to rest beneath the walls of the edifice, intended to immortalize his deeds, which placed him foremost in the ranks of the greatest generals of all ages.

As a whole, Mr. Matthias' design compares well with others that have been brought to our notice so far, and we hope that its publication will contribute to revive the interest of the public for the contemplated monument to our dead hero.



DESIGN FOR A GRANT MAUSOLEUM RIVERSIDE PARK N.Y.

GEORGE MATTHIAS, ARCHITECT
STEWART BUILDING NEW YORK.

Knotting and Its Uses.

Knotting, as its name implies, is a thin varnish used for coating over knots in wood preparatory to painting. No doubt every one in the painting trade is familiar with the brown stains which knots produce on paint when they have not been specially prepared. Before patent knotting was known, knots were chiefly treated with red lead, mixed with a little weak size as a binding agency, or gilded with gold leaf, this latter acting as an effectual stop to the resin of the knots. Now, red lead contains a good percentage of oxygen, which is ready to enter into combination with any other oxidizable substance, It has also the property of separating from drying oils the mucilage which prevents them from entering into combination with oxygen, when applied in the form of paint. We may suppose, from the action of the resinous or oily substance which exudes from the knots of wood, that it is composed also of mucilage, which is largely present in, perhaps, nearly all vegetable substances. Such is the fact with raw linseed oil, which is boiled with red lead, litharge, manganese, etc. These have the property of separating the mucilage from the oil, which otherwise would prevent its oxidization, or drying. In this way we often find that the paint on the knots of woodwork which has been newly primed is very often wet when the other parts, that are free from the resinous substances, are quite dry.

Patent knotting is a varnish which dries by the spirit volatilizing, and leaving the shellac in a solid form on whatever substance may be coated with it. The substances the shellac is dissolved in for making patent knotting evaporate very quickly, being in fact methylated spirits of wine, or naphtha. On account of the time which it takes for the spirit to evaporate, the resin has not time to enter into solution with the shellac. as it has in the case of paint. Again, the shellac presents an insoluble barrier to the oily substance which exudes from the knots. Paint, when once dry, also forms an insoluble compound, but in the case of paint put on unprepared knots, the resinous substance enters into solution *before* the paint has time to dry.

Strength of Paris Plaster.

The extraordinary forces of adherence, etc., of the Paris plaster enables the work on ceilings or partitions to be executed with far less expense of lathing than similar works executed with our lime and hair. Rondelet made experiments to acertain the limits of these forces, and he obtained the following results. A parallelopipedon of plaster, with a base measuring one inch each way, supported a weight of 76 lb., acting so as to tear it asunder. This he called the force of adhesion. Similar figures resisted a crushing weight of 722 lb.; so that the ratio of the resistance of plaster to an effort of traction compared to one of extension is as 1 to 9½.

Rondelet found that there was a sensible difference in the manner in which plaster adhered to brick or stone, from the action of mortar under similar circumstances. For when cubes joined by the respective materials were subjected to forces tending to tear them asuuder, the mortar broke through the center of the joint, leaving particles attached to the upper and under surfaces. Plaster, on the contrary, left the surfaces perfectly clean. In new works the plaster adheres to other materials with about half the force necessary to tear it asunder. Mortar, for several years at least, only attains one-third of the same force. This ratio does not continue, for after ten to twelve years the plaster loses its strength, while, at the same epoch, we find the adhesion of the mortar to other substances to be equal to the force of adhesion of the cubes themselves. The subsequent ratios are in inverse progression. Mortar always hardens by time; plaster loses strength. As these remarks only apply to its use as a mortar externally, it should never be employed permanently for such positions. Internally the loss of strength is not so rapid, for it depends upon the absorption of moisture from the atmosphere. For temporary works, for internal works, requiring great rapidity of execution, however, the use of Paris plaster is invaluable.—*G. R. Burnell.*

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APARTMENT HOUSE, BROOKLYN, N. Y.

We present a second story plan and a perspective of an apartment house erected by Mrs. Mary Johnson in Quincy St. between Nostrand and Marcy Avenues, in the city of Brooklyn, at a cost of about $50,000, from plans by Amzi Hill, architect, 1161 Fulton Street, Brooklyn.

The building is 55 feet front and 95 feet deep, has a Trenton brick front with rubbed brownstone trimmings, the front of basement is of rock faced brownstone ashlar.

The balconies and cornices are of galvanized iron.

The building is heated with steam, by radiators placed in the several rooms.

The interior arrangement is probably the most perfect of any building of its size in the city.

Every room has at least one window communicating directly with the outside air and light, except the bath rooms, which are lighted and ventilated by a 5 × 8 feet brick walled light shaft.

Each bed room has a closet and one of Mott's folding wash basins.

The main hall is lighted by a galvanized iron skylight, 12 × 17 feet.

In the center of hall is a 5 × 7 feet hydraulic passenger elevator, with stairs around it.

A fireproof hall and stairs is placed at the rear of the building.

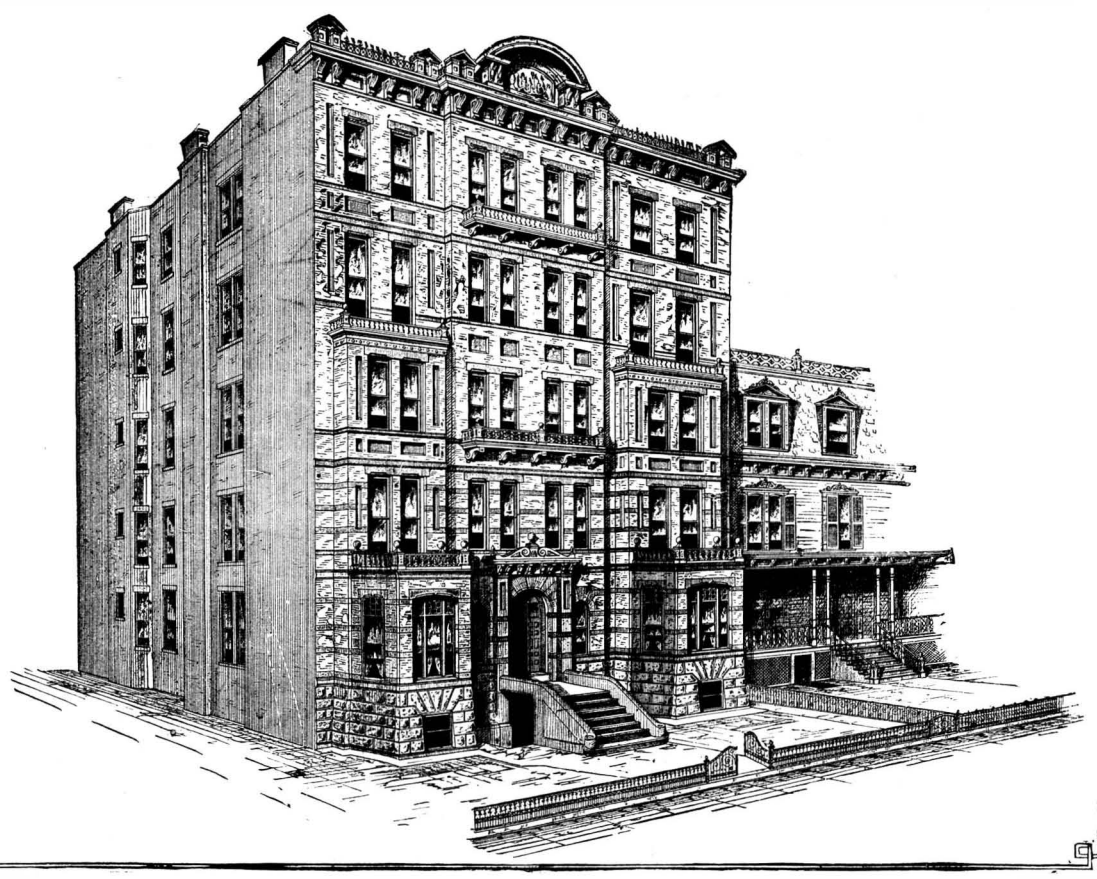
In this hall and near the kitchen doors are the dumbwaiter and ash shaft, all extending from the cellar to the roof.

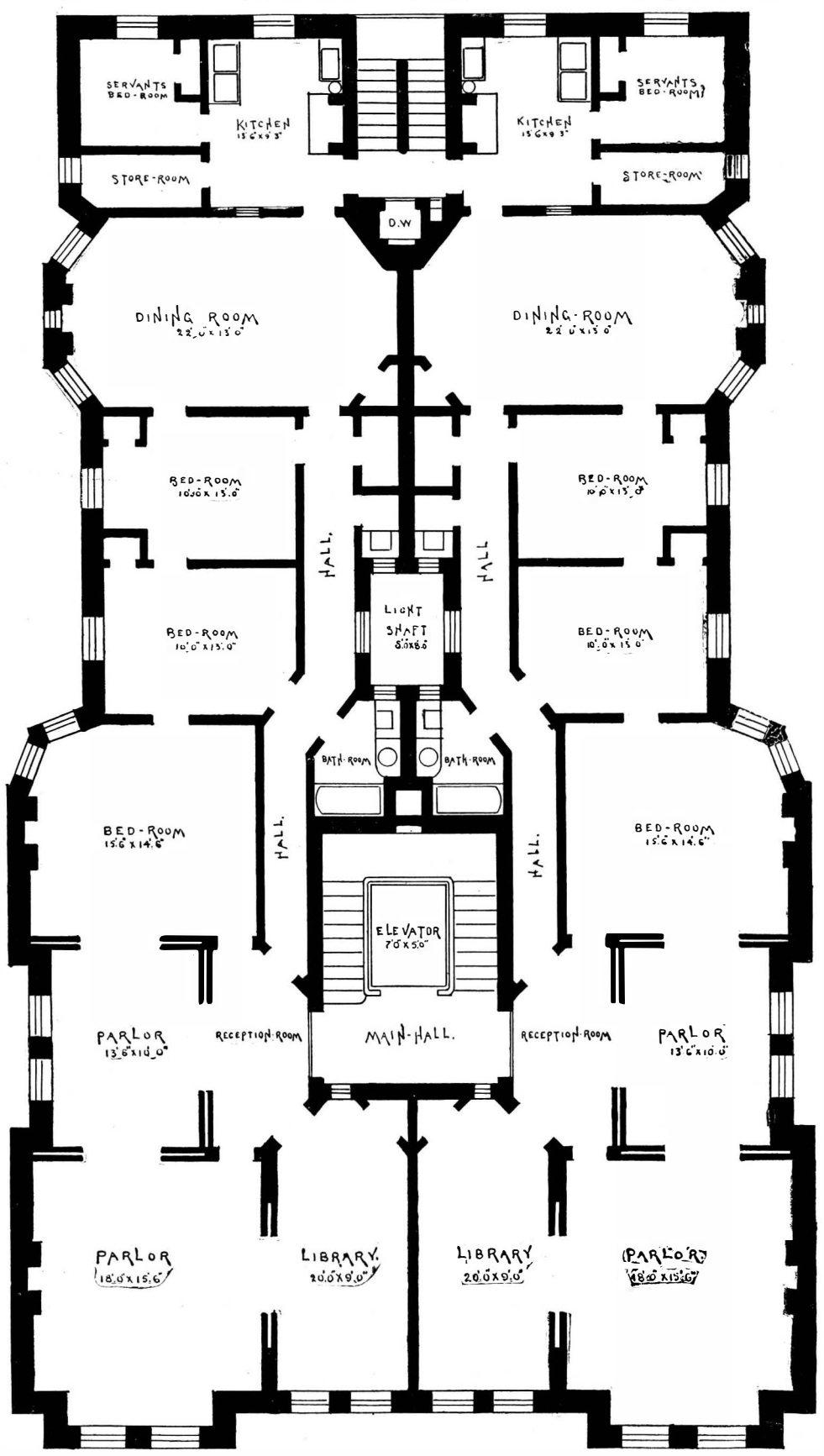
At the front of each apartment three or four large rooms connect with each other by sliding doors and arches, giving ample parlor room for those who require it, or some of them can be used as bed rooms by those who need more bed rooms.

Each of these rooms connects with a reception or ante room, which is lighted by stained glass doors, and from it a private passageway leads to the dining room, bed, bath rooms, etc.

The kitchen is placed at the rear, and communicates with the rear stairway, through which the servants can go down to the yard and to Lexington Avenue, by a rear alley way, through which all the coal and all groceries, etc., are brought into the building.

NEW APARTMENT HOUSE, BROOKLYN, N. Y.





Items Relating to Paints.

For rosewood a rather red ground is required. Use vermilion and chrome yellow. Graining color, Vandyke brown and ivory black. Lay this on freely, then wipe out with a sponge, using the blender to soften. A flogger may be used to advantage. Then overgrain with black, crossing the lines of the graining in curved lines.

Binding is an important feature in quick drying paints—dead colors—to insure adhesion to the work. If paint be mixed with turpentine alone, the latter will quickly evaporate and leave nothing but the dry pigments. Oil or varnish is added to bind the paint particles together. They, unlike turpentine, form a resinous coating by absorbing oxygen in drying.

Oil of turpentine may be deprived of its penetrating odor by rectifying it over five per cent. of its weight of unslaked lime added to it in the shape of milk of lime.

Ebony can be imitated on wood by first painting with one per cent solution of sulphate of copper. When perfectly dry, the wood is painted over with a liquid consisting of equal parts of aniline hydrochloride and spirits of wine. The blue vitriol acts on the aniline and forms nigrosine, a black which cannot be affected by acids or alkalies. A luster can be imparted by coating with copal varnish.

Ground for satinwood graining is similar to that for maple, a little more yellow being added. Raw sienna and umbers, or raw sienna and Vandyke brown make good graining colors. A sponge, a mottler, and a blender are the three tools principally needed. For overgraining, the same process may be followed as in maple; the grain, however, is generally stronger in satinwood than in the others, and not so curly. Study specimens of the real wood.

To make paint dry in half an hour, mix the colors in gold size and spirits of turpentine. Let each coat dry thoroughly before the next is applied. Varnish over, to give a gloss.

A wall exposed to cold and moisture may be coated with a compound of three-quarters of a pound of soap dissolved in ten pounds of boiling water, care being taken in applying it to avoid the formation of bubbles. A little alcohol assists in dissolving the froth, and causes the solution to penetrate deeper into wall. After twenty-four hours, a second coat, composed of a solution of sulphate alumina about half a pound in thirty pounds of water is added. We used Castile soap and common alum instead of alumina on a bad wall, and its action was perfectly satisfactory. (One pound of sulphate of alumina is equal to nearly two pounds of the alum of the drug store.)

A good drying black may be made with burnt lamp black mixed with cold boiled oil, turpentine and driers. A little blue improves it.—*House Painting.*

Water Back Explosions.

During the past winter quite a number of accidents have been reported from the bursting and explosion of the water backs to ranges. Among a number of remedies suggested for obviating such occurrences, the following, by a correspondent in the *American Architect*, possesses novelty, and may answer the purpose required of it.

The device consists of an air chamber made of corrugated sheet iron, placed inside of the water back; when the water freezes, it will expand 0·089 of its bulk; and as the compressibility of air exceeds this by far, an air chamber of, say, one by two inches, in an ordinary size water back, will accomplish the object, and danger of bursting or exploding is averted, either from the expansion of ice or pressure of steam; to make sure, I have added a device in the shape of a plug placed in the top of the water back, held in its place by a spring, which will allow the plug to rise up under a certain pressure of steam, thus acting as a safety valve; when, then, the connections between the water back and boiler are made with lead pipe, instead of iron pipe, the writer adds, all danger of bursting or exploding is averted.

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A TWO THOUSAND DOLLAR HOUSE.

SPECIFICATION

For a two story and attic dwelling house, designed for Mr. H. G. Bell, Rutherford, N. J., by B. J. Schweitzer, architect, No. 84 West Broadway, New York.

EXCAVATION.

Cellar.—To be under the entire house, 3 feet 6 inches deep.

Cistern.—To be 8 feet in diameter and 10 feet deep.

Cesspool.—To be 7 feet in diameter and 8 feet deep.

Privy Vault.—To be 4 feet 6 inches by 4 feet 6 inches, and 4 feet deep.

Trenches for all pipes not less than 2 feet 6 inches deep.

Grading.—Clean up the lot and grade off as directed after all other mechanics.

MASON WORK.

Cellar.—Lay up the cellar wall 16 inches thick of good quarry stone in lime and cement mortar. Above the ground build an 8 inch hard brick wall in good lime and cement mortar, and point up complete inside and outside.

Chimneys.—Build the chimneys of good hard bricks, laid in good lime and cement mortar. Strike all the joints of the flues, and put in a stove pipe hole, with collar and thimble, in each room.

Piers.—Build all piers of good hard bricks, laid in good mortar, complete.

Cistern.—Build the cistern with brick wall and arch over. Cement the inside and warrant it water tight. Connect all pipes from leaders, and also overflow pit.

Privy Vault and *Cesspool* to be stoned up dry.

Bluestone.—Furnish bluestone caps for both chimneys, and bluestone copings and steps for the outside cellar entrance.

LATHING AND PLASTERING.

All walls and ceilings on first and second floors are to be lathed with best spruce lath, and all are to be plastered two good coats of tempered mortar, and then hard finished with good finishing lime and plaster Paris.

CARPENTER WORK.

Posts 4 x 6 in., sills 4 in. x 6 in., and interties 4 x 6, all framed together, all hemlock. Floor beams 2 x 9, placed 16 in. from centers; rafters 2 x 6 and 2 x 8 in., all hemlock. All studs, 3 in. x 4 in. at openings. Brace all angles with long braces and fill in the frame and partitions with 2 x 4 in. wall strips, placed 16 in. from centers.

Sheathing.—Cover the entire frame with hemlock boards, and put on good resin-sized sheathing paper.

Siding.—Cover the first story with No. 1 narrow lap siding.

Shingles.—Cover the second story and gables with 6 in. x 16 in. sawed shingles, laid 6 in. to the weather.

Cornices and Trim.—Build all cornices of best white pine, as per drawings. Furnish and put up crestings and finials all complete. Curve the roofs over the porch and front bay window, and build all drips watertight. Build porch steps and rails complete, of white pine.

Tin.—Flash all valleys and gutters, also all chimneys, drips, etc. Cover all flat roofs with good I. C. tin complete.

Slate.—Cover all the other roofs with best Bangor slate.

Piazza.—Floor to be covered with 1¼ in. white pine flooring, with white lead in the grooves. Rear stoop floor same as piazza floor.

Leaders.—Put up ample leaders to convey all water from all gutters to cistern.

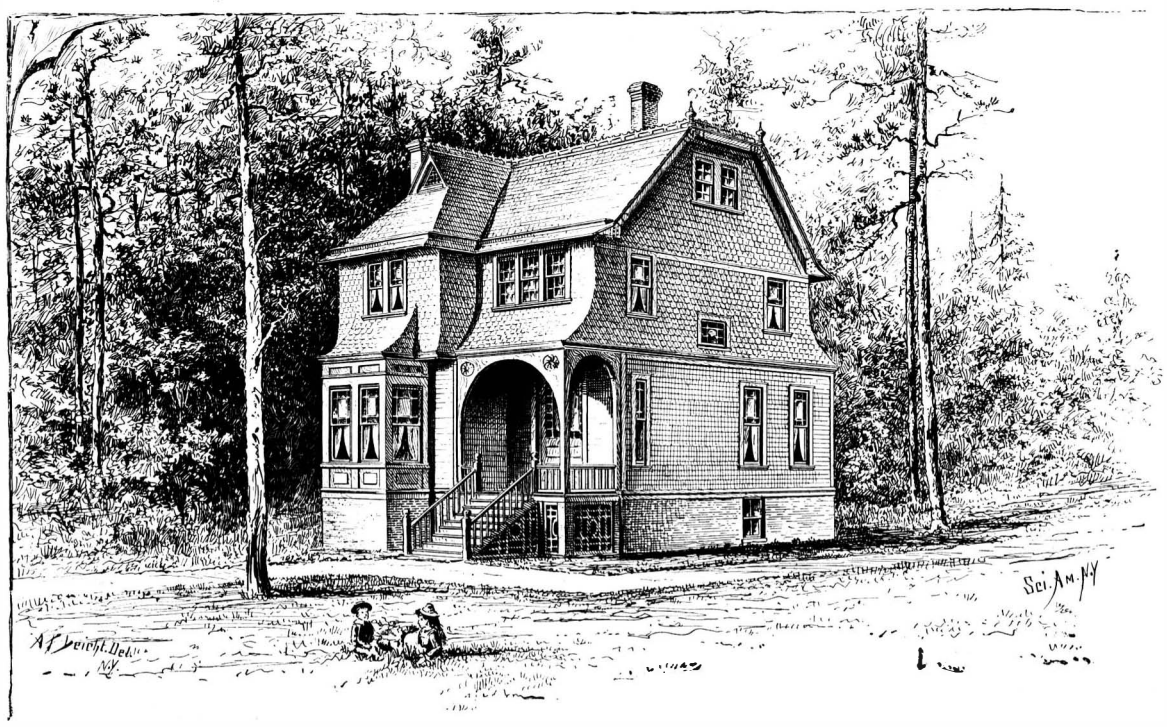
Windows.—All sashes 1½ in., glazed with French sheet glass double thick. The upper panels are to have marginal lights filled with cathedral lights. Hang all on pulleys, cords, and weights, and furnish with the "Ives" sash fastener.

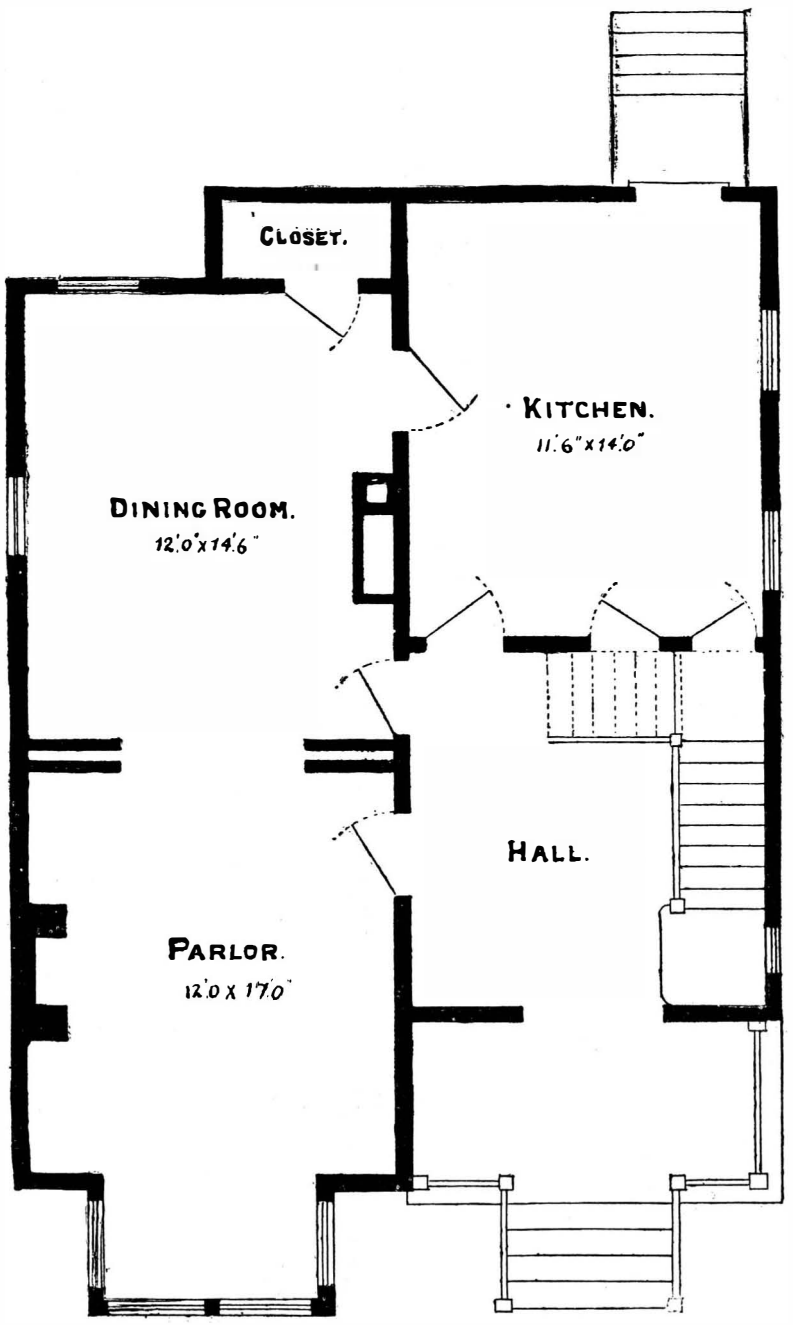
Blinds.—Furnish outside blinds for all windows 1¼ in. white pine, and hang them on good New York hinges. Also provide suitable fasteners.

Doors.—Outside doors 1¾ in. thick, paneled, as per elevations, and glazed in upper panels. Hung on good hinges, 4 x 4, and furnished with latch and lock complete, with bronze furniture. Also bolts, etc. Sliding doors furnished with Prescott's hangers and flush pulls. All other doors, except closet doors, 1½ in. thick, hung on good hinges, and furnished with mortise locks and jet knobs and furniture. All closet doors 1¼ in. thick, furnished with rim locks, all complete.

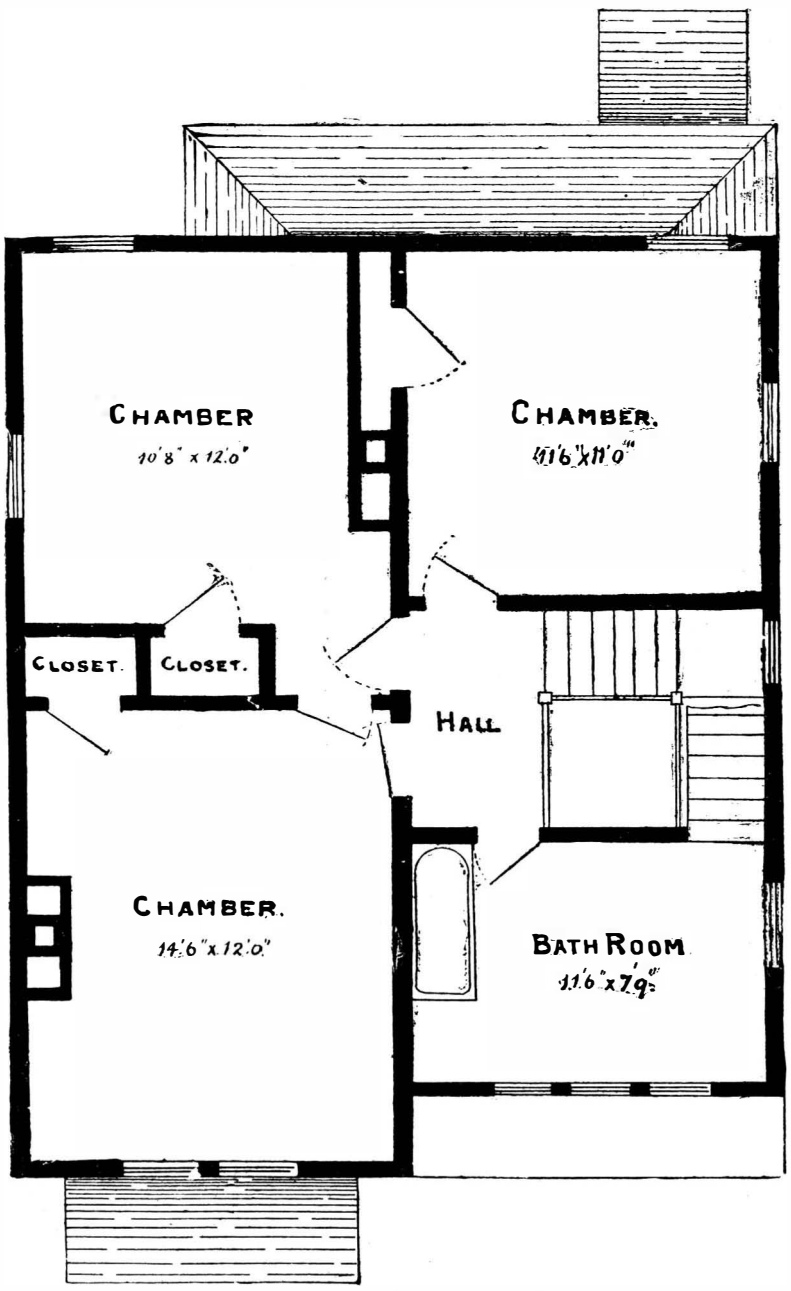
Floors.—All floors are to be covered with ⅞ in. x 4½ in. white pine flooring.

Inside Trim.—All casings are to be 5 in. Queen Anne, with turned corner block. All windows to have aprons and stools. Base on first and second floors 8 in. All closets are to be shelved, and wardrobe hooks are to be furnished on second floor.





FIRST FLOOR.



SECOND FLOOR.

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Stairs.—Build the risers of ⅞ in. white pine, treads 1¼ in. white pine, and strings 1¼ w. p. Wedge and glue together, and support the same in a proper manner. Balusters, 1¾ cherry. Newels, 7 in. on first floor and 5 in. at second and platforms. Rail, 3½ x 3½ in. Queen Anne. Attic stairs built in same manner, and inclosed.

Privy.—Build the privy over vault of ceiling boards, in usual manner, with seats, window, vent pipe, and door, all complete.

PAINTING.

Paint all metal work two good coats of Brandon metallic paint in linseed oil. Paint all shingles and other outside woodwork two best coats of white lead in linseed oil in tints to suit. Stain all inside woodwork, and varnish it two coats of No. 2 varnish, all complete and satisfactory.

FINALLY.

Do all that is necessary to finish the house in a faithful and workmanlike manner.

HEATING BY HOT WATER CIRCULATION.

It is not always easy to decide as to the proper method of warming dwellings. The best one can do is to choose that system which has the most advantages and the fewest defects. Latterly, heating by means of hot water has come into prominence, and justly so, as it presents advantages over both steam and furnace heat. In furnaces it appears almost impossible to avoid the dust that seems to be inseparable from registers, and with steam there is apt to be too much heat for mild weather.

In this connection we call attention to a new system of hot water heating, devised and patented by E. N. Gates, of Holyoke, Mass., which is simply constructed and easily managed.

In the engraving the separate boiler for each current of hot water is shown, and the direction the circulation takes, the fire under front end of boilers having given the benefit of its greatest heat to water just as it leaves the boilers, passes over bridge wall and, giving out remainder of heat to portions of boilers which are cooler, until it reaches the back end, where water enters, from return pipes, and having parted with all the heat possible, the coolest part of heated current is passed out at bottom through smoke pipe. Any number of boilers of different sizes can be arranged over the fire.

The following special advantages are claimed for this system :

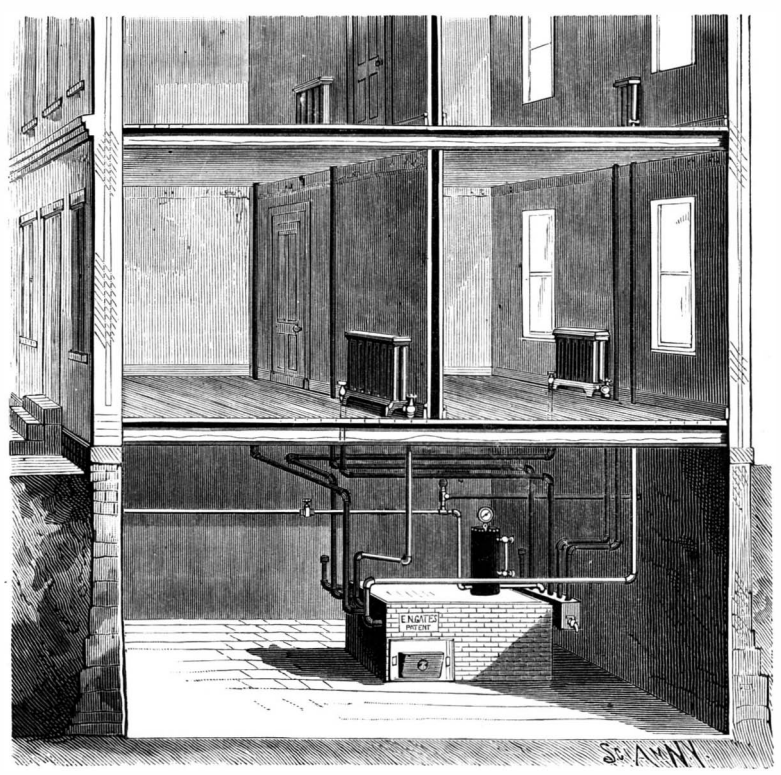
1st. Over hot air furnaces.—Ability to send the heat where it is wanted, without regard to direction of wind or height of cellar, and using less fuel for amount of space heated, and freedom from dust, burnt air, and gas.

2d. Over steam, high or low pressure.—From the fact that the temperature of water in radiators can be between 70° and 212° or higher, thus adapting it to all degrees of outside temperature, making a saving in fuel and insuring even heat.

3d. Over other hot water systems.—In others the water goes to radiators from one common reservoir. Therefore, it is almost impossible to have all rooms heated alike. With this system all rooms can be heated alike, when desired, from the fact that each current is provided with an independent boiler, and as the hot water must go where the pipe leads, you have perfect control over every room.

In this apparatus, the temperature of smoke leaving the apparatus is lower than return water from the rooms, showing that full benefit is derived from all the fuel used. The apparatus is so constructed as to be entirely free of any chance of freezing and bursting, as water can be removed if the house is closed in cold weather, and the fire allowed to go out for any length of time. These hot water radiators will heat with a low fire, and will give out heat not only as long as there is any fire under the boiler, but after the fire is completely out, and until the apparatus becomes of the same temperature as the atmosphere of the room, which requires several hours. The fire pot is lined with fire brick resting on grate frame, on which rests a patented rocking grate, operated by shaking bar outside of brickwork, grinding up all clinkers, which pass into a large ash pit.

A number of these heaters have been put in operation during the last year, and are giving perfect satisfaction. The extreme cold of the past winter has thoroughly tested all kinds of apparatus. We advise any of our readers who contemplate putting in new heating apparatus, or who are not satisfied with what they have, to correspond with E. N. Gates, Holyoke, Mass., who will be pleased to send them illustrated pamphlet, describing the system in detail, and give the opinion of those who have had the system in operation.

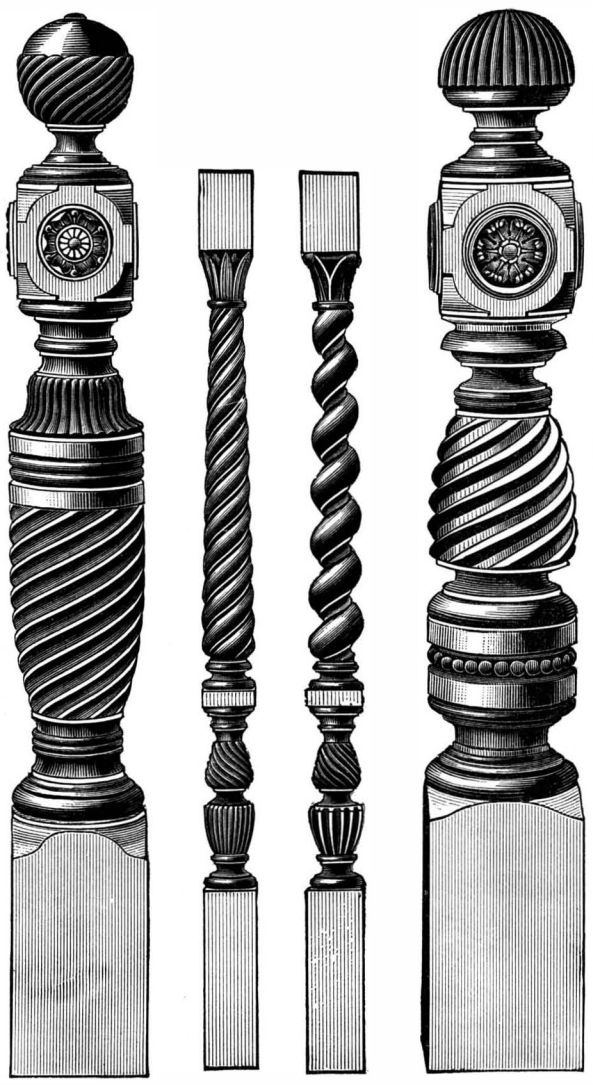


HEATING BY HOT WATER CIRCULATION.

THE Japanese and Chinese use a cement made of rice flour mixed with water.

ARCHITECTURAL WOOD TURNING.

In this connection we show some new designs recently executed by Messrs. Anderson & Dickey, 43 Bristol Street, Boston. This firm uses only the best machinery, and several of the special machines were designed by Mr. Anderson. One of these machines enables them to twist pieces in any curve or shape desired, in sizes from one-half to twelve inches in diameter. They will be pleased to send their illustrated catalogue, showing a large line of stair posts,



newels, etc., to any address upon application. They also make a specialty of work from architects' designs.

Ready Mixed Paints.

A superior paint may be defined as one that will permanently retain its original color, and that will, for an indefinite period, resist the destroying effects of the atmosphere. Upon the first depends the good appearance of the paint, even after having been exposed for a long time to all changes of the weather, and upon the second depend the preservative qualities of the paint. It is evident that the durability of a paint, considered merely as a coating or covering for wood or metal, and not as an artistic decoration, is controlled directly by the vehicle or liquid carrying the pigment. It follows as a natural sequence that we very seldom find a mixture of a durable vehicle with an inferior pigment, as the latter by losing its color in a short time would serve to condemn the paint; the same remark applies to the combination of a superior pigment with a poor vehicle. It may therefore be considered a safe and general rule to avoid those paints which may be said to "wash off," and also those which fade, as all of the ingredients in both cases are certainly inferior. The contrary to this is also true, and a paint that will either hold its color, or remain where placed for a long time, is composed of the best materials, as it would be an exceedingly foolish proceeding on the part of a manufacturer to give his paint one good characteristic and not the other, especially when both are absolutely necessary.

It is a simple matter for any one to satisfy himself in regard to these points. In almost any neighborhood, two houses may be selected which have been painted three or four years. One appears dingy and dirty, and it is impossible to tell what the original color was, while a closer examination shows that the paint has disappeared so thoroughly and effectually as almost to make the grain of the wood discernible. In this case both pigment and vehicle were poor. In the second house, the paint, wherever it has not been discolored by dust, retains its color perfectly, and a near inspection shows that but little has been worn off. Each ingredient in this instance was of the best quality.

It requires unusual skill and experience even for the manufacturer to tell by examination whether a given paint with which he is not familiar is first class in every respect, and ninety-nine out of every hundred consumers are compelled to rely solely upon the reputation and standing of the firms they buy from. There is no quick way of practically ascertaining the wearing qualities of a paint, they cannot subject a sample to an exposure to the weather for four or five years, and yet there is no simple or shorter method of finding what they want. A paint recommended because of only one excellent point should be viewed with suspicion—that is, a paint for which only a good body is claimed, or in which only the colors are warranted fast, should be avoided.

The present plan of marketing ready mixed paints is far more reliable in every way than the old method, since it leaves no operation to be performed by the unskilled consumer or local dealer. The paint as it now leaves the works is ready for immediate use, and it is natural to assume that it will prove to be better, as every step in its preparation has been benefited by the skill and long experience of the manufacturer; this also places the responsibility upon the producer. The painter or dealer now has nothing to do with the making of the article he uses or sells, the days of the "little mill" having passed away. One of the most important advantages resulting from this is the uniformity attained in the color and quality, and the ease with which colors may be exactly duplicated; another advantage is in the lessened cost to the consumer, as improved machinery takes the place of hand labor in the mixing.

One of the oldest paint manufacturers i this country is the firm of Chas. M. Childs & Co., of 225 Pearl Street, this city. This firm has been doing an extensive business for more than a third of a century, and during all that time there has been *no complaint touching the quality of these paints.* For the past fifteen years they have been engaged largely in the production of dry colors. This fact gives them a positive advantage, as it personally acquaints them with the peculiar features of every ingredient they use, and enables them to confidently place the standard of their products. At Tuxedo Park the colors from these works entered into all the paints used.

As a result of the immense increase in the consumption of ready mixed paints, they have turned their attention to that branch of the business, and have, consequently, procured the latest and most improved machinery. Their long experience and familiarity with all pigments enable them to turn out, as they claim, paints of superior quality, while the location of their works in South Brooklyn near the Atlantic Basin gives them all the advantages to be derived from cheap transportation of all raw materials and of the finished products.

This firm will, if they receive an idea of the colors wanted, furnish such shades as will be sure to be pleasing to the eye and will agree with the conceptions of the owners or builders. When necessary, they will endeavor to fill orders given descriptively of any colors desired, and will undertake to match precisely any sample that may be sent them. The specimen cards of colors they send upon application have been found by architects to be extremely useful, by giving them harmonious combinations, and thereby allowing them to present their ideas in a more complete and finished form to their clients. These paints have been used by and are strongly recommended by the celebrated architects Bruce Price and H. Edwards Ficken.

LAKE Tahoe is to be used to irrigate lands in Nevada.

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A NEW RULER AND SECTION LINER.

In all descriptions of mechanical drawing, an instrument by which lines may be readily drawn at any desired distance apart is a very valuable adjunct. Various appliances for the purpose have been invented from time to time, few of which are as complete or serviceable as that lately brought out by Messrs. Frost & Adams, of No. 37 Cornhill, Boston, Mass., under the title of the "Universal Ruler and Section Liner." An idea of the general form of the instrument may be gained from our engraving in Fig. 1, while Fig. 2 will illustrate a few of the principal uses to which it may be applied, this cut having been drawn with the ruler.

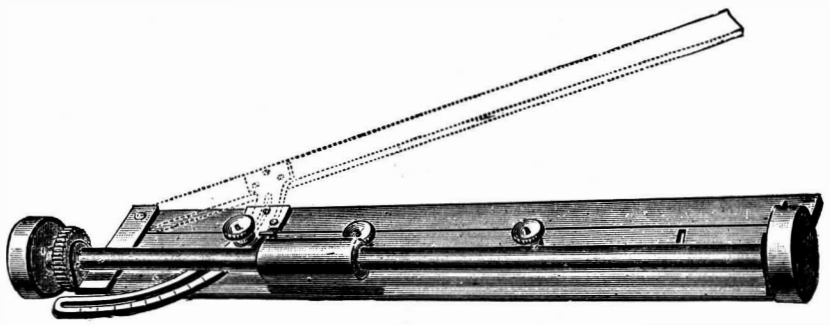


Fig. 1.

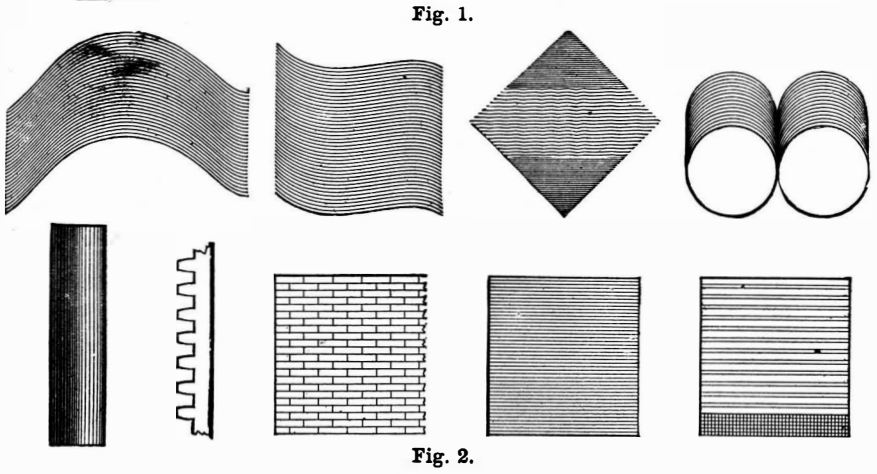


Fig. 2.

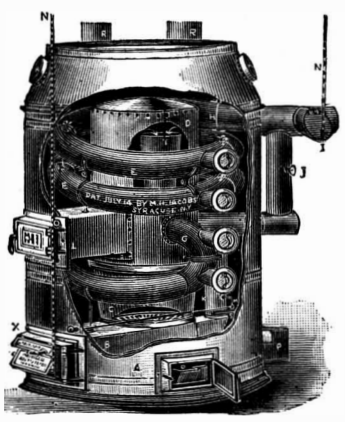
FROST & ADAMS' NEW RULER AND SECTION LINER.

The instrument may be used for drawing lines in any direction and at any distance apart, from one one-hundredth of an inch to any distance desired. In drawing parallel lines, the draughtsman places the ruler in the required position, and rules the first line. He then turns the shaft of the instrument toward him, by means of a rubber sleeve placed upon it, until he hears a click of the ratchet wheel, which is fixed upon the end of the shaft, and he then turns the shaft back a little until it stops. All the teeth of the ratchet are exactly equal, and the distance traveled by the wheels over the paper is always the same from one click to the next. When the lines are required at greater distances apart, the shaft may be turned to give two or more clicks. If they are required nearer together, the pivoted arm is fixed at an angle by means of the thumb nut and slotted quadrant, as indicated by dotted lines in the figure. For curved work, the ordinary French curve is attached to the ruler by means of the two thumb nuts in the center of the ruler plate, the lines being drawn with a right line pen, using the curve as a ruling edge.

In addition to the uses mentioned, this instrument may be employed for irregular lining and shading, setting out the spokes of wheels and teeth of bevel gears, shading cylinders, spiral springs, and screw threads. It is handsomely finished in steel and nickel plated brass, and will be found to quickly repay its cost, if only by the time it saves.

THE M. H. JACOBS CO.'S FURNACE.

With the large number of warm air and other furnaces now upon the market, those manufactured by the



above named company, of No. 96 West Fayette Street, Syracuse, N. Y., bear very favorable comparison. The arrangement of the details, and the strength and durability of the parts, render the furnace a most economical and serviceable one.

The general construction will be understood on reference to the annexed sketch, in which A represents the exterior casing, B the ash pit, C the fire pot, D the dome, and E the spiral radiator tube proceeding from the cast iron duct, G, in the lower part of the dome, and having its exit in the chimney flue, F. A shield, T, compels the flame and products of combustion to ascend to the top of the dome, by which they are deflected downward into the interior of the shield, as indicated by the arrows, thus causing the dome, and hence the radiators, to be thoroughly heated.

The advantages of such a system of construction are sufficiently obvious. A full description of the furnaces, which are made in five different sizes, may be had on application to the manufacturers.

THE GATE CITY STONE FILTER.

This filter consists essentially of two parts—an upper jar or chamber supported by a lower jar. The bottom of the upper jar is composed of a filtering disk, through which the water slowly finds its way to the chamber below. The filtering medium is a natural stone, having characteristics that perfectly adapt it for this work. The impurities in the water placed in the upper jar never penetrate the stone, but lie on the surface, so that the interior of the stone remains as pure and white after years of use as when taken from the mine. This feature insures the easy cleaning of the filter, as, by means of a brush and water all the impurities that have lodged upon the surface of the disk can be thoroughly removed, thereby restoring the filter to its original condition. Within the lower jar is placed an ice chamber, which is covered by a cap, so that there is no possibility of the filtered water being contaminated by any impurities that may be in the ice.

Every part of the filter can be easily gotten at for the purpose of cleansing; the disk is an efficient purifier, permits the water to pass slowly, and does not receive into its pores the impurities it extracts; the filter, considered as a whole, will last indefinitely; and there are no metals used in its construction. The filters are made of either china, glass, or brownstone

ware, in sizes varying from the traveler's portable china filter, which will purify a pint of water every two hours, up to those filtering twenty gallons per day. Physicians, chemists, and others who have used these filters recommend them as being in every way efficient and reliable.

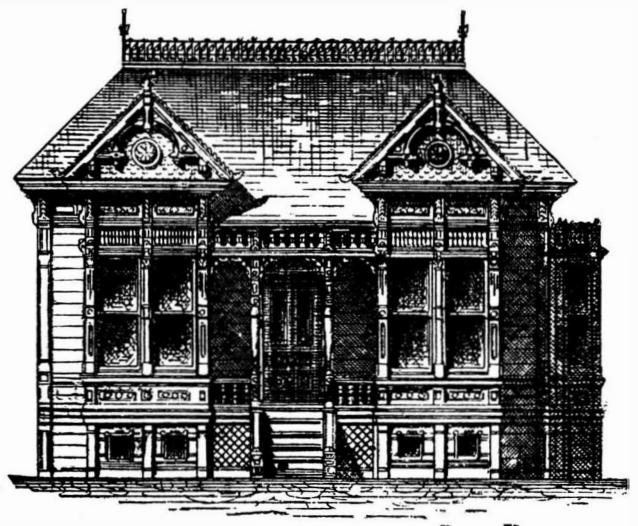
All further particulars can be had by addressing the Gate City Stone Filter Co., of 839 Broadway and 63 E. 13th Street, New York City.

AN EASTLAKE COTTAGE.

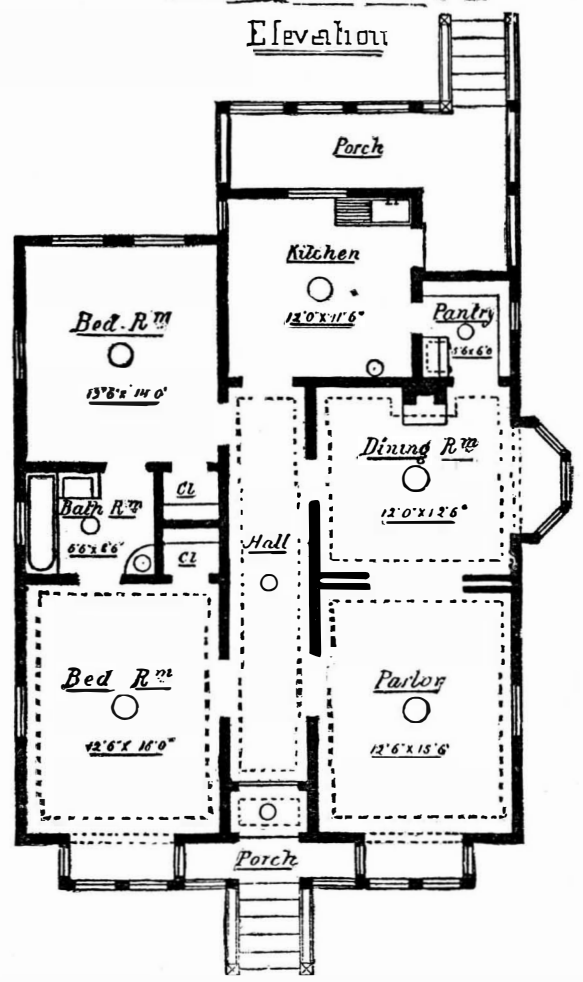
In presenting this design, attention is called to the compactness and beauty of arrangement of plans, well proportioned rooms, no unnecessary waste of space occupied by long, gloomy halls, and each door and window having its distinct purpose or cause.

The design, as illustrated, is a model of compactness and arrangement. On entering the hall from the vestibule, the parlor and dining room are situated on the right, separated by a neatly designed, paneled sliding door, and each room having a large bay window, with an ornamental arch. On the left of the hall are entrances to two bed rooms, with a bath room between them, and each room provided with a large closet with shelves, drawers, hooks, etc., usually found in closets.

The bath room contains a wash stand with nickel plated bibbs, and a Golden Gate plug water closet, finished in black walnut and nickel plated trimmings. The bath tub is provided with hot and cold water, through nickel plated bibbs, with attached soap cups.



Elevation



AN EASTLAKE COTTAGE.

The room is wainscoted five feet high and finished with moulded cap and paste board.

The floor should be covered with linoleum, giving the room a neat appearance, and making it easy to clean. The kitchen is provided with a sink, boiler, and a large paste pantry; and a commodious rear porch, inclosed by posts and railings, affords a good place to do washing, cleaning, etc.

The dining room is finished with paneled wainscoting, and all the woodwork finished in oak and highly polished. The dining room should be papered with some neat floral design, and the floor covered with a carpet harmonizing with the rest of the furniture.

The windows are furnished with sliding blinds, which slide in the casing, thus preventing the tearing of curtains and lambrequins. One chimney suffices for a fireplace for the dining room, and a separate flue for the kitchen. The elevation is of Eastlake style, and needs very little description, as a glance will show that it is neat in design, and solidly constructed. The roof is covered with the best quality of redwood shingles, laid four and a half inches to the weather, and well nailed. —*David Salfield, architect, Cal. Arch. and Build. News.*

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THE NEW LAW COURTS, BIRMINGHAM.—ASTON WEBB AND INGRESS BELL, ARCHITECTS.—[For description see page 96.]

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LOCAL BOARD OFFICES.

The illustration shows the design submitted in a recent competition for new local board offices to be erected at Brighouse. The building was proposed to be of stone from the local quarries, that to the main front being of ashlar, both to the plain wall surfaces and moulded work. The accommodation on the ground floor includes clerks' office, general rental office, committee room, waiting room, strong room, and lavatory, etc.; on the first floor, a board room, committee and waiting or ante room, lavatories, and book rooms. The front elevation was designed to harmonize with the adjoining building, belonging to the Halifax Commercial Banking Co., which building was designed and carried out under the superintendence of Mr. Geo. Hepworth, architect, Brighouse, by whom also the design for the building illustrated was prepared.—*The Architect.*

Wood Drying Experiments.

A very interesting series of experiments to determine the fluctuations of moisture in various woods during seasoning has just been closed, says the *Railway Review*, on the Chicago, Burlington & Quincy Railway, at the Aurora shops. The experiments are being continued, but the first series, the results of which we give herewith, ended in February, having been commenced December 21, 1885. The prime object of this work was to discover the laws of seasoning, if such laws existed, and thus to ascertain in what months the greatest amount of seasoning takes place, and whether wood thus seasoned reabsorbed moisture during the wet months of the fall and winter.

The work was undertaken in a very systematic way, and was done about in this wise: Three pieces of rough dressed oak, ash, and Norway pine, thoroughly green, were piled loosely, with cleats between, with a board overtopping all, in a situation where they were protected against drip and direct rain, but where they were open to rain, snow, and the sun on their sides. The conditions were, as nearly as possible, those to which lumber piled for outdoor seasoning is usually subject.

The seasoning, that is, the loss of moisture, began practically February 15, with all three woods, and ended August 2 with the ash and pine, but with the oak, October 11 seems to have been the finish.

The results with the oak were not altogether satisfactory to the experimenters. The second series of experiments will, it is hoped, throw more light upon this kind of wood.

From February 15 to August 2 the ash dropped from 29 to 12½ per cent, a loss of 16½ per cent. From August 2 to its finish, December 20, the fluctuations were between 12 and 14 per cent, the exact average being 13 27 per cent.

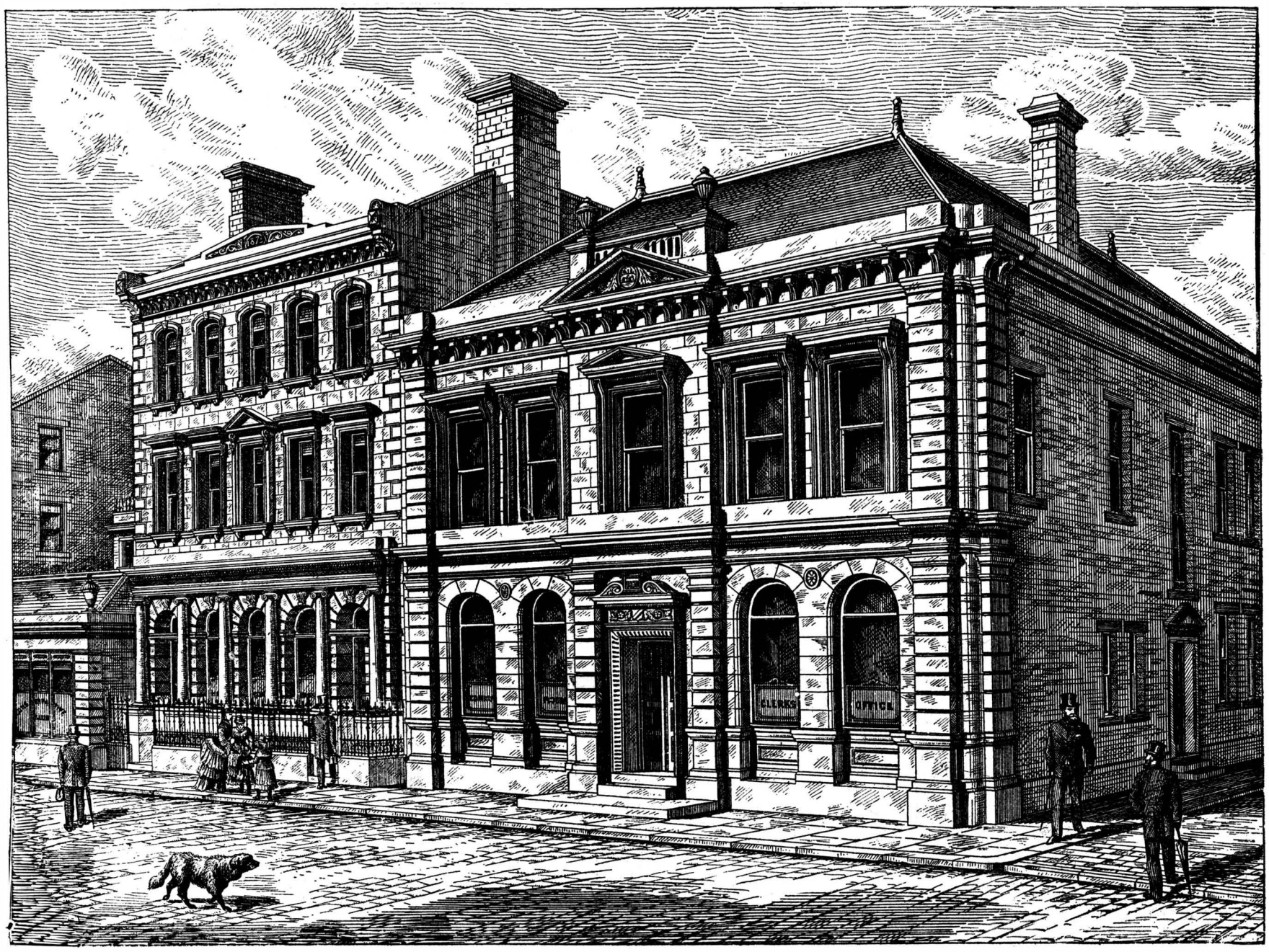
From February 15 to August 2 the pine dropped from 24 to 12½ per cent., a loss of 11½ per cent. From August 2 to its finish, February 28, its fluctuations were between 12½ and 15½ per cent. From October 25, 1886, to February 28, the exact extremes were 14·10 and 14·92 per cent, a difference of only 0·82 per cent. The extreme fortnightly fluctuation was 0·51 per cent. The average fluctuation was 0·30 per cent. The average moisture for that period was exactly 14·50 per cent.

These experiments cannot be taken at present as supplying infallible data, but in a general way it may be said that they lead to the conclusion that as regards oak, ash, and pine woods in a green condition, seasoning begins in very early spring (depending of course largely upon the kind of weather), and ends in midsummer. The provisional limits of this drying season may be fixed at the first of March to the first of August, in other words, including the months of March, April, May, June, and July. It has also been shown that, as regards ash and pine, after seasoning is effected, the wood will not take back water—that is, not beyond slight amounts during the wet and cold seasons. These conclusions are true only for the inmost parts of the woods in question, and of the sizes experimented upon. Variation in the character of the wood, condition at the time of cutting down the tree, treatment between that time and the first time of testing, sizes of pieces, etc., may alter the conclusions, although probably they would not materially do so.

The data which has been gathered in this way can be used to material advantage in many ways, notably, however, as an aid in the purchase of cars and in the purchase of timber. With the exact knowledge that it affords of the seasoning properties of different woods, and of the months during which seasoning is liable to be hastened or hindered, the guesswork of sellers of lumber and makers of cars can be readily checked.

Shrinking of Seasoned Timber.

The various kinds of oak, and some other kinds of timber, will shrink more or less every time the surface is dressed off, even a small fraction of an inch. Wheelwrights accustomed to the work are well aware of this fact, and a correct appreciation of it enables them to turn out work of a superior character, even of ordinary materials, by first blocking up the pieces roughly, then allowing the timber to season, and afterward working the various parts by degrees, as the seasoning process becomes more and more complete. White oak spoke timber, for example, may be allowed to remain in its rough state for half a score of years under shelter, without becoming seasoned so thoroughly that the timber will not shrink after the spokes have been dressed out. Carriage wheels have often been made of the choicest quality of oak timber, after every spoke has been seasoned for several years, and, to the great surprise of the wheelwright, every spoke would work in the joints before the vehicle had run three months. The defect in such instances could not be attributed to inferior timber, nor to perfunctory workmanship, but simply to this one circumstance—that the parts of the wheel were put together before the timber had ceased to shrink. To prove that the best quality of oak will shrink after a spoke has been dressed out, let a tenon be made on one end, and be driven immediately into a mortise. After a few days' exposure in a warm workshop, the spokes may be withdrawn with little difficulty. The same fact will hold good in the manufacture of woodwork of any kind where oak is employed for tenons. In order to make joints that will never start, the piece on which the tenons are made should be dressed several times, until the shrinking has ceased. Then let the tenons be made. After these have shrunk, while exposed to the drying influence of a warm workshop, the spokes or other parts may be driven in their respective places, with the assurance, especially if they are dipped in oil paint previous to driving, that the timber will shrink no more.—*The Woodworker.*



DESIGN FOR LOCAL BOARD OFFICES.—GEORGE HEPWORTH, ARCHITECT.

THE new boring at the Channel tunnel works at Dover has now reached a depth of 500 feet, and the operations, which are made with a view to ascertain whether the geological strata conform with those of the French coast, are being continued. No coal has yet been found, and the discovery of this is stated to be one of the objects of the boring.

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A DOUBLE HOUSE OF MODERATE COST.

These dwellings were erected at Buttonwood, R. I., from the designs of C. F. Wilcox, architect, at a cost of $5,000.

SPECIFICATION.

Generally.—Execute the whole of the work in a good, sound, and workmanlike manner, with the best materials of their several kinds, to the entire satisfaction of the architect. Completely finish the house, in all respects, ready for occupation, and leave the same broom clean, with all rubbish cleared away.

MASON.

Excavate for cellar under kitchen to a depth of 6′ 6″ in the clear. Build water closet with raised cover for urinal.

Foundation Wall and Piers.—To be erected in Potter's best brick, 8″×16″ under sills of the house, and 8″×8″ under piazza posts, with stone foundation 2′ under the ground.

Chimneys.—To be built as indicated on plans. All flues to be pargetted and plastered externally up to roof line. Flashings of 3 lb. lead to be placed around chimneys, and a clay pipe collar in kitchen and dining room.

Cesspool.—Form a cesspool 3′ in diameter and 5′ deep for waste from kitchen sink, and lay at a depth of not less than 2′ 6″ a 6″ clay drain pipe to same. Form manhole and cover with flat stone. A dry well to be provided under basin in front hall.

Cistern of a capacity of 6,000 gallons to be provided with a 4″ drain pipe from conductor.

Plastering.—All walls and ceilings to be lathed with spruce lath and plastered one coat of brown mortar, ceilings hard finished and walls same finish.

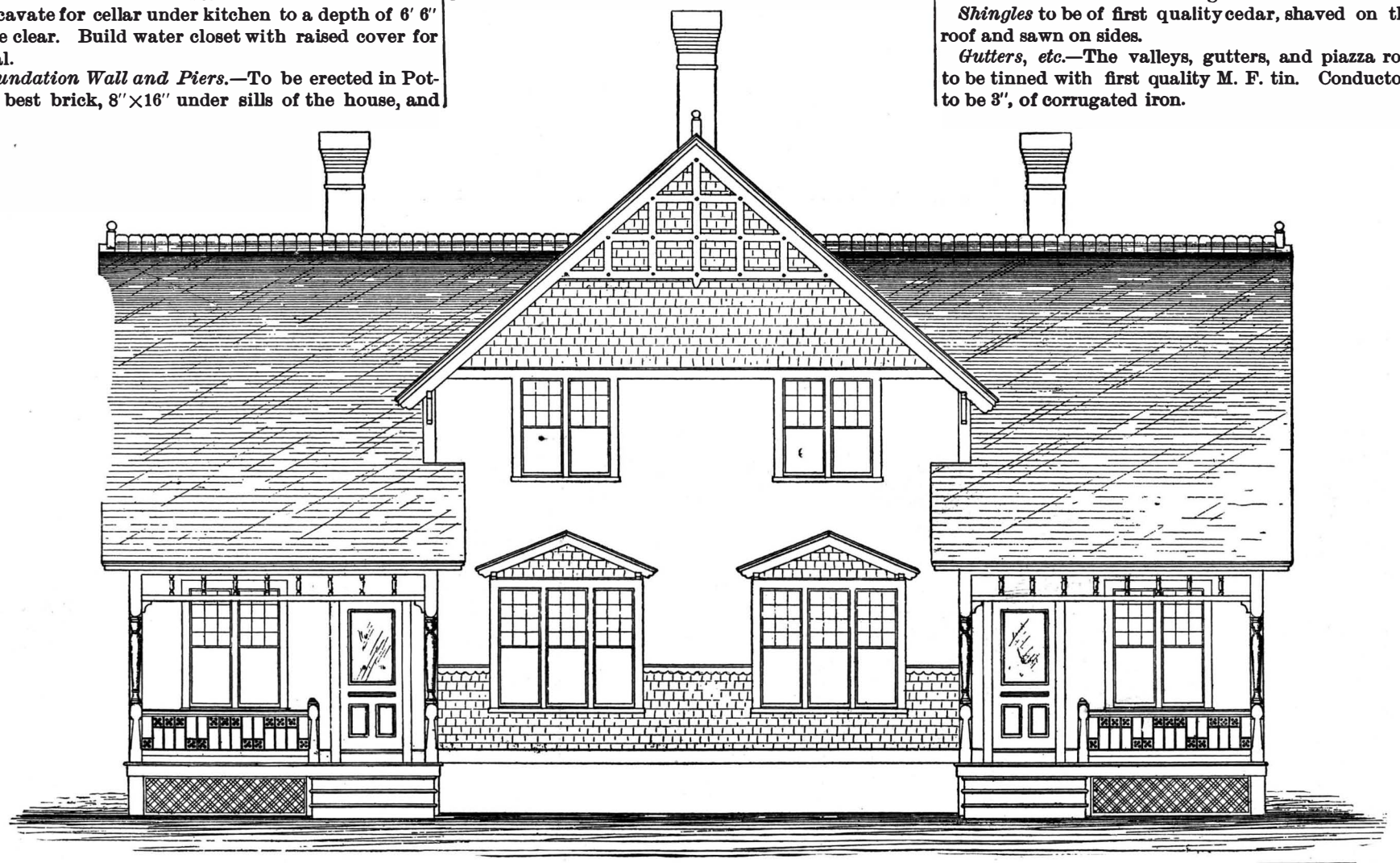
Cellar Steps to be of bluestone with brick risers.

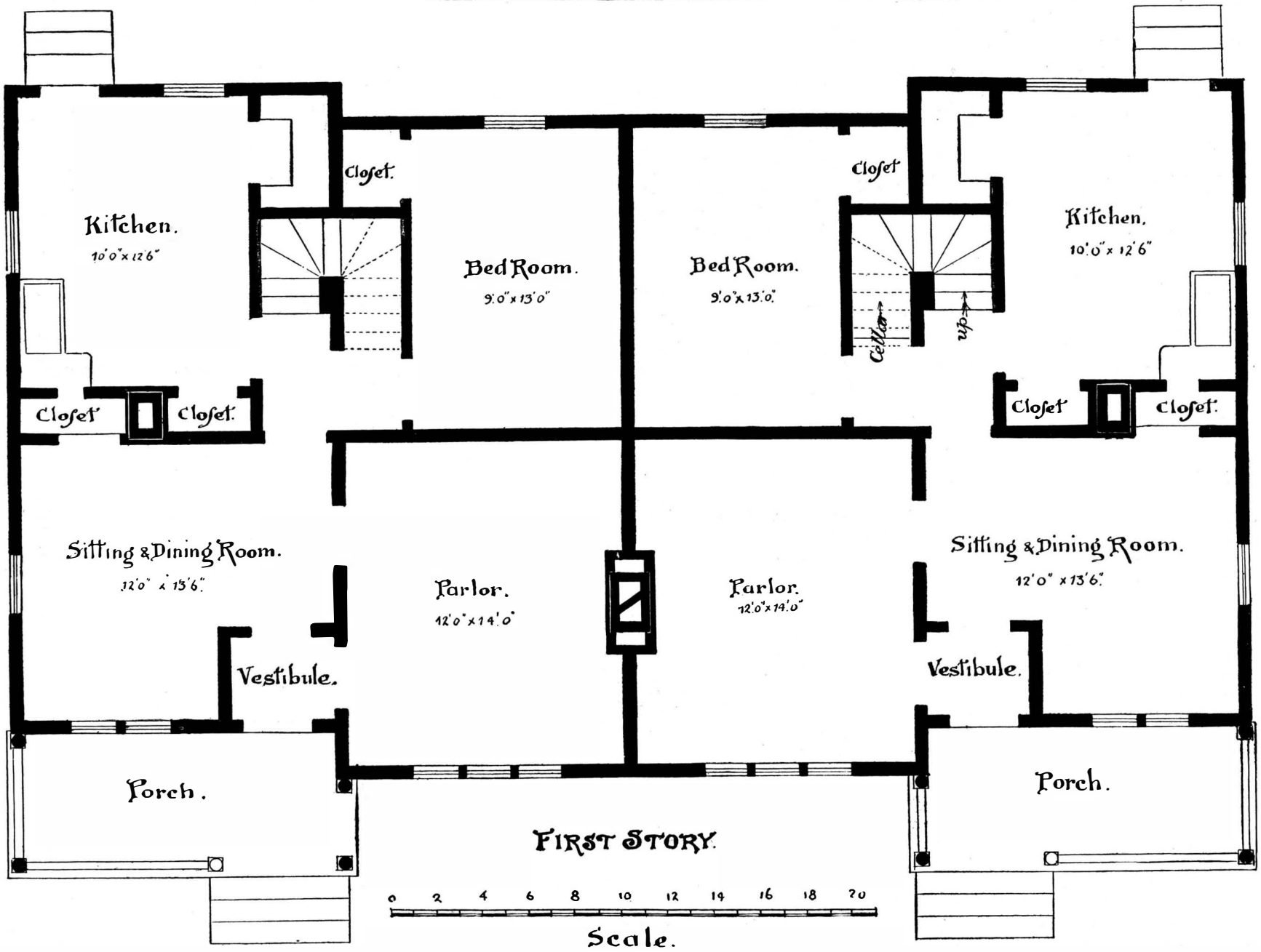
CARPENTER.

Frame of house to be of best well seasoned spruce timber, boarded with hemlock. Trimmings and clapboards of first quality pine. Soffits and other parts not exposed to the weather may be of second quality stock if free from loose and large knots.

Shingles to be of first quality cedar, shaved on the roof and sawn on sides.

Gutters, etc.—The valleys, gutters, and piazza roof to be tinned with first quality M. F. tin. Conductors to be 3″, of corrugated iron.





A DOUBLE HOUSE OF MODERATE COST.

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Sashes and Doors.—The sashes, blinds, and doors to be as shown on drawings. Sashes and doors 1⅜″ thick. Outside doors 1¾″. Mortise locks and latches to doors, with white porcelain knobs inside; bronze to outside front door and door bell, and dark mineral to back doors. The front entrance door is to be hung in two parts rabetted together and with a bolt to fasten them.

Floors throughout the house to be of spruce, excepting in kitchen, servants' bed room, and closets, which are to be of hard pine. Piazza and balcony floors, 1⅛″ matched hard pine. Ceiling over piazzas and balcony to be of matched and beaded pine.

Casings to doors and windows 4″ moulded, and baseboards 6″, with base on top edge.

Clothes Presses to be fitted with wardrobe locks and a shelf in each.

Stairs to be built with returned nosings, and to have 3″ ash rail, 1¾″ balusters, and 4″ posts.

Wash Bowl.—Fit up around wash bowl a cabinet with recessed door beneath, and provide a marbleized bowl connected by lead waste to dry well beneath. Put on marble top with back and ends.

Sink.—Fit a 3′ iron sink in kitchen, with a pump from well, and waste to drain pipe leading to cesspool.

Lattice.—Provide and fit around wash yard a lattice fence constructed of chestnut posts, pine strings and lattice. Fit lattice also under sills of house and piazza.

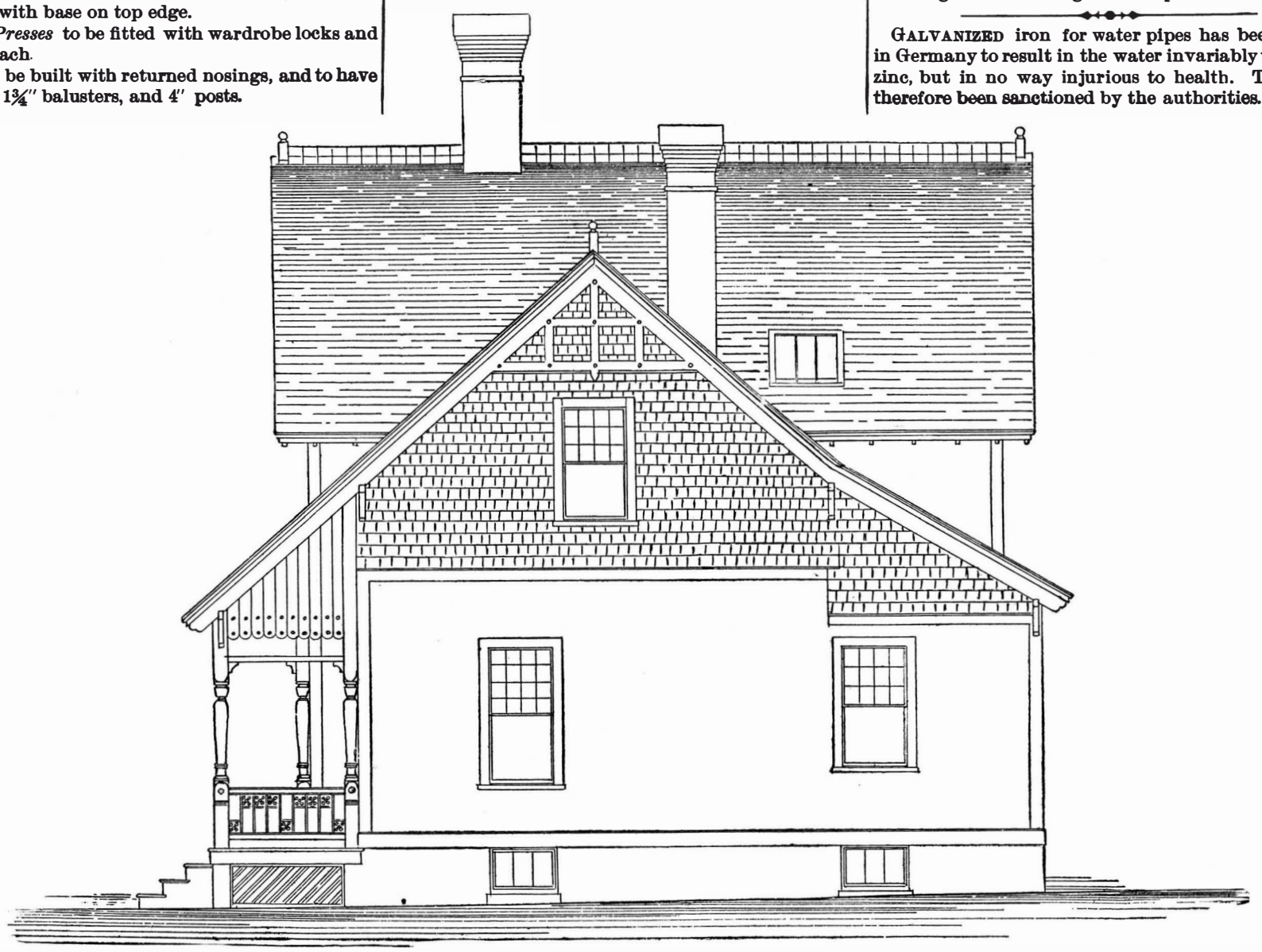
PAINTING.

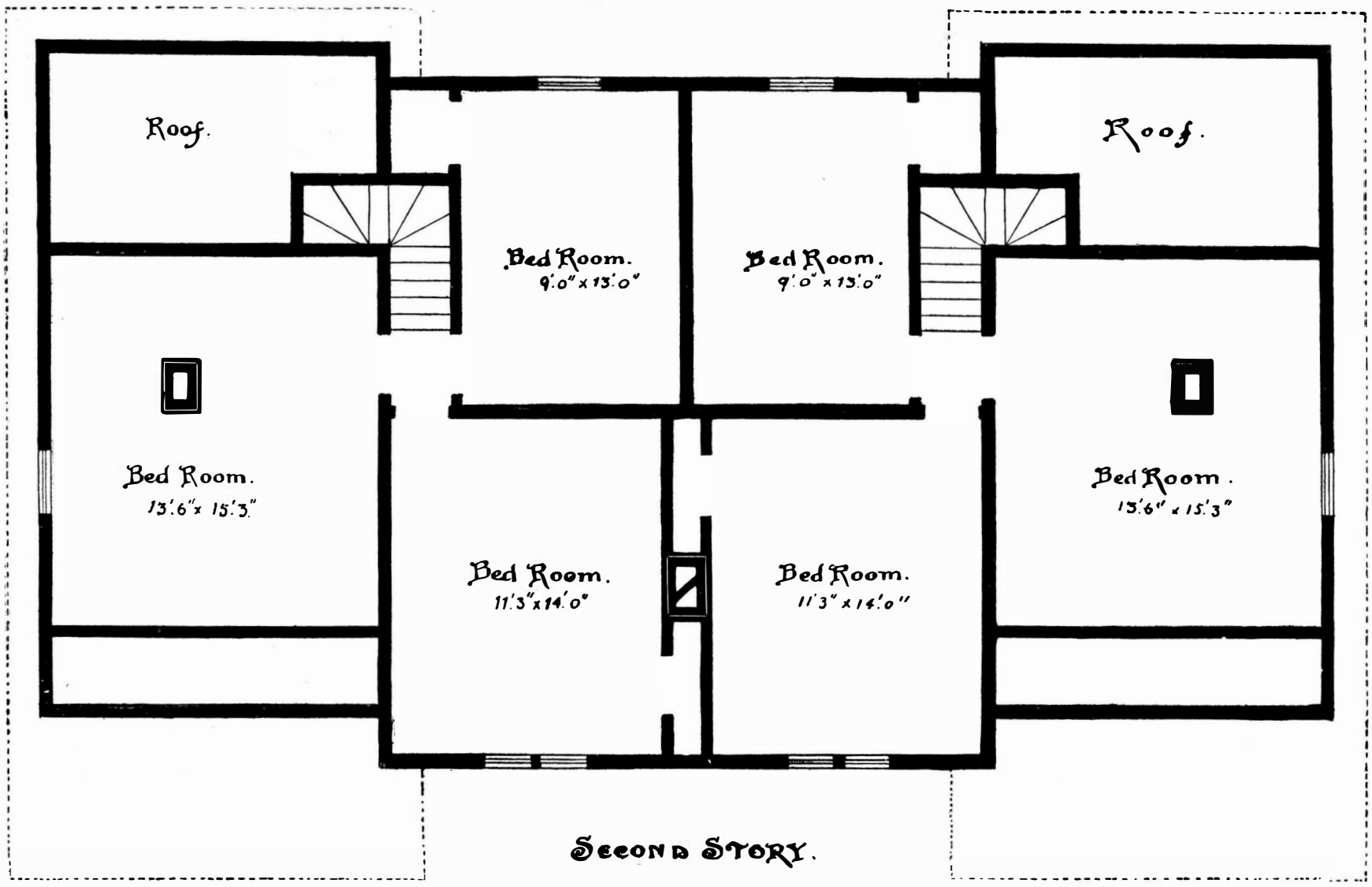
Exterior Work.—All outside work, excepting hard pine floors, which are to be oiled and well rubbed down, to be painted in three good coats, including the shingles. Conductors to have one coat of metallic paint and two coats of lead and oil, and tin roofs and gutters to have three coats of metallic paint.

Inside Work to have two good coats of paint on well prepared ground, knots and defects being shellacked and stopped as required. The whole to be finished in colors as directed. The hard wood is all to be three times shellacked and well rubbed down.

Generally.—Provide all labor and materials of the best and most perfect kinds necessary for the complete finishing of the building in all respects.

GALVANIZED iron for water pipes has been proved in Germany to result in the water invariably taking up zinc, but in no way injurious to health. They have therefore been sanctioned by the authorities.





SECOND STORY.

A DOUBLE HOUSE OF MODERATE COST.

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A $3,500 COTTAGE.

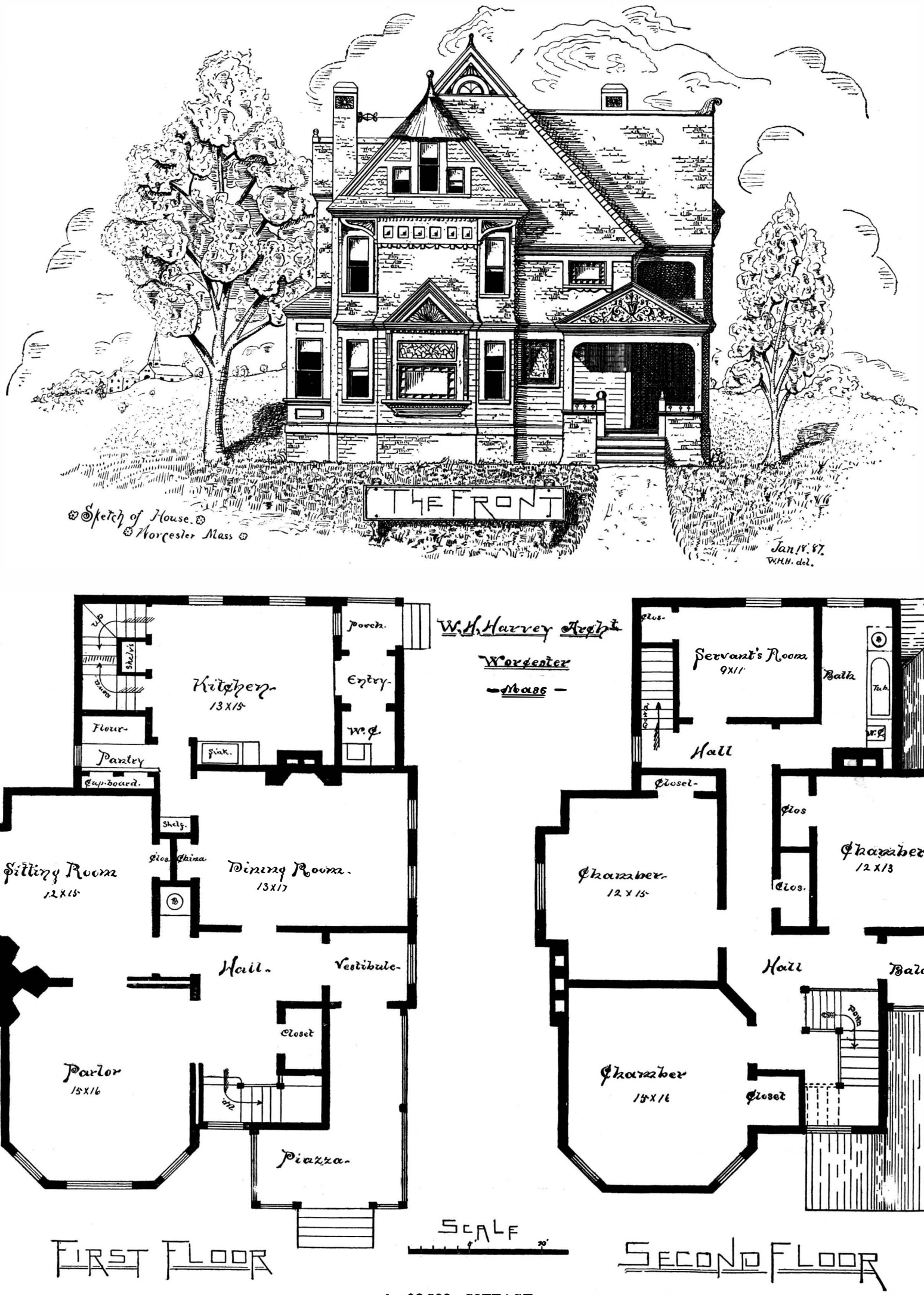
Exterior.—Foundation walls of stone. Under-pinning selected common brick. Cellar under entire house Height of cellar, seven feet six inches. Posts twenty feet long. First story nine feet six inches high. Second story eight feet six inches high. Attic unfinished, but will admit of three good chambers. Exterior frame sheathed and papered with building paper. First story clapboarded; second story and gables shingled. Roof shingled. Principal features, outside chimney, piazza. porch, balcony, gables, etc. *Interior.*—A pleasantly situated interior, containing eight rooms, besides hall, bathroom, and closets. The sitting room, parlor and hall communicate by means of sliding doors The principal stair-case has landings and cathedral glass windows. The parlor has an art window in bay. The kitchen, back stairs and bath room are wainscoted, and the kitchen has a hardwood floor. The entire interior is finished in whitewood, except the stairway. The parlor sitting room and dining room have fireplaces. All interior woodwork finished on the natural wood. The first story of the exterior is painted three coats, and the second story three coats of creosote stains. Roof painted two coats of mineral paint.

Cement Buildings.

A rapid method of constructing buildings has been introduced by Mr. J. C. Bloomfield, of Blen-na-Lung Leggs, Ireland. He erects uprights, wooden or metallic, either with or without sole plates, and either directly on or sunk under the surface of the ground, or on dwarf walls of concrete or other material, and for roofs he uses wooden, metallic, or other suitable rafters, and on the inside and outside of the uprights or rafters he affixes wire or metallic ribbon strained across, and fills up the space with broken stones, shingle, burned clay, clinkers, cinders, or other suitable materials, and plasters the exterior and interior, or exterior or interior only, of the walls so formed with plaster, preferably with cement plaster, formed of Portland, Castle-Caldwell, Selenitic, or Scott's cement and sand or other suitable materials. Buildings formed in this manner with cement plaster are put up in exceptionally short time, and become quite dry and habitable in a few days, and fitted for immediate occupation, without any risk from damp.

HOTEL AT MENTONE.

We give an engraving of a new and elegant hotel for 150 guests at Mentone, France, on the Mediterranean. This city is one of the favorite places of resort, especially for the winter months. The average temperature is 61° F. It is beautifully situated. The hotels and business part of the town are located near the water. Directly back of them rise the mountains, and here are located many beautiful villas and cottages. Mentone was one of the towns lately affected by the severe earthquake, which produced great consternation among the inhabitants.



A $3,500 COTTAGE.

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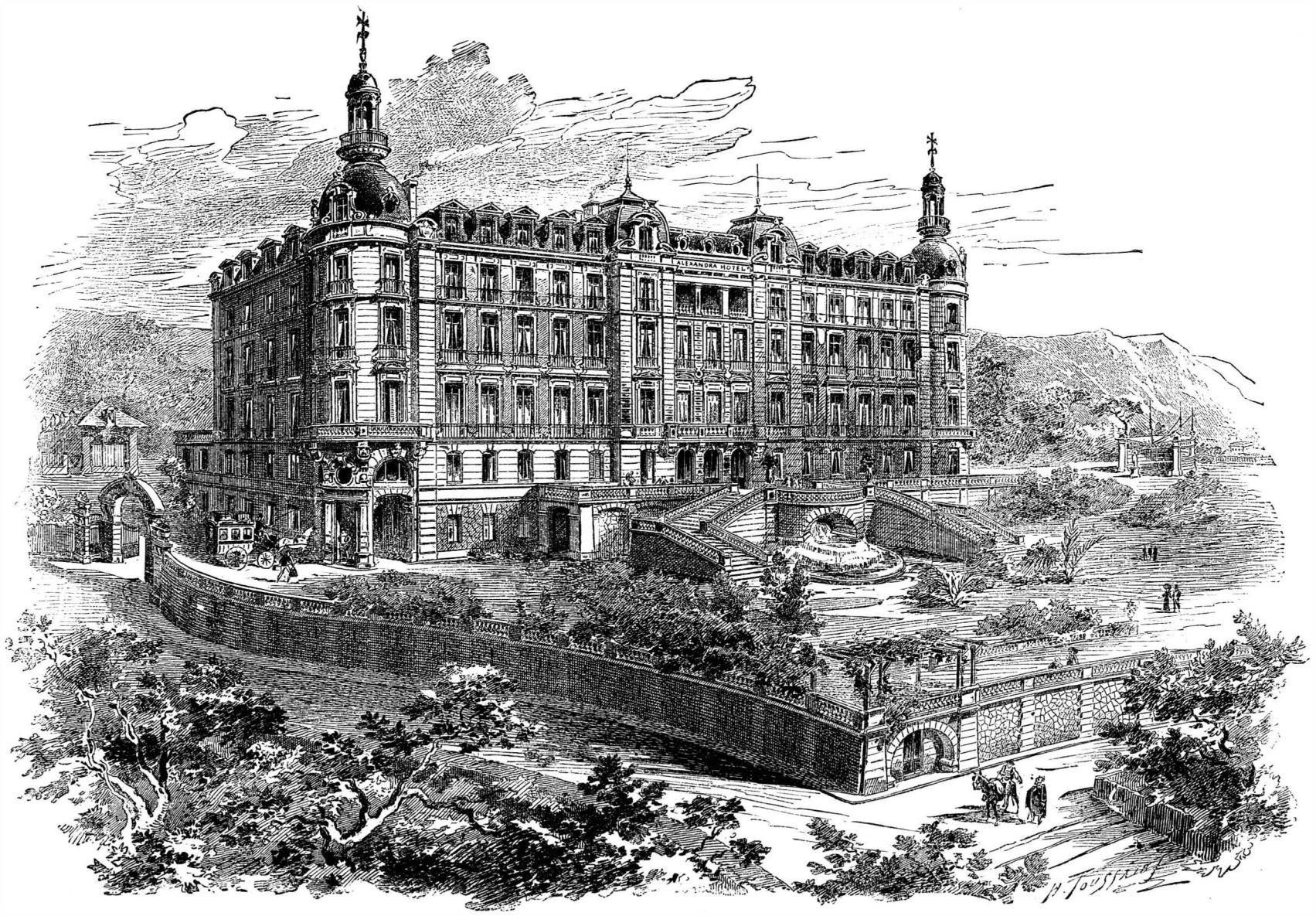

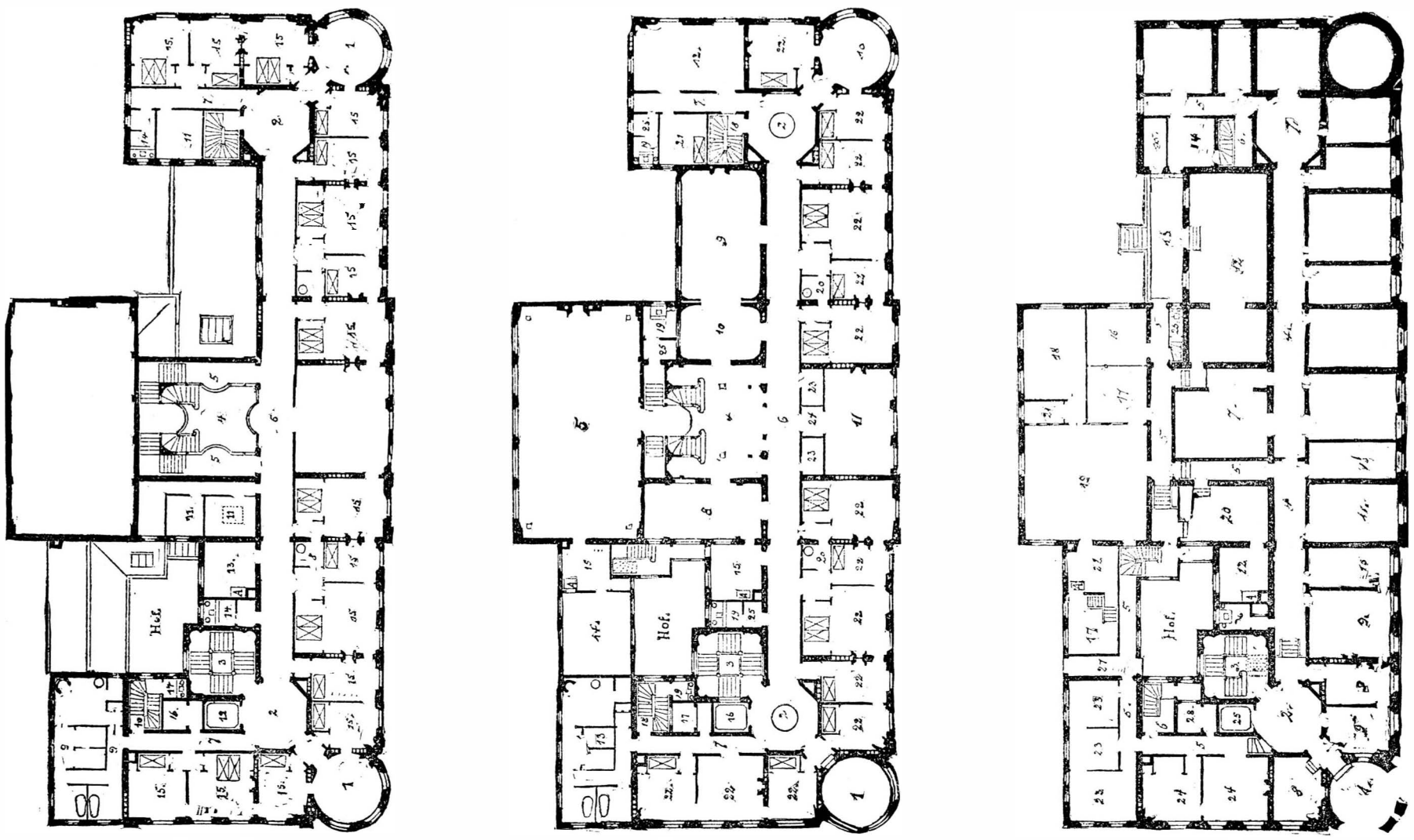

SECOND FLOOR. FIRST FLOOR. BASEMENT.

HOTEL AT MENTONE.—A. G. RIVES, ARCHITECT, PARIS.

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IRON CEILINGS.

During the past few years there has been a very decided advance in the construction of our buildings. The introduction of modern materials and apparatus has provided means of better and often less costly construction, which the public, as a rule, have not been slow to take advantage of. It is, however, a singular fact that we should hold on so tenaciously to the primitive and unscientific method of forming plastered ceilings. As a fact, the material has been in use so long that it is not easy to get the public to abandon it. On a very little consideration, it will be seen how many are the disadvantages of plaster which form serious objections to its use. The principal defect is its weakness. Let there be but a comparatively small vibration or jar in the building—to which, of course, every structure is more or less liable—or let there be a leak of water, and it will crack and fall off in patches, not only necessitating repairs in this respect, but forming a grave danger in the injury liable to be done by the falling material.

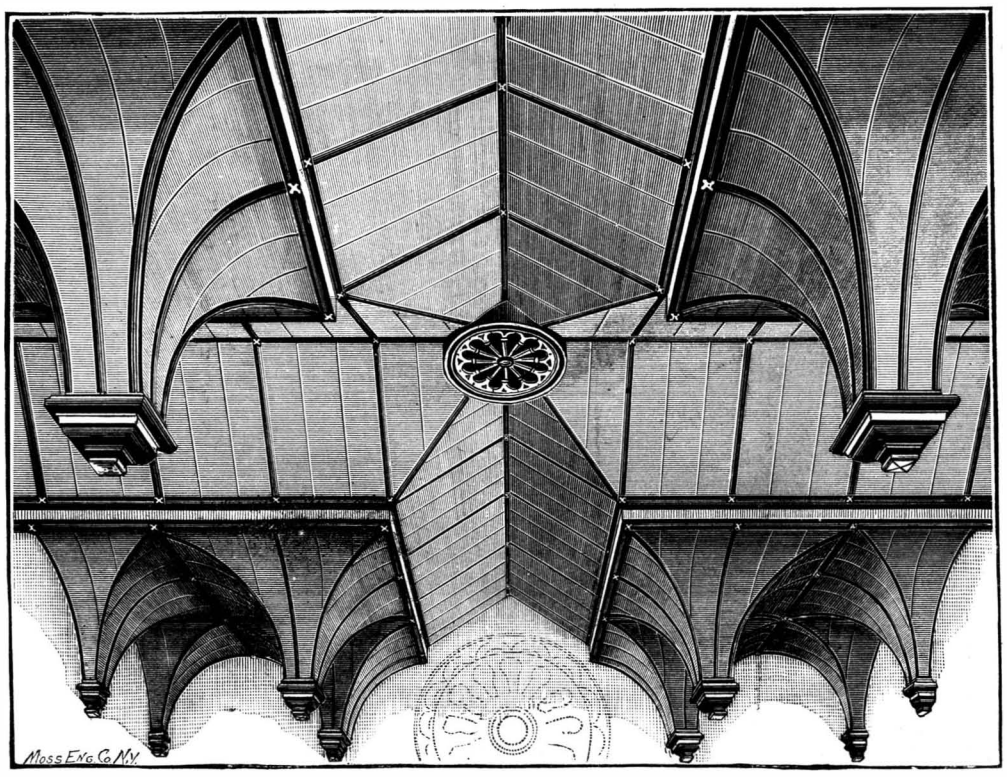

Fig. 1.—A CHURCH CEILING IN IRON.

Unsightly, cracked, broken, and patched plastered ceilings are only too familiar to every owner and occupant of a building, and the result has been the suggestion of innumerable plans by which a strong plastered ceiling might be produced. Among the methods which have been devised to this end is iron or wire netting to be used in place of wooden laths, but this, while improving the matter somewhat, possesses the serious disadvantage of rusting whenever wet comes upon it. It goes without saying that it is impossible to prevent water occasionally coming in contact with a ceiling. A leak in the roof, a broken water pipe, or water upset upon the floor happen now and again in all buildings. The result with iron netting in many cases is that after a few years the rust shows through, looking very unsightly, besides weakening the plaster, so that we return once more to our original position, with broken and cracked ceilings. But, even where the lathing is good and secure, there is another decided objection to plaster which is often overlooked. To incorporate it, a considerable quantity of water is necessary, and this water, during the process of evaporation, will fill the building with moisture. Now, all woodwork shrinks to some extent, be it ever so well seasoned, when fixed, and a skillful and judicious carpenter, who understands the effect of the shrinkage, will make due allowance for it in forming his joints, cutting them tight on one side and slack on the other, with the view of adjustment by the shrinkage. If, from the plaster or any other cause, the building should be filled with moisture, it will penetrate the timber, cause it to swell, and do considerable damage in splitting and cracking the woodwork. Without doubt, plaster is very unsatisfactory. What is required is not a change of *method* of construction, but an entire change of *material*, and in this will be found the only satisfactory solution to the problem.

The question of the decoration of ceilings is scarcely a less important one than that of the material used in their construction. Although there has of late been a successful attempt to treat the surface of ceilings in the more important buildings, still little has been done beyond either papering on the plaster or constructing paneled woodwork at great expense. Often a blank white expanse, they are not only conspicuously beautiless, but detract considerably from the decoration of the remainder of the room.

The material of the future for universal use for ceilings must be one which will be adaptable to the purposes of decoration and ornament, and which will substantially remove objections attendant upon the use of plaster. Such a material is iron, provided that it be properly treated. In many minds it is probable that the word iron in connection with the proposed use for ceilings suggests the idea of coarse corrugated sheets, nailed up roughly on the joists, with the nail heads appearing conspicuously, and with the laps and joints all showing. Used in such a manner iron would not be a success, but properly treated there is no reason in the world why it should not prove not only as substantial and lasting a material as could easily be had, but, from the illimited variety of the forms into which it may be contrived, at the same time one of the most artistic.

Considering its merits first from the point of view of construction, iron would appear to be eminently well calculated for the purpose of ceilings. When formed into sheets with small corrugations, and properly fixed in such a manner as to permit of the escape of any water falling upon it, it will prove to be really a permanent ceiling, which will be essentially indestructible, which will not crack and fall off by jarring or vibration of the building, and that will neither stain nor soak off whenever there is a leak of water. Then it will prove of great assistance in preventing the spread of fire, and, if used with a lining of asbestos felt, will be practically fireproof. In recent reports of the New York Fire Department it was pointed out how great the danger is, on a fire occurring in buildings having plastered ceilings, by the manner in which the plaster falls off and allows of a draught through the floor between the joists. It was strongly recommended that all such ceilings should be rendered somewhat fireproof by the insertion of sheet iron between the floor and ceiling. If iron were used as a ceiling, of course the inside sheet could be dispensed with, and hence a saving be effected.

But perhaps the chief advantage of the material lies in its lightness, for it is in this fact that there is a very considerable benefit. An iron ceiling is approximately eight to ten times lighter than plaster, so that the supporting timbers may be a good deal lighter. Take the case of a church or other building having a roof area of, say for example, one hundred squares. An iron ceiling for such a building would weigh about 5 tons, while a plastered ceiling would weigh from 40 to 50 tons! It is not difficult to see how much safer the lighter ceiling would be.

As to the artistic value of iron as a material for use in the construction of ceilings, much might be said. In this city one firm have given some considerable study to the subject, and have manufactured it with a good deal of success. This is A. Northrup & Co., of 54 East 23d St., New York, and 23d and Mary Streets, Pittsburg, Pa., by whose courtesy we are enabled to present our readers with two engravings showing two separate descriptions of the treatment of the material. Fig. 1 represents a view of the iron ceiling in the Methodist church at Warren, Pa., and has quite a unique and certainly a very handsome appearance. The iron itself is crimped or rolled into very small corrugations and is then arranged in panels, the joints being covered with raised mouldings. At the corners of each panel are ornamental rosettes, covering the joints of mouldings. The large ornamental drops are blocked out from the ceiling, and form a special feature.

In Fig. 2 is represented the ceiling in the parlor of T. D. Miller, Esq., at East End, Pittsburg, Pa. This is arranged, as is usual, on a flat surface, by being skillfully and prettily divided up into panels, with the raised mouldings and rosettes as before. On some of the panels floral and other designs are painted, which, with the bold cornice of iron, produces a strikingly pretty effect. The crimp or corrugations are so small that when the iron is fixed in position they cannot be discerned. The only effect is to soften down the colors and to render the design much more artistic and pleasing.

Some sheets are corrugated right across, in various descriptions of crimp, while others are crimped differently on the corners to the remainder of the sheet. One of the most beautiful examples is a raised floral pattern thrown into relief by gilding, which, with the tinted and textured background alternated with plain tinted panels, looks very handsome.

One of the most attractive qualities of this material is its immense variety. The desire for novelty, perfectly proper as it is as a principle, is often carried to extremes in house building, and odd and often useless features are frequently added to the elevation, in the desire to make the house novel in appearance. Probably there is no better opportunity for variety than in decoration with iron ceilings. No two rooms are alike in their treatment, and further, and indeed limitless, variety may be brought about by using as many colors as may be desired in painting them.

In view of what has been said, it will be clear that the use of the material is not limited to any particular description of building. For ordinary dwelling houses, for stores, warehouses, factories, churches, halls, concert rooms, etc., it is equally suitable. It is manufactured from a plain crimp or corrugation to the highest stage of elaborateness and beauty. The small flutings serve with much benefit for acoustic purposes, which is an advantage of great value in schools, theaters, halls, and other buildings for public gatherings. On existing plastered or other ceilings it may be applied without difficulty, and a special construction enables it to be applied to T iron and all other descriptions of ceilings.

Of course the question of cost has an important bearing upon the merits of a material of this kind. Certainly it is somewhat higher than plaster, although not greatly so; but having in mind all its advantages, taking into account the saving of material in roof and floor timbers by the lightened weight, the time it will last, the little attention it requires, the assistance it lends in preventing the spread of fire, and last, but not least, the beautiful appearance it presents, there can be but little doubt that while it costs a little more at first, it is really far cheaper in the end.

Fig. 2.—A PARLOR CEILING IN IRON.

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The Acropolis of Athens.

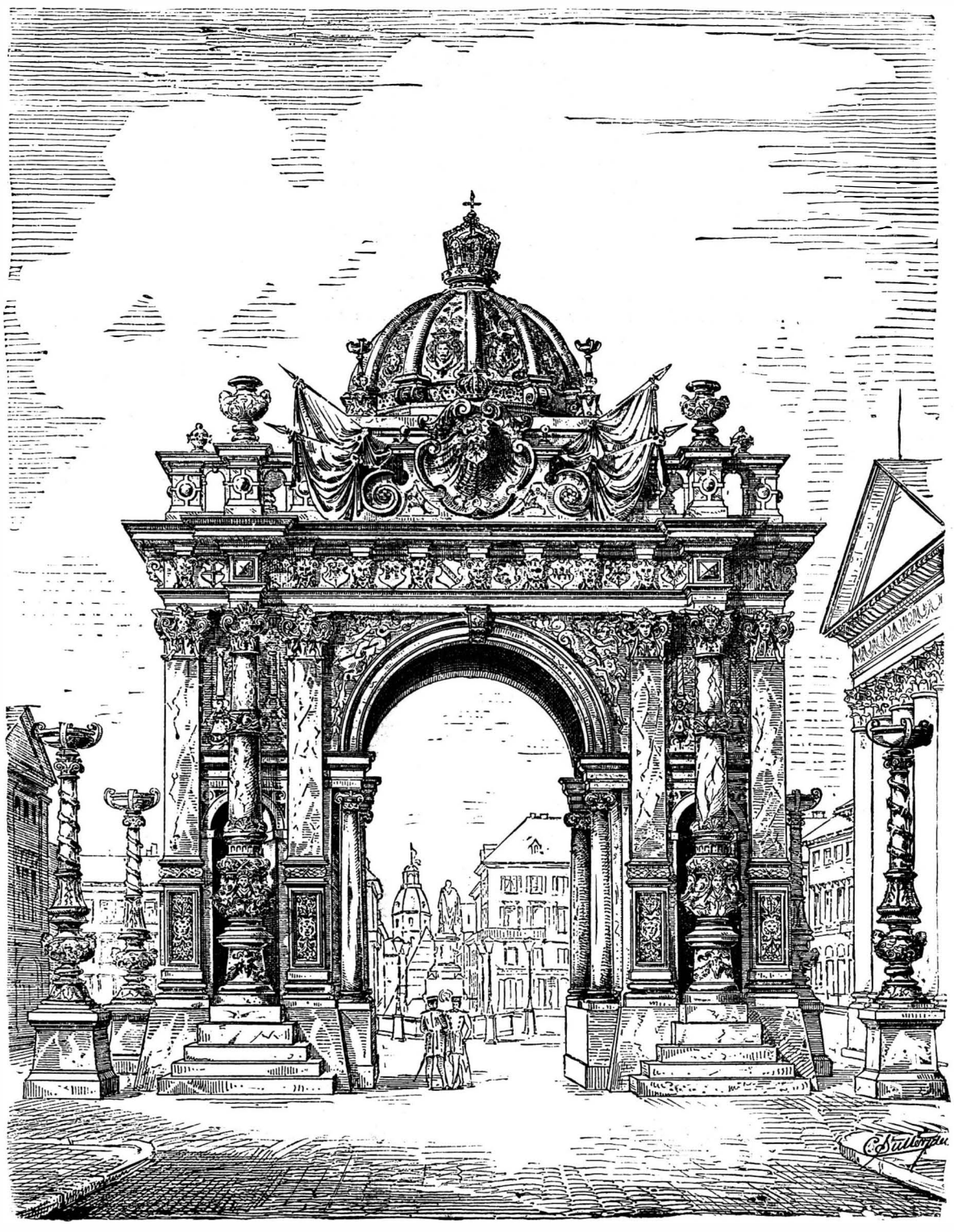
Before the close of the fourteenth century the first Duke of Athens, Neri dei Acciajuoli, transformed the Propylæa into a palace, which he surrounded with fortifications, and of which he destroyed in all probability a considerable part, so as to change it into a princely habitation according to the ideas of the age. Up to this period the exterior of the edifice was in a good state of preservation, but the taking of Athens by Mahomet II., about 1456, and the effect of artillery already in use at this time, resulted in an almost complete destruction of the monuments of the Acropolis. Although the lords of Athens had previously erected numerous fortifications, it was necessary to strengthen them still further, in order to make the Propylæa, now the habitation of the Aga, and the only accessible point, secure from artillery which might be brought to bear against that structure. An immense bastion was therefore constructed in front, the approaches to the citadel were shut by a line of walls and gates, and the ancient towers and walls were buried 40 feet underground. The Parthenon became a mosque, the Erechtheion a harem, and, in their aversion to images, the Turks mutilated every piece of sculpture that came within their reach. In 1656, on the eve of a great festival the Turks wished to celebrate, the Aga Joussouf took it into his head to destroy the church of St. Dimitri, which is built in the plain at the foot of the Museion. With this object in view, he had three pieces of cannon planted, and ordered his soldiers to be ready on the following morning at break of day. This Joussouf lived in a great dome, constructed under the principal vestibule of the Propylæa, which was used at the time as a depot of arms and powder magazine. During the night a thunderbolt fell on this little arsenal, which exploded, and blew up the Aga and his whole family. The invention of gunpowder has been fatal to the monuments of the Acropolis. Thirty-one years after the above event the Venetians, who had just taken possession of the Morea, menaced Athens. The Turks, determined to make a vigorous defense, immediately set to work with the intention of fortifying still further the Acropolis and constructing batteries, one of which has been elevated on the ruins of the Temple of Victory, which indeed they ruined for the purpose. The Venetians, however, landed at the Piré and the Count of Konigsmark, lieutenant of Morosini, planted his mortars on the hills which surround the western side of the Acropolis. The bombarding commenced on September 26, 1687. The Parthenon, which commanded the platform on this side, and in which the Turks had shut up their families, was more particularly aimed at. The Turks had also placed in it all their most valuable effects and a large quantity of gunpowder. The bombs themselves would not have penetrated the solid roofing of the Parthenon, but sparks having got into the structure, the powder took fire, and the Parthenon blew up on the evening of September 28. Almost all the cella and its frieze, eight columns of the northern portico and six of the southern portico, with their entablatures, were overthrown—the vast temple was cut, as it were, into two masses of ruins. The Turks, terror stricken, surrendered the following day, and Morosini entered in triumph the Acropolis. By his orders the horses and car of Minerva, in such admirable preservation that the most indifferent traveler spoke of them with enthusiasm, were carried away; but the work was so badly conducted that the whole group fell, and was shattered on the rock. The captains of Morosini followed the example of their chief, and fragments of the Parthenon, according to the testimony of Bronstedt, were carried even to Copenhagen.—*M. Delecluze.*

Architectural Excellence.

Architectural excellence consists in the judicious and skillful adaptation of an edifice to its specific destination and in the appropriate and tasteful display of its interior and exterior ornaments.

Every building of magnitude should be distinguished by decisive and positive marks of its purport. The church, the castle, the mansion, the jail, the temple, and town hall should each have its apposite characteristic form and features.

The Greeks and Romans were attentive to this principle; and the "architects" of the middle ages, though unrestrained by the rules and orders of their classical predecessors, very generally made a specific distinction between the edifice intended for religious worship and ceremonies and that appropriated for habitation.



ARCH OF TRIUMPH, KARLSRUHE.—DESIGNED BY PROF. HERMANN GOTZ.—*From Architektonische Rundschau.*

A critical examination of the buildings of any country or community displays with a significant truth the character of the people who inhabit them, and is a sure indication of their manners and customs. This inquiry must be replete with amusement and instruction, if pursued with a single and unerring determination to ascertain the truth; but when employed in the course of theory, superstition, or any sectarian dogma, it is repugnant to reason and hostile to good sense.

The stately colonnade and decorated frieze of a Grecian temple or the rude and ponderous circles of Druidical customs can only be properly appreciated and understood by those who have diligently and scrupulously analyzed the history of the refined people who elevated the former to excite our admiration, or the mysterious beings who reared the enormous masses of the latter to awaken our astonishment. In the one instance we have detail combined with its proper assimilation to mass; in the other, we find mass without detail. Each is distinctive and has its own characteristics, and tells, without words, the character and habits of the people who designed them, and have left these monuments to tell their story to other ages.

Every object of nature and art that is inherently grand or beautiful is calculated to afford pleasure to the human mind. The sublime and towering mountain, the romantic cascade, the interminable and restless ocean, the broad and translucent lake, are all highly interesting and impressive; but these are the inimitable works of an omniscient Architect. Man vainly endeavors to mimic them, and advance the productions of art to vie with those of nature. Though, however, his works be comparatively small and insignificant, they often excite the amazement and admiration of his fellow creatures.

Genius aided by science can produce surprising effects—can furnish to the curious and inquisitive mind ample sources of study and delight. This is fully verified in the ancient architecture of Great Britain, as well as in the splendid and much prized edifices of Greece and Italy. It has long been the fashion, founded on prejudice, to praise the latter at the expense of the former; but the impartial historian and critic will award to each its proper and just share of excellence. Each style of architecture has its peculiar beauties, merits, and defects, and each will afford important lessons to the judicious architect; but the man who tamely and frigidly copies either will impeach both his taste and his judgment, and add but little to an "American style of architecture." We have many buildings where the architect has manifested both "genius" and "science" in their design and execution; where there is a happy blending of detail and mass. We find such in almost every city in our country—buildings that show the marks of careful study and a proper distribution of mass and detail. They stand out bold, plain and impressive, like a graceful and elegant female, dressed in a light and flowing drapery, as the latter adorns the former. We find such on our crowded thoroughfares, often surrounded with shady neighbors; but they resemble a dignified beauty accidentally surrounded and incommoded by a motley group of the rabble.

Finally: All buildings should, so far as it is possible for the architect to meet the requirements, tell their own story, whether they are intended for church or state, mercantile or other purposes; and in their uses much depends on the space that can or should be used to make them massive, or how much can be given up to light and airy detail. All structures must be massive enough to show that they are substantial, and the detail should, too, be in keeping, being bold, clean, and impressive, and all having a meaning.

If the designer's pencil did not run so easily into graceful curves and lovely flowers, that look so beautiful in the picture; if its point would get directed to bolder, but subservient, detail to the mass, those structures would have a lasting appearance and enduring character, that would speak for a nation's grandeur, and perhaps in the future it would lead to an American style of architecture.—*L. D. Cleveland.*

Artificial Rubies.

At the Academy of Science's meeting held on March 14, M. Fremy read a memoir on the researches which he has made with M. Verneuil to artificially produce ruby. An alumina crucible was used, so as to avoid the presence of silica, which has the effect of imparting a lamellar structure to the product. Under such conditions, with alumina separated from calcium fluoride by a perforated platinum septum, they have obtained perfect crystals of alumina, which, being colored with traces of chromic acid, were an exact counterpart of the natural stone.

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ROSE COVERED PORCHES.

T. W. GIRDLESTONE.

How is it that plants are often seen flourishing in cottage gardens with a luxuriance which seems unattainable in gardens where all conditions appear to be so much more favorable? The great masses of hepaticas, for instance, in the cottagers' gardens in some of the western shires are unsurpassed, while the clumps (sometimes almost forests) of madonna lilies are the envy of passers-by, and the climbers by which the cottage is often half hidden seem to grow with more enjoyment than anywhere else. Perhaps the reason may not be further to seek than in the employment of materials well suited to the climate and conditions, for there is no doubt that common plants well grown are more decorative than half starved specimens of more brilliant things, for whose proper cultivation the requisite means are not attainable; and a cottage porch smothered with honeysuckles and some old fashioned rose is about as pleasant a sight as can be seen, in spite of the climbers being neither rare nor costly. But the supposition that the denizens of cottage gardens are so fine because they are indigenous or exceptionally hardy plants is not sufficient to account for the handsome subjects there so often met with. The finest Catherine Mermet I ever saw was climbing on the chimney of a cottage by the roadside in Surrey, and in a similar position in another part of the same county I have seen blooms of Gloire de Dijon such as I have never seen elsewhere, even in celebrated rose gardens. Every one will doubtless recall Canon Reynolds Hole's description of the noble specimens upon the walls of a cottage of the glorious but hardly-to-be-flowered Noisette, Cloth of Gold, which so rarely gets sun enough to ripen its shoots in this climate, and even more rarely succeeds in preserving them uninjured until the flowering time. I myself have experienced the pangs of jealousy when passing a house masked with a climbing devoniensis in full bloom, the cultural attention to which consisted in its being occasionally gone over with a long handled bill hook, such as is used in trimming hedges, "just to keep the shoots from rattlin' on the windows."

In spite of these seemingly anomalous instances, however, the real reason of the presence of striking specimens in cottage gardens will probably be found in the fact that, not being too numerous, each plant is tended and looked after with the greatest care. The precious and carefully collected road scrapings, not having to be spread over too wide an area, are heaped round special favorites to provide at once food and protection, and thus is encouraged that luxuriance of growth which renders possible the rose covered porches of our Surrey cottages, whereby a pleasant feast of brightness is afforded to weary travelers passing by.

CLIMBING ROSE ON PORCH OF COTTAGE.

It is remarkable how seldom the white rose (double or garden variety of Rosa alba) is to be seen in any but cottage gardens, and the same may be said of its near relation, the maiden's blush. Such good roses, capable as they are of highly ornamental treatment and so individually charming, certainly deserve more general culture than they receive. The white rose does equally well as a bush five feet to six feet high, or as a low climber. The cottage porch we engrave shows it in the latter form, trained to meet a honeysuckle in the front, the training not overdone, but with that happy knack of supporting and guiding without apparently constraining, that best shows the beauty and natural growth of rambling plants.

ROSE ARCHES.

The mode of decorating our gardens with arches of roses carried over paths seems of late years to have gone very much out of fashion, although roses so grown may be made to constitute a very attractive feature, a fact to which an engraving in a recent *Garden* abundantly testifies. It has been urged that rose arches are always ineffective or inconvenient, and generally both; but if so, the reason is probably to be found in a want of skill in the cultivator or constructor, or both. For there is no design that is safe from being made to appear ridiculous through its attempted execution in ill chosen materials. A house built of bricks and stucco from designs intended to be carried out in stone would not be more grotesque than the gaunt iron arch one sometimes sees with a stunted rose bush growing half way up each of its pillars. Such an arrangement certainly is ineffective, but then it is not a rose arch. Where there has been a want of success in making rose arches decorative, the failure may usually be attributed to one of two causes—either an attempt to furnish them with roses entirely unfitted for the purpose, or the employment of too many varieties. The number of available sorts is not large, and perhaps a dozen names would exhaust the list of first rate kinds, but the employment of these or any twelve different roses upon some half a dozen arches would effectually preclude the possibility of anything like a fine display. On the other hand, what could be more striking than such a series of arches, each arch densely wreathed with the evergreen Felicite perpetuelle, probably the best of all varieties for the purpose, with its rampant growth, its dark green persistent foliage, and its myriad pure white flowers, each one a perfect rosette? If numerous varieties are employed, the result is seldom satisfactory from a decorative point of view, because the different sorts will not flower at the same time; but this difficulty is obviated by using only one variety at a time, whereby the striking effect obtainable by having a number of arches of roses simultaneously sheeted with bloom is insured.

In case of the employment of several varieties on a series of arches, each arch, at any rate, should be covered with one rose, and not have two different kinds planted beside its two pillars, so that at the flowering time each arch, at least, may be complete, rather than have one half blossoming while the other half is green or bare. Even if they can be induced to bloom at the same time, unless they are of the same class and habit, the effect of two different roses mixed up together is generally somewhat incongruous and unpleasing.

In the selection of varieties, the qualities to look for, in addition to the obvious essentials of rampant growth and profusion of bloom, are hardiness, pliability, persistence of foliage—which foliage should be handsome, but only of moderate size, as the very large leaved roses, when grown on arches, get their leaves so lacerated by the wind and soon look untidy—and comparative freedom from the more disfiguring of rose pests, such as mildew, etc. In addition to Felicite perpetuelle, which is unsurpassed as an arch rose, there may also be mentioned as fulfilling the above conditions the Ayrshire splendens, whose white flowers, less regular in outline than those of the last-named, are relieved by a slight pink edge. These two varieties are the pick of their respective classes, but if a pink variety in the same section be desired, there is no fault to be found with the hybrid Laure Davoust, whose charming pink flowers are produced in immense clusters, except that in the north it is not quite hardy enough to avoid some disfigurement in a severe winter, unless it be somewhat protected with bracken, or such covering. In the southern counties, however, both this and the climbing Aimee Vibert, or Aimee Vibert scandens, as it is sometimes pedantically called, make good arch roses, and the two are sufficiently near in character to make a good pair, the one pink and the other white, where several sorts are desired. But when it comes to the noisettes, there are two varieties of which use should be made whenever possible; for if not perfectly hardy they are well worth the slight protection of fern, which renders them so. The first of these is Reve d'Or, an exceedingly vigorous rose and the hardiest of its class—a rose which could not be considered otherwise than a highly ornamental plant, even if it never flowered, for its young shoots are brilliant red, and the handsome foliage is rarely without some bright tint; but its character does not belie its name, and the wealth of golden and tawny blossoms displayed constitutes truly enough a vision of gold, and not a fleeting vision like an every-day dream either, for the flowering only ends when the frosts begin.

The second variety is the now well known and deservedly popular William Allen Richardson, not so rampant as Reve d'Or, but quite sturdily vigorous enough for all practical purposes, and very nearly, if not quite, as hardy as the latter. At any rate numerous plants of William Allen Richardson of various forms passed uninjured through the trying winter of 1885-86 with only the slight protection of a few fronds of bracken twisted among them, which all teas and noisettes deserve, and are the better for in hard weather; and, as far as can be seen at present, the long spell of cold now coming (it is to be hoped) to an end, although the thermometer twice registered upward of 25° of frost, has not inflicted appreciable injury on plants of this delightful noisette, whose decorative value is enhanced by the fact that the bright orange color of its flowers is unique among roses, while the plant is almost evergreen and thoroughly autumnal.

Red roses that are available for training over arches are few and far between, but the hybrid tea Reine Marie Henriette is a first rate variety for the purpose, and, growing with immense vigor, produces its bright, clear red flowers in abundance throughout the season. The attractive semi-double red hybrid tea or hybrid noisette Reine Olga de Wurtemburg, which was figured in the *Garden* early last year, would make an admirable arch rose, but for the solitary objection that its magnificent foliage is liable soon to become "tattered and torn" by the action of the wind when this rose giant is grown anywhere away from a wall. But a lack of good hardy red climbing roses is no reason for ignoring good hardy climbers that are ready to hand, even though they be not bright colored; and there are two single roses which are both better worth growing to cover arches than all the hybrid perpetuals so often recommended put together. One is Rosa brunonis, often called the Himalayan brier, which makes incredibly long shoots, enough to furnish an arch in a single season, and of which the pretty bluish green foliage is almost hidden at the flowering time by the mass of snowy single blossoms. The other, last, but not least in value at any rate, is Rosa polyantha, a Japanese sub species of R. multiflora, and one of the most attractive roses in cultivation. It has all the recommendations enumerated above. It grows with the utmost luxuriance, and regularly becomes smothered with blossom. M. Jean Sisley, of Lyons, declares his belief that it is the hardiest rose in existence. It may be easily trained in any direction. The foliage hangs on late, and though composed of many leaflets, the leaflet is not large, and the plant appears almost exempt from mildew. Moreover, it will grow in any soil or situation, it roots as a cutting with the greatest readiness, and its white flowers, though individually small, are produced in such immense trusses as to be highly decorative, while their delicious fragrance scents the air for yards round a large plant in blossom. Under these circumstances, the only wonder is that this plant is not abundant in all gardens where roses are appreciated; but the fact probably is, that too many gardeners still consider single flowers a reproach to a rose, which no other merits can compensate.

There are many other roses which are often included in lists of kinds said to be desirable as arch roses, such as the Boursaults, which, however, cannot conscientiously be recommended on account of their dreary coloring. Again, the charming rose which goes under the name of Fortune's yellow is too tender to be grown in this country anywhere but against a wall—a position which it thoroughly deserves; and the same may be said of the banksias. None of the mosses are of real value for the purpose. Lanei is the only one of sufficient vigor, and that is too stiff and rigid to be ornamental. One or two hybrid chinas, such as Blairi No. 2, may be employed, but all the hybrid perpetuals practically involve an outlay of time and trouble by no means repaid by the effect produced; while the few gallicas, etc., that might possibly be available are such victims to mildew as to be hardly ever otherwise than an eyesore.

In arranging rose arches it must, of course, be borne in mind that it is essential that things intended for use be eminently usable; and if arches are made across a path, care must be taken that they do not make such path inconvenient for traffic. Thus, the pillars of an arch should be at least three feet from each margin of the walk spanned, in order that the dresses of passers-by may be safe from the thorny shoots; and if the walk be six feet wide, this will give a base of twelve feet wide, for which a central height of ten feet will be found to give an effective and practical arch. Where there is to be a series of arches, they should be at least three yards or four yards apart, and each arch should be composed entirely of iron, for if the uprights be made of wood they soon give way at the ground line, especially when the plants trained upon them become vigorous and offer considerable resistance to the wind. The only objection to iron uprights is that from their smaller diameter they are less convenient to train plants to than wooden posts; but any difficulty arising from this may be obviated by fixing a few horizontal cross bars on to the iron uprights, and to these the rose shoots can be tied so as to avoid undue crowding in the earlier stages of growth. The best way of planting is to put in two trees of the same kind, one at the foot of each upright, and then by liberal culture to encourage the most vigorous growth possible; but if a variety is used which does not furnish well, there is no reason why two or three plants of it should not be planted at either pillar in order to get the arch more completely wreathed. Then, if varieties well adapted to the purpose be employed, the shoots from the two sides will soon meet across the center, and, interlacing, form a triumphal arch or series of arches.—*The Garden*

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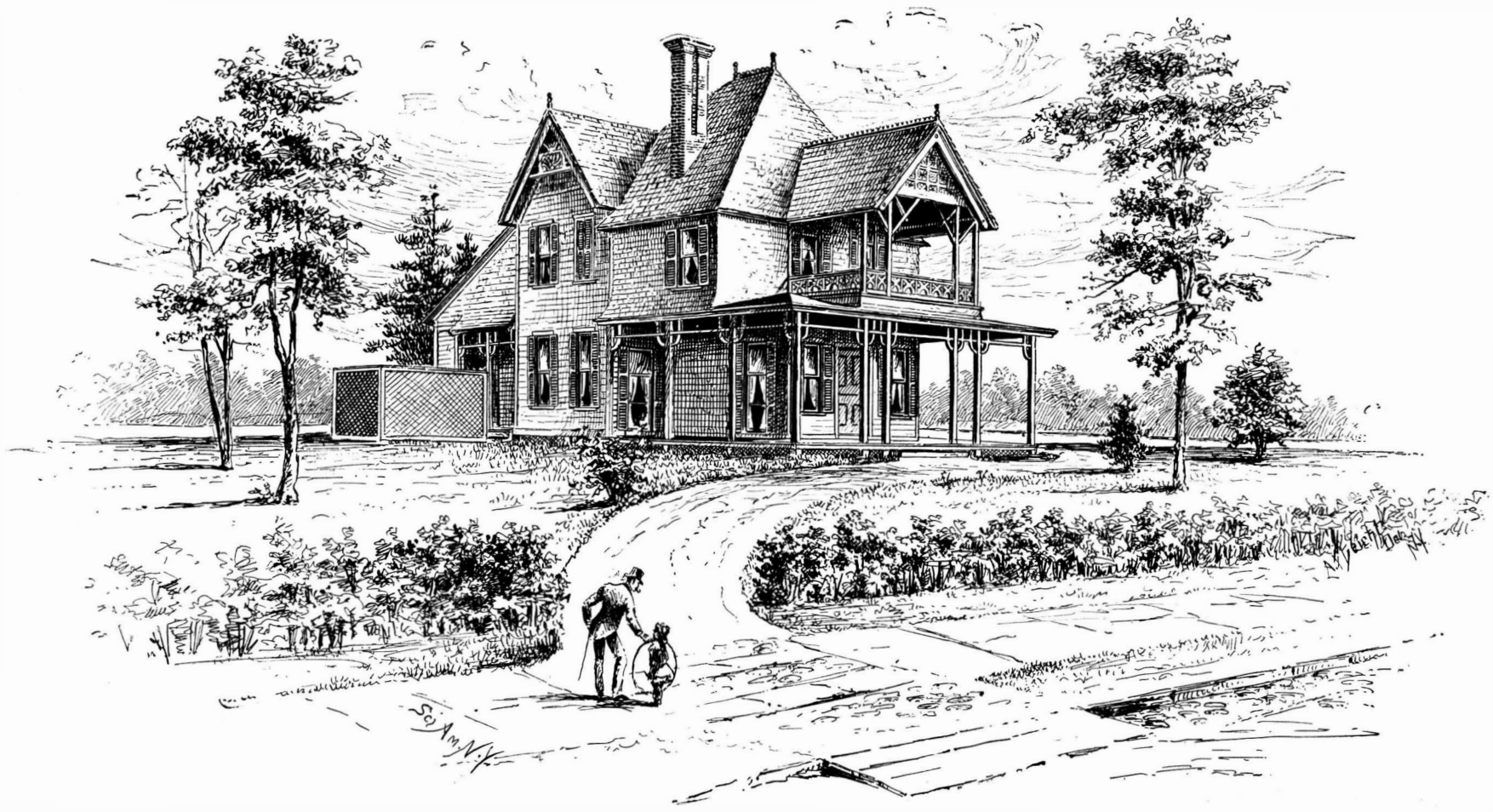

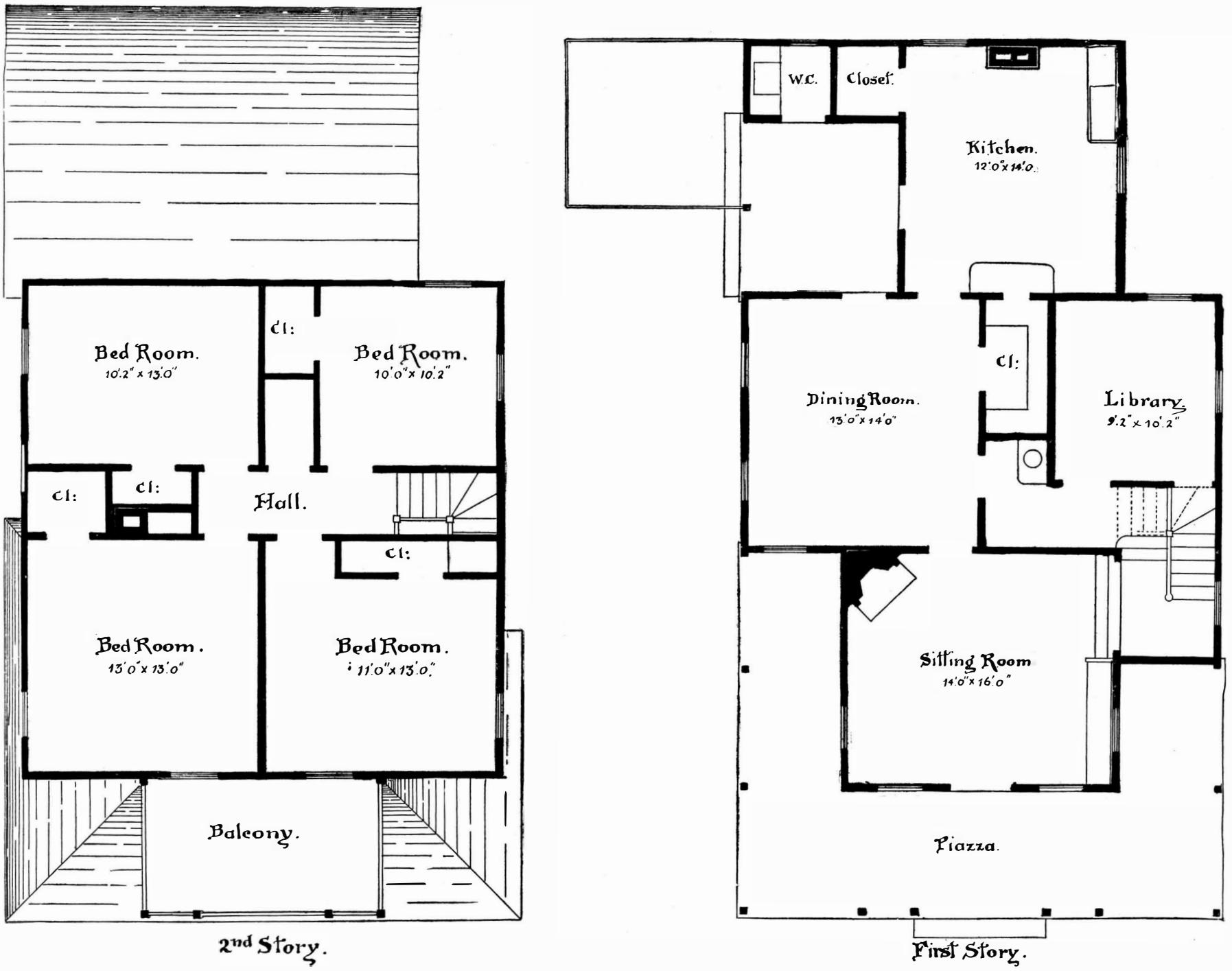

A DWELLING OF MODERATE COST.

[For description see page 118]

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RAISING THE OLD UNITED STATES COURT HOUSE IN BOSTON.

This building was originally the old Masonic Temple, built in 1832, in rather heavy Gothic style, a view of it in outline being given. It was was 60×80 feet in plan, with a heavy tower 16 feet square and 95 feet high at each angle of the Tremont Street front; was five stories, and was lighted by long arched windows on the sides. The walls were of granite, 22 inches thick on the average, and the weight to be raised, as hereinafter described, was estimated at nearly 1,500 tons.

After serving as a court house until the court was removed to the post office block, the building was sold, and the new owners desired to fit it up for business purposes. The 80 foot front was on Temple Place, which had been widened several years before, so that the building projected three feet over the new street line. At that time the owners charged so high a price for damages that the city declined to pay the sum. The present owners, therefore, feared that should they demolish the building they would be obliged by the city to adopt the new line; and, in order to save the 240 feet of ground space, they adopted the expedient of raising the old building and inserting girders underneath and iron columns for the store fronts. The line separating the part raised from that removed is indicated in the perspective diagram, the raised portion being about 36 feet high.

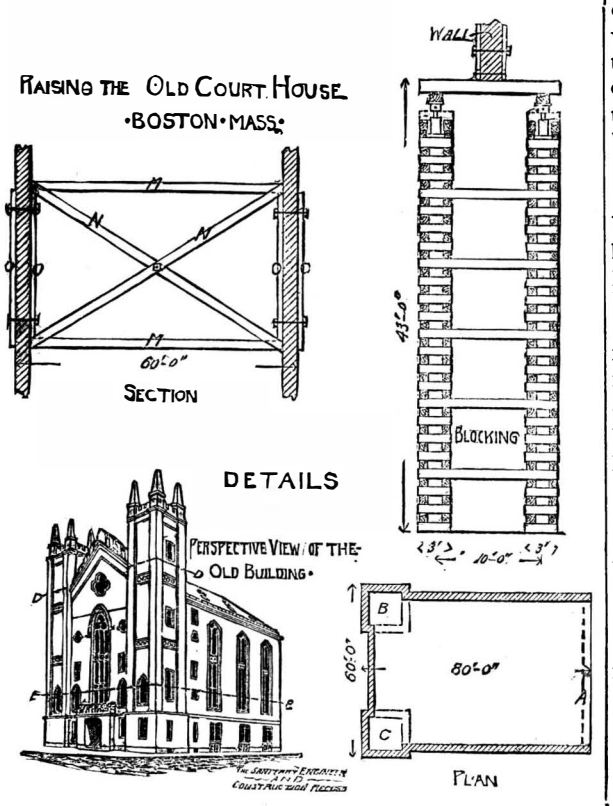
The contractor for the work was Mr. Issac Blair. The original design was to cut down the towers to the level of the roof, remove the interior work, and raise the exterior walls and towers intact.

After beginning the work, however, the contractor decided that as the rear wall (A, see small plan) had to be removed to take in an alleyway at the rear, and as the interior portion, B C, of the towers had a comparatively slight bond with the exterior, these might better be removed.

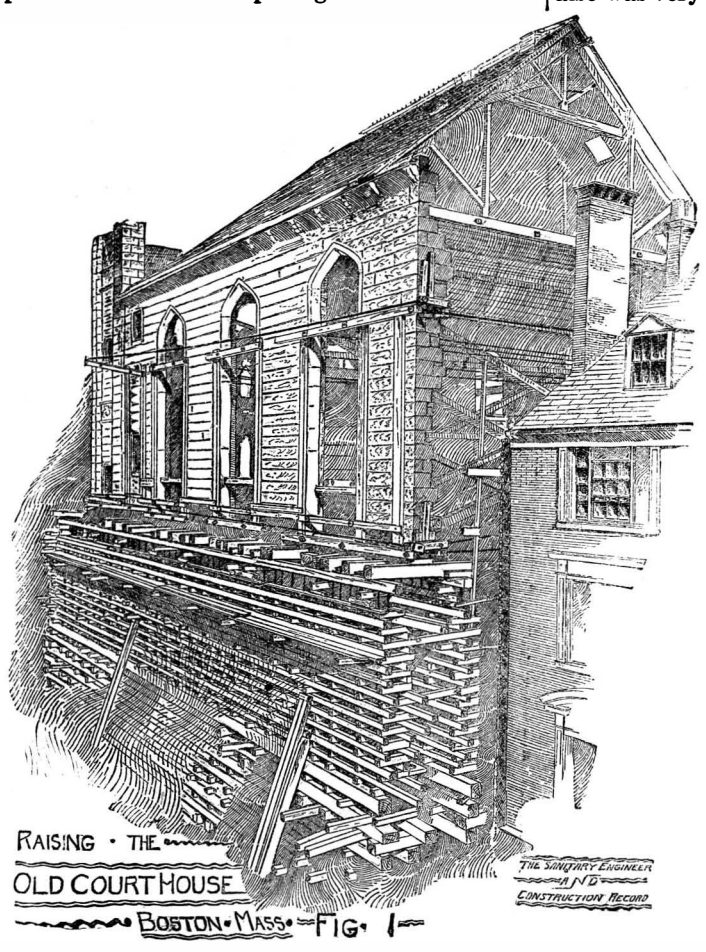
This resulted in dividing the building virtually into two halves, since the window at the front ran nearly to the peak; and it was noticed as the work progressed that any inequalities in raising of the two sides was indicated by opening and closing of the joint at the key of the arch above this window. It will be noted, also, that the side walls were divided into nearly separate portions by the long windows in them. To insure the stability of the whole, long timbers (M, see sketch) were braced from wall to wall with diagonals (N) in a vertical plane between them. The diagonals were bolted at their intersection. Timbers were placed across each opening at top and bottom, both inside and outside, and strongly bolted together. These serve also to support the ends of the diagonals and interior braces. Binding timbers were also placed each side of the openings, both inside and outside. Heavy tie rods in pairs at top and bottom of the openings served to tie the walls lengthwise, and similar rods were also run across the building. The general arrangement is shown in Fig. 1.

When this was all ready, the walls were pierced for "needles" at *about* 3 foot centers, according to the load to be borne. These were 14×14 inch hard pine, and were supported on two ranges of blocking, which were spaced at about 10 feet on centers. To prepare for this, excavations were made on each side of the foundation, so that at the start the cribs were 28 feet high, and at the close they were 43 feet high.

The cribs were built up of 6×8 inch timbers, and were each about 3 feet thick. At intervals of about 5 feet vertically, lines of timbers were carried across the space between to stiffen and bind the whole (see sketch). Several timbers were also carried through the blocking, across the building, and butted against the side walls of the adjacent building. There were also exterior shores



as seen in Fig. 1. An opening for the passage of carts was left through the cribbing at the front, and others at the side for carrying in material of various kinds. The "needles" rested directly upon longitudinals 14×14 inches, in lengths of 40 to 60 feet, against which the upper ends of the lifting screws took their bearing. The screws were 18 inches long and had a lift of 14 inches each; and as there were 300 in use, they were estimated to have a load of four to five tons each. Under the towers they were but 12 inches apart. They rested on 3 inch plank crossing the cribs, and were worked by six men, one on each side of each of the three walls turning each screw consecutively a definite amount. These were followed by a gang of men, who, as soon as the screws were out their full length, inserted new blocking. The job was eminently successful, and not the slightest accident occurred throughout. The cost also was very low, being about $3,500. The work of refitting was, of course, in addition to this.—*Sanitary Engineer.*



Gelatine Moulds for Reproductions of Carving.

Piece moulding, whether in clay, plaster or any other material, involves considerable skill and time; hence its unsuitability in reproducing large objects; and this renders it necessary to have recourse to a process not only more easy and quick, but to a great extent obviating the necessity of manipulating the casts when they issue from the mould. A process of moulding with gelatine was evolved, and it is applicable in the reproduction of big objects, by reason of the large area which a single mould can cover. As the gelatine is elastic, a great extent of what is technically called "undercut" in the carving may be embraced in one mould, thus rendering unnecessary the making of a number of joints.

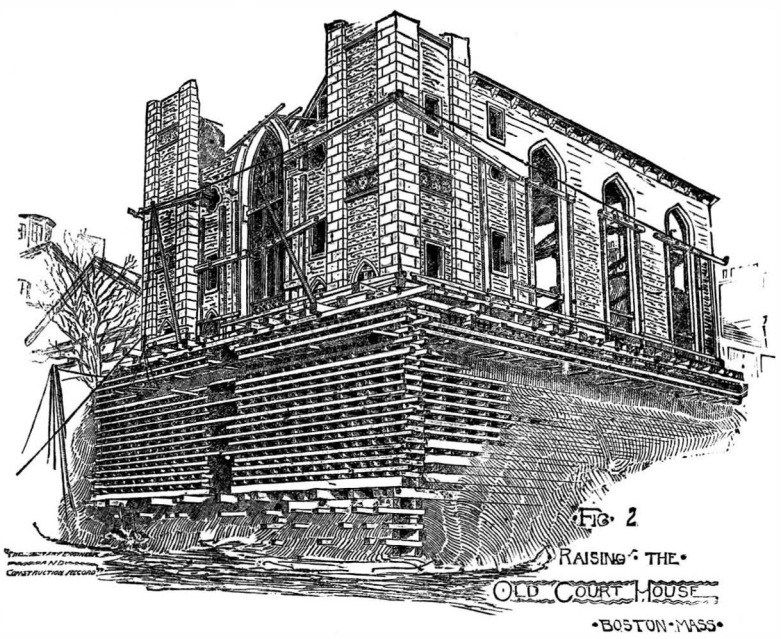
In withdrawing the elastic mould from the object under treatment, the gelatine stretches itself in order to become released from the undercut, but it regains its shape almost immediately, without destroying any of the extreme accuracy with which the gelatine is able to repeat every mark and grain on the surface produced. In every class of piece moulding, the method of covering the carved surface with a number of inelastic moulds, capable of being individually removed with ease, is theoretically the same; but the perfection of the plaster piece moulding depends on the skill of the moulder in so disposing the moulds as to have the fewest possible joints when the piece moulds have been made to completely cover the carving. These piece moulds are, in turn, covered, or rather backed, with larger moulds, which serve to hold them in position when the cast is being made. In the gelatine process the backing or wall to hold the mould is the primary work, and then hot liquid gelatine is poured between the backing and the carving.

The process is briefly as follows: The carved surface is thoroughly cleaned and covered with rolls of modeling clay, the outer surface of the clay is smoothed, and a plaster coating or wall built against it. This wall is then removed, and the clay taken away; when replaced, an interval of the exact thickness of the clay will exist, and into this interval is poured gelatine. After twelve hours the gelatine will have attained the consistency of India rubber, and may be peeled off the carved surface. In cases of deep undercutting, considerable force is required to effect this. The gelatine mould is then laid on the wall which supported it in the liquid state, and a plaster cast or facsimile is made. In every distinct operation the greatest care and experience are required, in order that the natural good qualities of the gelatine may be allowed perfect freedom in producing an accurate copy.—*H. H. Cole.*

Paper Roofs.

A roof pronounced superior to that of slate, because of its lightness and other advantages, is now made of fibrous pulp. From this material tiles of any shape desired are formed by pressure under machinery, or by any other method which may suggest itself. Pressed into the designs wished for, the pulp tiles are partially dried, previous to being subjected to a water proof solution. Thoroughly impregnated with the preparation to resist moisture, they are baked to harden them in the water proof mixture. After the baking the tiles are surfaced. To this is added a coating of sand, whereby the pulp is rendered proof against the action of heat or flame. By the use of different colored sands, a variety of tints may be imparted to the tiles, which, after the application of the enameling mixture and sands, are baked for a second time, after which they are ready for use.

Besides the inherent lightness of the pulp tiles, which obviates the necessity of a heavy frame to support a weighty roof, the pulp tile, being tough and not brittle like slate, is far less liable to be broken by blows, stones thrown upon them, or human footsteps. Again, slate tiles cannot be laid compactly together on a roof on account of their brittleness, which prevents their being drawn tightly together by nails. Through the fibrous pulp nails may be driven as close home as in shingles, thereby binding them closely to the bed and together, without any possibility of lateral movement, or being blown away in high winds, as slates loosely nailed on roofs usually are. Nails penetrate the pulp tiles more easily than shingles, and line closer together, being more elastic than wood.—*Nat. Builder.*



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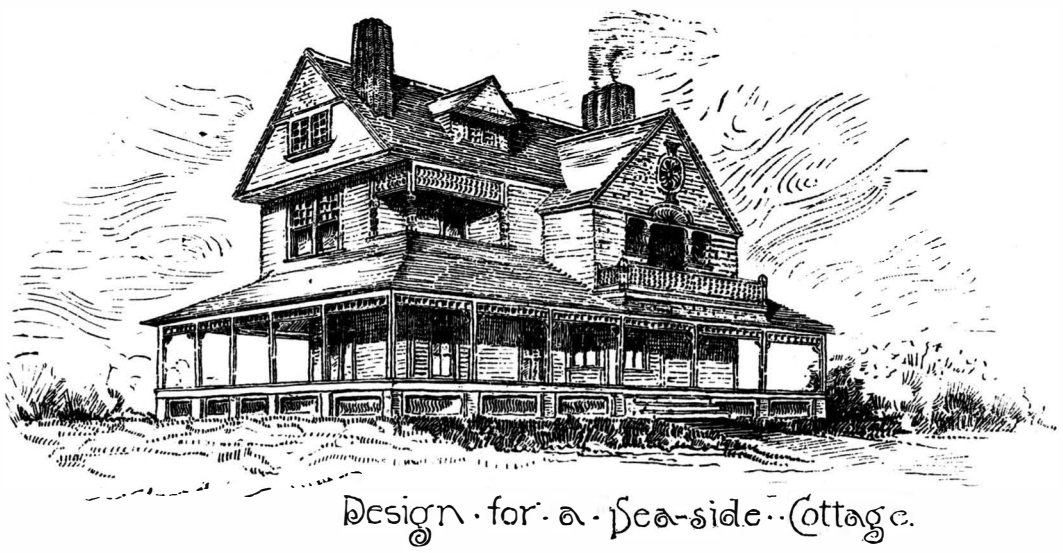
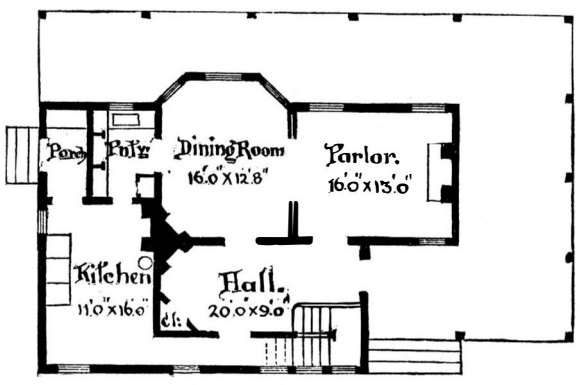
DESIGN FOR A SEASIDE COTTAGE.

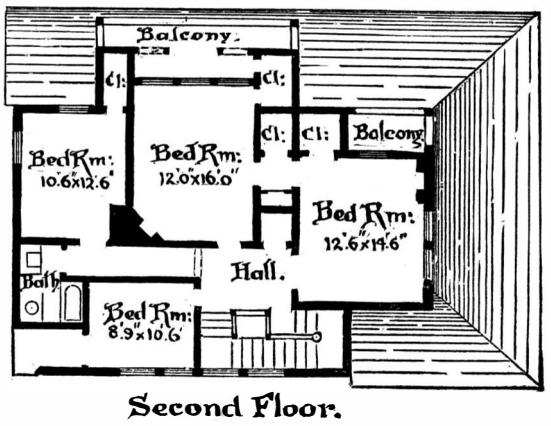
We give herewith from our excellent cotemporary, *Building*, a very pretty design by E. L. Messenger, architect, for a cottage for the seaside. It will answer equally well for any other locality. The piazza space is ample, the interior arrangement good, and the design as a whole very pleasing.



Design for a Sea-side Cottage.



First Floor.



Second Floor.

Floors and Ceilings: Ancient and Modern.

BY C. POWELL KARR, C.E, CONSULTING ARCHITECT, NEW YORK.

II.

THE ORIGINAL INHABITANTS.

It is by no means easy to determine the origin of the Japanese race, and latest researches have indicated that it is an amalgamation of several different races. The present Aino tribes of the island of Yesso are supposed to be the descendants of the ancient aborigines of the empire. They were scattered over a great portion of the country, but were gradually driven northward by the southwestern races. The conquering race were the ancestors of the present true Japanese people; but it is insisted by some archæologists that the Japanese are of Chinese origin. They assert that intercourse with the Chinese and Coreans has materially influenced the progress of Japan in the arts, and it is contended that the Chinese civilization is at least two thousand years older than that of Japan; but, if China has had such an early start, they have in the mean time fallen a long way behind the straight-haired race in the decorative arts, and whatever influences have been exerted upon them, they are able to preserve a distinctive character in all their works.

It will be seen from the relationship of the two races of people who inhabit the empire that we have two different types of homes to visit. There is not much difference in the two types, and it is quite probable that the one is the outgrowth of the other.

The earliest Aino buildings were floorless, but the needs of an advancing civilization led to the construction of floors to protect the tenants from dampness and rain. In Japanese buildings all the parts of a structure are held together by a system of "dovetailing," neither metal, nails, nor screws being used in their production, except for ornament. Miss Bird, who has left us the most interesting description of the Aino dwellings, having visited and lived in them for some time, says she is disposed to rank them, in some respects, above their conquerors. In their houses, as in their faces, the Ainos are more European than their conquerors, as they possess doorways, windows, central fireplaces, like those of the Scotland Highlanders, and varied sleeping places. The usual appearance, of which we shall give a plan and perspective drawing in a subsequent installment of this article, is that of a small house built on at the end of a larger one. The small house is the vestibule or ante-room, and is entered by a low doorway, screened by a heavy mat of reeds. It contains the large wooden mortar and pestle, with two ends, used for pounding millet, a wooden receptacle for millet, nets or hunting gear, and some bundles of reeds for repairing roof or walls. This room never contained a window. From it the large room is entered by a doorway, over which a heavy reed mat, bound with hide, invariably hangs. The room referred to was thirty-five feet long by twenty-five feet broad, and another was forty-five feet square. The smallest measures twenty feet by fifteen. These dimensions conflict with the statements of Dresser, Gonse, Audsley, Hildreth, and others, who uniformly agree that all rooms are some multiple of a yard, and that it is the size of the mats that establishes the floor dimensions of every room and the area of every house—that the houses are built to suit the matting, and the matting is never cut to suit the house. This unit mat, as we may call it, and which we shall more fully explain later on, is six feet by three feet. So that if one side of a room is divisible by six or three, the other adjacent side must be divisible by the same numbers.

On entering a room, one is much impressed by the great height and steepness of the roof, altogether out of proportion to the height of the walls, and of too bulky an appearance in comparison to the apparent strength of the supports. The frame of the house is of posts, 4 feet 10 inches high, placed 4 feet apart, and sloping slightly inward. The height of the walls is apparently regulated by that of the reeds, of which only one length is used, and which never exceeds 4 feet 10 inches. The posts are scooped at the top, and heavy poles resting on the scoops are laid along them, to form the top of the wall. The posts are again connected, twice by slighter poles, tied on horizontally. The wall is double, the outer part being formed of reeds tied very neatly to the framework, in small, regular bundles, the inner layer or wall being made of reeds singly attached. From the top of the pole, which is secured to the top of the posts, the framework of the roof rises to a height of twenty-two feet, made, like the rest, of poles tied to a heavy and roughly hewn ridge beam.

At one end, under the ridge beam, there is a large triangular aperture for the exit of smoke. Two stout, roughly hewn beams cross the width of the house, resting on the posts of the wall and on props let into the floor, and a number of poles are laid at the same height, by means of which a secondary roof, formed of mats, can at once be extemporized; but this is only used for guests. The poles answer the same purpose as shelves. Very great care is bestowed upon the outside of the roof, which is a marvel of neatness and prettiness, and has the appearance of a series of frills, being thatched in ridges. The ridge pole is very thickly covered, and the thatch, both there and at the corners, is elaborately laced with a pattern in strong peeled twigs. The poles, for the most part, run from wall to wall, compelling one to stoop to avoid skull fracture and the bringing down of spears, bows, arrows, traps, and other primitive property. The roof and rafters are black and shiny from wood smoke. Immediately under them, at one end and one side, are small, square windows, which are closed at night by wooden shutters, which, during the day time, hang by ropes. Nothing can insult an Aino more than to look into his window.

He is the last person in the world to exhibit an impertinent curiosity in the affairs of others, and he does not understand how it can possess other people. The experience, however, of a certain woman traveling in Japan, upon her first night in an Aino dwelling, rather tends to nullify our statement when the unknown is a foreigner; but we believe it will hold good as to its application to the Japanese in reference to each other.

On the left of the doorway is invariably a fixed wooden platform, eighteen inches high, and covered with a single mat, which is the sleeping place. The pillows are small, stiff bolsters, covered with ornamental matting. A pole runs horizontally at a fitting distance above the outside edge of each, over which mats are thrown to conceal the sleepers from the rest of the room. The inside half of these mats is plain, but the outside, which is seen from the room, has a diamond pattern woven into it in dull reds and browns. The whole floor is covered with a very coarse reed mat, with interstices half an inch wide. The fireplace, which is six feet long, is oblong. Above it, on a very black and elaborate framework, hangs a black and shiny mat, whose superfluous soot forms the basis of the stain used in tattooing, and whose apparent purpose is to prevent the smoke ascending, and diffuse it equally throughout the room. From this framework hangs the great cooking pot.

Household gods form an essential part of the furnishing of every house. Ten white wands, with shavings depending from the upper end, stick in the wall. What a good decorative suggestion is here offered to those who ask, "What shall we do with our 'alpenstocks' when we return from the White or Adirondack Mountains?" Another projects from the window which faces the sunrise, and the great god, a white post two feet high, with spirals of shavings depending from the top, is always planted in the floor near the wall, on the left side, opposite the fire, between the platform bed of the householder and the low, broad shelf invariably on the same side, and which is a singular feature of all Aino houses, coast and mountain, down to the poorest, containing as it does Japanese curios, many of them valuable objects of antique art. No offers can tempt these poor people to sell any of their household antique possessions, and so gold lacquer, pearl inlaying, gold niello work, and daimios' crests in gold continue to gleam in the smoky darkness of their huts.

Except in the poorest houses, where the people can only afford to lay down a mat for each guest, they cover the coarse mat, which Mr. Morse says is similar to the Canton matting which we use in our own homes, with fine ones on each side of the fire.

These mats and bark cloth are really their only manufacture, and this is one of the principal reasons we have for giving an account of it. They are made of fine reeds, with a pattern in dull reds or browns, and are fourteen feet long by three feet six inches wide. It takes a woman eight days to make one of them. In every house there are one or two movable platforms, six feet by four feet and fourteen inches high, which are placed at the head of the fireplace, and on which guests sit and sleep on a bear skin or a fine mat. In many houses there are broad seats a few inches high, on which the elder men sit cross-legged, as their custom is, not squatting Japanese fashion on the heels. A water tub always rests on a stand by the door, and the dried fish, bear, or venison for daily use hang from the rafters, as well as a few skins. Besides these things, there are a few absolute necessaries—lacquer or wood bowls for food and saki or sake or sachi, a chopping board and rude chopping knife, a cleft stick for burning strips of birch bark, a treble cleft stick for supporting the potsherd, in which, on rare occasions, they burn a wick with oil, the component parts of their rude loom, the bark of which they make their clothes, the reeds of which they make their mats. No iron enters into the construction of their houses, its place being supplied by a remarkably tenacious fiber. We shall now approach the modern dwelling, and also look into a Japanese shop or store.

(To be continued.)

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Moulds for Romano-British Coinage.

It is very well known to numismatists that moulds of baked clay, made for the purpose of casting coins, have been found in various parts of this kingdom. These moulds consist of flat pieces of clay, having on each side an intaglio impression from a Roman coin; these are placed over one another, generally in three piles; through the raised rim of each mould a small notch is cut, which is turned toward the center of the three piles; the whole is then inclosed in a case of clay, contracted at the top, so that the external appearance resembles a common stone bottle. The melted metal is poured into the neck of the bottle, passes down the hollow space left in the center of the three circular piles of mould, and thence through the notches in the rim of each mould into the moulds themselves. The whole mass is then broken up, the metal is separated from the moulds, the edge of each piece is carefully cleaned and polished, and thus are false coins rapidly and cheaply constructed. It cannot be doubted that coins so formed are forgeries; but the question has been much discussed whether they are private or public forgeries. From an examination of very many of these moulds, many of them arranged within the bottles ready for use, some also still unseparated, with the metal remaining within them, it is evident that they were formed from coins of various types, and even various emperors; and from coins also in various states of preservation, some fresh and sharp, some partially worn by use. The forgeries, therefore, would not resemble a recent issue of coins of the emperor then reigning, but the general mass of coins, of past as well as present emperors, which were in ordinary circulation at the time in the locality where these pieces were made. Under such circumstances, the pieces would carry with them no indications of the place of their birth; pieces made at Lincoln might have been cast in moulds formed from coins struck in London, at Treves or Constantinople, or any other parts of the Roman empire. It is not necessary here to discuss the question by whom these pieces were made, especially as there are not any records to which we can refer for authority, and either side must be supported by arguments deriving the whole of their force from the ingenuity of the combatants, unsupported by evidence. It may only be stated in favor of the practice having been connived at, if not authorized, that these moulds are generally found in the sites of large stations, dispersed over a large surface of ground, and in considerable quantities, leading to the opinion that the operations were conducted more generally and openly than would be consistent with an illegal act which would subject a culprit to severe punishment.—*E. Hawkins.*

Built-up Doors.

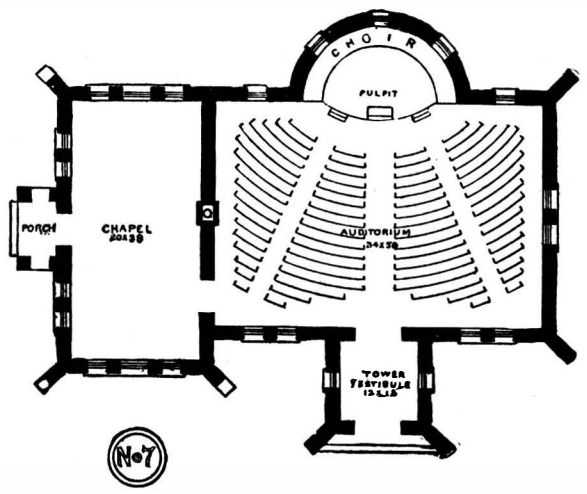
A feature of the building trade is the extensive use that is made of veneers. The method of building up doors of strips of pine has tended directly to this result. The built-up door made of strips of pine glued together is stronger than any other kind, at least of equal weight, and will not warp. But it necessitates the use of veneers of some kind. For heavy doors, quarter inch stuff is used; but for smaller doors in residences, one eighth inch is often considered thick enough. The kind of wood depends on the finish of the room. Mahogany, cherry, oak, and curly or bird's eye maple are perhaps the most common. This method of construction is particularly valuable where the opposite sides of doors have to be finished differently, to correspond with the rooms which they respectively face. This has often been done by making the door of two layers, generally of equal thickness, the unequal shrinking and swelling of which would twist the door, and often ear it to pieces. The objection is raised against veneering that it is dishonest, and so not true art. That criticism should never be made in regard to such work as that mentioned. The built-up door of pine, veneered with mahogany, costs about as much as one of solid mahogany, and is a better one.

DESIGN FOR A $5,000 CHURCH.

This design is modeled after some of the old English country churches. C. A. Dunham, architect. Its location should be upon a slight rise of ground, about as represented in the plate, with an abundance of space around it. When all is completed, let the ivy be planted and cared for, and in a few years it will present a picturesque appearance.

It is intended to be built of rough stone, dressed only around the doors and windows.

The capacity is 250 sittings.



Building to be warmed by steam and properly ventilated.

The windows fitted with stained glass.

Open timber roof and ceiling, walls decorated in an appropriate manner.

The cost of this structure need not exceed $5,000.

Staining Wood.

The following are recipes for staining wood, which are said to be used in a large establishment on the Continent with great success:

Light Walnut.—Dissolve 3 oz. permanganate of potash in six pints of water, and paint the wood twice with the solution. After the solution has been left on the wood for from five to ten minutes, the wood is rinsed, dried, oiled, and finally polished.

Light Mahogany.—1 oz. finely cut alkanet root, 2 oz. powdered aloe, and 2 oz. powdered dragon's blood are digested with 26 oz. of strong spirits of wine in a corked bottle, and left in a moderately warm place for four days. The solution is then filtered off, and the clear filtrate is ready for use. The wood which is to be stained is first passed through nitric acid, then dried, painted over with the alcoholic extract, dried, oiled, and polished.

Dark Walnut.—3 oz. permanganate of potash are dissolved in six pints of water, and the wood is painted twice with this solution. After five minutes, the wood is washed, and grained with acetate of iron (the ordinary iron liquor of the dyer) at 20° Tw. Dry, oil, and polish as usual.

Gray.—1 oz. nitrate of silver is dissolved in 45 oz. water, and the wood painted twice with the solution; afterward, the wood is submitted to the action of hydrochloric acid, and finally washed with ammonia. It is then dried in a dark place, oiled, and polished. This is said to give remarkably good results on beech, pitch pine, and poplar.

Black.—7 oz. logwood are boiled with three pints of water, filtered, and the filtrate mixed with a solution containing 1 oz. of sulphate of copper (blue copperas). The mixture is left to clear, and the clear liquor decanted while still hot. The wood is placed in this liquor for twenty-four hours; it is then exposed to the air for twenty-four hours, and afterward passed through a hot bath of nitrate of iron of 6° Tw. If the black, after this treatment, should not be sufficiently developed, the wood has to be passed again through the first logwood bath.

A DWELLING OF MODERATE COST.

This attractive little house was lately erected for Mr. Edwin A. Burgess, at Buttonwood, R. I., from the designs of Mr. C. F. Wilcox, architect, of Providence, R. I.

The foundations and chimneys are built of brick on a stone foundation, the cellar being six feet deep. The frame of the house is of spruce, boarded with hemlock, trimmings and clapboards of first quality pine, and the soffits and other parts not exposed to the weather are of second quality. Shingles are of cedar, shaved on the roof and sawed on sides. Piazza and balcony floors 1⅛ inch matched hard pine, and the ceiling over same matched and beaded pine. Gutters, valleys, and piazza roof are tinned with first quality M. F. tin, while the conductors are three inches in diameter, of corrugated galvanized iron.

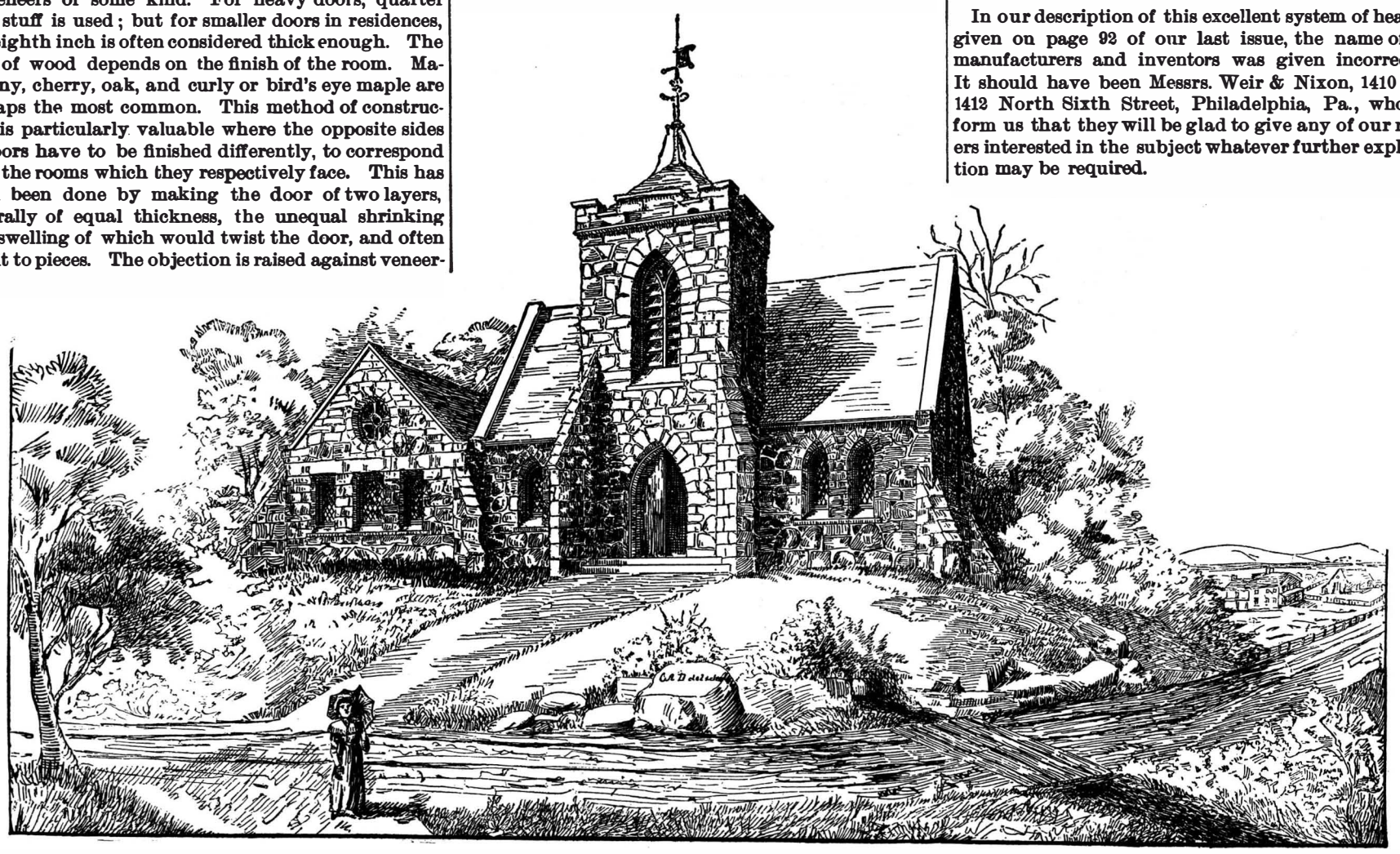
The sashes and doors are 1⅜ inches thick, and the outside doors 1¾ inches. The floors are of spruce throughout, excepting in the kitchen, servants' bedroom, and closets, which are of hard pine. Staircase is formed with returned nosings, and is provided with 1¼ inch balusters, four inch posts, and three inch ash rail. The trim is of ordinary stock patterns throughout.

The painting includes three coats for all outside work, including the shingles, three coats of metallic paint on tin roofs and gutters, and all inside pine work two good coats of paint, the knots, shakes, and defects being properly shellacked. The hard wood is finished with three coats of shellac and rubbed down.

The residence forms, on the whole, a very compact and convenient one, and costs to build about $3,000.

Heating by the Combination of Warm Air and Steam.

In our description of this excellent system of heating given on page 92 of our last issue, the name of the manufacturers and inventors was given incorrectly. It should have been Messrs. Weir & Nixon, 1410 and 1412 North Sixth Street, Philadelphia, Pa., who inform us that they will be glad to give any of our readers interested in the subject whatever further explanation may be required.



A COUNTRY CHURCH.—C. A. DUNHAM, ARCHITECT, BURLINGTON, IOWA.

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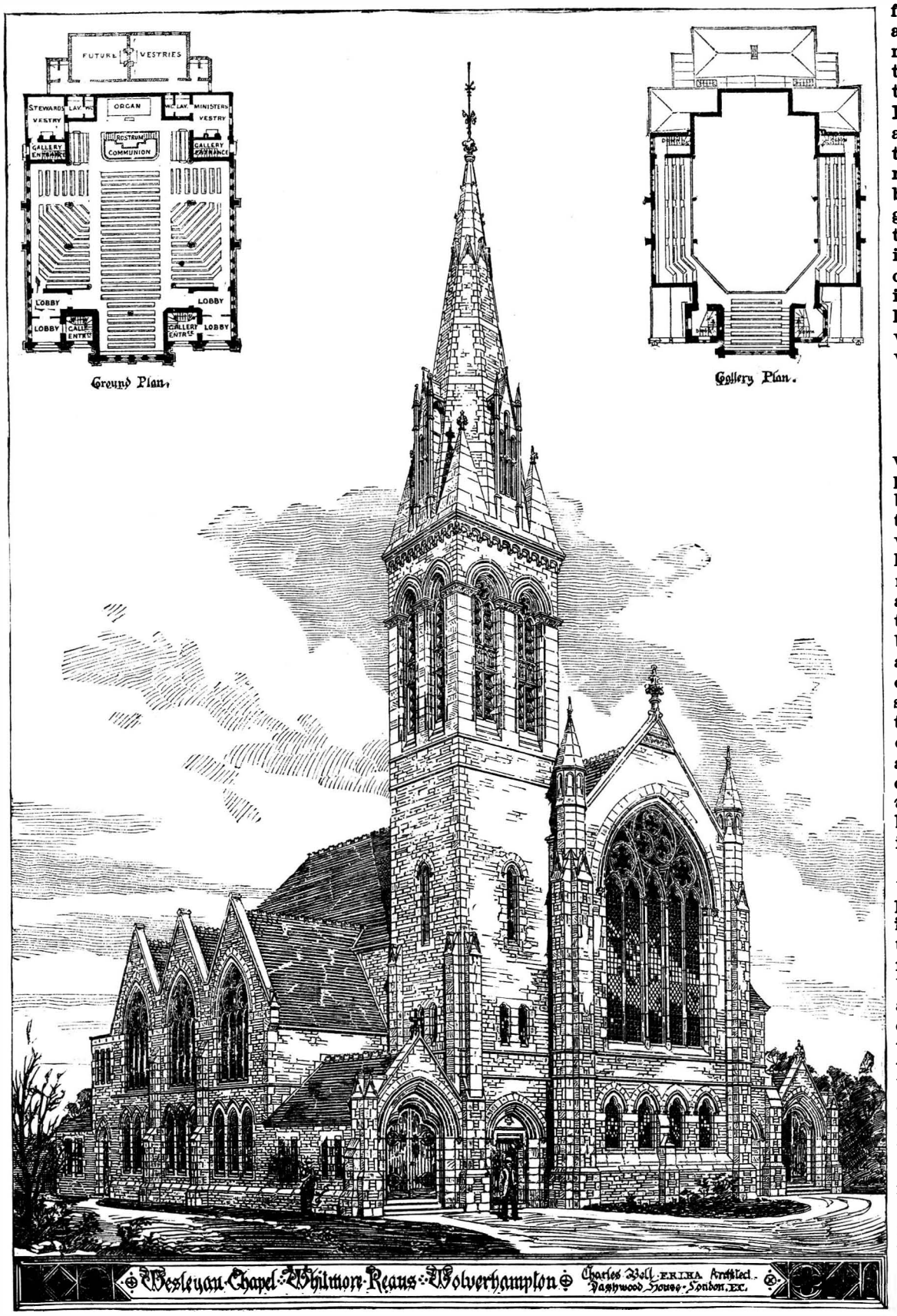
WESLEYAN CHAPEL, WHITMORE REANS, WOLVERHAMPTON.

The design for the above, which we illustrate, was selected in competition, and was prepared by Mr. Charles Bell, F.R.I.B.A., of Dashwood House, New Broad Street, London. A somewhat novel treatment of plan was adopted, viz., that of a nave and triple transepts, the effect of which, both internally and externally, is very satisfactory. The chapel is planned to seat 530 on the ground floor and 230 in the galleries —total, 760. The walls are built in parpoints, with Codsal stone dressings. The columns supporting the nave arcade are of red and gray granite. The sittings are of selected pine. The roof is open timbered, with hammer beam principals. The windows are filled with quarry glazing executed by Mr. Brewster, of Maitland Park, London, the front window being of special design. The builder was Mr. Thomas Moss, of Stafford, and Mr. Davis, of Walsall, acted as clerk of works. The total cost of the building has been about £3,500, or $17,500.—*The Architect.*



Shelter Belts and Hedge Screens.

What to plant is a question that some may desire to have answered. The very wealth of material before us greatly enhances the difficulty of making a response. We have deciduous trees that are bare in winter, when shelter is most needed, and we have also evergreens in great variety, that retain their refreshing verdure all through the year, and provide the most perfect shelter. For the wind breaks of the field, and even for groves about buildings, the leafless trees have much value, and their judicious disposition will greatly check the cutting storms. The wind, after sifting through the branches, is reft of half its power for evil. Nor is its force restored for some distance. The majority of wind breaks are composed of deciduous trees, and usually of the commonest species—anything that will rapidly grow into a tree, or that can be most cheaply procured. This practice need not, however, prevent us from using any of the more valuable hard wood and other trees in making shelters, but, in some instances, our impatience may prevail over our judgment as to the more valuable species, and induce us to plant only those of rapid growth to insure a speedy result. As to the use of evergreens in outside shelter belts, though more expensive at first, a smaller number and a narrower surface devoted to the wind break will prove so much more effective than a wider strip of deciduous trees as to justify the increased outlay. Sometimes even a single row of Norway spruce, or of hardy pines, like the Scotch or the Norway spruce, or even of the common red cedar or arbor vitæ, will make an admirable wind break. Plant any of the many trees at your command, and plant them where they will produce the desired protection. Whether you select the so-called cheap trees, such as white willows, poplars, soft maples, etc., or whether you choose oaks, hard maples, the white ash, the elm, the wild cherry, the tulip, the walnut, and hickories, or hardy evergreens, do not neglect the planting of these invaluable aids to good culture. When we come to a selection of the plants best suited to the protection of our homes and their surroundings, we again find abundant material from which to make choice. For trees and for tall screens the favorite with many will be the Norway spruce, which grows rapidly, is easily transplanted and managed, and which presents a welcome tint of green that is always persistent and full. The other spruces are also desirable, particularly the white and the black. They all bear the knife and shears very well, and may easily be kept within due bounds when used as hedges for shelter. The native hemlock is particularly commended standing alone, but it is also one of the very best species for forming a screen or shelter hedge, as it may be clipped to a perfect plane, and, when necessary, it can be confined within narrow limits. In the case of trees to be planted about buildings, we should consider their beauty, and, with this character in view, we should select, among evergreens, the hemlock, the white pine, perhaps also the red pine, or Norway, but not the Scotch fir, nor the Austrian. There we may also place the American arbor vitæ, but the especial function of this species is the formation of shelter screens and hedges, for which it is particularly well adapted, except in very dry soils. Nothing can be prettier than a well trimmed hedge of arbor vitæ, unless it be one of hemlock, as the latter preserves its deep green hue unimpaired all winter. Some of the dwarf pines may also find a place in front or at the sides of the house, but they never attain sufficient size to make much shelter. The same is true of the beautiful retinosporas from Japan, which answer well for low screens, and are highly ornamental. The common red cedar is, after all, a most useful plant. It has been called the poor man's evergreen, on account of the facility with which it may be produced in all parts of the country, as well as the certainty and rapidity of its growth. Though not of so fine a color as some others, this tree makes dense foliage when set as a shelter belt and wind break. It also makes a close hedge to screen pathways.

The ground for the wind breaks should be well prepared. A strip of one rod in width will be needed if it is proposed to plant but a single row, and several rods wide must be prepared if it be designed to plant a good wind break of many rows, which is the better plan. After harrowing the ground a furrow is struck for every row of trees, and these furrows may be four feet apart, for then the plants may be set every four feet. This requires very little labor, unless large trees are selected, and if these be large evergreens they need not be so close, but more care will be required in planting. Yearlings and two year old plants of most deciduous kinds, or stout cuttings of willows and poplars, will be the cheapest and best. The young trees, when planted with reasonable care and well fixed in the soil by pressure of the foot, will be sure to grow, but so will weeds, and the plantation must be cultivated for about two seasons, so as to keep down all intruders. With this treatment their growth is greatly enhanced, and they will the sooner shade the ground, when they will suppress the weeds and take care of themselves. They must, however, be protected from the inroads of stock of all kinds. This is an absolute necessity. When to plant, though an important question, need not detain us long. Plant when you get ready, autumn or spring, but be sure to have the soil ready for the reception of your trees before bringing them on to the ground. Let it be dry enough to crumble. Never plant when it is wet and clammy. Deciduous trees may be set out in autumn, when we have leisure to do the work, and when the soil is dry and warm.—*Rural New-Yorker.*

Building Construction in Winter.

The prosecution of masonry work during frost would appear to be plainly undesirable, even if it were practicable to make mortar and cement with freezing water. In Berlin, where a paternal government thinks for everybody, a police ordinance was some time ago issued to forbid bricklaying when the temperature falls to 26° Fahr. This order being based on the assumption that at the temperature named mortar freezes but does not set, Herr Krause, an architect of Stropp, sent a communication to the *Baugewerke Zeitung* to show, from his experience, that the order in question was unnecessary.

Herr Krause states that in the winter of 1856 he was compelled to erect a small building during a very sharp frost; the temperature being down from 14° to 23° Fahr. The bricks and sand were frozen, and the workmen had great difficulty in setting the bricks, the mortar freezing under their hands. It would have been much too expensive an operation to warm all the materials previously; and so the lime was slaked in small quantities at a time, and mixed hot—the brickwork being liberally pointed. He naturally expected to find the work perishing in the spring; but he was mistaken—the mortar continuing as firm as if it had stood for several years. The same building was pulled down in 1880, when the mortar was found to be so good that the bricks broke, and could only be cleaned with great difficulty.

Herr Krause subsequently had outer pointing done at several degrees of frost; and always found that if lime mortar had been subjected to frost for about ten days, it had set as firmly as mortar made in the summer in as many months. If frost attacks freshly used mortar, and continues for some time, the mortar is benefited rather than otherwise; but it is different if the frost gives way to a thaw in a few days. Herr A. Klemm, of Stuttgart, entertains the same opinion; citing in proof the brickwork of the Prussian House of Deputies, built in the winter of 1848-49 during a most severe frost. Hydraulic lime, freshly slaked, was used; and in 1867, when some alterations were required, wedges and hammers had to be used to break up the work. Throughout Wurtemburg it is the general opinion that sharp and long-continued frost improves brickwork and plastering, and other German authorities testify in the same strain.

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ST. AUGUSTINE, FLORIDA.

This ancient city, the oldest in the United States, founded by one of the bravest and most celebrated of the Spanish knights, was visited, on the 12th of April last, by a conflagration which resulted in financial losses estimated at a quarter of a million dollars and the destruction of the time honored cathedral, a loss which is irreparable. The fire broke out in the St. Augustine Hotel, which was soon in flames, as were the Edwards House, the Cottage, the Planters' House, the Florida House Annex, the First National Bank, the old Spanish cathedral.

The roof caught and soon fell, destroying all the old historic relics in the interior. The old chimes fell, too, their last work being the alarm which summoned the citizens to the scene of conflagration. By great effort the bishop's house was saved. In addition to the foregoing, the flames reached the Sinclair Block, in which were the stores of Gonzalez & Benhayon, Moy Yong's restaurant, Vedder's museum, Buck's restaurant, Davis' barber shop, Goldering & Co.'s cigar factory, and Speizegger's drug store. All were completely destroyed. Next Chamberlain's grocery and Mrs. B. E. Carr's dwelling, north of the Sinclair Block, were destroyed. Returning to the west side of the street, the flames reached the old County Court House on the north, which was totally destroyed. The records, however, were removed and saved. Vedder & Compton's store and Welter's restaurant on the west burned also. Here the fire was checked.

The old cathedral, one of the most interesting landmarks in the city, was built in 1793, and was in use for purposes of worship up to the time of its destruction.

It historical and antiquarian interest, as the oldest city in the United States, the quaintness of its structures and its atmosphere of mediæval repose have done perhaps as much as its mild climate and beautiful situation to make St. Augustine a favorite winter residence. Ponce de Leon, in his search for the "fountain of youth," made a landing there as early as 1512, at the point where the city was afterward established, but it was not until 1565 that a permanent settlement was made there by the Spanish. The cathedral had in its tower a bell bearing the date 1682. The custom house was formerly the residence of the Spanish governor. The remains of a lighthouse with fortified walls, one of the early buildings of the Spaniards, still exist on Anastasia Island, and traces remain of the two lines of defenses, a ditch and an embankment which stretched across the peninsula. During the two centuries of Spanish occupation the maximum population of St. Augustine was 3,000, besides a garrison of 2,500, and its population is about 3,000. Fort Marion, in which part of the Apache prisoners have been confined during the winter, was completed by the Spanish, having been more than 100 years building. Within the last two or three years St. Augustine has been growing rapidly in popularity as a winter resort, and a great sum of money has been expended upon hotels and other structures for the entertainment of visitors. The Villa Zorayda, constructed for a private residence, out of shell concrete, proved so satisfactory and so harmonious with its antique surroundings that H. M. Flagler, of this city, began last year the construction from the same material of the great hotel Ponce de Leon, the first of a group of notable buildings which was to include the "Alcazar," the "Casa Monica" and other structures of an Oriental type.

Some idea of the size and peculiar architecture of this remarkable building may be gathered by a glance at our engravings, for which and for the subjoined particulars we are indebted to our excellent cotemporary, *The South:*

"Who ever heard of driving *into* a hotel in America, or finding orange groves or flower gardens on its roof, reminding one of the famous hanging gardens of Babylon?

"It would seem there was nothing too costly or elaborate to connect with this remarkable building. The bewildered visitor, after being driven under an imposing archway and across a court wherein are fountains and rare tropical plants, trees and flowers, will alight under a regal canopy, and walking a few steps over a floor composed of variegated marble, will find himself in a rotunda under a dome whose apex is eighty feet above him, with galleries one over the other looking down upon him. Picturesque towers rise 135 feet on either side, affording remarkably fine views, marble staircases lead to the balconies or loggias overlooking the court, where lovers may find many a sequestered nook, or, instead of seeking the gloomy grandeur of one great parlor, may stroll into any one of many elegant rooms off the grand hall and enjoy a tete-a-tete unembarrassed by observation.

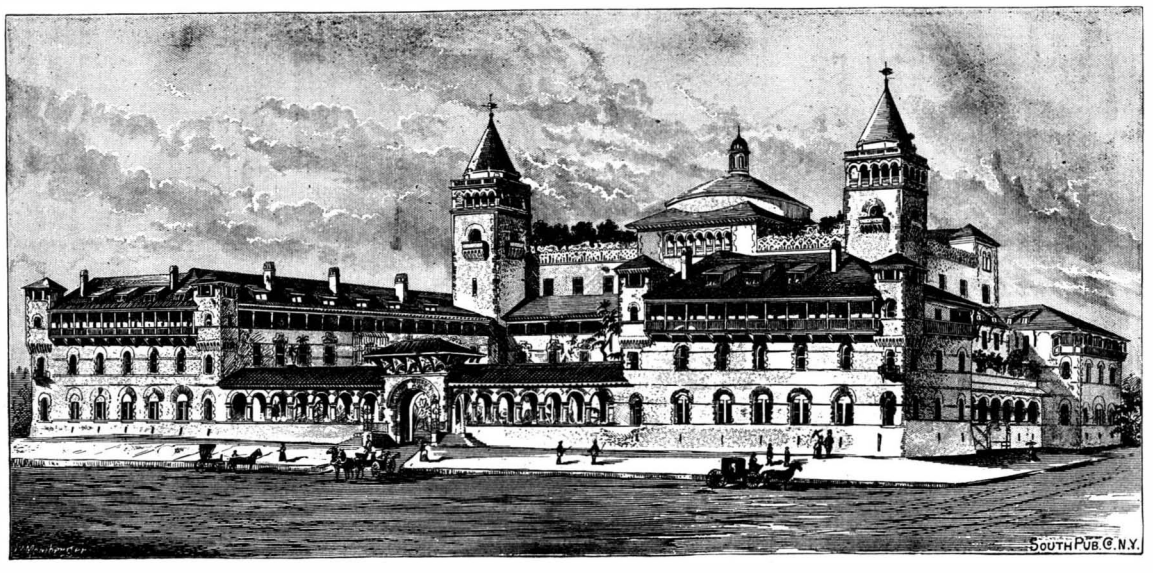
"The dining room reminds one of the great banquet halls of Belshazzar, though many times as large, as it will seat over 700 people at once, and vaults thirty-five feet to the ceiling, having circular ends, opening upon wide overhanging balconies.

"The entire structure covers nearly five acres, and contains 450 rooms, most of which have fireplaces. But statistics are tedious, and we only aim to chronicle what is unique regarding the Ponce de Leon. It is safe to say that there is enough of this to provide entertainment for the guest for days and weeks, and when these have passed he will still find new attractions, marbles, mosaics, carvings, terra cotta groupings and balconies before undiscovered, to please his æsthetic soul. Ennui is the bane of the tourist, and the owner has set himself to the task of entertainment by building an Alcazar, or pleasure resort, also of coquina, 250×450 feet, adjoining the hotel, which will include sulphur, salt swimming baths, billiard rooms and bowling alleys, forty shops or bazars for curiosities, and cafe arranged around an open court, and in the grounds adjoining will be lawn tennis and croquet courts. Tourists may in the Alcazar secure first class rooms at less rates than at the hotel proper, while rooms at the Ponce de Leon may be obtained at the same rates as those charged at any grand resort hotel.

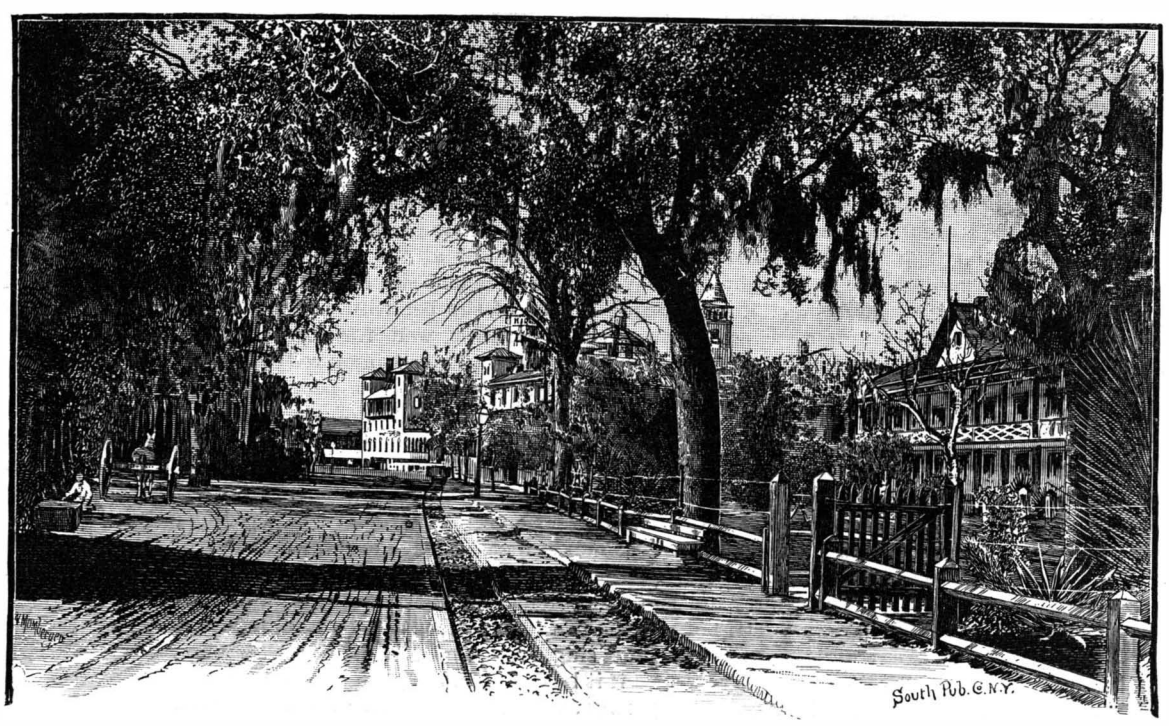
"As out door exercise is indispensable, the guests will have the range of twenty-five acres of beautifully kept grounds, including the romantic "Lovers' Lane," an archway of orange trees, formerly belonging to the Ball estate, destined to be the scene of many tender passages.

"Villa Zorayda, a private, elaborate Moorish residence, is opposite the towering hotel walls. Ten thousand car loads of earth have already been used for beautifying and extending the grounds connected with the hotel.

"As everything connected with this hostelry is on such a grand scale, it will not be surprising to learn of its unique water supply. The largest artesian well in existence is daily growing deeper, not for more water, for a flow of 8,500,000 gallons per day is already running to waste, or an amount equal to one-tenth of the capacity of the Croton aqueduct, but soft water is demanded. Now the supply is sulphureous, and while no doubt beneficial as a bath for those afflicted with skin diseases, is too odorous for healthy guests, ablutions or drinking purposes. But what if water *hot* enough to heat the hotel should be secured? The temperature of that flowing is now at 80°, with a steady increase as the bore progresses, so while the supply of pipe and money holds out, it may be that this most remarkable of all projects will result in success."



PONCE DE LEON HOTEL, ST. AUGUSTINE, FLORIDA.



PONCE DE LEON HOTEL FROM PLAZA, ST. AUGUSTINE, FLORIDA.

How to Finish in Natural Wood.

To finish the interior woodwork in the natural wood, says the *Hub*, first apply any of the modern wood fillers at present in the market, after which sandpaper very smooth, dust off thoroughly, and apply a coat of varnish, which should be allowed to stand until dry; then lightly rub down with ground pumice stone and water, clean off well, and apply a second coat of varnish, which should be treated in the same manner, and a third coat given. When thoroughly dry, rub down with powdered pumice stone and linseed oil. Hair cloth is preferred for the rubbing material. The work when cleaned off will present a dull satin finish, and be thoroughly filled up.

Many prefer hard oil finish to varnish, which has this advantage over the latter, that it is not so liable to scratch or chip, being more elastic in its nature. Whichever is lightest in color should be used, as its effect on the wood will be less liable to change its natural color. The lighter the varnish the less change there will be, the darker, the more change, hence light shade varnishes are always selected for this work.

THE *Sanitary News* recently made a suggestion in regard to keeping the plan of the plumbing in a building in a conspicuous place, so that when the same requires any repairs or alterations, reference can be made to the plan and the same consulted, and thus to a great extent much useless and expensive experimental work avoided. The suggestion is to engrave the plan on a slate slab and build same in the wall of the kitchen, thus making it permanent. Another journal suggests that the plan be painted on the inner side of a door to a closet. Either plan will suffice for the purpose, and the suggestion is one that deserves attention in the building of all classes of houses.

Although copies of the general plans are frequently preserved by owners, it is very seldom that they are turned over to the purchaser of a house when it is sold. To adopt the idea suggested above would incur very little expense, and will undoubtedly be favorably indorsed by all architects, when the fact is taken into consideration that this particular part of the work will probably require attention in after years, when the architect is no longer in charge of the work, and, therefore, would most likely not be consulted. Then his plan is there, and his original ideas can be seen.

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PLANING MILL CONSTRUCTION.

The first thing to be considered is the selection of the site. This matter should be weighed carefully, as the success or failure of the enterprise depends to a great extent on the facility with which material can be placed in the mill and the product discharged from it. Having settled this point, we begin our foundations, which should be heavy and well built, either of stone or brick, for, in addition to the weight of our machines, we are likely to have several car loads of lumber on the floor, which, in the course of working, are piled first on one side, then the other. The load is thus continually changing, causing the floor to sag unless well supported, thus making our machines stand like a chicken

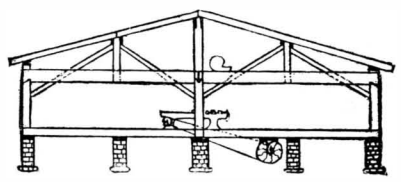


Fig. 1.

in the snow, first on one leg, then the other. It is impossible to do first class work, no matter how good the machine, unless it is well set on a solid foundation. We next come to consider the building. The engine room and shavings vault should be of brick, as a safeguard against fire and frost. The mill proper roomy, and with the least possible number of posts, to facilitate the handling of the lumber from one machine to its neighbor. Sixty feet is a very good width, the length to be governed by the number of machines it is intended to accommodate.

We present here a plan that has been tested with success under the heavy loads of snow of the North, as well as the more genial clime of the South. Fig. 1 is a cross section, showing manner of framing. Side posts are 6 × 8 in.; center post, 8 × 8 in.; purlin posts, 6 × 6 in.; beams, 2 × 12 in. One post on each side is dovetailed in and spiked to braces from main posts to purlins, 4 × 4 in. These pass up between the beams and are well spiked to them. The purlin plates are 2 × 12 in., spiked to sides of posts, their lower edge

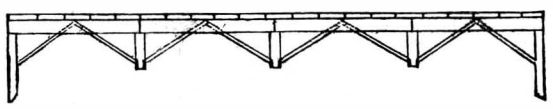


Fig. 2.

resting on the main braces. The purlin braces are 2 × 6 in., running up between the purlin plates, to which they are spiked, as shown in Fig. 2.

Fig. 3 shows a plan for raising the center portion of roof when it is desirable to get more light, as in sash, door, and blind factories. The ridge is supported by 2 × 12 pieces, spiked to sides of center posts, and braced in the same manner as purlins shown in Fig. 2. Thus it will be seen it is possible to get a room at minimum cost, 60 × 90 ft. if desired, with only three posts inside, and these located in the center, entirely out of the way.

In these plans it will be seen we locate the line shaft under the floor, which, for several reasons, is preferable to the usual way of placing it overhead. We are able to place the bearings as often as necessary, and near the driving pulleys, where they are most needed. Our driving belts are under the floor, out of the way. There is no danger of men getting hurt by getting caught in them. Machines stand steadier, and belts

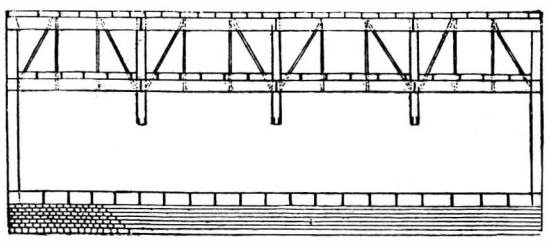


Fig. 3.

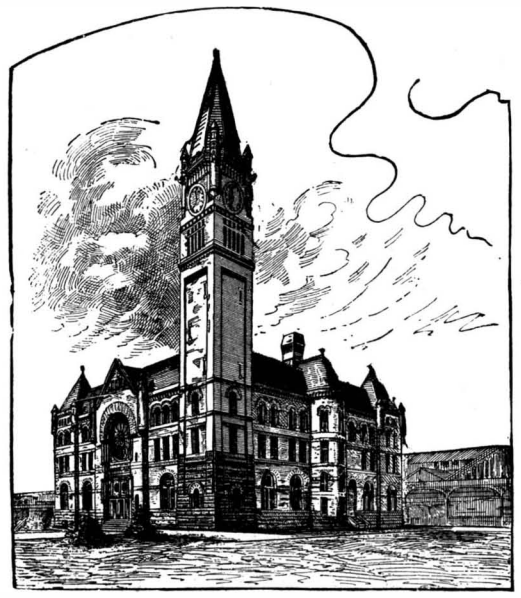
grip the pulleys better, as they run nearly horizontal. Thus we are able to run them with less tension, making them last longer, also reducing the tendency of loose pulleys running hot—a source of much annoyance and loss of time.—*The Timberman.*

Bursting of Lead Pipes.

A paper was recently read before the Glasgow Philosophical Society by Mr. George C. Thomson, F.C.S., on "The Bursting of Leaden Water Service Pipes by Water Pressure and Frost." The general impression, he said, was that a pipe burst after a thaw set in, being caused by the ice in the pipe melting, and the pressure thus becoming too great for the strength of the metal. Mr. Thomson gave a number of facts to refute this idea. He said that water in changing into its solid form of ice increased in bulk by 10 per cent, and this led to a pipe bursting. He asked the question at what pressure did a pipe burst, and in answering it said that the rules of the Glasgow Corporation Water Works specified only the weight of the pipes, and, unless otherwise agreed upon, they stated nothing as to the strength or quality. In order to have some idea of the strength of pipes, he had tested various sizes, from ½ inch up to 1½ inches, and found the bursting pressure of the former was 1,820 lb. and of the latter 812 lb. One would naturally suppose that the strength of the various sizes of pipes would be on an equality, or nearly so; but this was not the case, as the ½ inch pipe only burst at more than double the pressure the 1½ inch pipe did.

TIN ROOFING.

We have pleasure in referring to the well known and enterprising firm of N. & G. Taylor Co., who are so widely recognized for their integrity and the quality of



GRAND UNION DEPOT, INDIANAPOLIS.

their goods. This house, which is one of the oldest in the United States, having been established in 1810, has lately obtained a most important and extensive contract for covering the fine depot now in process of construction at Indianapolis, for the Union Railroad. This building, of which we show a view, is thus referred to by the Philadelphia *Press:*

The contract for supplying the tin for roofing the Grand Union Station, at Indianapolis, has just been awarded to Messrs. N. & G. Taylor Co., the well known tin plate and metal importers, of Philadelphia, Pa. It is of so large a magnitude that it forms the topic of general conversation among the trade. Fifteen prominent railroads will center in the immense structure, the total cost of which will exceed $1,000,000. The depot proper and baggage rooms will be 150 feet square and the train sheds, adjoining the depot, some 750 feet long by 190 feet wide. The building will be composed principally of glass, iron, and dressed stone of artistic shape and design.

The plans were designed under the supervision of Mr. Thomas Rodd, engineer and architect for the Indianapolis Union Railroad Company, at Pittsburg. The tin work on the buildings will be done by Mr. Thomas W. Irwin, of Allegheny, Pa., and Messrs. Carpenter, Annear & Co., of Louisville, Ky.

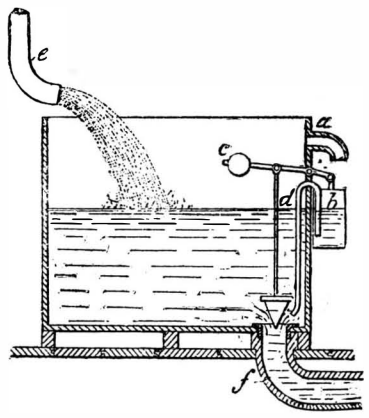
The award to Messrs. N. & G. Taylor Co. is for their "Old Style" brand of roofing. It is claimed to be the best roofing tin in the market to-day. Every sheet is made by the old manner of hand dipping, as first made in Philadelphia in 1830, and sold by this firm. It is thus called the "Old Style" double coated and redipped. It is said to outlast any other roofing made.

To fulfill the present contract it will take some 500 boxes of the 28 by 20 inch size ternes, there being in all some 150,000 square feet of surface. This is the largest contract ever awarded for so fine a grade of roofing plates, and it is a significant fact that in this age of deceptions, cheap qualities, and imitations, especially in roofing tin, so decided a preference should be expressed from so high a source in favor of this firm's brand over all competitors.

This same brand of roofing was selected by the Board of Guardians of the Poor to conver the Blockley Almshouse, in West Philadelphia, some months ago. Some 200 boxes were used there. Wherever the tin has been brought to the notice of practical men, unbiased by any political favoritism or otherwise, it has met with favor, and many instances could be mentioned in every prominent city and town in the country where this fine brand has been chosen over all others, on account of its superior quality.

RESERVOIR WITH AUTOMATIC VALVE.

The figure represents a new system of water reservoir with an automatic valve. The water enters the reservoir through the pipe, *e*, and, when it reaches the level of the spout, *a*, flows through the latter into the vessel, *b*. When the weight of this vessel counterbalances that of the counterpoise, *c*, of the lever and its valve, the latter rises and allows the water to flow out through the pipe, *f*. As the liquid flows into this

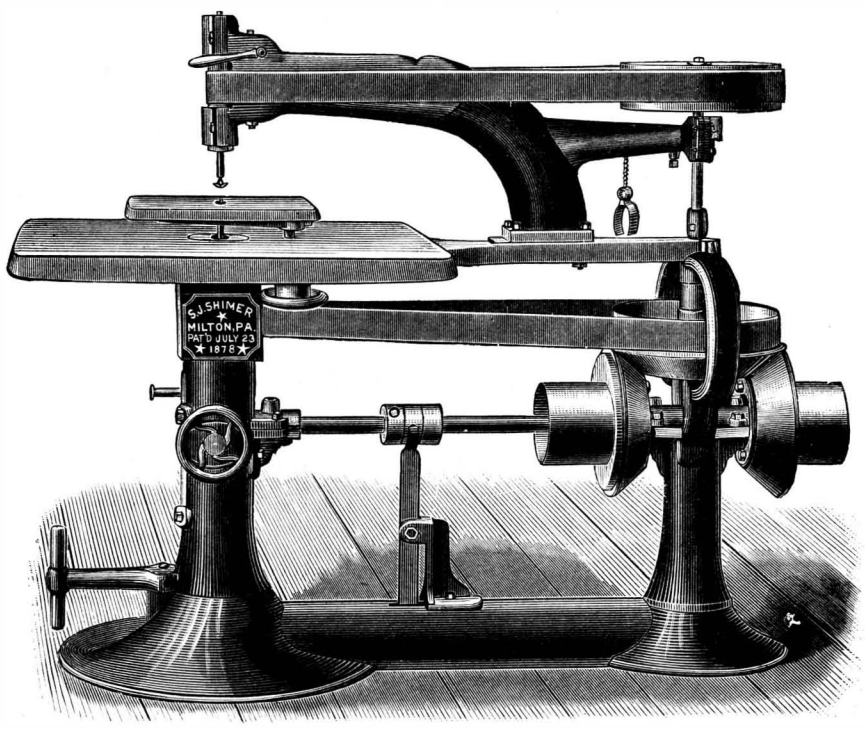


pipe, it creates a suction that sets in operation the siphon, *d*, which empties the vessel, *b*. This latter then drops and causes the lever to place the valve on its seat again.—*Revue Industrielle.*

IMPROVED VARIETY MOULDER.

Among the most useful tools for the planing mill, the woodworker, and the furniture factory are the patent variety moulders of Samuel J. Shimer, of Milton, Pa. These are made in several different sizes, styles, and weights, of which we show the one designated as "No. 6." This is a useful, compact, and very serviceable machine, fitted with all the latest improvements, the chief of which is that it may be used for both countersinking and edge moulding. The former is effected with a pattern guided by a pin, which automatically takes its position when the machine is started, and drops out of the way when it is stopped.

When it is desired, the machine may be quickly changed from a surface moulder to a variety moulder, by adjustment of the parts and by raising the arm. There is no necessity, in making the change, either to unbolt or lay away any part, which is a considerable improvement of itself on the old fashioned style of machines.



IMPROVED VARIETY MOULDER.

But the completeness and simplicity of the tool, and the accuracy and rapidity of its work, are its chief qualities, and render it one of the finest machines of its kind on the market.

WE should be pleased to have our readers bear in mind the fact that full plans and specifications for any of the buildings illustrated in this paper may be obtained at this office on moderate terms. We are assisted by able architects, and can execute any work desired on very moderate terms. Munn & Co., 361 Broadway, New York.

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Costs of Different Kinds of Walls.

The following, from the *National Builder*, shows the comparative cost of frame, brick, and stone walls.

The first idea that naturally suggests itself, after the general plan of arrangement has been perfected, is what material shall mainly enter into the construction of a building—brick, stone, or wood. In nearly every portion of the Eastern, Middle, and Western States, these three building materials can readily be had, and the cost of production does not vary much in any locality. Assuming, therefore, that the first cost is the same in the above localities, we may easily arrive at the ultimate cost of construction. For the purposes of this article, we may assume the cost of good common brick, during the summer, to be $8 per thousand; cost of labor and mortar to lay the same in wall, $4 per thousand, wall measure. The cost of good quarry stone, assumed at $10 per cord; the cost of labor and mortar to lay the same in wall, $8 per cord of one hundred feet. The cost of framing lumber, $12 per thousand feet; labor and nails to put same up, $6 per thousand. With these prices as a basis, it is a matter of computation only to arrive at the proportionate cost of each material after it has been worked into the walls. As an example, suppose we have ten feet square of plain wall to build; what will be the comparative cost? Ten feet square equals one hundred superficial feet. If to be built of brick twelve inches thick, estimating 22½ brick to the superficial foot, would take 2,250 brick; cost in wall per thousand, $12, equals $27.

To lay a good rubble stone wall, it should be 18 inches thick, therefore 10 feet square, or 100 superficial feet, of stone wall 18 inches thick, at $18 per cord of 100 feet, would cost $27. In estimating a frame or studded wall there should be included, first, the studding, say 2×8, 12 inch centers; second, the outside sheathing of 1 inch surface boards; third, the siding of clear pine. For this example we have placed the cost of rough lumber at $18 per thousand, put up. We will assume the cost of the inch surface boards for sheathing to be $25 per thousand, including labor, nails, and material. Siding at $40 per thousand, including lumber, labor, nails, and waste. Ten feet square, or 100 superficial feet, of 2 × 8 studding, at $18 per thousand, equals $2.43. The same surface, covered with surfaced boards, at $25 per thousand, costs $2.50; 125 superficial feet of siding, at $40 per thousand, equals $5, allowing one-quarter for lap and waste. Thus we find the total cost of the frame wall to be $9.93. Add to this the cost of painting the same, one square at $3, we find the cost to be $12.93. Comparatively, therefore, we find the cost of 100 superficial feet of wall, built of the three leading building materials of the country, as follows:

Common brick	$27.00
Rubble stone	27.00
Frame	12.93

The cost of window and door frames, cornices, etc., may be estimated about the same in either building. In brick and stone buildings we find the additional cost of cut stone windows and door sills, water table, etc., but the cost of these adjuncts does not enter into the first cost of the walls, and should rather be estimated on separately or considered as additional items of cost that maybe dispensed with if necessary.

Imitation Stone.

Excellent imitations of stone, marble, terra cotta, and such like, for the decoration of buildings, for statuary, and other purposes, are produced by the process invented by Mr. D. Cottier, of London. He applies powdered sandstone, freestone, brick, terra cotta, granite, onyx, or marble, sand or dust, to any interior or exterior architectural work, either curved or plain, or to buildings or structures of all sorts, or to statuary or ornaments made with stone, brick, plaster, terra cotta, cements of all kinds, or to stucco or other like compositions.

The powder or sand of any of the above mentioned substances is caused to adhere to the surfaces by means of paint made with oils, spirits, tars, varnishes, or other sticky materials which are insoluble in water. The powder or sand or dust is to be put on by a dredger, or thrown by hand instrument made for the purpose, or by an air blast, or engine driven by hand, water, gas, steam, or electricity, or otherwise. It is claimed that work so done will withstand the wear and tear of climate and weather better than any simple paint, while at the same time the natural and artistic effects gained will be evident to all. By its application to the reproduction of stone or marble statuary and ornaments, the self-same look of the originals can also be given. In these cases the stone or marble would have to be reduced to a very fine powder.

How to Grain Walnut.

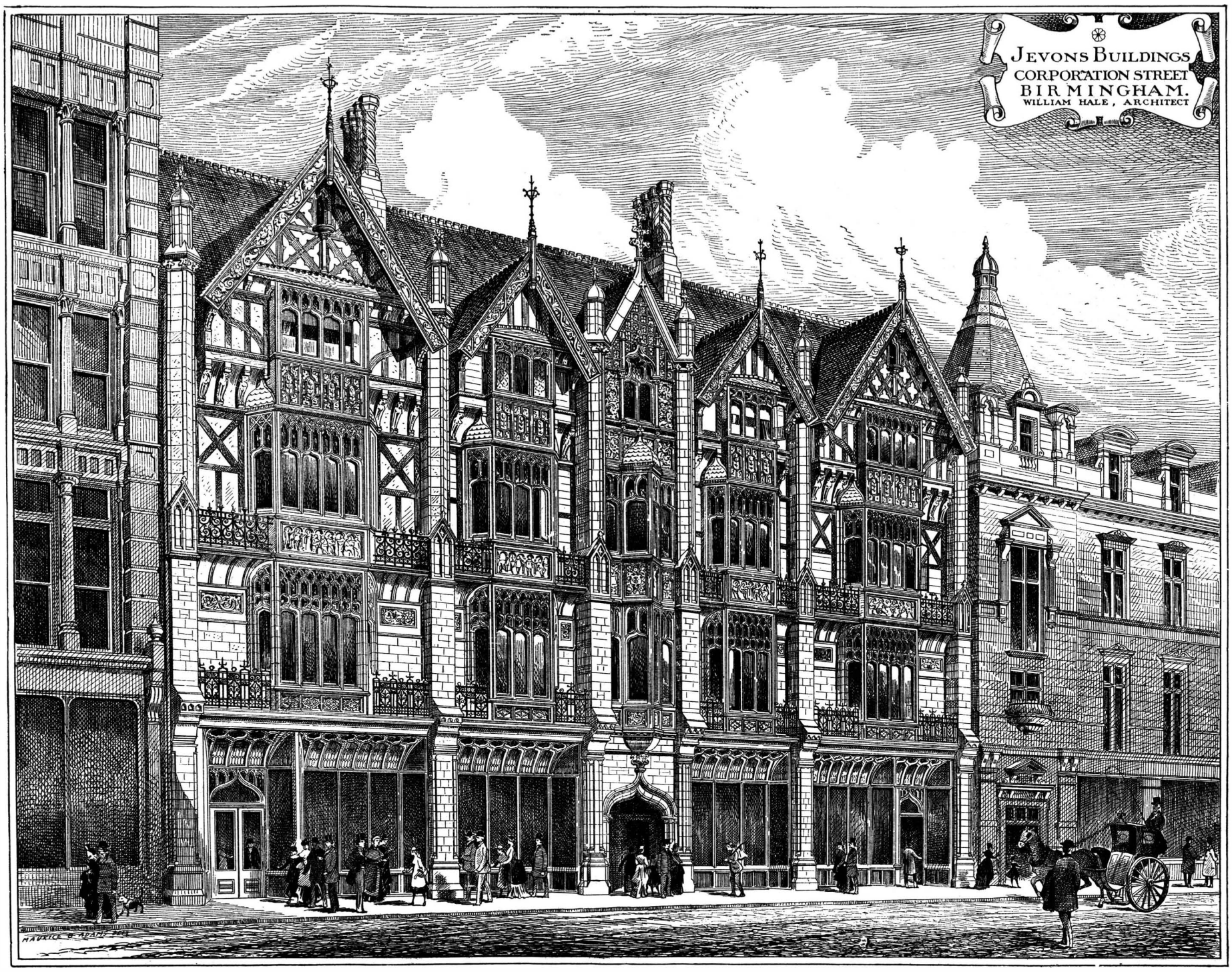
It is a very difficult thing to teach graining by essay, for, as experts know, this knowledge can be obtained only by years of practice. We do not profess to be expert on this sort of thing, as it is a little out of our line, still we will do our best.

The groundwork for black walnut should be made of white lead, yellow ocher, Venetian red, and black, and should dry with somewhat of an oil gloss. In order to obtain any degree of perfection in the imitation of burl walnut or any other wood, it is necessary to procure a panel or bits of veneer, and copy the color and form of the grain as nearly as possible. The grain color should be burnt umber.

To grain in oil, mix the grain color in boiled linseed oil and turpentine, and add a little soap or whiting, or both, as it makes the color flow more freely. For distemper color, grind the grain color in ale, beer, vinegar, or whisky (the latter to be preferred in cold weather), the object being to bind the color so that it will not rub off.

Graining should be done with a free and careless motion of the hand, yet having an eye to the character of the wood to be imitated. Glazing colors are transparent, and should be used very thin, whether in oil or distemper color. Blending should be done by brushing the tip of the blender back and forth slightly over the work while it is wet. Blazing, or the light shades, are put in by sliding a blaze stick up, and bearing around to the right or left. The same motion is required in packing in the fine check grain with the side of the blender.

The tools required are a brush to put on color; sponge; buckskin, to wipe out the lights; blender, and top grainer.—*The Hub.*



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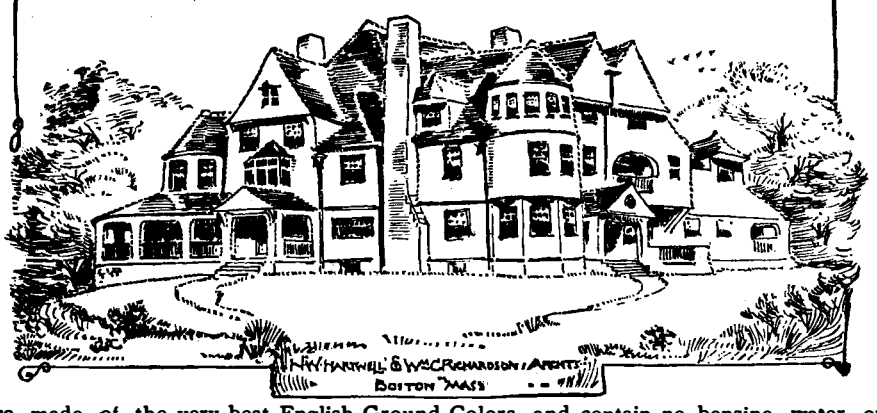

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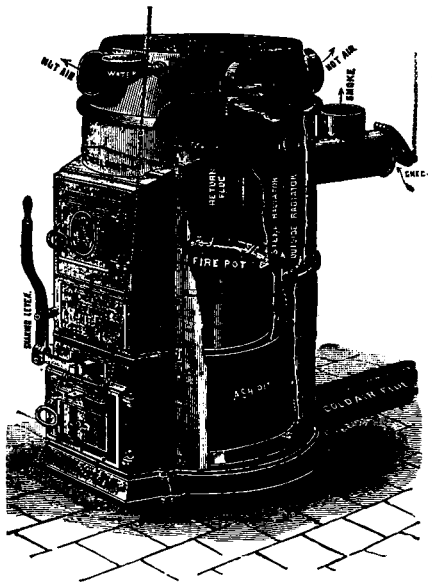

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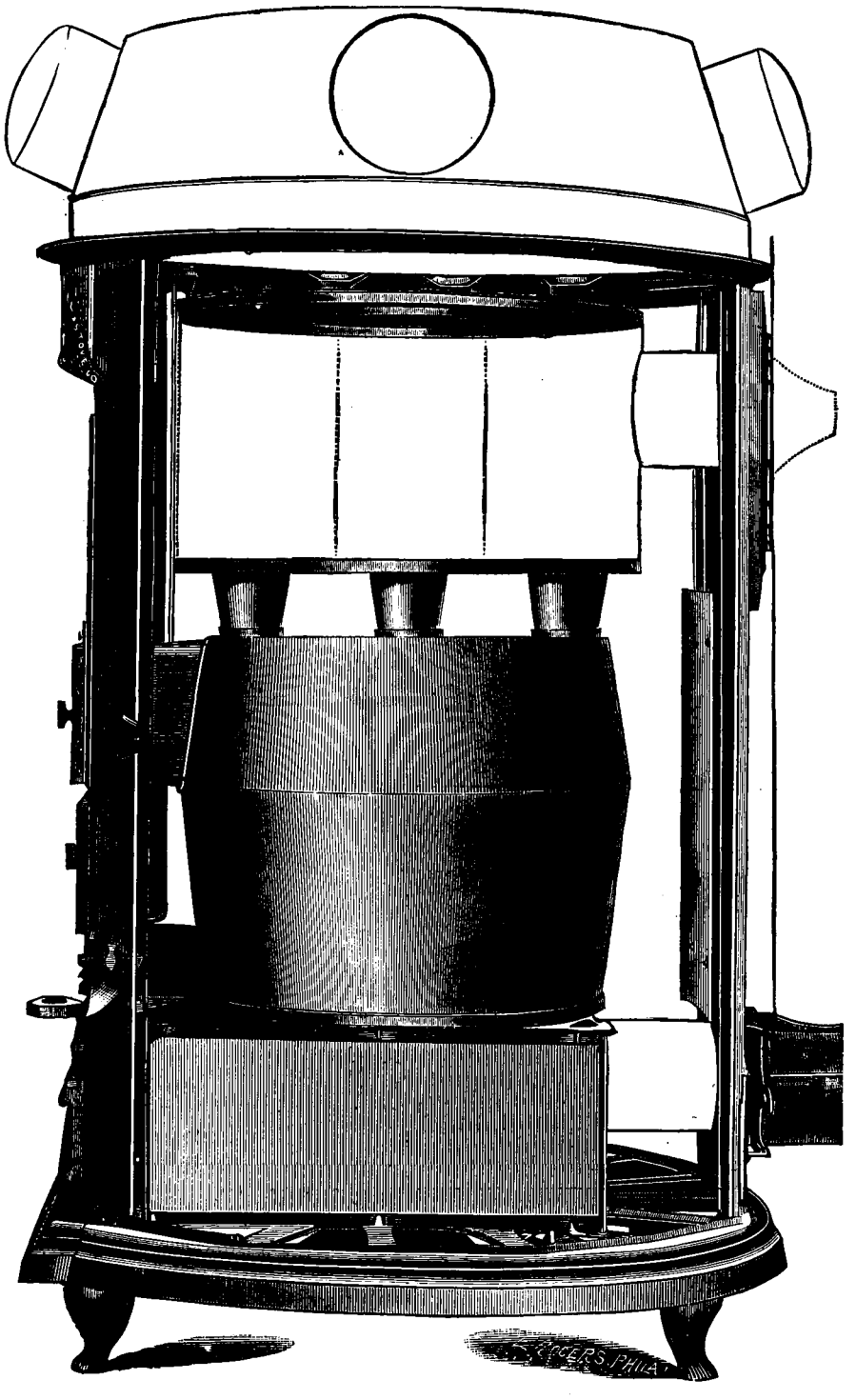

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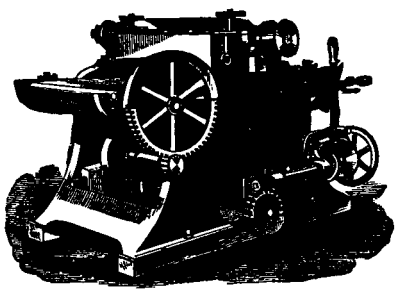

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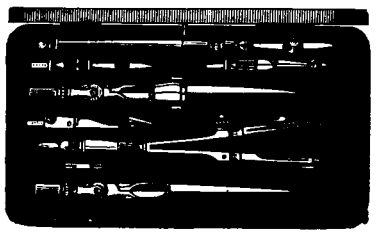

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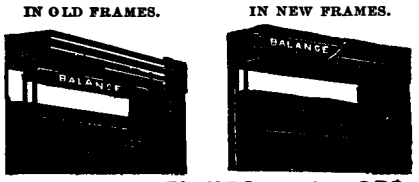

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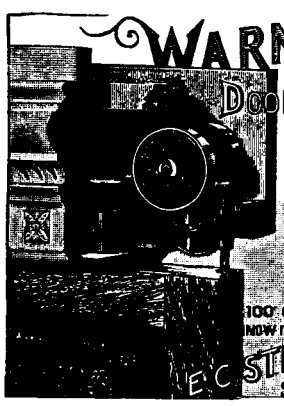

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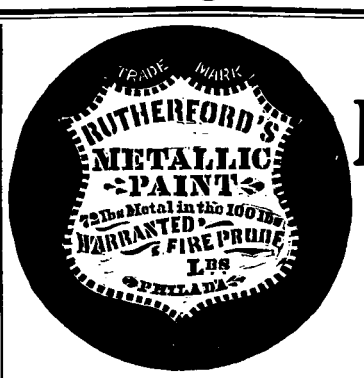

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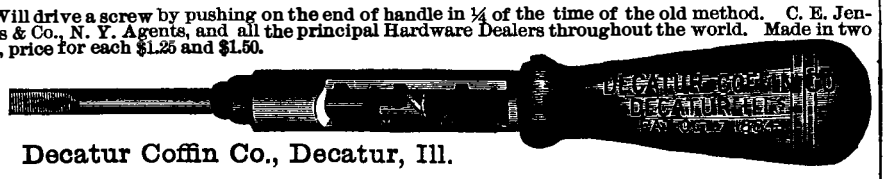

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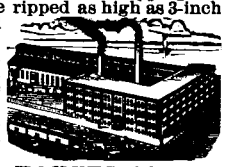

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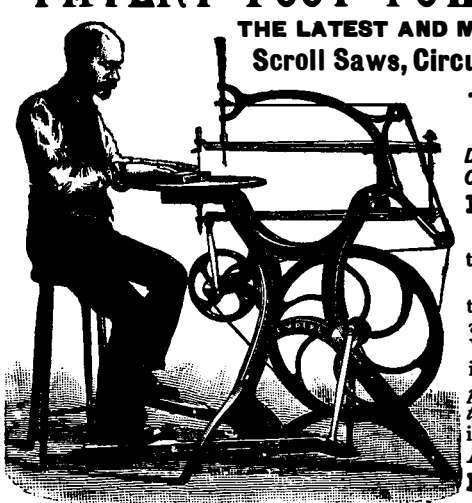

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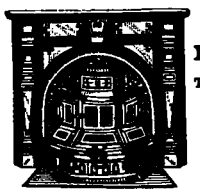

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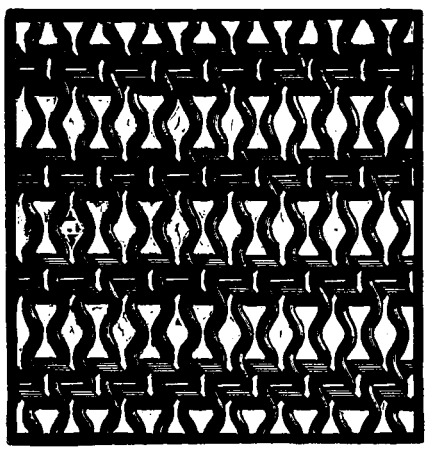

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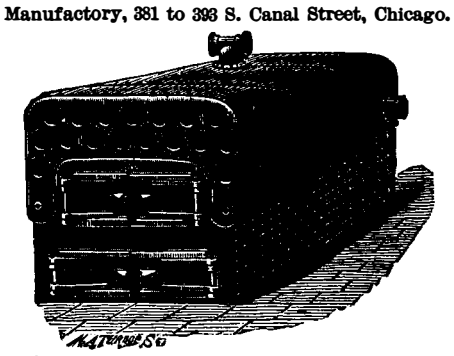

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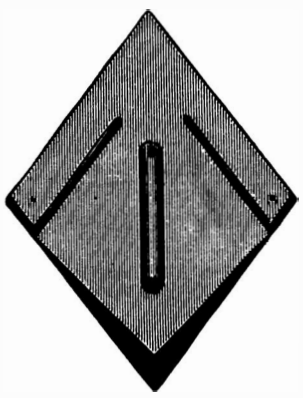

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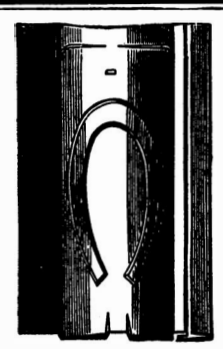

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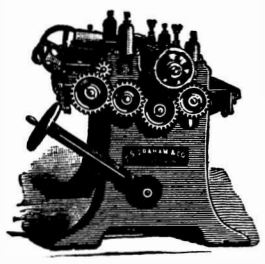

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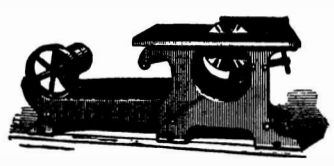

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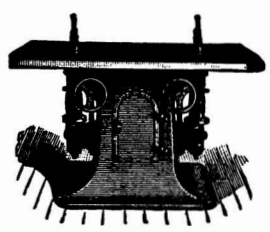

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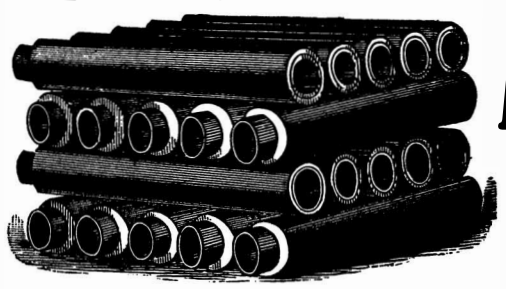

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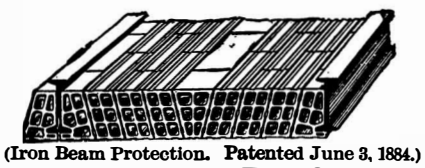

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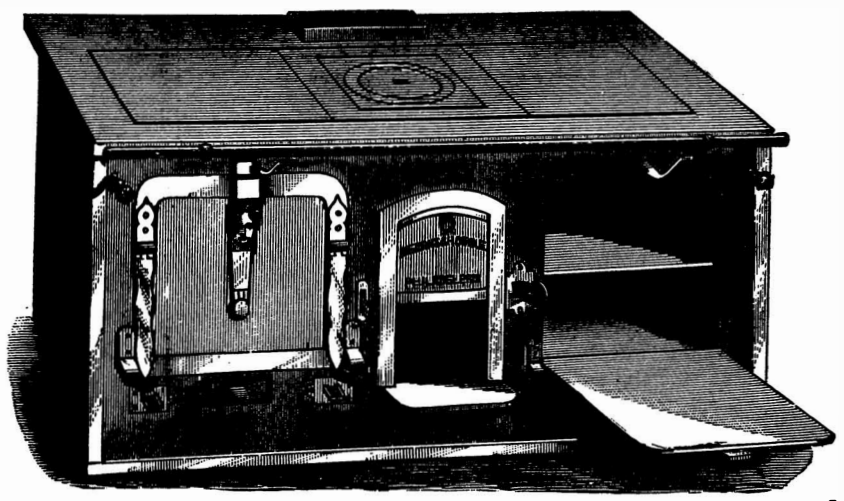

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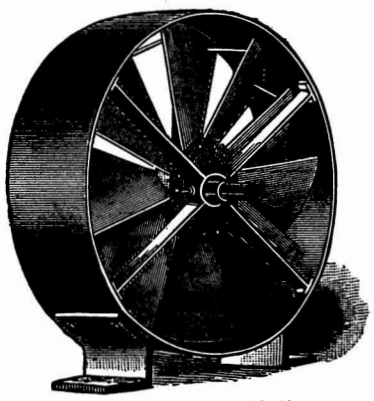

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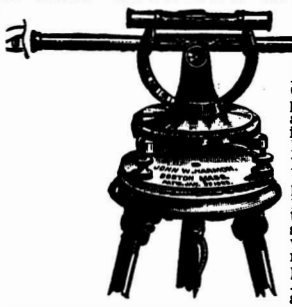

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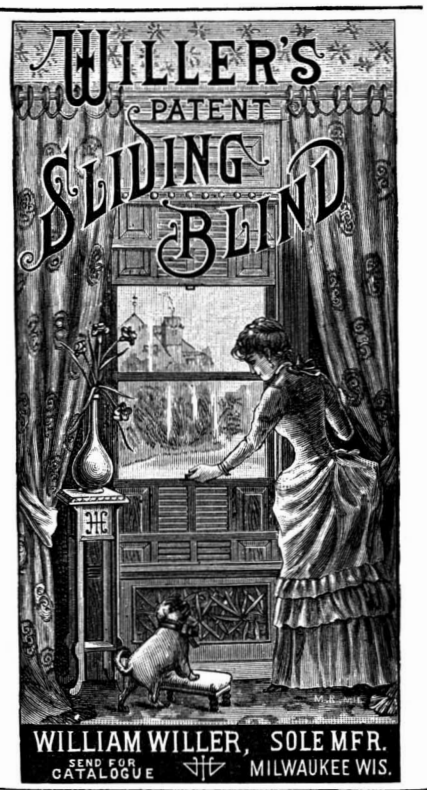

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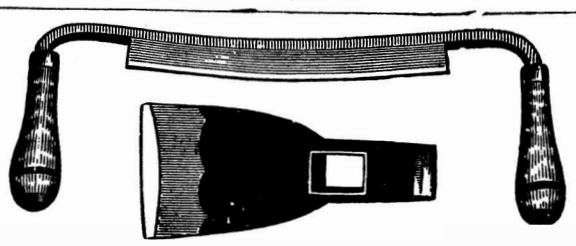

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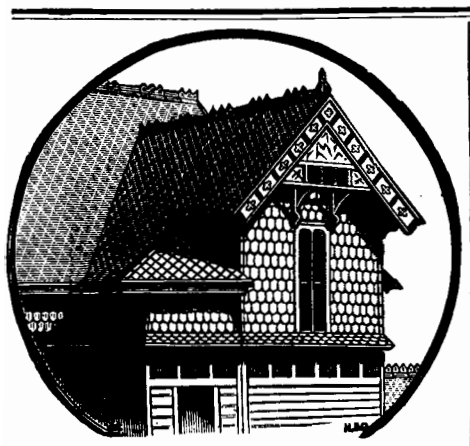

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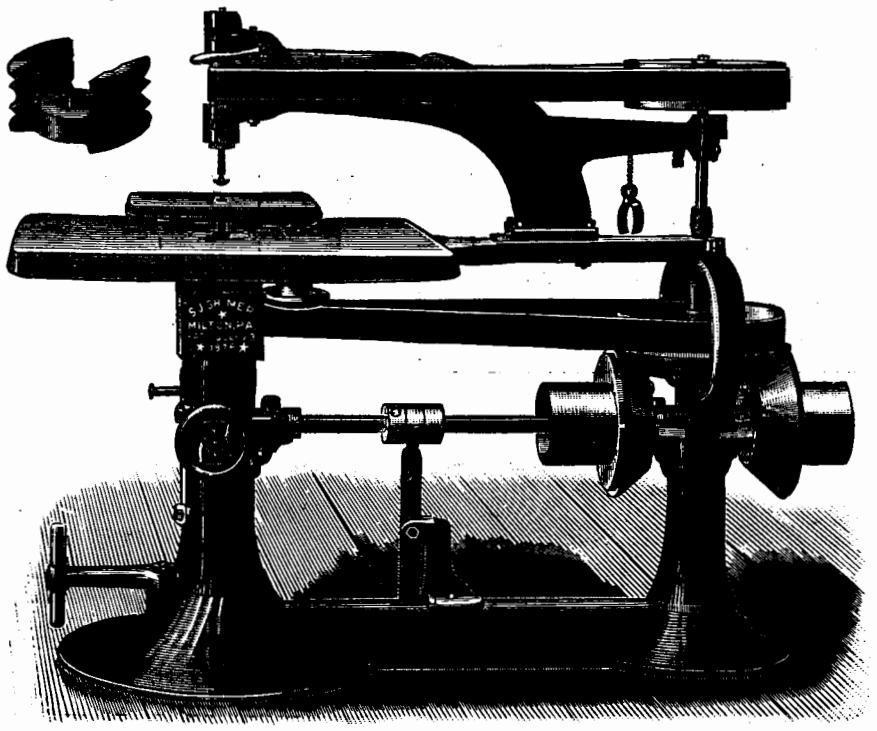

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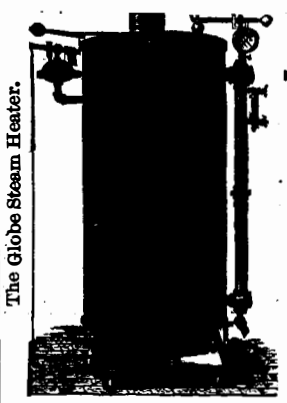

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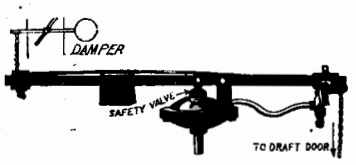

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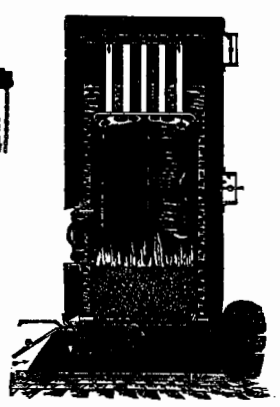

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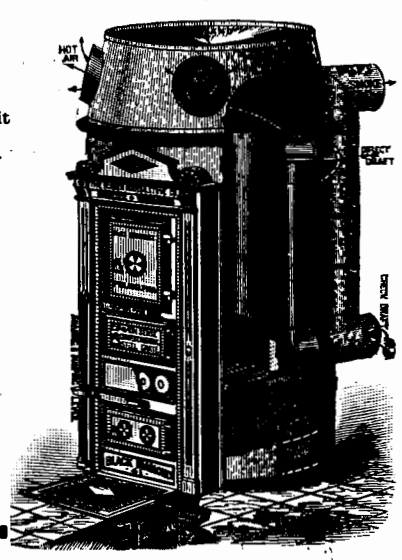

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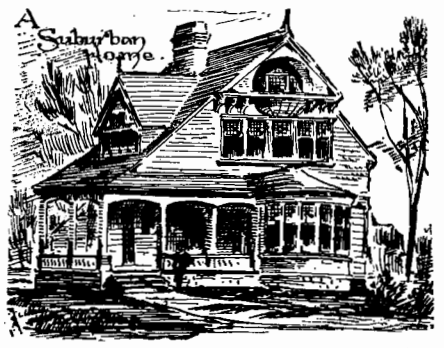

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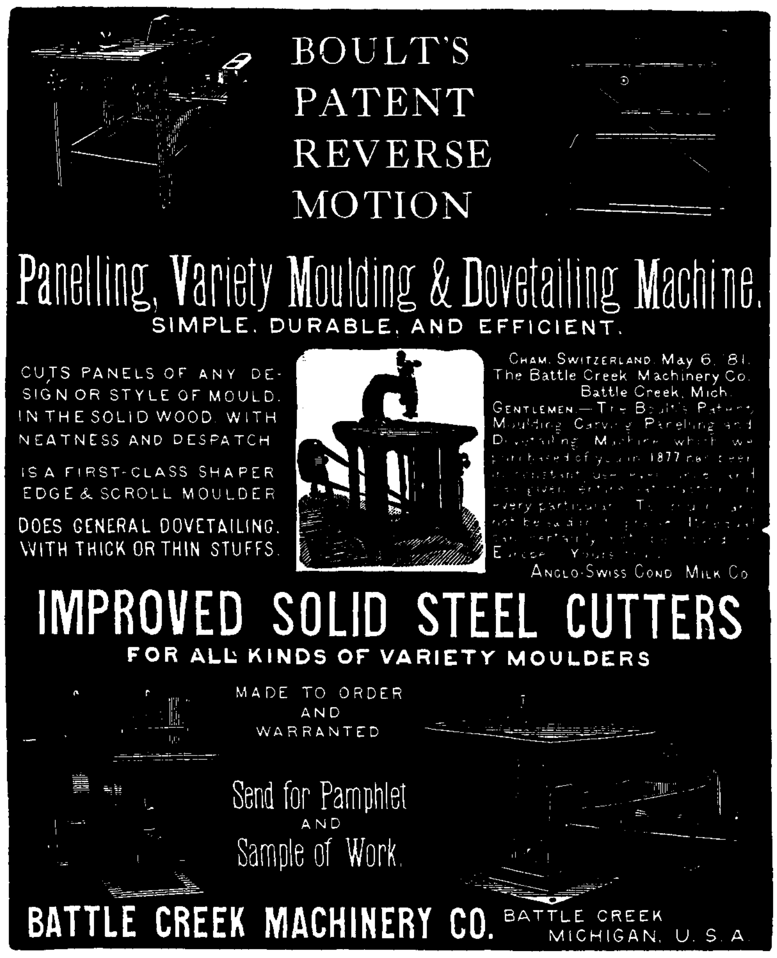

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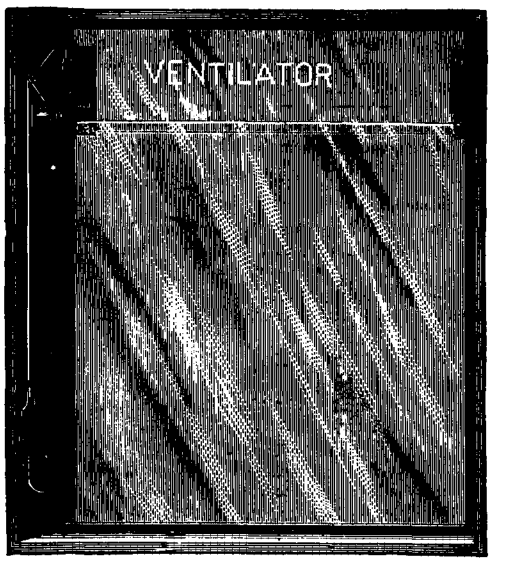

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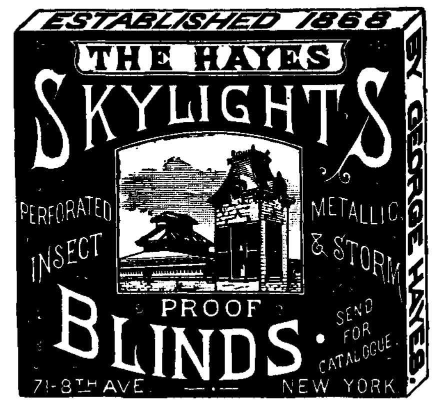

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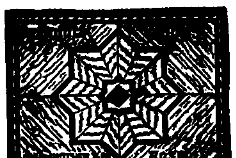

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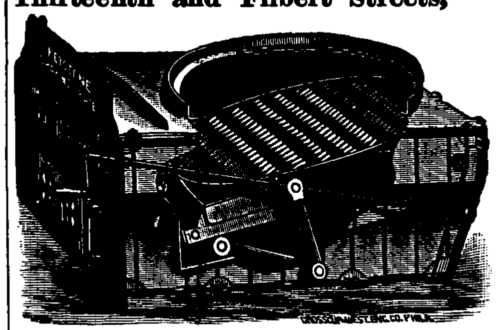

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Minerals sent for examination should be distinctly marked or labeled.

(1) W. E. P., of Bridgeport, Conn., asks how many pounds of water will a cubic foot of dry granite absorb? A. Good granite will absorb about one-half of one per cent of its own bulk of water. Hence a cubic foot of granite will absorb 0·005 cu. ft. of water, and this, at the standard temperature (62° Fahr.), will weigh 62·355 × 0·005 = 0·3118 lb.

(2) P. L. desires to know how to mix cement so that it will not crack or chip off on the surface. A. This is a general disease of cement pavements, and is due chiefly to impure sand, containing loam, etc., and also to a non-intimate combination of the cement with the sand. The remedy is obvious.

(3) L. J., of Chicago, suggests the use of hinged iron conduits to convey water from a point distant four miles from the shore of Lake Michigan to the city of Chicago, instead of a tunnel and a receiving crib. A. The latter would have to be built in either case. Admitting the possibility of making the hinged pipes, the natural query follows, How could such a system of piping be kept in repair? Leaks or ruptures in an iron main could not be repaired by a diver under water, and as for raising any section of the main after once in position, it would involve such an outlay of money as to more than pay the interest on a permanent piece of work, such as a well built tunnel. Again, the longitudinal strain on the joints would amount to an unknown factor of danger to the whole conduit, and we believe it is an impracticable scheme.

(4) J. B. N., of Shalam, Las Cruces, N. M., asks for a formula for artificial stone or cement, made without Portland cement? A. Artificial stone closely resembling natural sandstone in appearance, strength, and durability, can be made by cementing clean sharp sand with the double silicates of potash and soda. The latter can be prepared by calcining flints in the presence of carbonates of potash and soda, or, better, by the calcination of siliceous limestones. For an artificial cement: Take two equivalents of lime, two of silica, and one of alumina, calcine them, grind to powder and pack in barrels, to be kept dry until used. As soon as it is made into a paste with water, chemical action takes place, a double silicate is formed into a compact artificial stone.

(5) Query submits a drawing of two piers of equal base and height, but under one of them, which he calls "B," he has placed a flooring of 2 in. plank. He desires to know which of the two piers will settle the most, and why. A. The amount of settlement under precisely the same loads will be the same, but the manner of settlement might be decidedly different. The pier B having the timber floor will settle more uniformly than A, because the advantage of the timbering is its resistance to a cross strain with a trifling flexure. Timber footings secure uniformity of settlement, not immunity. Where the piers have a small cross section, stone or concrete footings are preferable to wood.

(6) I. J. M., of Cleveland, O., asks how can a cellar bottom be made waterproof? Cement alone will not do, have tried it. A. The reason it would not do is because the cement was laid in immediate contact with the clay. A good plan is to excavate the cellar about one foot below its present depth and replace the clay thus taken out, either with washed coal cinders rammed down with a heavy maul, or place a layer of broken stone rammed down compactly, or a layer of coarse gravel also rammed. Either one of these methods will insure a good bed for the cement concrete flooring, which can then be put down without any danger of the cement being "killed" by the clay. If the soil is saturated with water and springy, a good under drain is highly necessary to insure complete protection from dampness.

(7) M. U. C., of Vernon, Mich., wishes information in regard to the propriety of mixing water lime with stone lime for plastering. A. Pure or fat limes are the most economical and safe. Hydraulic limes require great care in handling. The only advantage to be obtained in their use is a more uniform setting of the mortar, but the advantage will not compensate for the difficulty in using it.

(8) H. M. B., of Birmingham, Conn., inquires what the safe load per sq. ft. of surface supported by angle iron beams, 2 in. by 2 in. by 3-16 in., spaced 2 ft., and length between supports 10 ft. A. The ultimate uniformly distributed load which such a beam will bear is 1,052·8 lb., and the safe load is 350·9 lb. The load per square foot, as the area called for by the spacing given, is 350·9 ÷ 20 = 17·54 lb. per sq. ft. If the load is concentrated at center of beam, the safe load will only amount to one-half of the above.

(9) W. E. W., of Askada, Mason Co., Wash. Ter., desires to know how to protect iron water pipe from rusting. A. The practice in the East is to have the pipe well galvanized, and then painted with a heavy coat of mineral paint, or to dip the pipe, so as to cover the external surfaces, in coal tar heated to 300° Fahr. Precaution must be taken, however, to thoroughly clean the outside surface before the dipping is done.

(*Continued on page* x.)

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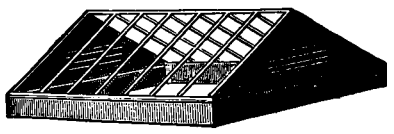

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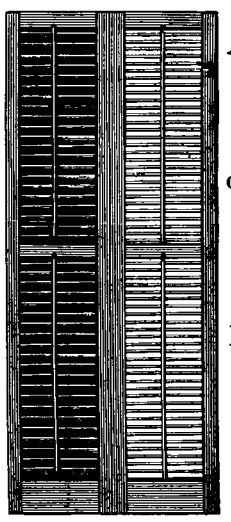

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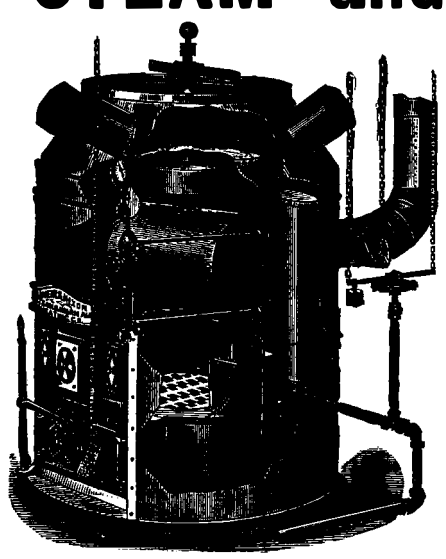

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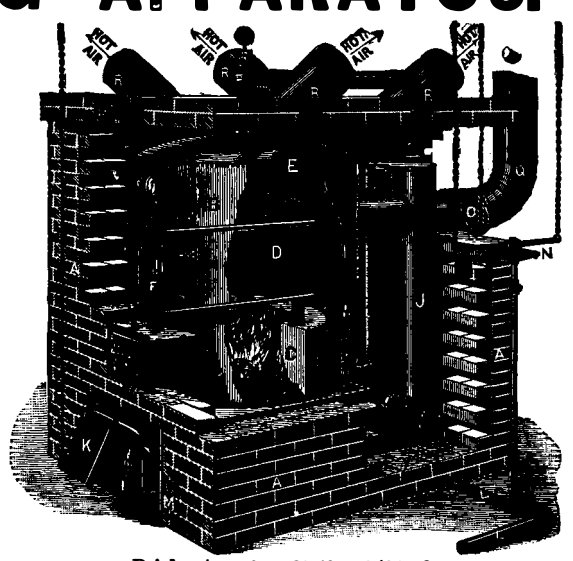

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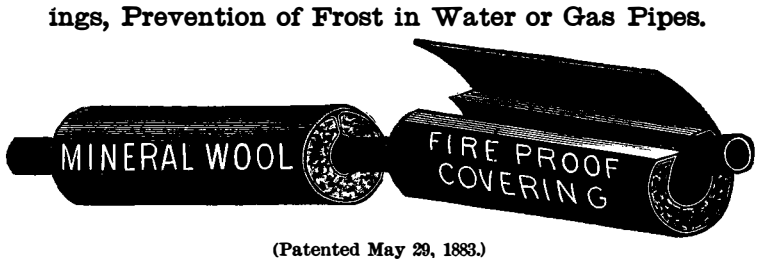

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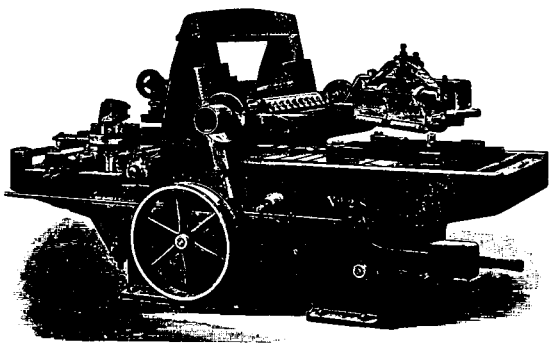

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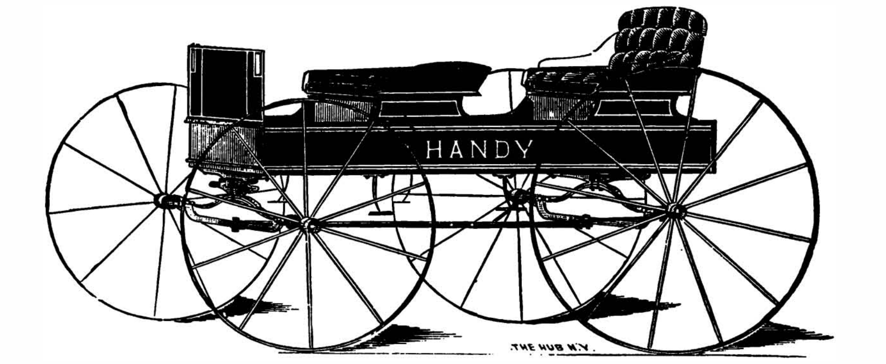

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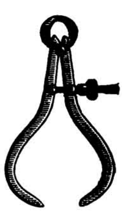

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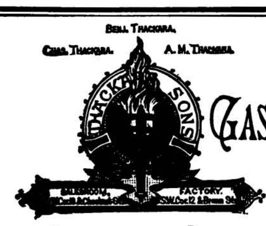

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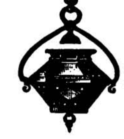

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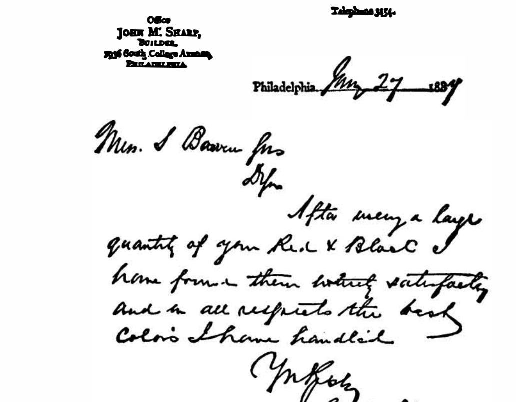

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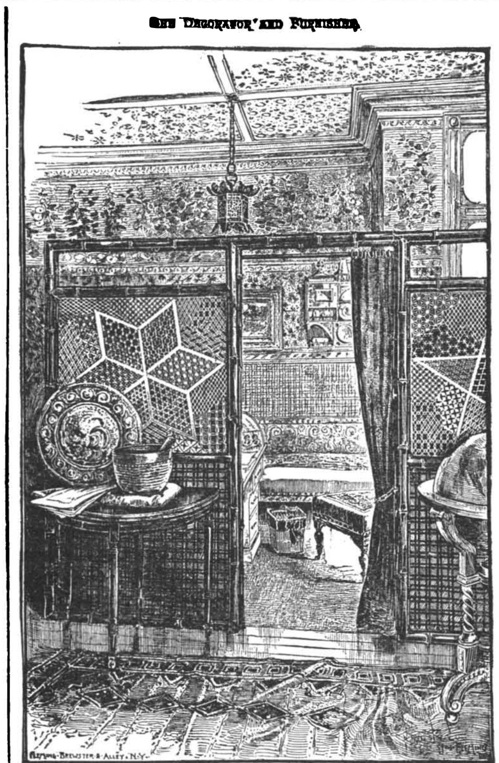

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Notes and Queries.

(*Continued from page* vi.)

(10) J. K. H., of St. Joseph, Mich., asks for a cement to be used in patching up a leaky tin roof. A. The following has been of great service: Equal parts of whiting and dry sand, and 25 per cent of litharge made into the consistency of putty with linseed oil. It is not liable to crack when cold, nor melt, like coal tar and asphalt, with the heat of the sun.

(11) "Stevens" says: Please give me a formula for making a cheap cement for floors and walks, also simple method of paving street with bricks. A. For a cheap floor, lay to a depth of about 2 in. a mixture of 1 part of Portland cement and 6 to 10 parts of short sand. Face up with cement and sand mixed, in the proportions of 1 part of the former to 2 of the latter. A floor or pavement subject to much wear should be covered deeper with the cement. Several other mixtures are given in the Sept. No. of our A. & B. edition. Brick pavements may be formed by laying hard bricks on edge in cement and sand, on a foundation of 2 inches of the cement. The roadbed should be well settled before the cement is applied.

(12) W. H. P. asks: What is the best preparation to put on a kitchen floor? The floor is spruce, and has been painted yellow about four months, but is all worn off, and looks bad. Do you know of any cheap paint that will dry quick and be durable? A. To resist the considerable wear on a kitchen floor, the paint should be of the best quality. A cheap, quick drying paint will not answer. Rub down the surface and give three good coats of some dark color, such as Indian red or umber. These are more durable than the lighter colors. Take care that the floor is perfectly clean and free from dust and grease before putting on the paint, and allow each coat to become thoroughly dry before applying another. The more durable job would be to stain the floor, if you can get off the old paint. To do this mix 2 parts of Vandyke brown and one of burnt sienna with size, and apply with a large brush, taking care to get it well into the grain of the wood. When dry, complete by applying a coat of copal varnish.

(13) J. B. S. asks: What is the best and cheapest roofing paint for shingles, to be painted before they are put on roof? A. We should recommend you to use Rutherford's metallic paint, a most excellent and reliable article.

(14) F. A. D. says: I am building a house, and propose to shingle it, and use the rain water for general use. Would not the creosote stain be apt to make the water taste bad? What would be the best paint to use for the purpose, or would it be better to leave them unpainted entirely? A. The water will be better for general use if you leave shingles on roof without paint. The stain is intended more for the vertical sides.

(15) J. E. C.—A good way to save the old ceiling would be to screw ⅞ by 3 in. strips each way, about 2 ft. apart, or as near as the width of the room will permit. Insert in these panels a neat pattern of paper. Paint strips some warm color, to suit surroundings. This will make a cheap paneled ceiling, and will look well. Strips may be scratch beaded in center.

(16) G. F. B. writes: Will you please give method of oiling shingles before laying? Is it advisable to so treat them? A. It is advisable to treat them with oil before laying. Use linseed oil, put it in a large tub, dip the thick end of the shingle in about 8 inches, and wipe off with brush and let dry about 24 hours.

(17) B. & Co., of Huntingdon, Quebec, ask (1) for a rule to find height of truss to length of span to bear a given load of from 4 to 5 tons. A. There is no established relation between height of truss to length of span, although for a Howe truss bridge the height is about equal to or exceeds one-fifth of the span. 2. Give height of truss for a span of 75 ft. between abutments, with proper size of lower and upper chord, posts, braces, and bolts for a Howe truss bridge, wood. A. Span 75 ft., rise 12 ft., number of panels 10, upper chord number of pieces 3, size 6 in. by 12 in., lower chord number of pieces 3, size 6 in. by 14 in. An end brace, No. 2, size 6 in. by 11 in., center braces two, size 6 in. by 8 in. A counter, number one, size 6 in. by 8 in. End rods two, diam. 2¼ in., center rods two, size diam. 1⅜ in. For a load which will not strain the timber to more than 800 lb. per square inch.

(18) G. H. H. asks for a recipe for mixing a paint to imitate cherry. To be used for inside work, and on wood which has before been painted. A. One part of lac varnish mixed with nine parts of ground cinnabar forms a rich colored paint, which answers well for imitating red cherry.

(19) E. K. asks: If you wished to warm a room by steam and the room is closed up, can you not raise the temperature of the room to a higher degree than the temperature of the steam at boiler pressure? Of course, we mean heat by direct radiation through steam pipes? A. You cannot heat a room as hot as the steam at the boiler pressure. In drying rooms for japanned and rubber goods, a temperature is seldom obtained nearer than from 15 deg. to 30 deg. below the temperature of the steam in the pipes.

(20) N. C. R.—The wood mouldings for picture frames are cut in a machine, brushed over with the plaster of Paris, and smoothed down with a steel trowel of the same form as the moulding. The plaster has a little glue mixed with it. For your blackboard to use with chalk use shellac varnish, lampblack, and powdered pumice; mix as a paint, and brush over quickly. For your artificial slate, use shellac varnish, lampblack, and finest flour of emery. Thin the shellac varnish with 95 per cent alcohol, so that the emery will have a cutting surface. The exact proportions you must find by trial.

(21) S. H. B. asks: What is the difference between "quarter" and "bastard" sawed lumber? A. Bastard sawed lumber has the annual rings parallel with the surface in some part of the board or plank, and is the ordinary method of sawing. Quartering is sawing the log into four parts across the center, and then sawing the quarters so that the annual rings will run out to the surface. It is not economical for the lumber producer. Quartered lumber may be made from bastard by culling and sawing out the bastard centers.

(22) T. H. T., Buffalo, N. Y., asks: What will clean fly specks from hanging lamps? A. Old ale is excellent to wash any gilding with. It acts at once on fly specks. Apply with a soft rag.

(23) J. P. asks: Will you please give receipt in your next issue to make a whitewash that will stand the weather, and also what to color with to make a deep slate color? A. Slake ½ bushel lime, strain, and add a peck of salt dissolved in warm water, 3 pounds ground rice put in boiling water and boiled to a thin paste, ½ pound powdered Spanish whiting, and a pound of clear glue dissolved in warm water. Mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used, put it on as hot as possible, with painters' or whitewash brushes. Color to suit by adding sparingly of a dry pigment.

(24) J. J. W. asks: What height and width inside should a brick chimney be made, to give sufficient draught to burn tan bark after being bleached and not dried? Length of boiler being 14 feet over all, tubes 12 feet long, 36 in number, 2¼ inches diameter. Furnace being double, *i. e.*, double the size of an ordinary one. Have you any idea as to what number of bricks it would require to build same? A. About 60 feet high, or perhaps more, according to location for draught, and about 2 feet square inside at bottom. Wet tan burning requires large furnace or oven capacity, and exceptionally good draught. Such chimney will probably take about 30,000 bricks.

(25) J. R. asks: 1. What paper is used in making paper boats? A. The paper is made specially for the purpose, in narrow rolls of varying thickness up to that of a thick cardboard, of flax, hemp, or wood fiber, according to the quality sought. It is laid in successive strips, over a former, with glue or paste. 2. How is papier mache rendered waterproof? A. The waterproofing is generally shellac or a varnish. 3. How are leaves bleached, such as ferns and oak? We have taken the SCIENTIFIC AMERICAN for ten years, and have not troubled you before. A. Leaves are bleached with a solution of chloride of lime and water, about one tablespoonful to a quart of water. Add a few drops of vinegar; subject for ten to twenty minutes, then rinse in clean water, and dry between blotting paper.

(26) H. S. S., Jr., asks: 1. Would it be dangerous, in case of lightning, to run a wire cable from the roof of one block across the street to roof of another, both roofs being tin? A. Unless both roofs are well connected with the ground, the lightning striking one roof might be conducted to the other, thence through the house, doing damage. 2. What result do we obtain by mixing a solution of acetate of lead and a solution of sulphate of zinc? A. A precipitate of lead sulphate.

(27) J. G. P.—A corrugated iron roof should be lined to prevent sweating, in places where the air is liable to become moist, or where many persons are congregated. Cover the frame with matched boards, then lay the corrugated iron.

(28) J. P. asks (1) how to take the rust off a bicycle, the rust having been on over a year. I have tried oil and sand, also oil and emery paper. A. Rub with kerosene oil or spirits of turpentine. 2. Also, is there any solution to make steel shine just as if it was nickel plated? A. Nothing except polishing. 3. Also of a solution, when you dip nickel or silver pieces into it, it will gold plate them, without a battery. A. Wash thoroughly a quarter of an ounce of gold chloride; then add it to a solution of 2 ounces potassium cyanide in one pint of distilled water; shake well, and let stand until the chloride is dissolved. Add 1 pound prepared Spanish whiting, expose to the air till dry, and then put away in a tight vessel for use. When applied, it is mixed into a paste with water, and rubbed on the surface of the article with a piece of chamois skin or cotton flannel. The surface of the article should be thoroughly cleansed before the plating powder is applied.

(29) W. F. B.—The trouble with steam tricycles is not with the light engine, but with the heavy boiler, water, and fuel. They have been built in England to run 8 to 10 miles an hour. We do not think you can attach an engine and boiler to any ordinary tricycle that will be of much service. The power stated would no doubt give the desired speed. Fuel, water, and attendance make the trouble.

(30) O. K. writes: 1. I would like a recipe for making a cement (with silicate of soda) for furnaces and stoves. A. This cement is prepared by mixing finely pulverized iron with silicate of soda to a thick paste, and then coating the cracks with it. The hotter the fire then becomes, the more does the cement melt and combine with its metallic ingredients, and the more completely will the crack become closed. 2. A recipe for making a glue for labeling on tin. A. See answer to query No. 21, in SCIENTIFIC AMERICAN, May 9, 1885.

(31) E. B. asks how to make paper for blue prints. A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 483, page 7707, for full details.

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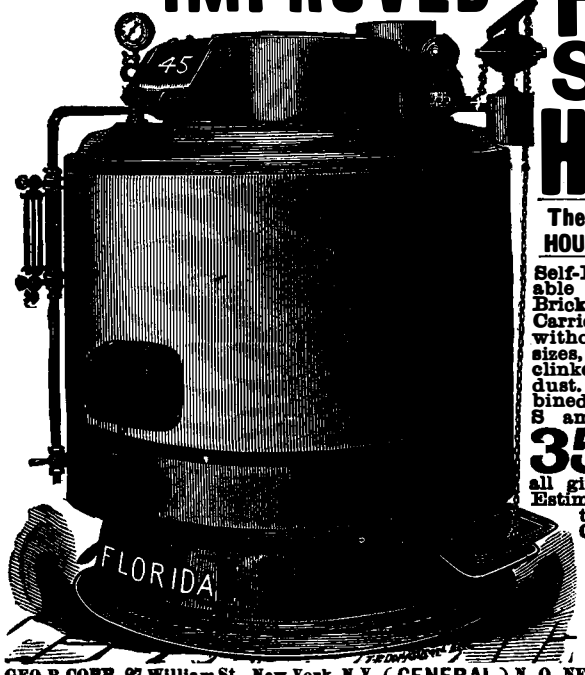

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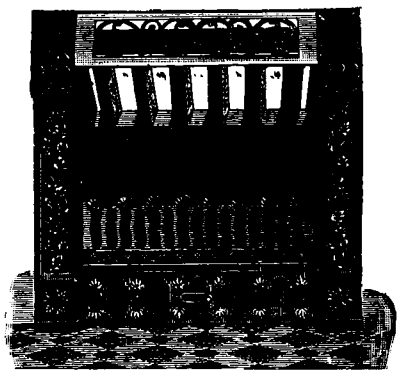

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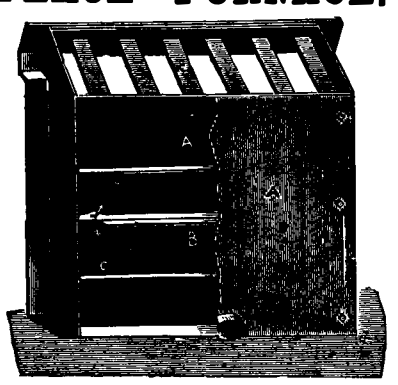

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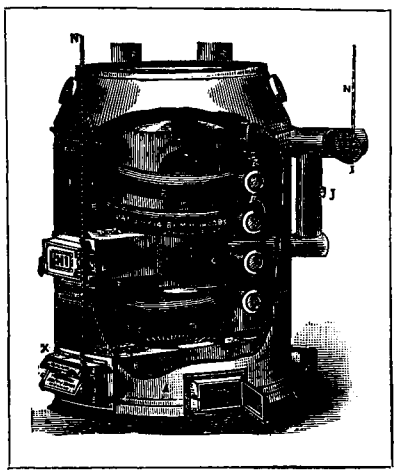

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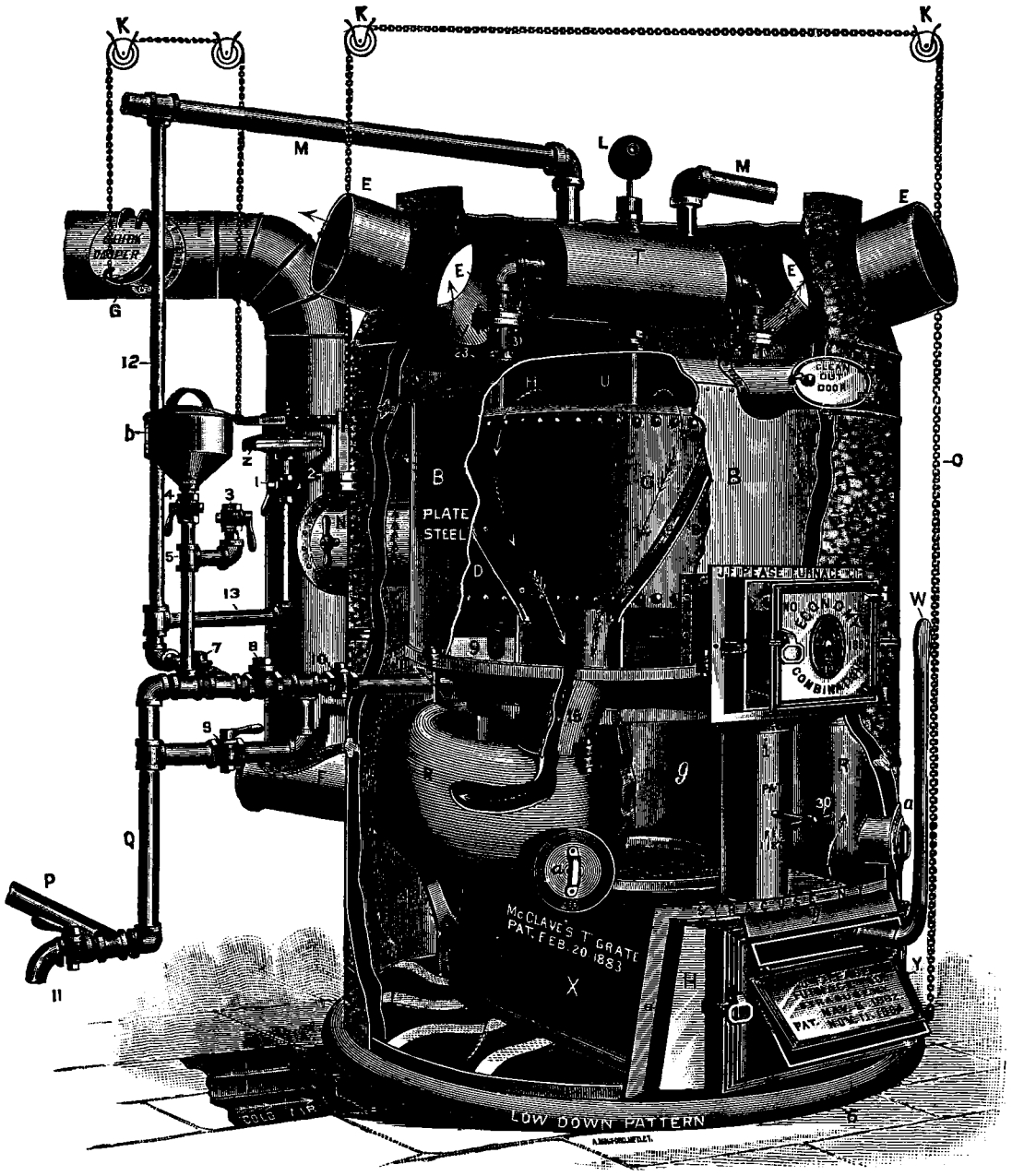

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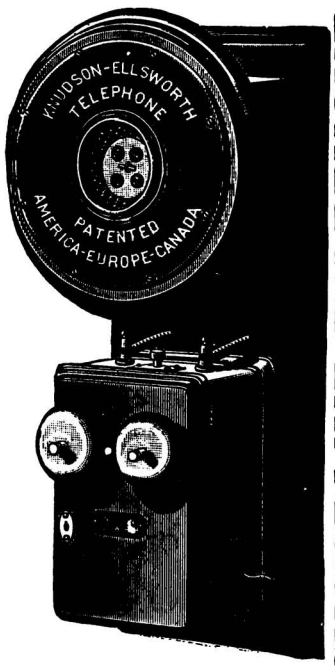

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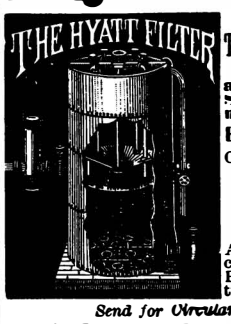

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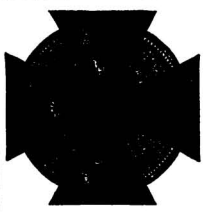

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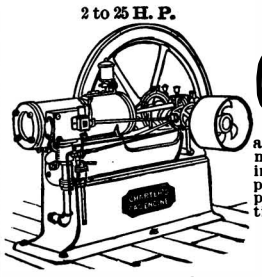

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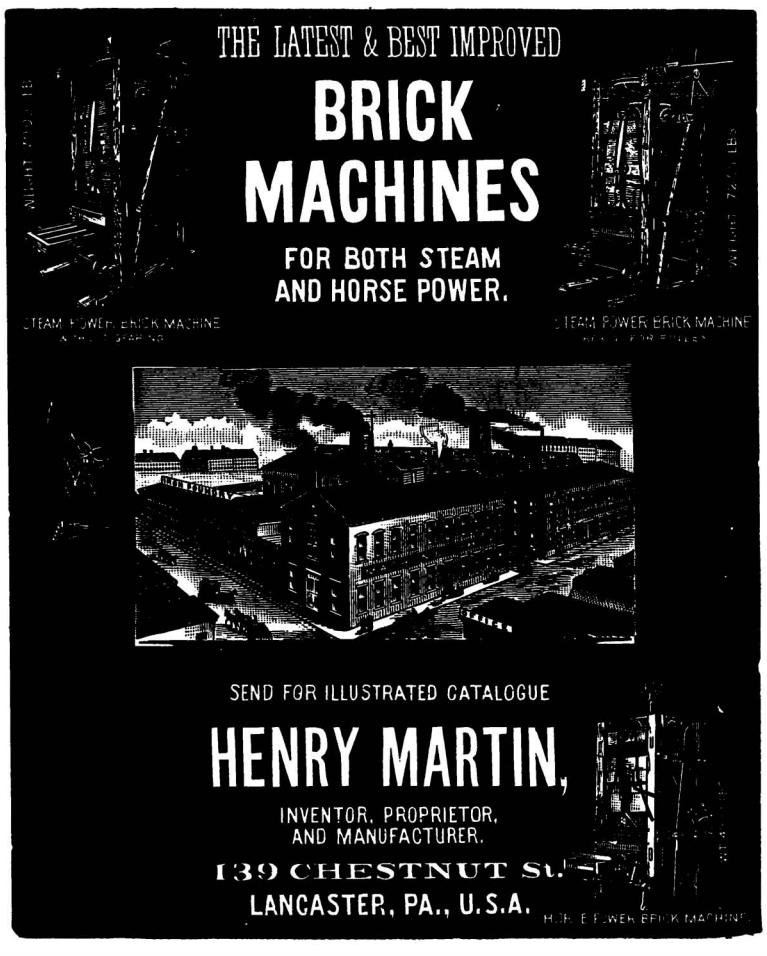

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