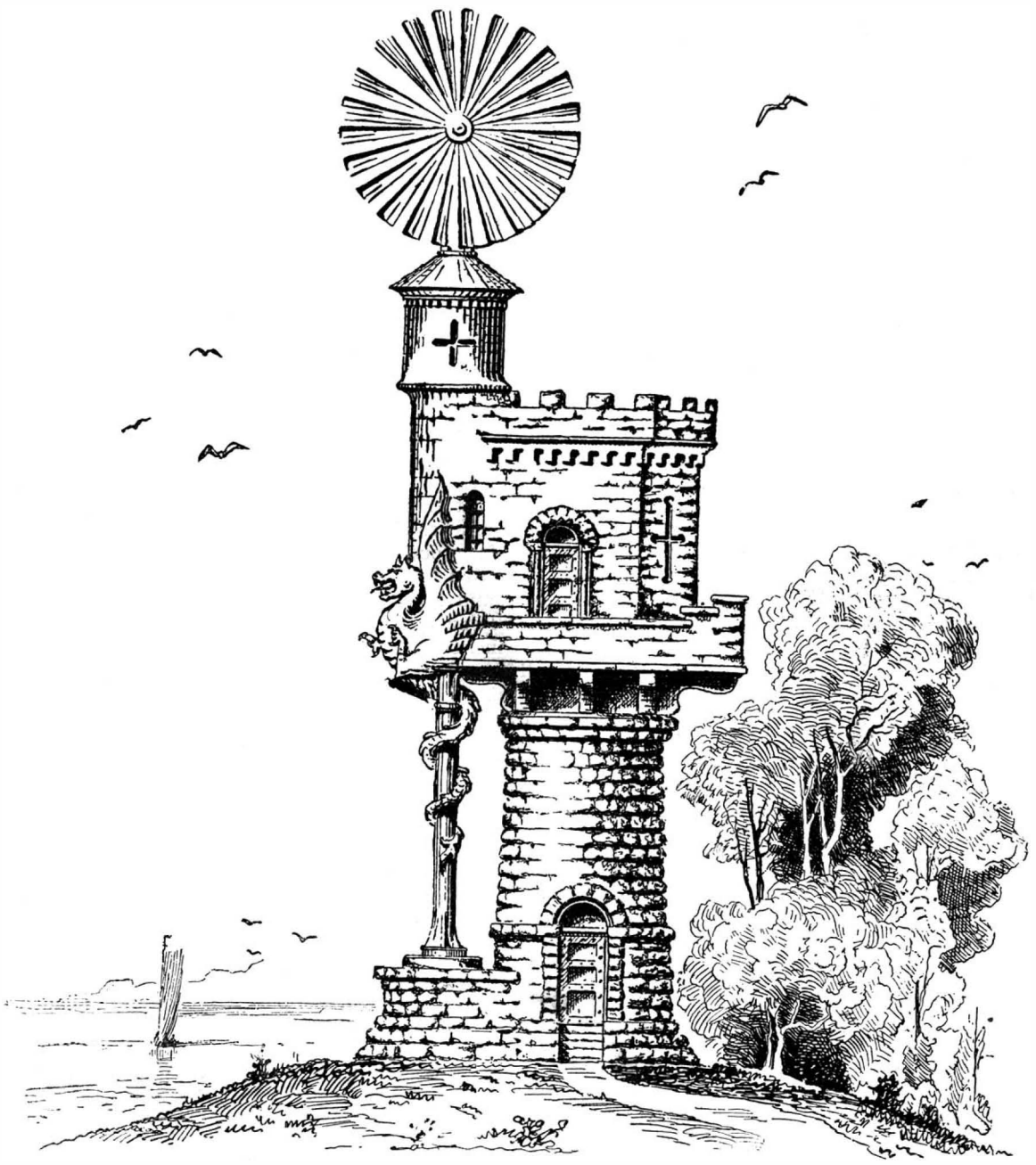
# SCIENTIFIC AMERICAN

Entered at the Post Office of New York as Second Class Matter.

## ARCHITECTS AND BUILDERS EDITION.

Vol. III. Subscription, $1.50 a Year. NEW YORK, MARCH, 1887. Single Copies, 15 Cents. No. 3.

**A WINDMILL TOWER AND WATER TANK AT NARRAGANSETT PIER, R. I.**

**CONSTABLE BROTHERS ARCHITECTS.**

[For description see page 46.]

# Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, MARCH, 1887.


THE

# Scientific American,

## ARCHITECTS AND BUILDERS EDITION.

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Commencing with the April number, the price of this periodical—heretofore $1.50 a year, and 15 cents a copy—*will be advanced* to **$2.50 a year**, and 25 cents per single copy. After April 1 the price of back numbers will be 25 cents each.

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Of the March number of the Architects and Builders Edition of Scientific American.

(Illustrated articles are marked with an asterisk.)





[Continued from page 24.]

## THE AMERICAN INSTITUTE OF ARCHITECTS.

### A GLANCE AT THE CHARACTER OF THEIR WORK, AND ITS INFLUENCE UPON THE GROWTH OF AMERICAN ART.

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

With the idea of americanizing our architecture, it was proposed that some connection be established between the students of our architectural schools and the supervising architect of the government. Precedents for such action are numerous. The building of the dome of Cologne Cathedral was cited. Other instances might be mentioned, such as the inducements offered to the graduating classes of the University at Palermo in reference to designing some portion of the great Cathedral of Milan. The project referred to was to give, as a graduation honor, a two years' appointment to service under the supervising architect. This appointment to be determined in some perfectly fair way by competition. The successful man to spend one year in the draughting room, and one year as assistant superintendent of outside construction. The usual salary paid for such services to accompany the appointment. It was believed that this scheme would identify the students of architecture, and, indirectly, the people themselves, with the art growth of our country.

Whatever derogatory may be said of the exteriors, our government buildings are acknowledged by Europeans to be the most commodious and convenient government buildings in the world; and many of the later buildings, notably the post office at Lexington, Kentucky, show a remarkable advance in architectural treatment. If, through the medium of our museums, our art galleries, our schools of design and architecture, our public and private buildings, we cannot interest this nation in its own art growth, then there is no help in us.

From a sanitary point of view, the Institute was addressed by the well-known specialist, Mr. Charles F. Wingate. The tendencies of sanitary progress were noted. It struck him as absurd that the sanitary expert should be called upon to overhaul buildings after they were completed and occupied, instead of having consulted him in advance when the plans were prepared. He dwelt upon the importance of a dry site and a house free from dampness. The prevalence of consumption and a large number of other ailments is directly traceable to damp soil and improper drainage. The exceptionally low death rate of London is to be ascribed, largely, to its perfect soil drainage, while the high mortality in New York from zymotic diseases is due chiefly to damp cellars upon a saturated subsoil. The details of interior plumbing work was cited to explain the cause of the late typhoid fever outbreak in Brooklyn. The necessity of a trap to disconnect dwellings from street sewers was urged, and the enlargement of soil pipe at the roof to the full sum of the areas of the small pipes leading to it was insisted upon. Air inlets came under the same heading, and were recommended to be as large as the house drain. That a contrary practice prevails to some extent is unquestioned. Methods of sewage disposal were considered. The irrigation system was criticised in certain particulars, and the necessity for some cheap and universally applicable substitute for cesspools emphasized. The speaker regarded the lack of ventilation in dwellings as the most serious source of injury to health. Impure and overheated air is a prime factor in creating disease. The public generally resort to window ventilation as a relief from oppressive air. Open fireplaces are a luxury, and, as such, must be considered unavailable to the mass of humanity. To find a house or any part of it well ventilated is as rare as a jewel. Within a recent period, improvements have been made in the construction of electric motors, so that, by means of small fans operated by these motors, it is now practicable to ventilate any room or building at a trifling expense. An electric motor that formerly cost $135 can now be made for one-fifth that amount, and foul air, by its means, can be forced out of a room, even in winter, without creating a draught, while in summer a cool current can be blown inward. This is one of the most remarkable improvements in modern science. It is not a monopoly, as several appliances of the kind are now in use and successfully working. Ventilation has been as good as a lost art. It now bids fair to take proper rank among modern sciences. A house may be the home of defective plumbing, leaky drains, or built on saturated soil; but if impure air can be driven out and pure air drawn in to take its place, the noxious vapors which are not forced out may be so diluted as to be rendered almost harmless.

Many of the members availed themselves of the courtesy of Prof. Ware to visit the architectural department of Columbia College, to inspect the system of instruction pursued there, the work of the students, and, lastly, and to some minds the most important, the now famous Kansas City Exchange competitive drawings. It was generally conceded that the successful drawings were worthy of the honor awarded them. The amount of work on each set of the drawings, singly and collectively, forced upon almost every beholder the conviction that a vast amount of time, labor, and genius were wasted on competitive drawings. The home of Mr. Marquand was thrown open to inspection of the members, and to say that the quaint elegance of its costly rooms, the seductive beauty of its mural paintings, the refined taste displayed in every adornment and enrichment, made a deep impression, would be merely to pass one more encomium upon the growth and beauty of American art.

The general feeling of the Institute in regard to unity of action among the members was announced in the report of the Board of Trustees. It was stated that the Institute cannot progress or maintain its hold upon the respect of the public without the steady support of its individual members. The evils of unregulated practice were incidentally alluded to. In order that the professional architect shall do the best work he is capable of doing, in order that he shall do something for the art growth of the country, for the sake of art and the country itself, and in order that he shall raise the standards of comparison and estimation, he must have the moral support of the people themselves. Can the profession accomplish this and be in conflict with itself?

At this session of the convention, grave charges of unprofessional conduct were preferred against a member of the Institute. Documentary proof was offered in support of these charges. They were referred to a committee for examination and a report. The evidence was found to be complete. The offending member was requested to resign, and in this way the pernicious evil was rebuked. The constitution of the Institute forbids the expulsion of a member for unprofessional conduct. Other organizations, similarly united for mutual protection and defense against the pretensions of quacks or pettifoggers, are obliged to resort to expulsion to restore to the association its proper *esprit de corps*.

In the discussion which followed the substantiation of these charges, several members advanced the recommendation of a more careful inquiry into the antecedents and present standing of applicants. The sense of the convention in regard to the measures to be taken to avoid a repetition of such charges was not fully brought out, but, admitting the wisdom of the recommendation alluded to, it does not strike at the origin of the trou ble. Perhaps it is impossible to enact a law that will, but it seems that the disgrace of expulsion to a member in good standing must greatly exceed the discomfiture of a rejected applicant. To the former, the blow is equivalent to a dishonorable retirement from the profession. To the latter, it does not necessarily imply disgrace. It may mean simply inefficiency, or incapacity, or want of experience, the latter of which may be overcome by study and time.

The annual dinner, on the evening of the second day, was given at Pinard's; and in the excellent discussions of art topics, in the quiet but timely hits at the architectural follies of the day (for even architects will admit that they sometimes imitate their clients, who do have follies), in the good fellowship that prevailed, and in the social amenities of the hour—perhaps it was more than one hour—the dinner may be pronounced a success. As a matter of reference, the names of the officers chosen for the ensuing year are herewith appended:

Thomas U. Walter, of Philadelphia, president.

O. P. Hatfield, treasurer; A. J. Bloor, secretary; both of New York.

The board of trustees are: H. M. Congdon, N. Le Brun, E. T. Littell, R. M. Upjohn.

The committee on publication: H. H. Holly, New York; Chas. Crapsey, Cincinnati; T. M. Clark, Boston; J. McArthur, Philadelphia.

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The secretary of foreign correspondence: W. L. B. Jenny, Chicago.

## DESIGN FOR A WINDMILL TOWER AND WATER TANK.

We give on our first page a design for a windmill tower, which is worthy of attention for the novelty and boldness of its conception. It is a striking departure from the common plan of such structures, which are ordinarily made to resemble some old barn or outhouse, devoid of taste or elegance. This design shows how prettily such a subject may be treated. The example we give will serve, we hope, a useful purpose in leading owners and builders to think and study how they may improve the forms and lines of all such structures. A little care and thought will sometimes do wonders. Our engraving is from the *Real Estate Bulletin*. This windmill was recently erected at Narragansett Pier, R. I., by Edward Earle, Esq., to supply water for ten cottages built by him at that place. It was designed by Constable Brothers, engineers and architects of this city, and, in its position among the summer cottages at Narragansett Pier, forms a very ornamental addition to the landscape. The water is supplied by driven wells, and is pumped up by the wind power into the reservoir at the top ot the tower, whence it is distributed by gravity pressure

throughout the ten cottages erected adjacent to it. It has proved adequate for all demands made upon it, and not only furnishes an abundant supply of water for domestic purposes, but provides an ample means of fire protection.

### A ONE STORY DWELLING.

We illustrate this month, in our colored plate and sheet of details, a style of dwelling much in demand in the southern parts of the country, in which the whole plan is arranged on one floor. The design, drawings, specification, and estimate are by Mr. Christopher Myers, architect, of Montclair, N. J.

There are several important advantages attached to the adoption of an arrangement of this kind. Chief among them is the facility afforded for access to the rooms, and the saving of stairs. The system has the further gain of producing a warmer house, and one which, from the exterior, gives the impression of large extent.

In order that our readers may derive the fullest advantage from the design, the architect has drawn up a complete bill of quantities, with the cost of the various items attached. This we print below. In adapting the design for erection in any particular locality, where the prices differ from those given, it will be an easy matter to adjust the difference. In the vicinity of New York, the building would cost $4,828.77, as shown by the items in the bill of quantities. To ascertain the cost of building in other localities, where labor or material is either cheaper or dearer than in New York, a corresponding reduction or increase must be made in the items affected.

The design is entirely a practical one, and has been carefully considered in the smallest detail. The elevation is very skillfully treated. As a matter of fact, it is very difficult to obtain a satisfactory elevation in this class of house. The great length compared to the height, unless very carefully treated, will always have the effect of a squatty appearance.

Mr. Myers has managed to overcome this difficulty by cutting up the sides of the building with a number of breaks and offsets, providing several hips and gables, and in constructing two turrets. The external details are effective, while being simple and moderate in cost, and the whole result is a most attractive elevation, with excellent skylines and a certain homelike aspect that will be generally admired.

The planning has been arranged in a manner which, although, perhaps, not open to much improvement, could be readily altered to adapt itself to special requirements. For instance, the main staircase in the hall occupies a good deal of space, and could be omitted altogether, if it were not intended to use the attic, thus leaving a hall measuring 12 feet 8 inches by 23 feet 8 inches. The position of the bath room would then be slightly altered, or it might be left out altogether. On the other hand, if the house were constructed exactly as it is represented on plan, the attic could be finished off and utilized for bed and other rooms.

It will be observed that the kitchen forms a wing, distinct from, although attached to, the main block, and the advantages of such an arrangement are too obvious to need comment. At the South, where one story houses are common, it is usual to detach the kitchen entirely, and it will be seen that this could be done in this case without in any way interfering with the main design as it stands. The kitchen has a large bedroom over it, which could be easily divided into two if necessary, and a cellar beneath.

On the plan shown on the colored sheet it was found necessary to cut off a portion of the kitchen. On the detail sheet, however, we give this plan in full, with the dimensions of the various parts.

#### SPECIFICATION.

Specification of the work required to be done and the materials to be supplied in the complete erection and finishing of a frame dwelling house, from the designs and under the superintendence of Christopher Myers, architect, Montclair, N. J.

*General Conditions.*—The drawings taken in connection with this specification are intended to provide for the complete erection of the house in all respects. If anything necessary for such completion should either be omitted to be mentioned in the specification or shown upon the plans, the same is to be executed without extra charge, to the true intent of the said drawings and specification.

The work is to be done in a thorough and workmanlike manner, and to be finished in all respects to the entire satisfaction of the architect.

#### MASON'S WORK.

*Excavating.*—Excavate cellar under kitchen to a depth of 4½ feet; all foundations 30 inches deep; the cellar wall to be 1 foot 4 inches thick, built of field or quarry stone, to height of 7 feet in the clear; all foundation walls to be level with kitchen wall; all the stonework exposed to view to have struck joints in cement; inside of cellar walls to be pointed flush; the trenches and under foundations of all brick piers and under walls, and chimneys, to be grouted in with cement grouting. Build brick piers where shown on plans, of good hard burnt brick. Build chimneys where shown, of good hard burnt brick. Joints for all flues to be struck. Brick for the top to be selected. All chimneys to have bluestone caps and bond stone, each 3 inches thick. Build kitchen fireplace with front brick laid in red mortar, with bluestone shelf and hearth, both rubbed.

*Hearths.*—Furnish all fireplaces with rubbed bluestone hearths; furnish and put in all necessary thimbles where directed.

*Cementing.*—Cement the entire cellar bottom of kitchen cellar with cement composed of 2 parts of sharp screened gravel and 1 part of Rosendale cement.

*Plastering.*—Lath and plaster the entire first story of main house and first and second story of kitchen, 3 coat work; scratch brown and sand finish; the closets to be laid on in two coats, also plaster privy in two coats. Furnish and set four center pieces in parlor, library, dining room, and hall, to cost seven dollars in all and to be selected by owner.

*Privy Vault.*—Build privy vault of stone 6 feet x 5 feet and 4 feet deep.

*Stoop Stones.*—Put down stoop stones where shown, to be of good heavy bluestone, in two lengths to each stoop and two feet wide, these stones to have foundations 26 inches deep, filled in with small stone.

*Cistern.*—Build cistern 10 feet x 10 feet in the clear, of good hard burnt brick, domed over on top with manhole and flat bluestone on top 2 feet square. Cement the inside with Rosendale cement, and leave perfectly tight.

*Cesspools.*—Build cesspools where directed, within 60 feet from the house; one to be 8 x 8 feet in the clear, built of brick and cemented inside and made tight, and the other of rough field stone laid in dry, both to be domed over on top and to have bluestone 2 feet square. Run a 4 foot pipe from one to the other turned down in the tight one.

*Drain Tiles.*—Run a system of tile pipe 4 inches from all the leaders to cisterns with well cemented joints.

#### CARPENTER'S WORK.

*Size of Timber, etc.*—Sills, 3 x 8 in. laid flat; summers, 6 x 10 in.; first and second tier beams, 2 x 10, placed 16 in. on centers and bridged every 8 ft. where space will permit; main post, 4 x 6 in.; plates, 4 x 6 in.; main rafters, 2 x 8 in., 24 in. on centers; piazza rafters, 2 x 6 in., 24 in. centers; piazza ceiling beams, 2 x 6 in., 24 in. centers; hip rafters, 2 x 8 in.; valley rafters, 3 x 8 in.; ridge pieces, 2 x 8 in.; all studding, 2 x 4 in., 16 in. on centers, all door and window studs to be doubled, all door and window heads to be doubled, these studs to be well spiked at tops and bottom; piazza sills, 3 x 7 in., beam, 3 x 8 in.

*Sheathing.*—Sheathe all the vertical sides with matched hemlock boards laid diagonally.

*Siding.*—Put on siding where shown on plans, 6 in. Michigan strips, laid 4¼ in. to the weather.

*Paper.*—Paper all the vertical sides with No. 30 Manila building paper, lapped well and laid under all eaves boards and window and door frames.

*Shingles and Lath.*—Lath the entire roof with 1 x 2 in. spruce lath laid 5 in apart; cover these with best xxx 18 in. pine shingles, laid not more than 5 in. to the weather.

*Cornice.*—Form cornice as shown on the details, of good soft pine lumber.

*Side Shingling.*—Shingle the sides of building where marked, the bottom course to be rounded or hexagonal, as shown.

*Window and Door Frames.*—Make window and door frames as shown on the plans. Windows to be made for double sliding sash, hung on weights and cords. Door frames to be made with rabbeted jambs and 1¼ in. outside casing.

*Water Table, Corner Boards, etc.*—Put on water table as shown on plans, of good soft pine lumber. Corner boards, 1¼ x 5½ in.

*Piazza, Stoops, etc.*—Put up piazza as shown on plans and details, cornice and ceiling as shown, the floor of piazza and stoops to be laid with narrow matched boards laid in white lead joints and blind nailed; put up all lattice, stoops, etc., to suit the grade.

*Tinning, Leaders, and Flashing.*—Put in all necessary gutters and valleys of I. C. charcoal tin, 2 ft. wide, also put up all necessary 4 in. leaders to convey water to ground, with copper tubes in gutters. Do all necessary flashing of every description.

*Ornamental Work, Brackets, etc.*—Put up all necessary ornamental work, as shown on the elevations, of good, clear, soft pine. See details.

*Finials.*—Finish and set boxed wood finial on one spire, and furnish and set one metal finial of some neat design on the elevations.

*Blinds.*—Furnish and hang complete, painted outside, rolling blinds on all first story windows and second windows in kitchen. No blinds on cellar or second story of main part. The blinds to have domestic fastenings where needed, and all other fastenings to make them complete.

*Sashes and Glazing.*—All sashes to be made as shown on the various elevations, and glazed with second quality, double thick, French sheet glass, the cellar and attic single thick. All this glass to be well puttied.

*Floors.*—The entire first floor, except kitchen and bath room, to be laid with sound narrow tongued and grooved pine boards. Kitchen and bath room, yellow pine. Second story to be floored with wide flooring pine, all well laid and nailed.

*Partitions, Bridging, etc.*—Set all partitions, where shown on the floor plans, with 2 in. x 4 in. joist, 16 in. on centers, and well nailed at both ends. Bridge these partitions with 2 in. x 4 in. midway up, put in horizontally, and well nailed at each end. Bridge all the floor beams with 2 in. x 2 in. herringbone bridging, accurately cut at each end, and well nailed.

*Grounds.*—Furnish and set all necessary grounds for mason to finish to.

*Door Jambs, Trimmings, Bases, etc.*—All door jambs to be 1¼ in. thick, rabbeted; all casings as per detail; bases scribed to floor.

*Wainscot.*—Wainscot the kitchen 3 ft 6 in. high, with 3 in. yellow pine strips with bead on edge, and finish with nosing and cove finish; bath room the same.

*Stairs.*—Build main stairs, as shown on plans, with 1¼ in. treads, ⅞ in. risers, 1¼ in. strings, these to be inclosed with narrow pine ceiling 3 in. wide, forming rail on second floor. The kitchen stairs in similar manner. Build cellar stairs of rough spruce plank.

*Bath Room.*—Finish bath fittings in ash, top and facing to tub, facing to wash bowl, riser, seat, and lid to water closet; all these doors and lids hung with brass butts.

*Doors.*—The front door to be made in two sections, 2 in. thick by 8 ft. high, and moulded, paneled, etc., as shown on front elevation, and to have glass in upper panel, of French plate glass; all other room doors to be 1½ in. thick, four paneled and flush moulded; closet doors 1¼ in. thick, made in same manner. All doors to have hardwood saddles. All hearths to have hardwood hearth borders. All doors, where needed, to have rubber tipped bumpers.

*Corner Beads.*—All exposed plaster corners to have corner beads, nailed on with turned ends.

*Closets and Pantries.*—Kitchen and dining room closets to have a tier of five shelves high. Kitchen pantry to be regularly shelved. Bed room closets to have two shelves, with hanging hooks underneath.

The niche on either side of library windows to be regularly shelved up; all these shelves throughout to rest on rabbeted cleats neatly nailed to the wall.

*Hardware.*—All the double hung windows to hang on cast iron weights and to have Italian sash cord, and to have an improved bronzed sash fast; all windows which swing to hang on tight 3 x 3 butts, including cellar; all these windows to have proper hooks and fastenings. The front door to be hung on 5 x 5 in. imitation bronze butts, two to each door, and to have an improved lock and night latchment, with bronze knob outside and brass face flush bolts, to fasten doors together. Sliding doors to have "Hatfield" patent anti friction sheaves with brass track and astragal sliding-door locks, brass face and brass flush handles. Other doors to be hung with 4 x 4 in. imitation bronze butts. All room doors to have 4½ in. mortise locks, brass face, city make; all closet doors to have reverse bevel rim locks, the knobs throughout to be jet and bronze. Furnish all necessary wardrobe hooks, catches, buttons, hooks, small bolts, etc., and everything to complete the job.

*Privy.*—Build privy 6 x 5 ft. and 7 ft. high, to be studded for plastering, and exterior finished same as house; to have seats with covers to holes, hinged panel door, and two small windows.

*Coal Bins.*—Build coal bins in cellar, where directed, of rough hemlock boards.

*Tubs.*—Build and put up three wash trays, where directed, of 2 in. clear well seasoned white pine, jointed together in white lead, and set on turned legs, and to have 1¼ in. hinged covers.

*Mantels and Grates.*—The mantels and grates will be furnished by the owner, and contractor is to allow $200 for same.

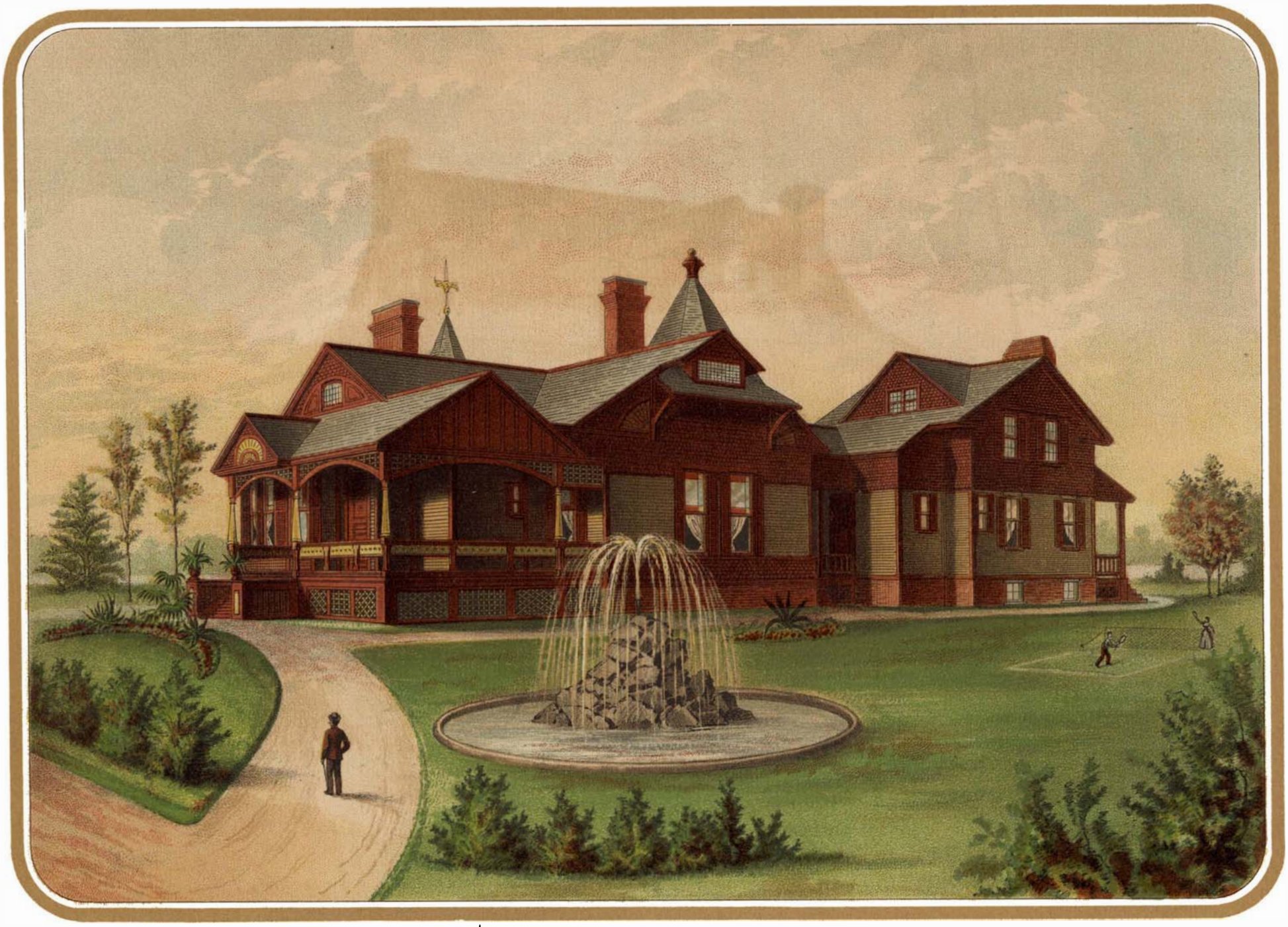
#### PAINTER'S WORK.

The whole of exterior of building to be painted two good coats of English white lead and linseed oil in such colors as may be directed; all tin work to be painted two coats of "Prince's" metallic paint. Chimneys painted same as house, all sashes cut in; also paint the bottoms of all outside doors and tops and bottoms of sashes; all knots and sap to be coated with shellac before priming is done; putty up all nail holes and cracks, joints, etc., and after priming is done, the outside of privy to be painted same as the house, the inside to be painted white.

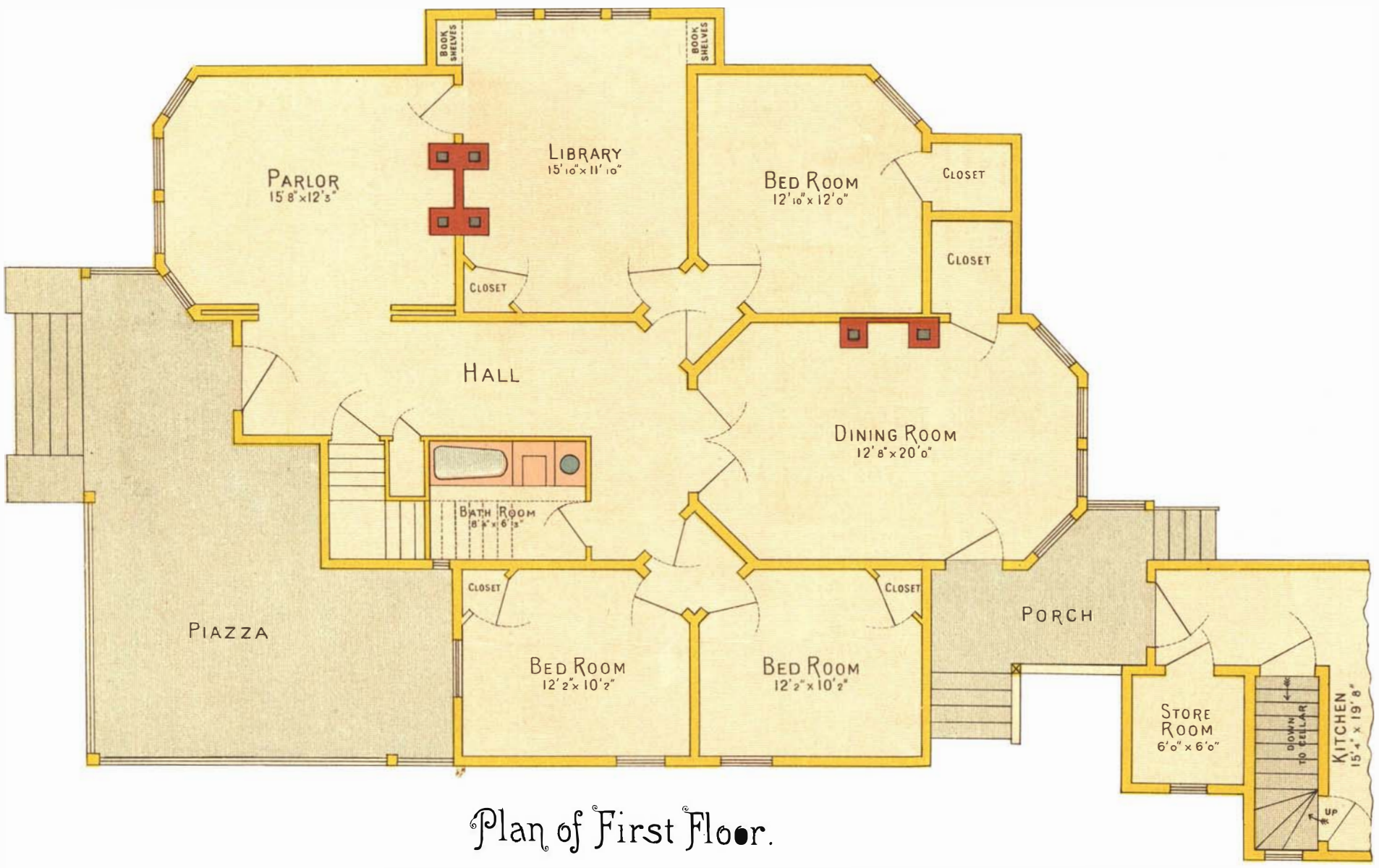
*Inside Finish.*—The inside to be finished with "Wheeler's" wood filler well picked out, and to be treated with two coats of hard oil finish, rubbed down on the last coat. All the nail holes to be puttied up, color to match that of wood. All door saddles and hearth borders to be oiled, the hard floors to be oiled and rubbed down.

#### PLUMBER'S WORK.

*Drain Pipes.*—Furnish and put in where shown on the plans a 4 in. cast iron drain pipe, to run from inside of building out to the tile drain 4 ft. outside of building, the drain tile to be trapped inside of the cel-



# A One Story Dwelling With Detached Kitchen. CHRISTOPHER MEYERS, ARCHITECT




Plan of First Floor.

lar wall, and to be supplied with fresh air from the outside of 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 drain in cellar a 4 in. cast iron soil pipe, and run same up to at least 4 ft. above roof, and cap with the "Smith" patented ventilating cap. Use Y branches for all waste connections. Coat the iron pipe with asphaltum, and in the cellar insert a 4 in. cleaning cap.

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

*Boiler.*—Furnish and put up where shown on the plans a 35 gallon copper boiler, and provide with drain cock for emptying the boiler and with shut-off cock for shutting the water off from second story. Provide with circulating pipe complete. Connect boiler draw cock with the sink waste. Put in a combined safe and cockrun valve on pipe at top of boiler. Boiler to have the "Lockwood" stand.

*Exhaust.*—Run from the highest point in hot water pipe a ½ in. lead pipe, to carry same 1 ft. 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, brass lined, and connected to a 1¼ in. B lead suction pipe. Insert an air cock, to prevent pipe from freezing in cold weather.

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

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

*Bath.*—Furnish and put up, where shown on the plans, a 16 ounce tinned and planished bath tub 5 ft. long, supplied with hot and cold water through ⅝ in. A lead pipe. To have a nickel plated combination compression bath cock, with rubber hose and sprinkler. Waste through a 1½ in. trap and 1½ in. C lead pipe, properly connected to main soil. Furnish the nickel chain and plug.

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

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

*Water Closet.*—Furnish and set in bath room, where shown on the plans, one "Inadosa" all-porcelain washout closet, with drip tray, also set up a painted iron cistern with flush tank attached. Supply cistern through ⅝ in. A lead pipe from main tank cistern, to supply closet through 1¼ in. D pipe. Ventilate the closet trap with a 3 in. lead pipe calked into main soil. Insert the nickel cap 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 in. all around, and to have ¾ in. D waste pipe running to cellar.

*Wash Trays.*—Supply wash trays with hot and cold water through ⅝ in. A lead pipe, and brass tray bibbs with flanges and thimbles. Provide an 1½ in. lead waste, connected to main soil, and properly trapped. Provide necessary chains and plugs of brass. Every trap to be placed as near to the fixtures as possible. Every trap in house to be separately ventilated, the same size as trap, and either connect with main soil above bath room fixtures or run independently to 4 ft. above roof line, and there cap.

*Range.*—Furnish and set a "Newport" range, and connect with boiler. The hot water pipe from range to boiler to be ¾ in. A.

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

*Gas Pipes.*—Put up gas pipes with outlets, as shown on the plans, and according to the rules of the gas light companies. All outlets are to be capped, and all pipes tested. All side lights are to be not less than 5 ft. 6 in. from floor. All drop lights to be hung plumb.

ESTIMATE AND BILL OF MATERIALS AS PER SPECIFICATION ABOVE.

| *Mason's Work, etc.* | Each. | |
|---|---|---|
| 115 cubic yards excavating | $ 25 | $25 75 |
| 8 brick piers complete | 3 00 | 24 00 |
| 4 stoop stones laid complete | 10 00 | 40 00 |
| 66 perches stone work | 4 50 | 297 00 |
| 38 perches filling to trenches | 2 00 | 76 00 |
| 286 feet cement bottom | 4 | 11 44 |
| 2 cesspools complete | | 40 00 |
| 1 cistern | | 50 00 |
| 1 privy vault complete | | 8 00 |
| Drain tiles complete | | 30 00 |
| 1 chimney complete | | 180 00 |
| 890 yards sup. plastering | 40 | 356 00 |
| 4 center pieces | | 7 00 |
| 1 bluestone hearth and shelf set | | 20 00 |
| Incidental expenses | | 25 00 |
| Total | | $1,193 19 |

| No. of pieces. | Size. | *Carpenter's Work.* | |
|---|---|---|---|
| 2 | 3″×8″×24′ 0″ | = 96 feet. | |
| 2 | " ×25′ 4″ | = 101 " | |
| 1 | " ×29′ 4″ | = 59 " | |
| 1 | " ×18′ 0″ | = 36 " | |
| 1 | " ×17′ 0″ | = 34 " | |
| 2 | " ×21′ 0″ | = 84 " | |
| 2 | " ×16′ 0″ | = 64 " | |
| | | = | 474 feet. |
| 35 | 2″×10″×16′ 0″ | = 934 feet. | |
| 64 | " ×13′ 0″ | =1,387 " | |
| 40 | " ×11′ 0″ | = 734 " | |
| 48 | " ×14′ 0″ | =1,120 " | |
| 30 | " ×17′ 0′, | = 850 " | |
| | | = | 5,052 feet. |
| 31 | 2″×8″×16′ 0″ | = 662 feet. | |
| 40 | " ×12′ 0″ | = 640 " | |
| 14 | " ×14′ 0″ | = 261 " | |
| 45 | " ×18′ 0″ | =1,080 " | |
| 4 | " ×21′ 0″ | = 112 " | |
| 8 | " ×20′ 0″ | = 213 " | |
| 1 | " ×24′ 0″ | = 32 " | |
| 1 | " ×32′ 0″ | = 43 " | |
| 1 | " ×26′ 0″ | = 35 " | |
| 16 | " ×13′ 0″ | = 277 " | |
| | | = | 3,355 feet. |
| 2 | 4″×6″×24′ 0″ | = 96 feet. | |
| 4 | " ×16′ 0″ | = 128 " | |
| 1 | " ×25′ 0″ | = 50 " | |
| 3 | " ×12′ 0″ | = 72 " | |
| 3 | " ×15′ 0″ | = 90 " | |
| 4 | " ×18′ 0″ | = 144 " | |
| 1 | " ×20′ 0″ | = 40 " | |
| 1 | " ×14′ 0″ | = 28 " | |
| 1 | " ×28′ 0″ | = 56 " | |
| | | = | 704 feet. |
| 2 | 4″×4″×22′ 0″ | = 59 feet. | |
| 2 | " ×16′ 0″ | = 43 " | |
| | | = | 102 feet. |
| 6 | 4″×6″×16′ 0″ | = 192 feet. | |
| 8 | " ×20′ 0″ | = 320 " | |
| 25 | " ×14′ 0″ | = 700 " | |
| | | = | 1,212 feet. |
| 80 | 2″×4″×16′ 0″ | = 853 feet. | |
| 400 | " ×14′ 0″ | =3,733 " | |
| | | = | 4,586 feet. |
| 1 | 3″×7″×20′ 0″ | = 35 feet. | |
| 1 | " ×24′ 0″ | = 42 " | |
| 1 | " ×18′ 0″ | = 32 " | |
| 1 | " ×14′ 0″ | = 25 " | |
| 1 | " ×27′ 0″ | = 47 " | |
| | | = | 181 feet, |
| 3 | 2″×7″×12′ 0″ | = 42 feet. | |
| 2 | " ×18′ 0″ | = 42 " | |
| 1 | " ×16′ 0″ | = 19 " | |
| 1 | " ×14′ 0″ | = 16 " | |
| 1 | " ×20′ 0″ | = 23 " | |
| 2 | " ×24′ 0″ | = 56 " | |
| 1 | " ×22′ 0″ | = 26 " | |
| | | = | 224 feet. |
| | | | 15,863 feet. |

| | | Each. | |
|---|---|---|---|
| 15,863 | feet dimension timber laid on | $ 25 | $396 58 |
| 30,000 | 18″ pine shingles laid on roof | 7 50 | 225 00 |
| 840 | 1×2×12 shingle lath laid | 7 | 58 80 |
| 12,000 | 18″ pine shingles for vertical sides laid on | 7 50 | 90 00 |
| 3,200 | feet matched sheathing and paper for vertical sides laid on | 25 | 80 00 |
| 1,200 | feet 6″ siding laid on | 40 | 48 00 |
| 5,500 | " main and piazza cornice put up | 55 | 302 50 |
| 265 | feet water table put on | 30 | 79 50 |
| 3 | square columns back porches fixed | 2 00 | 6 00 |
| 4 | turned columns front piazza fixed | 3 00 | 12 00 |
| 1 | stoop post put up | 1 50 | 1 50 |
| 50 | feet piazza rails and balusters put up | 45 | 22 50 |
| 53 | feet facia and lattice put up | $ 40 | $21 20 |
| | Front steps complete | | 18 00 |
| | Three other steps complete | | 25 00 |
| 575 | feet piazza and stoop floors laid | 8 | 46 00 |
| 550 | feet piazza ceiling laid | 8 | 44 00 |
| 200 | " five inch corner board | 5 | 10 00 |
| 4 | large brackets | 2 50 | 10 00 |
| 2 | radiators on side gable | 3 50 | 7 00 |
| | Ornamental filling in piazza gables | | 12 00 |
| 5 | sections of ornamental filling front piazza | 8 00 | 40 00 |
| 1 | wood finial on spire | | 4 00 |
| 1 | metal " " | | 10 00 |
| | Tin work and conductors | | 60 00 |
| 225 | feet band course at bottom of shingles | 20 | 45 00 |
| 2,200 | feet first floor laid complete | 5 | 110 00 |
| 2,000 | " second floor laid complete | 5 | 100 00 |
| 4 | cellar windows complete | 2 00 | 8 00 |
| 22 | first story windows with blinds | 14 00 | 308 00 |
| 6 | second story windows, blinds over kitchen | 10 00 | 60 00 |
| 28 | doors complete, hung and trimmed | 10 00 | 280 00 |
| 400 | feet 7″ base and moulding | 6 | 24 00 |
| 8 | closets finished complete | 3 00 | 24 00 |
| | Finishing bath room complete | | 20 00 |
| | Cellar stairs complete | | 5 00 |
| | Kitchen stairs complete | | 22 00 |
| | Front stairs complete, including ceiling | | 50 00 |
| | Mantels and setting, including grates | | 225 00 |
| | Outside privy | | 15 00 |
| | Incidental expenses and jobbing for other trades | | 150 00 |
| | | | $3,075 58 |

*Summary.*

| | |
|---|---|
| Mason's work | $1,193 19 |
| Plumber's work as per specification | 310 00 |
| Painting outside and finishing inside | 250 00 |
| Carpenter's work | 3,075 58 |
| Total | $4,828 77 |

## A $2,600 COTTAGE.

A portion of the colored plate accompanying the present number represents a cottage of pleasing appearance, lately erected for Mr. W. P. Macomber at Portsmouth, R. I. The treatment of the roof and convenient arrangement of the rooms are both very satisfactory, and the whole design is one of considerable merit and usefulness.

Mr. George W. Cady, the successful and well-known architect, of 164 Westminster Street, Providence, R. I., is the author of the design.

A number of detail drawings, with roof plan and elevations, are shown upon our supplementary sheet, and following is the specification used in the erection of the building:

SPECIFICATION OF A DWELLING TO BE BUILT ON THE OWNER'S LOT, AT PORTSMOUTH, R. I., FOR MR. W. P. MACOMBER.

The house to be as per plans and figures on the same, substantially as shown, all dimensions to be verified on the works.

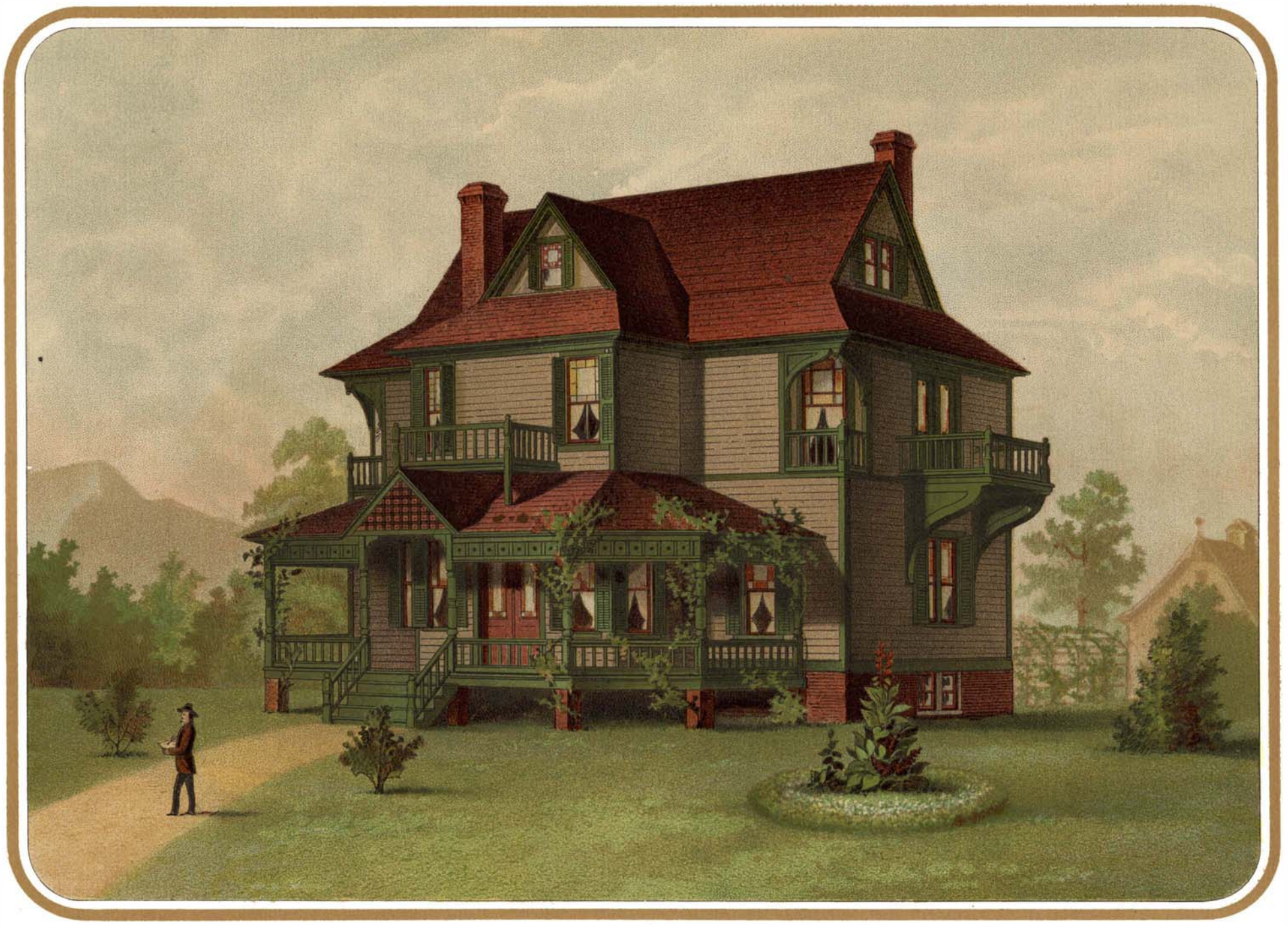
*Excavator.*—The cellar the full extent of the house. Trenches for foundation of steps or piers, and cross wall, pipes for drain, chimney foundations, and cesspools and cisterns to be dug the required depth, and all dirt not wanted for grading to be carted off. The loam to be saved by itself. Cellar 7 ft. 6 in. deep in the clear. All outside piers, etc., 2 ft. 6 in. under surface to their foundations. Cesspool 20 ft. from the house; size, 10 ft. deep, 6 ft. at the bottom, tapering to top, and covered over with flat stone under surface 2 ft. House foundation stone, 6 in. under cellar bottom. The same for chimneys.

*Walls.*—The cellar walls to be built up 18 in. thick, laid in cement mortar, underpinning faced both sides. Outside rubble work, natural face, the joints struck. Cellarway jambs the same. Chimney piers good common work.

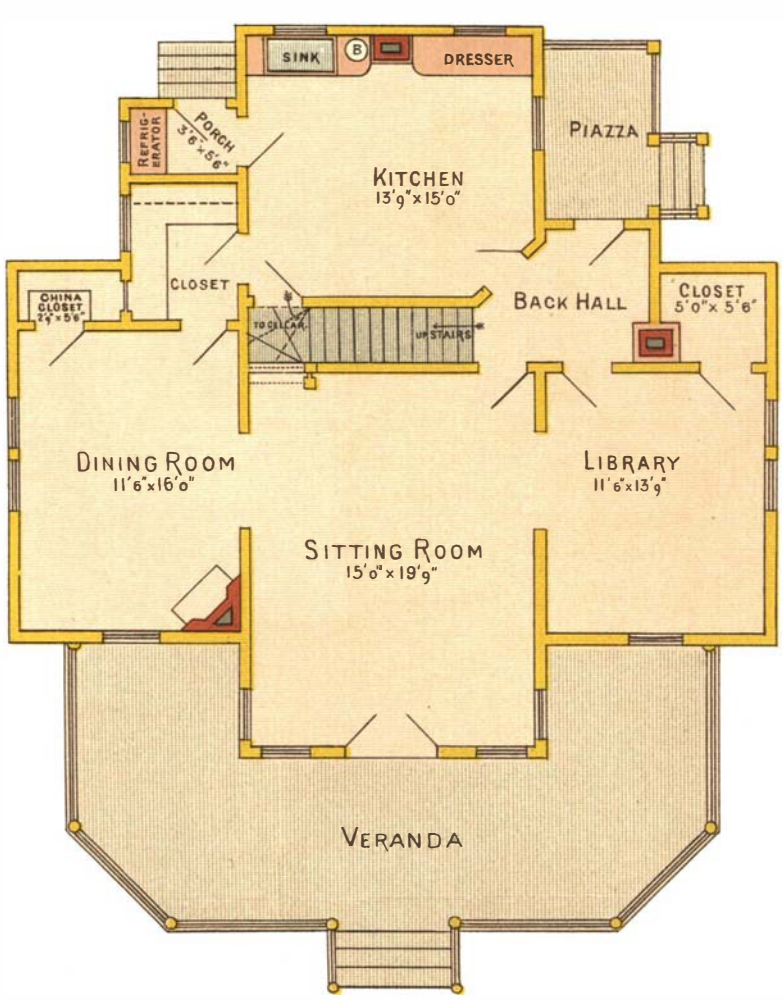
*Cross Walls.*—The several cross walls to be of brick, laid in mortar, close up to joists, and between joists up to floors, using good, hard building brick. The piazza piers to be Danvas brick.

*Chimneys.*—To be built as per plans. Hearth places arched to trimmer. The several fireplaces to be laid up with Danvas pressed brick. The tops to be the same. Flash with 3 oz. lead at roof. The shaft to be good brick, laid full in mortar. Black mortar in the fireplaces and tops. The shaft to be plastered directly on the brick, on the outside, from cellar to roof. Pipe rings of 6 in. vitrified pipe to be built in where required.

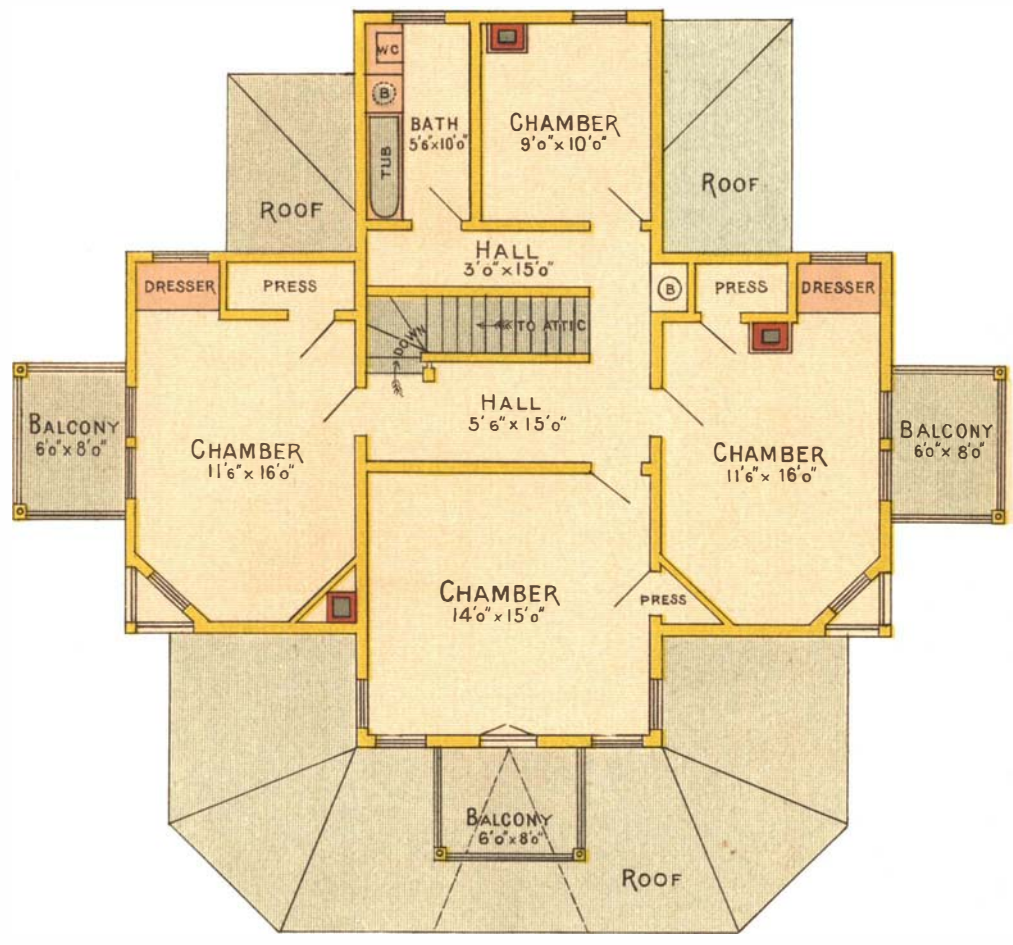
*Cesspool.*—To be stoned up, and covered with stone or brick arch. Six inch vitrified drain pipe, to be run from house to it, trapped outside of wall, all well cemented, tight and secure.



# A Two Thousand Six Hundred Dollar Cottage. GEORGE W. CADY, ARCHITECT.




Plan of First Floor.




Plan of Second Floor.

SCHUMACHER & ETTLINGER, NEW YORK.

*Lath and Plastering.*—The first and second stories to be lathed on sides and plastered. One good coat of spruce lath, well nailed, and good, strong mortar. Slake and run lime through sieve. Mix with clear grit sand and cattle hair in proper proportions. Put on and float. The three rooms and hall in the attic to have one good coat, sides and ceiling.

*Pointing.*—Point and whitewash the cellar walls.

*Cement.*—Cellar steps to be bluestone, with brick pier. Window stools rowlock course of brick laid in cement. Cellar bottom to be cemented in the hall and wash rooms 2½ in. thick, level and true in the Rosendale cement and sand, in proportions of 1 to 3.

*Cistern.*—A cistern to be dug to hold about 2,000 gallons, to be cemented on the earth secure and tight, with overflow to a dry well. The inlet pipes to be 3 in. vitrified drain pipe, leading to the conductors. This pipe to run to the bottom of the cistern (will require 25 ft. of pipe). The pump pipe to be cemented in the bottom end, to be covered with a beehive brick filter.

CARPENTER'S WORK.

*Generally.*—The building to be well framed, with good mill sawed spruce timber, spiked and nailed securely together. Sizes as follows: sills and posts 4 in. x 6 in., piazza sills 6 in. x 6 in., resting girts of second floor, at ends of joist, 4 in. x 6 in., cross beams 6 in. x 8 in. Frame in end floor joist and halve studs, plate 4 in. x 4 in., joist 2 in. x 8 in., 16 in. centers, 4 in. x 8 in. under cross and openings, and for trimmer heads and joist, ceiling joist, attic 1¼ in. x 6 in. Also over L, studs, 2 in. x 4 in. outside, 16 in. centers, curb of L 2 in. x 8 in. Rafters, 1 slant 2 in. x 4 in., 2 ft. center, upper 2 in. x 8 in. cambered. Main rafters 2 in. x 7 in., hips and valley rafters 2 in. x 8 in., 2 ft. centers, ridge 1 in. x 8 in., inside main partition 2 in. x 4, 16 in. centers, double at doors and trussed, others 2 in. x 3 in. Set all partitions under 3 in. x 4 in. plate. Notch on joists, etc. Plate of piazza 4 in. x 6 in. Rafters 2 in. x 6 in., planed and jack planed cornered, ½ in. ends from bracket, main rafters the same, all as per plan and details.

*Boards.*—Boarding of piazza roof 1⅛ in. planed, matched, and beaded spruce, laid smooth side down. Top roof of L the same, ⅞, not beaded. Back porch roof the same as the front. Other boarding on sides and roof to center of band on sides, mill planed hemlock, square edge. All well nailed.

Boarding below the band to be ⅞ in. weather boarding, 5 in. widths, sound seasoned pine, Michigan strips, nailed square through. Band, ⅞ in.; corner boards, 6⅞ in.; base ⅞.

*Jett.*—Main jett and other finish pine, and as plans and detail. The gutter on the main house to be trimmed. Two 3½ in. tin outlets will be put in where directed to connect conductors. The valleys will be shingled open, on one width of tin strip, painted both sides before the shingles are laid. Fastenings will be put in where required. A 4 in. dug out pine gutter will be put in at the flat on L, and the water supply the tank. Two short pieces of the gutter to be put from valley to it.

*Roof.*—The main roof and piazza and porch roofs to be shingled with first quality of Eastern shaved shingles, laid out not over 5 in. to the weather, and well nailed. The gable and sides to be 4 in., shingled with the same kind, laid not over 5½ in. to weather, and nailed as above. So much as comes in the gables will be clipped on but 1 in.

*Paper.*—Between the studs of the first story, put resin sized sheathing paper against the boarding, secured with a lath or strip nailed to stud.

*Door Frames.*—Cellar door frames rabbeted, 3x4 joist for size of doors required. All other door frames rabbeted plank of the kind of stock that may be chosen.

*Window Frames.*—The cellar window frames to be rabbeted pine plank, as per sizes given, 1¼ in. sash, to be hung with butts, and fasten down with button and up with hook and staple, ⅛ in. wire.

*Main.*—All the other window frames to have hard pine pulley stile, plowed for spline and bead, 1⅜ in. lip sash, sizes given, plank stools, and as per plans, all to be fitted with Sweet's spring on top and bottom sash, also with thumb lifts.

*Partition.*—All the several partitions to be well set, and the furring complete to receive the lath. Carpenters will cut for pipes and case where required.

*Iron Roof.*—The flat part of the roof to be covered with Smith's patent iron roofing, painted two coats.

*Floors.*—The attic floor to be ⅞ in. planed and matched spruce, well driven up and nailed. Other floors, except as hereafter designated, 1⅛ in. spruce, as above. Kitchen, closets, bath room, and back hall floors 1⅛ in. Southern hard pine, as above. Piazza and porch floors the same, square edge. Dining room floor, alternate strip of cherry and maple, 3 in. in width.

*Sides.*—The sides of the kitchen, back halls, and back stairs, also the bath room, well sheathed upright, 3 ft. high, with Southern hard pine, ½ in., as above, on the top edge, 1½ in. moulding.

*Stairs.*—Back stairs built with side partition of ⅞ in. hard pine, treads 1⅛, risers ⅞, and cove the same. Cellar flight the same, flight to attic the same.

*Front.*—The front flight to be post and rail stairs, all ash, treads 1⅛ in., risers ⅞ in., strings 1⅛ in., rail 2 in. x 4 in., post 4 in. x 4 in., turned top and bottom, balusters 1¼ in. turned pattern face band, under band, nosing and cover. Cellar sash, 1¼, two lights; attic sash, 1¼, lights as follows: Second story sash, 1⅜ lip; first story sash, 1⅜ lip. Glass to be first quality French sheet.

*Doors.*—Front doors will be one pair 7 ft. 6 in. x 5 ft. 1¾ in., panels as shown, upper ones glazed (plain). Vestibule doors the same size, 1⅜ in., three panels to each part. Library and dining room doors the same as vestibule. Other doors, 2 ft. 10 in. x 6 ft. 10 in. x 1⅜ in., five raised panels and cope moulding, all alike. Second story doors the same, 2 ft. 8 in. x 6 ft. 6 in., 1⅜ in., second quality. Attic doors 2 ft. 6 in. x 6 ft. 6 in., 1¼ in., four panels, third quality, all well fitted and hung. The two back doors to be 1¾ in. thick, 2 ft. 10 in. x 6 ft. 10 in., as above. Use suitable size black enameled acorn butts and flush edge bolts on double doors, top and bottom; barrel bolt on back doors, good two-lever mortise locks, brass face and strike; common butts and iron faced locks in attic; strap hinge and box lock, with thumb latch for all cellar doors, closet cupboards, etc., doors to have bronzed iron catches and pulls, suitable butts.

*Hardware.*—Knobs of attic, kitchen, and all doors in rear of sitting room, etc., to be white porcelain, nickel rose and escutcheons, maple strikers behind all. Doors of library, dining room, sitting room, etc., to be pearl white, bright rose and escutcheon. Front door, bright bronze, bell pull the same.

*Finish.*—Dining room to be finished in pine, sitting room to be finished in ash, and library to be finished in pine. Second story, front of back hall, in pine; rear room, bath, and hall, hard pine. Casings, single architrave, not to exceed 5 in. bases, 7⅛ in. with 2 in. moulding, for best rooms. 6 in. in attic and presses, press and closet casings 3 in. Band around dining room 5 in. wide moulded. Pine strip 2½ in. (shelves) in each press, 1 in closets, as may be required, stool casings.

*Casings.*—Case up bath tub, bowl, and seat in black walnut, as usually done.

*Hooks.*—put up wardrobe hooks of double pattern, in all cloth presses, one row all around.

*Closets.*—Closets to be finished in pine, the dining room closet to have broad shelf, under it one shelf in cupboard, and three drawers put in slide between, the other closet put up five shelves on back side and three over slide. Fit up in the other closet with broad shelves, a place for flour barrel, cupboard with one shelf, and three 2 ft. drawers, four shelves over broad shelves on two sides, all as per plans. Put up in the kitchen a wide dresser shelf, with cupboards. Set one 3 ft. 6 in. x 24 in. "Miller" sink. Case up with cupboards. Case a wash bowl in pine on the stoop. Set the 3 in. x 6 in. joist over the bath room, so as to make a tank 1 ft 6 in. lower than other ceilings, and build up a tank 3 ft. deep the size of the bath room, stud the sizes up to the roof, and line with 1⅛ spruce matched stock, all well secured.

*Blinds.*—To be hung to all the windows, two fold common lap slat blinds, with the best fastenings.

*Conductors.*—To be two stacks of 2 in. x 4 in. corrugated iron conductors, put up where the drains stop at the rear end, also two at the front to the ground.

*Tubs.*—Carpenters to build three plank washtubs, set the same and build a piece of floor in front of them the length and 3 ft. wide.

PLUMBING.

Line the tank 6 ft. 6 in. x 12 ft., 3 ft. deep, with 16 oz. planished copper. Put in a 3 in. copper inlet pipe from the gutter to it, also a cup top 3 in. overflow pipe to the conductor. This tank to be supplied with water from the cistern with a 2½ in. double acting force pump, located at the kitchen sink. Suction pipe 1¼ in. connecting cistern, main rise pipe 1⅛ in. to tank. Put in shut off between tank and pump, put stop cock at sink. Waste pipe to sink to be 1½ in. lead, 3 lb., well trapped, and connecting drain.

Set in bath room one 5 ft. 6 in. copper (16 oz.) planished bath tub, supply from tank, with stop, and ⅝ in. A pipe, waste 2½ lb., and trapped. Set one "Bartholomew" water closet, with S lead trap, 4 in. soil pipe of cast iron, socket joint calked with lead. Supply from tank with ⅝ in. A pipe. Set one 12 in. porcelain wash bowl, with back end and top slab of marble. Supply with ⅝ in. A pipe and stop.

Set a bowl, the same kind, in the porch, top slab wood. The soil pipe will vent out of the roof in 2 in. pipe, the water closet will vent under the seat into the chimney flue in tin pipe. All the stops, handles, etc., of the plumbing works, showing, to be nickel plated.

Fit two "Miller" sinks, supply and waste, one to be in the kitchen Set one 25 gallon range boiler, with circulation and hot water to all in the bath room, the two sinks and one of the wash tubs. Fit the wash tubs with supply and waste, as above, for the plumbing.

*Mantels.*—There are to be six wooden mantels built, with the finish of the rooms, all of hardwood, 4 in. pine and 2 in. ash, at an average cost of $10 apiece. Put up a shelf at kitchen chimney of hard pine, supported on brackets.

PAINTING.

The outside finish to be painted two coats of Johns' asbestos prepared paint, as follows: Gable shingle and that on the sides red, the main finish light drab, the weather boarding dark drab, piazza floors oiled two coats. The inside hardwoods to be covered with shellac two flowing coats, the pine work painted two coats, the floors to be oiled two coats where hard woods are used, all work to be well rubbed on first coat and puttied clean, and to match wood or paint.

*Generally.*—This specification is intended to cover all the items to fully complete the above named house, according to the plans accompanying the specification, and the detail for the same, to the satisfaction of the owner and of Geo. W. Cady, architect.

## OUR FIRST TWO VOLUMES.

The first and second volumes of our ARCHITECTS AND BUILDERS EDITION, comprising all the issues of the work from its commencement to close of 1886, are now ready for delivery, bound in handsome paper covers. Price $1.50 per volume. To be had at this office and of book and news dealers throughout the country. Those who have not seen a year's collection of our numbers put together will be surprised at the wealth and variety of contents which these volumes present, as well as at the cheapness of the price.

These two volumes contain all the numbers of the work from its commencement up to and including December, 1886. They embrace twenty-eight splendid plates in colors, representing the perspective elevations and plans of various dwellings, all having attractive features; fourteen large double sheets of details of construction of structures, nearly two hundred additional engravings of architectural subjects, public works, buildings, dwelling houses, cottages, etc., with plans; and upward of six hundred other engravings, mostly of superior character, illustrative of works and subjects interesting to architects and builders Including all the separate diagrams and engravings of construction details, the two volumes present not far from two thousand illustrations. The reading matter covers a large variety of useful and excellent subjects, interesting to every one. No architect, builder, contractor, engineer, or householder can afford to be without this splendid work.

### A Splendid Number for April.

The next number of our paper, April, will be one of unusual excellence. One of the colored plates will present a perspective view of a dwelling of small cost, built especially with a view to alteration and enlargement at a future time, should the owner so desire. The arrangement of doors, windows, and floor plans is such as to coincide with the plans of the new enlargement whenever made. Full working drawings, a sheet of details, estimates and specifications will be given. In a following number we shall give a colored plate, showing the appearance of the same dwelling after its enlargement and improvement, with working drawings, estimates, etc.

We shall also present in our next number a series of beautiful illustrations of ornamental plaster work, showing how the interior apartments of dwellings may be greatly improved in appearance at a very small cost. These illustrations will be accompanied by practical directions for executing the work, and will be invaluable to builders and plasterers, as well as to architects and owners. In addition to the foregoing, many beautiful plates, plans, and engravings of dwellings and buildings of all kinds will be presented, of rare interest and value.

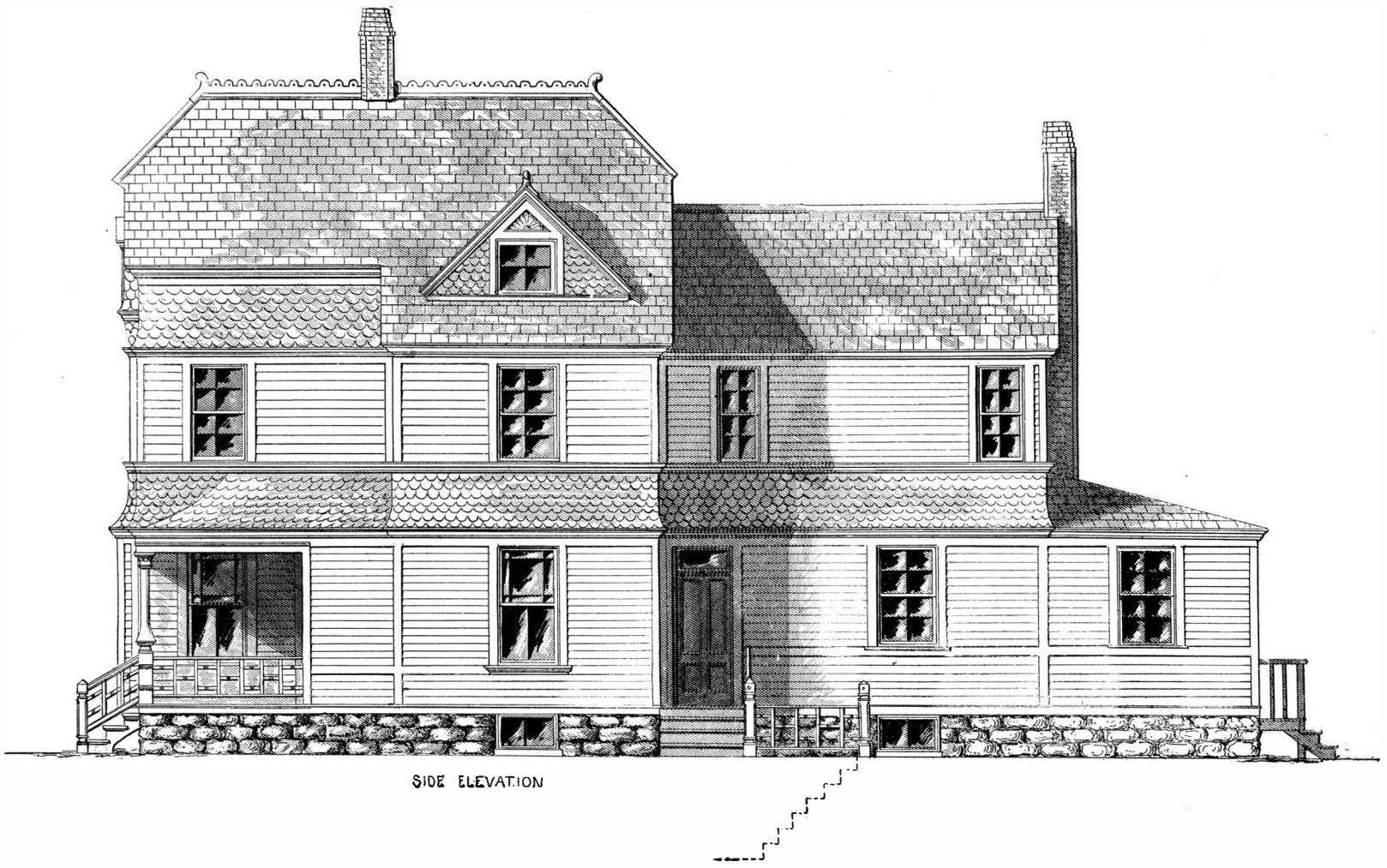
We believe there is no other building paper at present published in which so many plans, details, and specifications are regularly presented as the SCIENTIFIC AMERICAN. Hundreds of dwellings have already been erected on the various plans we have issued during the past year, and many others are in process of construction. Architects, builders, householders, and all who contemplate building of any kind should possess this work. It is full of useful information, and its illustrations have a permanent value for suggestion and reference.

### A Notable Copper Roof.

The State of Texas, which is about completing its new capitol, will cover it with copper, using about 800 squares.

The Cincinnati Corrugating Co., of Cincinnati, Ohio, has the contract for this copper roof, which will be, perhaps, the largest amount on a single building in the United States.

A PROPER, safe working load for wire ropes is as follows: One-half inch in diameter, 1,000 pounds; five-eighths rope, 1,500 pounds; three-fourths rope, 3,500 pounds; one inch rope 6,000 pounds. This is for nineteen wires to the strand, hemp centers.



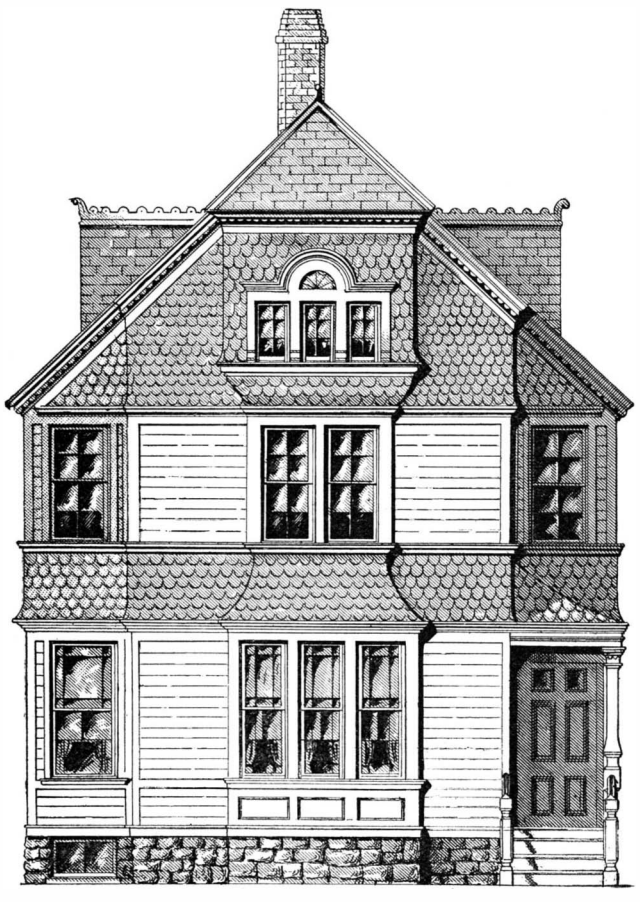
SIDE ELEVATION

# A Suburban Dwelling.

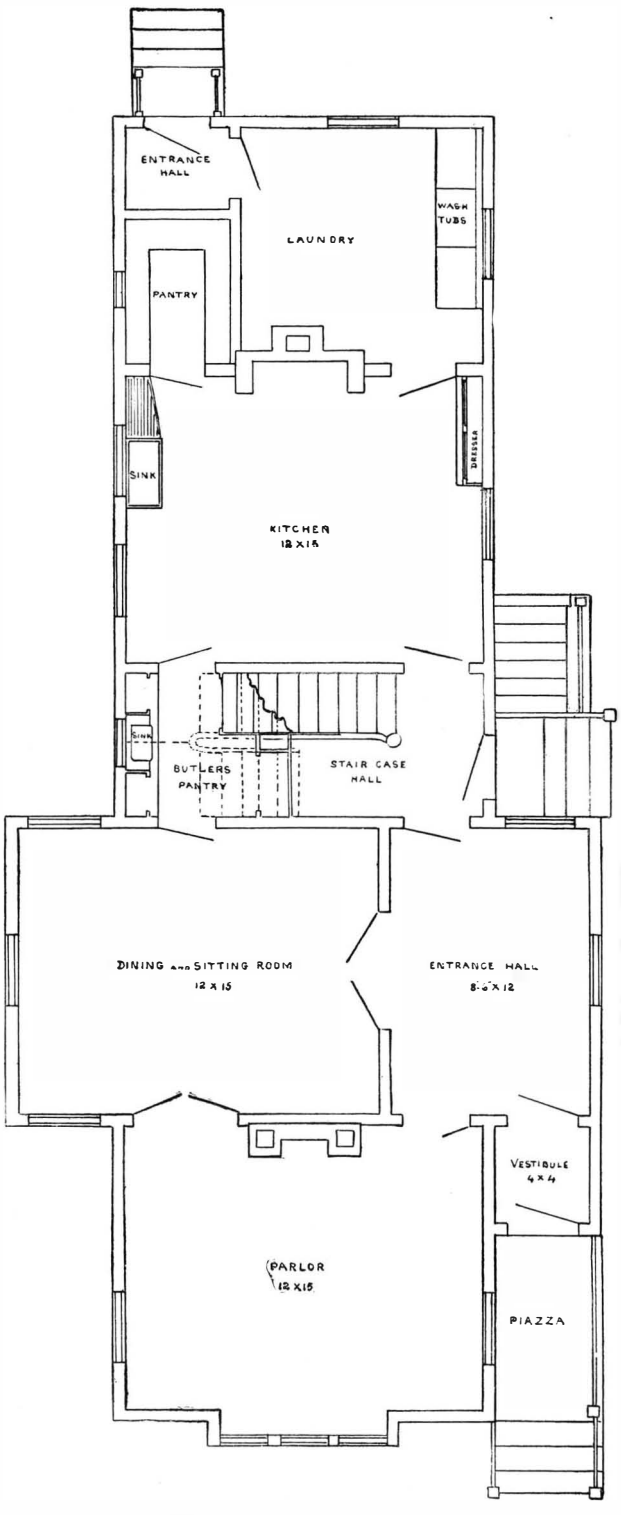
## Cost, $2,800.

## Charles G. Jones, Architect, New York.

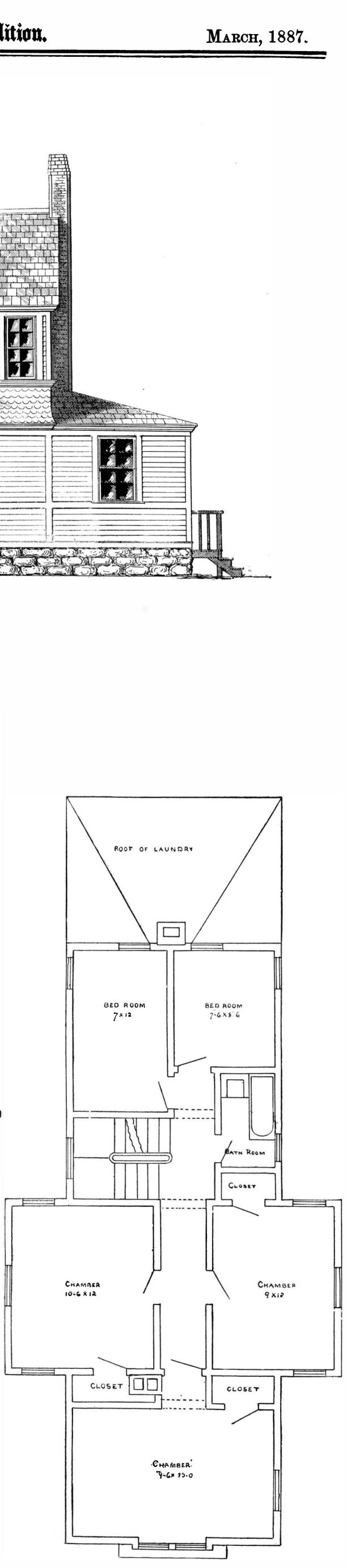
[For description see page 59.]



FRONT ELEVATION.




FIRST FLOOR PLAN.

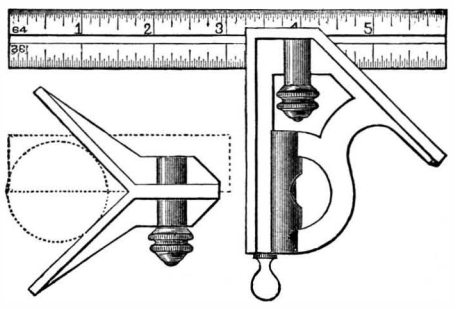



SECOND FLOOR PLAN.

Scale, one-eighth inch to one foot.

### STARRETT'S PATENT COMBINATION SQUARE.

With the adjustable scale this forms one of the most convenient and useful tools devised for the use of carpenters and mechanics. One is a complete substitute for a whole set of common try squares, and is one of the best gauges for transferring exact measurement or laying out work. It is also convenient for a depth gauge or to square in a mortise. For a miter it is perfect, while with the auxiliary center-head it forms a centering square, both inside and outside, which is unequaled for convenience and accuracy. L. S. Starrett,



of Athol, Mass., is the manufacturer, and will be pleased to send his catalogue and price list of fine tools for carpenters and machinists on application.

### WOMEN OUT OF DOORS.

It is thirty years and more since Thomas Wentworth Higginson wrote his famous essay on "Saints and their Bodies." It struck a new note. Before that time, the intellect and the soul had been cultivated. Learning, philanthropy, and religion were of consequence. To cultivate the body might be well enough for pugilists and circus riders, but was unworthy the serious thought of refined men and women.

Colonel Higginson's essay is to-day the keynote of a grand chorus in which men and women throughout the civilized world unite with ever-growing enthusiasm. Health is now the fashion. To cultivate the body is counted as essential to the best development as to fill the mind with learning. Every college has its gymnasium, every girls' school its regular system of exercise. Colonel Higginson is himself the president of the greatest 'cycle club in America, and in Boston a noble building for a ladies' gymnasium has just been dedicated under the auspices of the best society.

During the past five years a great advance has been made by the women of this country in the direction of physical culture. It is no longer counted unwomanly to use the same care in promoting health and vigor by intelligent exercise that one would use in developing literary taste or artistic skill by appropriate culture. The effect of this change is already seen in the growing strength of young women and their satisfaction in the ability to do things that would have crushed the belle of twenty years ago. Lawn tennis, rowing, horseback riding, tricycling, walking, and regular gymnastic training are in varying degrees popular among the women of to-day. They are found to be not only delightful in themselves, but of direct value in promoting health, strength, beauty, and happiness.

Among these, the tricycle is already recognized as the most useful and enjoyable means of bringing women into the open air and into contact with the attractions of nature. It is safe to say that five years ago there were not a score of lady 'cyclers in this country. Even in Europe there were few. To-day they are numbered by thousands, and hundreds of refined and cultured ladies are joining the ranks of riders every season.

The invention of the tricycle, and its rapid advance to the present state of mechanical perfection, is, I am firmly persuaded, the greatest boon to American women that the century has brought. Coming simultaneously with the conviction that "bodily exercise profiteth" much for womankind, it provides a way to take that exercise which is at once fascinating, graceful, invigorating, and healthful.

The tricycle is in the first place an economical vehicle. Its original cost is about the same as that of a very ordinary horse; but once bought and paid for, its expense of operation and keeping in order is almost nothing. Its diet is oil, its shoeing needs to be done say once in every twenty thousand miles, its repairs—if the machine is a good one—are trifling, and its daily care is not so great as that of a pet poodle. The machine may be kept in a front hall, a cellar, or a barn. It is always ready, by night or day. A chain and padlock will securely fasten it at the house of a friend, the market, or the church.

In the second place, it is mechanically adapted to afford the best possible exercise at the smallest expenditure of fatigue and nervous energy. The lady who mounts a tricycle with pedals and handles properly adjusted will be nearly erect on the pedals, and will use feet and legs very much as in rapid walking. At the same time the shoulders are thrown back, the lungs expanded, and through the action of the arms and the muscles of the back, the whole system receives constant but not exhausting exercise. The deep breathing that is a necessity for the tricycler is of great value to women in developing the strength of their lungs and the faculty of continued exertion. The whole body is more thoroughly exercised in riding a tricycle than in any form of exercise which I have ever tried, and yet so perfectly adapted to human needs is it that the fatigue of a ten mile ride is less than one would experience in walking a tenth of the distance.

There is a fragile woman in a neighboring city, who could not bear a carriage drive of half an hour without being prostrated with weariness. Her husband rode home one day a tricycle, in the faint hope that it might be of use to her. She rode a mile at the first trial, and came home refreshed. The machine was purchased, and I have known her to ride a dozen miles in a hot July day, with pleasure and advantage, when a walk of forty rods would formerly have exhausted her strength. She has been riding now for two seasons, is greatly benefited by it, and is making extensive plans for using a tandem tricycle with her husband, next summer.

The tricyle is unique, as far as I am aware, in that it affords the most thorough and pervasive exercise of all parts of the body, at the same time that the mind is so fully occupied with the care of managing the machine and enjoying the feast which nature spreads on every side, that one is conscious only of the pleasure, and gets the exercise as it were gratuitously. A ride over a pleasant country road in the early morning hours of a June day is an experience of rare delight. With a congenial companion the enjoyment is doubled. The fragrance of the woods and fields, the music of the birds, the exhilarating sense of rapid motion through the soft air, the free bodily movements, in which the tricycle seems only an added physical faculty, all go to make up an experience that, having once enjoyed, one is eager for a thousand times again.

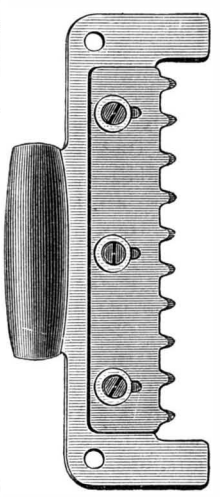
The practicality of the tricycle as a vehicle for the daily use of women is undoubted. There is scarcely a large town in the land where there are not some ladies who use the tricycle as others do their horse and carriage. It is always ready at the door for an errand to the market, a call on a friend, a spin for pleasure, or a journey to the next town. And where is the horse that, driven by his mistress, can be counted on for a uniform speed of eight miles an hour, with possibilities of ten or twelve on fine roads? The absolute independence which the woman with a tricycle has of mankind in every form, from the stable boy to her husband, is peculiarly gratifying to those who have always been compelled to wait the pleasure or convenience of the sterner sex.

The last two years has greatly developed the tandem tricycle in this country, which until that time was almost wholly used in England and on the Continent. Very good machines are now made on this side of the water, and their use is rapidly increasing here. The special advantage of the tandem is that it affords pleasant conveyance for a gentleman and lady, or two gentlemen, giving each equal use of the strength of both in propelling the machine. A husband whose wife is fragile and delicate may ride with her on a tandem, using his own superior strength to supplement her weakness in imparting an enjoyable rate of speed, which would be impossible for her on a single machine. The tandem is a social vehicle, and for touring is used with great pleasure and advantage. An easy rate of speed for a well made tandem tricycle is eight miles an hour, and it is not uncommon for a gentleman and his wife who live near my home to take an evening spin of two or three hours at the rate of twelve miles an hour. The touring in Italy and England of Mr. and Mrs. Joseph Pennell, on a tandem tricycle, has borne fruit in two of the most delightfully written and illustrated books of travel which have lately been published.

I have avoided in this brief paper giving figures, dates, and statistics concerning the use of the tricycle by women. They are accessible by every one who cares to know exactly what has been done. Any 'cycle maker or dealer will gladly supply such information on application. I have only amplified and illustrated the undoubted facts of the wonderful growth of the belief in physical culture among American women, and the unique adaptation of the tricycle, in its single or double form, for the promotion of that end in a manner at once pleasant, practical, and popular.—*William B. Howland.*

### STANLEY'S ADJUSTABLE CLAPBOARD MARKER.

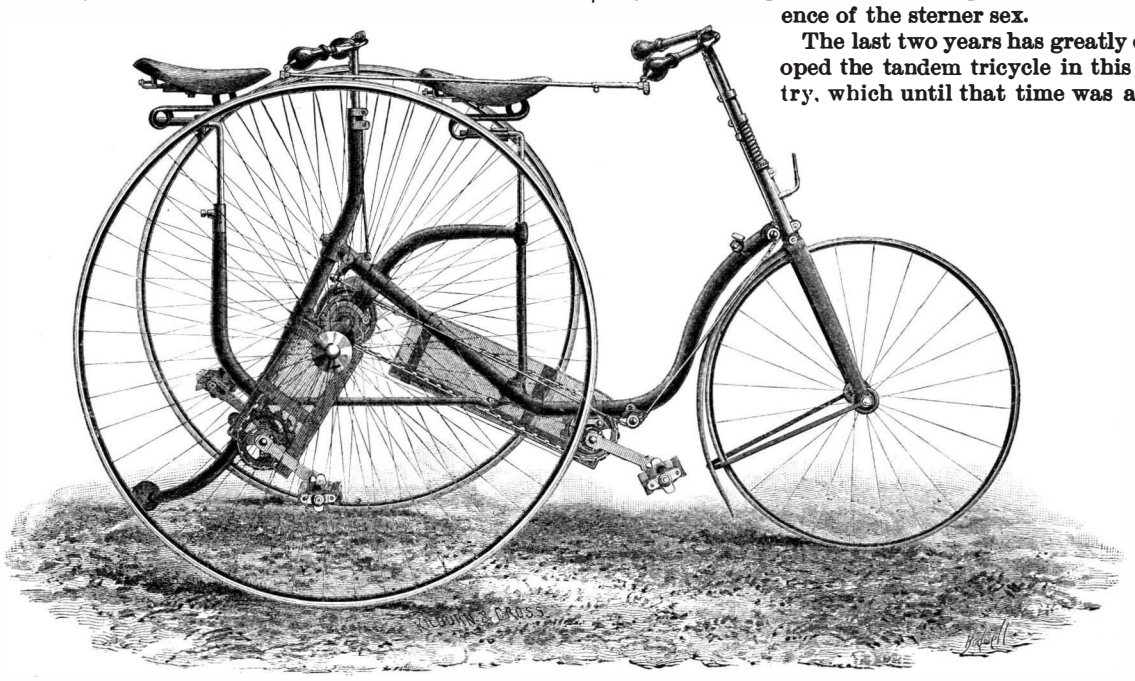
A very considerable part of an ordinary carpenter's work, is the laying of clapboards or siding. A difficult feature in this work has been the fitting of clapboards closely where they end, at the corner board or at window casings. The usual methods employed by workmen for marking and sawing off the boards, by use of a try-square and scrach-awl, or by aid of a clapboard-hook and scratch-awl, have demanded about one more hand than the average man has been supplied with by nature.



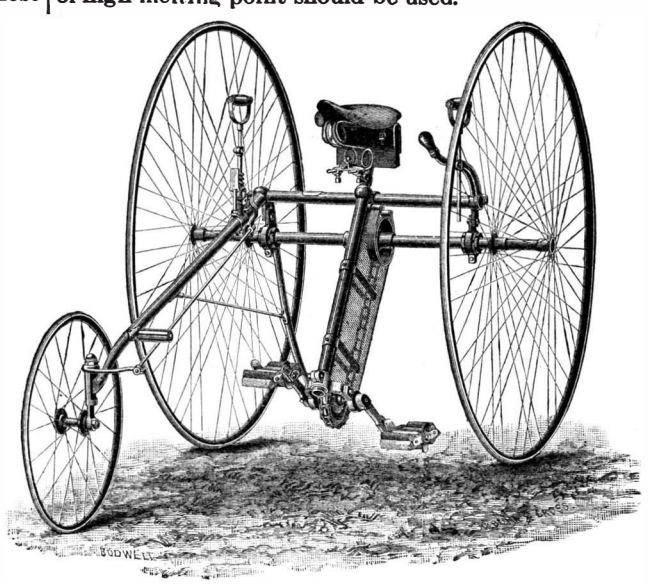
We illustrate on this page a tool which can be used with one hand, while the other is employed in holding a clapboard in position. The sharp edge of the teeth on the marking blade are just parallel with the outer edges of the legs when placed against the corner-board; and by moving the tool half an inch, it will mark a full line across the clapboard, exactly over and conformed to the edge of the corner-board or casing. There is then no difficulty in sawing for a perfectly close joint. The Stanley Rlue and Level Company, of New Britain, Conn., are just now supplying hardware dealers with this excellent tool.

### Impermeable Boxes.

Excellent water, air, and grease proof boxes can be easily made by immersing either paper, willow, or turned wood boxes in hot melted hard paraffin. Such boxes are very handy and useful for sending out ointments, pastes, pills, or anything of a hygroscopic or deliquescent character. They can be hermetically sealed by placing the lid on the box while warm. Mr. A. W. Gerrard, F.C.S., of University College Hospital, who communicates this note to the *Chemist and Druggist*, sends a specimen impermeable box. The appearance of the wood is little altered by the paraffin coating, and the box is perfectly water tight. Paraffin of high melting point should be used.



LADY'S AND GENTLEMAN'S TANDEM.



THE LADY'S TRICYCLE.

## NEW METAL SHINGLES.

One of the most simple and effective means of adding to the appearance of those buildings in which the roof forms a conspicuous feature is to cover it in with

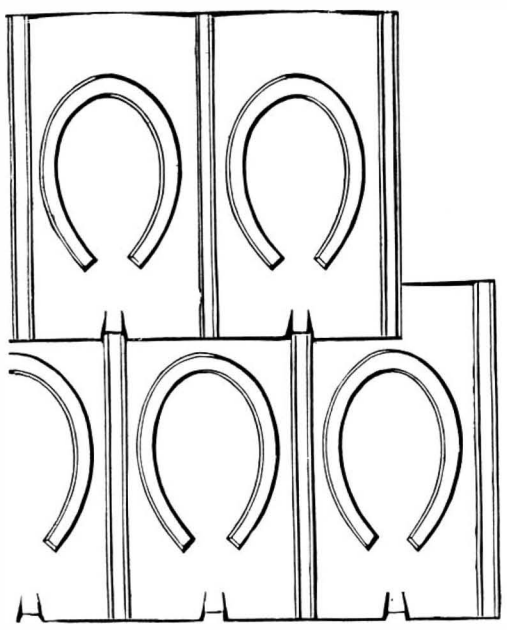


Fig. 1.

a material shaped to form some description of ornament. With this object are shingles and slates, having rounded or semi-octagonal ends, used to add to the effect.

The Thorn Shingle and Ornament Company, of 1201 Callowhill Street, Philadelphia, Pa., are the manufacturers of a variety of different shingles formed of sheet

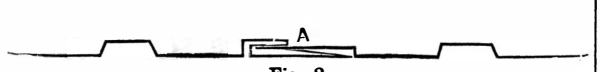



Fig. 2.

metal, which are very useful in giving a decidedly good appearance to the roof upon which they may be placed. One variety we show in the plate at Fig. 1, which indicates the manner in which they are laid upon the roof, and the general appearance they present. They are not inappropriately termed "The Horseshoe Spring Lock Shingle," from the shape of the figure embossed upon them and the description of the lock joint between adjacent shingles.

In all kinds of sheet metal shingles, the importance of the side joints being formed in such a manner as to entirely keep out the weather is great. As they are not laid doubly overlapping, as are slates and the ordinary wooden shingles, any admittance of water through the joints means a probable penetration into the building.

The diagram shown in Fig. 2 indicates the manner in which this is effected by the spring lock. At A is formed a double groove, and, in addition, the edge of the sheet is turned over nearly upon itself, forming a spring edge pressing in an upward direction well against the other edge of the shingle, which enters the before mentioned double groove. This system is found very effective in producing a water tight joint, and, at the same time, it is so simple that the shingles may be most expeditiously laid.

Among the other designs of shingles turned out by the same company are those having hexagonal, lozenge shapes, and other forms embossed upon them. They are made in various sizes, are supplied either painted or unpainted as may be required, and are usually shipped in boxes containing sufficient to cover one square.

By writing to the Thorn Company, those of our readers who are interested may obtain a useful catalogue illustrating the various designs.

## FURNACE HEATING FOR HOUSES.

The Fuller & Warren Company, of Troy, N. Y., with stores at New York, Chicago, and Cleveland, Ohio, has long held a leading position among manufacturers of stoves and heaters. In fact, the business of which this firm is the direct successor was founded more than half a century ago, and its managers have, for the long period since that time, been continuously in the front rank in introducing the improvements which have been steadily brought forward by inventors and experimenters for the advancement of this industry.

Among the specialties made by this firm that are particularly worth noting by house builders and architects are their top return flue heating and ventilating furnaces, constructed upon thoroughly scientific principles, and embodying the results of their long experience. The manufacturing facilities of the firm are such that excellence of workmanship has long been a distinguishing characteristic of their goods, a feature which is well exemplified in these furnaces, and which not only insures their durability, but is, in connection with their correct design, promotive of exceptional economy in their consumption of fuel. One of these furnaces is illustrated in the accompanying engraving. It is claimed to be absolutely gas tight, and to have fewer joints than any cast iron heater made, giving a complete control of the fire and a perfect combustion of the gases. In making the various parts of this furnace, the expansion and contraction of the metal at various degrees of heat have been so carefully calculated that the fire has the same effect over all parts, whether at a high or low temperature, and all exposed joints are protected by packing with a cement of their own manufacture, which becomes, after a time, a part of the iron itself.


TOP RETURN FLUE HEATING AND VENTILATING FURNACE.

This furnace is self-cleaning, care having been taken that there shall be no angles to accumulate ashes or soot, and the grate is made with a slide center, by which it can be thoroughly cleaned without opening the door. The dust flue connects directly with the exit pipe, and has an automatic slide that acts in connection with the anti-clinker door, which, when open, draws the dust-flue slide, and closes it again when the door is shut. Direct draught can be had when desired. The ash pit is of unusual capacity, and the flues are so arranged that all parts of the furnace in contact with the fire are heated thoroughly and alike, and the products of combustion as entirely utilized before passing to the exit flue. There is a damper in the ash-pit door, insuring complete control of the fire; the admission of air under the fire and through perforations in the feed door, the openings in the grate, and the size and shape of the combustion chamber, fire-pot, radiator, and flues being all carefully graduated to insure perfect combustion, and in accordance with a knowledge of the laws governing the principles of heating by warm air. Careful attention has been given to the height of the furnace, to accommodate cellars with low ceilings, and also to insure proper elevation for warm air pipes; and during the spring and fall months, when very little heat is required, it can be easily obtained at a very moderate expense with this heater.

## JOINT FOR WOODWORK.

The Tagg system of jointing woodwork consists essentially in soaking a long strip of canvas, or similar fibrous material, and lengths of spun cotton yarn, in a particular kind of vegetable gum, to form the material of

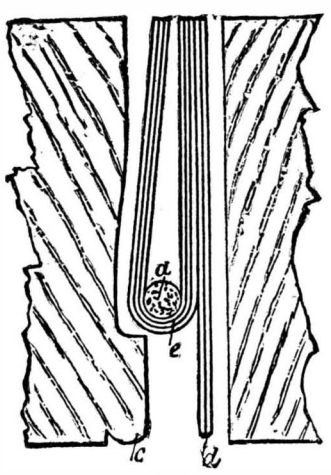



Fig. 1.

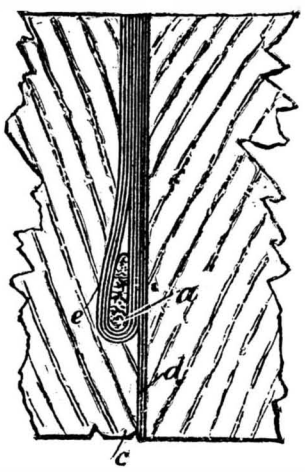



Fig. 2.

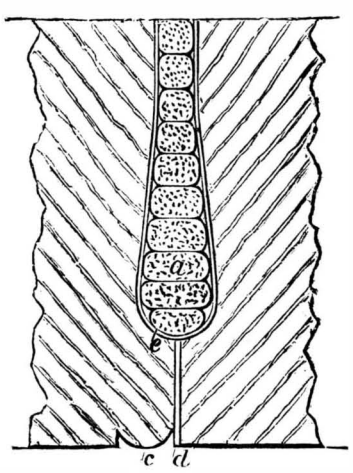



Fig. 3.

### TAGG'S JOINTS FOR WOODWORK.

the joint. The strips are folded up into as many plies as may be necesssary, according to the depth of the joint, then applied to one edge and held there while the other plank is pushed up and nailed down.

Figs. 1 and 2 show the various members of a deck joint, respectively before and after the joint is made. One plank has a plain edge, the opposite plank has a longitudinal cavity and a closing bead, *c*. The plies of canvas, *e*, have been previously saturated, and receive in their bight a saturated core, *a*. One two-ply length of canvas, *d*, completes the material of the joint. No special devices are required for closing up the planks; they are laid in the ordinary way. For thin decks the core, *a*, is dispensed with, and both plank edges are plain, there being the same number of layers of canvas for the whole depth of the joint.

Fig. 3 illustrates another type of joint, the bulk of the jointing material being saturated cores instead of strips. This type of joint is peculiarly well adapted for remaking old seams without disturbing the planks. No calking is required, and no calking tool is used. Consequently the edges of the timbers are not injured, but are left as sharp as when they came from the planer. The cores of Fig. 3 are rolled into the trough between the two planks by means of a roller with a serrated edge.

There is no exudation of the gum upward. The closing strip, *c*, prevents any droppings, and the lines of the jointing are scarcely perceptible.

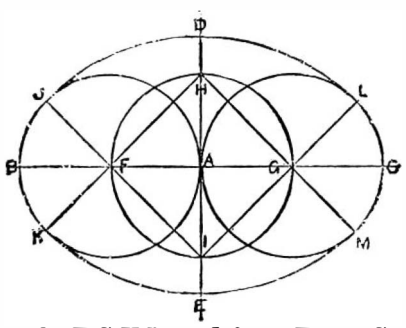
The material of the Tagg joint, says *Engineering*, gives and takes with the shrinking and swelling of the planks through the whole depth of the joint, without separating from the edges, for the canvas strip adheres to the plank edge so closely after the gum has dried that it will resist a straight pull of 41b. per square inch.

This joint has been tried on the decks of the steamship Glengarry for the double trip to China and home again, *via* the Suez Canal, and stood the severe test of the intense heat of the Red Sea thoroughly well. Samples from the Glengarry can be seen at Lloyd's, 2 White Lion Court, Cornhill, E. C.

This invention is applicable to many other purposes besides decks and other parts of ships, and can be used with advantage in many forms of constructional work. The process of manufacture can be seen at the inventor's, Island Boat Building Works, East Molesey.

## EASY METHOD OF MAKING AN ELLIPSE.

At the point. A, let two straight lines, B C and D E, cross each other at right angles. From the center, A,



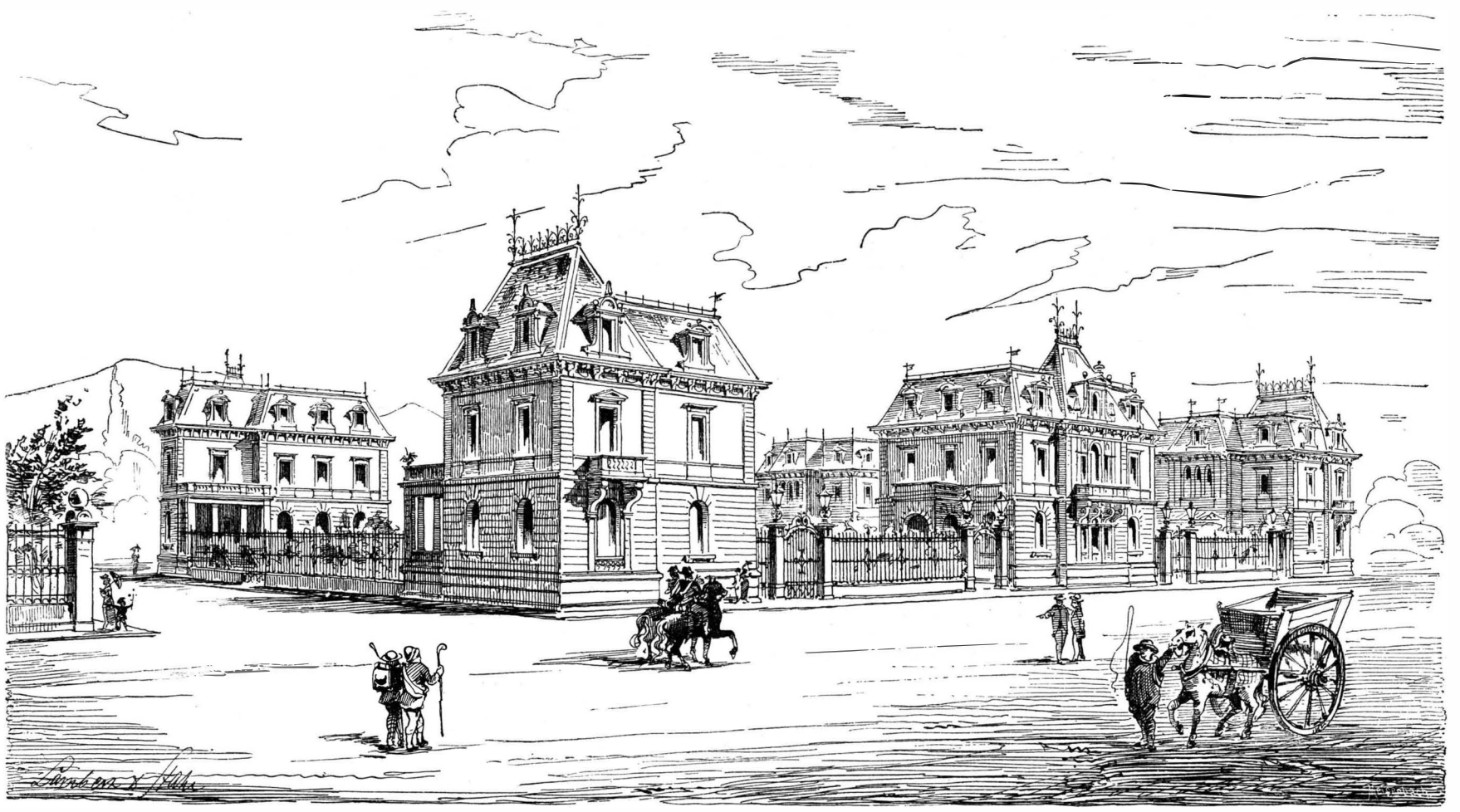

draw a circle, F G H I; and from F and G draw two other circles of the same circumference as F G H I.

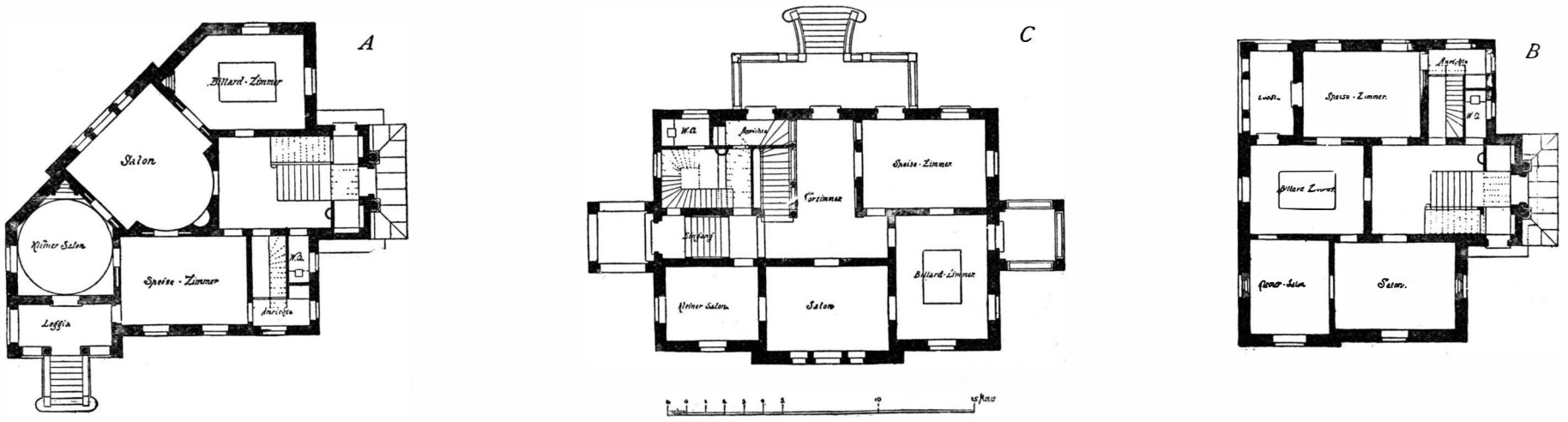
From the points H and I draw four straight lines through the points F and G to the points J, K, L, and M. Then from the centers, H and I, draw the arcs, J D L and K E M.

An ellipse of any size may be produced by making the diameter of the first circle half the length of the desired ellipse.—*H. C. Crew, English Mechanic.*

### SUBURBAN DWELLINGS IN ITALY.

We give from *Architektonische Rundschau* a group of suburban dwellings erected near Turin, Italy. They are from the designs of L. Neher, architect, Frankfort These buildings are quite attractive in appearance and the grounds are tastefully laid out.






GROUP OF ITALIAN DWELLINGS.

### Algaborilla.

Husks known under the name of algaborilla contain a tannin-like substance, which can be used for dyeing yellow. The trees from which these husks are obtained are the Prosopis pallida and the Prosopis algarobo, which occur in the mountainous districts of South America. The seeds form about one-fifth of the weight of the husk, but contain no tannin. The husks contain about 27 to 29 per cent of the tannin. The coloring matter yields yellow precipitates, with salts of tin, antimony, lead, or alumina; the tin compound is the brightest. For dyeing yarn, the latter is mordanted with tin, as usual, and placed in the dye bath, which contains water heated to boiling and about 7 to 10 per cent of algaborilla. After working the yarn in the bath for some time, the bath is left to cool, and the yarn afterward washed and dried. The color is not as brilliant as that obtained with fustic, but more of a straw color: it is, however, pretty fast, and resists weak acids; alkalies change the color into brown. With iron mordants, good grayish black shades can be produced, and 5 to 7 per cent of the husks will be sufficient for the bath. Wool can also be dyed with algaborilla.

### Steam Pipe Coverings.

The necessity of covering steam and heat conveying pipes with a non-conductor, both on the score of economy and in preventing the damage of fire, is now generally understood.

It is a fact, however, as Professor Gibson, in his report to the Western Manufacturers' Insurance Association, remarks, that "No combination, however successfully prepared will prove a perfect preventive against loss of heat by radiation; but the covering which possesses in the greatest degree the qualities of non-conductibility, incombustibility, and durability will, in the end, prove the cheapest, even if the first cost be comparatively high."

Examined by this somewhat severe standard, the pipe coverings of the Magnesia Sectional Covering Co. appear to rank high in degree of excellency. The nature of the material is well calculated to resist the action of heat and to prevent radiation. It remains unaffected by any heat below 2,000° F., and is very light and durable, averaging 1⅓ lb. to the lineal foot for a 2 in. pipe. An even more important advantage of this covering is that, unlike many others, it does not, to the smallest extent, affect or destroy the pipes.

The coverings are made in the form of hollow cylinders, divided into two longitudinally, and jacketed with canvas or other suitable material. They are secured to the pipes by metallic bands, which accompany each section

Full information concerning these coverings will be given, on request, by the manufacturers, the Magnesia Sectional Covering Co., No. 9 North Fifth Street, Philadelphia, Pa.

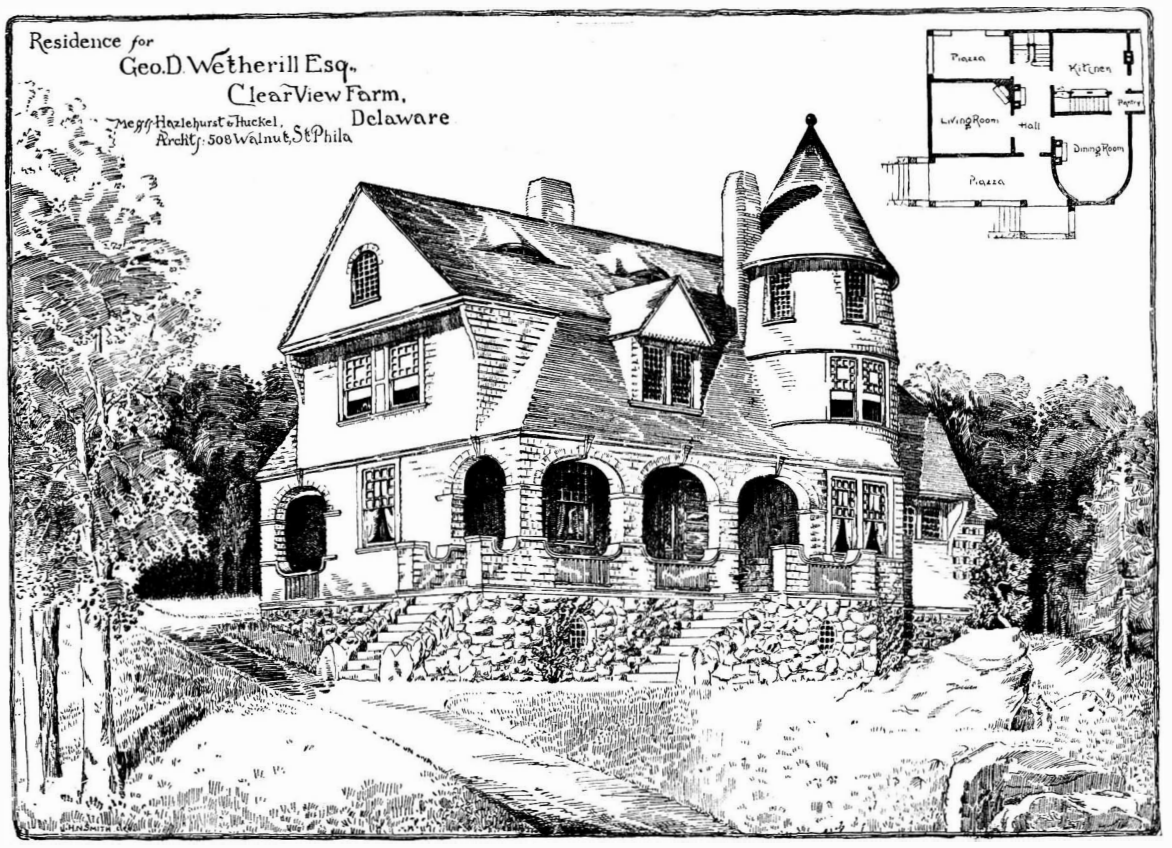
### Protection of Buildings from Lightning.

The French Minister of Public Instruction recently submitted to the Academie des Sciences an important question concerning the fitting of lightning conductors for public schools and other large buildings. It appears that a departmental commission represented to the minister that it was necessary in a particular case to connect all the iron stairs and other internal metal work of a school building to the lightning conductors, so as to prevent the danger of lightning leaving the outside conductors and striking through walls or roofs at the insulated metal inside. The minister logically concluded that if this was done for one building, it should be done for all similarly circumstanced; and as this action would involve the expenditure of a considerable sum, he asked the opinion of the Academy upon the point.

The committee to whom the question was referred have reported to the effect that it is indispensable for the perfect protection of buildings from lightning that the conductors should be well connected with all important metallic masses inside. The case applies not only to iron in roofs, partitions, or staircases, but also to gas and water pipes, heating apparatus, and similar metallic fittings. It is laid down also that where there are many lightning conductors attached to a building, the nearest of them should be placed in connection with the metallic masses in question. It is understood on the part of the committee that the lightning conductors themselves are always properly "grounded," by being put in perfect connection with the earth by means of a well which is never dry.

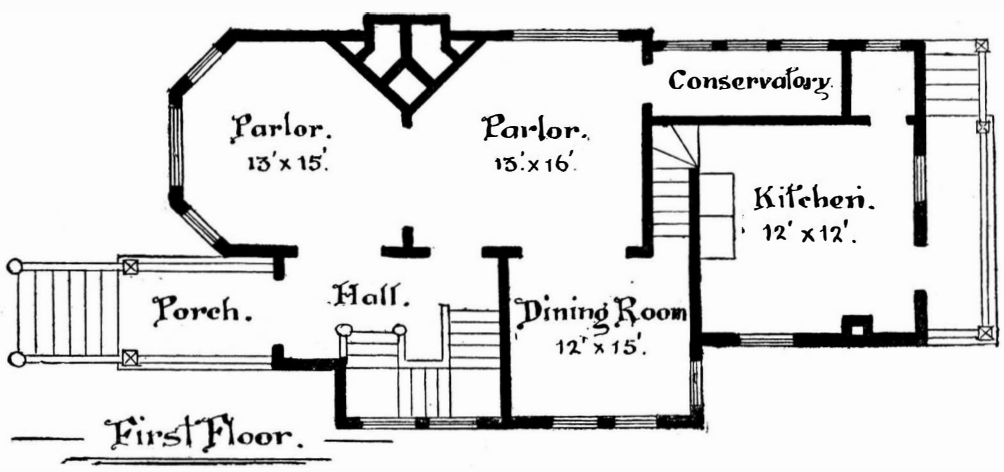
This general method of increasing the factor of safety in buildings, in case of lightning stroke, has been advocated in the SCIENTIFIC AMERICAN for the past twenty-five years, and we believe was first publicly suggested in these columns. We have repeatedly shown how faulty, if not useless, is the ordinary lightning rod system, where the lower end of the rod is simply stuck a foot or two into the dry ground; and we have urged, first, that the rod must have a thorough and extensive conducting surface in contact with the earth; second, that all metallic fittings both within and without the building should be connected with the rods, or with special rods leading to the ground terminals. Where there are underground metallic pipes, such as water, gas, or drains, the rods should be connected with them. If there are no such metallic pipes or masses, then long trenches leading away from the building should be dug, deep enough to reach moist ground, pulverized coal should be placed in the bottom of the trenches, and the lower end of the rod extended for a considerable distance in the trench in contact with the coal, which is itself a conductor.

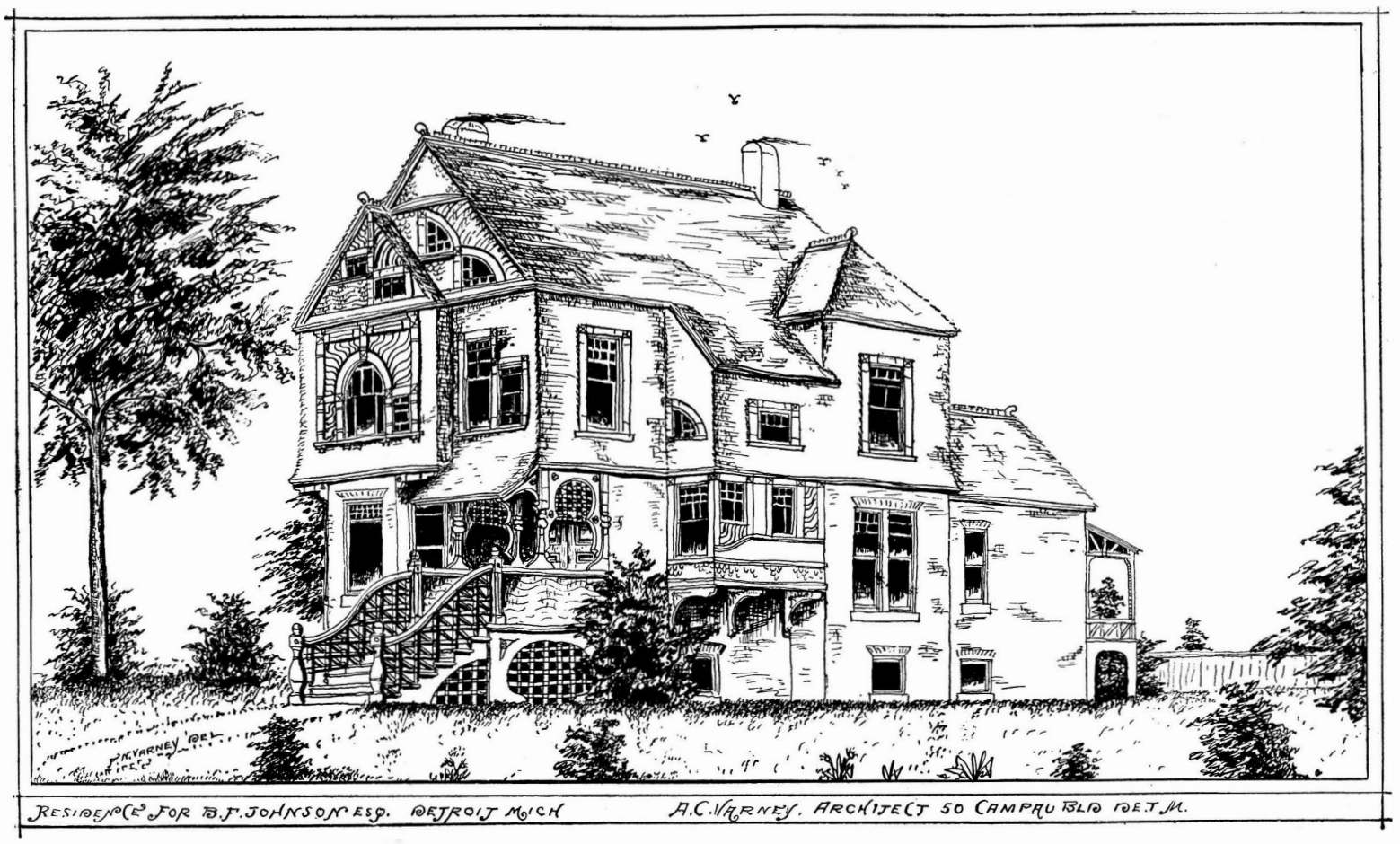
A SASH holder has been patented by Mr. James P. Hendrick, of Flemingsburg, Ky. The catch bar of the holder consists of a lower portion to be secured within the outer sash groove of the window frame, and an upper part which has an outward top or head plate, with various other novel features, making a device which can be readily applied, and will hold the sashes open at either the top or bottom, or at both places.




**A DELAWARE RESIDENCE.**

[For description see page 55.]



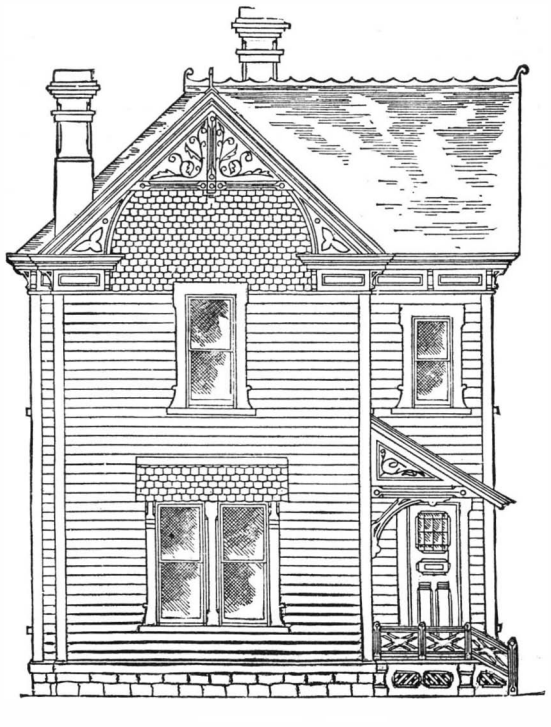




**A $2,600 RESIDENCE AT DETROIT, MICH.**

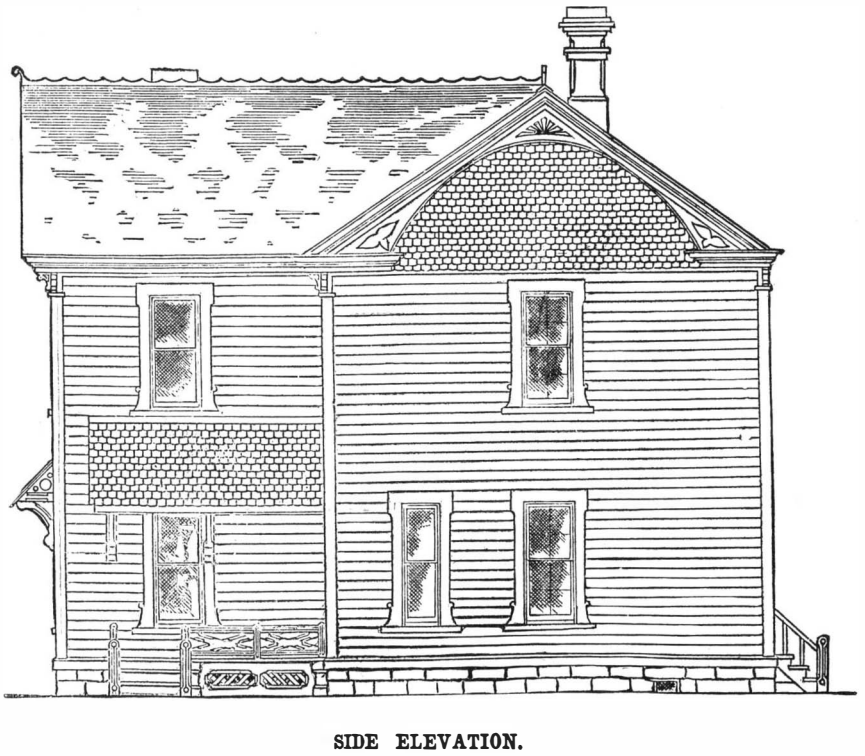
[For description see page 59.]

### A ONE THOUSAND DOLLAR COTTAGE.

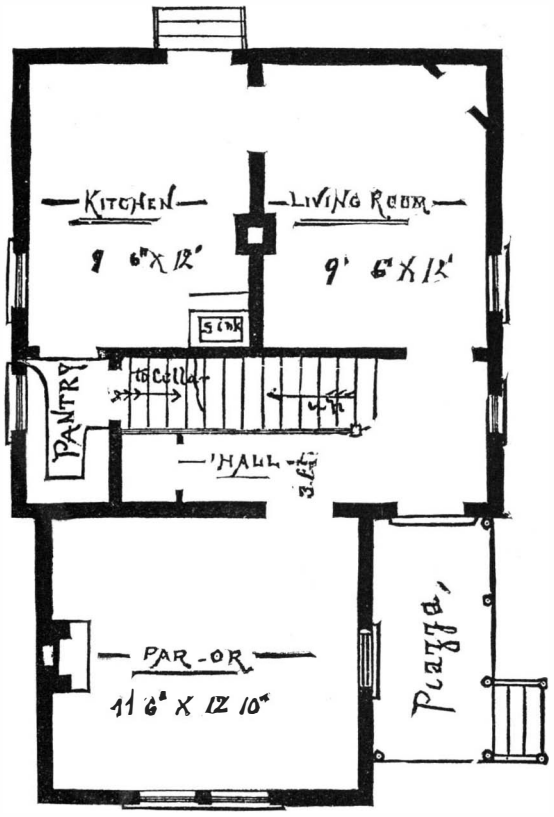
The cost of erecting this house, according to the estimate of the author of the plan, Mr. G. Goldstone, of Toronto, Canada, is only $997.35; and as the rooms are of modest dimensions (though sufficient for the needs of a small family), and the ceilings of the first and second stories respectively 8¼ and 8 feet high, the design can no doubt be carried out for that sum. With some latitude in point of finish and quality of material and work, however, it might easily cost $1,200, and we should be inclined to place the estimate at that figure for a thoroughly satisfactory job. This view of the case is especially suggested by the fact that the general design of the house, as shown by the elevations, is of a somewhat decorative character; and to be in keeping with its tasteful exterior, some liberty should be allowed in the inside work beyond what mere necessity is built of field stone, or bowlders, laid in random courses pointed with dark cement mortar. The house above the foundation is of wood, and the exterior is entirely covered with shingles. On the first floor there is a large hall running through the house, with a square staircase at the end lighted by a large stained glass window. The hall contains also an open fireplace and wide doors entering a living room on the left 14′ × 16′, and dining room on the right 14′ × 17′, each having a fireplace. From the hall the kitchen is also reached, which is 12′ 6″ × 14′, with a pantry between dining room and same, and a summer kitchen, etc., in the rear. The second floor contains three large chambers; bath-room and servants' quarters over kitchen and pantry, etc. The main staircase stops on second floor. The private staircase starting in kitchen continues up to attic, which contains a bed room, tank room, and tower room. The roof is painted a light brick or tile color, the shingles on sides a light yellow buff, with a darker trim color for cornices and string mouldings; black sash The cost of the building is about $4,000 complete.—*Building.*



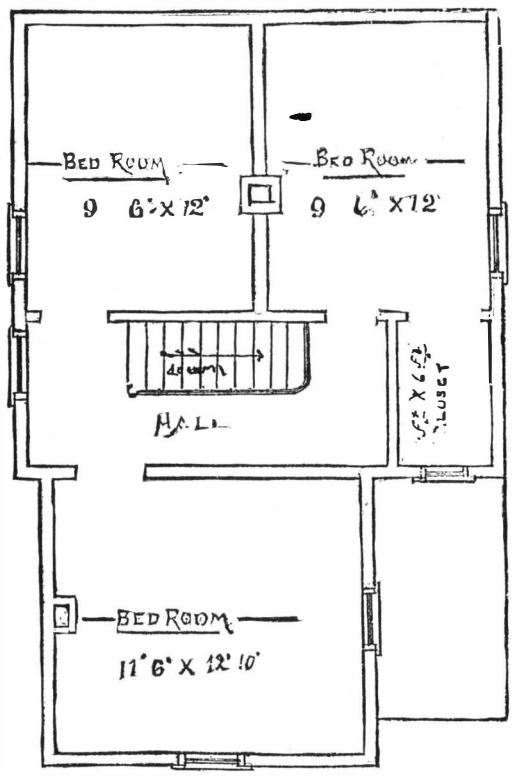
FRONT ELEVATION.



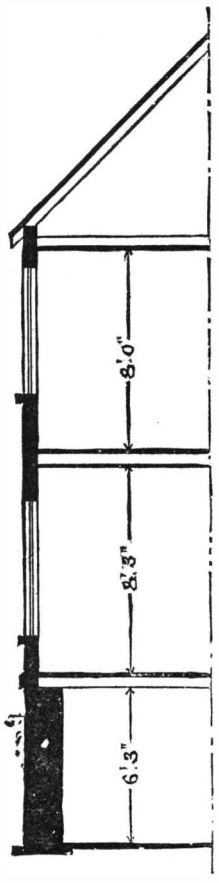
SIDE ELEVATION.




First Floor Plan




Second Floor Plan




### A ONE THOUSAND DOLLAR COTTAGE.

would require. If, however, absolute plainness in the finish be adhered to, the house can be built for the amount named by the author of the plan, and in some parts of the United States for even less.

A suburban lot of 25 feet front is quite sufficient for a house on this plan, and where lots are procurable for $10 to $20 per front foot, an attractive home may thus be made at a cost not exceeding $1,500 to $1,800.—*Mechanical News.*

### A DELAWARE COUNTRY RESIDENCE.

Residence for George D. Wetherill, Esq., Clear View Farm, Delaware. Hazlehurst & Huckel, architects, 508 Walnut Street, Philadelphia.

This cottage is built about twenty-five miles from Philadelphia. It stands on a slope of a hill commanding a view up the Delaware River and surrounding country for twenty miles. Above the natural grade, which has been but slightly changed, the foundation

### Impure Ice as a Cause of Disease.

The State Board of Health having been asked by the Board of Health of Syracuse to examine into the purity of ice taken from Onondaga Lake, from the Erie Canal at Syracuse, and from Cazenovia Lake, has not only made a careful investigation into the quality of ice from those sources, but has also prepared a report on the general question of the pathogenetic powers of contaminated ice. The board comes to these conclusions: Ice formed in impure water has caused sickness; it may contain from eight to ten per cent of the organic matter dissolved in the water, and, in addition, a very large amount of the organic matter that had been merely suspended or floating in it; it may contain living animals and plants, ranging in size from visible worms down to the minutest spores, and the vitality of these organisms may be unaffected by freezing.

### Analyzed the Ashes.

Two barns said to be filled with unthrashed wheat were recently burned in Germany. They were insured, but it was impossible to collect, because the claim was made that the contents of the barns were simply straw. When the affair got into the courts, chemical experts were called to analyze the ashes. Wheat contains a large quantity of phosphoric acid, almost ten times as much as does straw. Naturally, in the burning of these barns, wood ashes, cement, and other mineral substances were mixed with the ashes submitted to the chemists, but none of these admixtures contains phosphoric acid. The experts found that of two samples placed in their hands, one contained 10·2 per cent and the other 19 per cent of the acid, thus proving conclusively that the farmers were in the right, and the insurance companies, as is generally the case, according to public sentiment, in the wrong.—*Fireman's Herald.*

A SUBTERRANEAN water collecting dam has been patented by Mr. David H. Valentine, of Brooklyn, N. Y. The dam is combined with a conduit upon its source side, the dam and conduit being built from a central point or reservoir in a valley, up an elevation or hillside, and serving to intercept the earth flow of spring water through gravelly soil to the ocean or any watercourse.

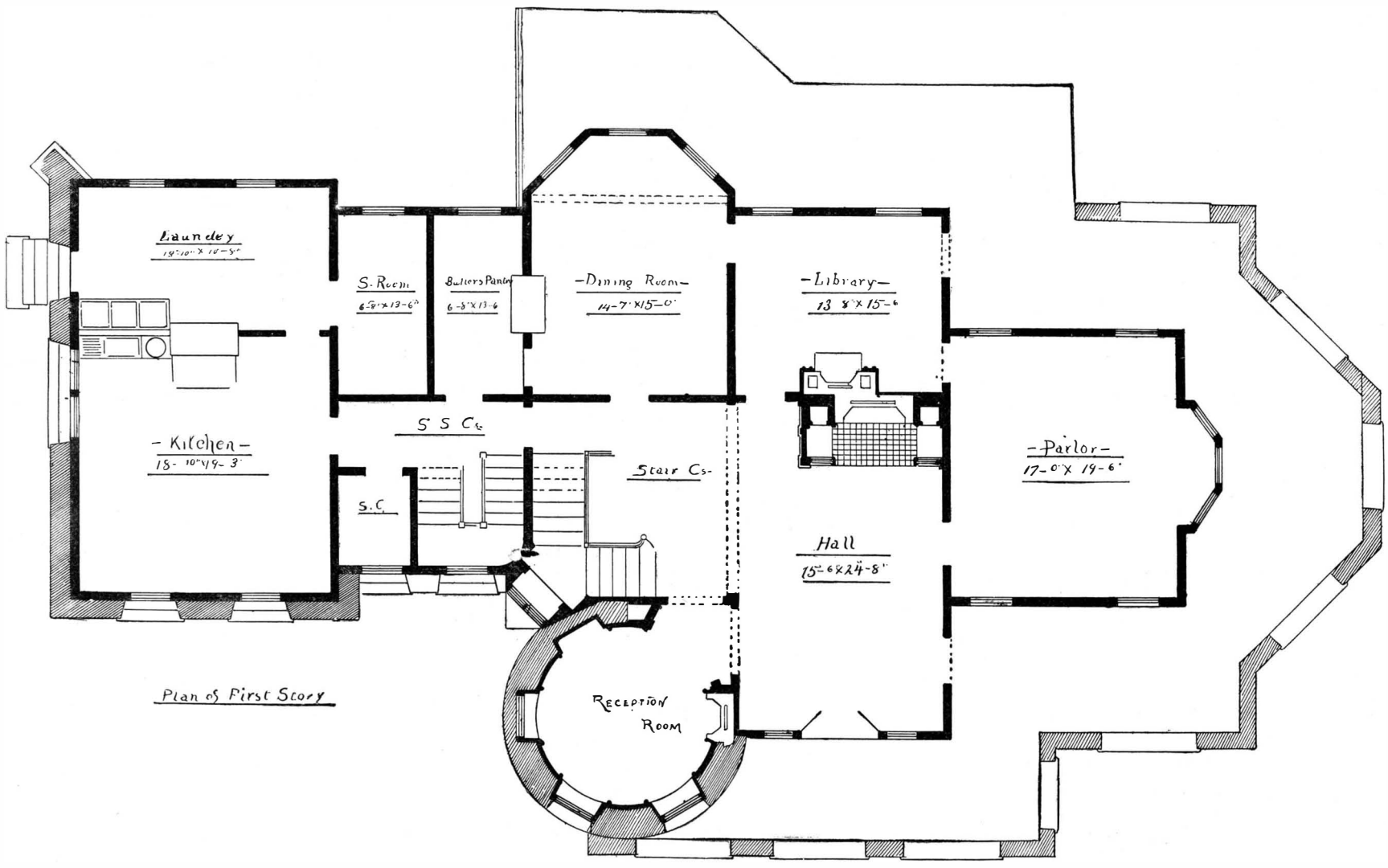
## REMODELING A HOUSE.

It frequently happens in the experience of the architect that he is called upon to enlarge or remodel a dwelling. Sometimes it is only required to add one or more rooms, while in other cases it is sought to improve the appearance of the exterior. Such problems often severely tax his ingenuity, for it becomes difficult to considerably improve the appearance of a building while substantially maintaining its original outlines.

As illustrating what may be done in this direction, we present to our readers a set of drawings, showing the ingenious and clever method of treatment adopted by Architect Howard Hoppin in dealing with the residence of Mrs. R. M. Clark, at Pomfret, Conn. This house before alteration presented the appearance of a comfortable, plain, country dwelling, as represented in the view in the upper right hand corner of our plate. The imposing appearance of it as it now stands can be seen from the large perspective view.

The alterations, although apparently so extensive, were, in fact, few beyond the addition of towers, the stone lining to some of the walls, and the new piazza. Scarcely a feature of the original house has been removed. It has simply been added to, and this in such a manner as to throw but little weight upon the old work.

We show a number of details of the construction, and give below a complete specification of the work, which cost about $7,000 to carry out. Mr. Hoppin's address is 33 Westminster Street, Providence, R. I.




**ALTERATIONS AND ADDITIONS TO A COUNTRY HOUSE AT POMFRET, CONN.—HOWARD HOPPIN, ARCHITECT.**

### MASON'S WORK.

Excavate and remove to place shown on lot all soil for air space under tower, for trenches, for all new walls, chimneys, piers, and foundations, as shown. Trenches for tower and stone walls at L to be dug below cellar bottom. Trenches for new porch and foundations, outside of walls, to be dug 4 ft. below grade.

*Footings.*—Bed on solid bottom, good footing stones under all walls, piers, and chimneys.

*Foundation Walls.*—To be of stone under all walls, piers, and chimneys, laid in lime mortar, pointed up on outside.

*Repairing Old Cella Walls.*—Take down old cellar walls where unsound or unsafe, and rebuild like other walls. Jack up house where sagged, and finish all securely. Point up old cellar walls where repaired, and leave in good order like other old walls. New foundation walls, outside, to run from footings to six inches below grade. Upon said foundations, 6 in. below grade, build stone walls of sizes, shapes, and dimensions shown. Said walls to show a rough random rock face, and to be carefully laid in lime mortar, and pointed up with sunk joints of cement—half and half mortar—at end of job. Stone walls of porch and piazza columns to be dressed off with hammer to curves as shown. Reset stone step at porch, with good solid foundation under.

*Sills.*—Set all stone sills.

*Lintel Arches.*—Turn lintel arches over windows of tower. All stone for building to be supplied by owner. The contractor to dress and set same in best manner. Build stone bases for piazza columns, as and where shown, from 4 ft. below grade to base of wooden columns, with batter all around, and corners dressed off to round.

*Chimneys.*—Build new chimneys in tower, of good hard body brick from foundations to under side of roofs or connections with piping as shown. To be brought up through small tower to ceiling of third story, each floor to be fitted to round 10 in. tile pipe with easy bends; from said bends run up lines of 10 in. tile pipe with incline of roof, to and through copper tower top.

*Fireplaces.*—Build three fireplaces in tower as shown, of good hard body brick, laid in red mortar.

*Flues.*—All tower flues to be 8 in. by 12 in., and parged from top to bottom. All new chimneys where not surrounded by stonework to be plastered on outside from top to bottom. In second story bed-room over hall to corbel out and to build brick backing in corner as shown, 5 ft. high from floor, with 6 in. tile from face of same to flue, 4 ft. from floor.

*Trimmer Arches.*—To be buried under all tower fireplaces.

*Hearths.*—To be of hard body brick to all fireplaces of tower.

*Lead Flashing.*—Of 4 lb. lead on all chimneys where coming through roofs.

*Note.*—Carpenter is to furr all stone walls and all ceilings.

*Lathing.*—To lath walls and ceilings of whole of tower, and other parts of house where required. All laths to be of good spruce 4 feet long, and securely nailed.

*Plastering.*—Plaster the whole of the above, and patch up through whole of house all cracks and broken places. First coat to be a good thick coat of hair mortar. Finishing coat of lime, putty, and plaster of Paris. All plaster to be slaked for a week before using.

*Outside Plastering.*—Upon wire netting, supplied and put on by carpenter, put a heavy coat of stucco (half lime and half Portland cement) well pressed into spaces of netting. Before this coat is set, press in bottle ends, glass, pebbles, etc., as directed. Glass, etc., will be furnished by owner.

### CARPENTER'S WORK.

*Timber.*—To be of good, sound quality, of sizes as follows: Tower floor joists, 2 in. by 9 in. (16 in. on centers); porch floor joists, 2 in. by 9 in. (16 in. on centers); porch ceiling joists, 2 in. by 9 in.; tower ceiling joists, 2 in. by 10 in. and 6 in. by 10 in., as shown, alternating, 6 in. by 10 in. joists to be of hard pine, others to be of spruce; tower rafters, 2 in. by 10 in. (24 in. on centers); small towers and dormer rafters, 2 in. by 6 in. (24 in. on centers); L roof rafters, 2 in. by 9 in. (24 in. on centers); sills, 4 in. by 6 in.; sill at top of main tower, 4 in. by 6 in.; posts, 4 in. by 6 in.; plates, 4 in. by 4 in.; studs, 2 in. by 4 in. (16 in. on centers); studs at top of main tower under 6 in. by 10 in. joists to be 4 in. by 6 in hard pine.

*Ties.*—Across main tower, 1¼ in. by 6 in. spruce.

*Crossbridging.*—To crossbridge ceiling joists of third story tower room with 2 in. by 4 in. crossbridging in three parallel lines, carefully spiked to joists. Crossbridge floor joists of tower in one line across same in center with good spruce scantling.

*Cutting and Jobbing.*—Do all necessary cutting, fitting, and jobbing for other workmen on the building, and leave space of 2 in. around new chimneys. Stud same, taking care not to drive nails into same.

*Cover* new roof sides and floors with good ⅞ in. hemlock boarding.

*Sheathing Paper.*—Before laying upper floors and putting on outside finish, cover boarding of floors and sides with one thickness of sheathing paper overlapping.

*Tinning.*—Cover roofs of front porch, flat part of south dormer, and new roof over entry to tower in third story with first quality M. F. I. C. terne tin. Also under sides of roof boarding and both sides of rafters, next to tile flue piping on tower, up full length in best manner.

*Flashing.*—With same tin on all new hips and ridges. valleys, and chimneys, also over all exposed doors and windows, over stool under third story tower windows, and wherever else is necessary.

*Shingles.*—Cover all new roofs and patch up old roofs where necessary with shingles of same quality as old shingles. Cover sides of building over clapboards with curves of first quality sawed cedar shingles 4½ in. lap.

*Clapboarding.*—Repair old clapboards where necessary, and leave in good order.

*Furring.*—Furr out all stone walls and all ceilings where plastering is to be used with good ⅞ in. scantling.

*Wire Netting.*—Cover outside where outside plastering is to be used with heavy wire netting ⅜ in. mesh.

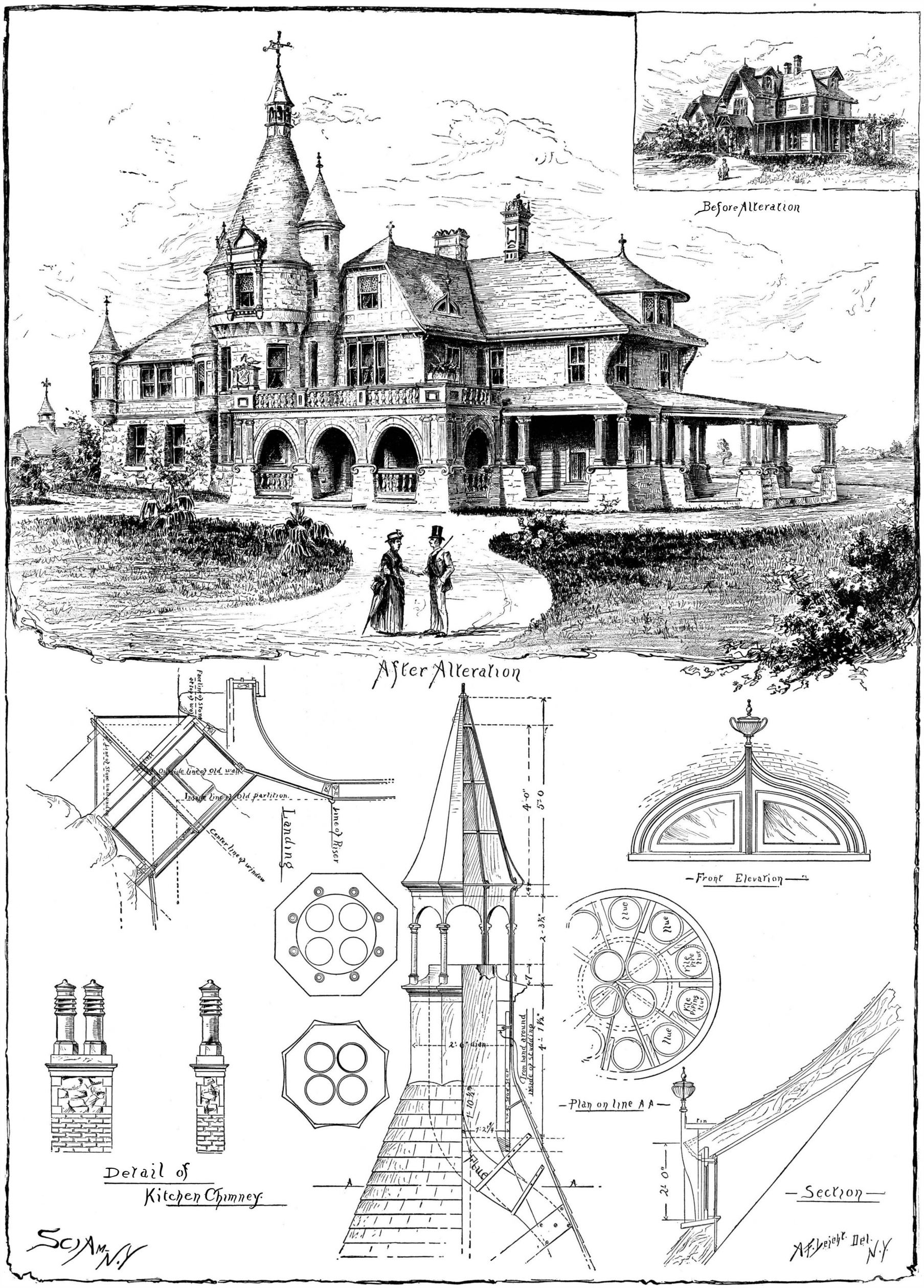
*Iron Ties.*—Put on iron ties to outside walls which are to be faced with stone, 18 in. apart, both ways.

*Gutters.*—To frame a gutter around and in jet of main tower, and to line same with first quality tin tied to main roof with strap irons and tin to run 12 in. up roof. Put up wooden gutters like old gutters of house on new roofs to kitchen, with good pitch to outlets, and line with first quality tin.

*Conductor Head.*—Put good conductor head to tinned roof over entry to third story tower room at front gable end, lined with tin. Look over old gutters and leave all in good working order.

*Conductors.*—Of 3 in. tin to ground. One line at front gable end, one line by stair-case bay window, and one line at each end of kitchen.

*Upper Floors.*—Lay upper floors of first quality spruce ⅞ in. thick, matched on floors of main tower and in other parts of new addition. Lay first quality floor of hard pine on porch and connection between porch and




**ALTERATIONS AND ADDITIONS TO A COUNTRY HOUSE AT POMFRET, CONN.—HOWARD HOPPIN, ARCHITECT.**

piazza as shown. All flooring to be carefully laid and blind nailed.

*Frames.*—New window and door frames of good white pine on all towers, stair-case hall (two stories), front hall, side windows, and two south dormers, frames and sash of kitchen L to be cut down as necessary.

*Sashes.*—To be of sizes and shapes as shown, of first quality white pine 1¾ in. thick. Sash of eyebrow dormer to be hung at side with good snap catches on each sash. All other windows to be weighted in best manner.

*Glass.*—Of first quality, like glass in rest of building.

*Doors.*—Of sizes and shapes given. Front doors to be repaired and covered on outside with first quality San Domingo mahogany ⅝ in. thick, perfectly plain, without panels or mouldings. Inside of front door not to be changed. Coat closet doors and reception room door to be of ash, like other doors opening into front hall. All other new doors to be of first quality white pine, like other doors of house.

*Hardware.*—To be like old hardware.

*Finials.*—Put up eight finials to roofs, and allow $50 for cost of same.

*Dormers.*—Take off north and south (front) dormers entirely, and put south (front) dormer on new, and change south dormer, as shown.

*Piazza Jet.*—Case in piazza jet as per details, with friezes inside and out. Mouldings of same to join flush with string course around house.

*Copper Tower Top.*—Make and put up a top to tower, as shown, of first quality copper, with floor and ceiling of copper. Floors to turn up over chimney flues, so as to prevent leakage. To be attached to roof, with all necessary irons, bolts, etc.

*Outside Finish.*—Of first quality white pine. Get out and put on heavy mouldings around casings of windows, etc., where at shingles, stone, or new work. Burr out gable ends and around kitchen L, as shown, with brackets, mouldings, and finish as shown.

*Half Timber Work.*—At outside, plaster to be of ⅞ in. stock over furring strips, and plaster. Furr out at third story of main tower and on small towers with corbels and mouldings.

*Piazza Columns.*—To be cut off at new stonework, and to be cased with grooved casings and with caps and bases, as per details. Flat columns to be of 1¼ in. stock, grooved, and with capitals and bases, as shown.

*Balustrade.*—Over front porch of 1¼ in. stock sawed and chamfered out, and with half turned column on outside. Turn moulded arch at front porch, with carved brackets under. Octagonal bases over columns on front porch to be gotten out, with strong top to hold vase of flowers, top to be covered with tin.

*Steps.*—Put on nosing to floor of front porch, and piece out piazza with curve and with nosing and base like other parts of piazza. Replace steps to kitchen door in best manner. All woodwork inside of bays and landings of first quality ash.

*Sheathing.*—Sheathe the overheads of front porch and under overhang of south dormer window with ⅞ in. matched and beaded white pine sheathing with bed mould.

*Blind Window.*—Frame in blind window in main tower with frame and outside blinds like other windows.

*Outside Blinds.*—To all new windows, except landing windows and eyebrow dormer, to be like other blinds. Blinds to windows with stone jambs to have long arm hinges, so as to swing back clear from same.

*Inside Finish.*—All inside finish for house to be of material and like other parts of finish; that in first story front hall of first quality ash.

*Closets.*—To have 12 double wardrobe hooks.

*Picture Mouldings.*—Put on 1½ in. picture moulding to second and third stories of tower ¼ in. below ceiling, and 3 in. picture moulding and cap on walls of reception room at ceiling.

*Tank.*—Build and set a tank in roof of tower of 1¼ in. matched white pine. Same to have four hoops of strap iron 1 in. x ¼ in.

*Scuttle.*—Build and put up a scuttle in roof of main tower at tank, with cover hung on heavy strap iron hinges. All to be carefully flashed and arranged with ladder on outside, so as easily to get at same.

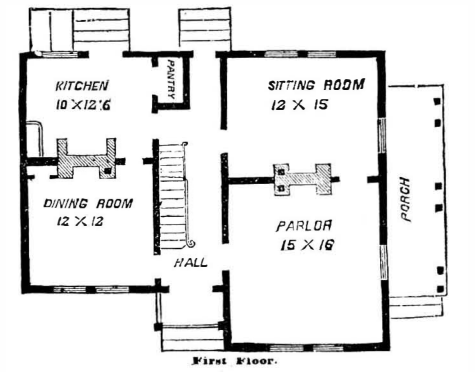
PAINTER'S WORK.

*Outside.*—Paint all roofs of house with first quality, leaving the whole at end of job clear and even. Give all shingles (except on roofs) one coat of Cabot's creosote stain, of shade selected by architect. Give all clapboards, conductors, gutters, blinds, metal, and outside finish two coats of first quality paint, in such colors as the architect may select. Give ceiling of porch and overhang of south dormer one coat of shellac. Give porch and piazza floors one coat of raw linseed oil.

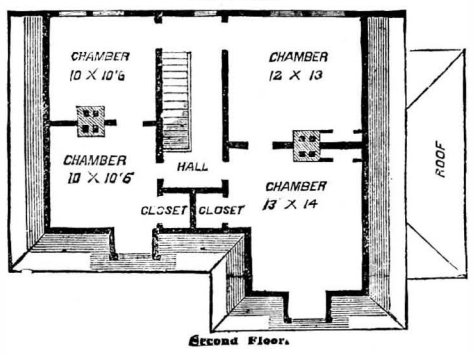
*Inside.*—Give all ash (and mahogany on front door) one coat of good filler. All ash an extra coat of shellac. Rub down mahogany of front door with pumice stone and oil, and leave same in fine dead finish. Paint woodwork of tower rooms with two coats of first quality paint, in such colors and shades as the architect may select. Owner to do all extra painting inside.

## A MANSARD ROOF DWELLING.

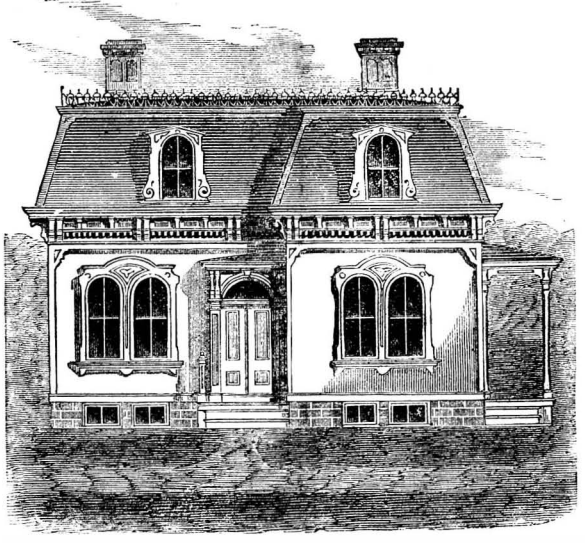
The principal floor of this design is elevated three feet above the surface of the ground, and is approached by the front steps leading to the platform. The height of the first floor is eleven feet, the second ten feet, and the cellar six feet six inches in the clear. The porch is so constructed that it can be put on either the front or side of the house, as it may suit the owner. The rooms, eight in number, are airy and of convenient size. The kitchen has a range, sink, and boiler, and a large closet, to be used as a pantry. The windows leading out to the porch will run to the floor, with heads running into the walls. In the attic the chambers are 10 ft. by 10 ft., 13 ft. by 14 ft., 12 ft. by 13 ft., 10 ft. by 10½ ft., and a hall 6 ft. wide, with large closets and cupboards for each chamber. The building is so constructed that an addition can be made to the rear any time by using the present kitchen as a dining room and building a new kitchen. These plans will prove




First Floor.




Second Floor.



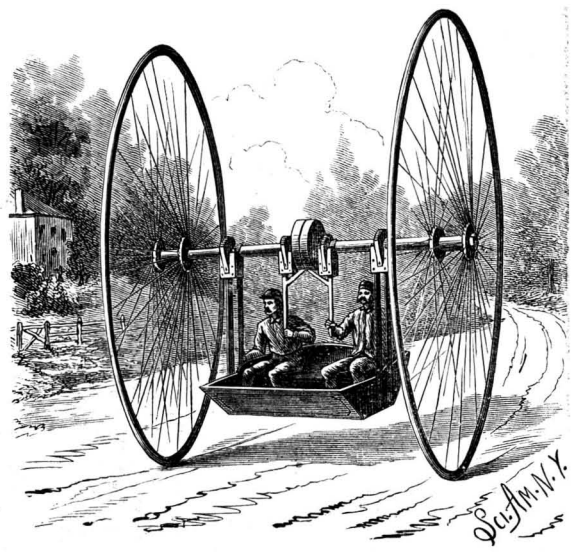
Front Elevation.

suggestive to those contemplating the building of a new house, even if radical changes are made in the accompanying designs.—*American Cultivator.*

## SWING BICYCLE.

The bicycle shown in the accompanying engraving is the invention of Mr. Nathaniel Brown, of Emporia, Kans. The wheels are secured to the outer ends of two hollow axles or shafts, which are mounted upon a central shaft, and are formed with ratchet wheels and friction disks. The seat is suspended by means of arms connected to centrally slotted straps passing over the axles; the ratchet wheels pass through the slots in the straps, and are engaged by spring pawls secured to the forward upper ends of the arms. In connection with each of the two other ratchet wheels is arranged a block, held to the hollow shaft by straps, and provided with a spring pawl engaging with the teeth of the ratchet. Pivoted in recesses in the lower ends of the blocks are lever arms, formed with inwardly extending fingers, arranged so that when the arms are swung toward each other upon their pivots, the fingers will be brought to bear against the faces of the friction disks.

The pulling of the levers downward starts the main wheels forward, and at the same time swings the seat forward, thus moving the pawls carried by the arms supporting the seat backward, and bringing them into engagement with teeth upon their ratchets, not so far advanced as were the teeth with which they were primarily engaged. As the levers are moved forward, the swing of the seat toward its normal position will act to advance the bicycle, and by so reciprocating the levers it will be seen that a pendulum motion will be imparted to the seat, which will, when once started, propel the machine for some time. When it is desired to turn the machine, say to the left, extra force is exerted upon the right hand lever, which will tend to drive the right hand wheel forward faster than the other; or the motion of the left hand wheel may be checked by moving the left hand lever so that its finger will bear against the friction disk. To stop the machine, both brakes are applied by moving the levers toward each other. The rider may stop at any



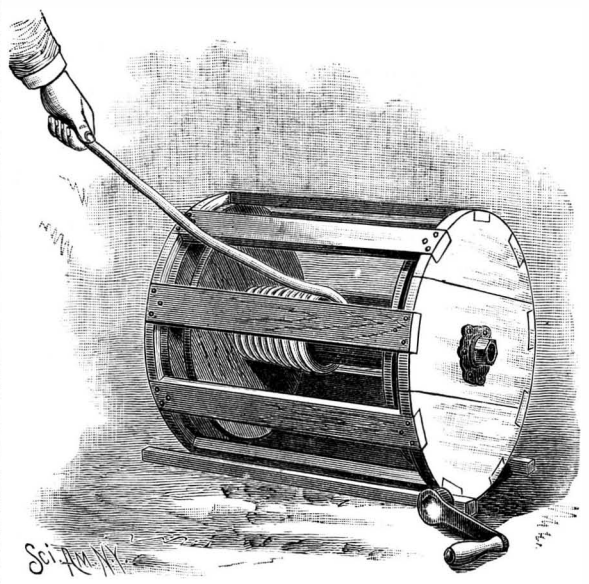
BROWN'S SWING BICYCLE.

desired point, when ascending a grade, and rest at ease, since any tendency of the machine to run backward would be counteracted by the weight of the seat.

## IMPROVED LEAD PIPE REEL.

Lead pipe is usually put up on reels which do not have an inclosing case, the heads of the reels being connected by slots, which must be knocked off before the pipe can be unreeled and disposed to customers; and before the reel can be turned, it is necessary to elevate it upon a bar passed through its hollow shaft or body. Like trouble also attends the putting up of the pipe on the reel. These difficulties are obviated in the invention here illustrated, which has been patented by Mr. Fred. Eitapenc, of Oneonta, N. Y. The outer reel case is of circular form, and is made up of opposite heads connected by slats. Within the case is arranged the reel proper, which is provided with two heads, suitably connected together and mounted upon a shaft having bearings in the heads of the case.

One end of the shaft projects sufficiently far to receive a crank handle, by means of which the reel may be turned. By this construction there will be no ne-



EITAPENC'S IMPROVED LEAD PIPE REEL.

cessity of raising the reel from the ground either to coil the pipe upon it or to remove it, while the slats need not be removed, as the pipe can be passed between any two of them. The reel is thus rendered more durable by not having to knock off the slats to pay out the pipe, and the whole is so fitted that it may be readily taken apart when required.

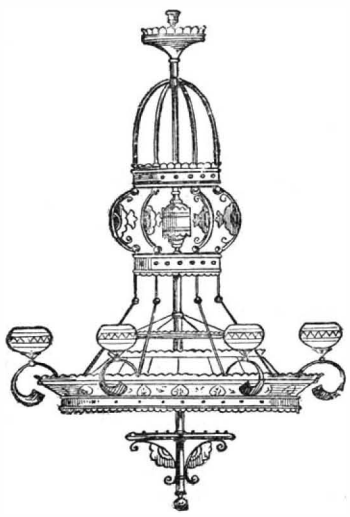
### Lime Cartridges.

The cartridges have been found most valuable for work in many kinds of stone, including granite, Portland stone, sandstone, etc., as well as masonry of stone or brickwork. A block of granite weighing about four tons, and embedded on two sides and at the bottom in strong cement, was recently moved easily by two shots. In experiments for the Admiralty at Portland, three shots of lime cartridges got thirty tons of stone in large merchantable pieces. The cartridges were used with great success for upward of twelve months in the formation of the Copenhagen Tunnel, North London, and they are now in use for removing the sandstone in the excavations of the Mersey Tunnel Railway Company, at Liverpool.

### FRINK'S PATENT REFLECTOR.

The various reflectors manufactured by I. P. Frink, of 561 Pearl St., New York City, under his patents are now used to a considerable extent throughout the country. They are formed in various shapes, patterns, and sizes for numberless purposes, from a highly polished silver plate which is corrugated on the surface. The effect is to reflect the light in a manner free from an objectionable glare, and to well diffuse it throughout a room.

One of the purposes for which the plate is found eminently useful is for application to the outside of a window which, owing to the construction of the building or from local causes, admits but little light. The reflector is formed in an attractive frame, and being placed at a proper angle, reflects the daylight into a



FRINK'S PATENT REFLECTOR.

room. The advantage in saving gas and preventing injury to the eyesight is very great, and it is astonishing how much light may be obtained by these means.

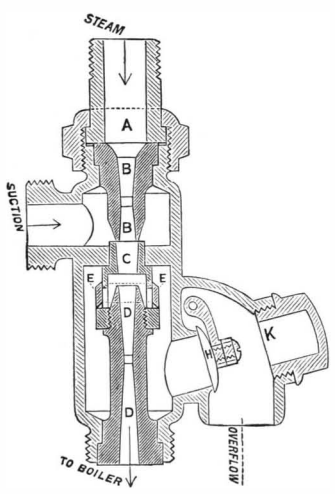
Then the reflectors have been made in an immense variety of kinds for different uses, such as for lamps, gas, oil, and electricity; in fact, from the smallest reflector, costing only a few cents, for a kerosene lamp, up to the magnificent chandeliers used in the principal of our theaters, this reflector has been employed with excellent results. The annexed engraving shows its application to a gas chandelier.

An illustrated catalogue giving full particulars of the material, prices, etc., will be forwarded on request.

### PENBERTHY INJECTOR.

At last a mechanical combination and device has been produced, and a man's labor and study crowned with success, in the production, for the convenience of engineers, of a simple and compact device known as the Penberthy injector or boiler feeder.

Its mechanical construction is very simple, but perfect. All its parts are movable and convenient of access (not being screwed in), its working so complete that an inexperienced person can operate it with success and perfectness. Its adaptability to all classes of boilers, such as stationary, portable, traction, marine, and locomotive, and its working on each, makes it very desirable, and recommends it to all classes of engineers. The automatic working of this injector is of very great advantage, as by this mechanical construction it works under all conditions of shakes, jars, and concussions. In




PENBERTHY INJECTOR.

case of a break, or the suction is to be removed and then returned. it picks up or begins working without any aid, assistance, or attention from the engineer, thereby relieving of much care and annoyance. Its convenience of access is of very great consideration and importance, owing to the advantage of cleaning and examining its interior parts.

The working parts of this injector are stationary in their work, thereby causing comparatively no wear in its mechanical parts. The inventor seems to have combined common sense with mechanical science, by leaving out all complications, and combining in the injector every convenience of operating, getting at, and putting it on the boiler.

The body is of a single cylinder or barrel, with two jets inside, "steam and combining," and governed by an automatic swinging overflow. The injector is operated by the opening or closing of the globe valves. It is connected to the boiler and pipes with uniform and interchangeable square centered unions, and can be put on or taken off very quickly without any annoyance or injury, and the only tool required being an ordinary wrench.

Another great point gained in this injector is its great range of working capacity. It will lift water twenty-five feet perpendicular, or take it a hydraulic pressure and force it into the boiler at a temperature of from 140° to 180° Fah. It will work under a steam pressure of from 20 to 140 lb. It will also lift and force water at a very warm temperature (say 120° Fah.) in tank or well, and under all circumstances and at all points it works automatically. The inventor and manufacturers of the Penberthy injector have great confidence in its working qualities, and to satisfy engineers of its merits and perfectness of work, solicit a trial. From observation, a brilliant future is in store for this little wonder of simplicity and compactness, which is a model of mechanism in appearance and finish.

For prices, etc., address Jenkins Bros., 71 John St., New York, 13 So. 4th St., Philadelphia, and 105 Milk St., Boston, agents for this injector.

### DESIGN FOR A SUBURBAN COTTAGE.

This dwelling is designed for a locality where economy in width is desirable. Being in the main only sixteen feet wide, with a small wing on either side, the plan has been developed so that the accommodations are not sacrificed to the peculiar requirements of the situation. The staircase is so arranged as to be conveniently available from front and rear, and the parlor, dining room, and entrance hall can be thrown together for social occasions. The folding doors might be made to slide if preferred. The kitchen is sufficiently separated from the front portion of the house to exclude the odors from cooking, and is also properly located for efficient service in dining room and attendance at front door.

The kitchen is provided with dresser, range, and sink, and the laundry has stationary tubs. A small sink is placed in pantry connecting dining room and kitchen. From this pantry access is had to the cellar, to which there is also an outside entrance. Bath room is in second story, and contains bath tub, wash basin, and water closet. Hot and cold water through house.

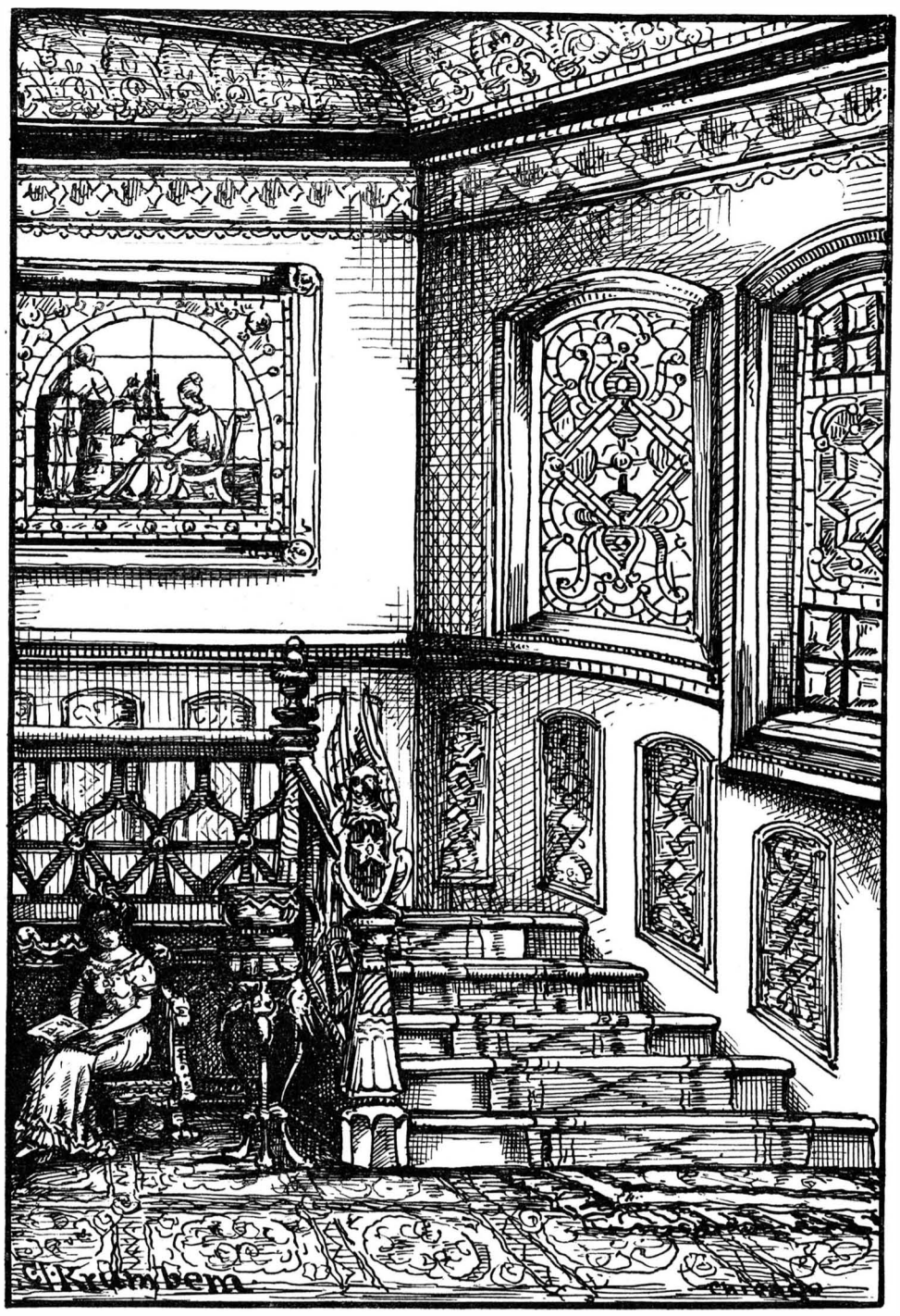
There are in all nine rooms, not including entrance hall and bath room, and the spacious attic can be arranged with one or two good rooms if desired. Cellar extends under entire house. Exterior of house is sheathed, and covered with narrow clapboards, except front gable and a strip between first and second stories, which, with the roofs, are shingled. Cellar walls are of stone.

The estimated cost of this house is twenty-eight hundred dollars.

The architect is Charles G. Jones, 280 Broadway, New York.

### DECORATIONS FOR A HALL.

We give a design for decorations for a hall and stairway, of moderate cost, for a country dwelling. Part of the glass of the windows is painted and part treated with beveled plate. The whole effect is rich and pleasing. Designed by C. J. Krumbeine, Argyle Park, Ill.




HALL DECORATIONS FOR A COUNTRY DWELLING.—DESIGNED BY C. J. KRUMBEINE, ARGYLE PARK, ILL.

### DWELLING AT DETROIT, MICH.

The perspective drawing and plan annexed represent a brick and frame house lately completed on Farnsworth Street, Detroit, Mich., from the designs and under the superintendence of Mr. A. C. Varney, architect, of 50 Campau Building, Detroit.

The house, which is of an attractive description, was built in a substantial manner, of good materials, at a cost of $2,600.

A SAFETY attachment for elevator cars has been patented by Mr. Charles R. Whittier, of Yonkers, N. Y. It is to prevent the elevator car from falling in case the hoisting rope should break, and consists of a special arrangement of wedges and counterweight rope, in connection with the hoisting ropes.

## A FRAME SCHOOLHOUSE OF MODERATE COST.

SPECIFICATION

of the materials and labor required in the erection of a new frame schoolhouse in district No. 7, Cranston, R. I. Wm. R. Walker & Son, architects, 27 Custom House Street, Providence, R. I.

### MASON'S WORK.

*Excavations.*—Excavate for the cellar 5½ feet below the finished grade around the building, leaving all the earth excavated and not required for back filling against cellar walls in the low part of lot near the two rear corners.

*Cellar Walls.*—Build cellar walls about 5 feet high by 1 foot 6 inches thick, from good building stone laid up dry; wall on a straight, true, plumb line, and level off same for starting the underpinning.

*Cellar Steps.*—Furnish materials and build cellar steps from 3 inch x 12 inch North River bluestone set in brick laid in sand and cement mortar, and the sides of cellar entrance faced up in stonework laid in cement and sand mortar.

*Window Sills.*—Furnish pointed granite sills to all cellar window openings.

*Curbing*—Amend opening for cellar steps, and under the porches and steps furnish and lay down 3 inch x 12 inch North River bluestone flagging set in cement and sand mortar. The flagging under porches and steps to set on stone foundations two feet above grade.

*Underpinning and Piers.*—Furnish good hard body brick and build underpinning walls about 3 feet high by 8 inches thick, the brick on face of underpinning to be selected of even color and laid up in lime and sand mortar colored red. The remainder of brickwork to be laid in lime and sand mortar.

*Chimney.*—Furnish good building bricks and build the chimney of the size and in form as shown and figured on drawings. The walls to be laid up 8 inches thick in lime and sand mortar, with 16 inch x 30 inch cast iron door frame and door in the base of the chimney and openings cut through the walls for inlet of ventilating pipes when and where required. Top the chimney out through roofs with selected body brick laid in red colored mortar, with a 6 inch x 8 inch split faced bluestone belt at starting of openings in face; the belt to have good beds and 1 inch drove margin lines on outside corners. Inside of chimney finish and set up one 10 inch cast iron smoke pipe 40 feet high with ⅜ inch shell, to have flanged and bolted joints and ten inch inlet under first floor joist; the inlet pipe to bolt on the main upright pipe and to extend out to and through the brick wall of chimney.

*Pointing.*—Point up the stone walls inside of cellar with lime, sand, and cement mortar, and whitewash all stone and brick work inside of the cellar.

*Grading.*—When underpinning is laid up, grade up around same to a line 2 feet 8 inches below the top, so as to incline the earth away from the cellar walls.

*Lathing.*—Lath the walls and ceilings of all the rooms, halls, wardrobes, and sides of stainings to basement and loft with best quality four foot spruce laths with four nailings to each, the side joints to be laid ¼ inch open and the end joints broken at every 3 laths. The lathing in schoolroom to stop at a level line 2⅓ feet from the top of finished floors, and in all other rooms, wardrobes, and halls to a line four feet above the floor.

*Plastering.*—Plaster all the walls and ceilings above specified for lathing, one good coat of brown plastering mortar made from slaked, screened, and puttied lime, laid one week to cool, clean sharp grit mortar sand, long well beaten cattle hair, and clean water used in the proper proportions for mixing good strong plastering mortar, to be well rubbed into the joints between laths, forming good strong clinches back of same, to be put on of even thickness, straight and true at all angles, and when at the proper stage of drying to be thoroughly troweled to a hard smooth surface. Any broken places in the mortar, after woodwork is put up, to be repaired in a smooth and workmanlike manner.

*Finally*—The mason to remove all rubbish from the inside of building and cellar, to sweep out the interior of building when plastering is done, to do all work in a good and workmanlike manner, when the same is required, and without delay or hinderance to the contractor for the carpenter's work, and to furnish three pounds to the square foot sheet lead flashings, and build the same into walls of chimney where the same comes out through the roof.

### CARPENTER'S WORK.

*Framing.*—Frame the building with good sound straight-sawed spruce timber of the following dimensions: Sills, 3 in. × 6 in.; first floor joists, 2 in. × 10 in., 16 in. from centers; posts, 4 in. × 6 in.; window and door studs, 3 in. × 4 in.; intermediate studs, 2 in. × 4 in., 16 in. from centers; plates 4 in. × 5 in; ceiling joists, 2 in. × 8 in., 24 in. from centers; tiner posts, 6 in. × 6 in; lower plates, 6 in. × 6 in.; braces, 4 in. × 6 in.; studding around the circle, 2 in. × 6 in.; plates and girts made of two thicknesses of 2 in. spruce planks sawed on the circle. The rafters in roofs to be 2 in. × 7 in., 20 in. on centers, with 2 in. × 6 in. in cellar joists; over the center of each schoolroom to be framed a truss with 6 in. × 10 in. tie beam, with 6 in. × 8 in. straining beam and rafters, and 1⅛ in. iron rods with nuts and washers.

*Boarding.*—Board the walls and roofs with 1 in hemlock boards, surface planed to ⅞ in. thick, and well nailed to the framework.

*Under Floors.*—Furnish and lay down ⅞ in. hemlock under floors to first floor, and a strip 3 ft. wide down through center of loft.

*Shingles.*—Shingle to roofs with best quality shared cedar shingles laid not over 5 in to the weather, and well nailed to the roof boarding. Shingle the walls from the top of window belt to the under side of cornice with best quality sawed cedar shingles, laid in straight courses not over 5 in. to the weather, and well nailed on.

*Clapboards.*—Cover all walls between the bottom board and window belt, including the nailing of porches, with 4 ft. eastern-sawed sap clear white pine clapboards, planed and painted, laid not over 4 in. to the weather, and well nailed, with all nail heads set in and united at all corners.

*Paper.*—Under clapboards, shingles, and trimmings on walls of building lay one thickness of "Bird's" waterproof sheathing paper, lapped not less than 2 in. at all joints.

*Trimmings.*—Get out, make, and set up from clear dry seasoned white pine, all the window and door frames, cornices, bottom boards, belts, and porches. To be made as per detail drawings furnished. The walls and ceilings of entrance porches to be covered with dry seasoned matched ⅞ in. white pine, with a ⅞ in. angle bead in corners of the arches. The floors of porches to be made from 1⅛ in. by 4 in. clear dry Southern hard pine jointed on the edges and laid ⅛ in. open joints, the sill and floor joist of porches first being covered with two thicknesses of tarred sheathing paper laid on top of the joists. The steps 1⅜ in. and risers ⅞ in., to be made from clear dry Southern hard pine, laid on stout 3 in. chestnut stringers sawed to receive treads and risers. The railings at ends of steps to be made from dry whitewood or pine, with turned tops on the posts and turned or straight moulded balusters. The thresholds of the doors at entrances to be made of clear dry seasoned 2 in. ash. In the cornices of the porches are entrance steps. Lay in a good sized gutter, line it with best I. C. tin, M. F. brand, well laid and rosin soldered, and run 3 in. galvanized iron leaders from the gutters to the ground, and turn bottom ends out with galvanized iron shoe at bottom.

*Belfry.*—The deck of belfry to be made by laying down 2 in. matched dry spruce on 4 in. x 12 in. floor boards, and to be a scuttle 2 ft. x 3 ft. through the deck with a step ladder leading to same from under the roof of building. The bell deck to be covered with I. C. roofing tin, M. F. brand, well laid and rosin soldered, and to turn up on sides of belfry 12 in., with the joints wiped with solder. The scuttle in deck to be covered with tin same as deck, hung to former with stout strap hinges, and fasten with stout iron hook and staples from inside. The walls inside of belfry to shingle same as walls of tower, the soffits of arches to be ⅞ in. matched white pine, with bead on outer corners to receive shingles, and the ceiling of belfry below plate to be ⅞ in. matched and beaded pine, fastened to 2 in. x 6 in. ceiling joists laid 2 ft. from centers. The finial and vane at apex of tower roof to be made from 20 ounce cold rolled copper, with the balls, vane, and flutes in skirt covered with gold leaf.

*Cellar Windows.*—The cellar window and door frames to be made as shown on plans, and set in walls whenever the masons are ready therefor.

*Sashes.*—The window sashes to be made from clear dry seasoned and kiln dried 1½ in. white pine, and of the forms and sizes shown on plans and elevations. To be glazed with second quality French sheet glass, and all windows on first floor hung to the frames with braided cotton sash lines passing over 2 in. polished wheel axle pulleys and counterbalanced with cast iron weights in pockets of the frames, weights in mullions of the main frames to have 2 in. pulley in the top ends of same. The sashes in gable end windows to be fitted and screwed in. The cellar window sash to be hung to frame with strap wrought hinges, and fastened at top with stout iron bolts.

*Furring.*—Cross furr the ceiling of all first story with ⅞ in. x 2 in. spruce strips, 16 in. from centers, and put up straight and true and well nailed. Furnish and put up ⅞ in. x 2 in. grounds at top line of the ceiling on sides of rooms, around windows and door openings, the grounds to be straight, true, and out of wind.

*Door Frames.*—Make door frames from 2 in. dry, seasoned plank (white pine), rebated to receive the doors, and when plastering is dry, set the same in door openings of partitions, straight, square, true, and plumb, and securely fastened in their partitions. All door frames from halls to schoolrooms to have 20 in. top light over the doors.

*Partitions.*—Partition the interior into rooms, as shown on the floor plans, with 2 in. x 5 in. straight sawed and sized spruce studding, set 16 in. from centers, with row of straight 2 in. x 5 in. bridging at top line of ceiling on walls, and one row of 2 in. x 4 in. bridging at the top line of blackboards The studs to be doubled and trussed at side and top of all openings for doors, and to be segment arched turned above sinks in the halls.

*Stairs.*—Build stairs to attic and basement with 1⅛ in. treads and ⅞ in. risers of dry spruce, and fastened to 2 in. x 10 in. sawed spruce stringers, and the front edges of treads to be a half round. The partitions around basement or cellar stairs to be 2 in. x 3 in. studs.

*Finish.*—Finish good, dry seasoned, and kiln dried white pine mouldings, 5½ in. x ⅞ in., and case all window and door openings on first floor of schoolhouse. Furnish material and ceil up the walls of schoolrooms 2½ ft. high with ⅞ in. x 4 in. matched and beaded whitewood or pine strips, set perpendicularly, with chalk shelf, and moulding at top edge of ceiling and 3½ ft. above chalk shelf. Finish and put up a ⅞ in. x 5 in. surface moulding, thus forming top of blackboards. Ceil the walls of all other rooms, wardrobes, and halls with the same ceiling boards as above mentioned, 4 ft. high, with a ⅞ in. x 5 in. surbase moulding at top of the ceiling.

*Doors.*—The doors to be of clear, dry seasoned, and kiln dried white pine, 1¾ in. thick from panels to each door, with moulded faces and wide moulded middle rails. To be a 1¾ in. pine sash top light over each door from schoolroom to hall, and glazed with one light French sheet glass, and hung to frame at bottom rail of sash, with stout "Stanley" wrought iron butts, and operated with one "Molensack" transom lift to each top light. The doors to be hung to frames with three 5 in. x 5 in. loose joint cast butts, and trimmed with lock and knobs, cost $2.50 for each door, and selected by the architect. To be rubber head stop knobs, set in ceiling behind where each door swings, to prevent door knobs from striking.

*Platforms.*—Furnish good, dry-seasoned ⅞ in. planed and matched clear Southern hard pine, and build platforms for teachers 10 in. high and of the size shown.

*Floors.*—Furnish good, dry-seasoned and kiln dried ⅞ in. planed and matched clear Southern hard pine flooring of the best quality, no boards over 4 in. wide, and lay down the top floors of schoolhouse to have two thicknesses of best deafening felt between under and upper floors, to be laid to close joints, blind nailed and smoothed.

*Thresholds.*—To be ⅞ in. or ¾ in. dry, clear Southern hard pine thresholds under all inside doors.

*Wardrobes.*—Put one shelf around each wardrobe 12 in. wide and at the line of top of ceiling or surbase moulding. Under the shelf and top of the ceiling boards furnish and screw on stout japanned double wardrobe hooks, 36 in each wardrobe.

*Closets.*—In each teacher's closet put down 7 in. base board with 2½ in. x ⅞ in. moulding top of same, one 12 in. shelf across back of each closet, a 3 in. strip around sides of each closet, with 12 stout japanned double hooks screwed to strips in each closet.

*Sinks.*—Furnish, set, and case up two cast iron sinks, four feet long, with the inside of sink enameled, to waste through 2 in. tar coated cast iron pipe with lead calked joints, to outside of cellar walls.

*Books.*—The space under arch at side of closet in each teacher's room to have a pine case with movable shelves built into the recess and with a light moulding around top of shelving.

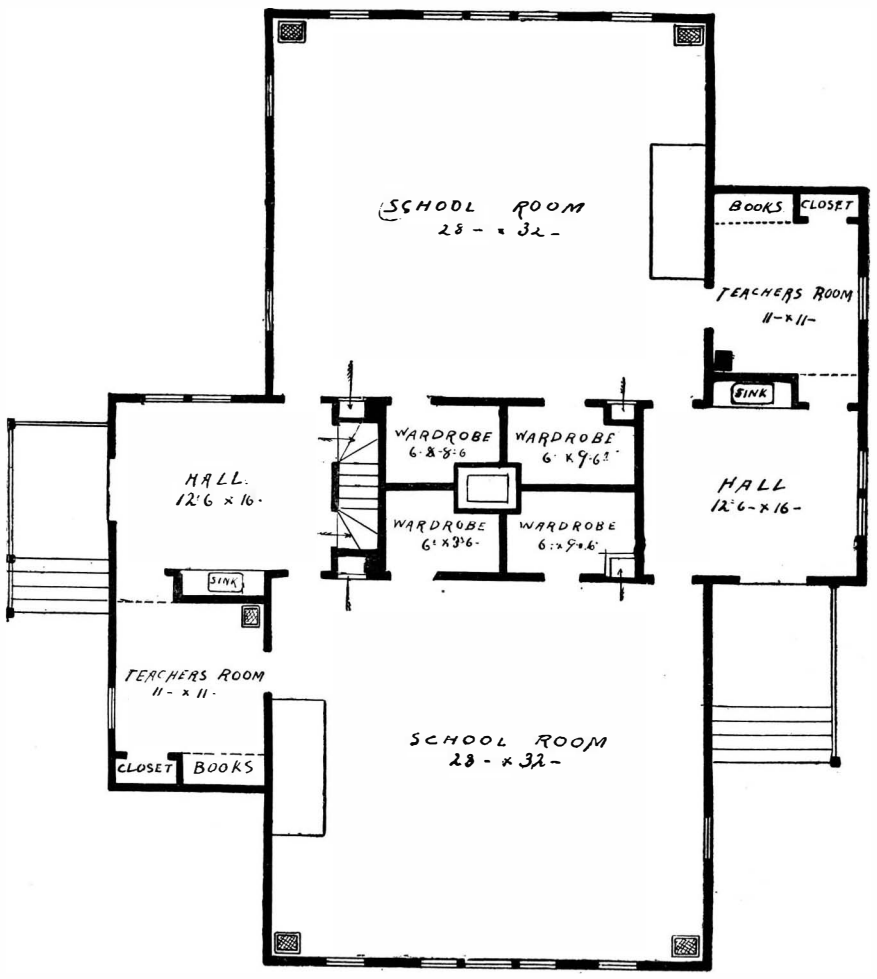
*Ventilation.*—Furnish good, sound, dry box boards and build 8 in. x 16 in. wide ventilating ducts from the floors of each schoolroom to attic, and thence into the brick ventilating duct, each flue entering the brick chimney independently. At the base of each flue in schoolrooms furnish and set in one 16 in. x 20 in. enameled cast iron ventilating register, secured to the ceiling of room.

*Cutting.*—The carpenter to furnish men to do any cutting that may be required for the heating pipes, and to cut in all the registers in floor which are furnished him by the contractor for furnaces.

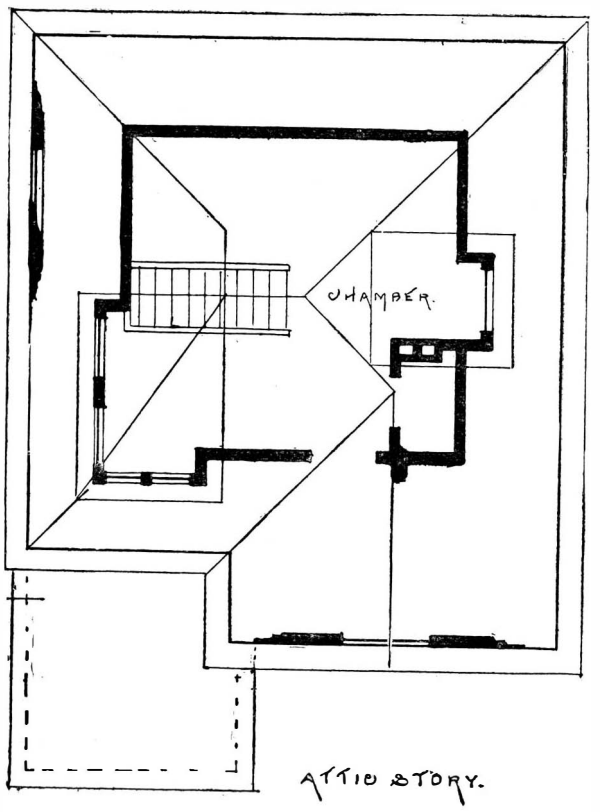
*Top Lights over Windows.*—The two top lights over single windows in each schoolroom to be hung to transom, and operated with Molensack fixtures, the same as specified herein for the top lights over doors.

*Painting.*—Paint all the exterior woodwork, other than roofs, two good coats of linseed oil paint, mixed to the colors as architects shall designate, and in two or more colors. The priming, or first coat, to be a good, heavy coat of paint, put on as fast as the woodwork is put up. The nail heads and cracks to be putty stopped between first and second coats of paint. All pulley stiles of windows stained with a red oil stain, and all tinwork painted two coats "Prince's" metallic paint. Paint all interior woodwork, other than floors and stairs, three coats of white lead, oil, and turpentine, colored as architects desire, and in two tints. Putty stop all nail heads and cracks, and draw all window sashes and top lights two coats Indian red. Oil all the Southern hard wood pine, floors, and platforms one coat best linseed oil, with umber stain in same.

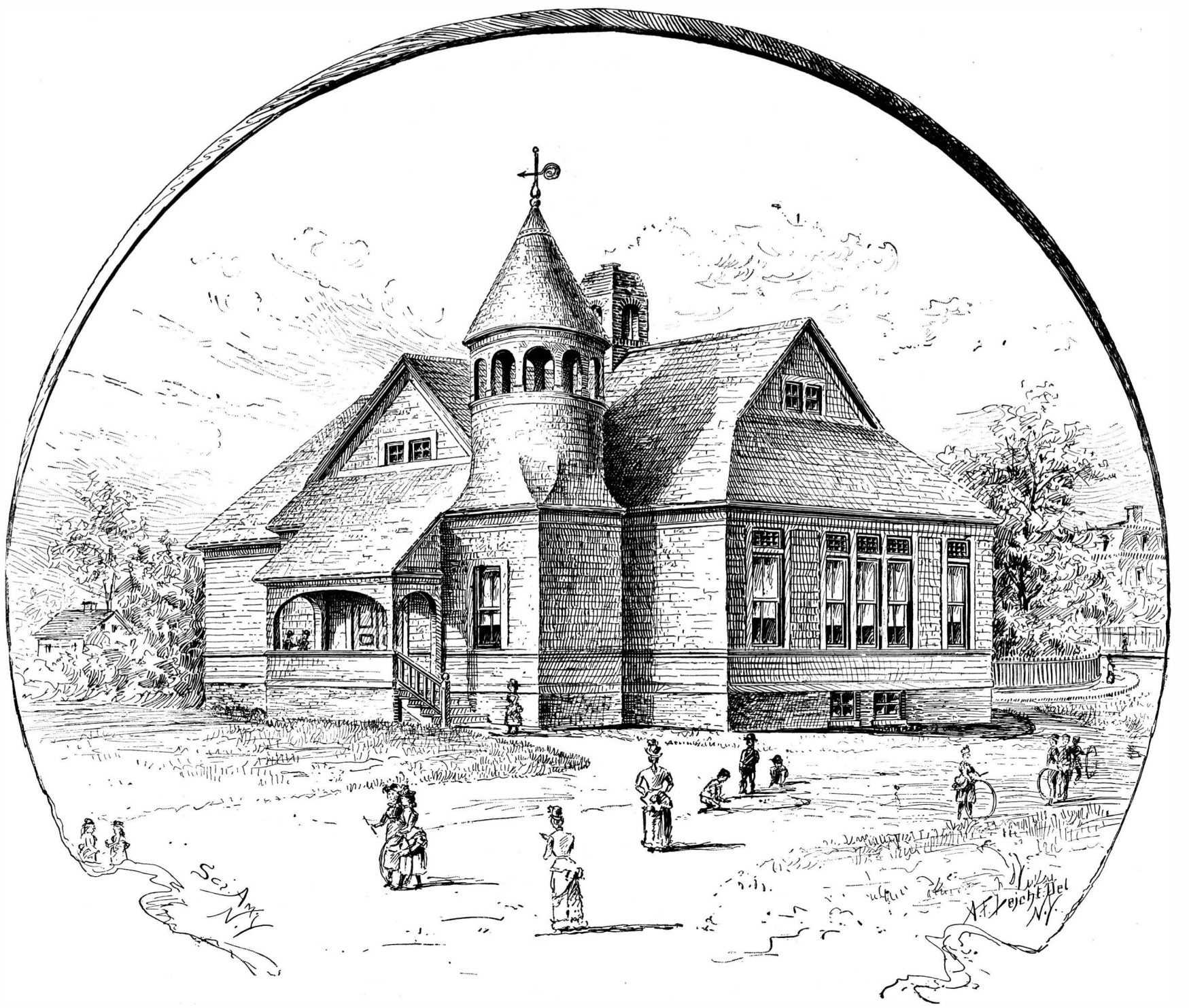
*Finally.*—All work to be done in a good and workmanlike manner, under the superintendence of the architects, and in strict conformity with the drawings furnished and these specifications.




FLOOR PLAN



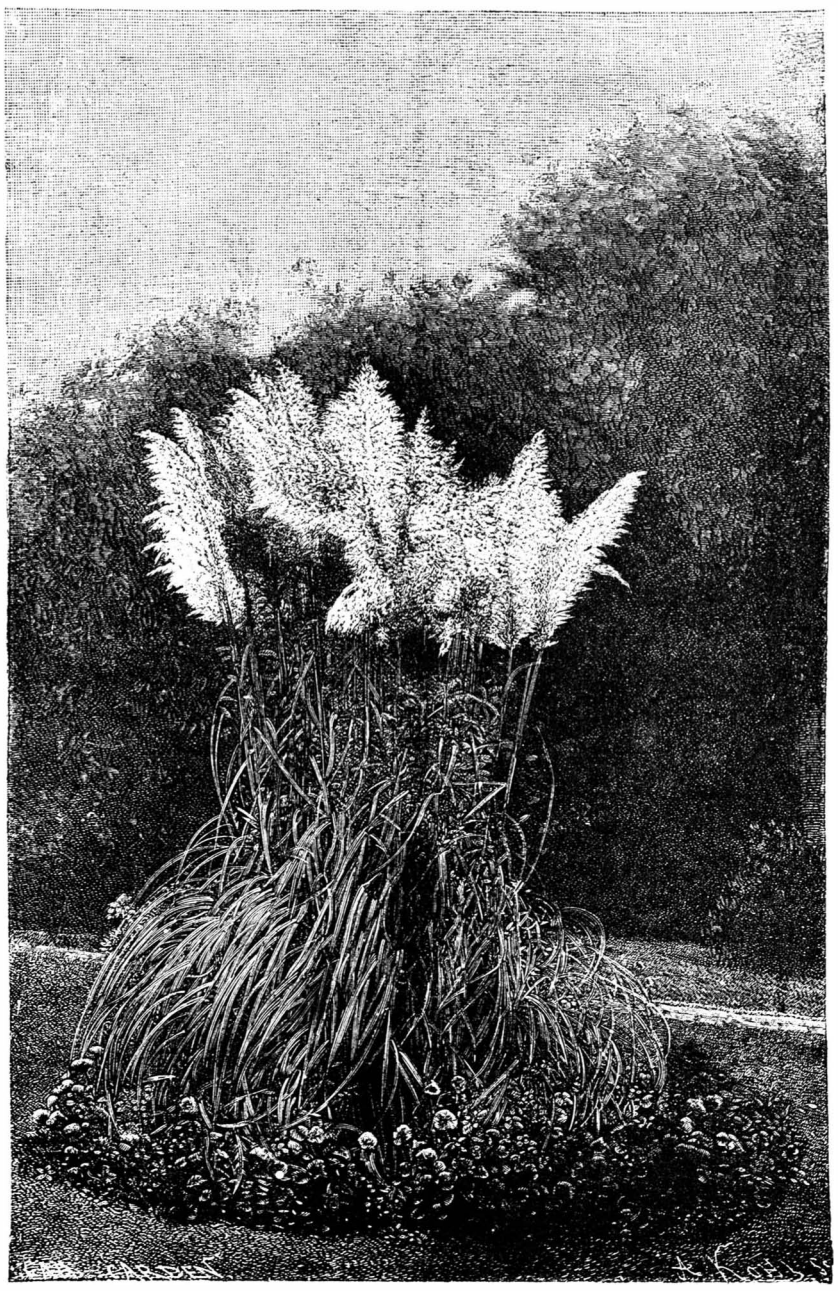

ATTIC STORY.




**A FRAME SCHOOLHOUSE OF MODERATE COST.**

### THE PAMPAS GRASS.

A stately mass of pampas grass in full plume is always a beautiful sight in a garden, and particularly if so placed that the surroundings heighten its effect. In such a position is the noble specimen in Mr. Gatehouse's garden at Chichester, who kindly sent us a photograph of it, taken last season by Mr. Malby. It was then exceptionally fine, the great mass of plumes being nearly ten feet high. It is planted in a part of the garden snugly surrounded by trees. Close to it is a stone-edged water basin and fountain, so that this corner is a pretty feature of the garden. The ring of flowering plants around the base of this pampas is decidedly a mistake. Such a stately plant as the pampas needs no embellishing, and it never looks better than when seen rising from a lawn with room to spread out its grass in a graceful way. The soil about the plant can be now and then enriched in the same way as when a circular bed is made around it. Mr. Gatehouse's pampas is of the best variety, the one that produces large spreading white plumes. There is such a great difference between the good and the bad varieties of the pampas, that care should be taken to get the best form, seeing that the plant always forms an important permanent feature of a garden, if it succeeds, and one that takes a long time to develop, and which is so difficult to replace.—*The Garden.*



PAMPAS GRASS.

[The Garden.]

### A NEW ORLEANS GARDEN.

About gardening in New Orleans, and about our own garden in particular, I am sorry to say there is not much to record. Ground being very cheap here, all the best residences, the majority of which are wooden, are built upon large "lots," measuring each from 80 ft. to 125 ft. in front by 160 ft. to 250 ft. in depth, and in some cases much more. This arrangement allows free ventilation and sunlight, and sufficient space for town gardening where people choose to take advantage of it. There have been but few attempts, however, at artistic effect; on the contrary, the grounds are planted in the most desultory manner, the main effect being apparently to get as much into them as possible. Notwithstanding, the general effect of these "wild gardens" is decidedly pleasing, and, in consequence, New Orleans has a widespread reputation for beauty, in addition to the quaint picturesqueness of the French quarter, about which so much has been said. As our winters are generally short and mild, and the atmosphere quite moist, vegetation is strong and rapid in its progress, so that in two or three years new dwelling houses, which are never more than two stories high, become embedded in dense verdant thickets, which, but for the saw and shears, would soon crowd those structures not only out of sight, but occasion speedy ruin and decay.

Our shade trees are for the most part natives, such as oak (several species), cypress, elm, catalpa, sweet gum (liquidambar)—probably the most beautiful of all—plane, hackberry, magnolia grandiflora, pine, cottonwood, etc.; to which may be added, of foreign introduction, tallow tree (stillingia sebifera), privet (ligustrum japonicum), pride of India, or China (melia azedarach), Japan varnish (sterculia platanifolia), and ailantus. For ornament the orange tree is in general use, especially the bitter species, which is not only somewhat hardier than the edible orange, but holds undisturbed possession of its beautiful fruit from one season to another. In addition to oranges we have palms, of which there are three indigenous species, and about as many more from abroad which are equally hardy; also pittosporums, magnolia fuscata, oleander (pink, crimson, purple, lilac, and white flowered), sweet olive, smoke tree, laurustinus, Chinese azalea, bottle brush, castor oil, camellia, crape myrtle (lagerstrœmia—crimson, rose, lilac, and white flowered), the prince of all flowering trees; cape jessamine (gardenia florida), pomegranate, yucca, cycas revoluta, banana, bamboo, poinsettia, agave, acalypha, alocasia, and others too numerous to mention.

In regard to my own garden, after several years of unsatisfactory work, I laid it out upon what is sometimes called the French system, *i. e.*, in circles and in portions of circles, and it has proved to be quite a success. It has no walks, the result being a long, unbroken sward,* which, besides its intrinsic beauty, deepens the perspective, and adds very greatly to the effectiveness of the water, rockery, and tree plantation in the rear.

For flowering plants, we rely mainly upon roses, more especially teas, all of which flourish in the open air without protection, and the display of color which they produce in March, April, and May is truly magnificent. Even now and until Christmas an abundance of blooms may be cut for house and table decoration. Besides roses, cannas—of which ehemanni is by far the best—crinums, hydrangeas, Chinese hibiscus, lantanas, abutilons, plumbagos, chrysanthemums, and a host of others with which readers of the *Garden* are familiar adorn the borders. For bedding purposes we rely principally upon pansies, anemones, phloxes, gladioli, and hyacinths for early spring; portulacas, pelargoniums, petunias, torenias, salvias, asters, balsams, and coleuses for summer; and chrysanthemums, dahlias, zinnias, etc., for autumn and early winter. At present (November 20) the garden is all ablaze with roses, zinnias, alternantheras, acalyphas, poinsettias, chrysanthemums, acacia corymbosa, perennial ipomæas, antigonums, annual thunbergias, manettias, etc. For covering trellises and verandas, we make another large draught upon roses, such as Marechal Niel, Solfaterre, Lamarque, Queen Henrietta, Gloire de Dijon, Ophirie, and Perle des Jardins; but, in addition to these, much use is made of rhynchospermum jasminoides, solanum jasminoides, wistarias, bignonias, clematises, antigonums, honeysuckles, ipomæas, and aristolochia elegans. The seed of the aristolochia was received by Mrs. Richardson some years ago without any name, and has been extensively cultivated ever since. It requires but little protection in winter, and when killed to the ground shoots up again early in spring.

In our pond, which is cemented, we grow several species of nymphæa, of which devoniensis and rubra are probably the most satisfactory; also nelumbiums (speciosum and luteum), pontederia crassipes, limnocharis humboldti, pistia, and trapa. The last, in consequence of its very rapid development, has to be cleared out every few weeks. Last season we succeeded in flowering the Victoria regia without artificial heat, the young plant having been started in the propagating house, and transplanted early in June.

For some years past I have been endeavoring to acclimate some of the subtropical palms which grow at considerable altitudes in their native countries, and thought that I had succeeded in adding quite a number to our old list until last winter, when the extreme cold which we experienced wrecked all my hopes. Only one genus (sabal) is indigenous to this locality, and of this we have two species, adansoni and serrulata. To this may be added s. palmetta and pritchardia filifera, which belong to the same latitude, the former in Carolina and the latter in California. Two species of chamærops, excelsa and fortunei, and phœnix dactylifera were naturalized long ago, and of late years cocos australis has also been found to be quite hardy. To these I had added phœnix tenuis, sylvestris, reclinata, canariensis, spinosa, and rupicola, sabal blackburniana, jubea spectabilis, corypha australis, latania borbonica, kentia belmoreana, and rhapis flabelliformis, and by means of such protection as was afforded by stuffing Spanish moss (tillandsia usneoides), which hangs in such profusion from our forest trees, between the petioles so as to envelop the crown, all went well for some time. Phœnix reclinata and canariensis and latania borbonica had already attained considerable size, the former furnished with a trunk 5 ft. high by 2½ ft in diameter, and the latter with one 3 ft. by 12 in.—the admiration of every passer by. Many of our neighbors, profiting, as they supposed, by our successful experiment, made similar plantations upon a smaller scale, and, therefore, the part of New Orleans in which we reside had begun to assume quite a tropical appearance. But, alas! for all our joys and hopes, on the 8th of January, 1886, there came from the far-off Rockies in the Northwest a "blizzard," which carried death and destruction not only to all delicate and half-

* Our best lawns consist of Bermuda grass (cynodon dactylon?), which forms a beautiful turf, but, unfortunately, loses its leaves by the first frost. Has its seed ever been discovered?

VIEW IN DR. RICHARDSON'S GARDEN, NEW ORLEANS.—[From a Photograph.]

hardy vegetation, but also destroyed many of our indigenous trees and shrubs, and even extended its ravages into countries ten or twelve degrees south of us, destroying some large plantations of coffee trees on the east coast of Guatemala.

The thermometer registered 12° Fahr., and the ground remained frozen for a week—a circumstance which had not happened along this coast before for more than sixty years. It was not until the weather became warm that we began to realize our losses, and, in some cases, not until the following spring. Suffice it to say, there now survive one phœnix canariensis, two large sabal palmetta, two chamærops, one cocos australis, one jubea spectabilis, and several small sabal adansoni and serrulata. Although greatly discouraged, yet, hoping that we may not live to experience such another visitation of northern weather, we have inaugurated another similar experiment. I ought to say, in praise of the sabals, chamærops, cocos, and jubea, that they stood the severe trial without any protection whatever.

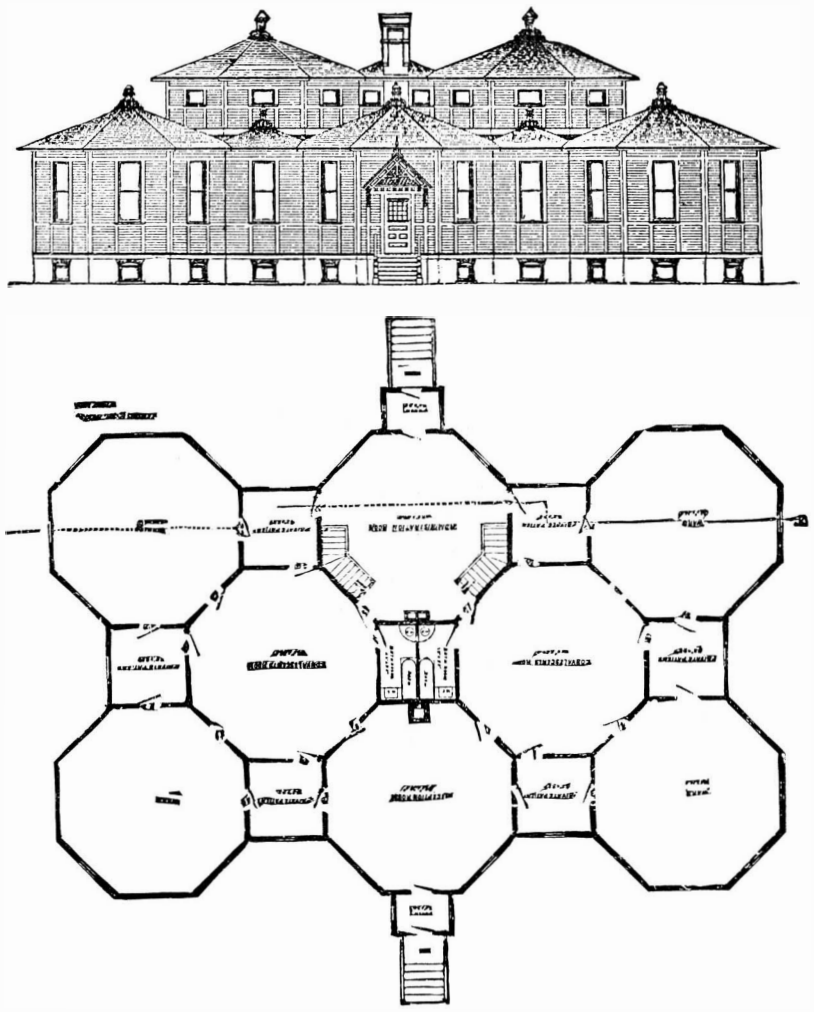
The length which my remarks have already run forbids even the enumeration of other plants which succumbed to this terrible frost. The death of four-fifths of all the orange trees in this neighborhood was, of course, the greatest loss, both on account of their economic and decorative value.

T. G. RICHARDSON, M.D.

## A MUNICIPAL HOSPITAL.

The city of Detroit, Michigan, after a struggle and conflict of many years' duration, has at length got an excellent hospital completed. It was designed by Health Officer Dr. O. W. Wight. He had certain ends in view, and planned an edifice in order to secure them practically. The architecture was made to conform to certain ideas of sanitary use. No closets for the heedless storage of infected clothing and bedding; no hollows in the walls or under floors for the burrowing of hospital germs; no attic places for the accumulation of contagium in the infected air; regulated warmth, dry and non-absorbent material, plenty of softened light and good ventilation—such were the needs of a contagious disease hospital, and the problem was to secure them by a structure at once economic and convenient for use.

Brick and stone were rejected as material, involving as they do either dampness or hollow walls. A frame would also necessitate "dead spaces" behind the plastering and above the ceiling. The method of building a grain elevator suggested the idea of the construction. Thus solid wooden walls could be made, which, when properly painted, would be non-absorbent, not subject to change of temperature, and dry. In order to avoid needless weight of material, awkwardness of form, unsightly partitions, and sharp angles; in order to secure the greatest amount of light, sunshine, utilization of the entire inclosed space, and convenience of administration; in order to obtain accommodation for the greatest number of patients at the least expenditure; in order to obtain wards of moderate size and proper rooms for needful isolation of the moribund or delirious; in order to arrange for speedy disinfection and cleanliness, the plan was adopted of a series of octagons separated by square rooms, all contiguous, yet separated by solid walls of painted wood, although communicating with doors wide enough to admit of the easy passage of the regulation hospital beds.



A MUNICIPAL HOSPITAL.

A glance at the illustrations will show the arrangement of the larger octagon and smaller square rooms. There are six external octagon rooms, twenty-four feet in diameter. There are also six external square rooms, ten feet across. All these inclose two octagon rooms, with an intervening square room, of the same size.

The basement, half under ground, half above, is made of hard burned brick, laid in good cement, and well cemented on the outside of the wall. It is paved with hydraulic concrete, and is nine feet high to the lower edge of the floor joists, which are mill dressed. There are double glazed windows all around, opening and shutting with transom rods. The basement rooms all open into one another. Thus is secured clean, well ventilated space for boiler room, kitchen, laundry, pantries, drying rooms, water closet and bath room, etc., etc. Doors from without lead to the basement on both sides of the building. The planed under surface of the floor above constitutes the ceiling of the basement. The walls are finished in hard calcimine. All the domestic arrangements of the hospital are thus amply provided for without encroaching upon the floor of the building devoted to patients.

Above the foundations the walls are built up with seasoned two by four pine stuff, laid flatwise and fastened together with long nails. The stuff is dressed to gauge, and the inside of the wall is planed smooth before painting. The outside is boarded up and down, so that the walls are solid, and five inches thick when finished. The height of the walls is fourteen feet from the floors. The windows are four feet from the floor, double glazed, divided into three parts, the middle stationary, the lower sliding up, the upper opening with transom rods. The doors are extra wide, to admit of rolling beds from one room to another. The floors are double, the lower course of pine, the upper of white maple The two central octagons and the intervening square are carried up six feet higher, with windows all around above the adjacent roofs, opening and closing with long transom rods, for ventilation and light.

The roof all over is broken up into separate cones, with one-fourth pitch, over each room, with intervening gutters. The roof is of solid wood, two and one-half inches thick, covered with tin. The under side of the cone-shaped sections of the roof over the separate rooms is the ceiling of the rooms. There is no upper floor, consequently no attic spaces at all. The thickness of the timber roof is to prevent heating through in summer and chilling through in winter. The hospital part of the building is one story, and all rooms for the sick are open from the double floor to the thick solid roof. At the center of each conic section of the roof, consequently at the apex of each room, is a solid ventilating shaft, octagon or square in form, according to the shape of the room, extending four feet above the roof, hooded to prevent the entrance of rain and snow, the opening of which is regulated from the inside.

The central rooms are also ventilated below by shafts from the outside. The two bath rooms and water closets into which the central square is divided are ventilated with elaborate care.

The whole building is heated with low pressure steam. Some of the more exposed rooms have three radiators. All radiators are placed under windows, and air is introduced to them by apertures through the wall behind them, regulated by slides.

The hospital is supplied with water from the city water works, and the sewers and drains are constructed in the most careful manner. The whole building is lighted with gas.

There is no plastering in the building. Each room, lined with painted and varnished wood, can be washed out with a hose, like a tub. There is no hollow space in the whole structure big enough for a mouse to creep into. The walls are non absorbent, and the whole hospital can be kept clean and sweet with a minimum of care and toil. The building, containing no blind spaces, is practically fire-proof. Fire cannot be concealed in solid wood, and will not kindle and spread where there can be no draught. Besides, a hydrant at the door, ready to attach hose, will furnish complete safety.

The whole cost of the building, including plumbing, heating apparatus, and especial provisions for lighting, is not quite eleven thousand dollars, and will accommodate fifty patients without crowding. It stands in the middle of ten acres of ground, is within two and one-half miles of the center of Detroit's population, and yet is quite in the country. The county of Wayne furnishes the ground and unites with the city in the maintenance of the hospital. Thus the surrounding townships will be cared for and the danger to Detroit diminished.

In one corner of the grounds, two hundred and fifty feet away from the main building, are three "huts," technically so-called, sixteen by twenty-four feet, built of wood, solid, provided with water, sewerage, light, and warmth, in which eight or ten small-pox patients can be cared for well Small-pox is epidemic only once in six or seven years. Sporadic cases in the long intervals can be cared for in these small buildings, while the main hospital can be devoted to other contagious diseases. The structure of all the buildings is such that they can be thoroughly and safely cleaned and disinfected in a few hours after long occupation by small-pox patients.

An eminent English sanitarian, a few years ago, expressed the wish that contagious disease hospitals might be constructed of "deal boards solid," as the safest and cleanest material. His idea has been first realized by the city of Detroit, with scientific precision of details and in an ingenious original form.—*Sanitary News.*

### White into Gray Cast Iron.

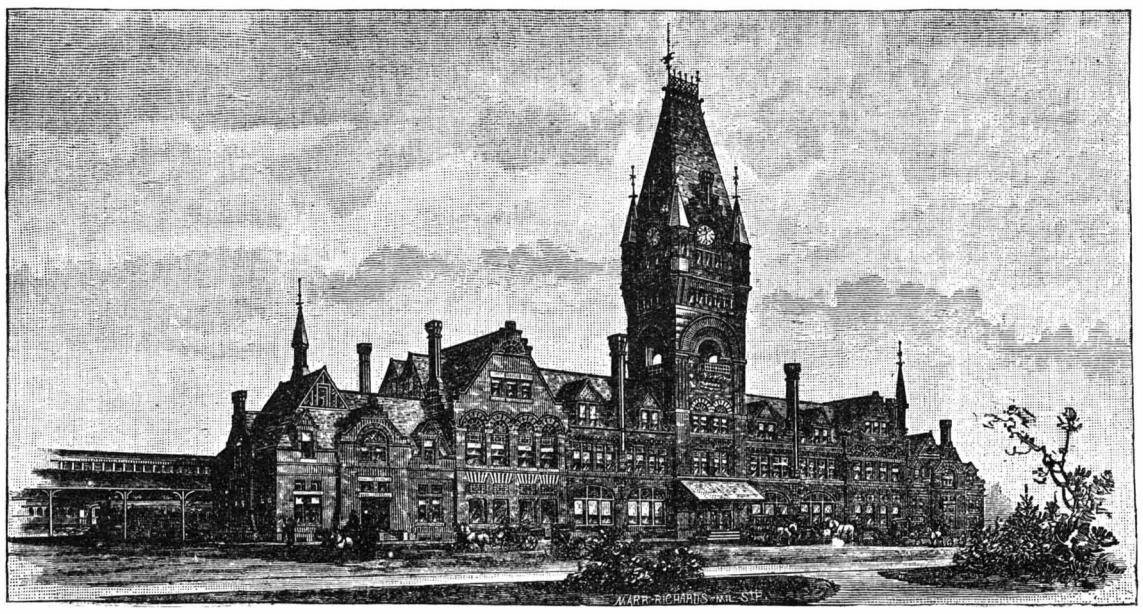
M. Ferdinand Gautier has communicated to the *Comptes Rendus* some observations upon cast iron. He says that gray iron alone can be perfectly worked in foundries; the white iron being too hard. Gray can be transformed more or less completely into white iron by the chill, through the intermediary of a metallic mould which rapidly cools the metal, and makes the graphite pass into the state of combined carbon. But the inverse problem—that is to say, the industrial conversion of white into gray iron by special treatment (a process of fusion in the cupola, for instance), is not a current operation in the foundry. At the same time this transformation is of great importance, because by successive remeltings gray iron tends to become white, and thus to lose its value to the founder, and spoil his castings. M. Gautier has been struck by the experiment of Messrs. Stead and Wood, of Middlesbrough, who made a fluid and tough gray iron by the mixture of equal proportions of Cleveland white with a silicious pig; and he has repeated the experiment in France. His results are described as absolutely conclusive. By the addition of silicious iron to any variety of white iron, he succeeded in producing from the cupola a perfect gray metal, close grained, soft to work, very fluid, and in every respect suitable for moulding. The best kind of silicious iron for this purpose is shown by M. Gautier's experiments to be that which is freest from manganese; so that the Scotch iron which is commonly used to make a good, fluid metal may be advantageously replaced by one-quarter of its weight of 10 per cent ferro-silicium. In addition, it is shown by many experiments that the artificial gray iron made by thus precipitating the combined carbon of white iron is stronger, because of its homogeneity, than the natural gray iron, in which the graphite is more or less irregularly distributed.

### The Heating Power of Gas.

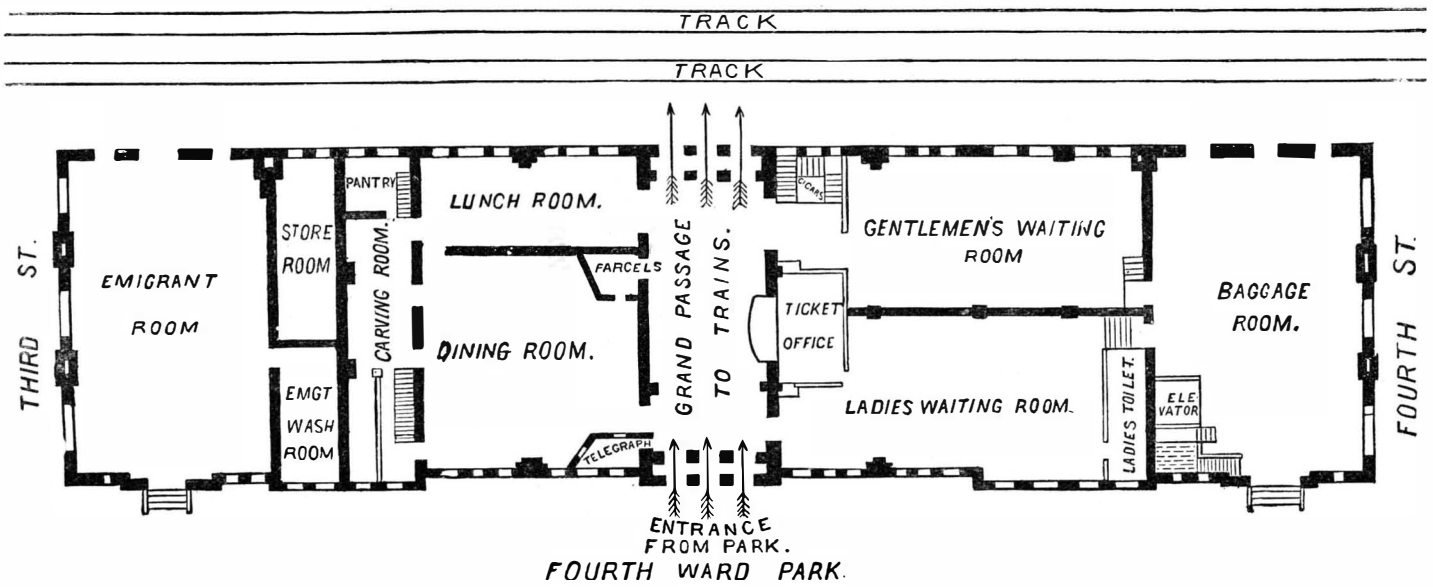
A series of tests has recently been made by Dr. Fischer, the well-known German chemist, showing that in ordinary domestic stoves in use not more than 20 per cent of fuel consumed is really utilized for warming the rooms, whereas, with stoves burning gas, 80 per cent and more of the possible effect is obtained. In a sugar manufactory at Elsdorf, it is stated no steam engines have been used for several years. Gas is made at a cost of about 10d. per 1,000 cubic feet, and is used for lighting and driving gas engines. At the Essen works, water gas is made at a cost of 4d. to 8d. per 1,000 feet, and serves both for fire and lighting.

### NEW PASSENGER DEPOT OF THE CHICAGO, MILWAUKEE, AND ST. PAUL.

The elegant new passenger station of the Chicago, Milwaukee, and St. Paul Railway at Milwaukee is now completed, and trains began running into it a few weeks since. It is among the finest buildings of the kind, as will be seen from the elevation and ground plan, which we illustrate. It is situated between Third and Fourth streets, one and one-half blocks from Grand avenue, and fronts on a park on Everett street. The ground plan of the building shows a surface of 120 x 65 ft. There are three floors—the first 16 ft. in the clear and the other two 14 ft. each. In the center of the facade rises a tower to the height of 160 ft., reminding one in its graceful lines of some Venetian campanile, and dominating the landscape in every direction. The style of the structure is modern Gothic. The foundations are solid and enduring, being constructed of stone, with granite facings above grade. The material used in the construction of the walls is Milwaukee brick, faced with pressed Philadelphia red brick. The trimmings are of red sandstone and terra cotta in handsome patterns.



NEW PASSENGER STATION OF THE CHICAGO, MILWAUKEE & ST. PAUL RY., MILWAUKEE.




GROUND PLAN OF MILWAUKEE PASSENGER STATION.

The main entrance of the building is formed of a triple arch, supported by columns of polished granite. It is reached by a flight of six easy steps. The swinging doors of polished oak are a few feet inside the arch, being surmounted by stained glass windows in beautiful designs. These admit the visitor into the large central hall which bisects the building. This is 30 x 65 feet. The floor is of tile, in a well defined pattern and soft, pleasing colors. The walls are of red brick up to the spring of the arch. From there on they are in a soft, creamy brick. The lower portion of the wall is marked with geometrical patterns in different colored brick, while the creamy surface above is picked out here and there with a dash of dark color, as Beauty enhances her complexion by a black patch. Around the rear of the hall runs a gallery, which serves to give the light and lightness needed to the whole. This gallery is surrounded by a railing in hammered dull brass.

On the right of the main entrance is the ladies' waiting room, an apartment of handsome proportions, 30 x 84 ft., with tile floor, and finished in oak in natural color. To the rear of the apartment are well appointed toilet rooms. On the same side of the hall, and occupying the south side of the building, is the gentlemen's waiting room, of the same size as the other room, less a slight abridgment in length. Between the two is a bijou ticket office. All these rooms, as well, in fact, as all the rooms down stairs, with one exception, are finished in a similar manner to the ladies' room, and have tiled floors. The ceiling on this floor throughout is ribbed by heavy beams, whose possible heaviness is relieved by tinting in light color approaching a soft shade of Nile green. On the left of the entrance is the dining room of the hotel connected with the depot, a room 40 x 52 ft., finished as the other rooms, but with a wood floor. The lunch room, on the same side, is 16 x 52 ft. in size, and is furnished with folding stools for the benefit of its patrons. Between the two rooms is the telegraph office and the parcel counter.

To the right and rear of the hall an alcove gives room for a handsome oak stairway that leads to the second floor. This, in the west end of the building, is occupied by the train dispatchers of the different divisions, and it is safe to say that never before did train dispatchers have more comfortable or beautiful quarters. The most of the offices look directly out on the park. The east end of the building is occupied, with the exception of one room, for hotel purposes. Descending to the first floor, in the extreme west end of the building is found the baggage room, an apartment 52 x 56 feet in its floor dimensions. Immediately above it, and reached by a water elevator, is a room of similar size for the purpose of storing baggage not called for immediately. In the east end of the building is the emigrant room, of size the same as the baggage room, with heavily timbered ceiling and tiled floor. This room and the one above it, also intende for the same purpose, are well appointed for their special object. The building is lighted throughout by electricity and heated by steam, both being furnished by boilers and engine located in the east end of the basement.

Outside are large car sheds, 600 feet in length and 100 in width, supported by iron columns and girders, and roofed with corrugated iron. They cover five tracks on which the highest skill of the road master's art has been displayed. There is placed in the tower, at a height that will make it easily seen from a good part of the city, a big clock, the dials of which will at night be illuminated by electricity. The clock is one of the finest as well as the largest in the country. It has four dials. Those on the north and south sides are 11 feet in diameter, and those on the east and west are 9 feet. Each of these dials is composed of six sections of the finest ground glass, so joined together as to appear one solid piece. The pendulum of this mammoth clock is 14 feet in length, and weighs 400 lb. It is regulated for heat and cold. The cost complete is $500,000.—*The Railway Review.*

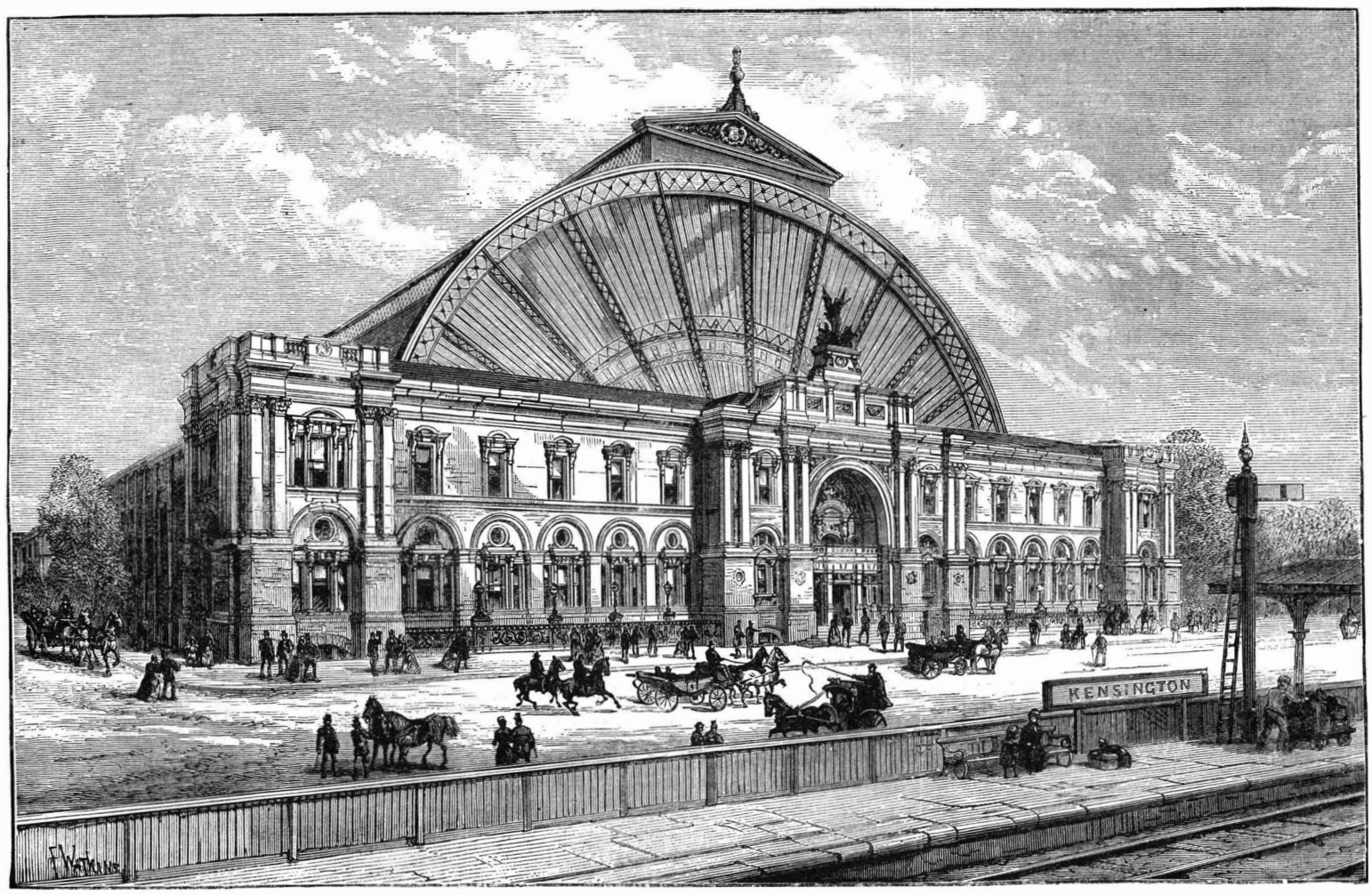
### MINNEAPOLIS RESIDENCES.

We give herewith a couple of attractive elevations of dwellings erected in Minneapolis, Minn., both by Mr. E. E. Joralemon, architect, of Minneapolis. For the drawings we are indebted to the *Northwestern Architect.*

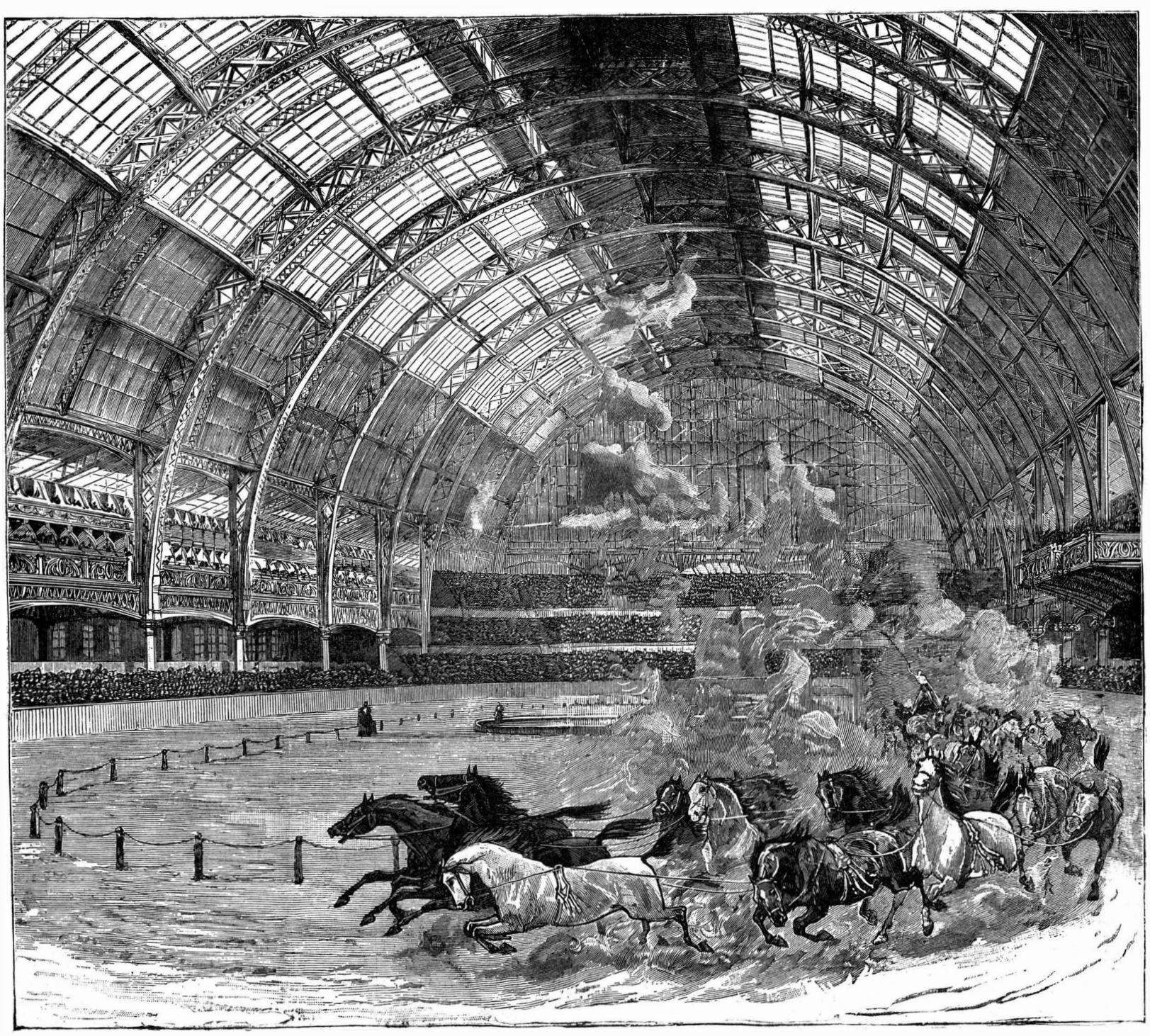
A FENDER has been patented by Mr. Baker V. Butts, of Halifax, N. C. It is formed of an inner and outer plate and damper, and designed to attach to open fireplaces to prevent coal, sparks, etc., from snapping out into the room, while in no way interfering when thus used with the draught of the fireplace.

RESIDENCE FOR E. B. GALUSHA, MINNEAPOLIS, MINN.

RESIDENCE FOR W. ANKENY, MINNEAPOLIS, MINN.




**OLYMPIA, THE NEW AGRICULTURAL HALL, LONDON—EXTERIOR VIEW.**



**OLYMPIA, THE NEW AGRICULTURAL HALL, LONDON—INTERIOR VIEW.**

[For description see page 66.]

### OLYMPIA.

Close to the West Kensington or Addison Road Station of the Metropolitan District Railway, London, on its western side, a few yards from the Hammersmith Road, a large range of buildings has been erected by the National Agricultural Hall Company, which is intended not only for exhibitions similar to those held in the Agricultural Hall at Islington, of live stock, cattle, horses, and dogs, but also for military tournaments, performances of horsemanship and gymnastic feats, and other public entertainments requiring space, and for a great variety of recreations. These buildings together cover an area of four acres, and will be popularly known as "Olympia."

The grand hall, two acres and a half in extent, is the largest hall in the kingdom covered by one span of iron and glass. It is 450 ft. long by 250 ft. wide, including an outer parade 40 ft. wide, affording a total ground floor area of 109,750 superficial feet, or nearly one half greater than the area of the Agricultural Hall at Islington. The galleries over the outer parade contain 46,000 superficial feet of floor space. The central area on which the performances take place is nearly a third of a mile in circumference. A minor hall forms an annex to the grand hall, and can be used separately for exhibitions, concerts, balls, theatricals, musical or other entertainments, while connected with the galleries will be spacious saloons for lecture rooms, picture galleries, refreshment rooms, public and private dining rooms, and offices.

The open gardens, comprising five acres and a half, are immediately adjacent to the hall. They will be devoted to fashionable gatherings, garden and floral fetes, musical promenades, and outdoor sports. One special feature of the company's programme will be high class musical performances in the open air, and Olympia will be in constant use, summer and winter, for any and every class of indoor and outdoor amusement, instruction, and recreation of a high style and character.

The facade overlooking the railway presents a handsome combination of red brick and white stone, and it is expected that an arrangement may be effected with the railway by which a broad and commodious road may be laid out in front of the new building from the station up to the Hammersmith Road. The station and the building will be connected by a short covered way, so that passengers by rail to Addison Road may pass directly into the hall in any kind of weather without inconvenience.

The hall is covered in by an iron roof, in which many ingenious novelties in engineering detail have been introduced by its designers. The structure consists of semicircular arched ribs 7 feet deep, and 170 ft. clear span, placed 34 ft. apart, and having a clear height from the floor to the crown of the roof of about 100 ft. It constitutes the loftiest iron and glass roof yet erected in or near London, the Crystal Palace excepted. The original architect was the late Mr. H. E. Coe, whose work has been completed by Mr. Edmeston. The contractors are Messrs. Lucas & Son. The engineers for the ironwork were Mr. M. Ende and Mr. Walmiston, and the contractors for it were Messrs. Andrew Handyside & Co., of Derby.

We give an exterior view of the building from the *Illustrated London News* and interior view from the *Graphic*. The latter shows the spirited scene enacted on the occasion of the recent opening entertainment, when 9,000 persons were present, and a team of thirty horses from the Paris Hippodrome were driven by a standing rider.

### A UNIQUE SYSTEM OF WATER WORKS.

BY E. O. HOVEY.

As everybody knows, water is frequently raised to a desired height by means of a hydraulic ram set in a stream at the foot of a hill, or at the bottom of dam, or at some other place where there is a natural fall of water; but at Elk River, Minn., there is a peculiar arrangement, a description of which may prove to be of interest.

The town is situated at the junction of the Elk and Mississippi Rivers, thirty miles northwest of Minneapolis. The geological formation is the area of modified glacial drift of central Minnesota. About half a mile northeast of the station the railroad passes within a few yards of the southwestern edge of a tamarack swamp, in which water is found on or near the surface. For a long time it has been known that, within a limited area southwest of the railroad at this point, good water could be had at a depth of eight feet, while just outside of this area water could not be found short of eighteen feet. The idea occurred to Mr. T. S. Nickerson, who lives at Elk River, and is water supervisor of the Breckenridge division of the St. Paul, Minneapolis, and Manitoba Railroad, that a hydraulic ram might be set so as to utilize this difference of water level. Test holes twelve feet deep were sunk with an elongated post hole auger, at the points marked A, Fig. 1, to determine the location of the edge of the basin of water standing at eight feet. Water failed to come into these holes, but at the point, B, Fig. 1, water was struck at the required depth. The operations which pertained directly to the setting of the ram are of especial interest. On a line supposed to be perpendicular to the rim of the basin a ditch sixteen feet long, two and a half feet wide, and about twelve feet deep was dug to allow the water to flow off while the "supply" well was in process of construction. This well is twelve feet in circumference and twelve feet deep. The first six inches of the well and ditch were cut through the light and sandy but fertile soil characteristic of this region, the next six and a half feet through loose gray sand. Then, on the line between the well and the ditch, the diggers struck a dike two feet wide at the top, but soon increasing in width to four feet, composed of coarse sand so firmly cemented by infiltrated oxide of iron and carbonate of lime as to render the use of the pick necessary in removing it. This dike is impervious to water, and, as shown in Fig. 2, has an inclination at this point of about 75° south of west. Northeast of the dike the well passed through coarse gravel containing many large stones, while southwest of it nothing but the loose gray sand was found. In the coarse gravel a copious supply of water was met with, which flowed off freely through the loose sand of the ditch.

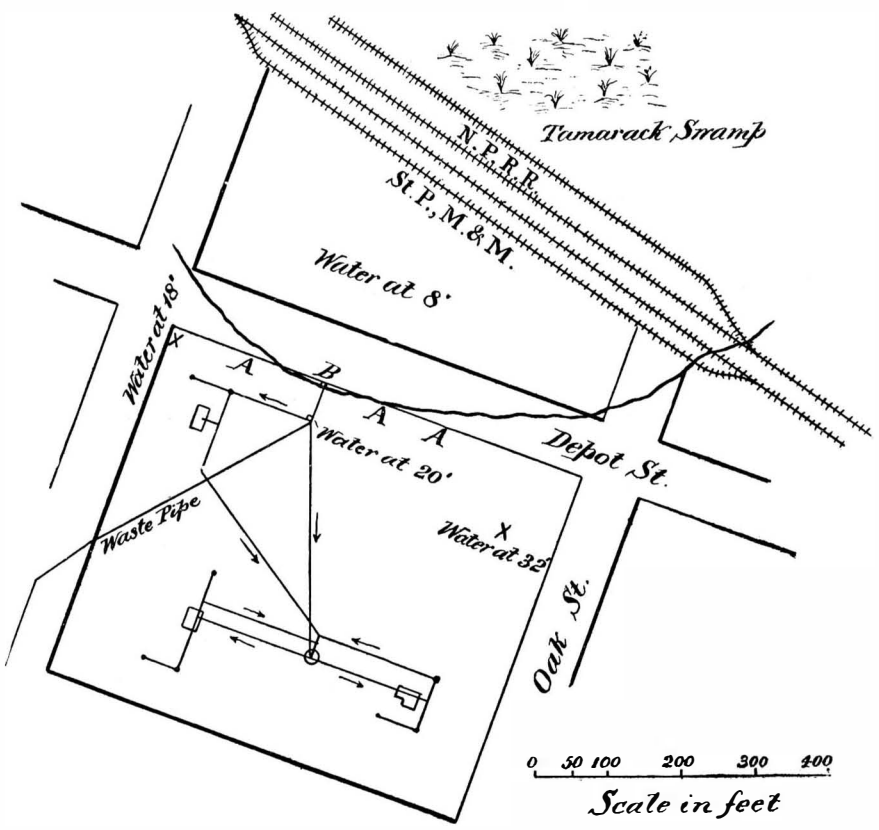



Fig. 1

A two and a half inch iron pipe was laid in the bottom of the well and ditch, the well was bricked up in the usual way, and the trench in the dike outside of the well was filled in with cement to make a water tight joint about the pipe and to prevent the washing away of the dike. Fifty feet southwest of this well another one, called the "waste" well, eight feet square, was sunk to the depth of twenty feet, and cairned to prevent caving. Water was met with at this depth, or the well would have been made deeper. A No. 6 hydraulic ram was then placed in the waste well at a depth of 16 feet, and was connected with the two and a half inch iron pipe mentioned above. The ram there has a head of water of eight feet, and it furnishes three houses and their dooryards with an abundance of water.

The arrangement of the pipes leading from the ram is illustrated in Fig. 1. Each pipe, after making the circuit of the house and dooryard which it supplies, is connected with a 250 bbl. tank, the bottom of which is 16 feet above the ground, which connection greatly increases the force of the stream at each faucet. In each pipe, after it passes through the house, there is a check valve to keep the water from flowing back from the tank through the house.

For about a year, *i. e.*, until the present summer, the waste water from the ram found free discharge through the loose sand surrounding the well; but lately the sand has seemed to be saturated with water, and drainage has not been sufficiently rapid. Therefore, some months ago Mr. Nickerson laid a two inch iron drain pipe from a depth of 18 feet in the waste well to a point 1,200 feet distant on the terrace of the Elk River, and the waste water is easily disposed of through this outlet.

The water within the basin is strongly impregnated with iron and has but little lime in its composition, while that from wells without the basin contains much lime and but little iron. The water from the tamarack swamp is like that found in the basin. The dike of coarse sand has been cut into at one other place, and found to trend in such a direction as to warrant the supposition that it forms a retaining wall on at least the southern and southwestern sides of the basin and tamarack swamp, thus preventing their waters from flowing off into the loose gray sand and descending to the general water level.

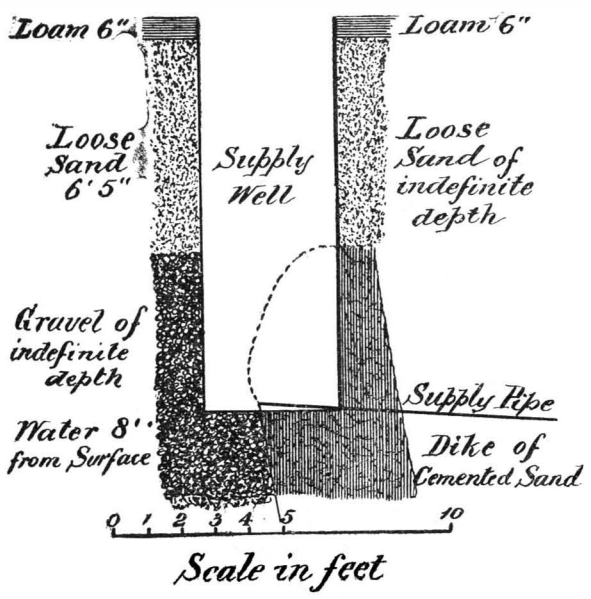



Fig. 2.

### Curiosities of Alloys.

The way in which an alloy of gold and copper or other metal is affected by a small quantity of impurity presents one of the most serious difficulties with which our case makers and jewelers have to deal in working gold. It has long been known to workers in the precious metal that minute quantities of certain metals render it brittle and unworkable; and referring to this in a lecture at Birmingham, Professor Roberts-Austen, of the Royal Mint, said:

"It may be well to demonstrate the fact. Here are 200 sovereigns. I will melt them, and will add, in the form of a tiny shot, a minute portion of lead, amounting to only the 2,000th part of the mass; first, however, pouring a little of the gold into a small ingot, which we can bend and flatten, thus proving to you that it is perfectly soft, ductile, and workable. The rest of the mass we will pour into a bar; and now that it is sufficiently cold to handle, you see that I am able to break it with my fingers, or, at least, with a slight tap of a hammer. The color of the gold is quite altered, and has become orange brown · and experiments have shown that the tenacity of the metal—that is, the resistance of the gold to being pulled asunder—has been reduced from eighteen tons per square inch toonly five tons. These essential changes in the property of the metal have been produced by the addition of a minute quantity of lead."

In the same lecture Professor Roberts-Austen said: "Here is a bar of tin, 2 ft. long and 1 in. thick, which it would be most difficult to break, though it would readily bend double. If only I rub a little quicksilver on its surface, a remarkable effect will be produced—the fluid metal will penetrate the solid one, and in a few seconds the bar will, as you see, break readily, the fractured surface being white, like silver."

A METHOD of purifying water has been patented by Messrs. William J. Morrison and John C. Wharton, of Nashville, Tenn. The invention covers a method of adding to the water a mixture of lime, soda, and sand, and then a mixture of alum, permanganate of potassium, and sand, the method being advantageous for all waters to be used for domestic purposes as also in the preparation of various beverages, and for steam boilers, laundry and bathing purposes.

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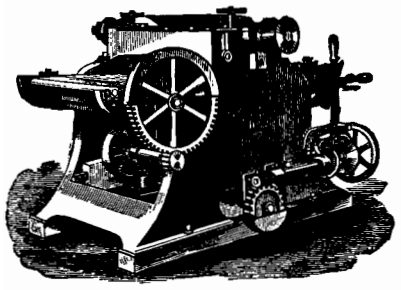

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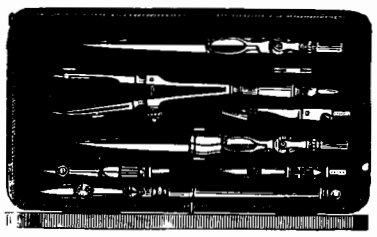

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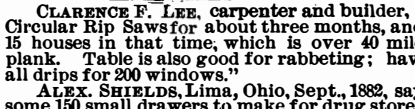


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| | |
|---|---|
| Premium Receipts in 1886, | $3,030,946.26 |
| Interest Receipts in 1886. | 1,617,992.24 |
| Total Receipts during the year. | 4,648,938.50 |
| Disbursements to Policy-holders, and for expenses. taxes, etc., | 3,696,352.66 |
| Assets January 1, 1887, | 31,545,930.77 |
| Total Liabilities, | 26 196,060.41 |
| Surplus by Ct. and Mass. standard, | 5,349,870.36 |
| Surplus by standard of N Y., | 6,800,000.00 |
| Policies in force January 1, 1887, 63,293, insuring, | 92,262,969.44 |
| Policies issued in 1886, 6,728, insuring, | 13,027,993.00 |

**MORGAN G. BULKELEY, President.**

J. C. WEBSTER, Vice-President.

J. L. ENGLISH, Secretary.

H. W. ST. JOHN, Actuary.

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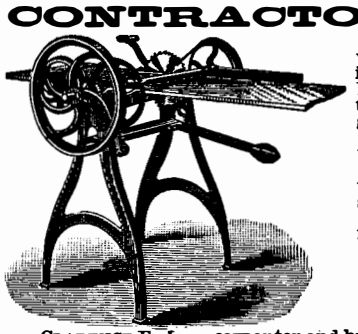

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ALEX. SHIELDS, Lima, Ohio, Sept., 1882, says: "A few days since, we had some 150 small drawers to make for drug store; the steam power mill wanted 50 cents each for making them. With my foot power machinery I made them, and saved $25 above good wages on the job."

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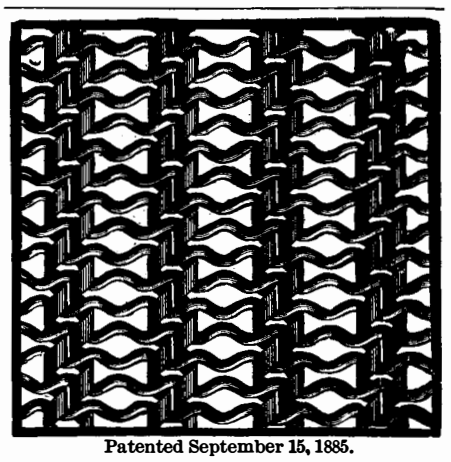

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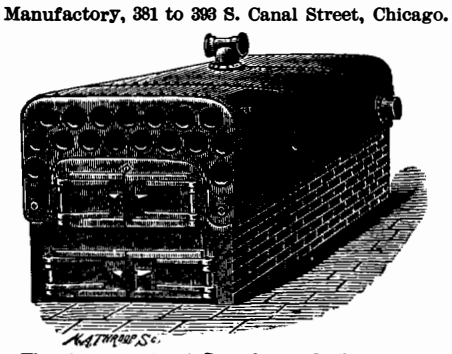

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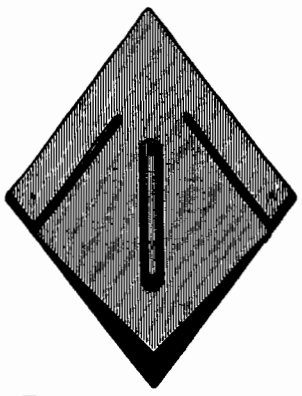

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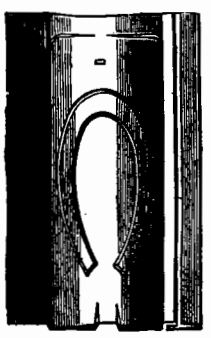
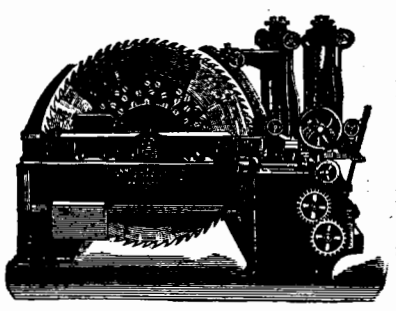


Horseshoe Spring-Lock Shingle.



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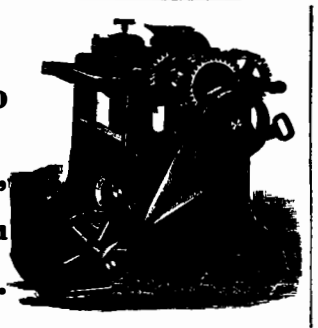

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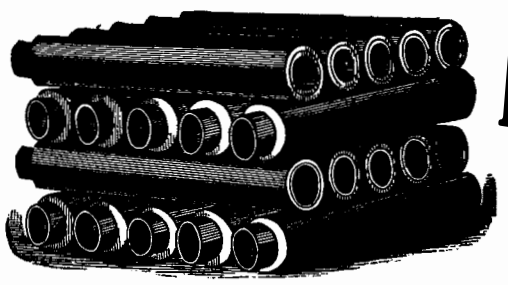

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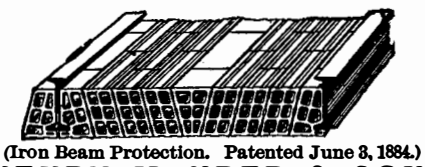

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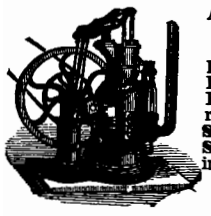

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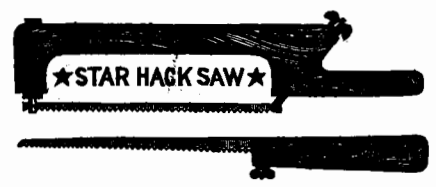


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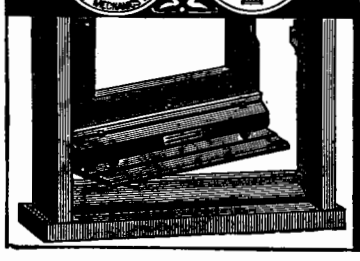


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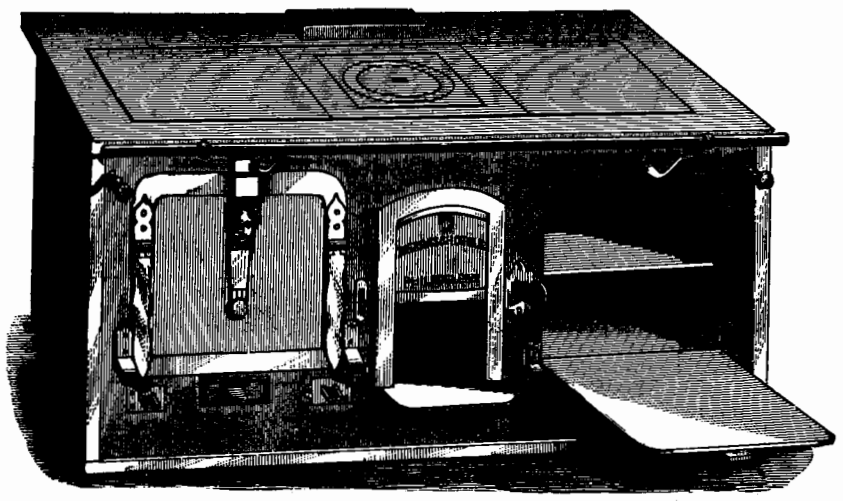

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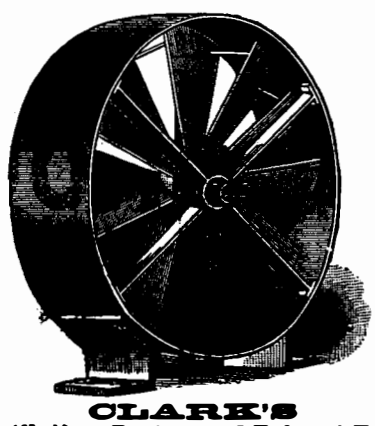

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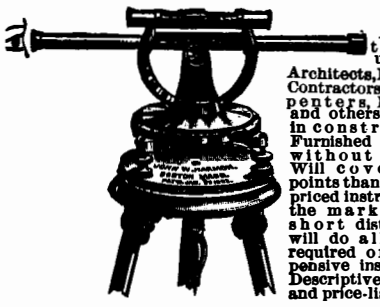

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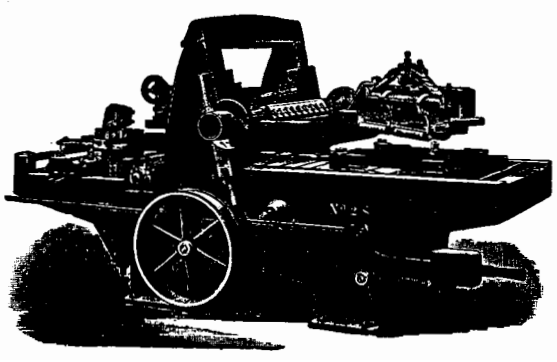

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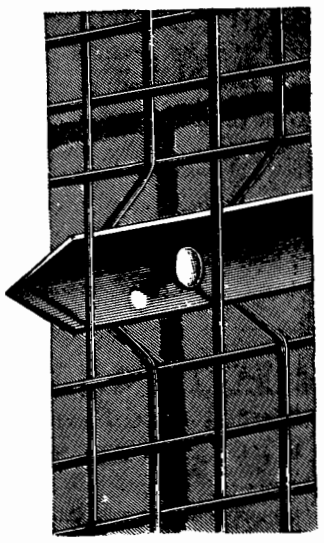

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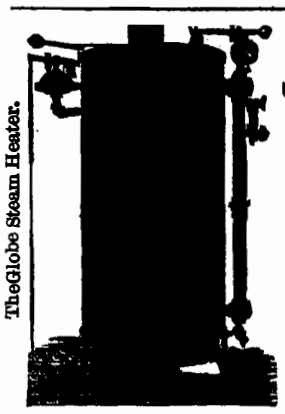


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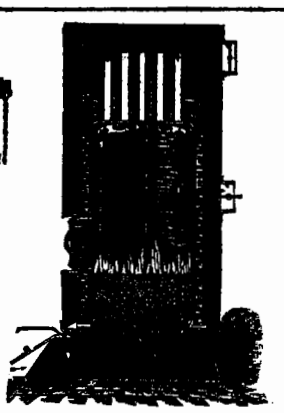

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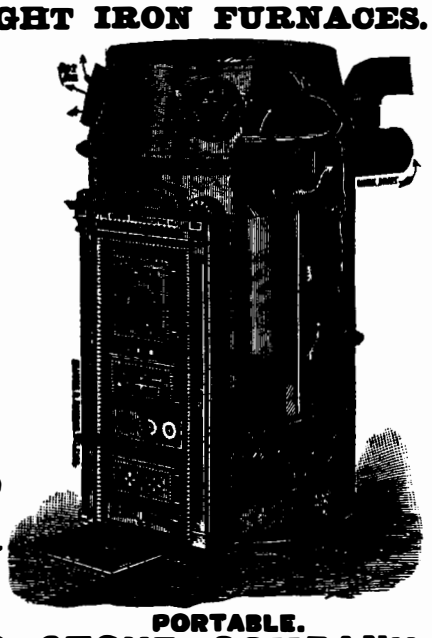

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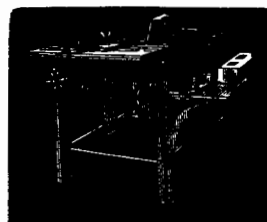

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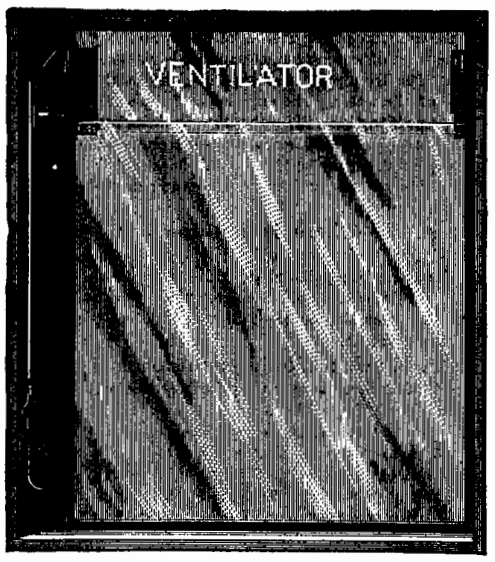


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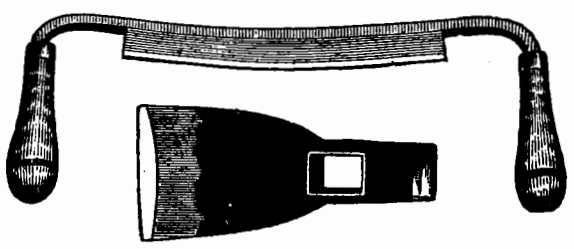

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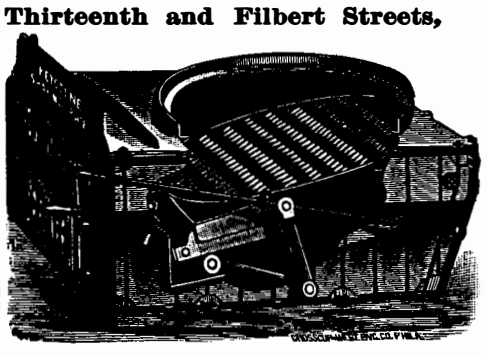

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# Notes & Queries

## HINTS TO CORRESPONDENTS.

**Names and Address** must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

**References** to former articles or answers should give date of paper and page or number of question.

**Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

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**Minerals** sent for examination should be distinctly marked or labeled.

(1) T. P. P. asks how blackboard slating is made. A. Use ½ gallon shellac varnish, 5 ounces lampblack. 3 ounces powdered iron ore or emery; if too thick, thin with alcohol. Give three coats of the composition, allowing each to dry before putting on the next; the first may be of shellac and lampblack alone.

(2) S. K. desires a receipt for mending broken marble. A. Take plaster of Paris, and soak it in a saturated solution of alum, then bake it in an oven, the same as gypsum is baked to make it plaster of Paris; after which grind the mixture to powder. It is then used as wanted, being mixed up with water like plaster and applied. It sets into a very hard composition, capable of taking a very high polish, and may be mixed with various coloring minerals to produce a cement of any color capable of imitating marble.

(3) O. S. C. asks a recipe for making a blue stencil paint which will not rub off when used on wood boxes. A. Take of shellac and borax each 2 ounces, boil in water until they are dissolved, then add 2 ounces gum arabic and withdraw from the fire. When the solution has become cold, add enough more water to make 25 ounces, and finish by mixing with Prussian blue sufficient to bring it to a suitable consistency and color.

(4) M. R.—For a French polish, dissolve 12 ounces shellac in 1 quart wood naphtha, add ½ pint boiled linseed oil, thoroughly mix, and rub the furniture with a small quantity on a woolen cloth.

(5) W. S. C. asks some way to remove the soot from a smoke stack 50 ft. tall, that is constantly annoying us by catching fire. Why is it that the soot forms and sticks to the walls of the stack more in the winter than summer? A. You probably burn wood which generates pyroligneous acid vapors, that condense upon the walls of the chimney and cement the unburnt carbon in the smoke. More condensation occurs in winter than in summer, from the greater cold, and hence greater accumulation of soot. There is no remedy but to burn anthracite coal, or sweep the chimney often.

(6) H. B. B.—There is no general proportion of height to length and number of panels applicable in bridge building. The weight to be carried, its kind, whether railroad is single or double track, whether there be also a common road, single or double, or with passenger walks, probable wind force, etc., are prime factors in establishing the height and length of panels. While the length of bridge is always a fixed measure, the quality and strength of material is a modifying and variable factor. In working out the details of strains to meet the requirement of assumed service, engineers may vary the details of construction and proportions to suit their individual judgment.

(7) W. C. T. desires a process by which he can bleach tallow (make it white) without interfering with its use for culinary purposes. A. We recommend simple boiling with its own volume of water, as there is a strong and well-founded prejudice against the use of chemicals.

(8) A. W. W. asks how flowers can be preserved in their natural colors. A. Dip the flowers in melted paraffine, withdrawing them quickly. The liquid should be only just hot enough to maintain its fluidity, and the flowers should be dipped one at a time, held by the stalks and moved about for an instant to get rid of air bubbles. Fresh cut flowers, free from moisture, make excellent specimens in this way.

(9) J. P. McL.—For drying hickory for mallets: Heat in a steam box until the sap is boiled out, then transfer to a dry room or box heated to nearly 200°, and allow to cool slowly.

(10) B. J. D. asks: 1. Will you please inform me of the best means to separate wire nails from the sawdust in which they are tumbled. I use hand sieves, and find it tedious, and it consumes too much time. A. Your question can hardly be considered of general interest. For separating the nails from the sawdust, we recommend a revolving tumbler set at an inclination, with the upper end solid, lower end a sieve of the proper mesh. Feed the nails and sawdust from a hopper spout at the upper end, constantly. The sawdust will work through the sieve, and the nails be discharged from the lower end clean and dry. 2. Also the next best lubricant to oils, in running the wire into the machines, as it requires so much tumbling and sawdust to clean the oil from them, and make them bright for use? A. For a lubricant use strong soap water; pass the nails through boiling water on a wire cloth apron and over a steam coil or other hot surface, and leave out the tumbling and sawdust.

(11) J. L. H. asks: 1. Is there any cement for glassware which will stand hot water? A. Glue to which bichromate of potash has been added, and which has afterward been exposed to strong sunlight, becomes insoluble. The proportions are not very well ascertained, but about 1 part of the bichromate, dissolved in water, and added to a solution of 6 parts of solid glue, answers very well. 2. Is there anything which will take mildew out of white goods which have been washed? A. Wet the spots with a very weak solution of chloride of soda (Labarraque's solution) or of chloride of lime (bleaching fluid) or with chlorine water and wash afterward.

(12) J. F. writes: 1. If I lay down 600 feet of one inch pipe in my rooms, and fire from a coil, what will the amount of expansion of the water be? A. The expansion of water from 46° to 212° is 0·0466 of its volume. The iron pipe also expands, due to the temperature of the water. The expansion of the water in the 600 feet of inch pipe will be about 135 cubic inches. 2. What can I add to the water to keep it from freezing, in case the fire goes out? A. Add one or two pounds chloride of magnesium to the water in the coils to prevent freezing.

(13) S. G. S.—There is nothing but a scraper good for taking off old, scaly whitewash. Bronzing liquid may be a paint made with light colored varnish in which is mixed gold bronze. The varnish may be shellac, mastic, or light furniture varnish thinned with turpentine.

(14) D. S. S. asks: Would you inform us in settlement of an argument as to the best method of gas saving—by closing cocks near the burner or by regulating at the meter? A. In general terms, the further from the burner the regulating is done the better. Gas should be as unobstructed as possible in its path to the point of consumption, so as to avoid eddies, which impair the illuminating power. The only objection to governing or regulating at the meter is, that it does not allow for different elevations of burners, and it does not, when cock regulating is used, allow for the burning of varying numbers of lights. The use of large burners and fewer in number is to be advocated.

(15) J. I. asks: Is it heavier on a horse to pull a load by a 100 foot rope or chain than close to it? A. If the rope or chain is free from friction on the ground, it is easier for a horse to pull a given steady load by the long hitch. Much depends upon the condition or kind of work.

(16) J. J. D. asks: 1. What composition is used by hardware manufacturers to make paper labels adhere to iron, and what is it composed of? A. Use a dilute solution of white gelatine or isinglass, in the proportion of about one to twenty. For receipts of cements see the collection given in Scientific American Supplement, No. 158.

(17) H. W. C. writes: A farmer wishes to know how to construct a cheap and easily handled filter for water. A. Use two stone pots or jars, as shown in the accompanying engraving, the bottom one being a water jar with side hole, if it can be procured; otherwise, if no faucet can be used, the top jar can be removed to enable the water to be dipped out. The top jar must have a hole drilled or broken in the bottom, and a small flowerpot saucer inverted over the hole. Then fill in a layer of sharp clean sand, rather coarse. A layer of finer sand, a layer of pulverized charcoal with dust blown out, then a layer of sand, the whole occupying one-third of the jar.

(18) W. M. M. asks for some transparent paint suitable to paint on tracing muslin. A. You must use a transparent varnish such as the following: Dissolve 30 parts of copal and 2 parts of camphor in 120 parts of oil of turpentine and 30 parts of oil of lavender. Use lakes, gamboge, Prussian blue, and the other transparent colors, mixed with the vehicle.

(19) A. H. asks the size of steel wire rope necessary to suspend a weight of 16,000 pounds, each end of the rope being fastened 1,600 yards apart, the weight to travel from one end to the other on the rope. A. The scheme of so long a span carrying a load is impracticable. A span of 4,800 feet will nearly absorb the margin of safety by its own weight, depending upon the amount of deflection that could be allowed in the catenary curve. The largest steel cables that are made, 2⅝ inches, weigh 13 pounds per foot, or over 31 net tons for your span; with a deflection of one twenty-fifth, or nearly 200 feet, the tension would be 3¼ times the weight, or 254,800 pounds, while the ultimate strength is but 400,000 pounds.

(20) W. F. E. asks: 1. How are bath bricks made? A. Bath bricks are found native as minerals, and are imported from England. 2. How are papier mache ornaments moulded, and where can I procure a work on the subject? A. We can send you Spons' "Workshop Receipts" for $2.00, first series, which contains full information on papier mache. See also various articles in Scientific American Supplement on the technology of the paper trade.

(21) D. B. wants a receipt for a dark cherry stain for a white pine floor. A. Use rain water 3 quarts, annatto 4 ounces; boil in a copper kettle till the annatto is dissolved, then put in a piece of potash the size of a walnut; keep it on the fire about half an hour longer, and it is ready to bottle for use.

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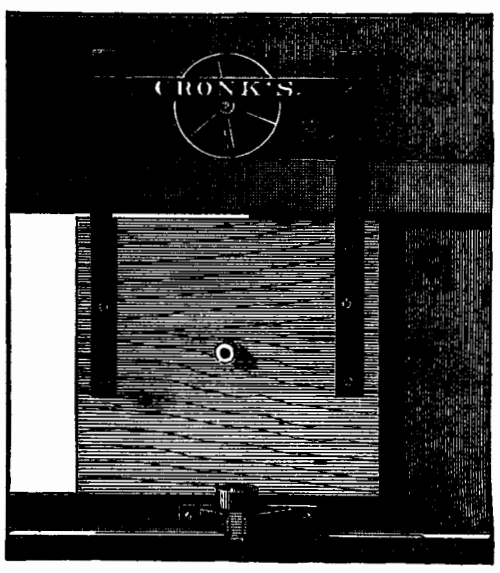


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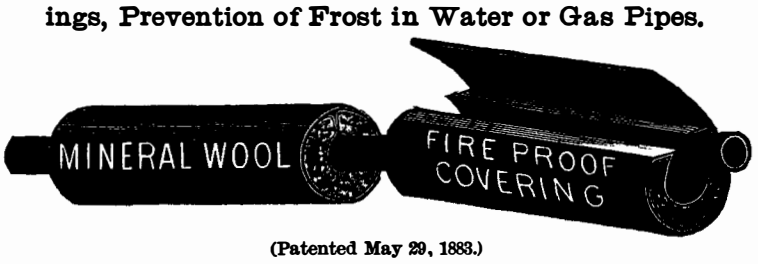


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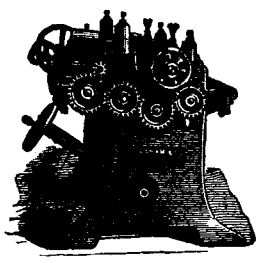

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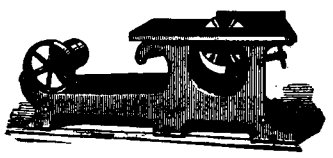

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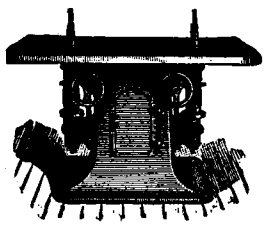

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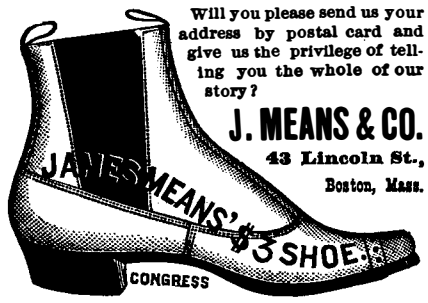


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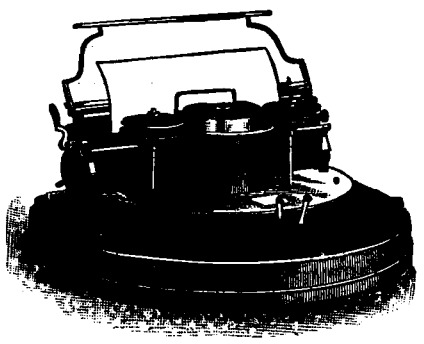

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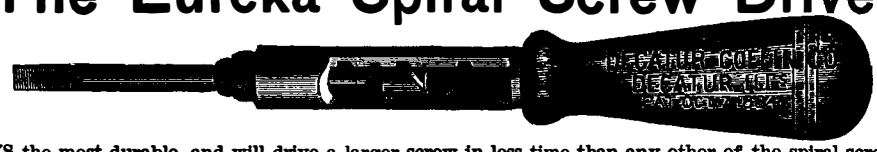

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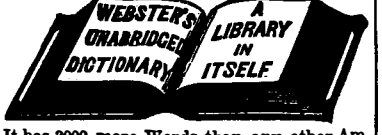


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