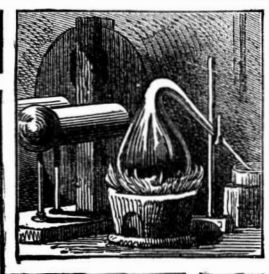
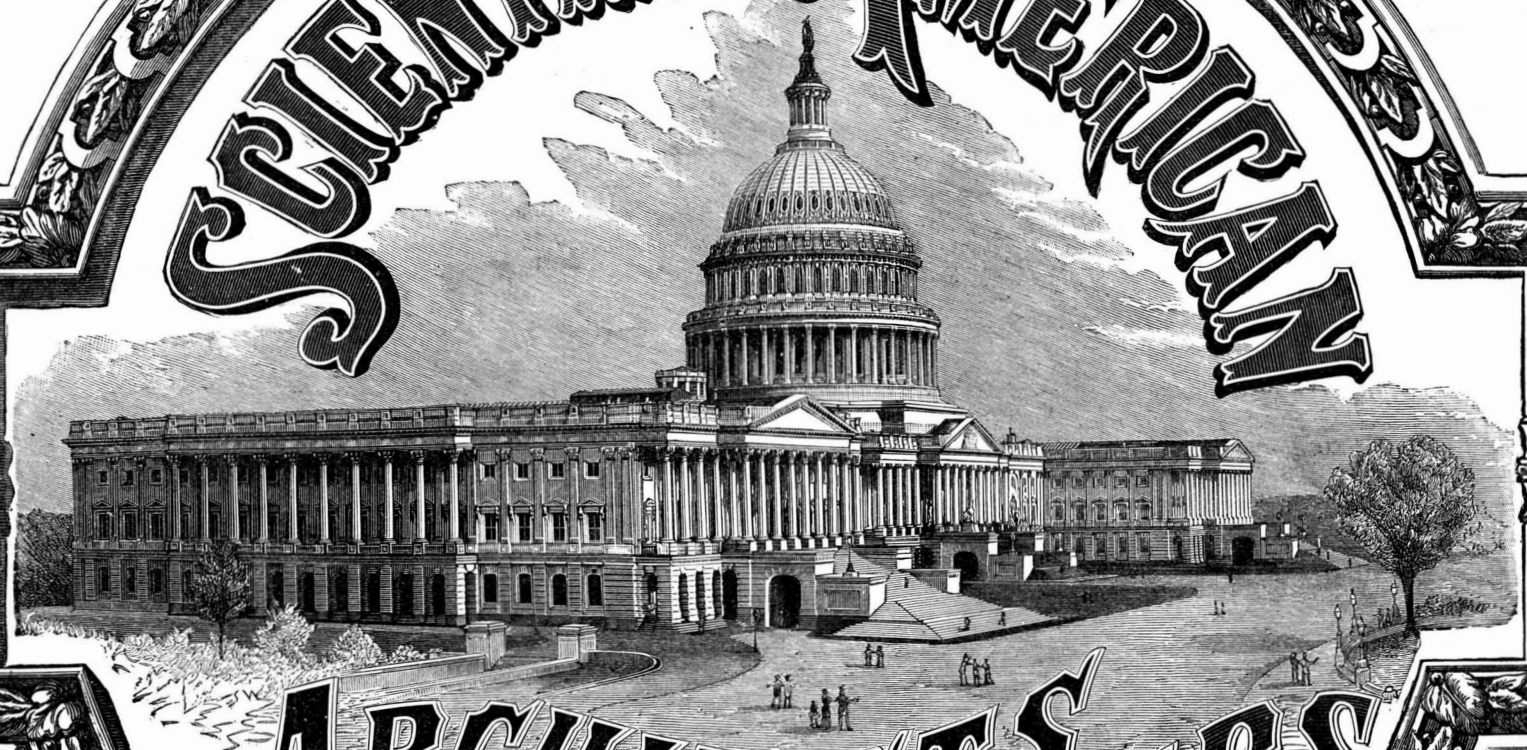


SCIENTIFIC AMERICAN

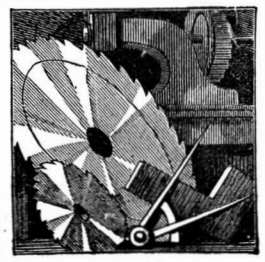


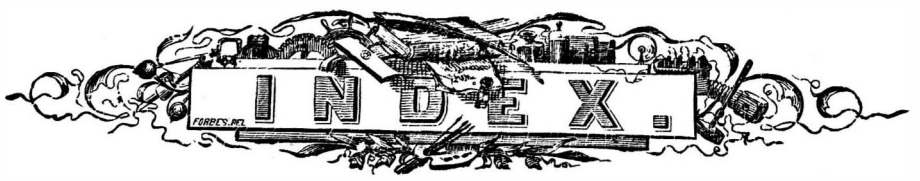
ARCHITECTS AND BUILDERS EDITION.

Vol. IV.

JULY—DECEMBER,
1887.

MUNN & CO., PUBLISHERS,
No. 361 Broadway, New York.





VOLUME IV.—JULY—DECEMBER, 1887.

Articles Marked * are Illustrated.

COLORED PLATES.

I. A Cottage for $2.500. A residence in Kansas City. With large plate of details drawn to a scale. July.

II. A $4,000 cottage. A $1,400 double house. With plate of details drawn to a scale. August.

III. A Southern residence of moderate cost. A $1,200 cottage. With plate of details drawn to a scale. September.

IV. A residence of moderate cost. A country store and flat. With plate of details drawn to a scale. October.

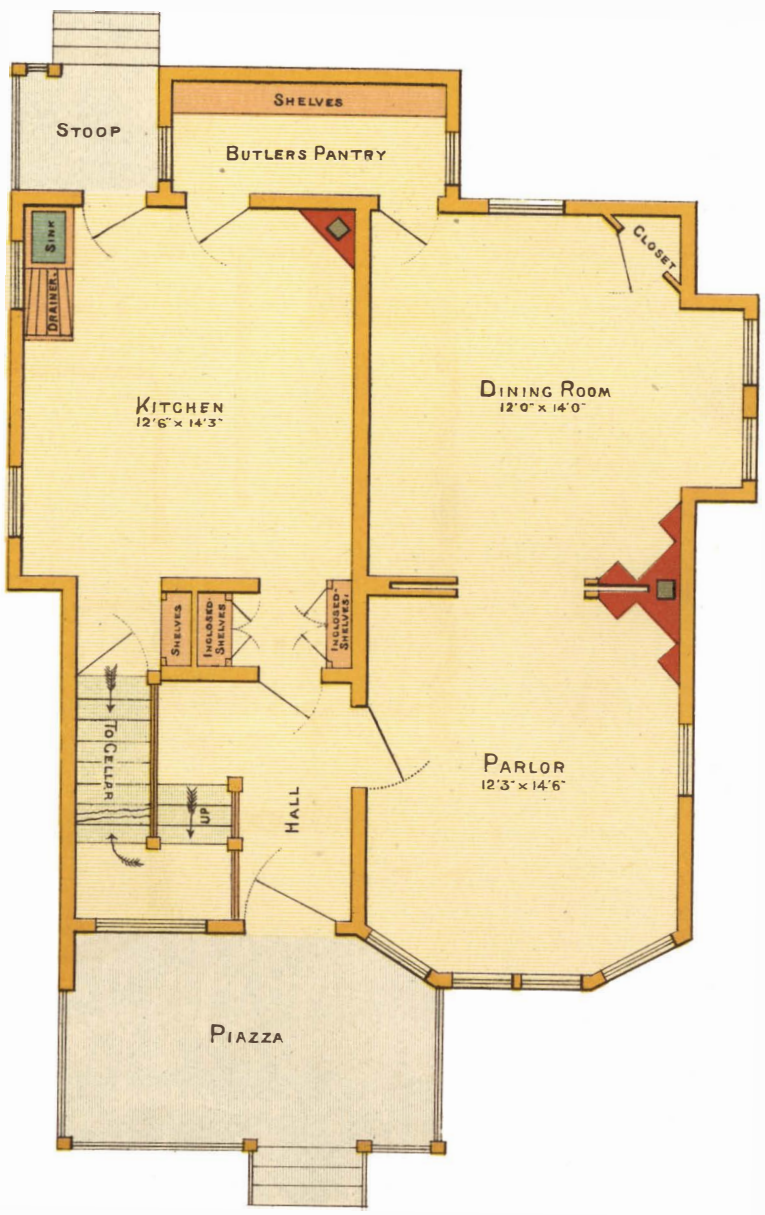
V. City frame houses of moderate cost. A $2,500 dwelling. With plate of details drawn to a scale. November.

VI. A dwelling of moderate cost. A suburban residence. With large plate of details drawn to a scale. December.

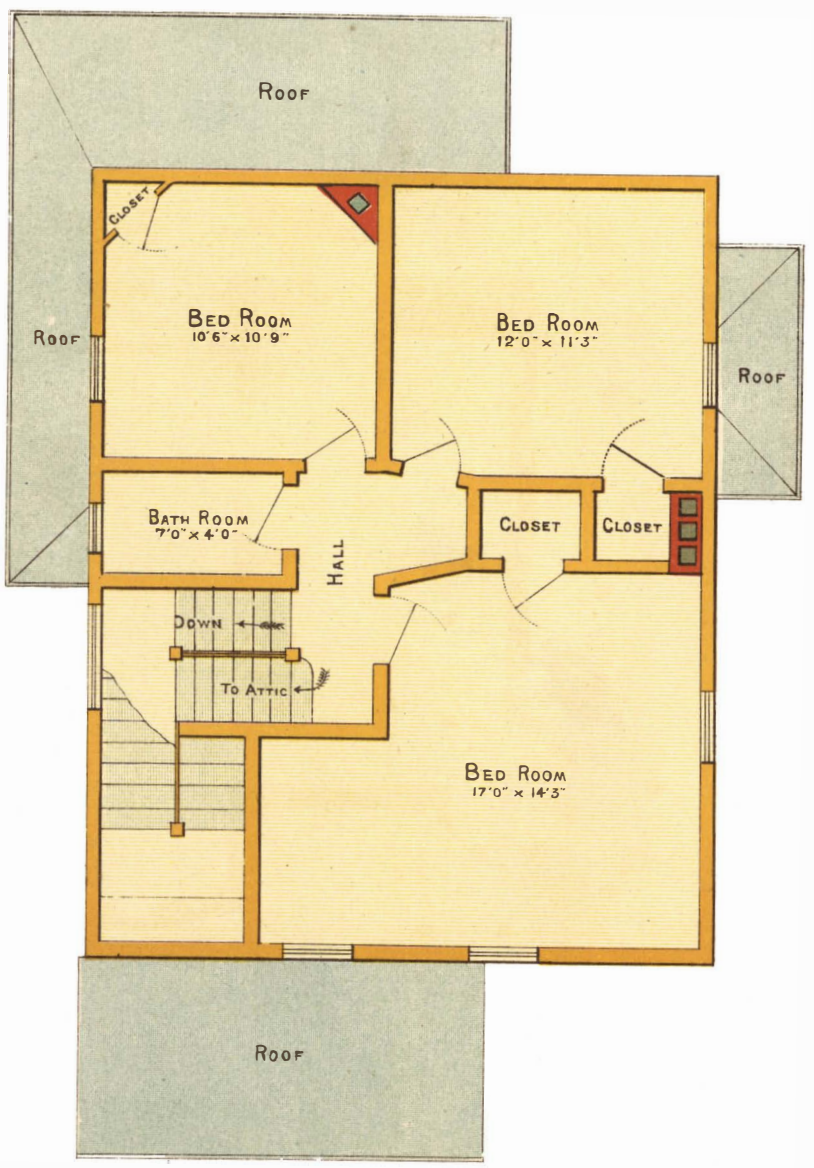
MISCELLANY.

Figures preceded by a *star* (*) refer to illustrated articles.

A Cottage for Twenty Five Hundred Dollars.

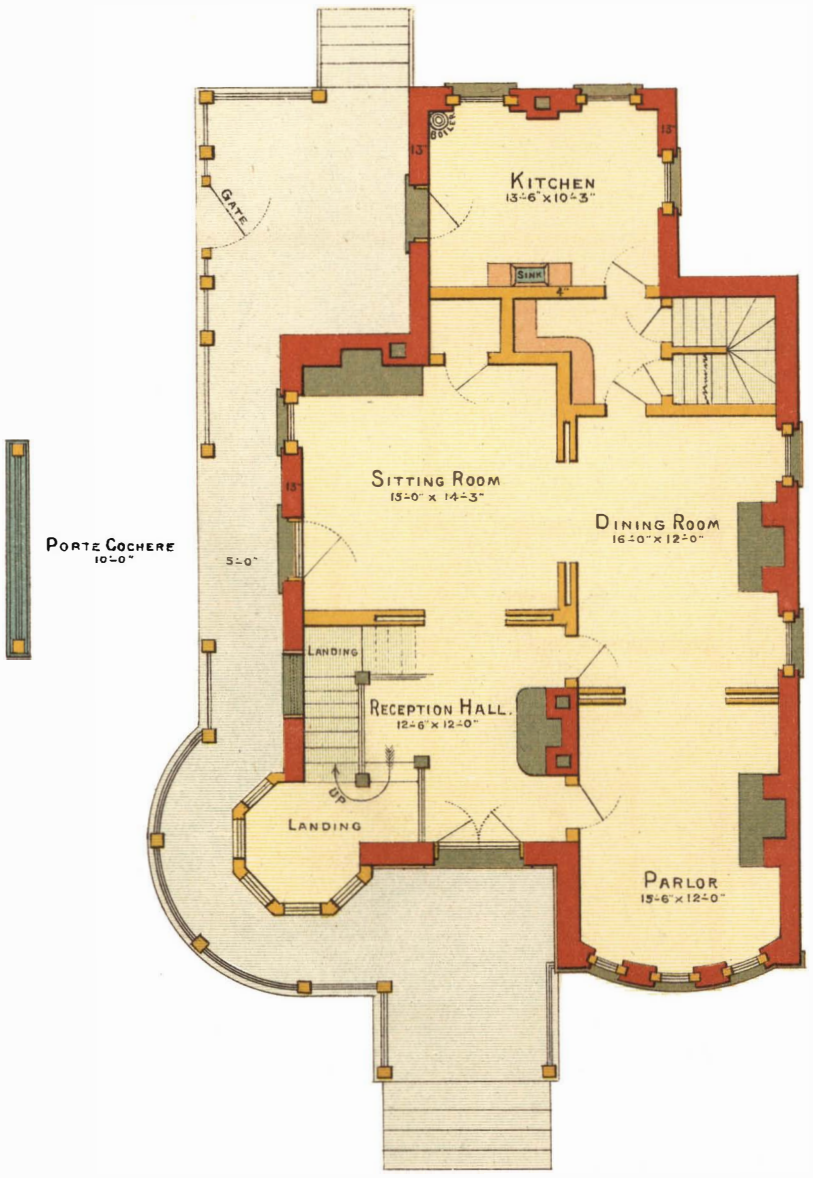


Plan of First Floor.

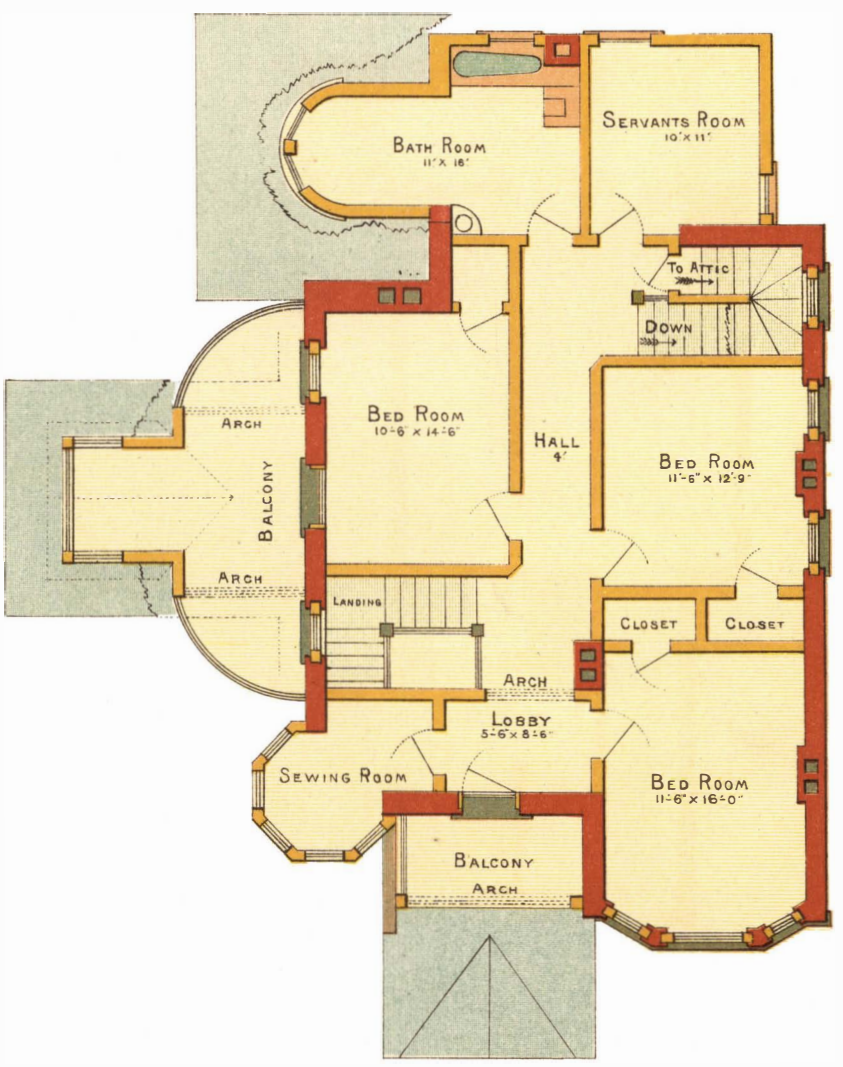


Plan of Second Floor.

A Residence in Kansas City, Mo.



Plan of First Floor.



Plan of Second Floor.

SCIENTIFIC AMERICAN

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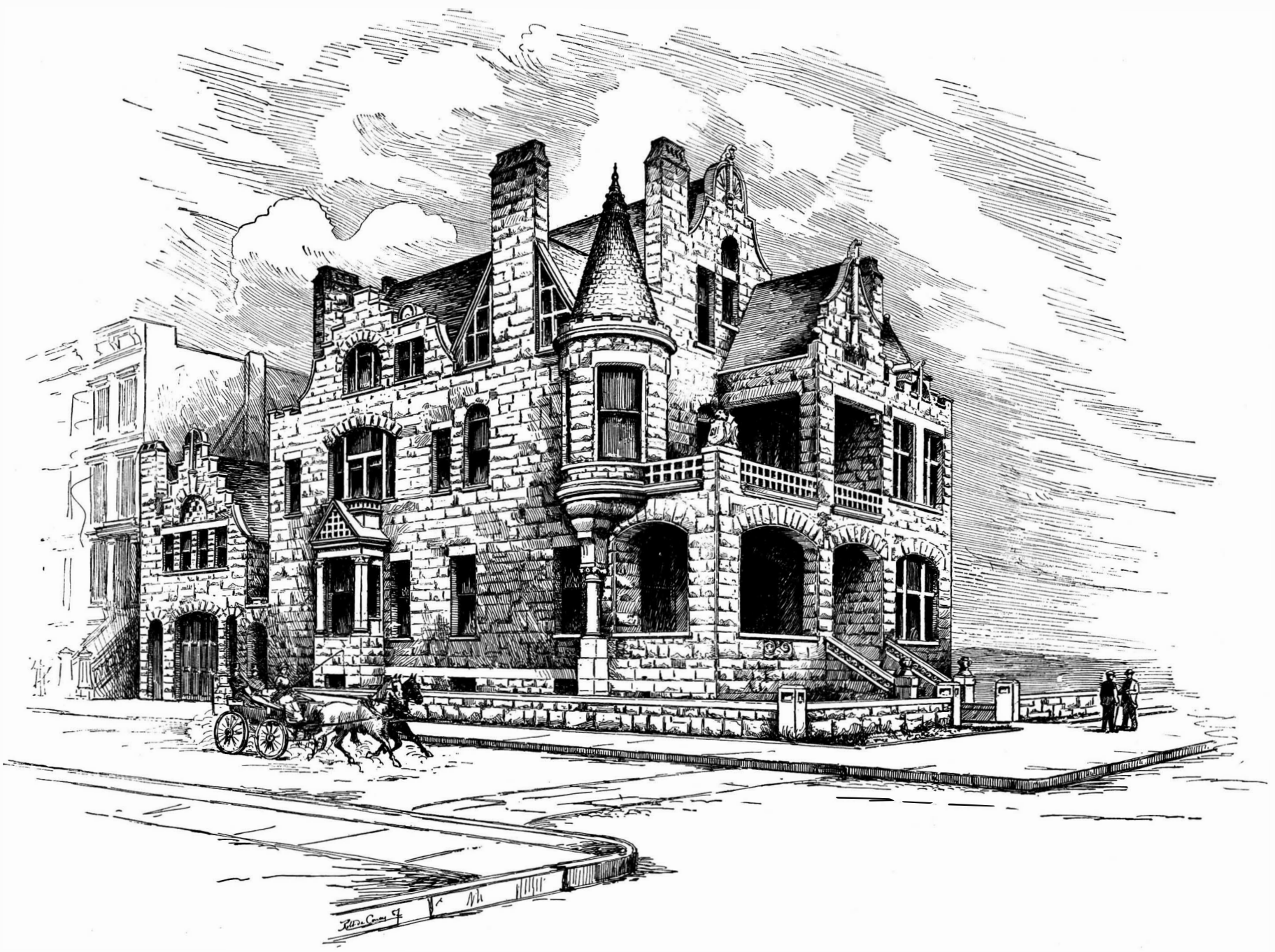
Vol. IV. Subscription, $2.50 a Year. NEW YORK, JULY, 1887. Single Copies, 25 Cents. No. 1.



RESIDENCE CORNER OF 119TH STREET AND SIXTH AVENUE, NEW YORK.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

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

NEW YORK, JULY, 1887.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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CONTENTS

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

(Illustrated articles are marked with an asterisk.)

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MUNN & CO., Publishers,
361 BROADWAY, NEW YORK.

A DWELLING AT MONTCLAIR, N. J.

SPECIFICATIONS AND DRAWINGS.

The specifications and drawings are intended to cooperate, so that any work shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be executed the same as if mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications, without any extra charge whatsoever. The drawings taken in connection with this specification are intended to provide for the completion of the entire carpenter work, mason work, painting, plumbing, tinning, etc, and everything mentioned in this specification.

DESCRIPTION OF WORK.

All work throughout to be done in good, substantial and workmanlike manner, and to the satisfaction of the owner or his agent.

Timber.—All the timber to be good, sound hemlock, free from all bad defects, and as well seasoned as the market will afford.

Sills, 3″ × 8″; posts, 4″ × 6″; interties, plates, etc., 4″ × 4″; first and second tier of beams, 2″ × 10″; partition plates, 4″ × 4″; studding, 3″ × 4″; main rafters, 2″ × 8″; ridge pieces, 2″ × 10″; piazza sills and bearing timbers, 3″ × 8″; piazza beams, 2″ × 8″; piazza rafters, 2″ × 8″; collar beams, 2″ × 10″ × 24″ on centers; beams under tank to be made extra strong.

Lumber.—All the lumber throughout to be of well seasoned clear white pine, except where otherwise specified.

Framing.—Sills to be halved at angles and corner and well spiked. Size floor beams on sill and spike well thereto; size second story beams on ties; post to have tenon on top to receive plate. Tenon all the studs on top and neatly fit on bottom. Double all beams for trimmers and headers; double all beams running parallel with partitions. Double all window and door studs, including heads. First and second story beams, 16″ on centers, all rafters 24″ on centers, porch floor beams 20″ on centers. Fit main rafters neatly to plate, mortise and tenon all headers and trimmers.

Siding.—Cover the entire vertical sides, except where otherwise shown, with clear 6″ Michigan strips, not less than ⅞ lap, and nailed with 6d. nails, not more than 6″ apart, and set nails for putty.

Cornice.—Form cornice as shown on the plans, with fascia and moulding as shown, all as per details

Gutters.—Form gutters on roof, line, and give proper cant to run water.

Shingling.—Shingle where shown on plans with 18″ pine shingles, laid not more than 5″ to the weather. The starting course to be rounded on the bottom; all the rest plain and straight.

Corner and Angle Boards.—All the corner boards to be 1¼″ × 5″; angle boards, 1¼″ × 3½″.

Water Table.—Run water table around the entire house, except where piazza comes; first member, 1¼ × 4″, with wide member at bottom, all as per details.

Window Frames.—Make window frames in usual way, for double hung sash pulley stiles, 1¼; hanging stiles, 1¼ × 5; 2″ main sill; 1¼″ rabbeted sub sill, stops and parting strips complete.

Door Frames.—Make door frames in the regular way; rabbeted jambs 1¼ thick; outside casings, 1¼ × 5″; 2″ main sill.

Piazza, Cornice, Rails, Columns, etc.—Piazza plates to be 6′ × 8′, made of 1¼ lumber, and a timber inserted for strength; form cornice same as main house cornice and as per details. Form the piazza rail as shown on the plans and as per details. Rail to be 4 × 3, moulded; bottom to be 3 × 4, moulded; columns to be 6 × 6, turned in center and square at each end; balusters for piazza, 1¼″ × 2″, beaded edges.

Piazza and Stoop Floors, etc.—Lay the piazza and stoop floors with 3″ × 1″ narrow pine flooring, tongued and grooved and laid in white lead joints; this flooring to be clear and perfectly dry, all to be blind nailed and all head joints smoothed off; all to have proper cant from house to nosing finish; fascias, 9″ wide.

Stoops, Lattice, Cellar Door, etc.—Put down all necessary steps to all stoops as shown on the plans; 1¼″ strings; 1¼″ treads; and ⅞ risers. Treads 11″ wide. Ccil up on sides of stoop strings. All steps to have nosing and cove finish. The front stoop to have bulkheads.

Brackets.—Furnish all brackets as shown.

Overhanging Floors.—All the overhanging floors to be deafened with rough hemlock boards, cut in between the beams at least 3″ down, and this space filled in with mortar.

Sashes, Blinds, etc.—All the sashes for first and second and loft stories to be 1½ thick; made of clear, soft pine, and number of lights as shown. Outside rolling blinds on first and second stories.

First Story Floors.—The first story floors will be laid with sound, white pine flooring. All to be blind nailed to each and every beam. All heading joints smoothed off. Second story floor to be same as first. Attic to be 9½″ wide flooring.

Bridging Beams, Partitions, etc.—Bridge all the floor beams once between their bearings with 2 × 2 bridging, nailed at each end. Bridge all partitions once in their height with 2 × 4, straight and well nailed.

Tin Work.—Line all the gutters and valleys with the best I. C. charcoal tin, 20″ wide, well nailed and soldered. Tin all flats. Furnish and put in all necessary flashing of every description.

Leaders.—Furnish and put up all necessary 3 leaders to convey water to ground where directed.

Slating.—Slate the whole entire roof with 16 × 8 black slate, not less than 3″ lap.

Doors.—For sizes and number see plans. The front door will be 2″ thick, and made as shown on the elevation, with heavy raised moulding on the outside and flush moulding on the inside to match other doors. Folding doors 2″ thick, four paneled, and flush moulding. All other room doors first and second stories to be 1½″ thick, closet doors to be 1¼″. 1½″ doors double faced, 1¼″ single faced, all to be four paneled and flush moulded. Those for rooms, 1½″; closets, 1¼″. All these doors to be blind tenoned and perfectly dry and clear for wood filling for door to have head light over.

Jambs and Saddles.—All the door jambs throughout to be 1¼″ rabbeted. All doors that swing, to have four and a half inch hard wood saddles. All hearths to have hard wood hearth borders. All doors, where needed, to have rubber tipped stops.

Bases and Wainscoting.—All the rooms and halls in the first and second stories, except bath room, to have 7½ base with moulding on top; closets to have 5″ beaded base. Wainscot bath room 2′ above the fittings all around; this wainscot to be of yellow pine.

Closets, Pantries, etc.—The butler's pantry will be fitted as marked on the plans. Five shelves high; shelves 14″ wide and to be supported with cleats all around. Shelves supported on turned columns. All the second story closets to have two shelves, each supported on cleats all around and hanging strips underneath with hooks. All these shelves to have beaded edges. Also build and shelve dressers as shown on first story plan.

Stairs.—Build main stairs from first to third story of clear, dry pine, 1½″ treads, ⅞″ risers, 1¼″ strings, both strings to be housed out. All the treads and risers to be wedged with glue. The front string to be moulded as will be shown on details. Treads to have nosing and cove finish. The balustrade on these stairs will be yellow pine rail 2½ × 3½. Intermediate newels 4 × 4, with head and drops, chamfered, reeded, etc.; rail to be moulded. Balusters 2 × 2, square and turned, etc.; all as shown. All these stairs will be well supported and furred and ready for lathing. Stairs from second story to loft to be plain box stairs. Build cellar stairs as shown, 2 × 10 spruce strings, 1¼″ spruce treads, no risers.

Architraves.—The trimmings for principal part of first story will be 4½ casings reeded and moulded as per detail, with wall moulding to miter with base moulding. Second story, kitchen, pantry, etc., will have 4½″ casings, moulded as per details. Closet to have 4″ plain casings. Window casings to match those of door, with stop beads complete. All the interior woodwork throughout, including doors and stairs, to be white pine.

Stools, etc.—All windows to have neat moulded stools with apron.

Corner Beads.—Furnish and put on corner beads to all exposed plaster corners.

Grounds, Furring, and Cutting.—Furnish and set grounds to all doors for the mason to finish his work. Do all furring of every kind. Do all necessary cutting for plumbers, gas fitters, and other trades.

Sash Weights and Cords.—All double hung sash to have cast weights and Italian sash cords.

Glass, Glazing, etc.—All the glass on first and second stories to have second quality, single thick French sheet glass. All this glass will be puttied in and well tinned, and the glass washed off immediately after the putty is put in. This glass must be protected from injury by the mason.

Hardware.—All the doors on the principal part of the first story to be hung on 4×4 lacquered plain butts, second story and kitchen to have 3½ × 3½ imitation bronze butts. Front doors to have three butts each. Principal part of first story to have jet and bronze knobs and bronze drop escutcheons. Second story to have lava knobs and roses and drop escutcheons. All rooms throughout to have brass faced mortise locks, city made. All closets to have reversed rim locks. Front doors to have heavy front door lock, night latch attachments and bronze knob outside; brass flush bolt top and bottom; the principal part of first story to have the Daisy sash lock with bronze tip, others plain tip. Furnish all necessary drawer pulls, cellar bolts and hooks, bolts, etc; all necessary hardware for bath room and pantries, etc.; in fact, all necessary to complete the job.

Mantels.—Contractor will set the mantels, but owner will furnish same.

Fit up bath room in ash, inclose wash bowl, set tub, furnish top to tub, fit up water closet with riser, seat, and lid, all complete. Furnish and set two wash tubs with covers, tubs made out of 1½ perfectly clear and dry lumber. Set up on turned legs.

Ceil the piazza with narrow ceiling, beaded, part on rake and part on level.

Furnish and put all necessary pipe boards for the plumber to screw his pipes to.

Contractor will set wood mantels.

Privy.—Build privy where directed, of wide ceiling boards, planed on two sides. Small cornice shingle roof, panel door. Small sash and holes with covers complete.

MASON'S SPECIFICATION.

Excavation.—Excavate for all piers and foundations 2′ 6″ deep. All earth and rubbish to be removed where directed. All water that may accumulate during the excavation, from any cause whatsoever, will be removed at once and the premises kept dry.

Brickwork.—The cellar walls to be of hard burnt brick, 8″ thick from bottom to top, started on a solid concrete footing course, laid up straight and level, headers every seventh course, to be good strong cement mortar, and to the height as shown on the plans, which is 7′ in the clear. The joints to be struck. Leave holes in wall where directed for soil, gas and water pipes. All angles and corners to be perfectly plumb and the wall level on top. The brickwork to run to top of beams

Brick Piers.—Build brick piers where shown on the plans, of good hard burnt brick, size and number as shown on plans. All piers to be excavated for at least 2′ 6″ deep, and filled in with small stone and well hammered down to a solid bed. Cement the whole entire cellar bottom 3″ thick with screened gravel and Rosendale cement, 3 parts gravel, 1 part cement, left perfectly smooth on top.

Chimneys, Flues, etc.—Build chimneys as shown on plans, of good hard burnt brick, the joints of all flues struck smooth and capped as shown. The fireplaces in dining room, parlor, hall, and library room will be built of selected brick, arched on top, and as will be directed; the hearth of same to be tile, to cost twenty-five cents per square foot, without the cost of laying.

Cesspool.—Build and excavate cesspool where directed, 60′ from house, 8′ × 8′ in the clear, laid up with brick and domed over on top, covered with flat stone.

Drain Pipe.—Run 4″ drain tile from inside of cellar wall to cesspool. Build privy vault 4′ deep, walled up with brick, 8″ smaller each way than privy frame, laid up dry. This vault to project 2′ in clear of rear of privy.

Cistern.—Build cistern in rear of house, 12′ in diameter by 13′ deep, laid up with brick laid on flat in cement mortar, domed over on top, and have manhole covered with flat stone or iron cover. Cement the entire inside with strong cement and put flat stone at bottom for water to strike against.

Tiling.—Run a line of 4″ drain tile from leaders to cisterns, with the joints well cemented.

Plastering.—The first and second stories, including all closets and soffits of attic stairs, to be lathed and plastered three coat work, last coat to be hard finish, gauged high The attic closets may be laid on, the mortar to lie at least one week before using.

The mason will make all his work good, after all the other trades are done, and leave the building broom clean immediately after the plastering is done. This specification is intended to cover all mason work to fit the building ready for occupancy as per plan, but should anything have been omitted necessary to that end, it must be done without extra charge.

PAINTING.

All the exterior woodwork usually painted, including privy and blinds, to be painted two good coats of H. W. Johns' asbestos mixed paint, all knots and sap to be well shellacked before priming, all cracks, joints, and nail holes and over nail heads to be well puttied after priming is done, all tin work to have two coats. Also paint the chimneys two coats, all the colors to be selected by numbers from the card of colors. The interior will be finished with David B. Crockett's wood preservatives. Give the wood one coat, let stand twenty-four hours, then another coat, and rub down with curled hair or like material. Putty to match color of the wood. All the door saddles, hearth borders and hard floors to be finished in same manner. The painting must follow immediately after the carpenters.

PLUMBER'S SPECIFICATION.

Drain.—Furnish and put in where shown on the plans a 5″ cast iron drain pipe to run from inside of building out to the tile drain, 4′ outside of the building. Use Y branches for all iron pipe connections.

Soil.—Furnish and connect with the drain in cellar a 5″ cast iron soil pipe, and run same size up and out of roof at least 4′ above highest point, and cap the same with the "Smith" patent ventilating cap. Use Y branches for all waste connections. All the iron soil pipe to have a coat of asphaltum. The soil pipe to have a cleaning out cap in cellar.

Calking.—All joints of all iron pipes are to be thoroughly calked with picked oakum and molten lead and screwed 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 plans, a 40 gallon round head heavy pressure copper boiler, and provide with draw cock for emptying the boiler, and shut-off cocks, for shutting the water off from the second story, and provide with circulating pipes complete, connect boiler draw cock with the sink waste, have a ⅝″ stop cock on supply pipe and combined safe and vacuum valve on top of boiler. Boiler to be supplied with a "Lockwood" stand.

Supply.—Tap and pay for tapping the water main, and connect a ⅝ *aaa* supply, and run to the boiler. Supply to have a shut-off cock inside the cellar wall. All pipes are to be graded so they will drain perfectly dry, each floor to be controlled separately by shut-off cock. Where pipes will not drain dry, put in a small pet cock.

Sink.—To be a Mott's Eastlake galvanized, with back air chamber, and iron legs. Furnish and set up where shown in the kitchen an 18×30 sink, and supply with hot and cold water through ⅝″ *aaa* lead pipe and Fuller cocks, and to have 1½″ C lead waste pipe, properly tapped and connected with the drain, with a 2″ iron pipe to the main soil pipe. To have a cleaning cap on end of pipe under sink.

Bath.—Furnish and put up where shown a 16 oz. sheet copper bath tub 4½′ long, well tinned and planished. Supply with hot and cold water through ⅝ *aaa* lead pipe and nickel plated combination bath cock with rubber spray, to have 1⅛″ C waste and be properly tapped and connected with the soil. Bath to have nickel plated plug and chain. Overflow to be connected with waste.

Bowl.—Furnish and set where shown on the plans a 14″ marble Italian ware wash bowl, with marble countersunk top and surbases 10″ high; supply with hot and cold water through ½″ *aaa* lead pipe and nickel plated Fuller patented basin cocks, to have 1½″ C lead waste properly tapped and connected with the soil, to have nickel plated chain and stay and plug.

Cocks.—No cocks to be placed at the end of a line, but the pipe extended so as to prevent jarring directly on cock

Closet.—Furnish and set in the bath room, where shown on plans, supplied with water through 1¼″ pipe from cistern above, an "Inodoro" porcelain wash out closet, with suitable size cistern. The cistern to have the flush tank attached, supplied through ⅝ *aaa* pipe and have cistern valve and rubber ball complete. Ventilate the closet with a 3″ lead pipe connected with the iron vent. Closet cup and pull to be nickel plated and to be inserted in the seat. Closet to have enameled drip tray.

Safe Pans.—The bath tub, bowl, and closet are each to be provided with 3½ lb. lead safe pans, edges turned up 2″ all around, and to have a ¾″ lead waste pipe to the cellar.

Wash Trays.—Supply the wash trays with hot and cold water, through ⅝ *aaa* lead pipe and Fuller patented cocks, with flange and thimble. Provide with a 2″ main waste, properly tapped and connected to main soil. Provide necessary plugs and chains and flanges. Also provide on end of pipe a cleaning cap.

Ventilation.—Every trap through house to be separately and independently ventilated from the crown by the same size pipe as trap.

Gas Pipe.—Put up the gas pipes with outlets where shown on the plans and according to the rules of the gas light company. All outlets are to be capped and all pipes tested. All side lights are to be not less than 5′ 6″ from floor All drop lights are to be hung plumb.

Range.—Furnish, set, and make connections to water back, a No. 8 J. L. Mott's "Defiance" portable range.

BILL OF MATERIALS.

1 6″×10″×26′=130 sq. ft.			
1 3″× 8″×12′= 24 "			
1 3″× 8″×16′= 32 "			
1 3″× 8″×28′= 56 "			
1 3″× 8″×17′= 34 "			
1 3″× 8″×15′= 30 "			
1 3″× 8″×26′= 52 "			
1 3″× 8″×14′= 28 "			
9 2″×10″×21′=315 "			
3 2″×10″×24′=120 "			
6 2″×10″×26′=264 "			
4 2″×10″×29′=192 "			
1 2″×10″×12′= 20 "			
1 2″×10″×20′= 34 "			
7 2″×10″×18′=210 "			
4 2″×10″×17′=116 "			
12 2″×10″×28′=552 "			
20 2″× 8″×24′=640 "			
5 2″× 8″×17′=115 "			
7 4″× 6″×22′=308 "			
4 4″× 4″×12′= 64 "			
2 4″× 4″×13′= 33 "			
1 4″× 4″×15′= 20 "			
3 4″× 4″×24′= 96 "			
1 4″× 4″×17′= 23 "			
1 4″× 4″×18′= 24 "			
4 4″× 4″×14′= 76 "			
1 4″× 4″×20′= 27 "			
2 4″× 4″×16′= 42 "			
1 4″× 4″×22′= 29 "			
2 3″× 6″×16′= 48 "			
1 3″× 6″×12′= 18 "			
3 2″× 6″×15′= 45 "			
33 2″× 6″×18′=594 "	=4,391 ft. spruce timber, At per M..	$20 00	$87 82
300 2″× 4″×12′=2,400 sq. ft.			
250 2″× 4″×13′=2,166 "	= 4,566 ft. hemlock, At per M...	$15 00	$68 49
2,500 ft. hemlock sheathing, per M.		15 00	37 50
1,500 ft. hemlock sheathing, for roofs, per M.		15 00	22 50
2,250 ft. 6″ siding, per M.		25 00	56 25
100 ft. shingling, per ft.		6	6 00
185 ft. piazza floor, per ft		3½	6 47
200 ft. piazza ceiling, per ft.		3½	7 00
4 piazza columns		..	8 00
2 short columns		..	2 00
8 piazza brackets, each		30	2 40
27 ft. piazza rail, per ft		25	6 75
2 stoops, ready to put up		..	9 00
Lattice under piazzas		..	7 00
Cellar door outside		..	6 00
72 ft. verge boards, per ft.		8	5 76
68 ft. gutter and tin		15	10 20
140 ft. cornice, per ft		12	16 80
110 ft. piazza and flat roof cornice		10	11 00
400 ft. tin roof		6¼	26 00
Leaders		..	7 50
1,225 ft. slate roof, per sq. ft.		7	85 75
150 ft. water-table and piazza fascia		5	7 50
2,800 ft. flooring, per sq. ft		3	84 00
300 ft. corner boards, etc		3	9 00
6 cellar windows, complete		1 50	9 00
13 first story windows, complete		8 00	104 00
7 second story windows, complete		8 00	56 00
5 third story windows, complete		7 00	35 00
Front door and frame, complete		..	10 00
20 inside doors, complete		6 50	130 00
300 ft. surbase		4	12 00
Cellar stairs, complete		..	5 00
Main stairs, complete		..	80 00
Prepared materials for closets		..	25 00
Nails, papering, etc		..	30 00
Labor		..	325 00
Painting		..	100 00
Plumbing		..	275 00
Mason work		..	700 00
Total			$2,492 69

A KANSAS CITY RESIDENCE.

The handsome new residence illustrated in the colored plate of the present issue is on a pleasantly located lot on the west side of Garfield Avenue, between Independence and Lexington Avenues, Kansas City, Missouri, for Robert Beatty, Jr., Esq.

The building fronts east and south, the principal front facing the east. It sets back a sufficient distance from the road to allow of a fine lawn being formed in front, and presents with its well arranged sky lines and spacious covered balconies a very attractive and imposing structure.

The exterior walls are all constructed of pressed brick, laid in red cement mortar; the roof is covered in with slates, and the woodwork is painted in pleasing colors.

The exact construction of the house is indicated by the specification printed below, from which it will be seen that the reception hall, sitting room, and stair-

way are finished in red oak, the newel and the balusters of stairs are "spiral turned," as shown on our sheet of details. The dining room is finished in white oak, the parlor in cherry, and the kitchen and second story all in natural woods, finished with three coats of oil and white shellac

The mantels are of wood, correspond in general design with the trim, and have "over-mantels" and beveled plate glass mirrors. The house is furnished throughout with a complete system of speaking tubes, electric bells, annunciators, etc.

The system of heating is hot air, supplied by a McGee furnace, and distributed to all rooms except kitchen and servants' room. This, in conjunction with the fireplaces, proves most economical, and insures a more perfect ventilation, as in early spring and autumn fires may be lighted on the hearths without resorting to the furnace, and in colder weather both may be used.

James W. Bryan, of No. 110 Vine Street, Kansas City, Mo., is the architect of the house, and Charles K. Balcom, of Kansas City, is the builder.

The cost of the residence as represented was $7,500.

GENERAL CONDITIONS.

The contractor to furnish *all* transportation, labor, materials, and utensils necessary for performing and completing the work. All materials to be the *best* of their respective kinds, and the work to be executed in a thorough and workmanlike manner, according to the true spirit and meaning of the drawings and these specifications, which are intended to include everything necessary for the proper finishing of the work, whether every item necessary to that end is particularly mentioned herein or not The contractor is to furnish and pay for the necessary building permit, to be responsible for all violations of the city building laws, and to obtain official licenses from the proper authorities for openings into the public sewers, and pay all fees for same.

MASON.

Excavation.—Excavate the entire area occupied by the building for a cellar, to the depth as shown on section, the excavation to extend six inches beyond the wall line everywhere.

Trenches.—The trenches to be three feet wide and carried twelve inches below the cellar bottom. Dig the required trench for the dwarf walls of veranda and carriage porch, the same to be not less than two feet below the surface, by the required width.

Vault.—Excavate a privy vault where directed, the same to be 3 × 5 in plan, by 8′ deep.

Cistern.—Also excavate for a cistern where shown 8 × 18. All earth taken from excavations to be carted off the premises.

Stone Work.—The footings to be of good flat stone, 12″ thick, projecting 6″ beyond the wall line, and firmly embedded into the earth. The footing course to be flushed up with "spawls" and liquid cement, and allowed to set, before starting the foundation walls, include an 18″ × 12″ rubble footing for the partition wall in cellar, and the dwarf walls of porches.

Foundation.– Build the foundation walls of good flat building stone, thoroughly bonded with ample headers in every course. The walls built to a line both sides, carried up perfectly plumb, and finished to the proper level heights Particular attention to be paid to angles, that they correspond exactly with the "*figured dimensions*" of the plans. All frames to be walled in perfectly plumb, square, level, and in their several proper positions, as figured on plans.

Sills.—Provide for the rear cellar door a 19″ × 5″ ×3′ 10″ plain sill of Cottonwood Falls stone. Use rubble sills elsewhere.

Mortar.—All rubble work to be thoroughly pointed up both sides of wall. The mortar to consist of Springfield white lime, Craig & Roberts washed sand, mixed in the proper proportions. Add one bushel Louisville cement to three bushels lime, the cement to be added when needed for actual use only, and none allowed to stand overnight, or to be retempered.

Range Work.—Build four courses of range on front wall where shown on plan. The same to have 6″ bed, 10″ face (rock face), each course to be thoroughly anchored to backing. All range stone to be laid in cement, and pointed with a tucking tool after settling has taken place. Include carriage porch in the above work.

Water Table.—The water table to have 5″ bed, 8″ face, and 1″ wash.

Window Sills —All window sills to have 5″ face by the required bed and length.

Lintels and Springers.—The lintels over doors and windows to have 10½″ rock face. Prepare the springers for second story windows as shown on drawings.

Door Sills.—All door sills to have 8″ face, 14″ bed, 1″ drip channels, and 4″ lugs, all of Cottonwood Falls stone. The water table, window sills, and all caps and springers to be of "light" Warensburg stone.

Brick Work.—All bricks used on the exterior surface of walls are to be the Kansas City calorific pressed brick (AA), gauged to uniform thickness, and laid in red mortar. The red mortar used to be guaranteed permanent color. The joints and beds of pressed brick work not to exceed $\frac{3}{16}$″ in thickness, or four courses of brick not to exceed 10½″ in height. All walls to be carried up perfectly plumb and straight, and finished to the proper level heights. Clip the brick every seventh course for blind headers. Back up the pressed brick with good hard burnt common brick with solid flushed joints, leaving no empty spaces in the walls. Include 9″ partition wall in cellar.

Arches.—Turn relieving arches at the back of all stone lintels, and in other places where required. Turn 4″ trimmer arches for the support of all hearths.

Chimneys.—Cap out the chimneys as shown on elevation, leaving the flues of the size as figured on plans, outside walls of each chimney to be 8″ thick and the partitions 4″. All flues to be thoroughly plastered inside. Build the several fireplaces as shown, the back of all fireplaces to be 9″ thick.

Thimbles.—The brick mason to furnish and set all thimbles required in flues, and project far enough to receive plaster, the same to be put in at the time the chimneys are built.

Finally, clean down all pressed brick with diluted acid, without defacing stone work, and leave all complete.

CARPENTRY.

Frame all timbers. Joists, partition studs, balcony joists, rafters, lintels, etc., are to be No. 1 W. P., and constructed according to the sections and detail drawings. All floor joist to be sized with a crown of ½″ on upper edge. For size of joist, rafters, etc., see sections. A header and trimmer to be put in double, and place double joist under all partitions running in same direction. All joist, studding, furring, etc., to be set 16″ on centers. Double stud around all openings, and place headers 4′ high.

Lintels.—Place all necessary wood lintels to all openings requiring it.

Furring.—Fur all brick walls with 1 × 2 furring strips, 16″ on centers, vertically, and well spiked to plugging in brick joints.

Bond Timbers.—Furnish all bond timbers and wood brick for insertion in walls, necessary for the proper execution of the work to be finished.

Roof.—Construct the roof as shown on roof plan, using 2 × 6 rafters. All valley rafters to be 2 × 8, and all firmly secured to walls, with all necessary iron straps, anchors, rods, and bolts, as shown on detail drawing. The rafters tied with 2 × 6 cellar beams, 8″ above attic floor line. Provide and firmly set in proper position the "lookouts" for the projecting eaves, as shown on detail.

Cornice.—The circled cornice on dormer windows from bath room to be of No. 27 galvanized iron, well soldered and riveted together, and all requisite weather joints as shown.

Sheathing.—The entire roof, including porches and balconies, to be tight sheathed with No. 2 surfaced sheathing boards, square edge, thoroughly nailed at every bearing.

Floors.—All floors, except kitchen, to be laid with first common white pine. Flooring tongued and grooved, well mill worked and blind nailed at every bearing with 8d. nails. Treat porch and balcony floors with like material. Lay the kitchen floor with ⅞ × 3½ Georgia pine, selected for close, even grain, carefully laid with close fitting joints, and all to be hand smoothed after laying, and all prepared for waxing, and kept protected from damage. The kitchen floor is not to be laid until the plastering is finished.

Attic Floor.—Lay the attic floor with Selfen flooring.

Wainscot.—Wainscot the kitchen 3′ and the bath room 4′ high, with narrow beaded T. pine wainscoting ⅝ thick, thoroughly hand smoothed, and finished with cap and base, as shown on detail.

Frames.—Make all door and window frames of the sizes as figured on plans. All windows to have box frames with 1′ 8″ pulley styles, made in the usual way. All exterior door frames to have paneled jambs 1¾″ thick, rabbeted. All interior door frames on first floor to have rabbeted jambs of the same kinds of wood as the finish of rooms in which they show. All frames on second floor to have 1⅜″ rabbeted jambs of clear white pine. All door frames that are marked with the specific "T" to have transoms of sufficient size to bring the frames to a uniform height.

Doors.—All doors of the sizes as figured on plans. Those showing into reception hall, parlor, dining room, and sitting room, to have veneering ¼″ thick each side, and finished 2¼″ thick, all other doors No. 1, 1¾″ white pine.

Trim.—The reception hall will be trimmed with red oak; dining room and sitting room, white oak; parlor, cherry; kitchen, T. pine; all rooms on second floor, white pine. The dado in hall, dining room, and sitting room, and all trim throughout, to be in strict accordance with detail drawing. Interior woodwork to be finished up perfectly clean, well hand smoothed, scraped, and brought to a true and even surface, and all marks and stains removed on such work as requires finishing in natural manner.

Porch and Balconies.—Construct the porches and balconies as shown, using 6″×6″ turned posts of poplar, 2¼″×2¼″ turned balusters, 3½×3½ hand and foot rail of white pine, all as shown on detail drawings. All porch and balcony floors to pitch one inch from building, and white leaded at joints, each course to be one continuous piece, and all blind nailed at each bearing.

Closets.—Form closets as shown, and fit up the same with 7″ band, with 10″ shelf above. Place three-pronged coppered wardrobe hooks on the band, not less than 8″ apart.

Pantry.—Fit up the pantry with counter shelf 18″ wide, 3′ above the floor, and place five 10″ shelves above counter. Place under counter shelf a case of four drawers, the full depth of counter, all to be firmly dadoed together.

China Closet.—Fit up the china closet with counter shelf, 2′ 10″ above floor, and place six portable shelves above. Below the counter shelf put in a case of drawers as directed, the same to be provided with locks and ornamental pulls. The shelving above counter to be fitted with glass doors hung with brass butts, as directed.

Main Stairs.—The entire stairway, including the floors of landing, to be built of thoroughly seasoned red oak, the newels and balusters to be spiral turned as shown, the newel to be glued up of seasoned plank, and warranted, the risers 1″, treads 1¼″, housed into stringers both ends, the risers and treads tongued and grooved to each other both front and back, thoroughly wedged and pinned and glued up everywhere, the face string and coping moulded and paneled and wrought in the manner as shown.

Servants' and Attic Stair.—Build the servants' and attic stairs as shown on plans, using ⅞″ risers, 1⅛″ treads of B. S. W. P., neatly and securely put together, all boxed.

LATH AND PLASTER.

Lath the building with good, sound, straight grained lath, free from loose knots and bark. All lathing to be horizontal. No vertical lathing permitted in any case. No lath allowed to pass behind the studs from one room to another, all corners and angles made solid everywhere; should there be any stud or angle not securely tied, stop and notify carpenter, and see that they are corrected and made permanent before the lath goes on.

Plaster all walls and ceilings with good coats of hair and brown mortar, made of the best Springfield lime, thoroughly slaked and mixed with the proper proportions of "Craig & Roberts" washed sand, well whipped ox hair, all to be thoroughly mixed on the premises at least ten days before using.

All plastering to be properly put on and applied with sufficient force to secure good clinches. Level and float the brown coat and bring it true and straight with the grounds everywhere, and the ceilings brought to a true and even plane. All plastering to be carried down to floor, whether wainscoted or not.

Finishing coat to be put on after the other coats are thoroughly dry, and to be compounded with "lime putty" and "Bronson's marble finish," mixed in three parts of marble finish and two parts lime putty, and allowed to stand two days before using, and to be applied in a careful manner, as directed, so as to secure a good and workmanlike job.

The plasterer to do all necessary patching and repairing after other mechanics are through without extra charge, and clean out the building, leaving the same broom clean, and remove all rubbish from the premises that has accumulated from his work.

PAINTING AND GLAZING.

Paint all the exterior wood, tin, and galvanized iron work that is usually painted, three good coats of lead and oil, in such colors as directed. Pure linseed oil, pure American lead, and the best shellac to be used throughout, all exterior woodwork to be primed as soon as work is up. All tin and galvanized iron work to be primed with a heavy coat of red lead.

All colors to have good body, well and evenly laid on, covering every portion. All exterior painting to be done as far as possible in dry (not dusty) weather.

All damage done by wind or rain to be made good by painter, and all to be left in good order when building is done.

INTERIOR WORK.

All hardwood on first floor to be filled with Wheeler patent filler, thoroughly rubbed and cleaned off shortly after putting it on, and while wet, and finish with two coats of the "Murphy Transparent Wood Finish Interior," well rubbed with rags each coat, and finish to a true and even surface. Treat the kitchen and bath room with two coats in like manner. All woodwork on second floor, except bath room, to receive three coats of lead and oil in such tints as directed. The hall to be grained to correspond with stairway, and receive one coat of best coach varnish.

Glazing.—Glaze all windows with the best American A. A. D. S. glass, free from waves, curls, and smoke stains, thoroughly beaded, and puttied and pinned with glaziers' points.

Ornamental Glass Work.—The transom over parlor window, the upper panels of reception hall doors, and the stair window to be lead glazed, with opalescent stained glass of a neat design, costing not less than

$5 per square foot. All work in this line to be first class in every particular.

Galvanized Iron Work.—Make all crestings, finials, gutters, and conductors of galvanized iron, No. 27. The crestings, gutters, and finials constructed as per detail, and the rain water conductor to be 4″ in diameter, corrugated, with all requisite elbows and branches, with a reversible cut-off at grade, connecting with earthen drains leading to cistern and drains.

Slating.—Cover the entire roof, dormers and dormer cheeks, porch, and balcony roofs with the best quality Pennsylvania black slate, 10″×18″, all laid on a bed of best tarred paper, carefully stretched, lapped, and tacked on. Place suitable tiling strips at all eaves, and secure each slate with two galvanized nails. The cheeks of all dormers, chimneys, and all places requiring it, to be flashed with good quality of zinc, the slater to include zinc. Valley of sufficient width. The slater will be held responsible that he furnishes ample flashing stock, and deliver up work complete in every particular.

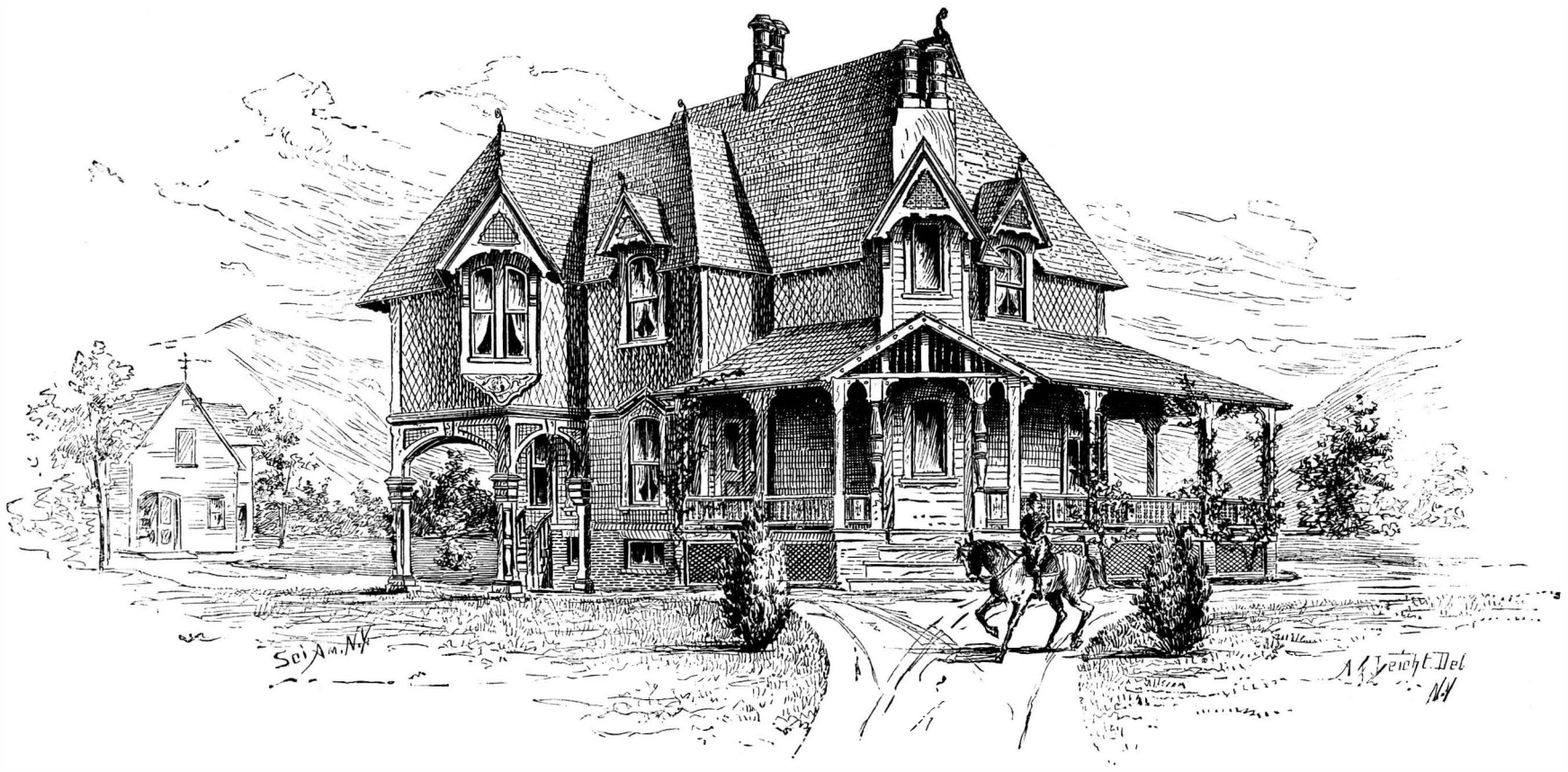
Gas Piping.—Fit up the house with the requisite size gas pipe, leaving drop and bracket lights where shown on plans. All work inthis line to be done in accordance with the rules and regulations of the Kansas City Gas Light Company, and to be paid for on their respective certificates.

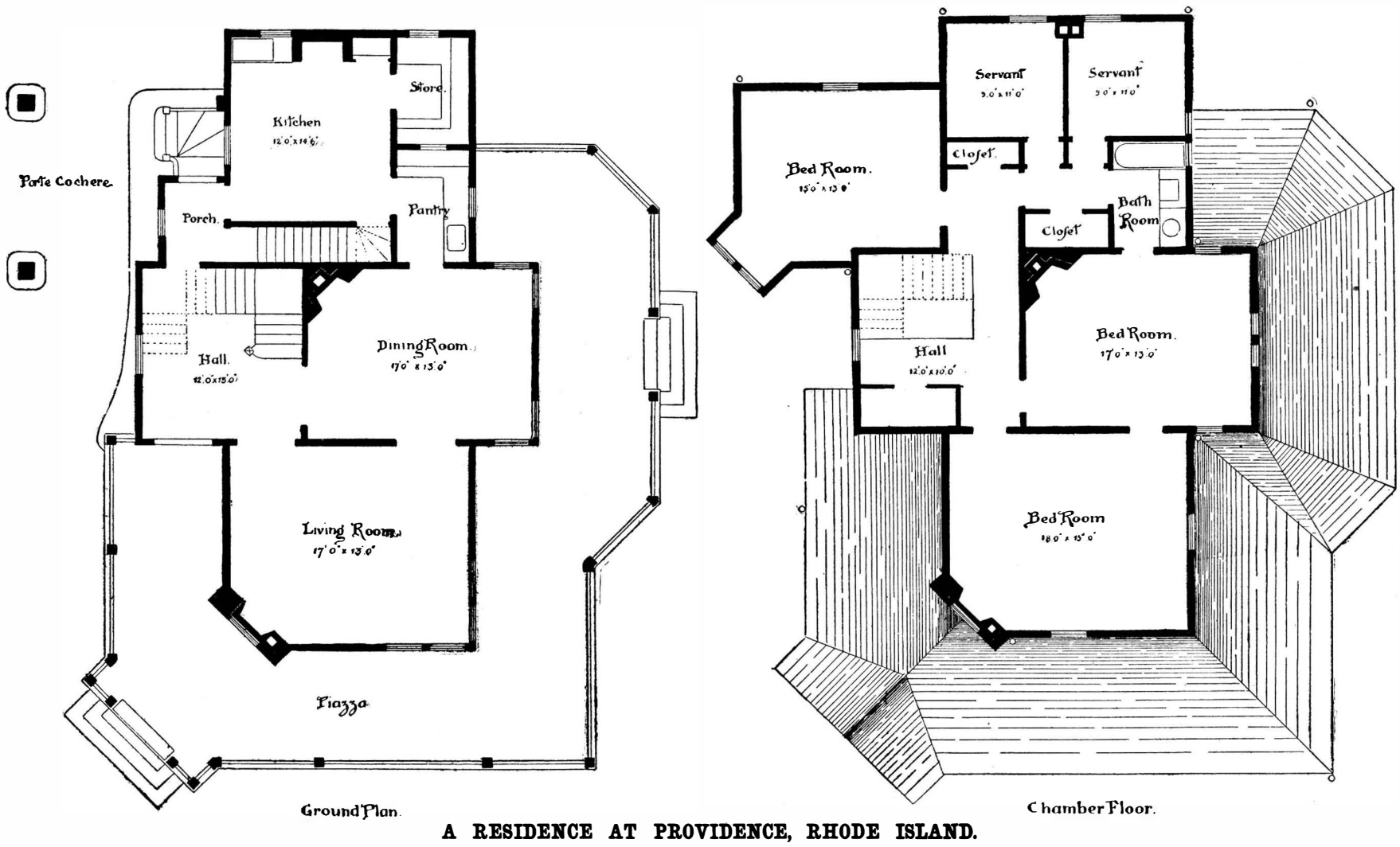
Plumbing.—Provide and put in complete working order, with necessary cocks, plugs, traps, fittings, and connections.

Place in the bath room a fourteen ounce copper planished tub, with all requisite nickel plated fittings. Include an approved closet, as shown, and a 14″ countersunk wash bowl, with moulded top, sides, and back of the best Italian marble. Provide for the kitchen a 20″×30″×6″ white enameled sink, where shown, and put in position in the kitchen a galvanized iron boiler, with inside strengthening rings, cast heads, and all requisite couplings, complete, the boiler to have a capacity of forty gallons, resting on cast iron standards. Hot water to be taken from boiler and carried to sink, wash bowl and bath tub on second floor. Place 3 lb. lead safings, turned up 1½″ and sloped to drain themselves. All lead supply pipes from city pressure to be extra strong, and wastes light. In putting up pipes, care is to be taken to have them so the whole system can be drained at will, and all as secure as possible from frost, and left accessible for inspection and repairs. The soil pipe to be 4″ cast iron, thoroughly tarred inside and out. The joints of soil pipe to be fitted into hubs or sleeves, and run with melted lead on hemp gasket and calked tight. The soil pipe to connect with earthen drain in cellar, pass up through the building, and extending at least two feet out of roof, and covered with ventilating cap, and properly connected by Y or T branches to all wastes, traps, etc. Make all connections with the city mains and public sewer, and include approved iron box and stop in sidewalk, and lawn sprinkler, where directed. Put separate stop and waste on service under house, and at the foot of every riser. Test all pipes for leakage, and leave the entire job in a complete working condition.

A RESIDENCE AT PROVIDENCE, R. I.

We illustrate herewith, by perspective and plans, an attractive residence lately built at Providence, R. I., at a cost of $5,500, E. I. Nickerson, architect. This dwelling has a number of desirable features, and the plans will well repay examination.





A RESIDENCE AT PROVIDENCE, RHODE ISLAND.

Plans and Specifications.

Full plans, specifications, and sheets of details, complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including churches, colleges, schools, stores, dwellings, carriage houses, barns, etc.

We are assisted in this work by able architects. Terms moderate.

MUNN & CO.,
361 Broadway, New York.

A $3,500 DWELLING.

We give herewith elevations and plans for a $3,500 house, by H. C. Palmer, architect, to be erected at Jersey City Heights, N. J. The estimate includes the "modern conveniences." The house presents a pleasing appearance, and the plans are considered satisfactory.

Women as Architects.

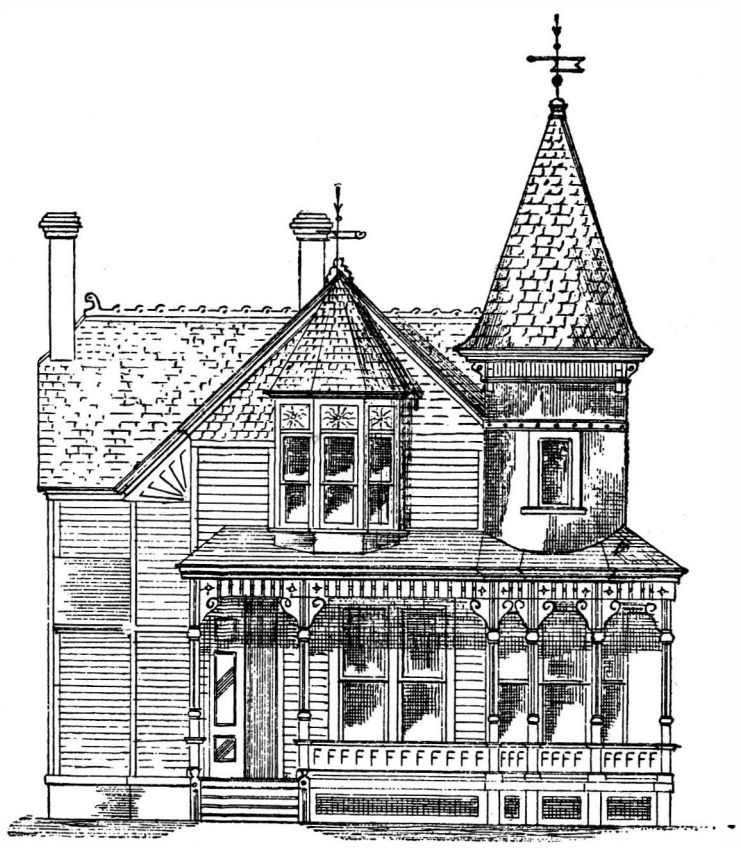
C. Harrison Townsend, a London architect of some note, writes in the *Pall Mall Gazette* on this subject. His remarks refer to the girl and young woman of the middle class, and he asks, "What really valid objection is there to asking her to become a 'draughtswoman,' and in due course an architect?"

The requisites for the preparation of architectural drawings are neatness and delicacy of touch, attention to detail, patience, and care, which women ought to possess more than men.

The present course of architectural training in England is as follows:

A youth on leaving school with an aptitude, more or less, for the profession, is articled as pupil for four or five years to an architect, to whom he pays a premium. This is, of course, in proportion to the position and repute of the architect in question, but may be stated at from a hundred pounds to four or five times that amount. As with solicitors, so among architects, the pupil is supposed by having "the run of the office," to acquire an intimate knowledge of its work—design, draughtsmanship, knowledge of materials, official routine, and so on. If a young fellow of parts, he soon begins "to feel his legs" and to understand his work, and, if wise, supplements his office instruction by attendance at the admirable classes of the architectural association and elsewhere. At the end of his articles he is qualified to dub himself a "junior draughtsman," in which capacity he claims salary from a pound to two pounds a week. A couple of years should then see him a draughtsman proper, and in a position to obtain three, three and a half, or four guineas a week. In many cases, of course, thanks to such "backing" of his friends as he may be fortunate enough to get, the lucky pupil can set up on his own account immediately his articles are completed.

In this training Mr. Townsend finds but two objections. The first one is the "commingling of the sexes" which would result from their introduction to an office. This objection is proved to be invalid by the American experience in using females in all kinds of office work without trouble. But a "women clerks' room" would remove that conservative objection. The other objection is that attached to the inspection of buildings under construction. To those not wishing to encounter this objection, the way to drawing board work and competition in plans, interior decoration, etc., is open.



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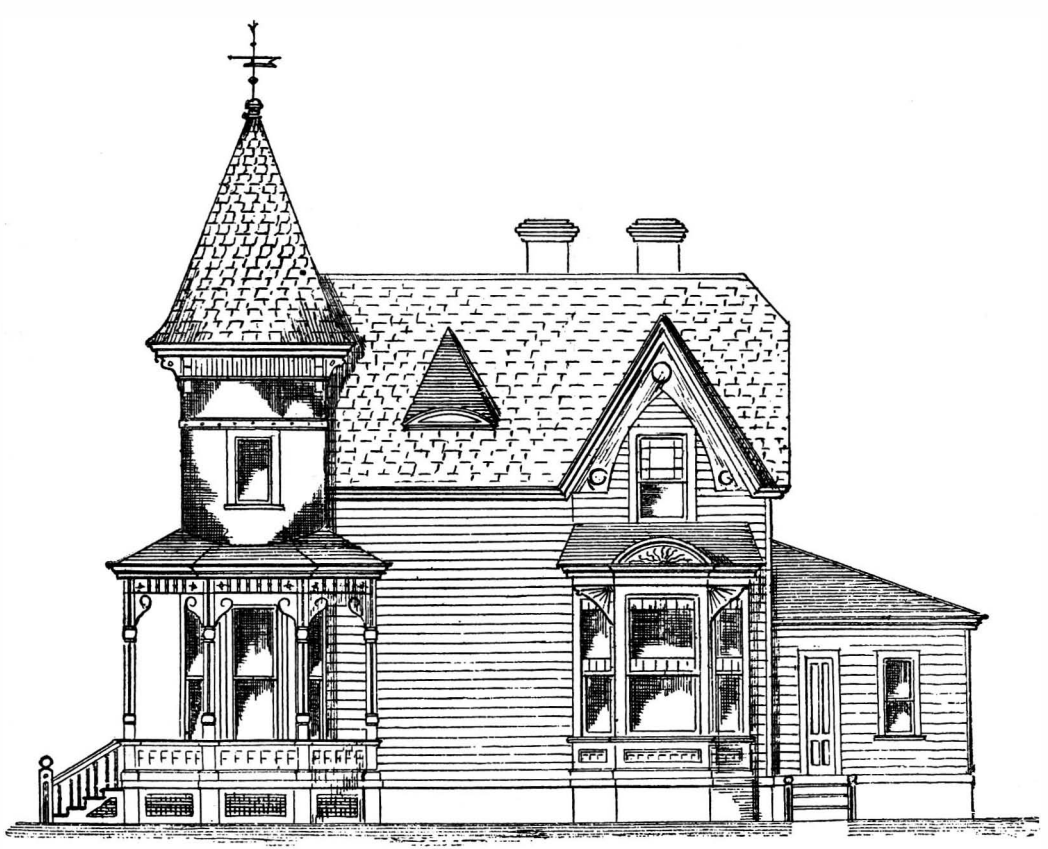
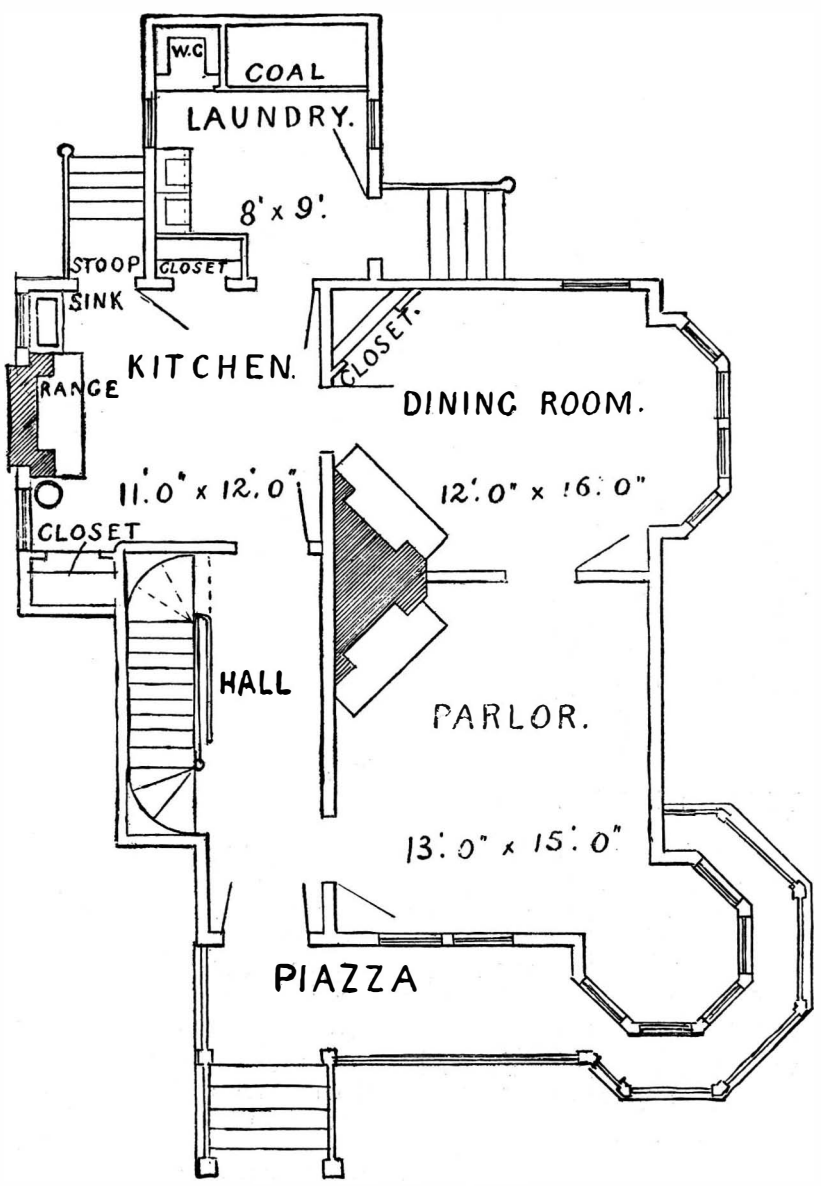
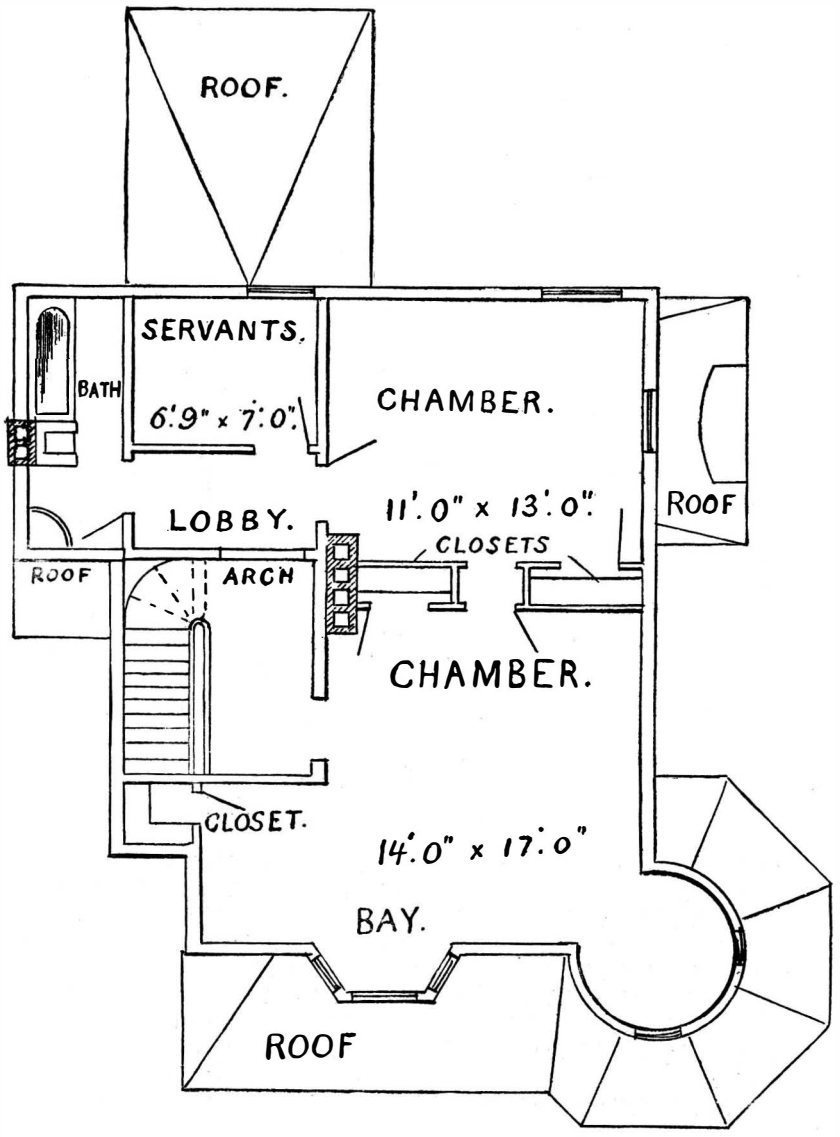


SIDE



FIRST FLOOR.

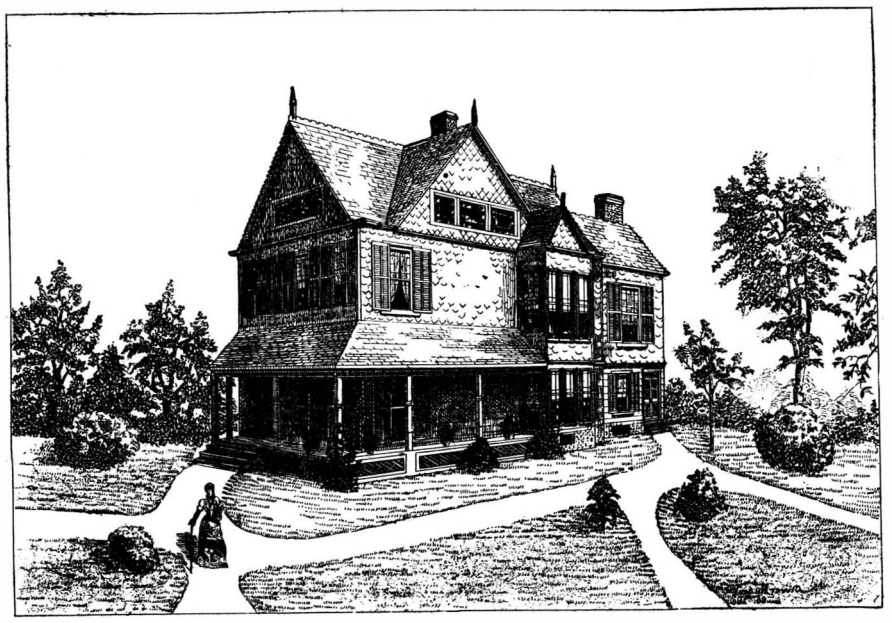


SECOND FLOOR.

A $3,500 DWELLING.

A DWELLING AT EAST NEW YORK.

Our engraving shows a pleasing dwelling erected at East New York. The cost is about thirty-five hundred dollars It has an ample piazza, and the interior arrangement is good.



A DWELLING AT EAST NEW YORK.

Terra Cotta Panels.

The way in which terra cottas were introduced into walls was not unlike that commonly used for inserting stone, marble, corbels, and jambs of stone. It is evident that the general skeleton of the wall was first constructed, keeping some bricks protruding, so that afterward the casts, figures, heads, cornices, and such like might be introduced into the interstices left between brick and brick out of the redundant material beyond the substance of the wall itself. Such pieces, if flat or slightly salient, were fixed in simply with lime and plaster; at the most, for greater strength, hooks of iron or mere nails were used. Large blocks were secured in the same way as corbels or stone cornices. They took, however, the precaution to hollow out by hand such figures as required to be fixed to the bricks that jutted beyond the wall level—sometimes, also, in order to lighten them, or to promote the uniform burning of large pieces, such as large heads and statues. The utmost care to strengthen them was bestowed on the first rows of cornices and on such architectural members as had to sustain others; these upper portions, on the contrary, being borne by the lower and fixed to the wall as best might be without any extreme care, but never made salient by excessive or abrupt protrusion. They are always graduated and pitched, so that rain water may never flow down behind, but invariably along their front. In Italy, through the sudden changes of temperature, frost will soon split the hardest marbles; nevertheless, although these terra cottas are not attached to the wall in a very elaborate fashion, yet in consequence of the builders' precautions to prevent water standing on them, they appear little injured by frost.—*V. Ottolini.*

Dumb Waiters.

The use of dumb waiters in private houses, apartments, flats, tenements, stores, and for light factory work, is largely on the increase, owing probably to the simplification and uniform construction in respect to sizes; and would have been much larger but for the many obstacles in their way, such as the many sizes required, the high price asked, and the complicated mechanism of adjusting them—most fixtures requiring the services of a man skilled in the business to put them up.

All these objections are overcome in the New York Safety Dumb Waiter, as the fixtures are made in one size only, and this is adapted to any size waiter. They are put up one complete set in a box, weighing, all told, about forty-five pounds; are handsomely bronzed; and are so simple to adjust that any carpenter, by the aid of the diagram and instructions which accompany each set, can place them in position.

Dumb waiters have heretofore caused more or less trouble, by the ropes holding them giving out and letting the car fall, often causing great damage, and in some cases serious accidents. The safety rope attachment with which these fixtures are provided, and from which they derive part of their name, prevents this, as a second rope put on slack, and on which there is no work or wear, immediately comes into play and prevents falling or accident, should the hoisting rope break. Another complete and desirable arrangement is the cam brake attachment, by which the car of the waiter can be held at any desired point when loaded beyond balance, and which can be operated from any floor. The adjustment of these fixtures allows the car to run closer to the floor at bottom and nearer to the ceiling at top than any other made, a desirable feature, especially when heavy articles have to be carried.

A full sized model waiter is running at the store of Messrs. John H. Graham & Co., 113 Chambers St., New York, who are the manufacturers' agents. These fixtures are protected by letters patent, and are made and controlled by the Edward Storm Spring Co. (Limited), Poughkeepsie, N. Y., manufacturers of the Edward Storm side bar springs and hardware specialties. Illustrated catalogues with full descriptions can be obtained from them or from their New York agents on application, and we would advise any of our readers who may need a dumb waiter to send for one of these catalogues.

NEW POST OFFICE, SPRINGFIELD, OHIO.

We give an illustration from the *American Architect* of the new post office building at Springfield, Ohio, M. E. Bell supervising architect. It is a substantial structure, effective and satisfactory in appearance.

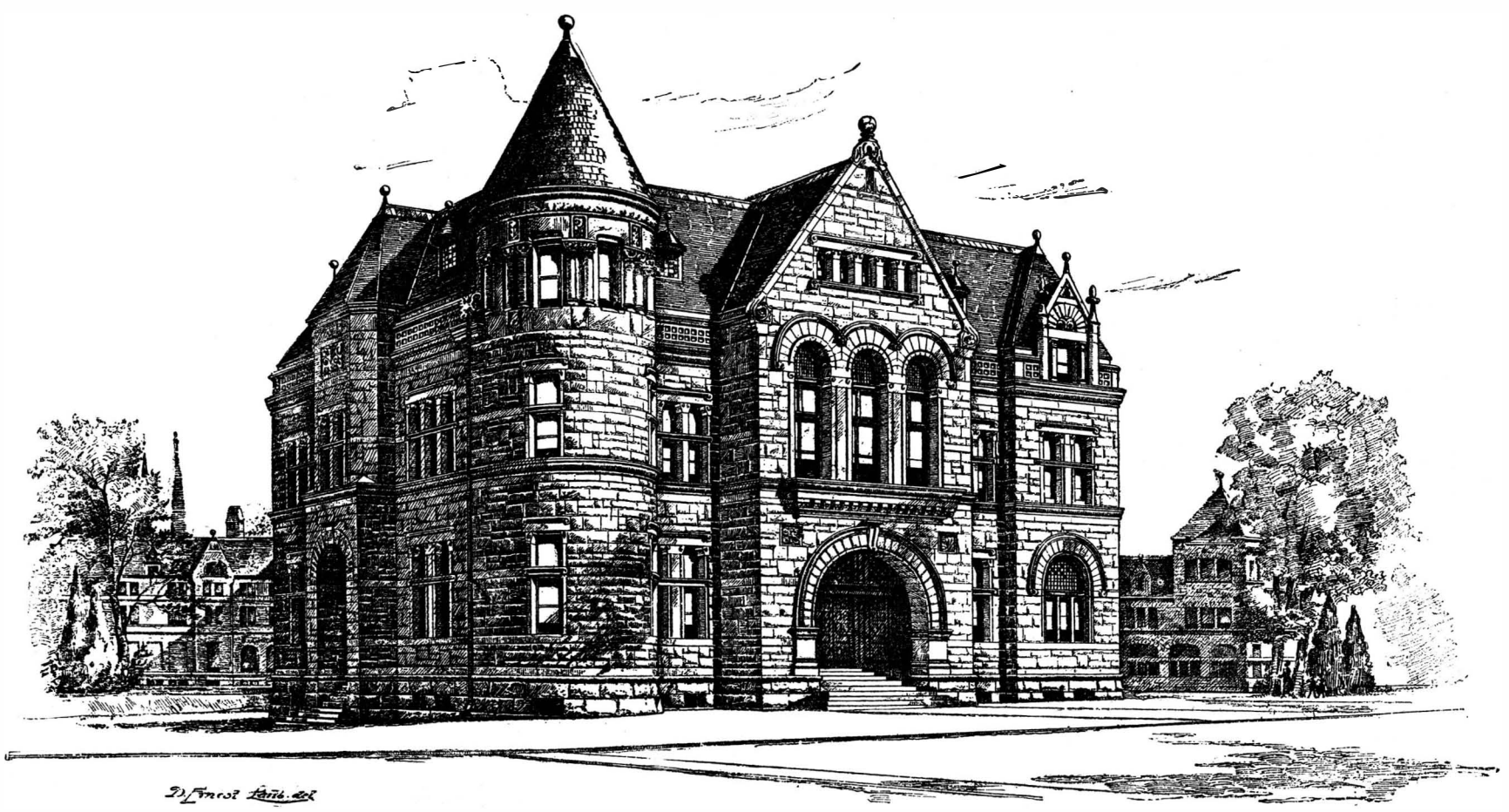
Acoustic Effects of the Britannia Bridge.

Some of the acoustic effects produced by the bridge are interesting. The report of a pistol fired beneath the tubes is repeated three or four times. In this particular, however, they are far surpassed by the large brick arches constructed by Mr. Brunel over the Thames at Maidenhead, under which the echo of a pistol is repeated from twelve to twenty times. The rapid repetition of echoes from each of the T irons on the side of the tube gives rise to a shrill, whirring musical note. When any violent noise is produced on the adjacent shore the note is the same, whether produced by the blows of the riveters or the report of cannon, and corresponds to the low D on a concert flute. The distance between the T irons is two feet. If the same note is sounded by a flute close beside one of the tubes, it is a perfectly soft and musical tone, which lasts many seconds. The report of a pistol produces the same effect much more powerfully. The effect of music in the interior is very striking, and a concert which was given in one of the tubes to the workmen was very effective. The floor was boarded, and the interior being illuminated by several thousands of candles, had a most imposing and gorgeous appearance. The cells of the top and bottom form excellent speaking tubes, and conversation may be carried on through them even in a faint whisper. By elevating the voice, persons may converse through the entire length of the bridge, a distance of more than 500 yards. If one end of the cells be closed, they return a powerful echo; but although a whisper is thus distinctly repeated, the loudest whistle does not appear capable of returning any echo.—*E. Clark.*

Green or Dry.

"Which is the stronger—green or dry timber?" This question is now under discussion by many of the leading lumber journals, and has provoked a perfect avalanche of opinions from experts and others. This discussion, after all, seems rather bootless. Some kinds of timber are stronger when wet or green. All woods are harder and less liable to bend when dry than when wet or green; but most hard woods when wet possess more tensile strength than when dry. Timber thoroughly seasoned is more brittle than when green, and with the necessary force will break square off, while the same timber green would stand about the same pressure by bending without breaking. Take a hickory sapling that it is almost impossible to break in its green state, although it may bend double, and after it is thoroughly dry one may easily break it almost "square off." So with almost any kind of timber. Dryness makes it stiffer, more unyielding, but in very few instances stronger.—*Dixie.*

WILLOW furniture can be cleaned by using salt and water. Apply with a nail brush, scrub well, and dry thoroughly.



THE NEW POST OFFICE, SPRINGFIELD, OHIO.

A MODERN ENGLISH DWELLING, MOWBRAY COTTAGE, EAST FINCHLEY.

This is a small house, built recently, in an old detached garden. The exterior is of stock bricks, with moulded red facings. The upper story is rough cast, and the roofs are covered with red plain tiles. Internally, the house has some good rooms (the dining room being 20 ft. by 14 ft., exclusive of bay), and is most carefully finished, a special feature being the woodwork. The cost was about $7,500. The architect is Mr. C. E. Sayer, 17 Soho Sq., London.—*The Architect.*

Regulation of Building in Boston.

The following sections are from the revised ordinances of Boston, Mass., for 1885, to regulate plumbing and vaults and drains:

PLUMBING.

SECTION 1. No person shall carry on the business of plumbing unless he shall have first registered his name and place of business in the office of the inspector of buildings, and notice of any change in the place of business of a registered plumber shall be immediately given to said inspector.

SEC. 2. Every plumber, before doing any work in a building, shall, except in the case of the repair of leaks, file at the office of the said inspector, upon blanks to be provided for the purpose, a notice of the work to be performed, and no such work shall be done in any building without the approval of said inspector.

SEC. 3. Every building shall be separately and independently connected with the public sewer, when such sewer is provided, and, if such sewer is not provided, with a brick and cement cesspool of a capacity to be approved by the said inspector.

SEC. 4. Drains and soil pipes through which water and sewage are used and carried shall be of iron when within a building, and for a distance of not less than five feet outside of the foundation walls thereof. They shall be sound, free from holes and other defects, of a uniform thickness of not less than one-eighth of an inch for a diameter of four inches or less, or five thirty-seconds of an inch for a diameter of five or six inches, with a proportional increase of thickness for a greater diameter. They shall be securely ironed to walls, laid in trenches to uniform grade, or suspended to floor timbers by strong iron hangers, as the said inspector may direct. They shall be supplied with a suitable trap, placed, with an accessible clean out, either outside or inside the foundation wall of the building. They shall have a proper fall toward the drain or sewer, and soil pipes shall be carried out through the roof, open and undiminished in size, to such height as may be directed by the said inspector, but no soil pipe shall be carried to a height less than two feet above the roof. Changes in direction shall be made with curved pipes, and connections with horizontal pipes shall be made with Y branches.

SEC. 5. Rain water leaders, when connected with soil or drain pipes, shall be suitably trapped.

SEC. 6. Sewer, soil pipe, or waste pipe ventilators shall not be constructed of brick, sheet metal, or earthenware, and chimney flues shall not be used as such ventilators.

SEC. 7. Iron pipes, before being put in place, shall be first tested by the water or kerosene test, and then coated inside and out with coal tar pitch, applied hot, or with paint, or with some equivalent substance. Joints shall be run with molten lead, and thoroughly calked and made tight. Connection of lead pipes with iron pipes shall be made with brass ferrules, properly soldered and calked to the iron.

SEC. 8. Every sink, basin, bath tub, water closet, slop hopper, and each set of trays, and every fixture having a waste pipe, shall be furnished with a trap, which shall be placed as near as practicable to the fixture that it serves. Traps shall be protected from siphonage or air pressure by special air pipes of a size not less than the waste pipe; but air pipes for water closet traps shall be of not less than two inch bore for thirty feet or less, and of not less than three inch bore for more than thirty feet. Air pipes shall be run as direct as practicable, and shall be of not less than four inch bore where they pass through the roof. Two or more air pipes may be connected together or with a soil pipe, but in every case of connection with a soil pipe, such connection shall be above the upper fixture of the building.

SEC. 9. Drip or overflow pipes from safes under water closets and other fixtures, or from tanks or cisterns, shall be run to some place in open sight, and in no case shall any such pipe be connected directly with a drain, waste pipe, or soil pipe.

SEC. 10. Waste pipes from refrigerators, or other receptacles in which provisions are stored, shall not be connected with a drain, soil pipe, or other waste pipe, unless such waste pipes are provided with traps, suitably ventilated, and in every case there shall be an open tray between the trap and refrigerator.

SEC. 11. Every water closet, or line of water closets, on the same floor, shall be supplied with water from a tank or cistern, and the flushing pipe shall not be less than one inch in diameter. But this requirement shall not apply to water closets substituted for vaults, where the same are located outside of the building proper, and water closets may be arranged so as to receive their supply directly from the main with such fixtures as shall be approved by the inspector of buildings, and by the water board and the board of health.

SEC. 12. Pipes and other fixtures shall not be covered or concealed from view until after the work has been examined by the said inspector, and he shall be notified by the plumber when the work is sufficiently advanced for inspection.

SEC. 13. Plumbing work shall not be used unless the same has first been tested by the said inspector with the peppermint, ether, or water test, and by him found satisfactory.

SEC. 14. No steam exhaust shall be connected with any soil or waste pipe, or drain which communicates with a public sewer.

SEC. 15. Water pipes in places exposed to frost shall be packed with mineral wool, or other substance equally good, and they shall be cased to the satisfaction of the said inspector.

SEC. 16. A grease trap shall be constructed under the sink of every hotel, eating house, restaurant, or other public cooking establishment.

SEC. 17. The provisions of sections three to thirteen inclusive, and of section fifteen, of this chapter, shall apply only to buildings erected, or to work performed, after the seventeenth day of March in the year eighteen hundred and eighty-three.

VAULTS AND DRAINS.

SEC. 18. The owner, agent, occupant, or other person

A MODERN ENGLISH DWELLING—CHARLES E. SAYER, ARCHITECT.

having care of a building used as a dwelling, tenement, or lodging house, or where persons are employed, shall furnish the same with one or more suitable water closets, or, where such building is located on a street in which there is no public sewer, with a suitable privy, the vault of which shall be built in the manner hereinafter prescribed, and shall be of a capacity proportionate to the number of inhabitants of such building, or of those having occasion to use such privy. Every such building situated on a street in which there is a sewer shall have water closets, and shall not have a cesspool or privy connected with it, except where, in the opinion of the board of health, it can be allowed to remain for a longer time, and then only as said board shall approve. And whoever neglects to comply with the provisions of this section shall be liable to a penalty of not less than five nor more than one hundred dollars, or by confinement in the house of correction not exceeding sixty days.

SEC. 19. Every privy vault shall be made of brick and cement, and shall be of a capacity of at least eighty cubic feet, and the inside thereof shall be at least two feet distant from the line of any adjoining lot, unless by the consent of the owner of such lot, and at the same distance from any street or public or private passageway, and every vault shall be so constructed as to be conveniently approached, opened, and cleaned, and shall be made tight, so that the contents thereof cannot escape therefrom.

SEC. 20. All waste water and all matter discharged from water closets shall be conveyed through sufficient drains, under ground, to a common sewer, or to such reservoir, sunk under ground, as may be approved by the superintendent of sewers, and no person shall suffer waste or stagnant water to remain in a cellar or upon a lot or vacant ground owned or occupied by him.

A RESIDENCE AT EAST ORANGE.

We give a sketch of a new residence on Arlington Avenue, East Orange, N. J., erected not long ago, A. M. Stuckert, Newark, N. J., architect. This house can be built for about $4,500. Those who like variety of forms and angles, both for interior and exterior, will doubtless find something of interest in this illustration.

THE DUOMO OF FLORENCE.

The unveiling of the new facade of the Duomo of Florence on May 3 last marks the practical completion of this great building, which has been intermittently in progress during nearly six centuries. The present cathedral was begun in 1294, on the site of a small and ugly church, Arnolfo di Lapo being appointed chief constructor. After a few years of suspened operations, Giotto was made head master, but died after three years of superintendence, and was succeeded by Francisco Talenti (1357–76), by whom the plan was extended. The next great name associated with the enterprise is that of Brunelleschi, from whose model, chosen in competition with fifteen others, the eight-sided cupola was built. The new front just unveiled was also a competition design, prepared twenty years ago by De Fabris, who, like all his predecessors, died before the work he devised was completed. Since the death of De Fabris, the work has been carried on by his assistant, Del Moro. There still remain the gallery round the dome to be done, and the gates, for which a new competition is about to be invited.

DONATELLO.

Among those who contributed greatly to the decoration of the cathedral was Donatello.

Donatello, whose real name was Donato di Niccolo di Betto Bardi, was born in Forence, in the year 1386. The first place among architects is given to Brunelleschi, as founder of the renaissance in Florence and as the originator of a new period of architecture by the construction of the dome of the cathedral, but Donatello and Lorenzo Ghiberti are placed among the first representatives of the art of sculpture. This is not the place to enumerate Donatello's works in order to give a clear idea of his greatness, but we can mention one or two of his best known productions. Of these his statue of David, which is on the west side of the clock tower, comes first; then there were statues of John the Baptist, the penitent Magdalen, etc. By order of the different guilds he produced his statue of St. Mark, which so delighted Michael Angelo, of St. Peter, and St. George, which latter belongs to Donatello's best works. Much of his work is to be found in Padua, where he spent several years in ornamenting the altar of the church of St. Antonio.

Donatello died December 15, 1466, and was buried near his friend Cosimo de Medici in San Lorenzo, in Florence. Donatello's place in the history of art and the greatness of his name are founded on the influence which he exerted on Italian art of his time. To him is due not only the honor of ripening Florentine art for the production of the greatness of Michael Angelo, but also of inspiring the art of Northern Italy with new life. Our engravings are from the *Illustrirte Zeitung*.

Planers.

Goodell & Waters, of Philadelphia, the well known manufacturers of woodworking machinery, have just issued a very complete catalogue of planers, which is fully illustrated and printed in the best manner. It embraces nearly thirty varieties of planers, suitable for all purposes, from the finest cabinet work to the heaviest timber dressing.

Among the machines illustrated and described are the following: Pedestal jointer, jointer or hand planer, panel, pony, and finishing planers, single and double surfacers, planer and matcher, single and double surfacers and matchers, woodwork planers and matchers, flooring machines, endless bed planer, endless bed single and double surfacers, endless bed double surfacer with jointer head attached, endless bed planer and matcher, and timber planer.

This is, undoubtedly, the most complete catalogue of planers ever issued. They are also prepared to furnish planing knives of any description, and give directions for ordering. With branch houses in Chicago and San Francisco, they are enabled to fill orders in any part of this country promptly, and we would advise any of our readers who may be in need of woodworking machinery to address them at 3031 Chestnut Street, Philadelphia, for one of their catalogues.

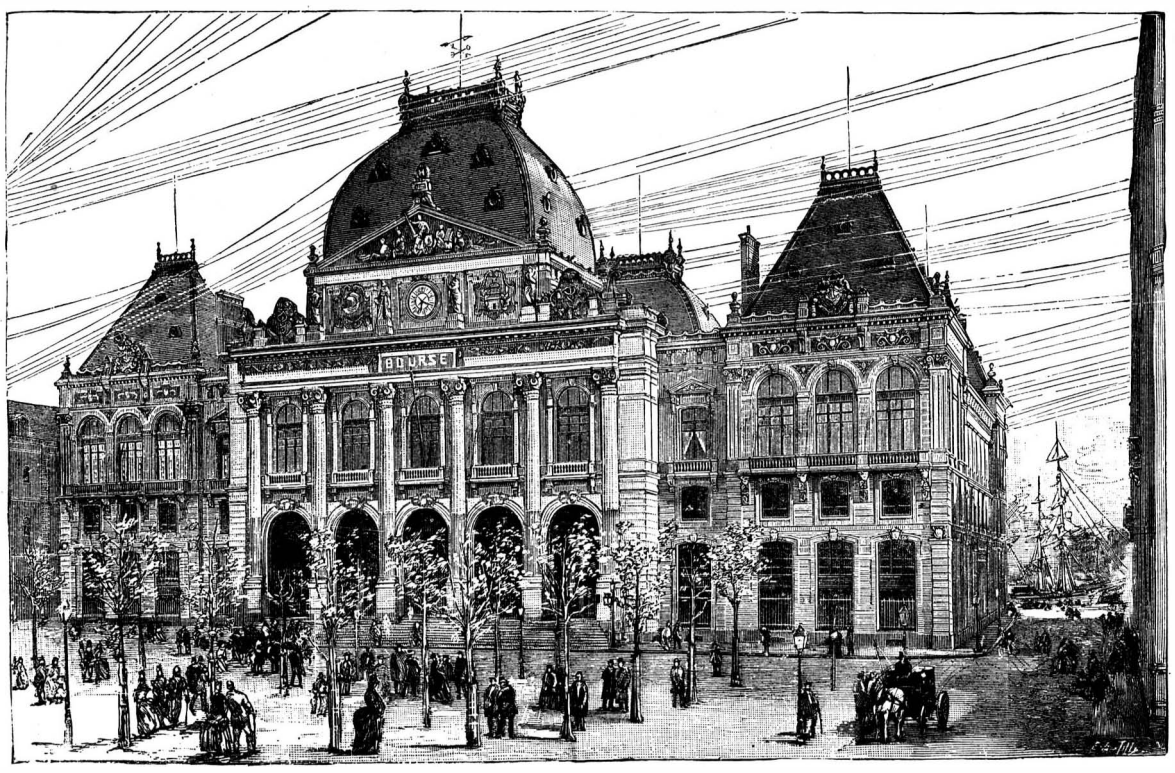
To remove candle grease from furniture without injuring the varnish, rub it off with a little warm water and a rag.

A RESIDENCE AT EAST ORANGE, N. J.

THE BOURSE AT HAVRE.

The active commercial city of Havre is at present enjoying the excitement of a great Maritime Exhibition. A large and splendid pavilion has been temporarily erected in the heart of the city, in which are collected almost every conceivable object pertaining to maritime industries. It is reported to be one of the finest and most interesting exhibitions of the kind ever realized.

We give an engraving of the Bourse or exchange at Havre, an imposing and elegant example of French architecture. The Maritime Exhibition is located not far from the Bourse.



THE BOURSE AT HAVRE, FRANCE.

IMPROVED CAMERA CLAMP AND TRIPOD HEAD.

The well known tripod screw for securing a camera firmly to the head of a tripod has many disadvantages, which have several times been pointed out, particularly when the camera is used in photographing architectural subjects. The object of the device shown in Figs. 1 and 2 of the engravings is to overcome the defects incident to the common screw clamp, by avoiding all separable parts and the wear of the screw thread, and at the same time to permit the camera to be easily and quickly secured to the tripod. A truncated cone shaped casting, having a projection provided with a socket or seat set flush with the top of the tripod head, is secured by screws to the under side of the head. The lower face of the casting is planed or filed off on a bevel. Passing through the hole drilled in its center is the fastening spindle, having a solid head turned on its upper end, and a thumb-actuated disk, held rigidly by suitable screws, at its lower end. The upper face of the disk is beveled to correspond with the bevel on the casting above.

Located in a slot in the spindle is a very light steel spring (see Fig. 2), which, in pressing against the walls of the hole, holds the spindle by friction, in any position, as it is elevated or depressed, and at the same time allows the spindle to be freely rotated. When the spindle is not secured to the camera, its head is drawn down into the seat in the upper face of the casting, so that nothing will project above the surface of the tripod head.

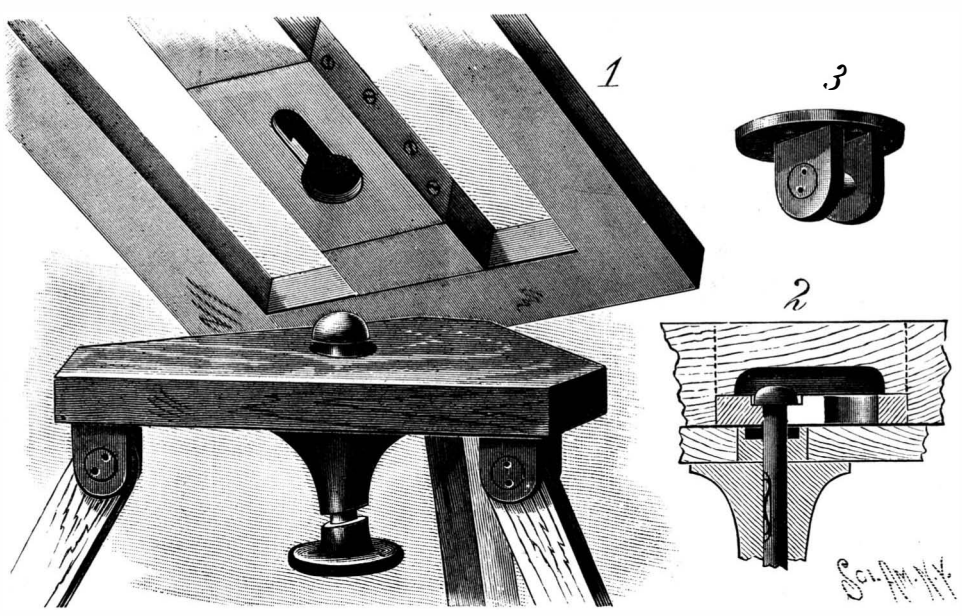
A light metal plate, having its ends bent up around the sides of the central bar of the camera bed frame and secured thereto by screws, as shown in Fig. 1, has a key hole slot in which the head of the spindle of the clamp fits. The wood of the camera bed is dug out back of this slot, forming a recess, as shown in Fig. 2. It will be noticed this method of fastening the plate to the camera bed frame secures unusual strength, since the pull on the screws is at right angles to their length. To prevent any possible slipping of the camera after it is secured, a slight depression is provided in the inner surface of the plate at the end opposite the entrance slot, clearly seen in Figs. 1 and 2.

To clamp the camera on the tripod head, it is only necessary to rotate the spindle by the thumb disk until the two beveled faces are parallel with each other, then to push the spindle upward until the faces meet, which leaves the spindle head projecting above the tripod head. When the camera is then set upon the tripod, the head of the spindle enters the key hole slot, and by a slight movement lengthwise the head is brought directly over the seat of the slot. By slightly rotating the spindle by the fingers with the thumb disk the beveled faces act upon each other like a cam, and at once draw down the spindle head into the seat of the key hole slot, firmly clamping the camera bed to the tripod head. A reverse movement allows the spindle to be pushed up, so that the camera may be quickly removed.

It will be observed that the clamp is very simple, effective, and strong, is, in fact, more durable than a screw, not liable to get out of order, and with it a camera can be very quickly adjusted to a tripod.

The inventor prefers the triangular form of a tripod head, made either of wood or vulcanized fiber, as shown in Fig. 1, and has the tripod legs rigidly secured thereto to avoid the wear and racking motion incident to detachable legs, which frequently occurs when photographing in a brisk wind. The fastening for the leg of the tripod is shown in Fig. 3, and consists of a round plate, provided with two projecting ears having a pin riveted between them, which passes through a hole in the extremity of the tripod leg. The plate is secured to the under side of the tripod head by screws. This construction makes a very rigid and steady bearing for the tripod head and camera. Both may be carried about on the shoulder without in any way straining the clamp.

Different sized cameras may be used on the one tripod head. The improved clamp may be fitted to any tripod head or camera. Further information may be had from the inventor, Mr. M. P. Warner, Holyoke, Mass., who is prepared to furnish the improved clamps and fit them to tripods.



WARNER'S CAMERA CLAMP AND TRIPOD HEAD.

JOINTS IN WOODWORK.

It would be an indubitable advantage in the construction of our buildings if framers and carpenters more generally understood the principles which govern the form of joints in woodwork. Many of the most important joints are commonly executed in a manner which is bad in workmanship and improper in form, and to prove the truth of this it will only be necessary to examine any of the less important of our buildings

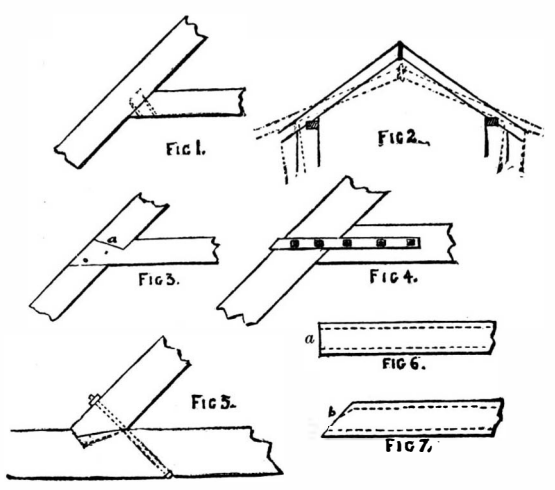
Professor Rankine, in his "Civil Engineering," and Tredgold, in his "Carpentry," have dealt with the subject of joints in a very comprehensive and thorough manner. The forms for various joints recommended by these authors are substantially the same, and are, to a considerable extent, followed in Europe. Here in America, joints in woodwork are generally executed in a much more crude and imperfect manner, even in the best work, where the form is, as a rule, simpler and less perfect.

The reason for this is not far to seek. In any country like this, where wood is abundant and labor expensive, the system of construction will be different from that used in countries where labor is comparatively cheap and timber dear. The effect will be to simplify the construction to a considerable extent, and to save labor in the execution so far as possible, even at the sacrifice of material. These conditions have had a considerable influence on the general forms of joints, with the result of producing a quantity of bad work. The question of the adoption of any particular form of wooden structure, which requires the use of more or less timber, with a corresponding loss or gain in the labor required upon it, will be simply determined by the local cost of labor and materials and the comparative loss or gain in the two items. But with joints the matter is different.

The strength of any structure must be as the strength of its weakest part, and in most wooden structures the joints necessarily form the weakest portions; so that if the strength of the joints is lessened by imperfect workmanship or improper form, the strength of the whole structure is thereby lessened in a corresponding degree. This has the effect of not only lowering the strength beyond safe limits, but of directly causing the absolute waste of a considerable quantity of material. For example: The members of an ordinary roof of some magnitude are usually much stronger than is actually required under normal conditions, the object being to provide for the effect of the pressure of high winds and for other emergencies which may arise. Some idea of the extent to which this is done may be obtained from the fact that, while it is usual to allow only 8 cwt. per square for the weight of slates and timbers, and much less for shingles and felting, as much as 36 cwt. per square is allowed as the probable wind pressure on the roof in times of gales and hurricanes.

Such emergencies are provided for by the use of timbers of sufficient size to resist such force, should it be applied. But if, in joining these timbers together, the connections are badly, carelessly, or improperly formed, the full strength of the timbers can never come into play at all; for if a very high wind take place, the joints will fail under the exertion of a force much less than the roof would safely carry with such timbers properly jointed.

In determining the form of a joint, it should be striven to produce a strength as near to that of the solid piece as is practicable. Rankine, in his work before referred to, lays down a number of rules upon which the form of a joint depends, and the reader interested in the subject will do well to refer thereto.



JOINTS IN WOODWORK.

For our present purpose we can consider that the following points chiefly determine such form: (1) The direction of the load; (2) the description of the load; and (3) the nature of the materials to be joined.

As characteristic examples we will consider two cases. In the first place, the joint used in connecting a collar to the rafter in a collar-beam roof. The description of strain here is important, as strictly determining the form of joint. Occasionally a carpenter is found

who is under the impression that as the effect of the weight on the roof is to cause the rafters to sag to some extent, the collar must be subjected to a direct compressive strain, and that the best joint is a butting one, as shown in Fig. 1. This is altogether wrong. The only possible condition under which the collar could be compressed is where the feet of the rafters are immovable, and even then (a condition impossible to produce in practice) the sagging, and consequently the pressure upon the collar, could not be more than would result from the very slight lengthening of the timber due to the elasticity of the material.

The strain to which any member of a roof truss or other simple structure is subjected may always be found by determining the manner in which such structure, if overloaded, would fail. Thus in the present case the effect of an overload would be to throw the rafters out, as shown by dotted lines in the case of a single pair of rafters in Fig. 2. The effect of a load, even that of the weight of the timber composing the roof, would be to *tend* to throw out the rafters in the same direction. The object of the collar, then, is to simply tie the two rafters together, and prevent them spreading out, and the collar is therefore clearly subjected to a tensile or pulling strain.

It is apparent that, such being the strain, the butting form of joint, before referred to and shown in Fig. 1, would be almost useless, and would in fact depend for its strength entirely upon the adhesion of the nails joining the two parts. Nevertheless, partly from ignorance, this joint is used, and very frequently, even where the strain is understood, to save labor the collar is simply nailed upon the side of the beams.

The proper form of this joint is that shown in Fig. 3, in which a portion, usually about one third of the depth, is cut away and the collar halved on and pinned in place. The inclined edge, *a*, prevents the piece from being withdrawn, and hence effectually resists the strain. Sometimes this joint is formed by fitting the collar on the rafter with a tenon, and connecting it with an iron strap, as shown in Fig. 4; but this construction is only employed in roofs of large span.

The form of joint, if such it can be called, shown in Fig. 1, although not infrequent, is a fair example of the manner in which timber may be wasted by bad construction, for the sake of saving a little labor. Can it be doubted that this is very far from true economy?

As an example of strains unlike those just referred to, we will take the case of the joint between the foot of the principal rafter and tie beam of a king post roof truss. There is the same tendency here for the rafters to separate as in the preceding case, and the effect is to throw the tie beam strongly into tension, and the strain on the joint will be a compressive one. The load being communicated to the tie beam by the rafter at an acute angle, a special provision is necessary in forming the joint. The most important point is to form the butting surfaces at right angles to the thrust, and this is provided for by letting the rafter into the tie beam, as shown in Fig. 6. Then, as there is some tendency for the rafter to slip out of its place, a tenon is provided, forming the joint usually termed the shouldered tenon, as shown in Fig. 5. There is a tendency, too, for the rafter to rise out of its place, and, to prevent this, a bolt is passed through the two, or in large trusses an iron strap is placed around, to embrace the two and keep them from separating. Other forms of this joint are sometimes employed, some having two tenons and others two bearing surfaces, but their use is limited. It is not necessary to illustrate here the various bad and ill considered forms of this joint in common use. The example in Fig. 5 is the simplest form which should be allowed, even in unimportant work.

In the proper construction of this joint, it is obviously important to place the end of the rafter far enough back from the end of the tie-beam to prevent detrusion or splitting off of the wood. Hurst gives the following rule for finding the distance: Let *a c* equal the required distance in inches; B equal breadth of tie beam in inches; H equal horizontal thrust in pounds; and S the cohesive strength of a square inch of the material.

$$\text{Then A. C.} = \frac{4H}{BS}.$$

The time occupied in the execution of this joint is, of course, somewhat long, but it is of so much importance (for the whole stability of the roof depends upon it) that the inferior forms so often seen, some without tenons at all, others without straps, would never be adopted by a good workman.

A consideration of the nature of the material to be jointed is of importance in determining the description of joint to be used. The most important characteristic, so far as the question of joints is concerned, is the manner in which it shrinks. It may be taken as a fact that any alteration in the length of a piece of timber by shrinkage is inappreciable, but the shrinkage in the direction of its width is considerable. This fact will have an important bearing on the form and execution of joints. If a piece of timber be cut off at the end at right angles, it will, on shrinking, still retain the same shape. If the end be cut at an angle, the effect of shrinkage will be to make the angle more acute. In other words, let the full lines in Figs. 6 and 7 represent pieces of timber cut at right angles and obliquely, respectively, as shown. When the timber shrinks to the position shown by dotted lines, the end *a* will be unaltered in shape, but still retain its end perpendicular with the body; while the end *b*, shrinking in the same manner, will be altered, becoming more acute, as shown by dotted lines in the figure. Framers should remember these facts, and make allowances for the alteration in shape, and especially when working upon timber unusually sappy.

When a joint is not quite true, it is usual to run a saw-cut between the abutments, to produce a better bearing; but as timber all shrinks to some extent, it is well not to make the abutments fit too closely at first, provided always that the inequality is properly allowed to be compensated by the subsequent alteration in form which will take place from the shrinkage, as explained.—*Artus, in the American Architect.*

WHEELER'S PATENT WOOD FILLER.

In the SCIENTIFIC AMERICAN of March 12 we mentioned another decision in favor of the Bridgeport Wood Finishing Co., further establishing their patent upon Wheeler's wood filler, rendered in the United States Circuit Court, Boston, Judge Colt entering a final decision in their suit *vs.* Asahel Wheeler in equity. This decree affirms the validity of the Wheeler patent, and restrains infringement thereof by the use of ground silex in wood fillers.

The various goods manufactured by this company have long been noted for their excellent qualities, and it gives us great satisfaction to know that we have largely assisted in introducing them to distant countries. Among many letters received by the manufacturers is the following:

OFFICE OF SUPT. OF WORKS, SIMLA IMPERIAL CIRCLE,
SIMLA, March 28, 1887.

BRIDGEPORT WOOD FINISHING CO., New Milford, Ct.:

SIRS: I learn from an advertisement in the SCIENTIFIC AMERICAN that you are the manufacturers of Wheeler's patent wood filler, an article I have heard praised. I shall feel much obliged by your sending me particulars of it, and any preparations for wood finishing that you manufacture. We shall shortly have a large quantity of woodwork to do in the interior fittings, furniture, and decorations of the new viceregal palace here, and I am anxious to learn of all labor saving processes and preparations that are in the market.

Our woods are chiefly teak, which is imported from Burma, walnut, box, took, and Himalaya oak, which grows in the neighborhood, besides the cedars and pine. You will also oblige by stating your agents or where your preparations may be obtained in the United Kingdom. I remain, sirs, yours faithfully,

L. M. ST. CLAIR,
Executive Engineer and Supt. of Works,
Simla Imperial Circle.

We congratulate the Bridgeport Wood Finishing Co. upon this letter, and have no doubt but they will receive the order, as their goods are well made and reliable. Their works are situated at New Milford, Conn., on the Housatonic Railroad, thirty-five miles north of Bridgeport. The raw material from which their products are principally made is found in the immediate vicinity of their mills. Their plant consists of silex mill, wood filler factory, paint factory, storage and packing warehouse, barrel factory, and japan and stain factory. All these buildings are located separate, so that in case of fire one will not endanger another.

Besides manufacturing the Wheeler's patent wood filler, they are also largely engaged in manufacturing silex and feldspar, producing it of various grades of fineness, from coarse grains to impalpable powder, and for various purposes, such as making porcelain, scouring soap, sandpaper, etc.

Among the other products are Breinig's lithogen silicate paint, and Breinig's lithogen primer, and Breinig's white japan, drier, wood dyes and stain, all of which are giving general satisfaction and are meeting with large sales.

Readers who are in need of any of these articles should address the Bridgeport Wood Finishing Co., New Milford, Conn, who will be pleased to send illustrated catalogue and full particulars upon application.

RIVERSIDE AVENUE, SPOKANE FALLS.

The marvelous growth and development of the great West is well exemplified in the sketch we give, from the *Northwestern Architect*, of the substantial hotel and office buildings on Riverside Avenue, Spokane Falls, Washington Territory. Messrs. Joy & Fitzgerald, of St. Paul, Minn., were the architects.

THE NEW FRONT OF THE DUOMO, FLORENCE.

[For description see page 9.]

A RESIDENCE AT FLATBUSH, N. Y.

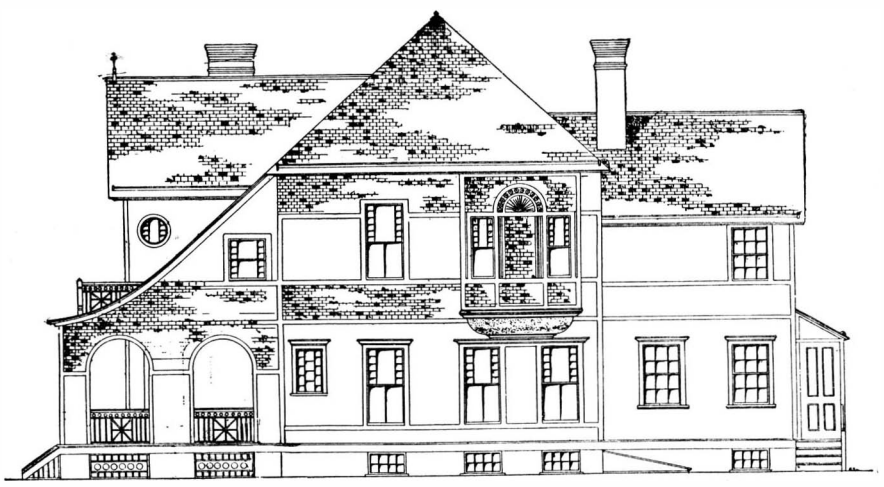
We give beneath the floor plans and elevations of a very comfortable dwelling at Flatbush, N. Y., erected for Mr. Martin by H. L. Harris, architect, of this city. The cost of the house was $3,700. The general style of the building is substantial and pleasing.

Preventive for Dry Rot.

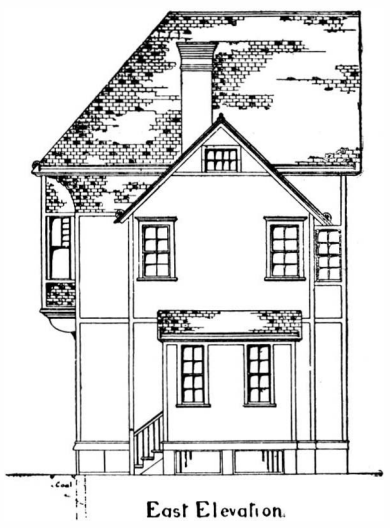
A Bohemian chemist has found that salicylic acid is a preventive and a cure for dry rot. At first the acid was used in the dry or powder form, but latterly the greatest success has been achieved, according to Prof. Farksky, by dissolving 5¼ ounces of salicylic acid in one quart of common spirit, and diluting this solution to a convenient degree with water at the moment of using it. In some of the old houses of Bohemia dry rot is a very dangerous thing, especially when it attacks the principal beams, which are mostly of beech wood.

Great California Dam.

A remarkable dam is about to be constructed by a water company at the San Mateo Canyon, four miles from San Mateo, Cal., in order to form a reservoir. The canyon is very narrow and steep, and 15 ft. below the bottom is a solid rock on which the foundation of the dam will rest. The structure will be 170 ft. high, 175 ft. wide at base, 20 ft. at the top, and 700 ft. in length. It will be the largest stone dam ever known to have been built. The dike will have a curvature of eighty feet, and the convex side will be upstream. The material will be a new sort of concrete, composed of stones. The walls will be perfectly smooth. The reservoir that will be formed by it and the adjacent hills will be about eight miles in length and 150 ft. deep in the deepest places. Its capacity will be about 32,000,000,000 gallons. The water will be conveyed by tunnels to the city of San Francisco.—*Boston Journal.*

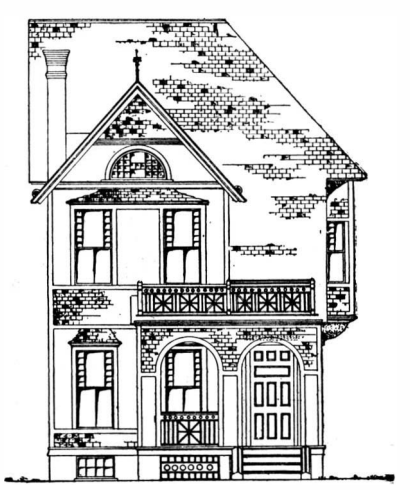


South Elevation

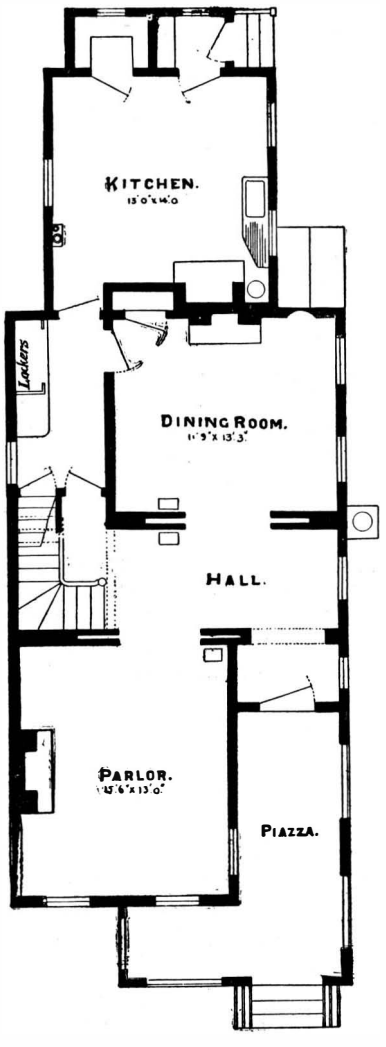


East Elevation.

North Elevation.

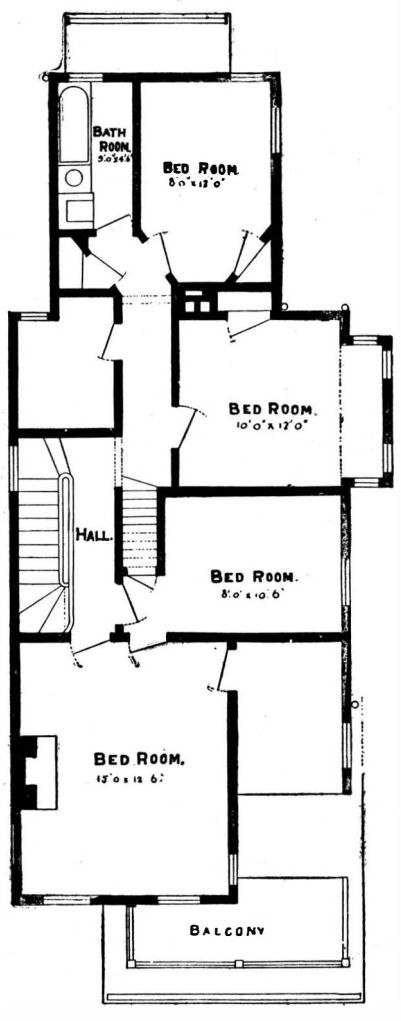


West Elevation.

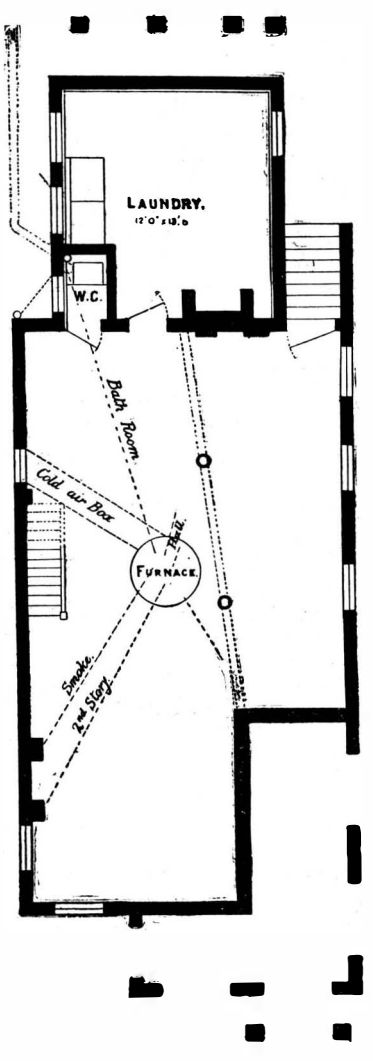


First Floor.

Scale of feet.



Second Floor.



Cellar.

A RESIDENCE AT FLATBUSH, N. Y.

THE MANCHESTER JUBILEE EXHIBITION.

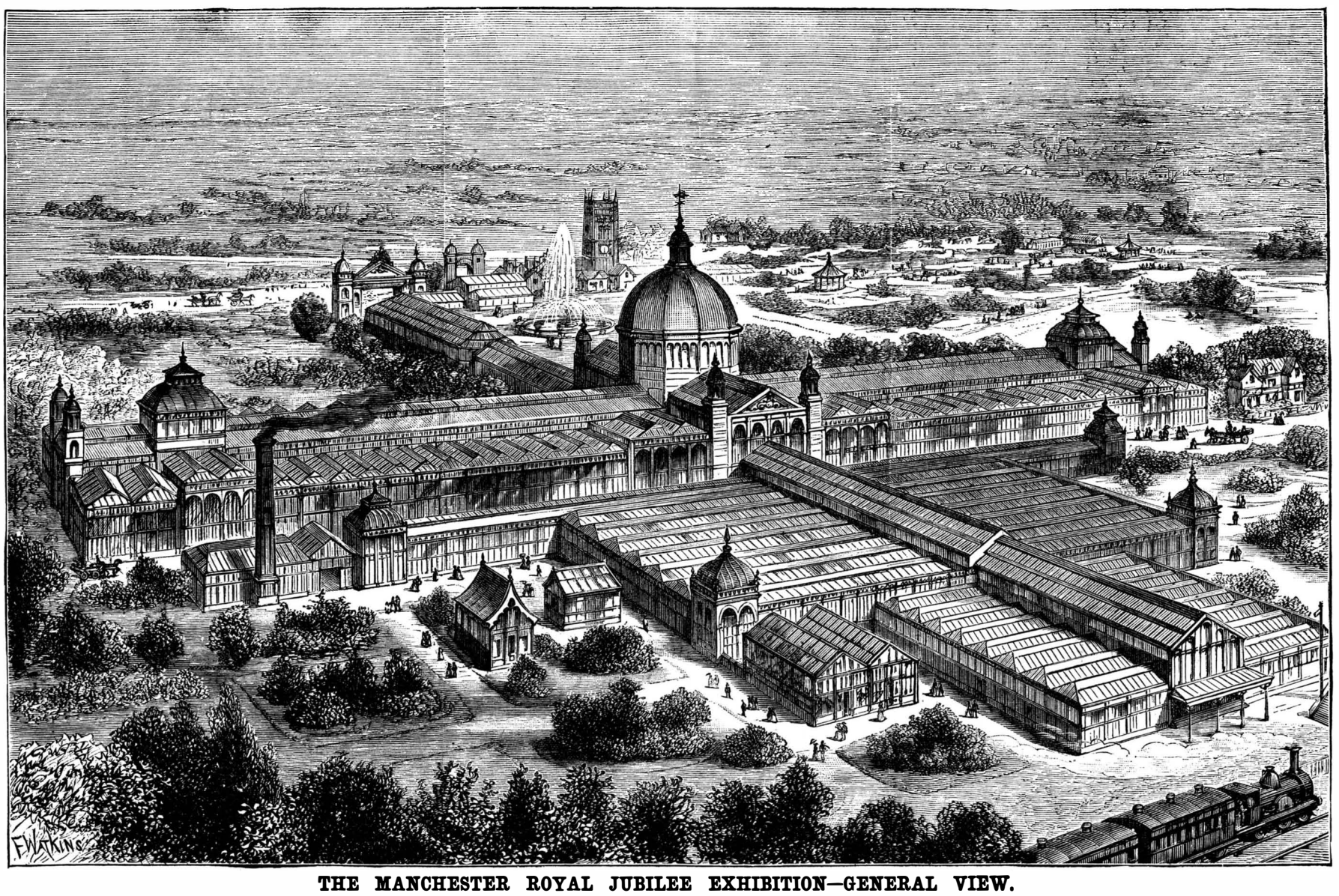
On May 3 last this exhibition was opened by their Royal Highnesses the Prince and Princess of Wales, under favorable auspices.

The *Engineer*, from which we take the following particulars, says: In many respects the exhibition is superior, not only in extent, but in variety, to anything that has been seen in England for several years. All the conditions are favorable to its success, for it possesses those elements of attraction which have been found so popular in London, inasmuch as it closely adjoins the botanic gardens, and as these will be thrown open to the visitors, it will be easy to provide open air attractions of no common order of merit.

The contents of the great machinery gallery fully maintain not only the reputation of Manchester, but of England. Never, since 1862, has anything like the display of textile machinery been seen within our shores.

The main building of the exhibition claims the special attention of all who are interested in iron structures. It is a remarkable example of the adaptation of means to an end.

The architects of the building are Messrs. Maxwell & Tuke.



THE MANCHESTER ROYAL JUBILEE EXHIBITION—GENERAL VIEW.

The principal building consists of a nave or main avenue, 1,000 ft. long, crossed at the middle point by transepts, surmounted by a graceful dome, which is finished above by a well proportioned lantern. Near to the ends of the nave are situated two pavilions, which rise to a considerable height above the nave roof, making with the dome a pleasing sky line, not usually found in exhibition buildings. The interior of the building when viewed from one end presents a very satisfactory vista. The nave has a total width of 100 ft., but as the sides are partitioned off to form rows for the display of furniture and other matters, the visible width of the main avenue is only 60 ft. The dome is 90 ft. in diameter, and is supported, as, indeed, is most of the roof covering, by slender clustered iron columns. The approach avenue from the royal entrance in Old Trafford road forms a most imposing corridor. It is 600 ft. long, and is covered in for its entire extent. There is a broad causeway down the center, and on each side there is a wide margin planted with exotic ferns, palms, and other foliage plants, which, as a whole, presents a feature that for luxuriance of vegetation is almost unique. This covered road is lighted after dark by electric arc lights, with excellent effect. Both north and south of the main building there is a vast covered area of ground, where the aim has been to afford protection for machinery and other exhibits, rather than to satisfy the eye by architectural effect. A special area of large extent has been devoted on the north side of the nave to the Irish section, which is well filled with exhibits of various kinds, some of which will be referred to in a future notice, but almost all of such a character as to show great excellence of workmanship and design. The large annex on the south side of the main building is almost wholly occupied by machinery at rest and in motion. This area is separated from the main building by Talbot road, across which is carried a foot bridge of 70 ft. span, which is used by all visitors arriving by rail at the exhibition station. In addition to the botanic gardens, there is a considerable area available for open air recreation. This ground is situated for the most part near Talbot road, and it contains detached buildings, notably a creamery, conservatories, billiard room, and smoking room. The proximity of the botanic gardens, as a matter of course, suggested the provision of all the accessories which made the fisheries and the other recent exhibitions at South Kensington so enjoyable as a summer resort. The grounds have been rearranged to a great extent. A wide promenade has been formed, with a band stand at each end, and, as we have said, a magnificent fountain has been provided for display with electric light.

The roofs of the exhibition building contain several features of a novel kind. The architects have shown considerable ingenuity in using those forms and sections of iron that are commonly found in the market. By doing so the delay consequent upon the adoption of special designs has been avoided, for with the exception of some small castings of a special form, every portion of the roof could be procured in any desired quantity. The adoption of the ordinary forms of iron has, of course, been attended with economy in two respects. The material was doubtless cheaper at first cost, and if the building is to be taken down when its present purpose is served, the greater part of the material will be available for the purposes for which it was originally made.

The whole of the columns are built up of flanged pipes of 4 in. interior diameter, having a thickness of ½ in. and flanges of ¾ in. faced. They are placed in groups of two, three, and four, and have a very light and elegant effect. Between the flanges are fixed cast iron zones, which are beaded round the edge, and as they project a little beyond the outer edge of the flange, they almost entirely conceal the fact that so utilitarian a material as a steam pipe has been employed. These zones have a further use in some situations, as they are then cast with a lug, to which is attached any tie or bracing that is required. Ordinary angle and T iron is largely used, and it will be seen by the drawings that hardly any smiths' work has been necessary. The labor has consisted almost entirely of shearing, punching, and riveting. The arrangement of the purlins is both simple and sound in construction. They are for the most part made of wrought iron water pipes screwed in the usual way at each end. These are passed through a purlin coupling of cast iron, and are fixed in position by nuts, which are tapped to fit the screw of the water pipe.

Most of the tie rods also are made of small iron water pipes, and these are attached at the ends in a simple but effective way. A piece of flat bar iron is punched with a hole in the center and a hole at each end. The bar is then bent twice at right angles, bringing the ends into proximity, so that any number of flat bars can be gripped and a bolt passed through the whole thickness. The end of the tubular tie rod is then passed through the center hole in the strap, and a nut is screwed on the end of the pipe, by which the whole can be drawn tightly together. It will be seen from the drawings that the suspending rods are also made of drawn tubes, and are attached to the tie rods by ordinary T pieces or junctions. The clustered columns are secured to the brick foundation by being bolted down to a cast iron bed plate of 1¼ in. thick. The heads of the bolts are countersunk so as to insure a uniform bearing on the brickwork, and the bed plates are secured by holding down bolts, which are built into the brickwork.

In the roofs of the low main buildings, not only are all the members which are in tension made of drawn pipes, but the rafters and purlins are of the same class of material. The struts are of angle iron, and are attached to the purlin couplings by rivets. The shoes of the principals, and what answers for a ridge piece, are made of flat bar iron punched and formed to a suitable shape to receive the ends of the pipes, which are attached with nuts, as above described, for the tie rods. The dome, which is twelve sided in plan, is of graceful form, and is very light in construction Each rib is made up of two T irons, which are tied together by ordinary diagonal bracing of angle iron 2 in. × 2 in. × ⅜, each having a single rivet at each end. No pipes have been employed in this part of the structure, but the necessary ties are of steel wire rope, which is so light as to be hardly visible from the floor of the building. There are two complete sets of tire wires which cross the dome horizontally, but diagonally, as shown on the plan of the lantern, touching each other as they pass.

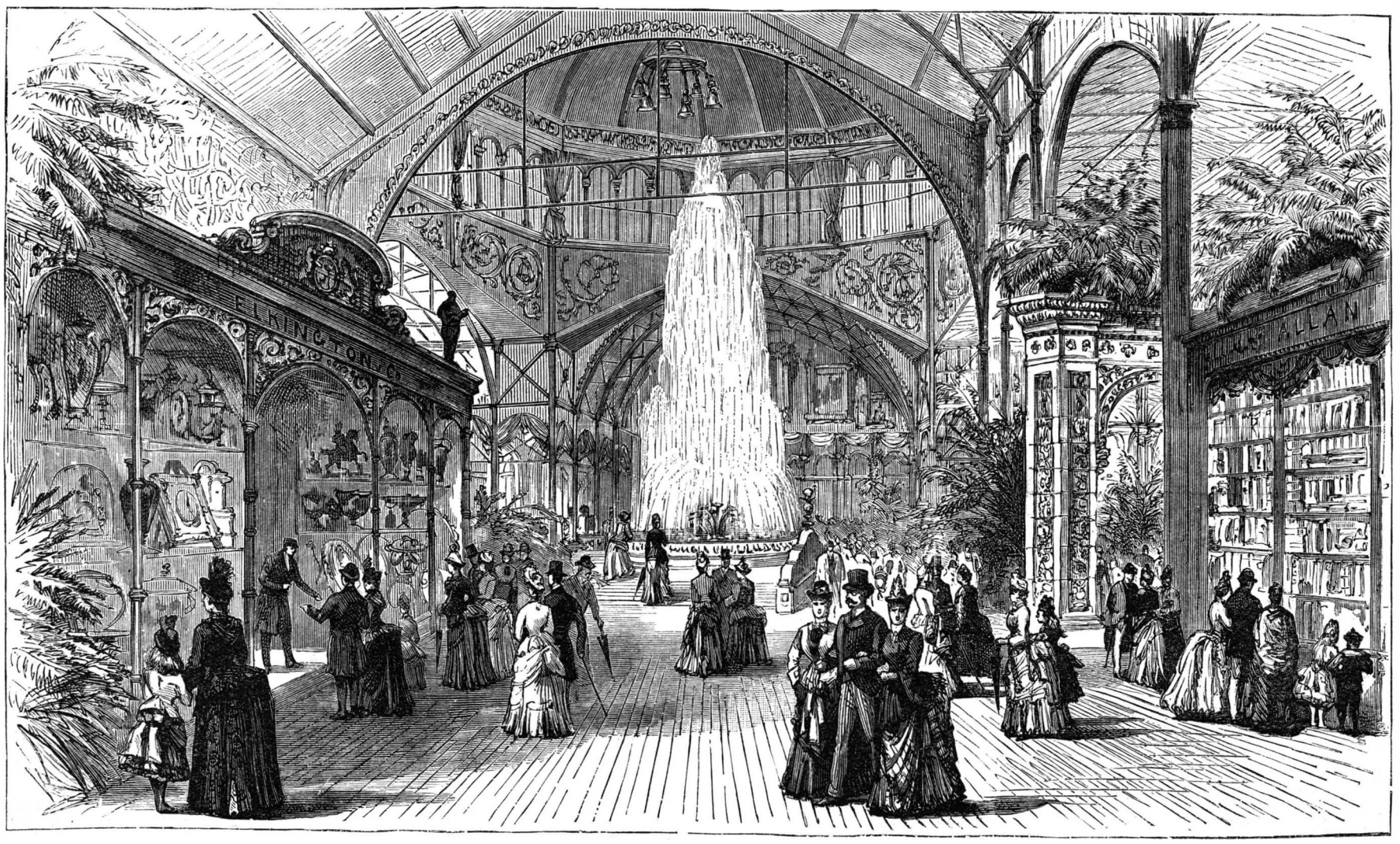
The buildings are, with very few exceptions, covered with corrugated iron, and no other material is used with it, except in the music room, at the eastern end of the building, where the inside of both roof and walls is lined with thin boarding, which, for obvious reasons, is more suitable than galvanized iron and ordinary brickwork.

The exhibition buildings are situated at some distance from the center of the city, but there are ample facilities provided for reaching it by both road and rail. The principal or, as it is called, the royal entrance is in Chester road, a few yards from the gates

of the botanic gardens. The exhibition is divided into two sections by Chester road, a thoroughfare 70 ft. wide. On the north side is the main building, on the south the great machinery hall, 510 ft. long and 210 ft. wide. This will be devoted to machinery in motion. Opening off it, still to the south, is an annex 180 ft. square for machinery at rest. The entire building is, as we have already stated, lighted by electricity. The contract for the whole of the arc lighting has been placed with the Anglo-American Brush Electric Light Corporation. The total number of lamps employed is 546, exclusive of those required for the private use of exhibitors. All the lamps are of the Brush standard pattern, working with a current of 10 amperes, and are maintained by twenty-six dynamos, inclusive of spare machines. The engines employed to drive the dynamos are by Messrs. Robey, Hornsby, Davey Paxman, Ruston Proctor, and Yates, and are arranged to suit the requirements of the several circuits as nearly as possible.

Our two sketches of the exhibition buildings are from the *Illustrated London News*, from which we also take the following:

A very interesting feature of this exhibition is the architectural reproduction of "Old Manchester and Salford," erected on the large lawn on the northern side of the botanical gardens, between the ordinary entrance to the gardens and the grand entrance to the exhibition in Chester road. The task of design was entrusted by the executive committee to Messrs. Alfred Darbyshire, F.I.B A., and F. Bennett Smith, architects. From the set of drawings which they prepared, models in plaster were made by Mr. Hindshaw, and were colored by the architects for the guidance of the scenic artists. The general contract for the construction of buildings was taken by Messrs. R. Neill & Sons. All the lead lights and stained glass windows were provided free of charge by Messrs. Edmundson & Son. The committee secured the services of Mr. Walter Hann for the artistic painting. The result will be admired by all visitors to the exhibition. "Old Manchester" is entered through a Roman arch, flanked by two circular towers, presumed to represent the Porta Decumana of the ancient Mancunium, with a tablet bearing the names of the Emperor Domitian and of Agricola. The names of Roman legions and cohorts which garrisoned Mancunium are inscribed on the wall. Fine beech trees overhang this representation of historical antiquity. The interior contains faithful imitations of many old buildings that formerly existed in the town and suburbs; characteristic examples of domestic architecture in the Tudor period, in the seventeenth century, and in the early part of the Georgian era. Our sketches are those of Market Sted lane, with its timber framed houses, one of which—"The Palace"—was the lodging of the Young Pretender in 1745; the Cheetham College, which still remains; Hulme Hall, as the model is viewed from the gardens; and Ancoats Hall, with the tower of the old church, as seen together from the entrance by the Roman arch, of which also we give an illustration. The Prince of Wales during his sojourn was the guest of Lord Egerton, of Tatton Park. Fifteen miles south of Manchester, in Cheshire, is the quiet little town of Knutsford, to which there is a pleasant walk, from Altrincham, by the beautiful "mere" or small lake of Rostherne, and through Tatton Park. This rural part of the country presents an agreeable aspect of soft verdure with clear streams, unlike anything on the Lancashire side of Manchester. There are several noble parks, those of Dunham Massey, Tatton, and Tabley, adorned with clusters and avenues of fine trees, and inhabited by herds of deer. Tatton Park is the largest, being ten miles in circumference, and contains one or two meres, the grassy margins of which are refreshing to the eye. The mansion is a handsome building of white stone, with a Grecian portico, erected from Wyatt's design by Mr. Wilbraham Egerton. Its next owner, his son, was raised to the peerage in 1859, having been M.P. for a division of the county twenty-six years; he was also Lord Lieutenant of Cheshire. His lordship died in 1883, and was succeeded by his son, the Right Hon. Wilbraham Egerton, the second Lord Egerton of Tatton, who was born in 1832, and who likewise had sat in the House of Commons, for North Cheshire and Mid Cheshire, from 1858 until his accession to the barony; he is married to a daughter of the second Earl Amherst, but has no son; and his brother, the Hon. Alan de Tatton, is heir presumptive to the title. Tatton originally belonged to a family of that name, from whom it passed by marriages to the Masseys, the Stanleys, the Breretons, and to Sir Thomas Egerton, Lord Chancellor in the reign of James I., ancestor of the Earls and Dukes of Bridgewater, the Earls of Ellesmere, and the Egertons of Tatton.



THE MANCHESTER ROYAL JUBILEE EXHIBITION—THE CENTRAL DOME.

From the *London Graphic* we take some illustrations of Tatton mansion, where the Prince and Princess of Wales sojourned during their stay in the vicinity of Manchester. The *Graphic* says: Tatton Park, the seat of Lord Egerton of Tatton, where the Prince of Wales has just been a guest, is situated about three miles from Knutsford and six from Altrincham, in the County of Cheshire. Although the surrounding country cannot be said to be particularly picturesque, yet the park, of some four thousand acres, is well diversified with hill and dale, and planted with fine groups of trees, some of which are evidently of considerable antiquity. There are, moreover, two large lakes and several ponds, which add greatly to its attractiveness.

The mansion is situated upon an eminence, from which the ground declines to the south. This decline was formerly covered by one of those monotonous sloping lawns so beloved of "Capability" Brown and other English landscape gardeners of the last century, but has just been cut into terraces and gardens by the present Lord Egerton. At the foot of this decline is a thick grove of yews, cypresses, and other evergreen trees, whose dark foliage forms a pleasing contrast to the white balustrades, urns, and fountains of the terraces. Beyond this grove most delightful gardens spread away to the banks of a charming lake with islands, rustic bridges, and a little temple erected in imitation of the Choragic monument at Athens. The late Sir John Paxton greatly improved this portion of the estate, and his genius for this kind of landscape gardening seems to have had a good opportunity of displaying itself here. There is a larger lake further away from the house toward the southern end of the park.

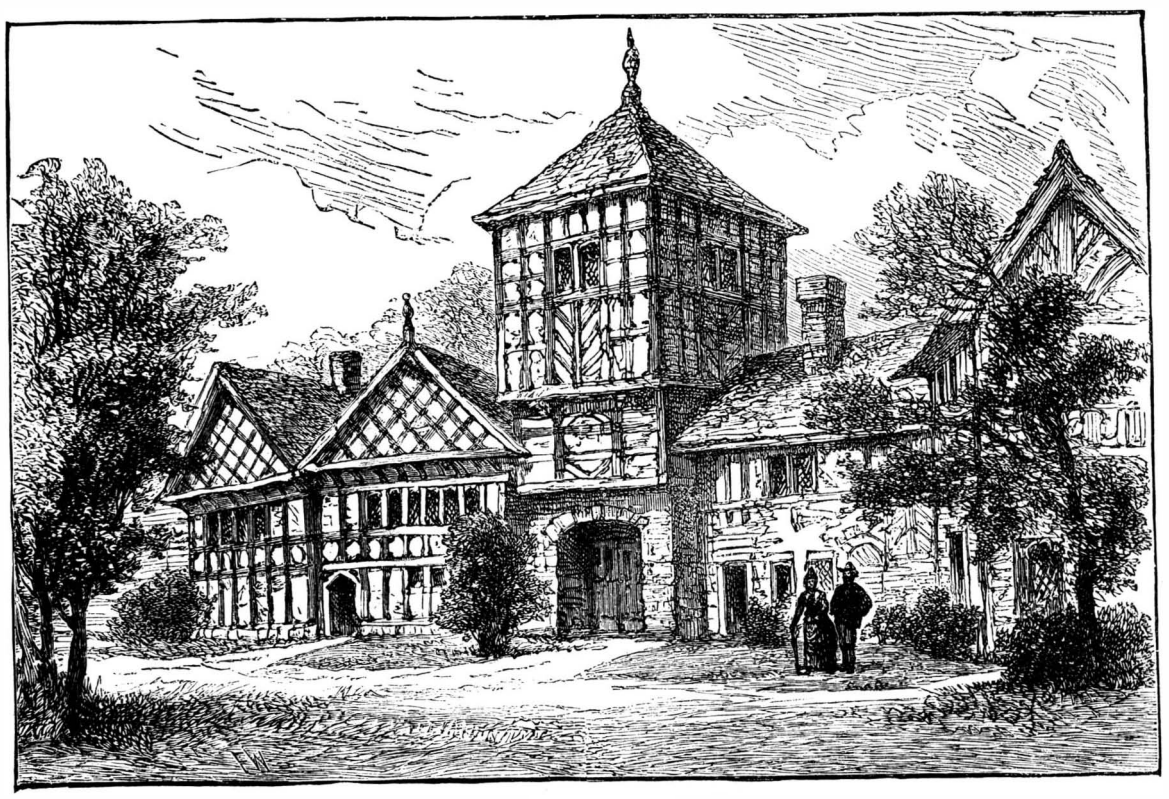
The mansion itself is for the most part—at least, externally—an erection of the elder Wyatt's, who built or rebuilt so many noblemen's houses during the reign of George III. It is of stone, and in the cold and formal, though dignified, classical style in vogue during the latter half of the last century. The south front has a Corinthian portico and plainly treated wings, forming its main features. A lower kind of wing, adorned with a double colonnade, stretches away to the west, and conceals externally portions of an earlier house dating from the time of Charles II. The north front of the house, also by Wyatt, must until recently have presented a somewhat dreary appearance, as it is unadorned with either portico or pilasters. It has, however, been greatly improved of late by the present Lord Egerton, who has added a forecourt, approached by large ornamental iron gates in the center, opposite to the chief entrance of the house, and two pedimented gateways at right angles to it, that to the left leading into the garden, and that to the right to the usual entrance of the house, the offices, etc. Beyond this gateway is seen the pretty apse and *flêche* of the new chapel, another of the additions by Lord Egerton. Entering the house through the principal doorway, one is admitted into a spacious hall subdivided into three parts by columns. This is really strikingly treated, and is the best work executed by Wyatt at Tatton. There appears to be distinct evidence that it was from Wyatt's designs, or one would feel inclined to doubt the matter. The inner hall, with the principal staircase, is also handsome, but the little side staircase, recently brought from the decayed old mansion at Hough's End, and re-erected here by Lord Egerton, is far more attractive to the artist. It is called Queen Elizabeth's staircase, because, when the old mansion at Hough's End was first erected, Queen Elizabeth honored it with a visit in recognition of some services which its proprietor had afforded in the way of collecting arms and supplies to resist the Spanish Armada.

Wyatt seems to have made such very extensive alterations at Tatton Park that nothing is now visible of the old mansion of Charles II.'s date except the dining room. This is, however, a good example of its style, with excellently carved panels, wreaths, and arabesques somewhat French in character. Of the more modern apartments, the library, which has been al

most reconstructed by the present Lord Egerton, is the most elegant. The chapel, which is at present unfinished internally, will be very handsome.

The whole house is lit by electric light. A group of buildings, situated near the western wing, and consisting of conservatories, orchid house, aviary, and a large fernery, deserves to be noticed. The fernery is said to be the largest attached to any private house in the country, and is most beautifully laid out with paths, ornamental water works, rock work, and planted with superb examples of ferns of every description, with here and there a palm tree.

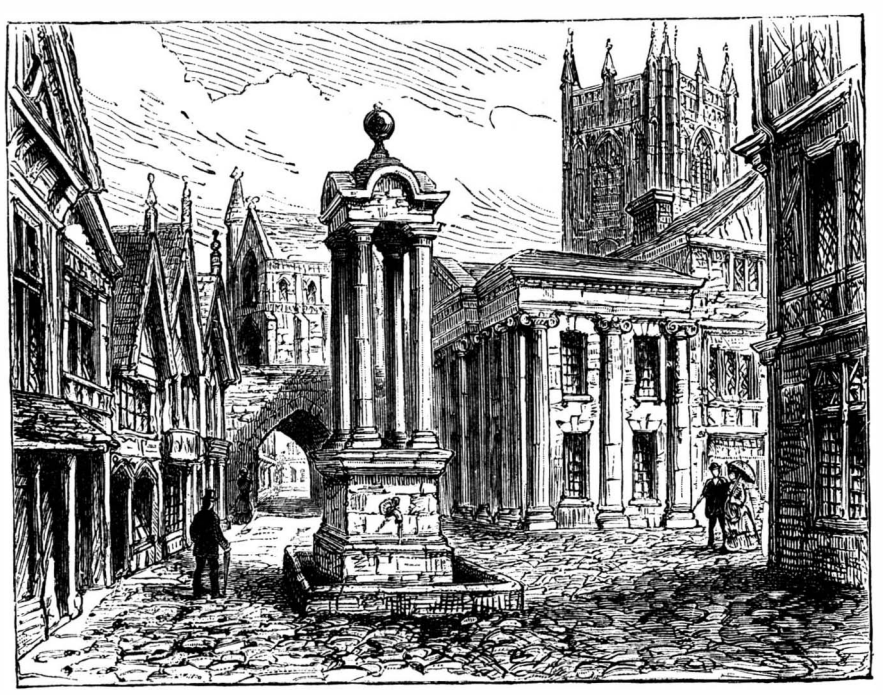
About half a mile from the present house, situated in the park, are the remains of old Tatton Hall. It appears to have been a fine old Gothic mansion of red brick, but has been very much curtailed as to its dimensions, and altered to convert it into three separate dwelling houses, so that, externally, there is little to give one any idea of its former magnificence. That it must, however, have been a grand old mansion is proved by the fact that in the loft over one of the houses are to be seen the remains of an early perpendicular roof of singular beauty and unusual span, which must evidently have formed a portion of the great hall of the house, and, from its remarkable elaboration and great size, suggests the idea of a very noble apartment. Unfortunately, a modern floor cuts it off some four feet below the wall plate, and, in order to convert the lower portions of this hall into dwelling rooms, every vestige except this roof is concealed from view. The roof would seem to date from about the time of Henry VI., and is certainly one of the most elaborate examples of domestic architecture of that period in existence. The old mansion is known to have been in use as late as the time of Elizabeth, and in all probability was so down to the erection of the present mansion in the time of Charles II.



HULME HALL.

ROMAN ARCH.

ANCOATS HALL, AND CHURCH TOWER.



MARKET-STED LANE.

SPECIMENS OF "OLD MANCHESTER AND SALFORD," FROM THE ARCHITECTURAL MODELS AT THE MANCHESTER EXHIBITION.

Light violet with black trimmings is the new color of Mr. G. W. Childs' cottage at Long Branch.

Plumbing and Drainage.

The Common Council of Providence, R. I., has passed a bill regulating plumbing and drainage, as follows:

Section 1. The inspector of buildings shall inspect the drainage within the outside walls and the plumbing of all buildings hereafter erected in the city of Providence, except as herein otherwise provided.

Sec. 2. The Board of Public Works shall transmit to the inspector of buildings the names of all persons licensed to carry on the business of plumbing or drain laying, together with the location of their respective places of business, and notice of any change in the place of business of a licensed plumber or drain layer shall be immediately given to said inspector by said Board of Public Works.

Sec. 3. When any building is to be connected with a public sewer, the drain from the sewer to the point where it enters the cellar or passes above ground shall be inspected by the inspector appointed by the Board of Public Works.

Sec. 4. No work shall be done upon the drainage or plumbing of any building hereafter erected in the city of Providence, until plans fully showing the entire drainage and plumbing of the building shall be first filed in the office of the inspector of buildings, and be approved in writing by said inspector.

Sec. 5. Soil and waste pipes and their branches shall be of iron or lead. Wooden spouts or sheet metal pipes shall not be used for carrying sewage. All soil pipes and all waste pipes not connected with soil pipes shall be extended full bore above the roof without return bend, to such a height as the inspector of buildings may designate. When lead pipe is used for waste pipe, it shall not be lighter than the following weights per lineal foot, viz.: One and one-quarter inches, two and one-quarter pounds; one and one-half inches, two and one-half pounds; two inches, four pounds; three inches, five pounds; and four inches, eight pounds per lineal foot.

Sec. 6. All drain pipes when within a building and for five feet outside the foundation wall thereof shall be of iron, and connection shall be made with the sewer through drain pipes of iron, cement, or earthenware. Iron pipes shall be sound, and those above ground of a uniform thickness of not less than one-eighth of an inch for a diameter of four inches or less, of five thirty-seconds of an inch for a diameter of five or six inches, and with a proportional increase of thickness for greater diameters. Iron pipes under ground shall be of not less than the following weight per lineal foot, viz.: Two inches, five and one half pounds; three inches, nine and one-half pounds; four inches, thirteen pounds; five inches, seventeen pounds; six inches, twenty pounds, with a proportional increase of weight for greater diameters.

Sec. 7. Iron pipes, before being put in place, shall be coated inside and out with coal tar pitch, applied hot, or with paint, or with some equivalent substance. Joints shall be run with molten lead and thoroughly calked and made tight. Connections of lead pipes shall be made with brass ferrules, properly soldered and calked to the iron. In all iron and earthenware pipes, changes in direction shall be made with curved pipes, and connections with horizontal pipes shall be made with Y branches.

Sec. 8. Earthenware pipes shall be of the best glazed pipe, and all joints shall be made with Portland or hydraulic cement and sand mixed in equal quantities.

Sec. 9. Every drain shall be trapped with a running trap of the same size and material as the drain, and, if within a building, such trap shall be provided with a hand hole for convenience in cleaning. No connection shall be made with the drain on the street side of said trap. There shall be a fresh air inlet pipe entering the drain on the house side of and close to said trap, of a diameter of not less than three inches, leading to the outer air, and opening at any convenient place away from windows.

Sec. 10. The inclination of water closet, kitchen, and all other drains not over six inches in diameter, liable

to receive solid substances, shall be not less than one-half an inch in two feet, and of cellar or other drains to receive water only, one-quarter of an inch in two feet.

SEC. 11. The inside of every drain pipe, after it is laid, shall be left smooth and perfectly clean throughout its entire length, and to insure the same a scraper of suitable material, of the shape of the pipe and slightly less in diameter, shall be drawn through each length of pipe after the same has been laid.

SEC. 12. The ends of all pipes not to be immediately connected with shall be securely stopped by brick and cement, or other water-tight and imperishable materials.

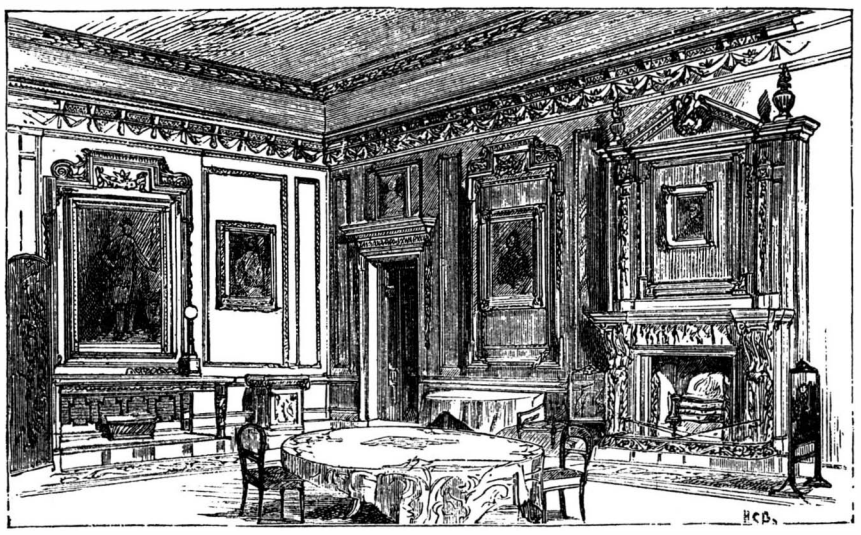
SEC. 13. All pipes that must be left open to drain cellars, areas, yards, or gardens shall be connected with suitable catch basins, the bottoms of which shall not be less than two and one-half feet below the bottom of the outlet pipe, the size, form, and construction of which are to be prescribed by the officer named in Section 3. When meat packing houses, slaughter houses, lard rendering establishments, hotels, or eating houses are connected with the sewers, the dimensions of the catch basins shall be required to be of a size according to the circumstances of the case. When the end of the drain pipe is connected with a temporary wooden catch basin for draining foundations during the erection of buildings, the drain layer shall be held responsible for dirt or sand getting into the drain or sewer from such temporary catch basin.

SEC. 14. All exhausts from steam engines, and all blow offs from steam boilers, shall be first connected with a catch basin of such dimensions as the officer mentioned in Section 3 may prescribe, and in no case shall they be allowed to connect directly with the private or public sewers, without special permission from the board of public works.

SEC. 15. Sewer, soil pipe, or waste pipe ventilators within a building shall not be constructed of brick, sheet metal, or earthern ware.

SEC. 16. Rain water leaders connecting with drain or soil pipes, and opening near windows, shall be trapped, and when placed inside of buildings shall be of iron, with joints calked with molten lead.

SEC. 17. Every wash basin, bath tub, sink, urinal, water closet, or other fixture shall be separately trapped as close to the fixture as possible. Water-sealing traps of any pattern may be used when separate air pipe connections from the top of the same are provided; where separate air pipe connections are not provided, traps which will not unseal shall be used, such traps to be first approved by the inspector of buildings.



THE DINING ROOM, TATTON.

SEC. 18. When separate air pipe connections are provided for back airing traps, they shall be of a size not less than the waste pipe; but air pipes for water closet traps shall be of not less than two inch bore for thirty feet or less, and of not less than three inch bore for more than thirty feet. Air pipes shall be of not less than two inch bore where they pass through the roof. Two or more air pipes may be connected together, or air pipes may be connected with a soil pipe; but in every case of connection with a soil pipe such connection shall be above the upper fixture of the building.

SEC. 19. Drip or overflow pipes from the safes under water closets and other fixtures, or from tanks or cisterns, shall be run to some place in open sight, and in no case shall any such pipe be connected directly with a drain, waste pipe, or soil pipe.

SEC. 20. No waste pipe from any refrigerator, or other receptacle in which provisions are stored, shall discharge into the soil of any cellar bottom, or into the soil beneath any floor of any building; all connections of such waste pipes, with a drain, soil pipes, or other waste pipes, shall be provided with traps suitably ventilated, and in every case where such connections are made there shall be an open tray between the trap and the refrigerator.

QUEEN ELIZABETH'S STAIRCASE AT TATTON.

SEC. 21. Drains, pipes, and other fixtures shall not be covered or concealed from view until after the work has been examined by the authorized inspector, who shall be notified by the drain layer or plumber when the work is sufficiently advanced for inspection.

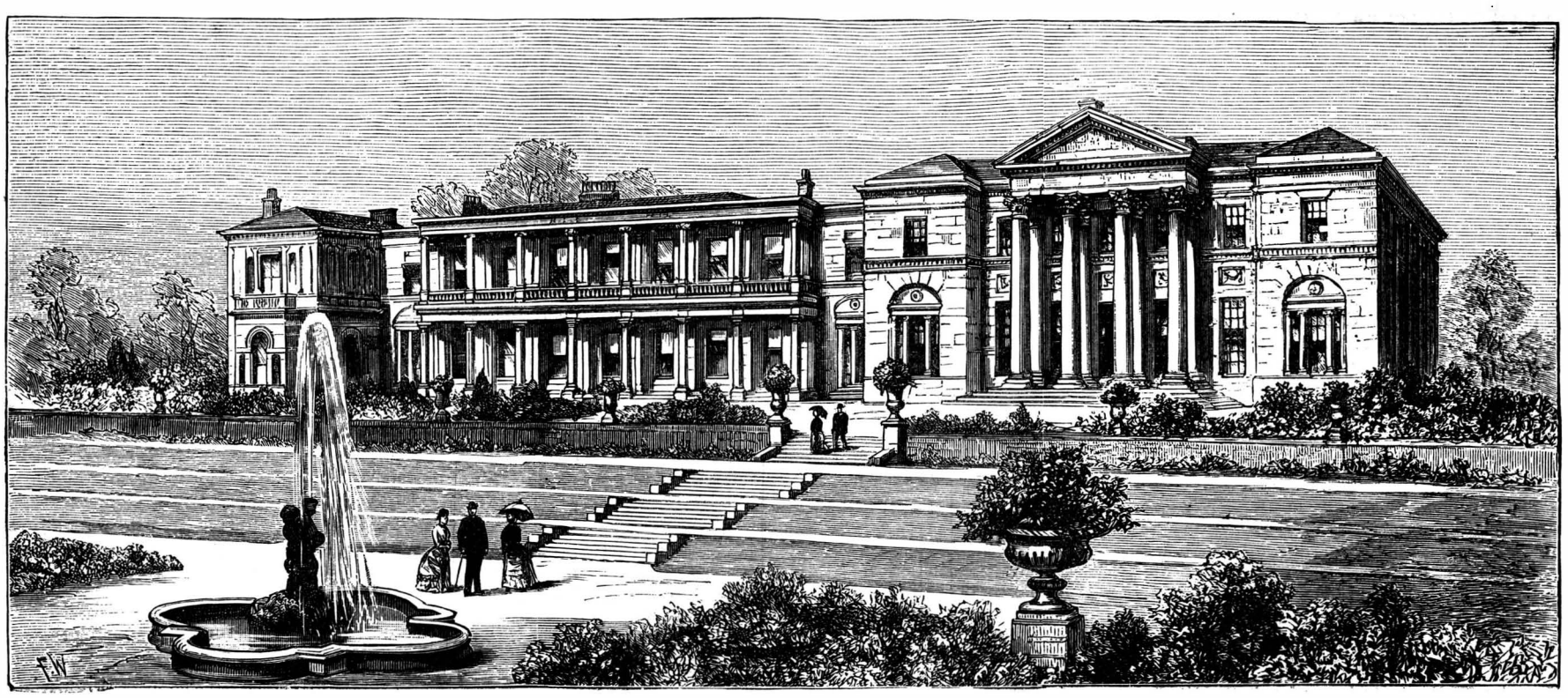
SEC. 22. Plumbing work shall not be used unless the same has first been tested, at the expense of the plumber, by the authorized inspector, with the peppermint, ether, or smoke test, and by him found satisfactory.

SEC. 23. No privy vault or cesspool shall be built upon any premises situated upon any street where there is a public sewer.

SEC. 24. Every cesspool shall be built of stone or brick, and provided with an iron cover which can be readily removed, so that the contents may be inspected.

SEC. 25. No privy vault shall be connected with a public sewer. Vaults of privies shall be built of brick or stone laid in cement, and shall be cemented so as to be water-tight, and shall be so constructed that no surface water can find access to them. Every such vault shall have convenient approaches for opening and cleaning, and such approaches shall be properly covered. No privy vault shall be built within ten feet of a dwelling house.

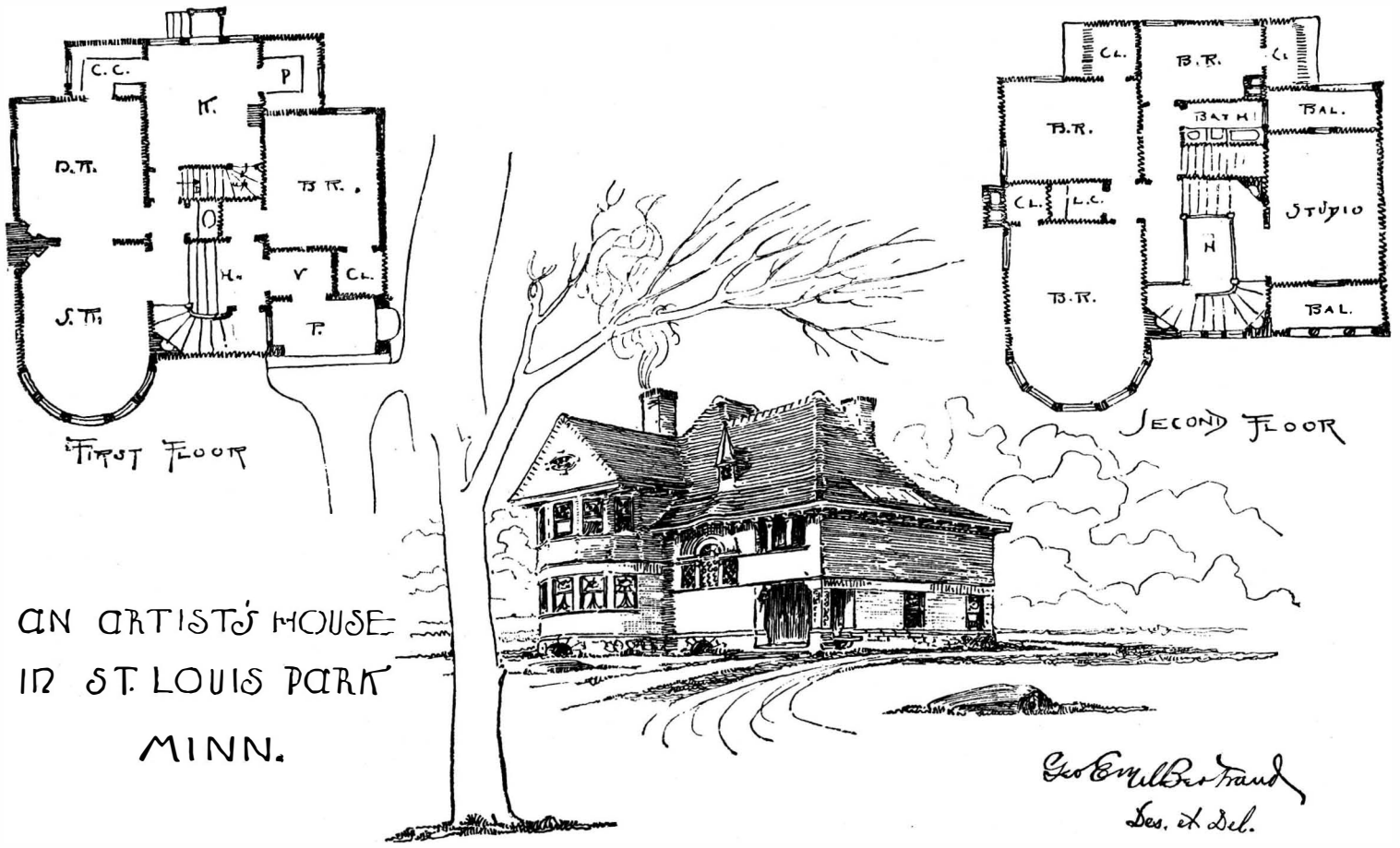
SEC. 26. The authorized inspector shall promptly



TATTON, CHESHIRE.

condemn and order the removal of any defective materials, or any work done other than in accordance with the provisions contained in the foregoing sections, and the contractor putting in such defective materials or shall have done such work, or the owner of the building, shall, upon receipt of such order, remove such defective materials and any work so ordered.

Sec. 27. Every person who violates any of the regulations contained in this ordinance shall be fined not more than $50.



AN ARTIST'S HOUSE.

Our sketch, which is in the nature of a suggestion, shows an artist's house in St. Louis Park, Minneapolis, Geo. E. Bertrand, architect, of that city. Such a house may built for about $5,500. We are indebted for our sketch to the *N. W. Architect.*

VARYING MITERS.

In the ordinary routine of work pertaining to each of the different woodworking crafts, there are certain forms of joints, cuts, or important details of construction and decoration which are well known and occur almost daily, and other forms of the same which are varying. As those which are most in use are more easily worked and familiar to the operator, so it must of necessity follow that unusual forms will call forth more labor of brain and manual skill to effect their successful completion. This is particularly applicable in the case of the miter joint, which every woodworker is in daily contact with. It is being continually employed in different parts of joinery, in all places where a continuous grain or moulding is required, but the most difficult of all its employments to execute is the mitering of mouldings, both flush and raised, in framing. Here the intersection of the profile, especially those with many members, necessitates great care in marking the miter box and sawing it, marking and sawing the moulding, and in suring its perfect intersection before driving the pieces to their permanent place in the panel. Concerning a simple square miter of the angle of 45°, as it is too well known to require special comment here, we will avoid its consideration, except to recommend readers to take careful heed of three important points, essential to perfect mitering :

First.—To mark the miter box by a bevel set to the diagonal of a square about 4 in. wide, laid down with a knife on a clean board

Second.—To mark the box also with the knife and saw, carefully, keeping the saw kerf to one side of the knife mark.

Third.—Saw moulding exactly to the mark made on the panel, and out of one continuous piece for each panel, round the sides, and intersect perfectly before driving down.

Care and exactness will help to perfection and save trimming off afterward.

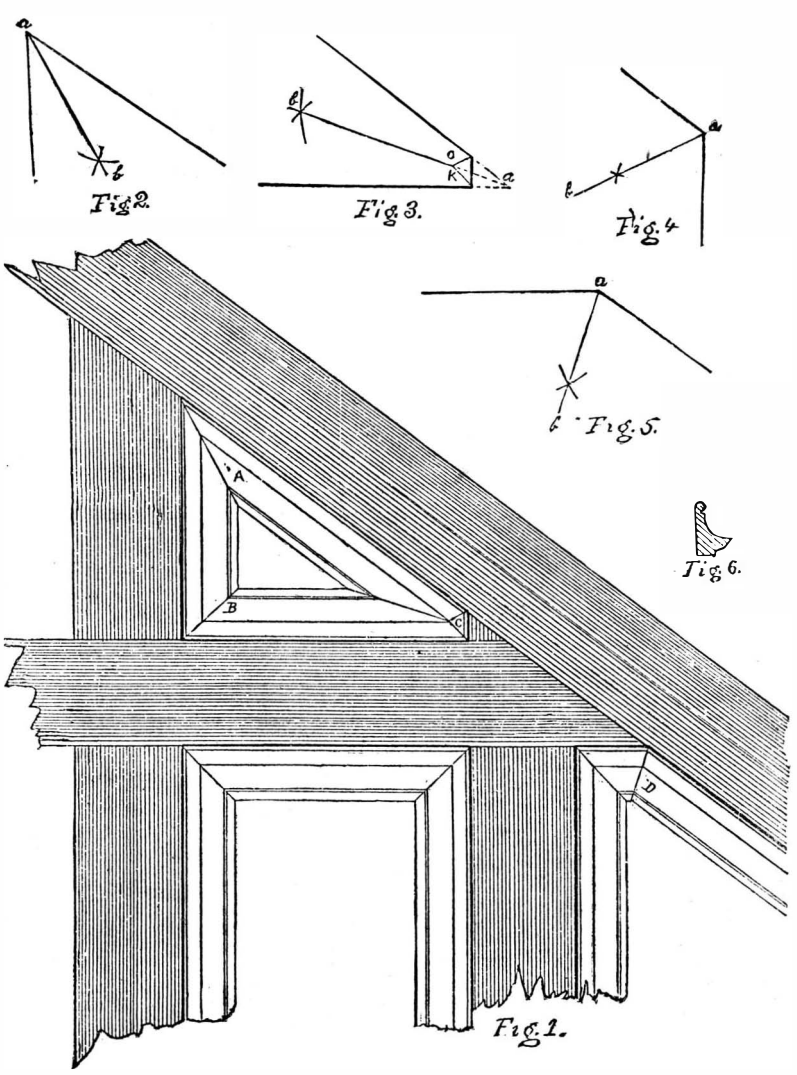
Fig. 1 represents a piece of ash paneling, designed to stand under a stair string. It embraces four miters of different angles, one of which involves in itself three separate intersections. By referring to Fig. 1, it will be seen that the angle A is less than the angle of 45° at B, and being thus acute or less, the moulding will form a longer intersection or miter than B. Similarly, the angle at D is greater than B, consequently the miter is shorter, which is plainly seen in the sketch.

To find the miter at A, strike out the angle inside the framing at A, like Fig. 2. Take any two points equidistant from *a*, Fig. 2, the apex of the angle. With the compasses, strike the crossed lines shown and draw a line joining their crossing with the apex of the angle. This line will be the exact miter, and if a bevel be set to it and marked on a good box, the cut can be got direct from the saw.

Fig. 3 shows the compound miter at C. It is rendered compound by the insertion of a small piece necessary to continue up the mullion below the rail shown, and the miters are found thus. The angle at the corner of the rail and raked piece, being even less than at *a b*, will be longer, and this line is gained by the method used above. B being a right angle, the miter for it is cut in an ordinary 45° box, but *o* must be cut to the line *a b*, shown at Fig. 4, which is the miter for the upper corner at C. These two cuts will give the small piece, its length being obtained on the small piece of mullion.

It will be noticed that the point of intersection of the three combined miters is at the apex or junction of the two main curves of the moulding represented at Fig. 6. The great length of the principal miter in this corner rendering it unhandy for a box, it is recommended that the moulding be marked on the bottom side and the miter cut square to the bottom to insure a close joint above. This method will always be found suitable for very long cuts. The fifth miter, shown in Fig. 1 at D, is obtained by the same process as before, and, being short, can be marked on (Fig. 5) and cut in the miter box.

Finally, experience has taught that the only way to obtain a perfect miter is from the saw alone, as it is invariably the case, no matter how carefully the block plane is used, the joint can never be evenly surfaced or satisfaction gained.—*By Owen B. Maginnis, in the Journal of Progress, Philadelphia.*



VARYING MITERS.

Wire Fences.

When barbed wire first came forward as a competitor with four and six inch strips as a material out of which to construct fences, it was feared that the demand for this particular kind and grade of lumber would so far decline as to leave it somewhat of a drug in the market. This was some years ago, and since that time perhaps even more than was apprehended respecting the increasing use of wire has come to be true. It is impossible to even estimate the miles upon miles of this almost invisible but efficacious material that has been bought and used in fencing Western lands. It has met with disfavor in many quarters, but despite all that has steadily made its way, the supreme recommendation of cheapness proving invincible. It is the old story of the cheaper driving out the dearer material, that is bound to be told of every case in which they come in conflict —*Timberman.*

A Blacksmith's Epitaph.

Carisbrooke Church, said to be founded 1064, has been partially restored, says the *British Architect.* It is beautifully situated, surrounded by a fine old churchyard, adjoining the "Priory Farm House," the site of the priory attached to the old church. There are a few monuments and a pulpit, dated 1658. The tower contains eight bells. There is some fine, bold carving on the pinnacles, and the view from the tower is magnificent. There are some curious stones in the churchyard. A slab over the grave of a farrier has the following lines :

"My sledge and hammer lie reclined.
My bellows, too, have lost their wind ;
My fire's extinct, my forge decay'd,
My vice all in the dust is laid ;
My coal is spent, my iron gone,
My last nail's driven, my work is done."

M. Ruprich-Robert.

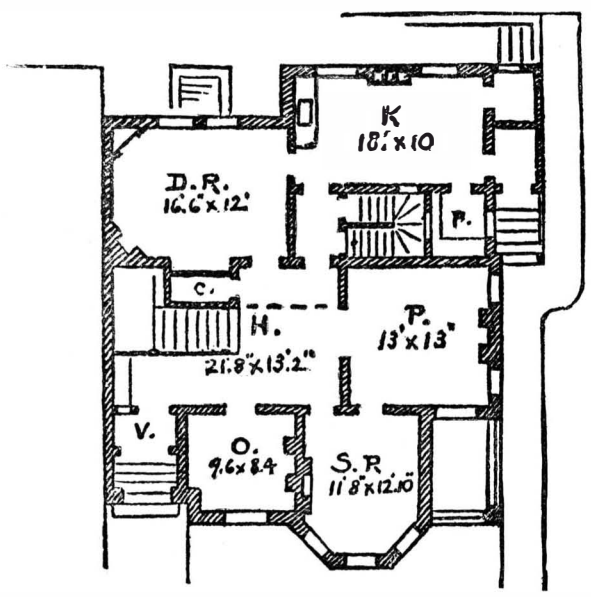
The death is announced of M. Ruprich-Robert, who held a distinguished place in the ranks of French architects. In *La Construction Moderne*, M. Maurice du Seigneur gives the following account of his life and works:

French art has sustained a great and veritable loss, for he who has just died was not only a master in the full sense of the word, but also one of those rare spirits who seem to be the guardians of the primitive forms of our national architecture, a scholar who was conscientious and precise, fascinated with the study of the past and careful of the independence of artists in the future. Ruprich-Robert belonged to that valiant school who defended mediævalism against the stupid attacks of routine and conventionalism. Like Viollet-le-Duc, he was one of the most vigilant and sagacious of the restorers of the monuments which were termed Gothic by the successors of the famous Petit-Raidel, the imaginative architect, who proposed to transform the pillars of churches of the fourteenth and fifteenth centuries into Doric columns resembling those of Pæstum. It must be said, however, that if Ruprich-Robert preferred mediæval art, it would be unjust to fail in recognizing his respect for the works of antiquity and for the works of a later time which were inspired by them. With so vast and honest an intelligence, he was perfectly able to comprehend the gracious adaptations of the Renaissance, as seen in the pomp of the seventeenth century and the caprice of the eighteenth. His protests and disdain were reserved for the immaturity and want of equilibrium of the present. His apprehensions, which were expressed with energy, were excited by the menacing apparition of that official art which is sure to lead to the banalities of academicism of the official sort.

In appearance Ruprich-Robert resembled one of those respectable and austere figures of apostles that are seen under canopies in the doorways of churches; and as they seem to smile at the young birds who build amid the sculpture of the tympanum, so he regarded with affection the students who were to be the architects of the future. His opposition on the subject of official diplomas must not be misunderstood. He was the first to recognize how much had to be gone through before gaining one of them, and also the talent and capacity of the competitors, but he feared that the diploma would lead to the supremacy of mediocrity in art, of which he was always an opponent.

Victor Marie Charles Ruprich-Robert was born in Paris, on Feb. 18, 1820. At sixteen he entered the *atelier* of Constant Dufeux, and, during the five years he remained in the Ecole des Beaux Arts, was recognized as studious and capable. He became attached to the Commission of Historic Monuments in 1844, and exhibited for the first time in the Salon, the subject of his drawings being the Templars' Church at St. Gaudens, which dates from the twelfth century. They were for the commission, and were followed by others which were also intended to be deposited among the archives. In the Salon of 1847 he exhibited drawings of St. Nicholas, Caen; in 1849, the church of St. Luke, Calvados, and the doorway of the church of Seez. He sent also a design for a sepulchral monument. A second class medal was awarded to him at the International Exhibition of 1855 for the drawings already mentioned, which were re exhibited with others of St. Sauveur, Dinan, and a project for the restoration of the Abbaye aux Dames, Caen. Afterward he was appointed professor in the special school of design and mathematics in the Rue de l'Ecole de Medicine. There he delivered a remarkable course on the history and composition of ornament, in which he developed the principles of his well known book, "La Flore Ornamentale."

In 1878 he was appointed inspector general of historic monuments. The work which has made his name most prominent is the "Flore Ornamentale," a folio volume with 152 plates. He also wrote about the influence of public opinion on the conservation of ancient monuments, and about the "Arenes de Lutece." The most important of his books is known as "L'Architecture Normande aux XIe et XIIe Siecles en Normandie et en Angleterre." It is the result of thirty years of study and observation, and exhibits in a new light the success of the art on both sides of the Channel. It contains 170 engraved plates, historic and descriptive letterpress, illustrated by about 200 designs. The last months of the life

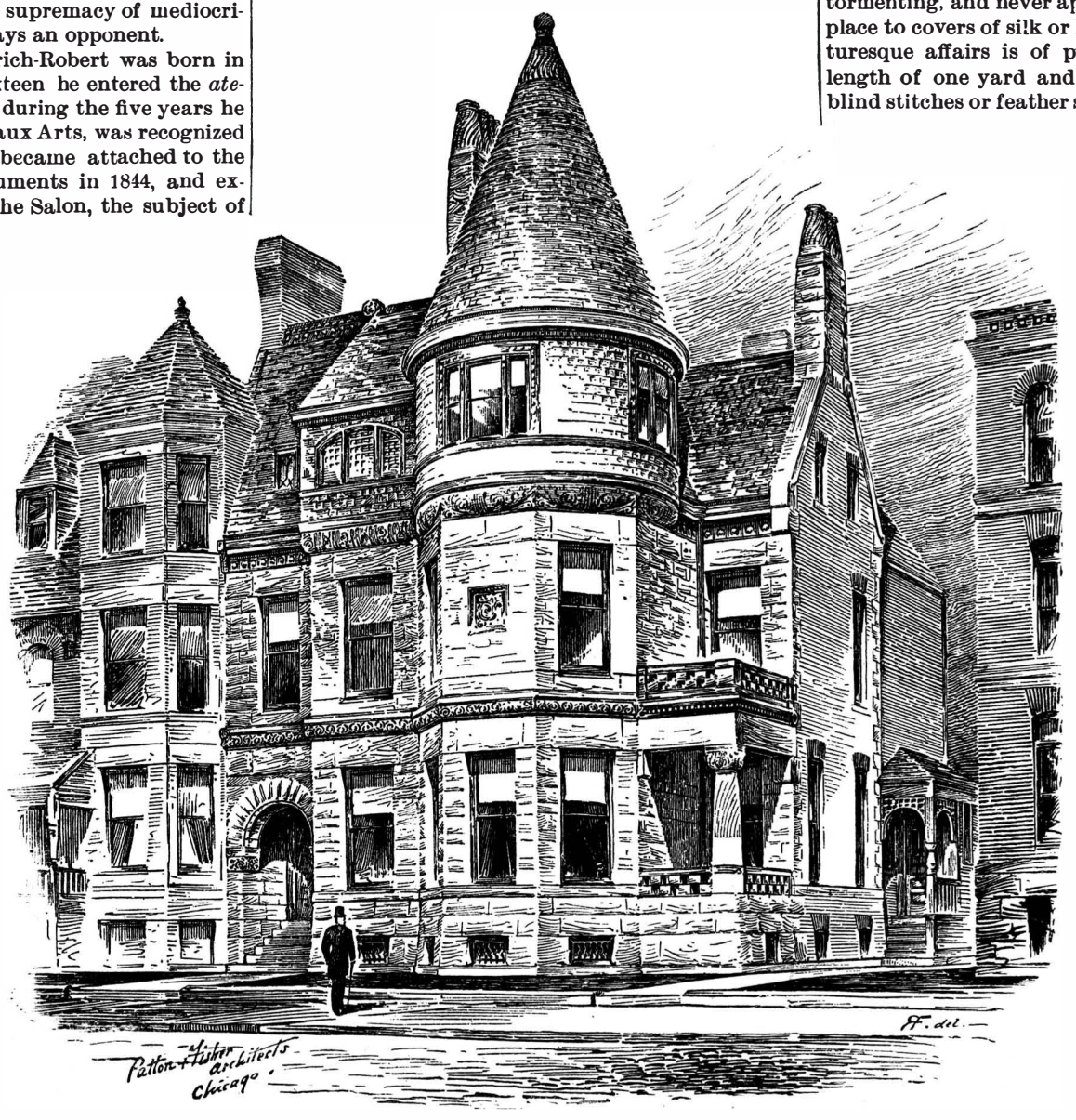


of M. Ruprich-Robert were employed on the completion of this work, which is a veritable historic monument.

It was in Cannes on May 7, at half-past six in the morning, that he expired. He left three sons, one of whom, M. Gabriel Ruprich-Robert, was the faithful and intelligent auxiliary of his father, and who will, no doubt, as an architect uphold the credit of his name. His father's work and life may be summed up in two words—"Science and Conscience."

A CITY RESIDENCE, CHICAGO.

We give, from the *Building Budget*, the sketch of a city residence for Mr. A. B. Lawton, Superior Street, ne[illegible] pleasing st[illegible] Messrs.



A CITY RESIDENCE CHICAGO.

Patton & Fisher. The house is of stone, the cornice and upper part of the tower of copper. The size 38×48 ft., and the cost sixteen thousand dollars.

PETRIFIED lobster, clams, turtles, and the like are found in great abundance in the Santa Catalina Mountains in Arizona, at a height of neariy 10,000 feet above the level of the sea.

Home Interiors.

In furnishing, one must consider, first, the uses to which articles will be put; second, the amount to be expended; and, above all, the real comfort to be secured from possession of, possibly, "high art furnishing." Do not sacrifice comfort to artistic desires, for true artistic designs are comfortable, and proper outlines are the groundwork; while details of beauty are made subservient to practical uses. High art nonsense is fast passing out of sight as art is developed in so many channels of practical usefulness.

Fancy gilt chairs with spindle legs are put in dark corners, allowed at times to hold one's fan, a stuffed dog, owl, or alligator, but the true art chairs have solid frames, careful filling and covering. They are beautiful from the fact that they are supremely comfortable. Sofa, divan, and floor cushions are large, comfortable, and softly rounded, full of carefully prepared material which produces a perfectly rounded outline and graceful form.

Cheap art furniture has had its day. Ungainly chairs into which one must climb, wretched sofas so full of art features that one almost despaired of life if obliged to use them continually—these have almost disappeared, for poor people have found out that the wretched affairs are only a delusion, and that the time spent in keeping them together would earn a better outfit. Home interiors gain beauty from the grouping of needful articles, the pleasant articles which make the inmates feel that home is the best place in the world, and that here there is room for every fancy. The book lover has a table that will hold his student lamp and all his needful books, the artist member has a corner with good light for the easel, while the piano has its own cozy chair and adjustable music rack. Baby has her own little rattan rocker, bright with bows of ribbon, and grandmamma looks picturesque in a huge rattan rocker, whose soft cushions are of plush or cretonne, to suit the season.

It is the touch of beauty upon needful articles, not the introduction of art features, which really makes the interior furnishing artistic and lasting in beauty. What shall we offer in place of tidies? some one asks. A proper tidy was made of lace and ribbon. This dainty creation followed the generous covers our great-grandmothers used to protect furniture. To-day we have returned to furniture covers, and the tidy, useless, tormenting, and never appropriate to its use, has given place to covers of silk or linen. One of the most picturesque affairs is of pongee or wash silk. Take a length of one yard and a half, finish the edges with blind stitches or feather stitching, and finish the ends with tiny tassels of silk, which come already to put on. Knot the silk into a loose sailor knot or bow of any kind, and put it on the chair with fancy tidy pins. A square backed lounging chair can have a square cover of linen or silk, cut to fit over the chair back, falling short at the back, long in front; sew the sides strongly and draw over the chair back, covering top only. Embroidery in wash silk will make this addition fanciful as one could wish, and your pretty trifle cannot get away, will wash, and still be beautiful.—*American Art.*

Pa Crusta.

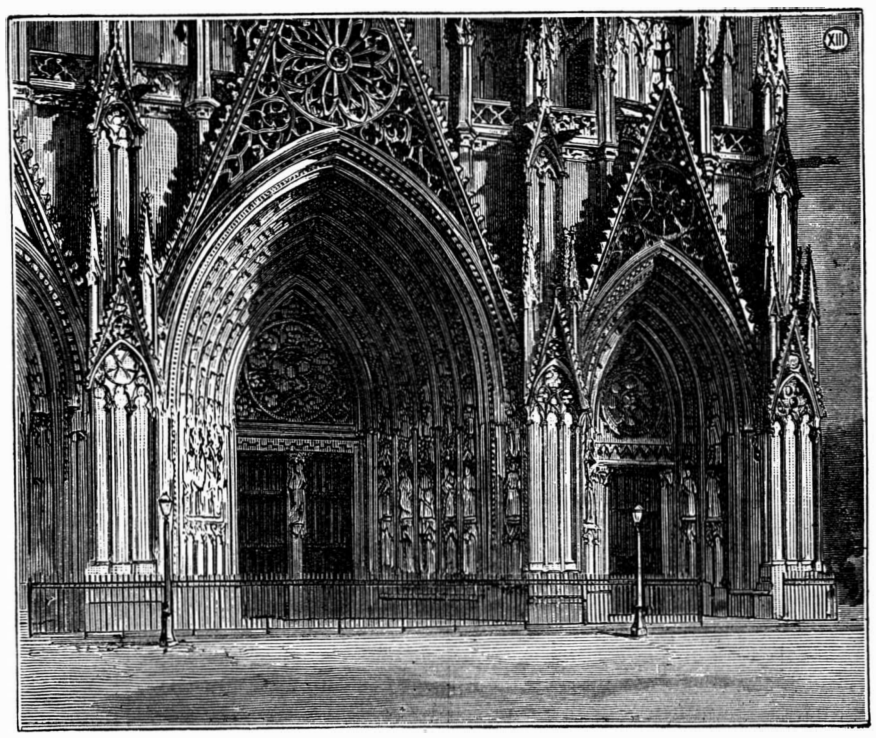
A new style of interior decoration has just been introduced in Minneapolis, the first work of the kind having been put up on the walls of Mr. Legg's jewelry rooms, which opened May 1. The new invention is known as Pa Crusta. It is simply different grades of paper soaked in glue water and formed into various shapes by the hand of the workman as he places it on the wall, where it hardens and is then decorated by the painter. While it is cheaper than lincrusta or stucco, it is far handsomer, and no two walls are ever decorated alike. In the hands of competent men, there seems no limit to the variety and styles and practically none to the beautiful effects to be obtained. It is equally adapted to the elaborate decoration in public places and to the simplest forms of ornamentation required in the houses of those who are able to bear the cost of stucco and the like.—*N. W. Architect.*

GEMS FROM ROUEN.

We give a few illustrations of memorable buildings in Rouen, France, for which we are indebted to *Le Monde Illustre*. First is the ancient pile known as the Hotel Bourgtheroulde. Next a front of the famous cathedral of Notre Dame. This wonderful structure dates from the thirteenth and sixteenth centuries. It is 434 ft. long and 103 ft. broad, with transepts 174 ft. long. The nave is 89 ft. high. The ornamentation of the front is superb. Its three grand portals are flanked by lofty towers. The central tower, which stands at the intersection of the nave and transept, is surmounted by an iron spire 470 ft. high. The interior decorations are elaborate and profuse. There are 130 windows. The church contains many tombs of celebrated worthies, among them that of Richard Cœur de Leon.

Another of our illustrations is that of the portal of the abbey church of St. Ouen, a magnificent structure. This church is regarded as one of the most perfect examples of Gothic architecture in the world. It has a tower 260 ft. high, composed of open arches and tracery, and terminating in a crown of *fleurs de lis*.

The city of Rouen has a splendid library of 120,000 volumes, an academy of science, a museum of oil paintings, etc. The place formerly belonged to the English. It was here the Maid of Orleans was burned, A. D. 1431.



PORTAL OF ST. OUEN ABBEY, ROUEN.

Dry Rot.

Having of late years had experience with the destructive and seemingly increasing, though not yet satisfactorily explained, fungi class known in the building trade as dry rot, I think that a few words anent the subject will not be amiss.

My first practical acquaintance with dry rot and its deteriorating work was at a village church of moderate antiquity. It had a few years previously been thoroughly restored, and there were a few small air ventilating grates round the building just above the ground. The part that engaged my special attention was curtained off for the use of the choir, as a vestry, close by the organ, and I was told that the floor which was laid at the restoration had been completely taken up twelve months previous to my visit, entirely rotted by the perniciousness and insatiableness of dry rot, and was relaid with pitch pine, those in power seeming to think that pitch pine was a universal panacea against dry or any other rot. As I saw it (after taking up the linoleum with which the floor was covered), the fungus had eaten through 1¼ in. pitch pine boards in twelve months, and still appeared flourishing in all its luxuriance. The worst places were cut out and replaced with new boards, the linoleum replaced as before, and the reckoning day staved off for a time. Circumstances took me away from the place, and I have not had the opportunity of inquiring after the progress of events since. This I may say, that the church is situated on a high hill, and its surroundings are such one would think unfavorable to dry rot.

My next acquaintance with dry rot was in a building the very reverse of the above—a flour mill in a large town in a valley, with the canal on one side of the building, and a goit or sluice passing under the mill to turn the water wheel. The floor of the basement was, and is, of wood, and below the level of the canal, so that dampness pervades the atmosphere, and ventilation is difficult and expensive—in fact, there was no ventilation to the basement floor, the infected part.

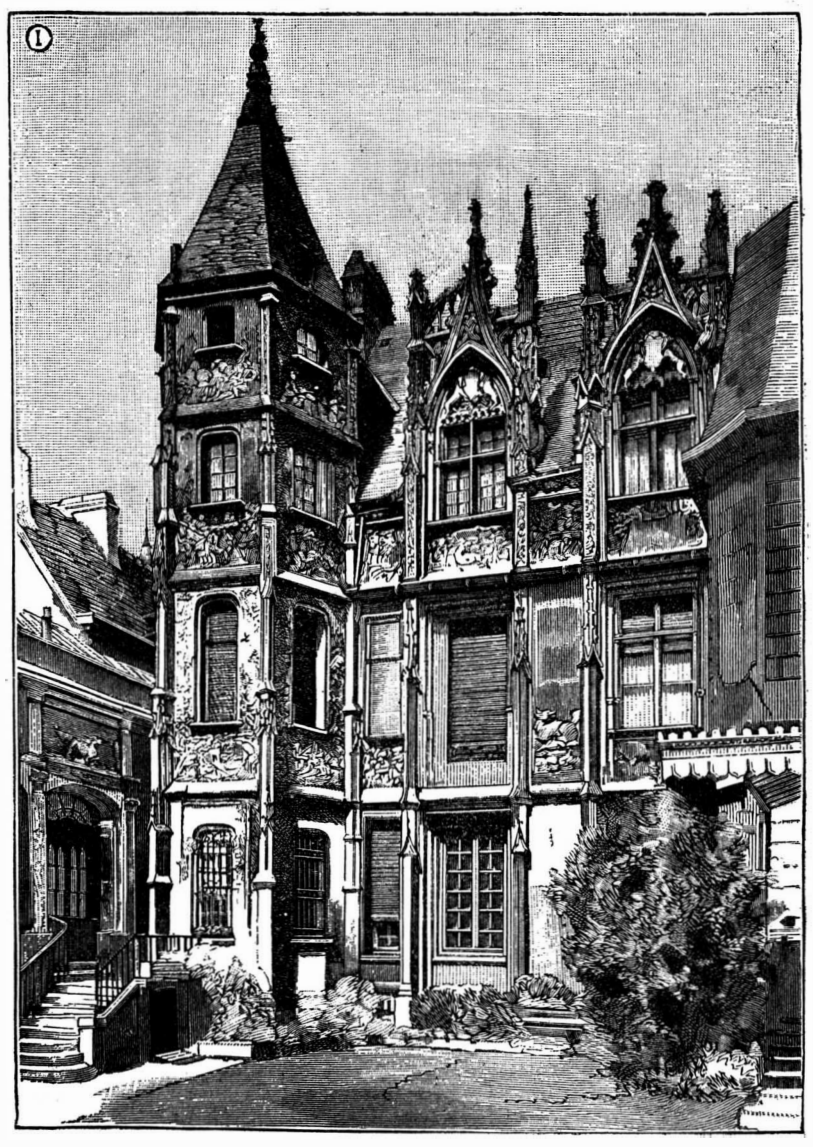
Probably the mistake is in having a wood floor at all, and the most effective remedy, I think, would be to take the whole basement floor up and relay with concrete. As it is, the floor has to have periodical attacks made upon it by the joiner, first in one place and then another. I had the privilege or misfortune to make one of these attacks, taking up a considerable portion and relaying with new timber, having the joists and the under side of the floor boards coated with a good coat of tar. Two years afterward I took up the adjoining part, and so had the opportunity of examining the tarred part, and with satisfaction noted that the dry rot did not seem as yet to have touched it. My next experience was at the post office, built twelve or fourteen years ago. The building itself was designed and built under an architect of professional status and good practice. Here again it was the basement floor. The building itself has a well drained, flagged area all round, the flagged bottom being below the basement floor, and the upper part covered with cast iron grates flush with causeway. Iron ventilating grates led from this area to underneath the floor, the floor being carried on joists on sleeper walls. Here I found dry rot flourishing, and, after taking part of the floor up, found water to the depth of 3 in. or 4 in. Upon tracing this, I found it was fed by a small cistern fixed to supply the kitchen range boiler, the cistern being fed by a ball tap which was out of gear, and had probably been so since the completion of the building. The leakage was of course stopped, the water pumped out, some of the soil taken out to give greater air space underneath the joists, and the worst parts of the floor taken up (which, by the bye, was just where the water had stood; the ground rose slightly from here, and where there was no water the wood did not seem infected) and replaced by new wood, the wood, sleeper walls, and soil being well soaked and washed with copperas or blue vitriol (cupric sulphate) dissolved in boiling water. This was little more than twelve months ago, so I have not yet had the opportunity of taking notes. The next sphere of action was on the opposite side of the road to the post office, in a large warehouse. Here, again, the evil was in the basement floor, which was below the road proper; but a small back yard sloped from the road to the level of the floor, for the convenience of wagons. This inclined yard butted against the warehouse wall with no area, dry drain, or air space intervening. The worst part of the floor was the part adjoining this yard. Indeed, the opposite side of the floor, which adjoined other rooms, was quite sound, the rot seeming to have commenced at the joist ends which butted against the wall bounded by the yard, and to have traveled along them and the under side of the floor boards six or seven feet. The room had a wood dado fixed round it, the part fixed to the wall in question being completely infected and eaten through in several parts; in fact, the space between the dado and the wall was quite choked up with the fungus, it having apparently traveled up the dado and from there to the window bottoms, linings, and even into the window sill, and from thence into the soil of the yard, exhibiting white, minute roots between the joints of the yard sets. One of the windows had a round, white, bulbous protuberance growing outside, something like a mushroom.

This floor had no ventilation, and after taking out all imperfect parts, some of the soil, and the sleeper walls, the ground, walls, etc., were well washed with a solution of blue vitriol, with which also the new wood was impregnated, the joists being carried on brick piers without wall plates, instead of the old sleeper walls with wall plates. An air drain was made between the yard and the wall, covered with iron grates, grated openings being made from this to underneath the floor.

My attention was next directed to the basement floor of another room in the same building. This had an open area adjoining the external walls, but no ventilation of any kind to the floor. The proceedings in this were somewhat similar to the last.

The next attacking point upon this thriving fungus was in the boxing pit of the gymnasium of an athletic club. The attack was not made with the gloves, but by pulling the whole floor up, which was several feet below the road, and had no ventilation. The proceedings here were somewhat similar to the last, except, there being a fireplace, an air draught was led from underneath the floor to feed the fire and to create a draught.

My next acquaintance with the enemy was in a small dwelling house which has only been built two or three years. The house stands by itself on the side of a hill facing a wood, the hill being partially excavated for the building. The kitchen is at the back, and has a cellar underneath. At the front is a small parlor, but no cellarage, the floor of this room resting on sleeper walls, with a moderate depth of space between the floor and the soil, and with a small air grate leading to the front. The sides are parpoint walls (and will be the party walls should houses be erected adjoining), having the soil of the hill butting against them; but on one side there is an open passage leading from front to back, between the hill and the house proper; but the other side had nothing (excepting a fireplace) but the parpoint wall between the soil and the floor, and it was here the mischief commenced—between the fireplace and the kitchen wall. The rot had first attacked the wall plate in this corner, which crumbled away between the finger and thumb; from thence it had traveled to the joists, floor boards, and up the back of the plinth, infecting the whole of the woodwork between the fireplace and the kitchen wall, and from the side wall to about a yard into the room. The other or front side of the fireplace was not touched at all, and here I may



HOTEL BOURGTHEROULDE, ROUEN.

say that the ground outside sloped to below the joists. The fungus in the infected corner appeared to flourish on the soil under the floor; but it had not traveled beyond the area of the infected part of the floor. The soil was full of small, minute white roots wherever the fungus grew. The infected part was taken out, the ground, walls, and timber carefully washed and soaked with a strong solution of blue vitriol, and an air drain constructed outside.

In conclusion, I may say my observations are these: That the material first infected seems to be Baltic deals, either red or white; that after the *fungus germs* have got established, they do not appear particular what sort or class of timber they attack; that they appear very partial to basement floors and damp, ill-ventilated places; that soil which is of an argillaceous character seems to encourage their growth, and a radius of one mile will include all the above cases.—*J. S. G., in Building News.*

Algerian Marbles.

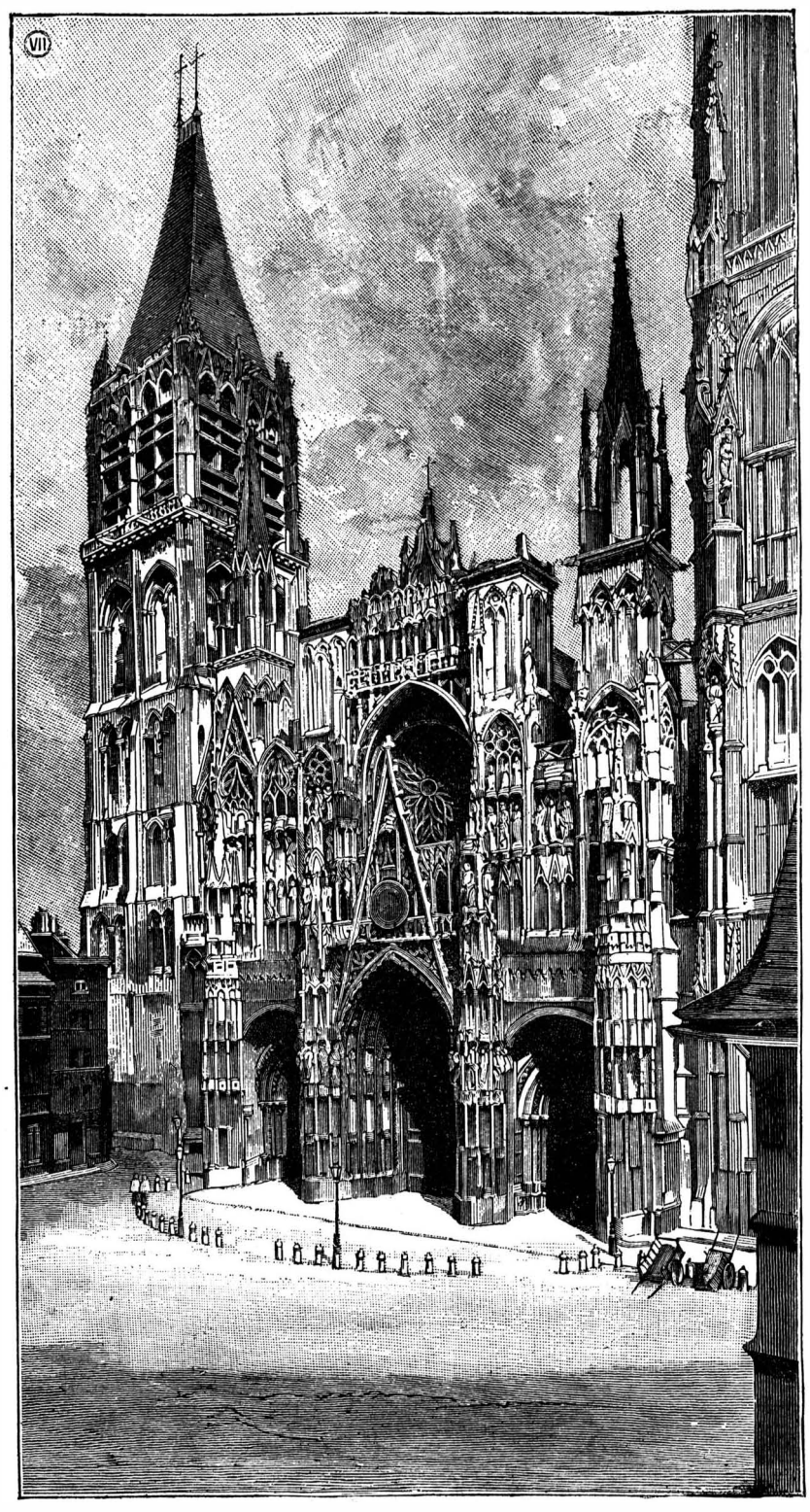
BY ARTHUR LEE.

Very valuable quarries of marble have been found in the French colonies of Algiers and Tunis. It was from these that the Romans procured their so-called Numidian marbles. Numidia proper is outside of the district in which the greater part of the marbles are found; but it gave its name apparently to all of them. Pliny says that Numidia produced nothing remarkable except marble and wild beasts, and that Numidian marble was first brought to Rome under the consulate of M. Lepidus (B. C. 77), who used it in his own house. These marbles were greatly prized by the Romans, who imported great quantities of them; but after the fall of the empire they were altogether lost sight of, and have only lately been rediscovered and worked. The most beautiful varieties are found in a district about 20 miles northeast of Oran, in the western part of Algeria. Near the little village of Kleber rises an imposing mountain called by the colonists "Montagne Grise," from its arid, gray appearance. This mountain is one of a chain which extends in a northeasterly direction from Cape Aiguille on the west to Cape Carbou on the east, and is about the center of the range. On its summit there is a level plateau with a superficies of some 1,500 to 2,000 acres, and running east and west. It is here that the marble is found. At the extreme east a creamy-white marble is produced called "Marmor bianco;" next comes marble of a beautiful flesh colored tint—"Rosa carnagione;" then a fine variety of "Cippolino;" and some yellow marbles of various tints—"Giallo avorio," "Giallo canarino," "Giallo paonazzo," and "Giallo antico." At the extreme west there are a number of breccias—"Breccia sanguina," "Breccia coronata," "Breccia dorata," "Breccia grande"—a deep red marble, somewhat brecciated, and greatly resembling, if not identical with, the famous "Rosso antico"—and a fine black and white marble, "Bianco e nero antico." There are numerous depressions to be seen in the "Montagne Grise," each evidently marking the site of a Roman quarry. Some blocks of stone have been found actually extracted, and some with grooves and wedge holes ready to be raised; but what is somewhat strange, there is no indication of any great monoliths having been prepared, and there is none of the usual debris of a quarry. Colonel Playfair is of opinion that the emperors carefully guarded the secret of these quarries, and that only comparatively small pieces of the precious stone were taken away just as they were separated from the mountain, without even any preliminary hammer dressing. They were probably worked up into mosaics, or used for other finer decorative purposes. Seneca mentions their employment in conjunction with those of Alexandria.

The rediscovery of these beautiful marbles came about by the finding of some very fine mosaics in some excavations made at St. Leu, in the vicinity of Arzen, the ancient Portus Magnus. These were recognized as being very like some of the long lost antique marbles found in Rome, and led to a careful examination of the surrounding country, and the discovery of the treasures on the "Montagne Grise." Some of the first geologists in the country had carefully examined the mountain on account of the iron ore which it contains; they decided that it was not in sufficient quantities to make the working of it profitable; but they had failed to appreciate that it had already performed its task by communicating an almost endless variety of tints to the marble rock.

The beautiful Algerian onyx marble is found at Ain Tekbaleli, near Tlemcen. It is translucent, faintly white and iridescent, and of stalagmite formation, bearing a resemblance to onyx—whence it derives its name. Bands of crystalline white alternate with others of a yellowish brown, dark brown, or umber color. In ancient times, these quarries supplied the inhabitants of Rome and Carthage with the marble which was much used for monuments and for the internal decoration of houses. It was often cut into small vases for holding precious ointments, and was one of the stones known as Oriental alabaster. It was not an alabaster as we now understand the word; it is a true marble or carbonate of lime. It was very largely used in the beautiful Moorish architecture of Tlemcen, where Numidian marble is never found. Evidently, with quarries of onyx at their doors, neither the Romans of Pomaria, nor their successors, the Moors of Tlemcen, were tempted to transport any other variety for the decoration of that important city, so many, many miles from the sea. Great quantities of Algerian onyx have of late found their way to Paris, where it has extensive employment. With white or any of the red or pink marbles, it forms a beautiful combination.

The marbles of Tunis consist of three distinct varieties—a yellow marble, the true "Giallo antico;" a fine rose colored marble, and a small brown breccia. The quarries are now being extensively worked by a Belgian company whose headquarters are at Liege. They are situated near Chemtou, on the line of railway between Algeria and Tunis, in the valley of the Medjerda. This locality is not far from the eastern boundary of Numidia. A road was constructed by Hadrian, on his first visit to Africa in 128–129, between it and Tabarca for the purpose of transporting the marble to the sea coast, and thence to Rome.—*Building News.*



CATHEDRAL OF NOTRE DAME ROUEN.

Ancient Relics at Sidon.

Additional dispatches received at the State department from Consul Bissinger at Beirut, Syria, respecting the remarkable archæological discoveries at Sidon, state that the number of sarcophagi excavated is seventeen, found in seven distinct chambers. Beshara Effendi, civil engineer, is having a tunnel excavated for their removal to the seashore, whence they will be shipped to Constantinople. A shaft thirty-five feet square, discovered in the western chamber, led to a sarcophagus twenty-five feet below the surface, with seven large rooms cut out of the solid rock. In a room adjoining the western chamber four sarcophagi were found. One of these, of pure white marble, highly polished and exquisitely sculptured, is ten feet six inches long, six feet nine inches wide, and five feet high, with a cover three feet higher. The roof is composed of tiles resembling leaves, and also shows rampant figures, crouching lions, human heads with double faces, and stags' heads with curved horns. Three of the sides of this sarcophagus are devoted to battle scenes and emblems of war—arrows, spears, bows, and lions, with dead, dying, and wounded soldiers.

The fourth side represents a hunting scene. There are also panels with richly ornamented geometric figures. In one of the battle scenes there are prominent two nude figures of a man and woman. The color is still fresh, as if put on recently. There are scarlet cloaks, blue tunics, and blood oozing from the wounded warriors. In the north room seven Egyptian sarcophagi were found richly carved. In the eastern chamber there were three sarcophagi, one plain and one lavish with exquisitely carved sculpture. This is the famous so-called Greek sarcophagus. It is surrounded by a porch of eighteen fluted Ionic columns and four Doric columns at the corners. Between each of the columns stands a beautiful girl representing "Grief," all cut without a spot or blemish. Two sarcophagi were found in the south room, one of black marble, the other of white. Inside one of these was found a gold ring, a gold chain, and an alabaster vase. The others had been rifled of their contents without suffering any special injury. The local Turkish authorities are jealously guarding these valuable relics.

A Windmill Clock.

A new pattern of a fog bell is to be anchored off Nix's Mate, Boston Harbor. The machinery is constructed on the principle of clockwork. The power for winding it up is furnished by a windmill arrangement 12 feet square, consisting of a number of sails so placed that they revolve at every breeze. A rod is attached to the middle wheel, driven by the pendulum, so that it falls seven times a minute upon a gong, the sound of which can be heard from five to seven miles. The machinery when wound up will run ninety hours without any other winding. The new fog bell is said to possess advantages over all other inventions of the kind in its perfect regularity and in requiring no care.

THE dome of the great telescope of the Lick Observatory, upon Mount Hamilton, is now in position. The framework is covered with a sheathing of copper and nickel. The dome is a hemisphere about seventy feet in diameter. The hope now is that by the middle of September the largest telescope in the world will be ready for use.

NEW HARDY PASSION FLOWER.

(PASSIFLORA CÆRULEA CONSTANCE ELLIOTT.)

An addition to the list of climbing plants suitable for open air culture in this country is such an uncommon occurrence, says the *Garden*, that peculiar interest attaches to the appearance of a new white flowered variety of such a popular old favorite as the hardy blue passion flower, which, in favorable localities for its growth, is one of the most beautiful wall climbers in cultivation. When this white-flowered variety, Constance Elliott, was first announced, many were induced to think that an albino of Passiflora cærulea belonged to that large family of mythical plants that exist only in the imagination of nurserymen, and certainly the first flowers that were seen of it did not go far to refute the idea, as they were decidedly too green to be termed white. Since, however, the plant has become widely distributed and grown under various conditions, it has quite answered to the description given of it at the outset.

Its flowers, we may here remark, are not snow white, but ivory white, both in the sepals and the fringe, which in the original blue passion flower is of a bluish shade. The Constance Elliott variety, moreover, is a vigorous grower and exceptionally floriferous, much more so, in fact, than its parent, but why such is the case is unexplainable. In every place where the common passion flower succeeds, this new white variety will no doubt supplant it, on account of its being more attractive in flower; and a more delightful garniture for a veranda, alcove, pergola, or wall could not be chosen from the long list of open air climbers. I have seen the Constance Elliott passion flower several times growing and flowering in the greatest luxuriance, but I have never been more struck with its elegance and beauty than when I saw it festooning a veranda, last September, in M. Herbst's garden, at Richmond. It was getting dusk at the time, and the flowers seem to stand out in bold relief from deep green foliage in a charming way, and I at once saw what a valuable open air climber it was.

The variety, I believe, originated in a Devonshire garden, and was distributed by Messrs. Lucombe & Pince, of the Exeter nurseries, and few among the many beautiful plants sent out by that firm surpass this one in value. It has now become tolerably common, for as soon as it was known to be "a good thing" no further recommendation was needed.

The original Passiflora cærulea, represented in the annexed woodcut, is one of our oldest garden plants, having been in cultivation since 1699. It is a native of Brazil and Peru, in the mountainous districts where the climate is mild, about the same climate, in fact, as the southern part of these islands, where the plant is thoroughly at home, and not only flowers profusely, but ripens its fruits. There are few prettier sights in autumn than a wall clad with passion flowers, and hung in profusion with their great egg-shaped fruits of orange yellow amid the luxuriant green foliage. Like all climbers of a similar degree of hardiness, the blue passion flower thrives best against a warm, southerly exposed wall, though on other aspects it flowers well, and may even be grown on open bushes in some favored parts, but under such conditions it rarely fruits well. In very severe winters, such as that we experienced in 1879–80, the passion flower is killed, unless protected; but the plant is so rapid in growth that if a large plant is killed it may be replaced in a season or two if the young plant is treated liberally. There is nothing to say with respect to its culture, as it grows well in any good garden soil, the better if light and rich.

There is no other passion flower that can be grown successfully in the open air in this country, the majority of the species being natives of tropical and sub-tropical regions. W. G.

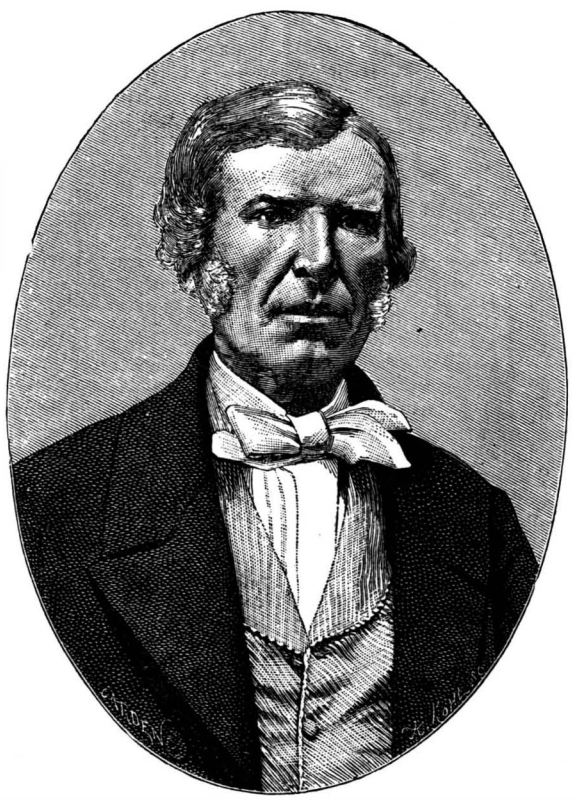
PASSIFLORA CÆRULEA.

Effects of Change of Temperature on Girders.

Some experiments made by Mr. Fairbairn and Mr. Braidwood show that iron loses a considerable proportion of its strength when heated to a temperature of more than 220° Fahrenheit, and that it becomes uncertain below 32°. Mr. Clarke described the effect of the sun coming out and shining on the Conway tubular bridge for half an hour to have been to raise the tube vertically one inch; and he mentions that at night, from the low temperature, the deflection was always greater than in the day time. Mr. Fox instances the effect of frequent and great changes of temperature on some short girders, six feet long, which support the hoods of the forges in his workshops. In the day time they are so warm that the hand can only just bear the heat. At night they become cold. The effect is to make the girders swag, and the swagging appears to be continually increasing. Some have attained as much as three inches deflection in the center, but their strength does not seem to be impaired.

HENRI JACOTOT, RAISER OF GLOIRE DE DIJON.

Until Henri Jacotot delighted the rose growing world with Gloire de Dijon, there was no hardy climbing rose of anything approaching yellow in color. That



HENRI JACOTOT.

a chance seedling should suddenly supply this want in every particular ought by itself to be sufficient inducement to all rose growers to sow the contents of every rose hep that they can lay hands on; for the fact unfortunately remains that the pedigree of Gloire de Dijon was not preserved, and its parentage consequently is not certainly known. The appearance of the plant, however, can hardly fail to give an impression of a strong Bourbon influence, and the late Mr. H. B. Ellwanger, of New York, expressed his opinion that the variety was raised from seed of a tea that had been fertilized by some Bourbon rose. From recent correspondence with Mons. F. Jamin, it appears probable that one of the parents of Gloire de Dijon was the Bourbon Madame Desprez, but no one seems to have any very definite idea as to what the tea-scented parent may have been.

Be its origin what it may, however, Gloire de Dijon remains the delight of rose growers in every part of the world where roses can be grown, and its raiser, the late H. Jacotot, whose portrait is engraved in this month's issue, will be thought of by all grateful rosarians as having been a benefactor of his race. An ingenious writer in a foreign contemporary has lately been endeavoring to show that no rose can be of real value, or a true credit to its raiser, unless both its parents are known; but as long as a variety has qualities that commend it to every lover of roses the raiser's name will be cherished, and certainly the name of Jacotot rosarians will not willingly let die. As for the qualities of Jacotot's great rose, it seems absurd to attempt to say anything fresh about a rose that is already classical, and it will be impossible to do better, in concluding this brief reference to the raiser of the most popular rose the world has ever known, than to quote the description of the greatest classic of rose literature, Canon Reynolds Hole, who says of Gloire de Dijon:

"Its flowers are the earliest and latest. It has symmetry, size, endurance, color (five tints are given to it in the rose catalogues—buff, yellow, orange, fawn, salmon, and it has them all), and perfume. It is what cricketers call an 'all-rounder,' good in every point for wall, arcade, pillar, standard, dwarf, *en masse*, or as a single tree. It is easy to cultivate out of doors and in. It forces admirably, and you may have it almost in its summer beauty when Christmas snows are on the ground. With half a dozen pots of it, carefully treated, and half a dozen trees in your garden, you may enjoy it all the year round; and if ever, for some heinous crime, I were miserably sentenced for the rest of my life to possess but a single rose tree, I should desire to be supplied, on leaving the dock, with a strong plant of Gloire de Dijon."

Admiring often the beauty of Gloire de Dijon, both in cottage and other gardens, we thought last year that it would be well to find out something of the raiser and give a portrait of him if possible. We found on inquiry that no portrait had been engraved. We succeeded in getting a photograph, through the kind aid in the first instance of M. F. Jamin, of Bourg-la-Reine, and afterward of Mr. Webber, of the botanic gardens at Dijon, who kindly communicated with the family of Henri Jacotot. We have the pleasure, therefore, of offering the first portrait engraved of a man who has added a great charm to our gardens. Jacotot lived and was a nurseryman in the town of Dijon, in Burgundy, and died there not many years ago.—Ed.—*The Garden.*

Gloire de Dijon.

Among roses which have stood the test of time, and which still not only maintain their position, but are ever increasing in popularity, few can equal Gloire de Dijon; for although Marechal Niel appeared a few years ago as if it would carry all before it, it must be acknowledged that as an outdoor rose it is as much inferior to Gloire de Dijon as it is superior to the latter under glass. I have grown Gloire de Dijon in all sorts of forms and positions out of doors, and it is always satisfactory; and as a wall climber I do not think that any rose excels it, either as regards beauty when in bloom or the length of time during which it continues to produce its lovely blossoms. It is one of the earliest and latest of roses.

Who has not seen glorious examples of this popular rose on the sunny sides of villa and suburban residences, with its strong shoots of the preceding year's growth, perfect wreaths of delicately colored flowers? We have a plant of it here covering a large space of southwest wall that is seldom seen without blooms or buds on it. Under a continuance of mild weather, this grand old rose well deserves the title of perpetual flowering, and it is no slight boon to have a variety on which one may depend to furnish even a few blooms to cheer the dark days of early winter without the aid of glass. Therefore, to any one about to plant wall climbers, whether on mansion, villa, or cottage, I would say, if you have only room for one, let it be that well tried rose, Gloire de Dijon.—*Hants.*

Fire and Water Proof Paper.

The process of manufacture consists in mixing about 25 per cent of asbestos fiber with about from 25 to 35 per cent of powdered sulphate of alumina. This is then moistened with an aqueous solution of chloride of zinc. The mixture is next washed with water, and then treated with a solution composed of 1 part of resin soap and 8 or 10 parts of water mixed with an equal bulk of sulphate of alumina, which should be as pure as possible. The mixture thus obtained should have a slightly pulpy consistency. Finally, there is added to it 35 per cent of powdered asbestos and 5 to 8 per cent of white barytes. This pulp is treated with water in an ordinary paper machine and worked just like paper pulp. In order to manufacture from it a solid cardboard, proof against fire and water, and capable of serving as a roofing material for light structures, sheets of common cardboard, tarred or otherwise prepared, are covered with the pulp. The application is made in a paper machine, the pulp being allowed to flow over the cardboard.

THE HOWE BROILER FARM.

Although there are a dozen large broiler farms at Hammonton, N. J., we have selected the largest and most successful in order to describe it to our readers. The proprietor, Mr. E. C. Howe, is not an incubator manufacturer, nor has he anything to sell. His sole business is that of raising chicks and ducklings for market. He is probably the most successful person at such business in this country, and yet, strange as it may seem, he had never seen an incubator one year ago, and knew nothing at all about poultry. Being given two or three lessons, he ventured ahead, and his most sanguine expectations have been realized.

To describe Mr. Howe's place, it may be stated that the entire space devoted to broilers is 26×200 feet, or about one-eighth of an acre; but one mile from his residence he has 600 hens on a farm, in charge of an assistant, which have also been a success. His broiler farm is on a town lot, in the busy portion of Hammonton, and quite close to the railroad stations. The building (see Fig. 1) is a center house, 20×20 feet, used for incubators, with a slaughter house at the rear, in which the chicks are killed and dressed for market. To each end of the incubator house is attached a brooder house, 10×70 feet, making a total space of 10×140 feet for the two wings. Each brooder house has a passageway two and one-half feet wide extending the length of the building and leading from the incubator house. The brooder houses are divided into partitions 5×7½ feet each (deducting for passageway), making 14 brooders in each wing, or 28 in all, each brooder accommodating 100 chicks, the total capacity being 2,800 chicks every 10 weeks.

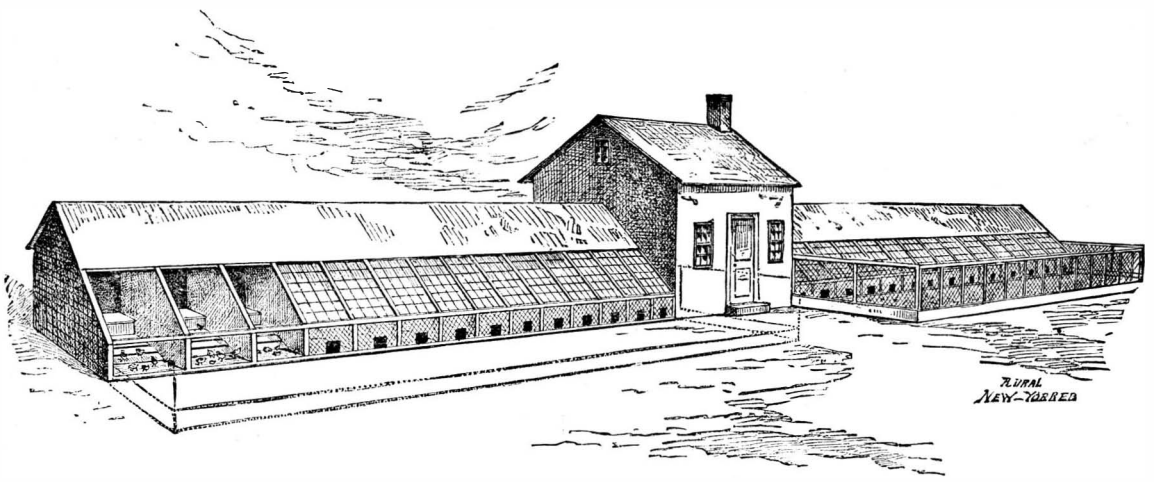


Fig. 1.—HOWE BROILER FARM.

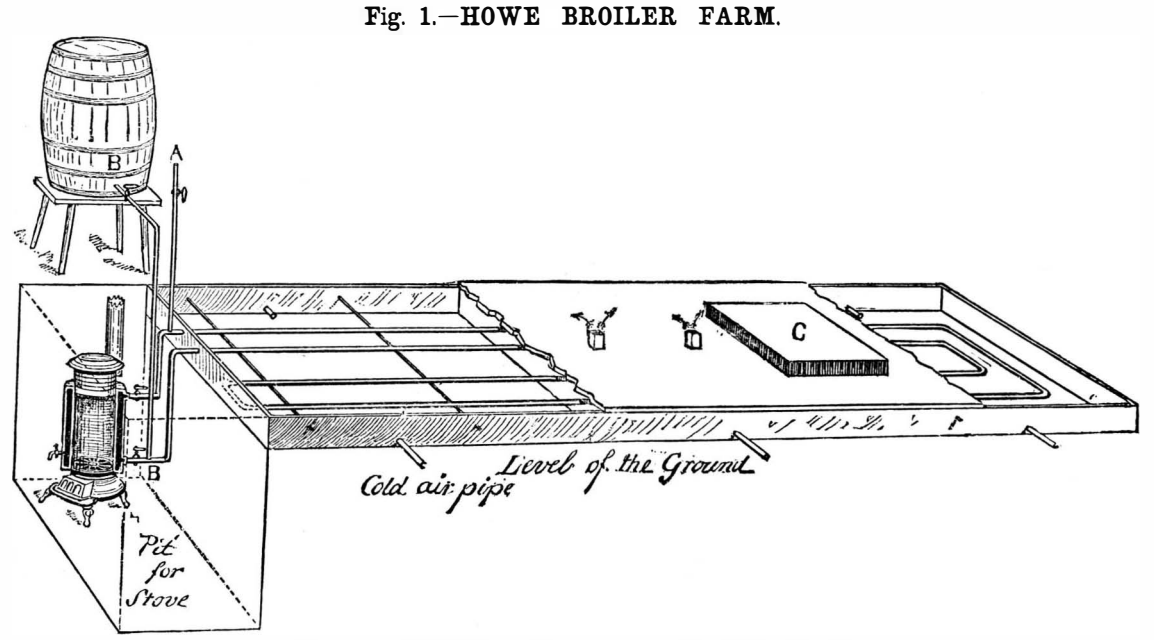


Fig. 2.—METHOD OF HEATING BROODERS.

Mr. Howe hatches and raises his chicks with hot water, and does not require lamps. With a single exception his incubators are home made, no lamps being used, the heat being maintained by drawing off a bucket or two of water from the incubators twice a day and adding boiling water. He has no regulators to them, and yet they require no watching, as he never looks into them during the day or night except to turn the eggs and add the hot water. Limited space will not permit of a full description of the incubator in this issue, but we will state that it is the ordinary hot water tank surrounded by sawdust.

The brooders are heated by hot water pipes (not steam) arranged as shown in Fig. 2. A stove with a circular water back (or boiler surrounding it) heats the water, which rises as it becomes heated, and flows into the pipes, returning to the boiler near the bottom of the stove. Observe the way the pipes are arranged, the first and last being together, thus evenly distributing the heat. A tube, half an inch in diameter (A), is intended to allow the escape of air in the pipes, and is also a safety valve. It is attached to the hottest or highest pipe. B is a keg or barrel filled with water, and connected with the lower pipe, to give pressure to the water The stove is in a pit, below the ground. The pipes are arranged side by side, in a box one yard wide, six inches deep, and 70 feet long, and are held level and in place by iron rods or supports of any kind. One or two tubes, one inch in diameter, extend from this box, or frame, to the outside—an arrangement which allows pure air to come in and circulate around the pipes; but these cold air pipes must be below the iron pipes, or the cool air will come out of the tubes under the brooders. As the air becomes heated it rises through the brooder tubes, which are fastened in the floor. These tubes are one inch in diameter and 2½ inches high. Over them are "mothers" or brooders, which are 28 inches square and three inches high (for very young chicks), but the legs are adjustable, and the mothers can be raised as the chicks grow. The floor must not be very warm, or leg weakness will result. The heat comes through the tubes and diffuses itself above the chicks. The temperature under the mothers should be 90 degrees.

The chicks are sold when from eight to ten weeks old, and at weights ranging from one to two pounds, according to the market (New York and Philadelphia), and they often sell as high as 60 cents per pound, April being the best month. The loss does not exceed eight per cent after they are hatched, the only difficulty being to procure fertile eggs in winter. When hatched they go directly to the brooders, and are fed nothing for 24 hours. The first 10 days they are fed every two hours (early and late) on bread cooked and crumbled for them, composed as follows: Ground meat, one part; corn meal, two parts; middlings, one part; ground oats, one part; also a small proportion of bread soda and salt. Sometimes this is varied by a mixture of corn, oats, and wheat, ground together, and one-fourth ground meat added. Mashed potatoes, chopped cabbage, ground bone, and fresh meat, occasionally, are always in order. After the tenth day the food is simply scalded instead of being made into bread. Raw grain is seldom fed, though cracked corn and wheat are allowed as soon as the chicks will eat them.

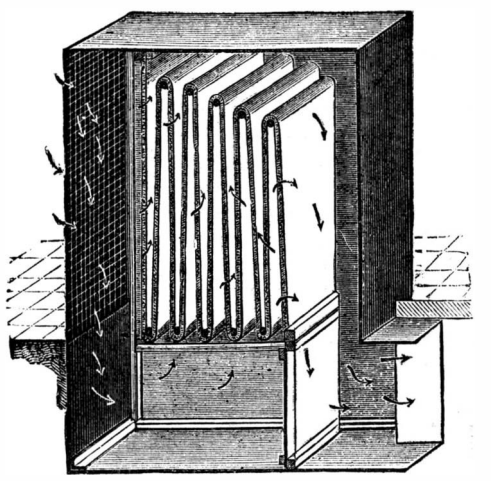
Particular attention is given to keep everything clean, and the chicks must at no time become chilled. On cold or damp days they are kept inside, but given the privilege of the yard on clear days. When they become too large to get under the mother, they will have become sufficiently hardy to do without, as the houses are warm. As Mr. Howe's house holds 2,800 chicks every 10 weeks, his capacity is 14,000 per year, and these are raised on less than one-eighth of an acre of ground; but it is customary to take a vacation in summer. He has hatched about 4,000 chicks, some of them selling for a dollar each, and is now preparing to hatch 3,000 ducklings. The cost of feed to produce one pound of chick is five cents, but the first pound is costly, as the expense of eggs, time of incubation, labor, etc., are important items. Mr. Howe does nearly all the work himself; but is sometimes assisted when very busy killing and dressing the chicks for market. He uses two stoves, which not only heat his brooders, but warm the incubator house, and boil water for the incubators.

There are quite a number of persons in Hammonton who raise broilers, but keep no fowls, as adult birds cause vermin, and cannot be allowed near the brooders. Mr. Howe is now considered very expert in testing eggs, and also as an operator of incubators. His chicks have brought not only the highest prices in market, but he has received many complimentary letters from commission merchants. He keeps cross-bred birds, but will, in future, grade up his stock with pure bred Plymouth Rock males. He has hardly been at the business long enough to be perfect yet. Although expending over $3,000, Mr. Howe has already received back nearly all of his capital, and expects to make a profit also.

As we stated, Mr. Howe has nothing for sale, though he always welcomes visitors; but as many readers may desire further information we will state that Hammonton has a poultry association of nearly 60 members, of which Major Charles M. Jordan (late postmaster at Summerville, Mass.) is secretary, and he will kindly answer all inquiries or show visitors the farms. In describing Mr. Howe's place, we at the same time describe many similar, though smaller, establishments, while limited space prevents giving other methods which are in use; but none equal the hot water method. The total capacity of all the brooders in Hammonton is estimated at 50,000 chicks every 10 weeks, yet the prices are high, and the market far from being overstocked.—*Rural New-Yorker.*

AIR FILTER.

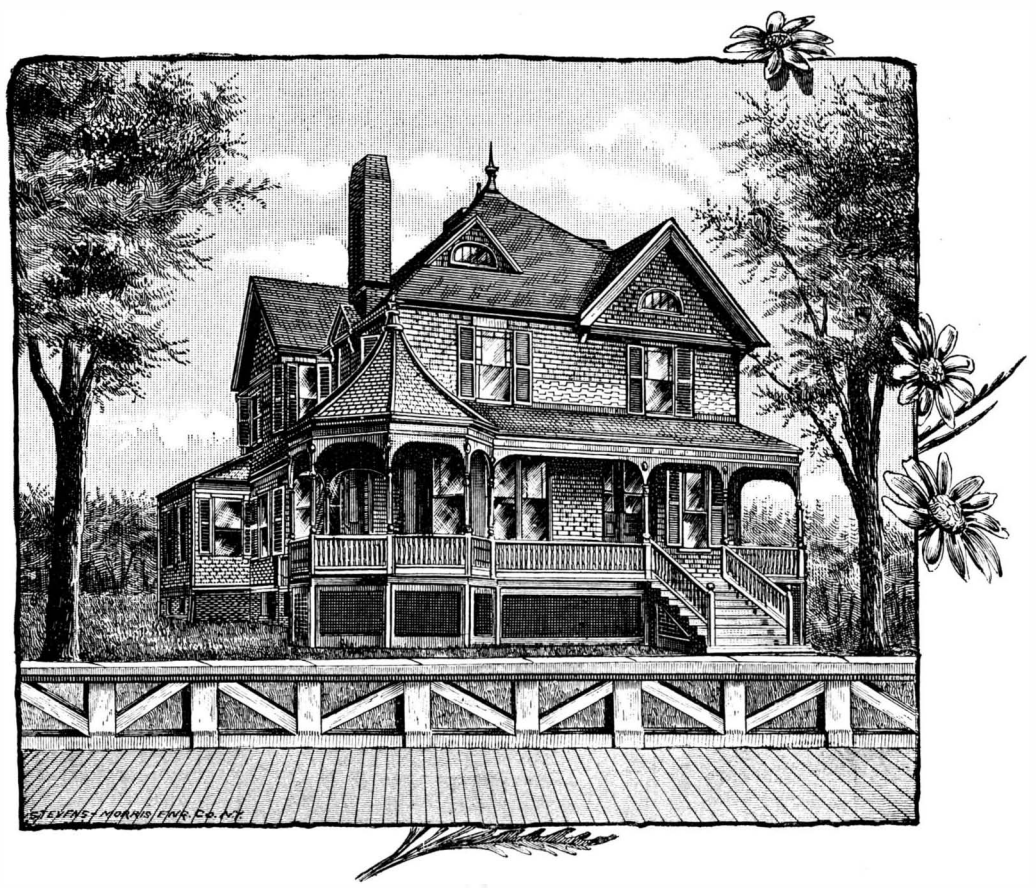
The object of this apparatus is to free the air which enters dwelling houses from dust and other impurities, more or less injurious to health and inimical to comfort. The filter can best be applied in conjunction with the hot air system for heating. In this case, it is placed across the main channel, and all the air which enters the rooms must first pass through it, as will be seen from the illustration we annex. The filtering medium consists of a thick and coarse cotton cloth, wound in zigzag fashion over ledges forming part of a frame in a cast iron box. The direction in which the air passes is indicated by arrows. The surface of cloth exposed to the air must be large enough not to offer any sensible resistance to the current of air, as otherwise a partial vacuum would be created, and air be drawn in from other sources. This, of course, is undesirable, and it becomes a matter of importance to be able, from time to time, to clean the filter cloth, which is done either by simply beating or by washing. To facilitate the renewal and cleaning of the cloth, the internal frame is so arranged as to be removable with very little trouble. The air passes only once through the cloth. The filter is usually put into the cellar of the house which is to be supplied with pure air, and where a hot air system is employed, it is best placed in the main air duct. The filter is now manufactured in various sizes, varying from 56 sq. ft. to 1,100 sq. ft. of filtering surface, arranged to pass from 16,000 cub. ft. to 330,000 cub ft. of air per minute, and costing from £4 15s. to £32 10s. The difference of pressure between the two sides of the filter is only 0·08 of an inch water gauge.—*Industries.*



DWELLINGS AT CAMBRIDGE, MASS.

We give herewith illustrations of several comfortable dwellings at Cambridge, one on North Avenue, erected at a cost of about $7,000. It is elegantly finished. Another engraving shows a pretty cottage on Brattle Street, cor. Mercer Circle. Cost between $5,000 and $6,000. All of these houses might be duplicated at a considerable reduction from the above costs by omission of expense in certain parts of the interior finish.

Another is a double house, pleasing in all respects. Cost about $7,000.



A DWELLING IN NORTH AVENUE, CAMBRIDGE, MASS.

About Plumbing.

The mistakes made by people in speaking of plumbing work are sometimes painfully amusing to the plumber. Nine women out of ten, when they smell a disagreeable and unpleasant odor in the house, are positive that it is sewer gas, and must have the health inspector or the plumber at once to determine its source. Some time ago a lady called at a plumbing shop in a fashionable residence part of the north side. She wanted the plumber to send one of his men to the house at once and get her diamond earring, which had fallen into the wash bowl and had been carried into the waste pipe. The plumber asked her if there was a trap under the bowl, but seeing that she did not understand him, he asked her if there was a bend in the pipe below the bowl. She said there was, and "supposed that the plumber had too much pipe, and, not wanting to cut it, he bent it."

This will not compare with the sagacity of the lady who suddenly discovered the prevalence of sewer gas in the house. It may be just as well to remark right here that there is not a woman in Chicago who is not an expert on sewer gas. She can sniff it where it is not, where it has never been known, and probably where it never will be, but she is sure it is sewer gas. The lady mentioned above is the occupant of a second story apartment in a south side flat building. The plumbers were at work on the first floor. At noon one day the plumbers were eating their lunch, and one of them had some Limburger cheese, which he was holding on a stick over an open fireplace. Naturally, the odor was somewhat stronger and, perhaps, somewhat more penetrating than usual. It was wafted up the chimney through the cracks and fissures and into the apartments of the family on the second floor. Suddenly the lady came down and wanted the plumbers to come up and find where the "sewer gas was escaping." She said the whole house was permeated with it. The plumber was responsible for "sewer gas" in that house at least.—*Sanitary News.*

Antiquarian Discovery.

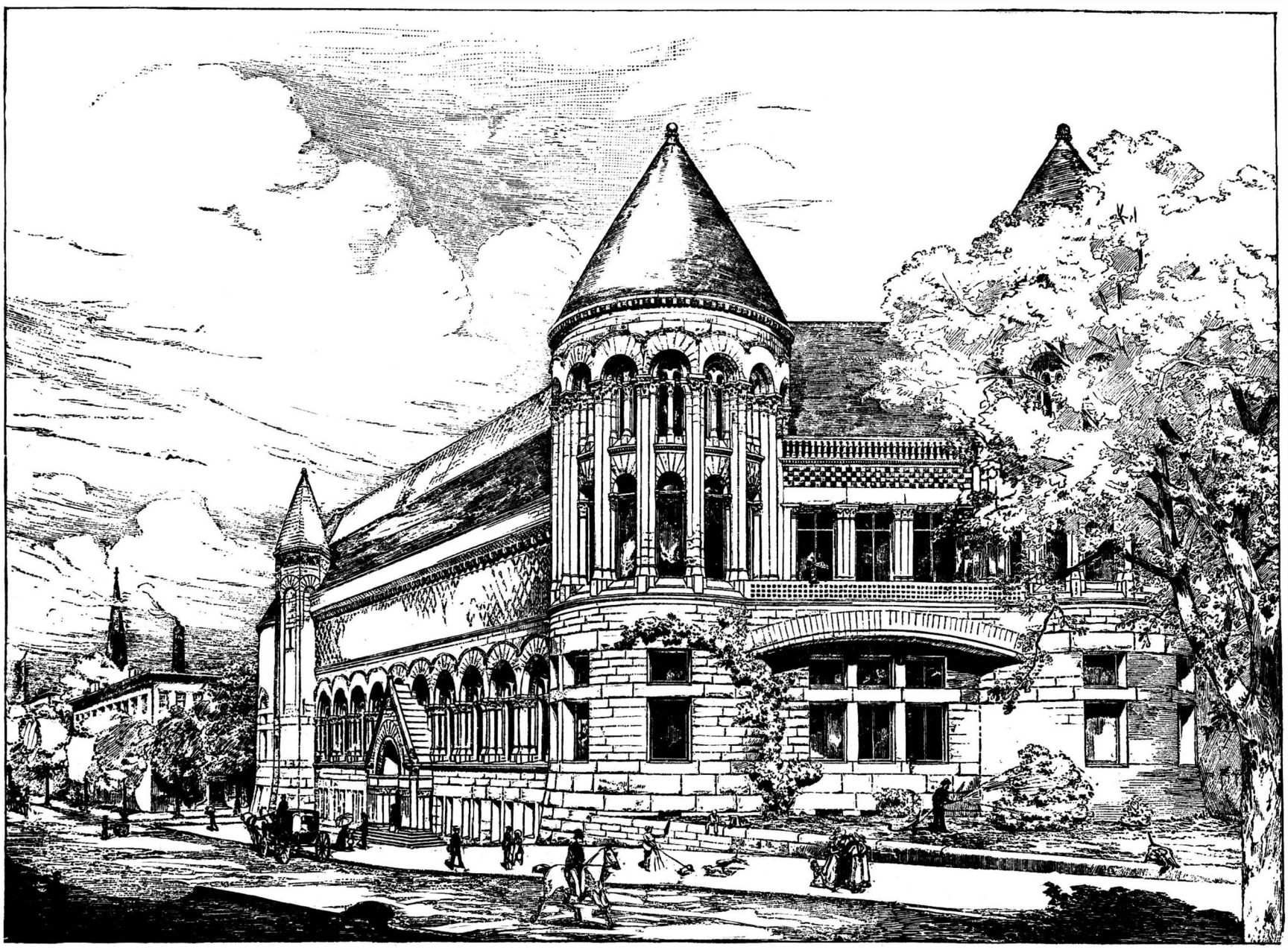
An interesting discovery was made recently at Winchester Cathedral during the construction of the monument to hold the skeleton of Bishop Courtenay. A workman, on making an opening in the choir wall, exposed De Blois' leaden coffer, in which that bishop had enshrined the bones of his uncle Richard, the second son of the Conqueror, who was killed by a stag in the New Forest. Richard's bones were thus preserved by King Stephen's brother, and the coffer, after some seven centuries, remains perfect. The inscription denotes that the coffer contains the bones of Richard, but the words "Beorn Dux" lead antiquaries to believe that the coffer also holds the bones of Earl Beorn, nephew of Canute.

YOUNG MEN'S ASSOCIATION BUILDING, BUFFALO, N. Y.

We find in a recent number of the London *Building News* a drawing of this structure, designed by H. H. Richardson. The engraving hardly does justice to the architectural excellence of the work; but we reproduce it as given, on a reduced scale.

Common Uses of Woods in England.

More conversant with the living trees, their characters and habits, than with their uses. tree planters may perhaps have little interest in any detail of a subject somewhat outside their vocation; but apart from the picturesque or garden uses of trees, there is some importance to be attached to the uses to which trees can be applied after they have been cut down and manufactured for use. The oak is the grandest and most historical of all our forest trees. It has long been associated with our national defense as the chief element in shipbuilding, but harder and sterner iron has robbed the oak of this sentimental element, and the glory of our "wooden walls" of Old England has forever departed. Now the oak furnishes



DESIGN FOR YOUNG MEN'S ASSOCIATION BUILDING, BUFFALO, N. Y.—H. H. RICHARDSON, ARCHITECT.

the builder with the best material for door posts. Wheelwrights find in it the best wood for the bottoms of carts and wagons, and it makes the best of all wood fencing. Pollarded oak is a valuable element in the making of furniture, the knotted and intricately designed surface making the most elegant of veneering for what is known as oak suites.

To the elm is attached a melancholy and weird interest, inasmuch as it forms the small but solid inclosure in which dead humanity is placed. For commoner uses it is valuable for the making of wheel stocks, as it is not so liable to split, and enables the spokes to be fixed with any amount of force. It also enters into the construction of wide fellies, such as are employed in wheels for farm carts and heavy wagons. It forms a prominent element in the construction of that useful vehicle, the wheelbarrow, and the bodies of carts. It also enters into the construction of heavy bellows as boards, and in the form of seats to Windsor chairs it furnishes frequent means of rest to exhausted humanity.

Ash is a very valuable timber, and is fast getting scarce. It is not one of the favored ornamental timbers, and therefore is now much less planted than formerly. A dearth of ash timber would be productive of great inconvenience to many trades. Wheelwrights employ ash largely in the construction of carts and carriages. It forms the best material for shafts, and is widely employed in the making of all kinds of tool handles, especially those used in gardening, such as spades, forks, shovels, hoes, etc. In a less interesting way it is used for butcher's blocks, and many other common purposes.

The beech is a noble tree in life perhaps the most beautiful and decorative of all forest trees, but its uses in domestic life are not so varied as are those of some other woods. Beech is the chief constituent in the making of the elegant cane bottomed chairs found in the parlors of the poorer classes. It is useful for gun stocks, saddle trees in heavy harness, wheel fellies, and many of the lesser tool handles. Hornbeam is closely allied to the beech in life, but its uses are even less varied. Owing to its peculiar toughness it is often employed as cogs in mill gearing and in the construction of bearings, as its wear is regular and even. In another direction it administers to the employment of a section of the community—it makes the best of skittle pins.

The sycamore furnishes a peculiarly white, smooth wood, free from grain, and is used for the formation of curtain rings, butter churns and prints. For this latter purpose it is valuable, as it enables a finer design to be cut than does any other wood of home growth.

The lime in life is for a time the means of diffusing sweet odors and sweet sounds when the myriads of bees are seeking for its honey treasures. After death it enters into the production of other harmonies, as it is largely employed in pianofortes, where its value is seen in a comparative immunity from those fluctuations of contraction and expansion peculiar to most woods. Shoemakers find it also the most suitable material for their cutting boards, as it does not blunt the fine edges of their knives. The Spanish chestnut, also, is largely employed in the formation of sides for pianos, and at times is elevated as signboards. Formerly the chestnut was largely employed in the construction of principals and rafters for open roof churches, and is occasionally degraded to the common uses of posts and rails for fencing. The grand looking horse chestnut does not furnish a specially valuable timber, its wood being occasionally employed in the making of brushes. The birch, also, is employed in brush manufacture, and in the formation of hat blocks for hatters, also in the production of toys. In this way the tree becomes a source of pleasure to infantile life and a terror to breeched boyhood.

The fir tribes are productive of noble trees, but the timber is not of a specially useful kind. It is too soft, as indeed is the case with all wood that is the product of quick growth. Both the spruce and Scotch firs are of kindred quality, and are commonly employed in the construction of outhouses and sheds, or rafters to barns, and for temporary posts and rails, but, except where kept very dry, having only slight powers of endurance. If the pine tribes are to furnish the trees of the future, our posterity will find that in the matter of useful woods we have left them but an indifferent legacy. Larch is superior in enduring quality to the evergreen firs, and is therefore largely used as railway fencing and for ordinary estate and farm purposes. Yew wood is valuable when employed for veneering. It also makes most enduring gateposts. The maple is employed in the turning of bowls, and the bird's eye maple for the manufacture of furniture. Acacia is very hard and durable, and makes good ladder rounds and bottoms to carts. The poplars cut out good weather boarding, and are also employed in the formation of railway brakes, as the wood is woolly and tenacious. Walnut is valuable for the manufacture of furniture and gun stocks. Apple is used for wheel cogs, and the hard stems of the crab for beetle heads. Pear will dye black, and resemble ebony, and makes good walking sticks. The willow is famous for the production of cricket bats. The plum produces shuttles for weaving, and the cherry is used in the making of chairs. These are but a few of the many uses to which home raised woods are put, but for all our chief constructive purposes we give the preference to foreign timber.—*A. D.*, *The Garden.*

A DWELLING ON BRATTLE STREET, CAMBRIDGE, MASS.

Sandstone as a Building Material.

Sandstones consist of small grains, chiefly silica, aggregated into a compact rock, the grains being cemented together by various substances. Sometimes it is carbonate of lime, sometimes silica or iron, and sometimes clay. The nature of the cementing mass has considerable influence upon the character of the rock. Iron is, however, the most usual, and the one which forms the most typical sandstone. There is a great variety of color, from white, through gray, yellow, red, and brown, to black.

Sandstones are of all geological ages, from the lowest sedimentary rocks to the most recent. The older rocks are usually the most compact, and in general contain some feldspar grains, and frequently a large quantity of clay, which gives them more or less of an argillaceous character. When sandstones are very hard, and their fracture harsh, and they contain small silicious pebbles, they are usually called grit. If the rock consist, not of grains of sand, but of numbers of pebbles cemented together, it is designated a conglomerate, which is further subdivided into pudding stones when the pebbles are rounded, and breccia when they are angular. And as these pebbles may consist of any kind of rock, there exists a considerable variety of these compound rocks, which are distinguished by the nature of the pebbles of which they consist. Sandstones are generally excellent materials for buildings; but, for this purpose, they should be firm and uniform in texture, and free from iron pyrites or iron sand, which would, by their rusting, not only spoil their appearance, but render them liable to peel off on exposure. Many sandstones, especially those from the thick beds of what is called the new red sandstone (or from the variety of colors from white to dark brown which it exhibits, the variegated sandstone), and which lies above the coal measures, are exceedingly soft when first quarried, but gradually become hard when exposed to the atmosphere. Others, again, especially those rich in clay, although compact and hard when freshly quarried, crumble away rapidly on exposure. The durability of this class of stone depends, however, very much upon the nature of the climate. Any sandstone which will bear exposure for some weeks, after being saturated with a solution of Glauber's salt, may be considered fit for use.

W. K. SULLIVAN.

Japanese Tea.

In the "Proceedings of the German Naturalists' Society for Eastern Asia," held at Yokohama, Messrs. Kellner, Makino, and Ogasawara give some interesting details of the mode of preparation and composition of Japanese tea. They state that the preparation differs from that of Chinese tea, chiefly in this: that the leaves are not intentionally allowed to ferment, but after moistening and cooling are at once placed in the oven; and also that the prepared tea is not flavored with fragrant flowers. The amount of theine is from 2 to 4 per cent; of tannin, 17 to 20 per cent. The aqueous decoction contains chiefly tannin, theine, and mineral substances.

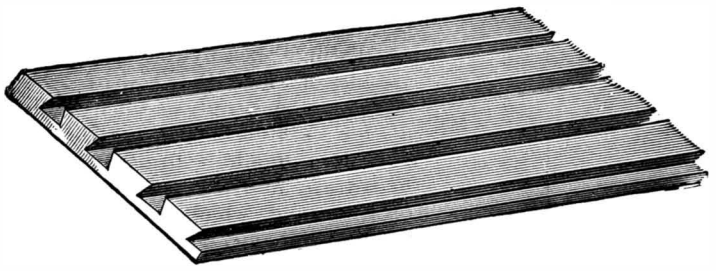
As is the case with all alimentary substances which are chiefly valued for their taste and fragrance, chemical analysis gives but little indication of the value of tea for commercial purposes. The evergreen organs of the tea plant exhibit phenomena during their first period of growth very similar to those which take place in the leaves of conifers; and, like them, they retain, even when old, a large quantity of proteinaceous substances and carbohydrates. It is true that, in consequence of the fresh formation of organic substance, the amount of nitrogenous constituents, including theine, diminishes slowly and regularly, as also the soluble non nitrogenous substances, while the fatty constituents accumulate rapidly, and to a remarkable extent, apparently in consequence of the formation of wax. The amount of woody fiber increases very rapidly during the first weeks, and after that remains nearly constant. The greatest changes are exhibited in the composition of the ash; the proportions of potash and phosphoric acid diminish very rapidly, while those of lime, magnesia and oxide of iron increase.

A DOUBLE HOUSE, CAMBRIDGE, MASS.

HALL'S PATENT SHEATHING LATH.

It has been said, and with a good deal of truth, that the public generally are slow in adopting new construction and new methods. Architects and owners are too apt to run in the same groove, and neglect to make themselves acquainted with the various new articles of manufacture placed from time to time upon the market. Of course, it cannot be expected that every trumpery and unimportant invention should receive investigation, but there are not a few improvements brought out in recent times of which the merits and advantages are so considerable that every architect and owner, in fact, every person building, would find it to their benefit to look well into.

Just such an article is Hall's combined lath and sheathing, which is designed to supersede ordinary lathing. It consists of pieces of lumber, of any length and width, having a series of dovetailed parallel grooves running lengthwise, as shown in the cut. This



HALL'S PATENT SHEATHING LATH.

sheathing is nailed on to the studs or furring, and is then ready to receive the plaster directly upon it.

The advantages of this new construction are several. First, it is cheaper, for it effects a saving of twenty-five per cent of the mortar and a good deal of labor in putting on. A mason can put on as much as fifty yards more of mortar a day than he can on ordinary lathing, so that, if for no other reason, the fact of its being cheaper gives it a decided advantage. But then it makes a much more solid and warmer wall, the dovetailed grooves give a better clinch to the mortar, and, above all, it will not crack.

The last advantage is one which, although it does not, perhaps, appear so obvious as some of the others, has, nevertheless, been proved to be a fact. No plaster job ever executed is entirely free from small cracks here and there, and with this sheathing, although some slight ones might appear, they would certainly be less in number than with ordinary lathing, and this has been shown to be the case in many instances where a job has been executed by the same mason and with the same mortar on the two different lathings.

But, beyond the very decided and important advantages already pointed out, there are others of not less moment. Of these, the foremost is the great aid the sheathing lends in increasing the strength of the structure. It is especially adapted for ceilings under floors, when strength and solidity are required, and for city ceilings and expensive buildings where cornice and center-pieces are put up. It ties the joists firmly together, prevents, to a great extent, all warping and twisting, and stiffens the floor and ceiling sufficiently to obviate the necessity of bridging.

Sheathing lath has evidently come to stay. Its use is every day increasing, and it will most probably, before long, be very generally employed. The manufacturer is I. G. Jenkins, of Oswego, N. Y., who supplies not only the sheathing, but also the machines for making it.

All who are interested in fireproof buildings and building materials should be familiar with the different kinds of hollow brick, porous terra cotta, flat arches, partitions, furring, etc., manufactured by Henry Maurer & Son. Their system of iron beam protection by means of hollow brick has been adopted in the new building of the Equitable Life Assurance Society, the Potter building, and other of the most important structures in the city. The office and depot of the company are at No. 420 East Twenty-third Street, this city.

Red Granite.

Near Assouan, Egypt, there are immense deposits of red granite, which furnished much of the material used by the ancient Egyptians in the making of obelisks and other monuments, which have since found resting places in various parts of the civilized world. The great obelisk of Luxor is now in the Place de la Concorde at Paris. Its height in the socket is rather more than 72 ft. Another of these monuments, known as Cleopatra's Needle, is a familiar object on the Thames Embankment in London. There are several in Rome, and one in New York (in the Central Park). The enormous size of some of these monuments, cut out of a single stone, has made them the wonder of all ages; more especially when the mechanical means at the disposal of the engineers of that era have been considered. An obelisk, still lying in an unfinished state in the quarry of Syene, shows us how these great monoliths were quarried. The obelisk was cut out in the solid rock, and polished on three sides before the fourth was disengaged; wooden wedges were then driven in the under side of the stone, and these were repeatedly moistened until they swelled sufficiently to effect separation from the bed below. From inscriptions and diagrams carved on some of the pedestals, we gather that the mode of transport to Lower Egypt was by the Nile, the stones being loaded on rafts. They were then dragged to the place where they were to be erected on a rude kind of carriage made of logs, which was set in motion by large trains of men and animals; they were finally lifted on the pedestals by means of an inclined plane. The lasting capabilities of Egyptian granite are proved by the sharpness of the sculpturing on the obelisks, which in some cases was cut as much as 3,000 years ago. It is, however, a curious fact that the same stones when set up in London and New York have shown signs of decay within a very few years of their erection.

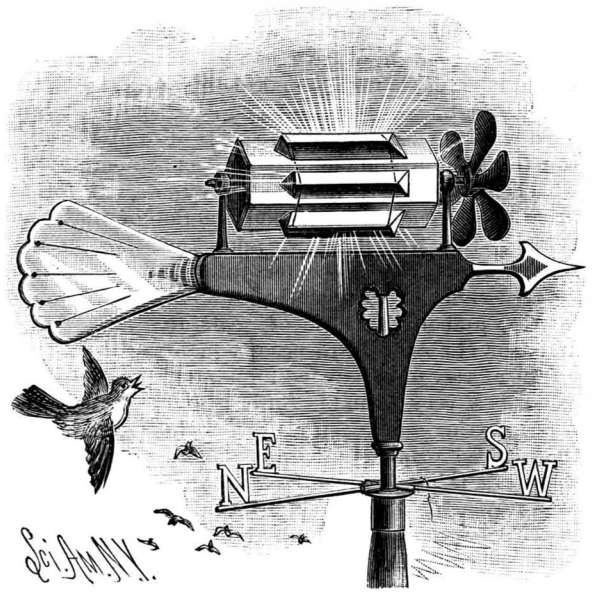
BE WISE IN YOUR SELECTION.

If it is known that a business man does not insure his property, his standing is impaired with those of whom he asks credit. It should be so; for no man should hazard property when by the payment of a small sum he can be secured against the ravages of fire or the damage by water. Successful business men regard life insurance as of vastly more importance than fire insurance. Property may never burn, but death is sure to occur.

It certainly pays to secure the best, when it can be obtained at the least expense. The Ætna Life Insurance Company, of Hartford, Conn., through its conservative management and successful business, is giving to its patrons, upon its admirable plans (two of which are copyrighted), the best results obtainable in the business. If you desire to know of the particulars of this company, and the peculiar advantages it offers, you will do well to address it at Hartford, Conn.

A NOVEL WEATHER VANE.

A decided departure from the ordinary type of weather vane may be secured very simply by following the construction shown in the accompanying engraving. A hexagonal barrel, with sides of mirrors, is mounted on its axis as shown, and a propeller or helix is connected with it at one end, whereby a rotary



REYNOLDS' NOVEL WEATHER VANE.

motion is imparted to the barrel by the action of the wind. Prisms are wired to the sides of the mirrors, which give to the rays a rainbow-like hue which is dazzling in the extreme. This contrivance has been devised by Mr. R. B. Reynolds, of Stockport, N. Y., and it possesses a novelty which will commend it to the attention of those seeking something quite unique in this line.

The Richmond Weather Strip.

The Richmond Weather Strip Company has just closed a contract with the Pennsylvania Railroad Company for the use of their improved car door weather strip on all passenger coaches on the main line and branches and all its leased roads.

As the Pennsylvania company is ranked as the highest authority in all matters of railway improvements, it is only reasonable to predict that this valuable improvement will go into general use on the passenger coaches of all the railways as an item of comfort and economy, which opens up a big future for the Richmond Weather Strip Company, and is a high compliment to the energy, skill, and business capacity of Mr. Frank Dennis, who has had the entire management and control of the business from its beginning.

Vegetables in Japan.

The Japanese are almost vegetarians; not so much from choice, perhaps, as from necessity, though the eating of flesh is, in a great degree, forbidden to those who are religiously faithful. Fish is not among the prohibited articles of diet. Most of the flesh prepared for food is for the infidel. In 1880, in the whole of the empire, there were but 36,600 head of cattle slaughtered—the half of which was used by the foreigner. Nine-tenths of the food used consists of vegetables. Rice is the chief article—beans, peas and sweet potatoes are largely consumed. A fourteen pound radish is very popular, and numerous sea weeds are used as food.—*Gardeners' Mon.*

Full plans, specifications, and details, ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York.

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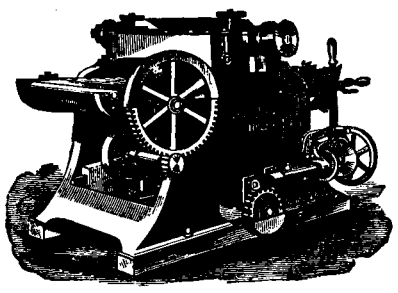

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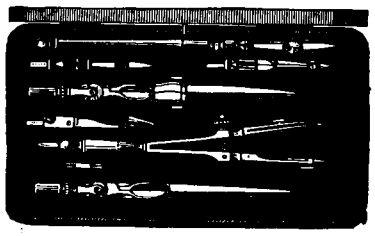

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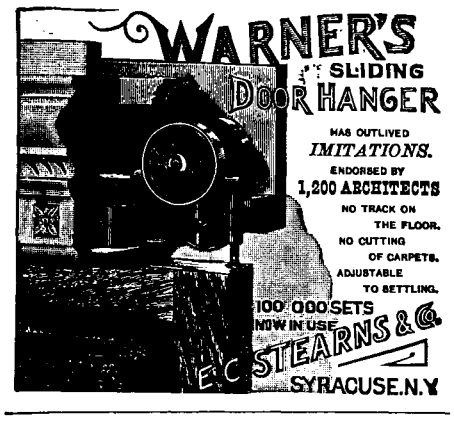

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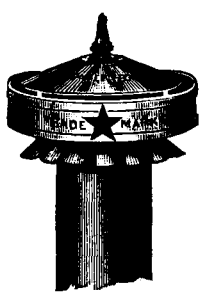

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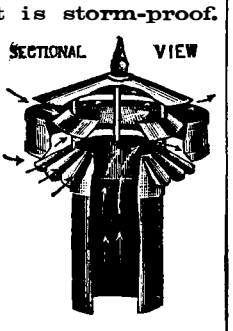

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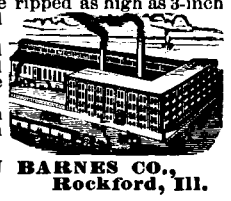

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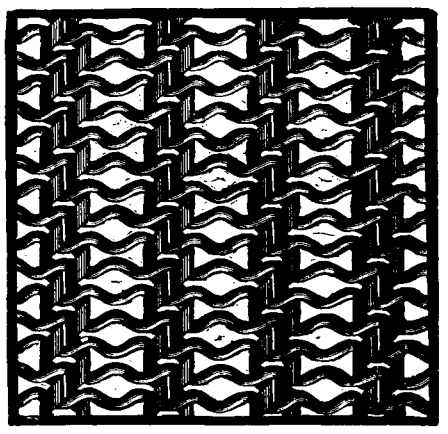

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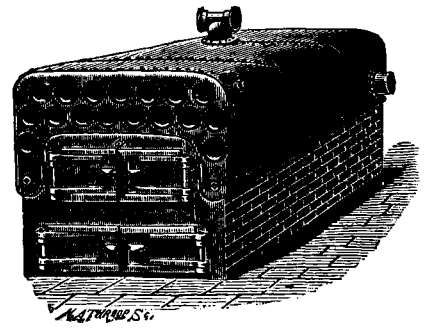

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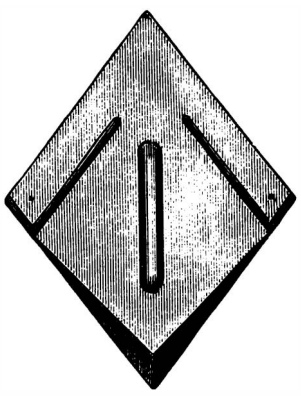

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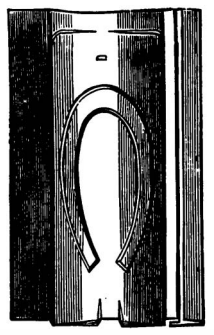

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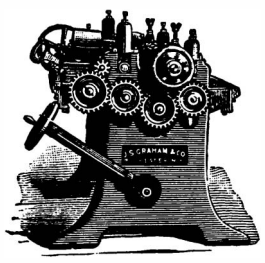

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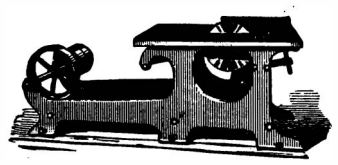

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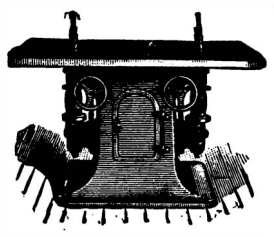

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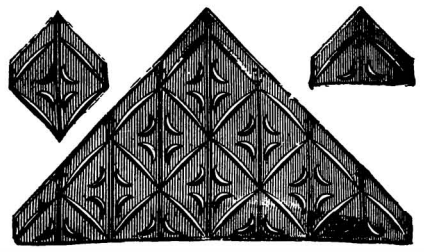

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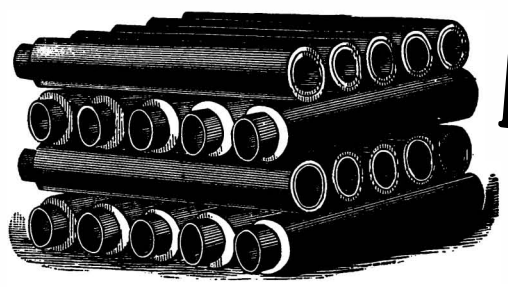

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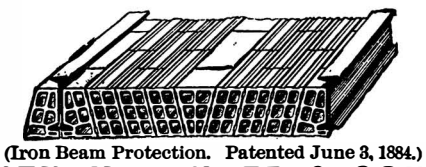

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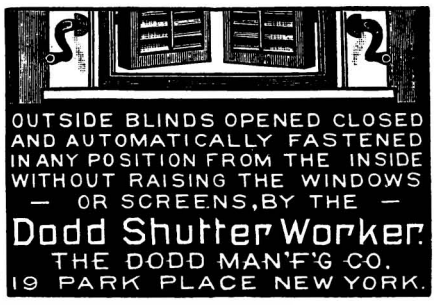

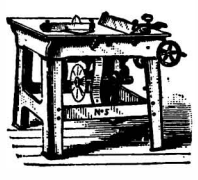

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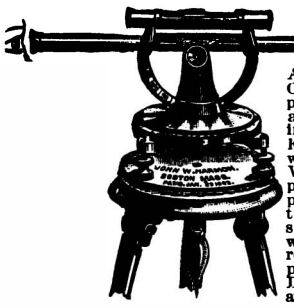

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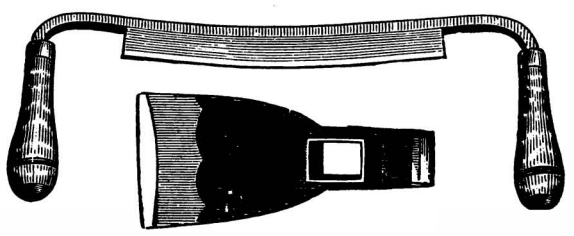

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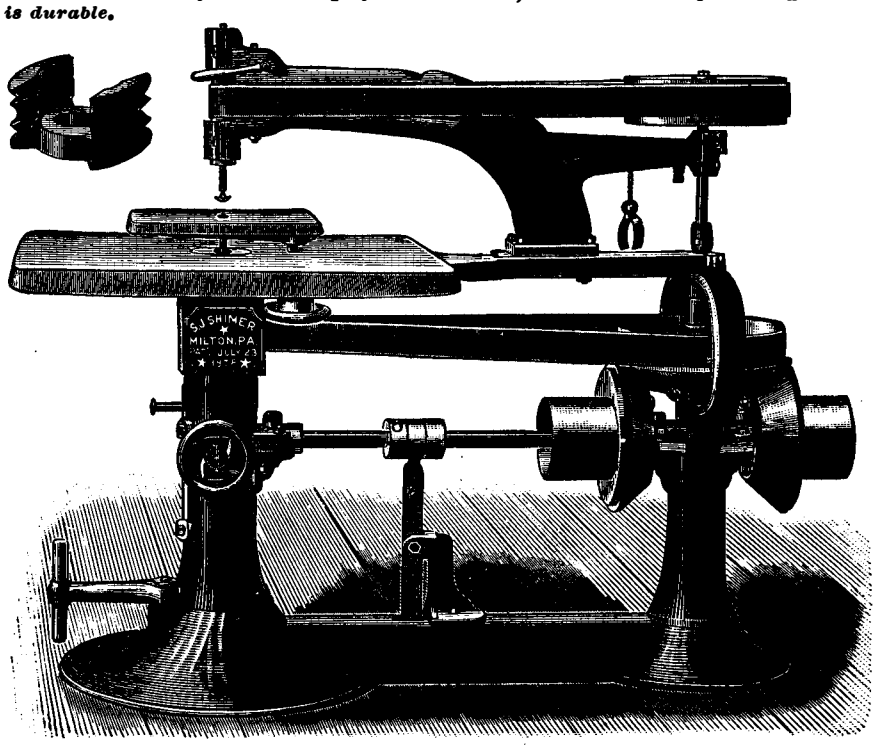

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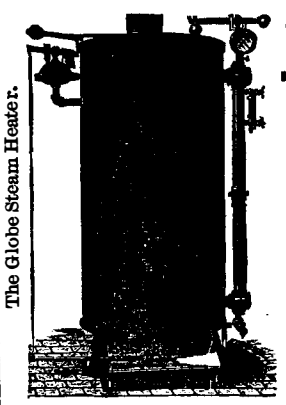

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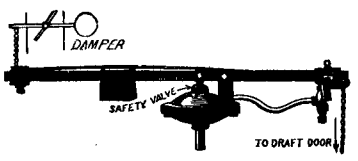

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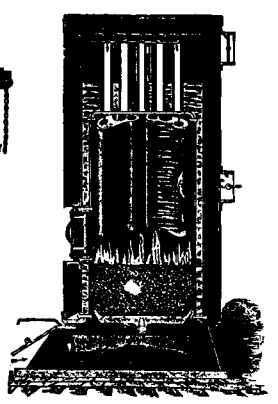

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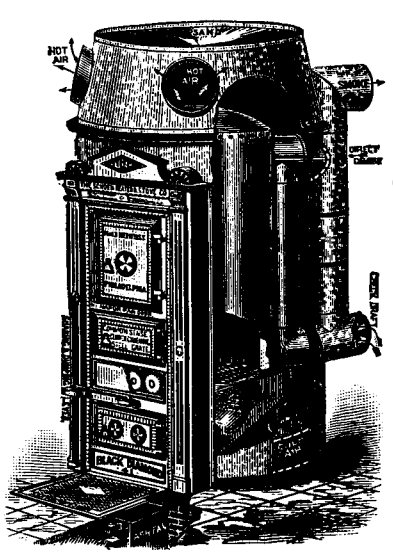

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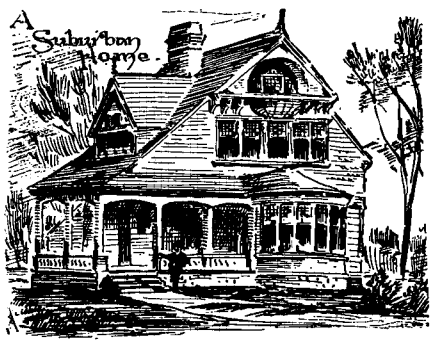

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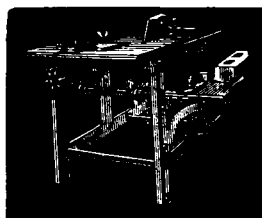

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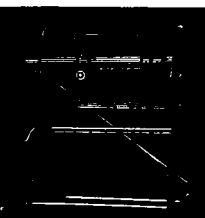

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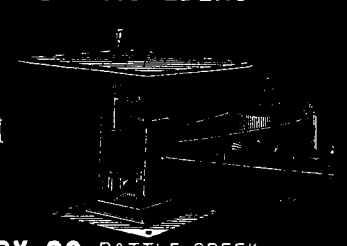

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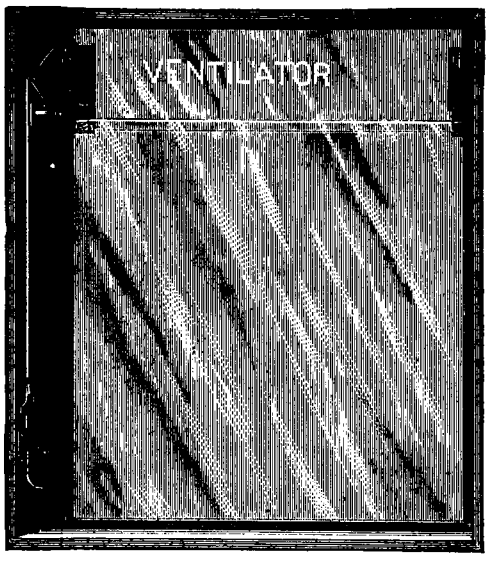

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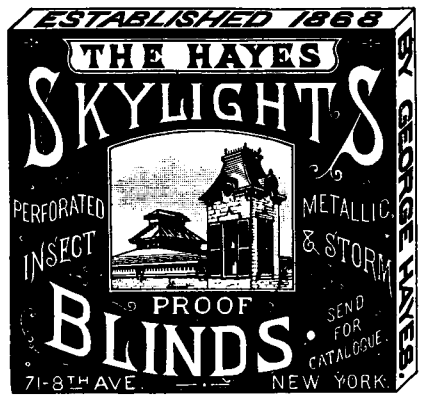

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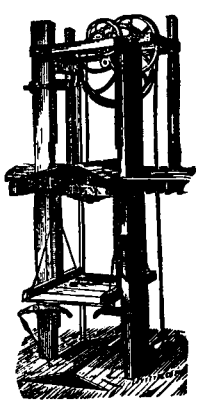

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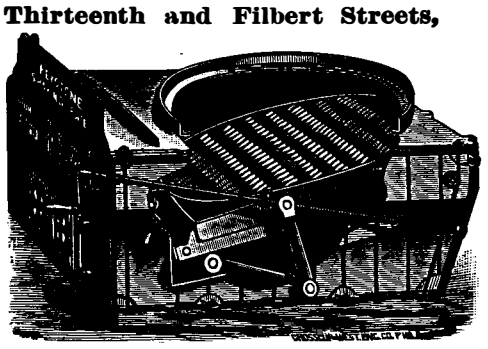

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Notes & Queries

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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.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(1) E. A. H. says: The inside walls to the basement of my house are rough brick, and dampness from the earth outside comes through. Is there anything I can put on the walls to prevent it? A. Rake out all the joints and clean the wall thoroughly; then plaster it carefully half an inch thick with a mortar made of Portland cement one part, sand one part. To be applied in a dry time, when no water is coming through the wall. The mortar is held up by the wall, and any considerable thickness of mortar tends to drag itself off by its own weight. The more the mortar is worked into the joints, the better. The cellar bottom may be covered with same material, but should be two inches thick.

(2) J. F. L.—Water meters are read in the same manner as gas meters. The 1st dial is cubic feet up to 100; 2d dial is cubic feet by 100 for each figure; 3d dial 1,000 cubic feet for each figure, and so on to the 6th, each dial indicating 10 times the amount of the whole of the preceding dial. Always read the figure behind the index in the direction that it moves. The index hands alternate to the right and left in their motion, to accommodate the plan of gearing.

(3) L. S. says: (1) I am about to build a small dwelling house, and am at a loss to know whether to build of brick or frame, and whether to use brick or stone for a foundation. Location high and dry, faces north, and is exposed on all sides. A. The best material for the house is brick; foundation of brick or stone, whichever is cheapest in your place. 2. How can I heat an attic room, from a lower room used as a dining and sitting room? I thought of using a register, or allow the pipe of stove run through ceiling of lower room, and use a drum in the upper room. The upper room is to be used as a sleeping room. Which would be the better of those two ways of heating? A. Heating the upper room by drum is effective and economical.

(4) R. K. T., of Unadilla, N. Y., asks if he should use pure cement or cement and sand, and in what proportion, for a chimney cap. A. Use good Rosendale cement, one to one of sand, or Obelisk Akron cement, one to one, and we should prefer to use the latter at the same price. The cap is formed on the top of the chimney in a wooden mould previously made, in accordance with the required design. In using Rosendale, care should be taken to mix it up with about 33 per cent of its own weight of water, and about 25 per cent if Obelisk Akron is used; the latter is the quickest setting, and in the proportion of one to one is slightly superior to Rosendale.—The tallest chimney in the world is not the German chimney, so widely quoted as such, but Townsend's chimney at Glasgow, Port Dundas, Scotland, which rises 454 feet from the ground line and is some 18 feet higher than the great chimney at Metternich, Germany.

(5) A. D. T., of Wheeling, W. Va., submits a sketch of a cottage in perspective, accompanied by a plan, and is ambitious. He desires to become an architectural draughtsman and wishes advice as to how to proceed. The sketch is rather faulty in its perspective, the point of view not having been well chosen. Would recommend Mr. F. A. Wright's book on architectural perspective for beginners, which can be supplied from this office, also "Building Superintendence," by T. M. Clark, and Rivington's Notes, or Leddon's Notes on Building Construction. Learn to draw and sketch free hand in India ink. Never task the patience and time of an editor by sending to him a pencil sketch. Even working drawings are now made in ink, and none other are acceptable. No scale nor elevations are furnished with the drawings, so that we have no means of verifying the correctness of the quantities which are given.

(6) A. W. H., architect, of Westfield, Mass., says: I have some redwood shingles that when first put on the sides of buildings, oiled first rate, but after they had been on a short time they would turn, some dark and some light colored. Is there any way to overcome this? We believe not. Water from a redwood shingle roof will be almost black owing to the coloring matter in the wood, and yet this water will not stain the whitest of clothes. It is said by those who have used it to be the best water in which to wash clothes that was ever known. The only remedy for the discoloration of the shingles in spots is to use great care in the selection of the wood from which the shingles are made. Young redwood trees, known by their darker color, will stain in spots, but wood from old trees will make a shingle that will be comparatively uniform in color. We believe, however, that if the shingles were impregnated with paraffin before laying, no discoloration would ensue, for that would make the shingles impervious to water. We do not know, however, whether it has yet been tried.

(7) H. E. W., of La Crosse, Wis., asks for a method of making tar and gravel or composition roofs. Cover the board roof with thin, soft, spongy straw paper used in making paper boxes, which comes in rolls. Lay in course up and down the roof, and lap over, then spread on several coatings of the following

(*Continued on page* x.)

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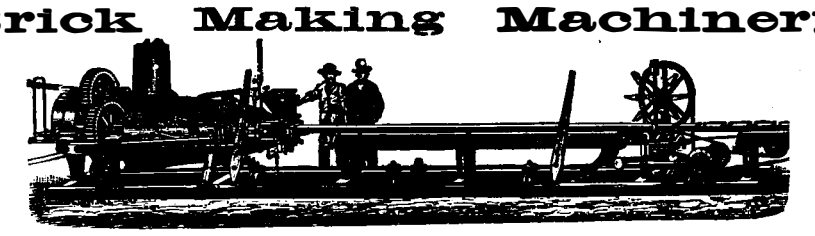

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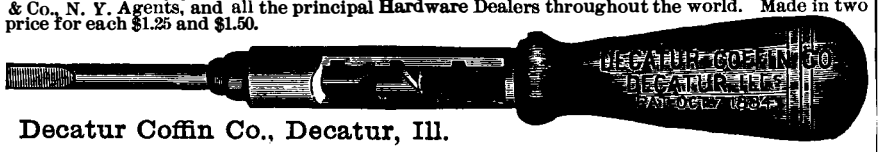

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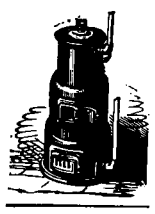

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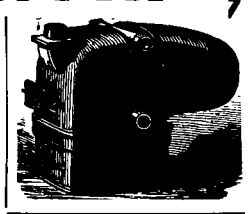

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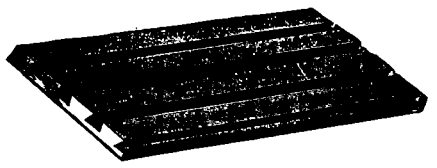

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Testimony of a New York Architect.

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W. A. SYMONDS, Architect.

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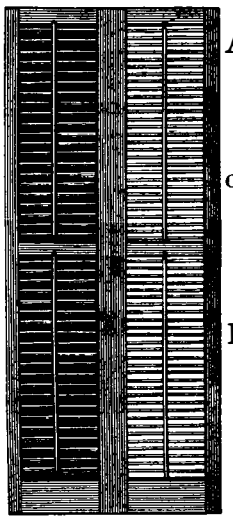

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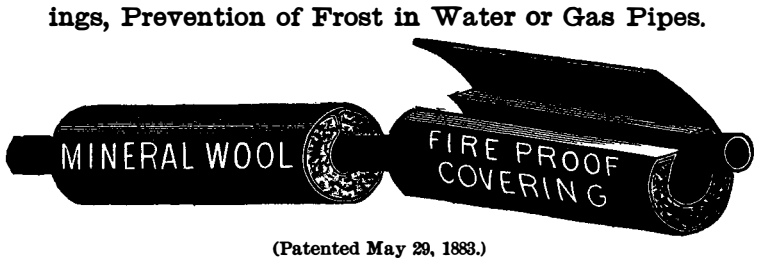

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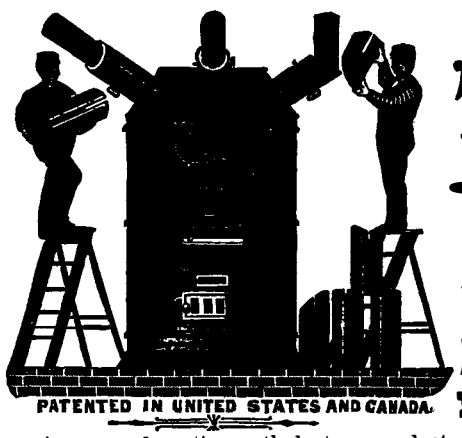

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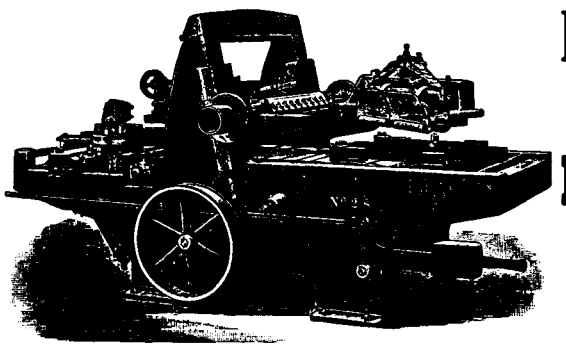

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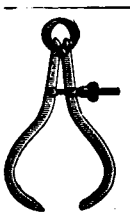

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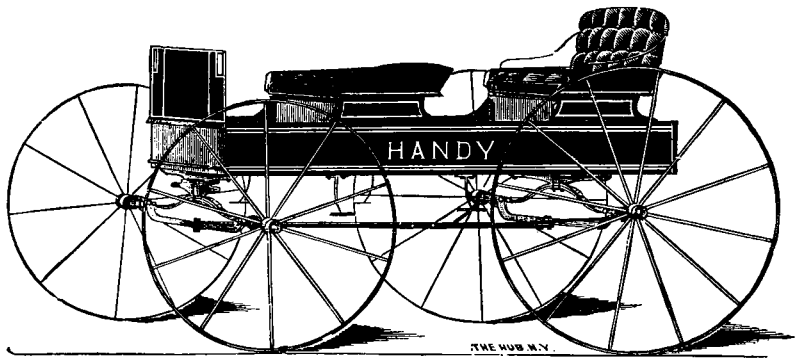

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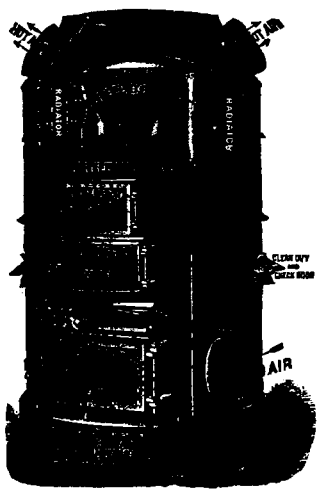

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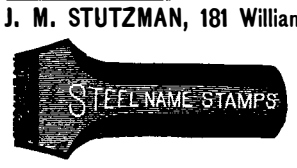

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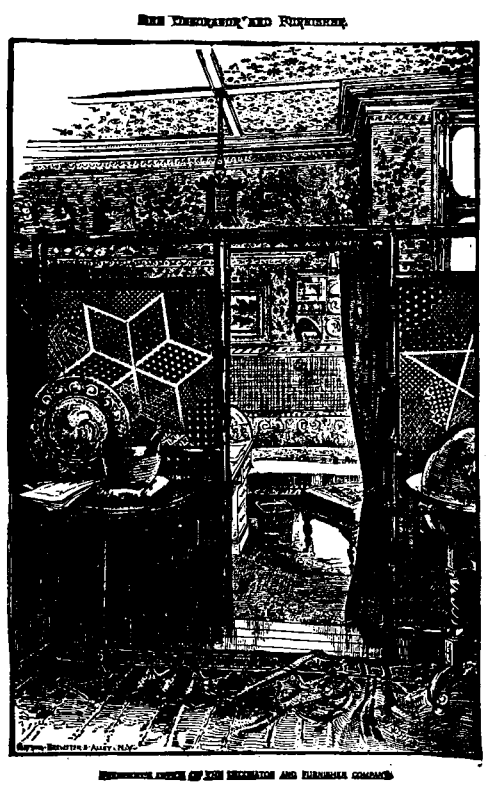

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Keystone Stained Glass Works,
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Notes and Queries.

(*Continued from page* vi.)

composition, previously boiled, stirred and mixed together: Good clean tar, 8 gallons; Roman cement, 2 gallons (or in its place, very fine clean sand may be used); resin, 5 lb.; tallow, 3 lb.; apply hot, throw on this sharp gritty sand, pressing it into the tar composition.

(8) F. F. M. asks: 1. How can I construct a rain gauge? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 419. 2. How, and what of, will I build a small kiln to reduce oyster shells to lime? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 360. 3. A short description of diamond drills and their cost? A. For diamond drills and their cost, address manufacturers who advertise in the SCIENTIFIC AMERICAN. 4. I want to season some inch sections of native woods, averaging four inches diameter. I've tried kerosene, also oven drying, in longer and shorter sections, but wood would crack and bark peel off. Outdoor seasoning is too slow. I want to preserve the color of wood. A. There is no other way than slow drying; pack in a box, and exclude air for six months. 5. On a tree, if a limb is cut off flush with the bark, will the balance of limb left in the tree decay and be crowded out, and the vacancy be filled with woody fiber; will the bark grow over again? A. The wood grows over cut limbs. 6. A growing tree marked with a blaze or hacks; will such marks always remain at the same level, or tend to rise with the growth of the tree? A. Remain at same level. 7. What causes shaking asp leaves to be always in a quiver? A. The wind or vibration of the air only causes the quiver of the aspen leaf. 8. What is used to measure cold below 35° Fah., as mercury or alcohol is irregular? A. Metallic thermometers are used to measure lowest temperatures, alcohol being quite irregular. 9. Is the top surface of ice on a pond, the amount of water let in and out being the same day by day, on a level with the water surface or above it? A. Ice is slightly elastic, and when fast to the shore the central portion rises and falls with slight variations in water level, the proportion above and below water level being as is the weight of ice to the weight of water it displaces. 10. Of the two waters, hard and soft, which freezes the quicker: and in ice which saves the best in like packing? A. Soft water freezes the quicker and keeps the best. 11. Will slush ice save better than block ice? A. If you mean by block ice clear ice, it keeps the best. 12. Will boiled water freeze quicker than before boiling? Or steam water quicker than either the others? A. Yes. 13. Does water in freezing purify itself? A. Clears itself from chemicals; does not clear itself from mechanical mixtures, as mud and clay. 14. Why is the inclined plane not used by any canal in the world but the Morris canal, running from Jersey City to Phillipsburg? A. Inclined planes on canals are only used as necessities; possibly because other canals do not need an inclined plane. 15. I've heard the statement made that Roebling, Niagara Bridge engineer, selected for the iron in his cables ore mined at Andover, N. J., after tests made of various foreign and home ores; is this so? A. Very probably so. 16. In cutting ice with a crosscut saw, does it ruin it for a timber saw; if so, why? A. It does not ruin the saw. 17. How do engineers classify masonry as first class, second class, etc., in piers and abutments? A. First and second class are terms for quality of material and workmanship. 18. Is kerosene oil magnetic? A. No; unless combined with iron. 19. Why is it that so many chestnut trees are struck by lightning? It is not altogether on account of their standing alone, because they are struck in the woods. A. We do not know that an undue proportion of chestnut trees are struck, considering the isolated and irregular way they generally grow. 20. Will setting a compass near or under them affect the needle? A. We see no reason why it should.

(9) M. E. asks the cheapest way to bring water to factory from well three-fourths of a mile distant. The water is sometimes four and sometimes eight feet from top of ground. The factory is probably six feet below the top of the well. Steam power at factory, none at well. Can we not lay iron pipe, and draw the water to us with an air chamber pump? How much water can we draw this way through an inch diameter (inside) pipe, also inch and a half pipe? A. One inch pipe will be useless for a suction pipe for so great a distance. One and a half inch pipe would yield about one cubic foot or seven and a half gallons per minute, on a 4,000 foot suction with pump at factory. Two inch pipe would double the volume.

(10) W. M. B. asks (1) for good receipt walnut stain. A. Mix dragon's blood and lampblack in methylated spirits till you get the color required, and rub it well into the grain of the wood. 2. How can I color glue size like walnut stain? The stain I buy in cans won't mix with the size. A. Take one gallon very thin sized shellac, add 1 pound dry burnt umber, 1 pound dry burnt sienna, and ¼ pound lampblack. Put these articles into a jug, and shake frequently until they are mixed. Apply one coat with a brush. When the work is dry, rub down with fine paper, and apply one coat of shellac or cheap varnish. 3. How can I give pine a beautiful mahogany or lively reddish color? A. Boil ½ pound madder and 2 ounces logwood chips in 1 gallon water, and brush well over while hot. When dry, go over with pearl ash solution, 2 drachms to the quart. By using it strong or weak, the color can be varied at pleasure.

(11) C. W. B. writes: Please give me a recipe for mixing kalsomine so that I can put on successive coats (without mixing with alum or any size) and not wash up. A. Kalsomine is composed of zinc white mixed with water and glue sizing. The surface to which it is applied must be clean and smooth. For ceilings mix ½ pound glue with 15 pounds zinc. For walls 1 pound glue with 15 pounds zinc. The glue, the night before its use, should be soaked in water, and liquefied in the morning. 2. Also, will you give me a recipe for making a gold size that will not lose its tack? A. Gold size is prepared by grinding calcined red ocher with the best and oldest drying oil, and mixing with it a little oil of turpentine when used. When the work is to be gilded, first give it a coat of parchment size, then apply the bove size where requisite, either in patterns or letters, and let it remain till, by touching it with the finger, it feels just sticky. Then apply the gold leaf, and daub it on with a piece of cotton. In about an hour wash off the superfluous gold with sponge and water, and, when dry, varnish it with copal varnish.

(12) J. D. G.—For the breaking stress of white pine timber and joist: Rule.—Multiply the square of the depth by the breadth in inches, and this product by the coefficient 10,840. Divide the last product by the length between bearings in feet multiplied by the depth in inches. The quotient is the breaking weight in pounds.

For the	3″×12″×13′ beam.....	30,018	lb.
"	4″×14″×13′ "	46,690	"
"	8″× 8″×13′ "	53.366	"
"	10″×10″×13′ "	83,384	"
"	12″×12″×13′ "	120,073	"

etc. Safe load about one-tenth of the above.

(13) W. J. D. asks how to make a small portable "filter," to be used on a faucet for filtering hydrant water. A. The essential feature of the ordinary portable filters is a layer or stratum of sand and coarsely powdered charcoal; the water, however, first passes through a sponge, in order to remove the coarser portion of the impurities. This is inclosed in a brass tube fitting by means of a thread on to the faucet, and also it is capable of being opened at the center, so that from time to time the filtering substances can be renewed.

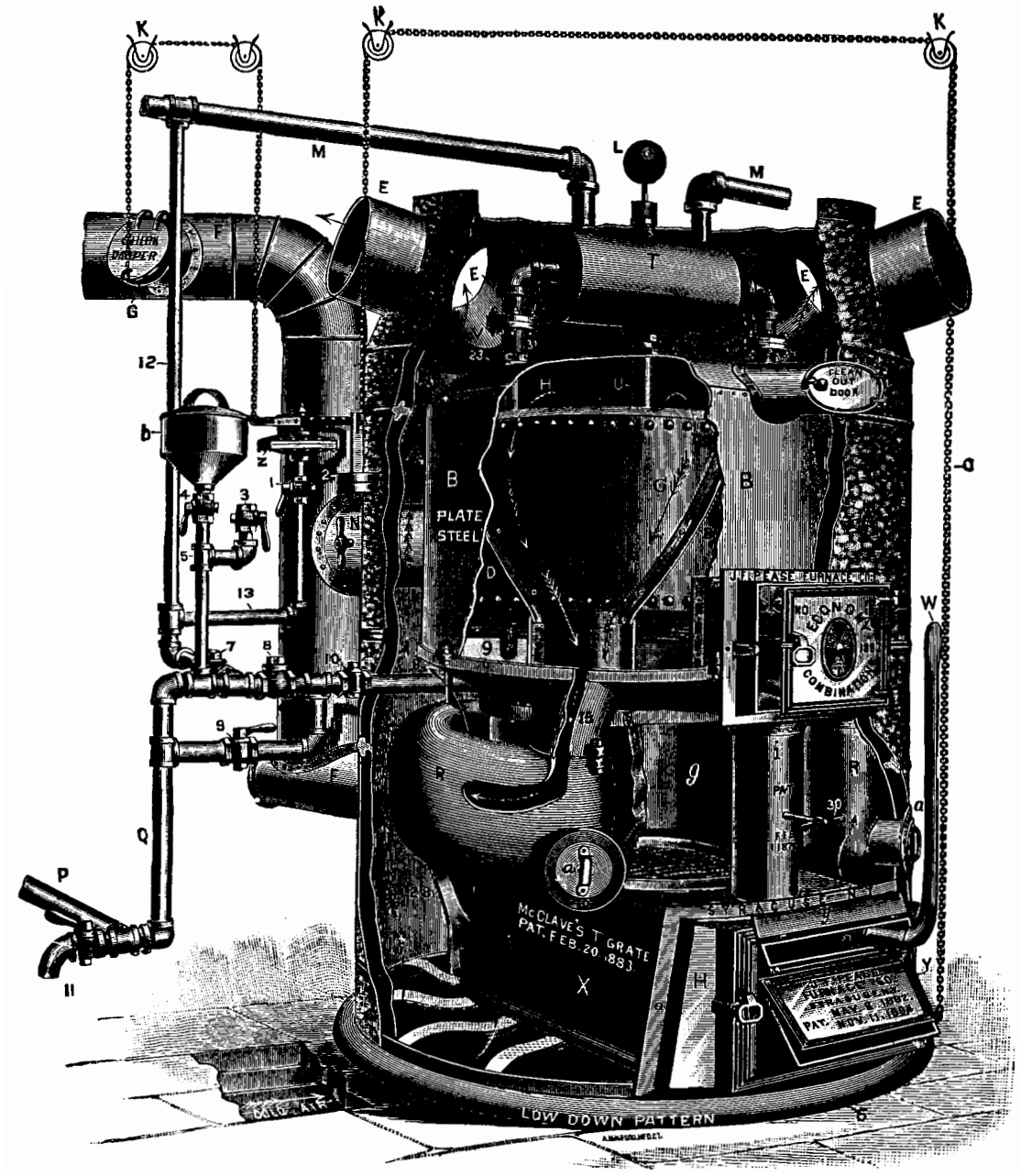
(14) A. V. W. asks why it is that on the ceiling of a lath and plastered room one can see every joist and lath, the space where the joist and lath are being alike. A. Plastered ceilings are porous, allowing air to circulate through them. The air carries dust and smoke with it, which lodge on the surface, the ceiling acting as a filter. Where beams and lath back the plaster, the circulation is impeded or entirely stopped, which prevents the lodgment of smoke and dust.

(15) G. B. B.—A fireproof whitewash can be readily made by adding one part silicate of soda (or potash) to every five parts of whitewash. The addition of a solution of alum to whitewash is recommended as a means to prevent the rubbing off of the wash. A coating of a good glue size made by dissolving half a pound of glue in a gallon of water is employed when the wall is to be papered.

(16) J. B. C. writes: I have an inch pipe running from the steam drum of my boiler (with a globe valve near the boiler) into the lint room of my gin house, with the purpose of emptying the boiler of steam therein, in case of fire. There is a doubt in my mind as to whether the pipe would be more serviceable as it is, or if it led from near the bottom of the boiler. Would like to hear your opinion on the subject. A. Your steam fire connection is right where it is, which is the usual arrangement for steam fire apparatus. If you connect with the water space in the boiler, you will gain nothing, and endanger the boiler also, in case of fire in the gin house. The end of the steam pipe should terminate near the point of greatest danger.

(17) T. J. D. writes: On the hill above Canyon City are two water tanks, 10x12 feet, and 8 feet deep. These tanks are about 2½ feet apart, but are connected at the bottom by a 3 inch iron pipe. Another iron 3 inch pipe leads from one of these tanks to a hydrant 120 feet lower. There is no decrease in size of pipe at the hydrant, as it is simply a fire plug on which to fasten the hose in case of fire, thus forming a hydraulic fire extinguisher. Now, if the two tanks were full, and the supply cut off, and the water should be turned loose at the hydrant, would these tanks lower equally? If not, how much water would be in the one tank when the other was empty? A. The tank having the hydrant connection would fall the fastest, but how much, depends largely upon the size of the nozzle at the hydrant. If the full capacity of the 3 inch pipe should be used, the hydrant tank would be emptied when the other would be half full. The smaller the nozzle used, the more nearly equal would the water remain in the tanks.

(18) R. M. C. asks for details of a 14 inch hollow wall, designed to keep out the damp. A. Such a wall is formed of two casings with a space 2 inches wide between them, the outside casing being one brick, or 8 inches, in thickness, and the inside casing half brick, or 4 inches. The bricks of each casing are laid in the ordinary manner, either in the usual running bond or, if it is preferred, in Flemish bond. The two casings are connected together by the insertion of galvanized iron or other ties in every fourth course in height and at distances apart of about 30 inches. Ties are manufactured for the purpose in various designs. The base of the wall is built solid up from the footings to just above the ground line, where it is covered on top with a damp course of asphalt or some other suitable material, impervious to moisture. The casings are then built upon the asphalt with the two inch space between them, forming a gutter to receive and carry away any water that may get in. This gutter is constructed with a slight fall, and is connected with the drains. Care must be taken to place over every window and door frame a strip of sheet lead or zinc of a width a little greater than that of the frame, so that any water which may fall upon it shall drip off into the gutter below. A house built with hollow walls, properly constructed of good materials, will be perfectly dry.



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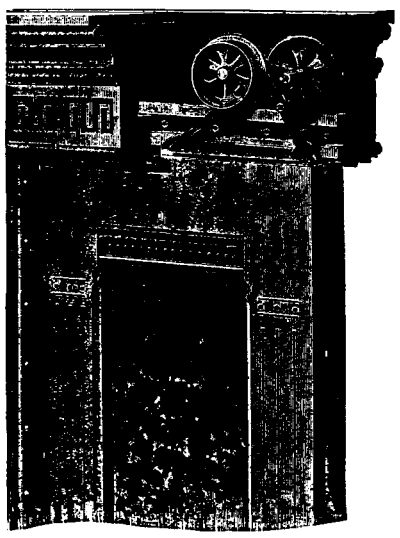

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Supplied ready for use, in rolls containing 200 square feet, and weighs with Asbestos Roof Coating, about 85 pounds to 100 square feet.

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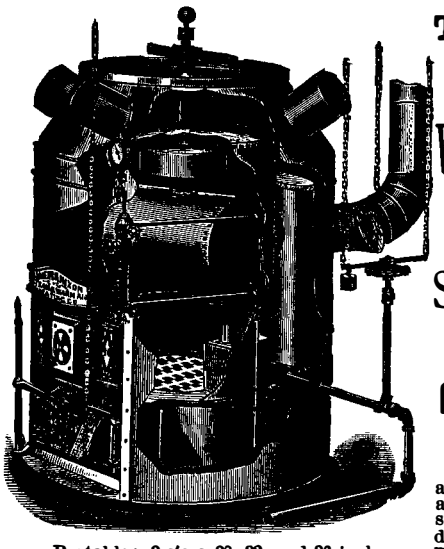

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In the back half circle of the fire chamber is a water back, against which the fire rests, and just above, standing upon two water legs, across the center of the fire and in the middle of the combustion chamber, is a cylindrical boiler, and just above it a steam drum. All of these parts are incased in a steel dome and devoted entirely to the production of steam.

Upon the outside of this dome and the fire cylinder, in conjunction with the back radiator, is where the warm air is generated, thus combining the two systems in one apparatus and producing two results with but one fire, assuring a return of threefold to its owner.

The many positive and perfectly satisfactory testimonials (where we have removed hot water, steam, and hot air heaters) assure us that we give a much better return than can possibly be produced from either system when worked upon their individual merits.

The advantages our apparatus presents are: In the first place, you get a return immediately upon kindling the fire, while with straight steam no return is given until after the apparatus is heated beyond 212 degrees.

In the second place: In the combination the radiation never ceases (unless the fire is out). With straight steam it drops out when the fire is banked, the radiators become cold, and it takes several hours in the morning to recover what was lost during the ni ht, while the combination responds quickly whenever required to do so.

Now again in the third place: Straight steam compels the same outlay in fuel at sixty (60) degrees as it does at zero, showing positively the combination system (as demonstrated in our apparatus) excels upon these three points, and at least 33⅓ per cent. in favor of our system, and also removes the objections of either system when run separately. With the old hot air heating, distant points cannot be reached, and in zero blasts all hot air flues become weak, requiring two, three, and sometimes four heaters instead of one.

In our apparatus, we overcome this difficulty by regulating its power according to the demands of the thermometer outside, and when a cold wave strikes us, we use the steam as a reserve to draw from. Upon the score of economy it requires but little more than half the fuel it takes to run the systems separately. Where power is wanted and little attention required, our apparatus will supply the want, and is sure to give entire satisfaction to any one that has the perplexing trial with one that lacked the power when necessity demanded it.

Another advantage our apparatus has (when properly set): It assures circulation and insures ventilation, and the building to be heated will not be subjected to sulphur gas, dust, or other impurities, but will present an atmosphere that is at once agreeable and pleasant to breathe. We have a most positive assurance of this fact in a dwelling where we removed a hot water apparatus that had become foul, weighing over six tons, replacing it with one of ours, at one-third the cost, and the relief being so sensitively felt, was pointedly mentioned in the testimonial. In another case, showing its power, is a public school where we placed two of our apparatus, and successfully heated twenty-four (24) class rooms, while during the winter before, 1885, when they used eight (8) thirty-six inch hot air heaters, the school was dismissed twelve sessions, on account of not being warm, and no dismissals have occurred from a similar cause since the introduction of our apparatus.

These developments are conclusive, and show the power and efficiency of our apparatus, constructed under the combination system, and must take the advance in making homes the most desirable dwelling place in zero weather, and will in the near future take the lead upon the subject of comfortable and effectual heating.

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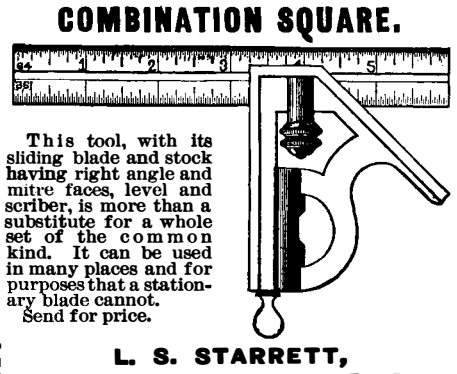

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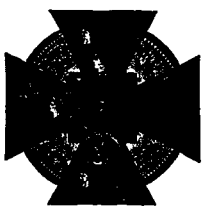

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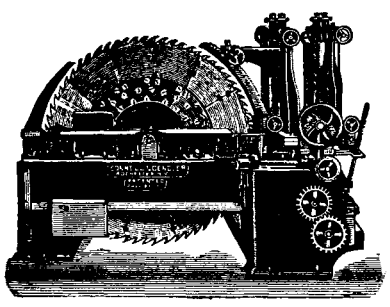

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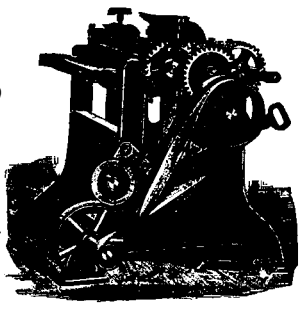

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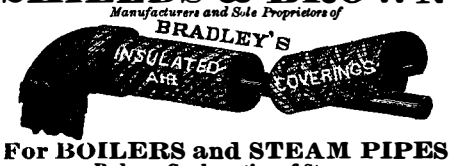

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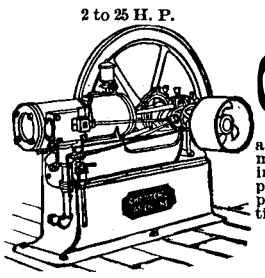

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