SCIENTIFIC AMERICAN

ARCHITECTS AND BUILDERS EDITION.

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RESIDENCE, CORNER OF EIGHTH AVENUE AND BERKELEY STREET, BROOKLYN.

This house was designed for Mr. H E. Beguelin by F. Carles Merry, architect, of New York.

It is built mainly of brick with terra cotta trimmings, except the first story front on Eighth Ave., which is of Euclid stone.

RESIDENCE CORNER EIGHTH AVENUE AND BERKELEY STREET, BROOKLYN.

F. CARLES MERRY, ARCHITECT.

The entrance doorway has been treated in Romanesque.

The entrance hall and staircase are designed in a very original manner, in "Old Colonial," of cherry.

The parlor is finished in mahogany. The dining room is of oak, while the library walls and ceiling are entirely wainscoted in oak of very pleasing effect. The upper stories are finished in cherry and ash.

The building, which is elaborately decorated throughout, has a frontage of 40 ft. on Eighth Ave. and of 47 ft. 6 in. on Berkeley Place, and was erected at a total cost of $35,000.

Seven-foot-four Circulars.

It takes perfection to bar out improvement, and it is often taken for granted that an article of manufacture is perfect when it is not. The circular saw is a thing of slow growth. Various trade papers insist in keeping on deck an item to the effect that a man named Cummings, whose remains rest near Kalamazoo, Mich., was the inventor of the circular, notwithstanding it was invented before Cummings was born, and possibly before Cummings' father was born. It is within forty years, however, that the circular has become a success in the saw mill. Within that period circulars placed in Michigan mills were not satisfactory, and were made to give place to the straight saw. At first the thicker the saw, the better. It had never entered the mind of man that a thin saw would answer the requirements. Gradually saws of larger diameter and thinner gauge were made. It was discovered that speed gave backbone to a saw. The latest achievement in saw making is a circular eighty-eight inches in diameter—the largest ever made—and of eleven gauge. It was manufactured by E. C. Atkins & Co., Indianapolis, Ind., and is in use in the mill of Hurd & Co., at, or near, Xenia, Ind. One may properly ask, What next? Will the time come when circulars will be made so large that no double or three saw rigs will be necessary for converting the monstrous redwood logs into lumber?—*N. W. Lumberman.*

MARBLE may be stained or dyed of various colors by applying the solutions mentioned below to the stone, made sufficiently hot so that the liquid will just simmer on the surface. Blue, tincture of litmus; brown, tincture of logwood: crimson, a solution of alkanet root in oil of turpentine; green, tincture of sap green; red, tincture of dragon's blood or cochineal; yellow, tincture of gamboge or turmeric. Success in the application of the colors requires considerable experience.

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

NEW YORK, AUGUST, 1887.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

$2.50 a Year. Single Copies, 25 cents.

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

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

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All who contemplate building or improving homes, or erecting structures of any kind, have before them in this work an almost *endless series of the latest and best examples* from which to make selections, thus saving time and money.

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

(Illustrated articles are marked with an asterisk.)

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A $4,000 RESIDENCE AT FLUSHING N. Y.

SPECIFICATIONS.

Quality.—All the material used to be of good quality, free from all defects impairing its strength or durability.

All timber, except where otherwise specified, to be of good, well seasoned spruce.

Sizes.—Girders to be 6"×10", flush with top of beams. Sills to be 3"×8". Plates and interties, 4"×4". Posts to be 4"×6". First and second floor beams, 2"×10". Third tier, 2"×9". All 16" on centers. Rafters, 2"×6"; hip and valley rafters, 3"×8"; 24" on centers; all studding, 2"×4"; 16" on centers. Bearing strip, 1¼"×6". Ridges, 2"×8".

Framing.—All studding placed 16" on centers. All door and window studs to be doubled, bridged once on each floor. Partition studs to rest on partitions below, where possible, and not on the floor beams. Spike a 2"×4" beam to side of girder for floor beams to reston, and spiked well thereto. All headers and trimmers to be doubled; all beams under partitions running parallel with same to be doubled; the entire frame to be mortised and tenoned and pinned together.

Sheathing.—The entire frame, from wall to plate, to be sheathed with 1" matched hemlock boards, put on diagonally, and well nailed at every post and stud; this to be covered with No. 30 manila building paper, well lapped, and laid under door, window frames, and corner boards.

Flooring.—First and second story floors, except kitchen and bath room, to be laid with narrow pine flooring, well driven together and nailed to each and every beam. Attic to be pine, 9½" wide, well driven together, and nailed to every beam. Kitchen and bath room to be laid with white maple, 2½" face.

Siding.—Cover entire building, except where otherwise shown in drawings, with sound and clear No. 1 beveled clapboards, not less than 1" lap, nailed every 16", and set nails for putty. Do all necessary furring; set grounds for all doors. Shingle the vertical sides where shown with XXX 18" pine shingles, laid not more than 5" to the weather.

Roof.—The roof is to be sheathed with rough hemlock boards; valley and gutters to be lined with the best I. C. charcoal tin; all joints to be carefully soldered. Do all necessary flashing around chimneys, dormers, bay windows, porches, etc., also counterflash all chimneys and junctions. Slate the entire roof with 16"×8", royal black slate, not less than 3" lap. Put up where required three tin leaders, connected with drains where directed.

Piazza.—The sills and bearing timbers for porches to be 3"×6", floor beams 2"×6", placed 20" from centers, notched into the sill and well nailed; the floors to be 1" thick, 4½" wide, laid in white lead and blind nailed. Steps to have 1¼" treads and ⅞ risers; the roof to be ceiled and tinned; columns, plates, balusters, ceiling, etc., to be white pine, worked and trimmed as per details; the piazza to be ceiled on the under side, part raked and part on level, with 3" beaded ceiling, ⅞ thick, beams, "×4".

Blinds.—All windows, except cellar and attic, to have 1¼ outside blinds, made, hung, and fastened in the best manner, painted at the factory three coats. The bay in reception hall, dining room bay, parlor bay, and bay over hall to have Venetian blinds, with cornice made of stained wood, hung complete.

Exterior.—The water table, corner boards, cornice, window frames, bay windows, porches, and all other exterior ornamental work to be made of the best quality of white pine, in accordance with the drawings and details.

Window and Door Frames.—Window frames to be made for 1½" double hung sash, with 1¼" pulley and hanging stiles; 2" sills and ⅞ subsills; 2" axle pulleys, stops, etc., all complete. Small cellar frames to be made with rabbeted frames, cased inside, and hung at top with 3" narrow butts and proper fastenings.

Door frames to be made of 1¼" plank, with rabbeted jambs; outside doors to have 1¼" outside casings.

Sashes.—All sashes, except cellar, to be 1½" thick, dimensions and number of lights as shown in drawings; to be glazed with second quality French double thick glass; cellar to be glazed with third quality. The double hung sash to have best Russian hemp cord, proper weights, and Berlin bronze sash fasts, size and number as per plans. Window on stair platforms to be stained cathedral glass, leaded in, designs selected by the owner, to cost $1.25 per square foot.

Doors.—The front doors to be 2" thick, moulded as per plans, upper panels to be glazed with stained cathedral glass, to cost $1.25 per sp. ft., selected by the owner, hung with 4½" lacquered loose butts, fastened with 4½" mortise lock; night latch attachment, brass face, wooden furniture and escutcheons, brass flush bolts top and bottom. Sliding doors, to roll on Hatfield's patent 4" anti-friction sheaves, astragal face mortise locks, flush trimmings, bronze or brass. Closet doors 1¼" thick, paneled and moulded one side, hung with 4" lacquered butts, fastened with 4½" mortise lock, wooden furniture, etc., for principal part of first story and hematite for second floors, white porcelain for kitchen, closet doors to have reverse bevel rim locks. All doors, where needed, to have rubber-tipped base pins and ash saddles.

Stairs.—Build the stairs as shown on the plans, from first to second story with 1¼" treads, ⅞ risers, and 1¼" strings, to be put up in the best manner; the steps to be wedged with glue and supported on strong carriage timbers. Newels, balusters, and hand rails to be made of cherry, as per details, all the treads and risers to be tongued and plowed together. Cellar stairs to be rough spruce plank steps housed into strings. The flight from second to third stories to be inclosed, as shown, with door at bottom hung complete. Fur off all soffits of stairs complete for lathing.

Trimmings.—The architraves for all doors and windows throughout the house to be made 5" wide moulded on face. First and second stories to have turned corner blocks, the bases to be 7½" wide, moulded on top. All to be of well seasoned and clear white pine.

Pantries.—Kitchen pantry to be fitted up with wide shelves on two sides as directed. China pantries also to be fitted up with shelves, doors, and drawers complete, as directed. Bed room closets to have one shelf with strip fitted with japanned hooks for coats and hats. All these shelves to rest on rabbeted cleats all around.

Kitchen Wash Trays, etc.—Wainscot kitchen 3' 0" high, 4' 0" behind sink, with narrow beaded yellow pine ceiling, with nosing and cove finish. Furnish and fit up in kitchen two wash trays made of 1½" clear lumber, dadoed together with white lead, covers hung complete.

Bath Room.—Bath tub to have ash top; skirt the front of bath tub with narrow beaded ceiling. Wainscot bath room 2' 0" above the fittings all around, nosing and cove finish, ceil in front of wash bowl, and hang door complete, with catch. Put up water closet, with seat riser, and lid hung with brass butts.

Grading.—The owner will do all grading.

Mantels.—The dining room, parlor and one bedroom on second floor to be furnished with mantels and grates, of the prime cost in all, including setting, of $175, to be selected by the owner.

Cutting, etc.—Furnish and put up all necessary pipe boards for plumber to screw his pipes to, do all necessary cutting for gas fitters, plumbers, and heater men.

Picture Moulding.—Put up picture moulding in principal rooms, first and second stories and halls, wood to match that of rooms, 1½" wide.

Back Panels.—All the windows on the principal part of first story and stair platforms to have panel backs and moulded stool, all other windows to have neat moulded stools and aprons. Furnish and hang a 5" gong bell in front hall complete. The pull to match front door knobs.

Cellar Door.—Put up outside cellar door as shown, of narrow beaded ceiling, put together with wrought nails, hung and locked complete.

Hang Shelf.—Put up hang shelf in cellar where directed, of wide ceiling and good strong hangers, 2' 6" wide by 8' long.

Coal Bins.—Put up coal bins where shown or directed, of planed hemlock boards and 3"×4" stanchions, one bin for furnace coal and one for range, each to have small door for access.

Air Box.—Build cold air box as directed by the furnace man, of wide pine ceiling boards, with wire over entrance space through wall.

Painting.—All the exterior woodwork usually painted to be painted two good coats of white lead

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and linseed oil 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 of Prince's metallic paint; also paint the chimney two coats. All the colors to be selected by the owner. The blinds will be painted at the factory. The interior will be wood filled with Wheeler wood filler, then two good coats of hard oil finish. The first story and main stairs and balusters and rails will be rubbed down to a smooth surface. The second story will not be rubbed down. All the doors, saddles, hearth borders, and hard floors will be oiled; all sash and outside doors must be painted on top and bottom. The painters must follow immediately after the carpenters.

MASON'S SPECIFICATIONS.

Excavations.—Proper excavations of depth as shown on plans, or the cellar proper, to be about 4½′ deep, all piers and foundations 2′ 6″ deep. Stoop foundations 2′ 6″ deep, also footing course under foundations 4″ deep. Earth and rubbish to be removed where directed. All water that may accumulate during the excavation, from any cause whatever, to be removed at once and the premises kept dry.

Stonework.—The cellar walls to be hard burnt brick, those generally used in the vicinity, 8″ thick to the full height of cellar, which will be 7′ in the clear, and to be laid as shown in cement and lime mortar, with sharp sand, all to be neatly pointed inside and out, every seventh course to be headers. All angles and corners to be perfectly plumb and the walls level on top. Cement the entire cellar bottom with best Rosendale cement, gravel, and sharp sand, at least 3″ thick, well smoothed over on top, the cellar wall to be faced on both sides, the outside to be cemented from bottom up, foundation under walls to be solid grouting 4″ deep.

Brick Piers, etc.—Build brick piers where shown on plans, of good hard burnt Jersey brick, of dimensions indicated on plans. All piers outside to be excavated for at least 2′ 6″ deep, and filled in with small stone and well hammered down to a solid bed.

Stoop Stones.—Put down stoop stones where shown, with foundations at least 2′ 6″ deep and filled in with small stone; on this lay flags in two lengths and 2′ wide, to be full length of each and every stoop. Turn trimmer arches to all fireplaces. Furnish and set bluestone sills to all cellar windows. Furnish and set bluestone steps where shown with brick risers and stone cheeks and copings.

Chimneys, Flues, etc.—Build chimneys as shown on plans, of good hard burnt brick. The joints of all flues struck smooth and capped with bluestone caps, 3″ thick, with holes cut in. The kitchen fireplace jambs to be built of Trenton front brick, laid in red mortar. Furnish and set bluestone shelf, and hearth rubbed smooth for kitchen. Furnish and set three thimbles where directed.

Drain Pipe.—Connect a 4″ drain tile from inside of cellar wall to cesspool. Run 4″ drain tiles from leaders and connect with cesspool pipe at the nearest point.

Vault.—Excavate and build privy vault where directed, of brick 4′ deep, and to project back 2′ in rear, this opening to be covered with a box neatly fitted.

Plastering.—The entire house to be lathed and plastered, except cellar. The attic rooms and closets to be laid on with one coat and hard finished; all the others to be regular three coat work and all hard finished, except dining room, parlor, library, first and second story hall, also soffits of stairs. These to be sand finished in the regular way, and all done in the very best manner, using the best materials. The mortar to lie at least one week before using.

The mason will make all his work good after all other trades are done, and leave the building broom clean immediately after the plastering is done.

This specification is intended to cover all mason's 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.

PLUMBER'S SPECIFICATION.

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

Soil.—Furnish and connect with the soil drain in cellar a 4″ cast iron soil pipe, and run same size up and out of roof at least 4′, and cap the same with the "Smith" patent ventilating cap. Use Y branches for all waste connections. All the iron soil pipes 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 the lead pipes to be soldered to it with wiped joints.

Boiler.—Furnish and put up where shown on the plans a 35 gallon round head, heavy pressure copper boiler, and provide with draw cock for emptying the boiler, and shut-off cocks for shutting off water from second story, and provide with circulating pipe, complete. Connect boiler draw cock with the sink waste, have a ⅝″ stop cock on the supply pipe and combined safe and vacuum valve on top of the 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 cocks. Where pipes will not drain dry, put in small pet cock. Run a ⅝″ *aaa* lead pipe to and through cellar wall to a point where directed, and furnish and fit a stop cock both on the inside and outside of building.

Sink.—Furnish and set up where shown in the kitchen an 18″×30″ Mott's Eastlake galvanized iron sink, with back air chamber and iron legs, and supply with hot and cold water through ⅝″ *aaa* lead pipe and Fuller cocks, and have 1½″ X lead waste pipe, properly trapped 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, 5′ 6″ 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 1½″ X waste, and properly trapped 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 plan a 14″ marble Italian ware wash bowl, with marble countersunk top and sub-bases, 10″ high Supply with hot and cold water through ½″ AAA lead pipe and nickel plated Fuller patent basin cocks, to have 1¼″ X lead waste properly trapped and connected with the soil, to have nickel plated chain and stay and plug.

Air Chamber.—No cocks to be placed at the end of a line, but the pipe to be extended so as to form an air chamber.

Closet.—Furnish and set in the bath room where shown on plans, supplied with water through 1¼″ pipe from cistern above, an inodorous porcelain wash out closet with suitable size cistern. The cistern to have the flush tank attached. Supply 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 enamel drip tray.

Safe Pans.—The bath tub, bowl and closets are to be provided with 2½ 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 patent cocks, with flange and thimble. Provide with a 2″ main waste pipe, properly trapped and connected with main soil pipe, also all necessary plugs and chains and flanges, also provide on end of pipe a cleaning cap.

Ventilation.—Every trap through the house to be separately and independently ventilated from the crown by the same size as the 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 and set in kitchen a No. 70 Boynton's "Newport" range. Connect water back to boiler, fit smoke pipes, etc., complete; also furnish and fit in sheet iron throat pieces in chimney, with hole and slide complete.

Heater.—Furnish, and erect in a good, substantial, and workmanlike manner a No. 8 "Economy" warm air heater, with double casings, of J. F. Pease Furnace Co.'s manufacture, 206 Water Street, New York, to heat the first and second floors at 70° F. Provide Tuttle & Bailey's black japanned bordered registers of the following sizes: Hall, 10″×14″; parlor, 9″×12″; dining room, 9″ × 12″; chambers (three), 8″×10″; bath, 7″×10″.

The smoke pipe to be of galvanized iron, and all tin pipes to be IX bright charcoal tin. All tin pipes to have proper dampers near furnace, also patent damper in smoke pipe with regulating chains. Finish and complete the apparatus in all respects, and leave the same in perfect working order.

BILL OF MATERIALS.

1	girder	6″×10″×20′ =	100	sq. ft.
1	"	6″×10″×16′ =	80	"
1	piece	3″× 8″×19′ =	38	"
3	"	3″× 8″×14′ =	84	"
4	"	3″× 8″×18′ =	144	"
3	"	3″× 8″×16′ =	96	"
1	"	3″× 8″×19′ =	38	"
1	"	3″× 8″×13′ =	26	"
1	"	3″× 8″×14′ =	28	"
1	"	3″× 8″×20′ =	40	"
1	"	3″× 6″×21′ =	32	"
1	"	3″× 6″×19′ =	29	"
1	"	3″× 6″×22′ =	33	"
1	piece	3″× 6″×16′ =	24	sq. ft.
7	"	2″× 6″×16′ =	112	"
30	"	2″× 6″×18′ =	540	"
36	"	2″× 6″×12′ =	432	"
6	"	2″× 6″×22′ =	132	"
5	"	2″× 9″×18′ =	135	"
13	"	2″× 9″×26′ =	507	"
11	"	2″× 9″×24′ =	396	"
3	"	2″× 8″×12′ =	48	"
1	"	2″× 8″×22′ =	29	"
1	"	2″× 8″×16′ =	21	"
10	"	4″× 4″×12′ =	160	"
1	"	4″× 4″×20′ =	27	"
3	"	4″× 4″×15′ =	60	"
7	"	4″× 4″×16′ =	147	"
6	"	4″× 4″×14′ =	114	"
2	"	4″× 4″×18′ =	48	"
11	"	4″× 6″×22′ =	484	"
13	"	2″×10″×18′ =	390	"
32	"	2″×10″×26′ =	1,387	"
6	"	2″×10″×24′ =	240	"
6	"	2″×10″×12′ =	120	"
1	"	2″×10″×20′ =	32	"
2	"	2″×10″×17′ =	58	"
6	"	2″×10″×14′ =	140	"
4	"	2″×10″×28′ =	187	" = 6,730 sq. ft. At $19 per M, $127 87
300	pieces	2″×4″×12′ = 2,400 sq. ft.		
300	"	2″×4″×13′ = 2,600 " = 5,000 sq. ft. at $14 per M,		70 00
75	lineal feet, 1¼″×6″ rough spruce			1 50
3,000	feet matched hemlock for sheathing bay and piazza roofs, at $19 per M			97 00
1,850	"	6″ siding at $25 per M		46 25
1,700	"	rough sheathing for roof, at $14 per M		23 80
1,700	"	slate, main roof, at 7 cents per foot		119 00
2,000	"	No. 30 manila paper at		10 00
135	"	main cornice ready to put up, at 25 cents per foot		33 75
400	"	1¼″×5″ corner boards, etc., at 4 cents per foot		16 00
175	"	short gable cornice ready to put up, at 8 cents		14 00
500	"	vertical shingling, 6 cents per foot		30 00
125	"	band cornice ready to put up, at 8 cents per foot		10 00
65	"	piazza plate and cornice, at 18 cents per foot		11 70
120	"	water table at 6 cents per foot		7 20
65	"	piazza facia and cove, at 4 cents per foot		2 60
28	"	front piazza rail, at 35 cents per foot		9 80
15	"	back piazza rail, at 20 cents per foot		3 00
28	"	front front piazza filling, at 12 cents per foot		4 56
12	brackets	front piazza, 12″×12″×2″, at 30 cents each		3 60
4	"	back piazza, 12″×12″×2″, at 30 cents each		1 20
2	short posts, back stoop, at 75 cents each			1 50
3	brackets for bay windows, at $1 50 each			4 50
2	"	front piazza gable, at 75 cents each		1 50
1	back piazza column			1 50
5	front piazza columns, at $1 75 each			8 75
3	stoops, ready to put up			13 00
325	feet piazza floor, at $35 per M			11 37
325	"	piazza ceiling at $35 per M		11 37
	Outside cellar door, ready to put up			4 00
45	feet lattice			12 00
6	finials, at 75 cents each			4 50
220	feet 20 ft. tin gutters and valleys, at 10 cents			22 00
300	"	tin roof, at 6 cents per foot		18 00
75	"	3 ft. tin leader, at 12 cents per foot		9 00
8	cellar windows complete, with sash			10 00
17	first story windows complete, at $9			153 00
	Extra for Venetian blinds			30 00
15	second story windows complete, at $8 25			123 75
	Nails, etc			35 00
11	third story windows complete, no blinds, $5 each			55 00
12	first story doors, complete, $6 50			78 00
10	second story doors, complete, at $5 50 each			55 00
3	third story doors, complete, at $3 50 each			10 50
300	feet picture moulding, at $1 50 per 100 feet			4 50
3,000	"	flooring for three floors, at $25 per M		75 00
275	"	yellow pine floor, at 3½ cents per ft		9 62
40	"	wainscot for kitchen, at 20 cents per foot		8 00
30	"	wainscot for bathroom, at 20 cents per foot		6 00
	Prepared material for two pantries			20 00
	Prepared material for four closets			8 00
	Main stairs			60 00
	Attic stairs			15 00
	Cellar stairs			4 00
	Prepared materials for bathroom			6 00
	Mantels			75 00
				$1,607 19

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Labor, putting up work	$600 00
Painting	160 00
Mason	750 00
Plumbing and gas	320 00
Heating	195 00
	$3,632 19

A TWELVE HUNDRED DOLLAR DOUBLE HOUSE.

The estimate for this house, in this vicinity, is $1,200—with superior finish, $1,400—but its cost will be less in some other places, where materials are cheaper.

SPECIFICATIONS.

The specifications and drawings are intended to co-operate, so that any work shown on the drawings and not mentioned in the specification, 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 extra charge.

The drawings taken in connection with this specification are intended to provide for the completion of the entire carpenter work, mason work, tinning, painting, etc., as well as everything mentioned in the specification.

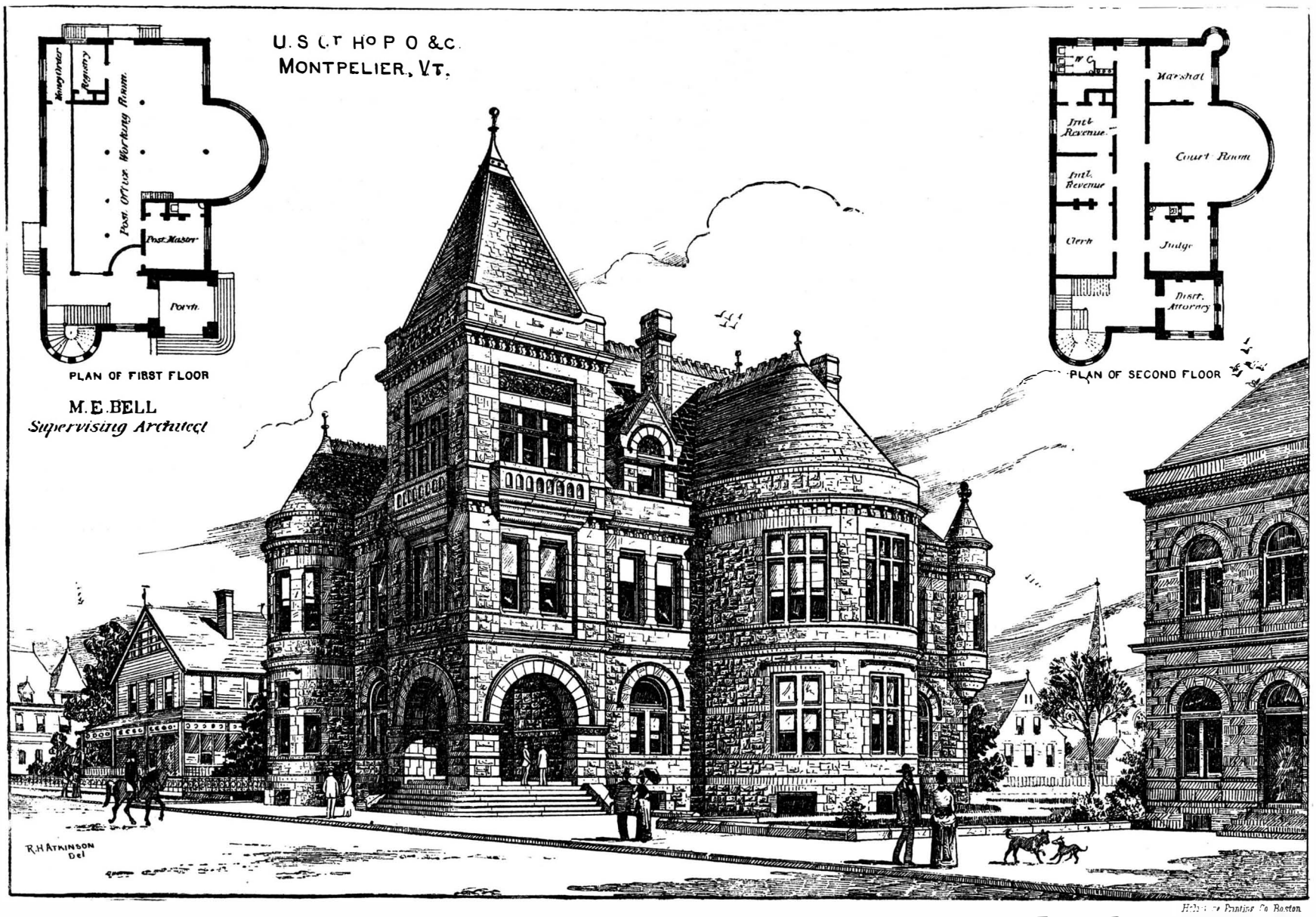
Casings for doors and windows, ⅞″×4″; door jambs, 1¼″ thick, rabbeted. The casings to have ½″ bead on front edge; all the windows to have neat moulded stools and aprons. All windows to have stop beads, and to be hung on weights and cords. Sash, 1¼″ thick; number of lights, etc., as per plan, second quality French sheet glass. All room and front doors to be 1½″ thick, all other doors 1¼″ thick, and all four paneled, flush moulding. Build the stairs as shown, ⅞ treads, strings, and risers. Put down ash saddles to all doors. The upper flight of stairs to have hand rail; also level rail on second story. Rail, 2×3, moulded; balusters, ⅞×⅞ . newel, 4×4; all of ash. All 1½″ doors to have 4″ mortise locks; other doors to have 5″ rim locks. Put in shelving as shown, ⅞″ lumber, all resting on rabbeted cleats. Bedroom closets to have strips under shelves, with wardrobe hooks screwed on same; all windows to have approved window fastenings. Kitchen pantries to be five shelves high. Stoop floors to be ⅞″×4½″ white pine; porch ceiling, ⅞×4½ white pine, beaded. Build privy of wide ceiling boards, with seats, door, and a sash complete, with wood box under same, 3′ deep.

All the windows, first and second stories, to have outside rolling blinds, hung and fastened complete,

245 ft cornice, per lineal ft	$0 12	$29 40
4 stoops, ready to erect		12 00
4 circles for piazzas		4 00
2,500 ft. flooring, per M	20 00	50 00
4 cellar windows, complete		4 00
14 first story windows, complete, each	5 50	77 00
10 second story windows, complete, ea	5 50	55 00
16 first story doors, complete, each	4 25	68 00
14 second story doors, complete, each.	4 25	59 50
Main stairs, complete		25 00
Cellar stairs complete		3 00
400 ft. surbase, per ft	3	12 00
Prepared materials for 2 pantries, 2 washrooms and 8 closets		10 00
Mantel shelves		2 50
Labor for constructing work		250 00
Mason work, complete		423 43
Painting		120 00
Total		$1,400 00

THE COURT HOUSE AND POST OFFICE, MONTPELIER, VT.

We give from the *American Architect* a view of the new Court House and Post Office, Montpelier, Vermont.



THE NEW UNITED STATES COURT HOUSE AND POST OFFICE, MONTPELIER, VERMONT.

MASON'S SPECIFICATION.

Excavation.—Excavate for cellar under rear part of house full width and as marked on cellar plan. The balance to have a trench wall, at least 2′ 6″ deep below grade. The cellar walls and underpinning to be an 8″ brick wall from bottom up, and the cellar to be 6′ 3″ high in the clear. All to be hard burnt brick. Build the chimneys, as shown on the plans, of hard burnt brick. Plaster the entire two stories, including the closets, with two coat work, skin finish. Furnish and set bluestone sills to all of the cellar windows.

CARPENTER'S SPECIFICATION.

All timber throughout to be pine. The floor beams, 2×8, 16″ on centers; rafters, 2×6″, 24″ on centers; studding, 2″×4″, 16″ on centers; partitions, 2″×4″, 16″ on centers; shingles for vertical sides and roof to be 18″ pine, laid on 1″×2″ shingle lath. The siding to be narrow novelty. Corner boards, 1¼″ ×3″; water table, 1½″×5½″; window frames, 1¼″×4″; outside casings; ⅞″ jambs; 1¼ main sill; ⅞″ subsill; and to have pockets and pulleys; door frames made in the usual way. Outside casings, 1¼″×4″, and 1¼″ jambs. Stoop treads, 1½″; risers, ⅞″; piazza columns, 5″×5″, boxed. Piazza rail, 3″×4″; balusters, 1¼″×2″; outside cellar steps, 2″×10″, pine timber. Outside cellar door to be made of wide ceiling boards with battens hung, and have padlock. Form cornice as shown. Gutter and valleys to be lined with tin 14″ wide; put up galvanized gutters where shown. Put in furring where required. Floors to be of matched pine boards. Bases, ⅞×5″, beaded.

when shut or open. The entire house to be sheathed with ship lapped sheathing, well nailed; put tar paper between ship lap and siding.

PAINTING.

Paint the entire house, inside and out, including blinds, chimneys, two coats of good ready mixed paints, of such colors as may be selected. All sap and knots to be shellacked before trimming is done. Putty up all nail holes, etc., complete; paint all tin work two coats of Prince's metallic mineral paint; also paint privy same as house.

BILL OF ESTIMATES.

Lumber.			
50	2″×8″×24′ = 1,600	sq. ft.	
2	2″×8″×22′ = 58	"	
4	4″×4″×16′ = 84	"	
28	2″×5″×16′ = 373	"	
18	2″×5″×12′ = 180	"	
14	2″×5″×20′ = 233	"	
13	2″×5″×12′ = 130	"	
4	3″×4″×24′ = 96	"	
2	3″×4″×22′ = 44	"	
200	2″×4″×16′ = 2,007	" = 4,805 ft. timber, at per M.	$1 40 $67 27
2,000 ft. siding, per M		20 00	40 00
14.000 1×8″ pine shingles, per M		4 00	56 00
500 1×2 shingle lath and furring, each.		4	20 00
130 ft. water table, per lineal ft		3	3 90
200 ft. double corner board, per lin. ft.		4	8 00

M. E. Bell, supervising architect. It is a pleasing design.

THE time which would be taken to discharge 500 gallons of water through a 1½ inch pipe 700 yards long, with a fall of 100 yards from inlet to outlet, is theoretically 16 minutes; but any inequality in the inside of the pipes, or minute obstructions, would increase the time.

PATENTS.

Messrs. Munn & Co., in connection with the publication of the **Scientific American,** continue to examine improvements, and to act as Solicitors of Patents for Inventors.

In this line of business they have had *forty years' experience*, and have now *unequaled facilities* for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. **Messrs. Munn & Co.** also attend to the preparation of Caveats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringement of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

We also send, *free of charge*, a synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world.

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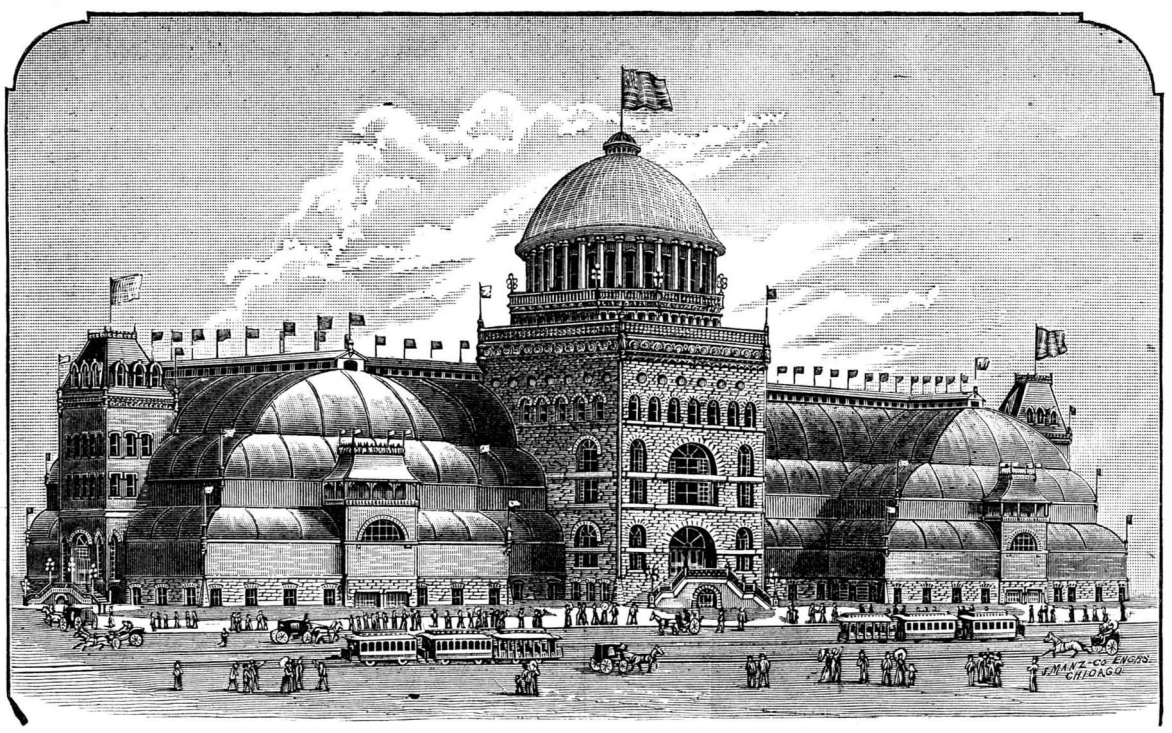
THE NATIONAL AGRICULTURAL EXPOSITION.

An enterprise has been inaugurated in Kansas City which bids fair to become *the* event of the year in the West. The National Agricultural Exposition is a legitimate outgrowth of the location of Kansas City at the gateway of one of the largest and most productive agricultural areas in the whole country The Missouri Valley has been properly styled "The Egypt of America," on account of its corn-producing proclivity.

The exposition will give great prominence to the products of agriculture, and all the counties of Kansas and Missouri and many Western States will have special pavilions in which their particular products will be displayed at the exposition. The great Western lines of railroad centering at Kansas City have manifested a desire also to have separate exhibits. In addition to these, the mining department will be amply represented in the minerals from Colorado and New Mexico. The machinery department will not be neglected either, but every effort is being put forth to exhibit all the leading articles of American manufacture, and a wide variety of machinery in motion will be displayed in this department. It will be seen, from the picture of the exposition building which is published in this issue, that a really fine exposition structure is being erected for the purposes indicated. It will be constructed of brick, stone, iron, and glass, and will resemble somewhat the old Crystal Palace of London.



THE NATIONAL AGRICULTURAL EXPOSITION BUILDING AT KANSAS CITY.

The officers of the exposition are: James Goodin, president; Hamilton S. Wicks, vice-president and secretary; John W. Ryckman, manager; and F. J. W. Hart, architect. The building is under contract to be completed September 1, and work is being conducted by day and also at night, by the aid of electric light. The doors of the exposition will be thrown open to the public on September 15, and it will continue thereafter for forty-five days, closing November 1. Kansas City will enjoy quite a carnival season this fall, for, in addition to the exposition, there will be a grand trades parade display, similar to the Veiled Prophets of St. Louis. The exposition grounds are located on the east side of the city, on a beautiful tract of ground, reached by ample street car, cable, and railway accommodations.

The building in which the exhibition will be held is now in process of construction. Its dimensions will be 450 by 255 feet, three floors, with domes, towers, and other elegant appointments. It will have over six acres of floor space for exhibition purposes, and will be constructed of brick, stone, iron, and glass, in a most substantial manner, and at the same time will be a superb architectural ornament. Several commodious annexes will also occupy contiguous positions on the exposition grounds.

These grounds are sufficiently centrally located, yet they have ample room to accommodate all the outside pavilions and agricultural machinery and cattle exhibits that may apply.

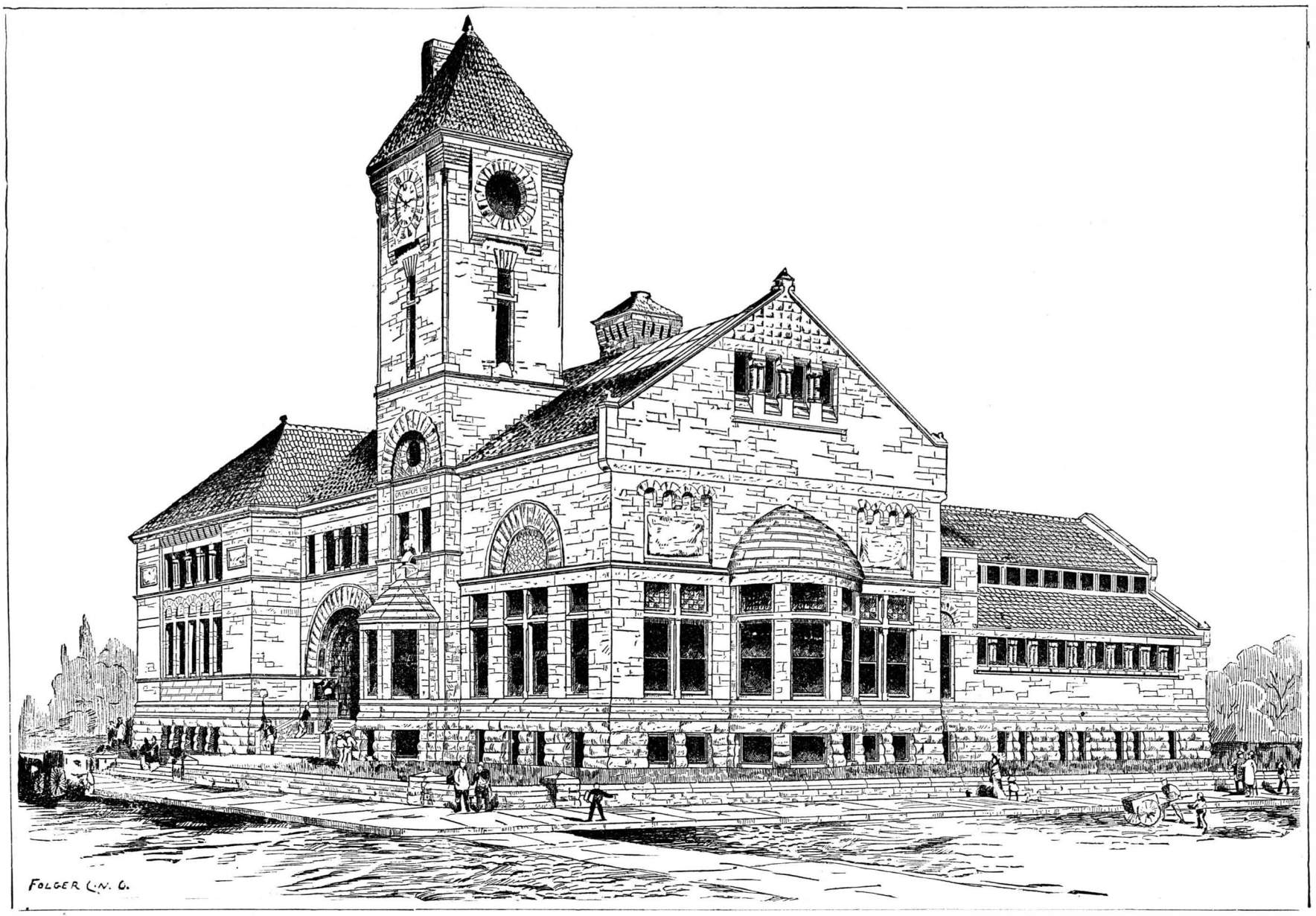
Items for Builders.

Three and a half barrels of lime will do one hundred square yards of plastering, using two coats. Two barrels of lime will do the same amount of plastering with one coat. One and a half bushels of hair will do a hundred square yards of plastering. One and a quarter yards of good sand will do a hundred square yards of plastering. One barrel of lime will lay one thousand bricks. Two barrels of lime will lay one cord of rubble stone. One half barrel of lime will lay one perch of rubble stone. One thousand shingles laid four inches to the weather will cover a hundred square feet of surface, and five pounds of shingle nails will fasten them on. One-fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding and matching. One thousand laths will cover seventy yards of surface, and eleven pounds of lath nails will nail them on. Eight bushels of good lime, sixteen bushels of sand, and one bushel of hair will make enough good mortar to plaster a hundred square yards. A cord of stone, three bushels of lime, and a cubic yard of sand will lay a hundred cubic feet of wall. Five courses of brick will lay one foot in height of a chimney. Sixteen bricks in a course will make a flue four inches long, and eight bricks in a course will make a flue eight inches wide and sixteen inches long.

THE CARNEGIE FREE LIBRARY, ALLEGHENY CITY, PA.

By the generous gift of Mr. Carnegie, the city of Allegheny is to be provided with a splendid library, and some of our architects have busied themselves in preparing designs for the structure. We present herewith the design of Mr. McLaughlin, for which we are indebted to the *Western Architect and Builder*.

It represents a noble edifice, and is highly creditable to the architect.



COMPETITIVE DESIGN FOR CARNEGIE FREE LIBRARY, ALLEGHENY CITY, PA.—JAS. W. McLAUGHLIN, ARCH., CINCINNATI, O.

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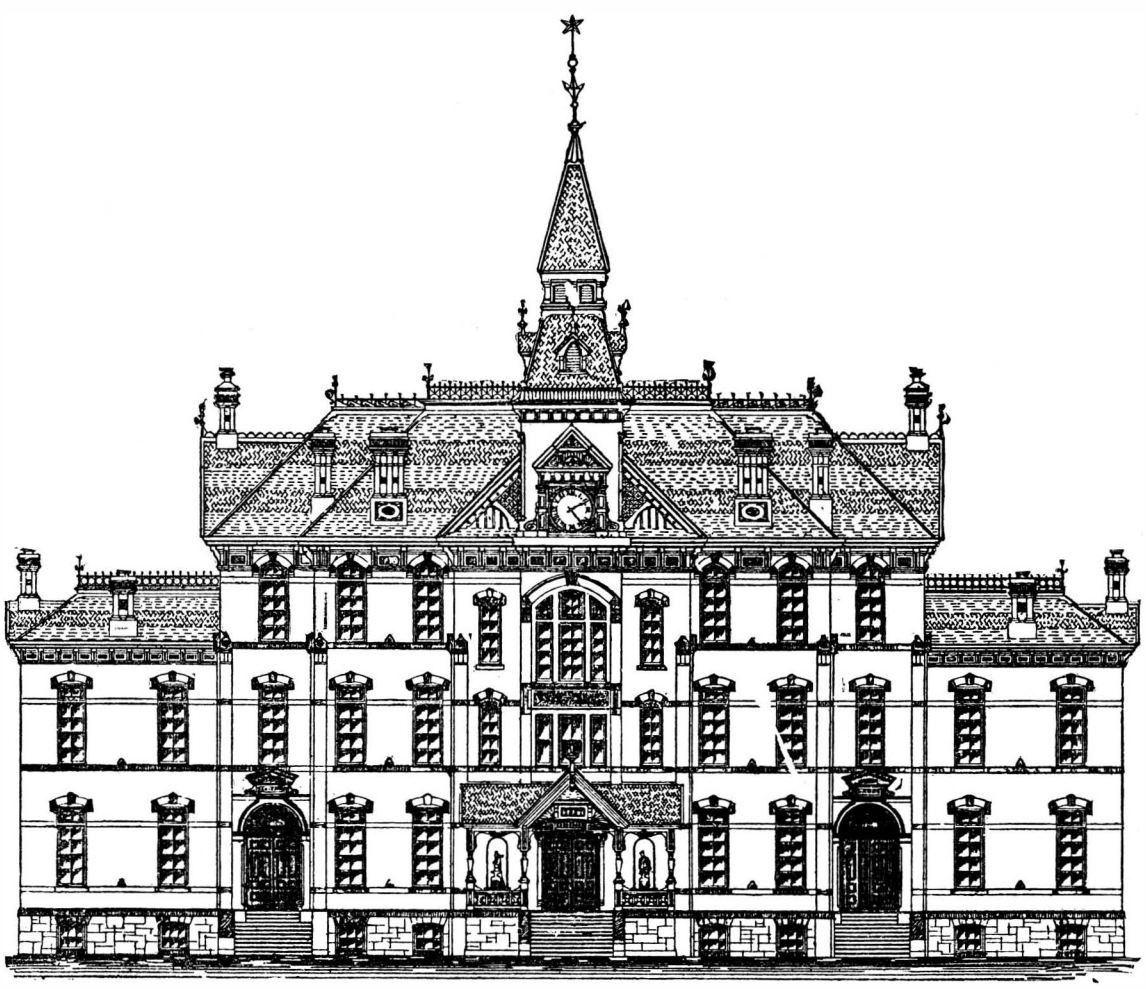
THE COGSWELL POLYTECHNIC COLLEGE.

A few weeks since we chronicled the fact that Dr. Henry D. Cogswell, of this city, had donated property worth $1,000,000 to found a technical school where our boys and girls may prepare themselves for the trades and vocations of life. On this page we give the elevation of the main building of this new institute of learning, the plans of which were drawn by Chas. Geddes, the architect. The structure will be of pressed brick with stone trimmings. It is to be located on the lot corner of Folsom and Twenty-sixth Streets, with a frontage of 245 feet on the first named street and 182 feet on the latter.

The building will be three stories high, and from its imposing and substantial appearance will be the most notable structure in the southwestern portion of the city. It will be 71 feet in width by 85 feet in depth, not including the projections. On each side will be a wing two stories in height, each 35×40 feet. The building will be surmounted with a high roof, covered with ornamental metal Queen Anne shingles, and have handsome cresting on the ridges. In front a high tower rises to the height of 127 feet, the apex topped with a revolving crystal star set in a copper pinnacle. On the face of the tower, above the third story line, will be the dial of a clock, and still lower down will be the name of the school. The main entrance is spacious and surrounded with a wide porch. On each side of the door is a niche for the placing of pieces of statuary. There are also two side entrances—one for boys and the other for girls. The main entrance porch is approached by a broad flight of stone steps. The main hallway is 10 feet wide, and opens into a cross hallway 12 feet wide, which crosses the building from end to end. From the cross hall, stairways lead to the second story. Stairs also lead to the stage at the rear and to the front of the assembly hall, in the story above. It will thus be seen that the means of egress are unusually excellent, there being three wide doorways from the ground floor to the street and two from the second story to the assembly hall.

There are to be ten classrooms, each 28×30 feet, four to be on the main floor and the other six to be in the second story. On the first floor, also, will be the offices of the president and secretary, a reception parlor, a library 16×28 feet, and a museum 20×28 feet, besides a number of dressing and toilet rooms. A spacious assembly hall occupies the entire third story. It is 68×70 feet in size and will have a seating capacity for 1,000. It will be used for the delivery of scientific and other lectures in connection with the regular courses of study in the school. This hall is to be handsomely furnished and provided with a stage with all the necessary adjuncts for completeness. All the rooms are well lighted, and every appliance known to modern skill will be introduced to make ventilation perfect. They are to be lighted with electricity, and electric bells and speaking tubes will be run throughout the structure.



THE COGSWELL POLYTECHNIC COLLEGE, SAN FRANCISCO.

A short distance in the rear of the main edifice will be another building, in which the shops and laboratories are to be fitted up. It will face to the north and be 152 feet in length by 40 feet wide, and two stories in height. The ground floor will be devoted exclusively to ironwork, both designing and moulding, having departments for filing, fitting, and chipping. A laboratory will be established in a room 35×40 feet, and fitted with all the essentials for thorough instruction in polishing, fitting, and setting up of various pieces and descriptions of machinery. A machine tool laboratory will be 40×40 feet in size, and completely equipped with iron lathes, a drill press, planers, and rollers, by the aid of which pupils will be instructed in the arts of turning, drilling, and planing iron, so that they will be qualified to construct tools and small pieces of machinery. A forging furnace and laboratory will also be established and occupy a space 40×40 feet. The founding laboratory will be 35×40 feet in size, and contain a furnace and other necessary appliances.

The second floor will be devoted to the chemical, wood, and physical departments. The carpentry department will be 40×35 feet, and be supplied with an extensive assortment of tools. A wood-turning factory will be 40×40 feet, and be supplied with lathes, a planer, a circular saw, a band saw, a mortise machine, a moulder, and several other machines. The remaining space on the floor will be at the disposal of the physical and chemical departments. One room, 20×20 feet in size, will be fitted up with shelving inclosed in a glass front, where all the philosophical apparatus will be kept that is used in experiments in chemistry and physical instruction. The furnaces in connection with this department will be in an adjoining room, 40×50 feet in size.

The department for the instruction of girls will be fully as complete in detail as that for the boys. Here instruction will be given in wood and metal carving, sewing, cutting, and fitting, as well as other mechanical studies. In the basement will be well lighted lunch rooms for the boys and girls; also rooms for the janitors and others who will reside permanently on the premises. There is also some additional space which may be utilized for class rooms or shops that may hereafter be required or found desirable. All the departments of machinery will receive motive power from a seventy-five horse power horizontal engine, which, together with the boilers, will be of the most approved pattern.

In connection with the instruction in the mechanical arts and sciences, a four years' course of instruction will be given to those pupils who may so desire. The course will include a thorough English education, together with German, Spanish, and French. Arithmetic, geometry, and algebra will be embraced in the English course, and special attention given to all branches that may in any manner be deemed essential to the many mechanical pursuits. A course will also be given in mechanical and architectural drawing, embracing both free hand and perspective. Business forms, single and double entry bookkeeping, telegraphy, phonography, commercial law and correspondence, will also receive special attention. A notable feature of the college will be its recognition of the coming education for the preparation of progressive teachers.

The school will be open to the boys and girls of this city and State who may have completed the third grammar grade in the public schools. Tuition will be absolutely free, the endowment of the college being fully provided for by the donation of its generous founder.

The cost of the buildings alone will be some $85,000, and the machinery and tools $25,000 or $30,000 more. The school will be under the personal management of James G. Kennedy, as president, and Mrs. M. E. Arnold, vice-president, who have already been engaged to fill those two important positions. Mr. Kennedy supervised all the plans of the building, and many details were suggested by him. As soon as the construction of the building is fairly under way, Mr. Kennedy will go East and visit institutions of a similar nature, study the methods of work, and ascertain just what will be needed in the shape of machinery and scientific appliances to make the school all that it should be, and all that its generous and thoughtful founder wishes to make it.—*Mining and Scientific Press.*

Roofing Slate.

The roofing slate quarried by E. J. Johnson at his quarry (the "Bangor Central"), situated at Bangor, Pa., has made such a high reputation for its superior qualities that he is compelled to largely increase the output in order to supply the demand for this brand of slate. If parties building will always insist on having "*Bangor Central*" roofing slate, they may rest assured they are securing the best quality of slate in the market.

Any information pertaining to slate roofing will be cheerfully furnished by Mr. Johnson. Prices will be quoted, delivered to any point in the United States.

All correspondence should be addressed to E. J. Johnson, 18 Burling Slip, New York.

A Woodpecker's Sugar Bush.

I have detected one of our yellow bellied woodpeckers, *Picus varius*, tapping a maple tree for the sake of the sap. Attracted to my window by a vigorous hammering, I saw a beautiful male bird sinking a shaft near the base of a large maple. It struck me as being a discouraging place to bore for grubs, as the tree was healthy and the sounds from the tapping gave no evidence of hollowness; so I thought at first it might be a case of misguided instinct, or perhaps merely an experimental bore. As soon as one hole was completed, another was begun, and by the time that was done, the sap had commenced to flow freely from the first. It was then I noticed that it was the sweet sap the fellow was after, and not with the hope of any other reward that the bore was made, for, as the sap flowed, it was sipped up, first from the first hole, and then from the second, and meanwhile, between drinks, the little fellow was vigorously at work upon a third excavation. When this was done, and all three taps flowing profusely, his sweet tongue was not yet sated, but his scarlet head was kept bobbing to and fro, sipping the sap from the three holes, while he energetically started a fourth. This completed, and all four taps well under way, his whole attention was, for a few moments, devoted to his sugar bush, until, at length satisfied, he flew off—possibly to get a pickle!—J. W. Clark, Albany, N. Y.—*Swiss Cross.*

Preservation of Woodwork.

It is said to have been settled by practical and repeated tests that petroleum is an excellent preservative for shingles, lattice work, the timber parts of tools and machinery, and all wood exposed to the weather. A producer and user of petroleum gives as the result of his experience the information that fresh, light petroleum, if applied warm, will penetrate dry wood almost as readily as water, and when it is thoroughly saturated the condition is permanent, water having no effect upon it, as can readily be conceived. He has never found a board or piece of timber about the petroleum works, which he has been running for years, where it came in contact with the oil, that did not remain sound; but where no oil had touched, there were decayed places, and the decomposition was rapid when it had once set in. A wooden storage tank, which was taken apart after eighteen years' service, exposed to all kinds of weather, did not show a rotten spot anywhere, every board being sound. Oil barrels and small tanks have been known to have been covered with a thin layer of earth, in one case for fourteen years, and to have come out sound. Where the sills of barns and similar structures have been saturated with petroleum, they have outlasted any other part of the frame. After the first two or three days it is said the application does not expose the wood to increased risk from fire.—*N. W. Lumberman.*

A Car Load.

An American car load of twenty thousand pounds will contain the following:

70 barrels of salt, 70 of lime, 90 of flour, 70 of whisky, 200 sacks of flour, 6 cords of wood, 15 to 20 head of cattle, 50 to 60 head of hogs, 80 to 100 head of sheep, 6,000 feet of solid boards, 340 bushels of wheat, 400 bushels of corn, 680 bushels of oats, 400 bushels of barley, 360 bushels of flaxseed, 360 of apples, 430 of white potatoes, 1,000 of bran, 130 to 190 of eggs, and 200 kegs of nails.

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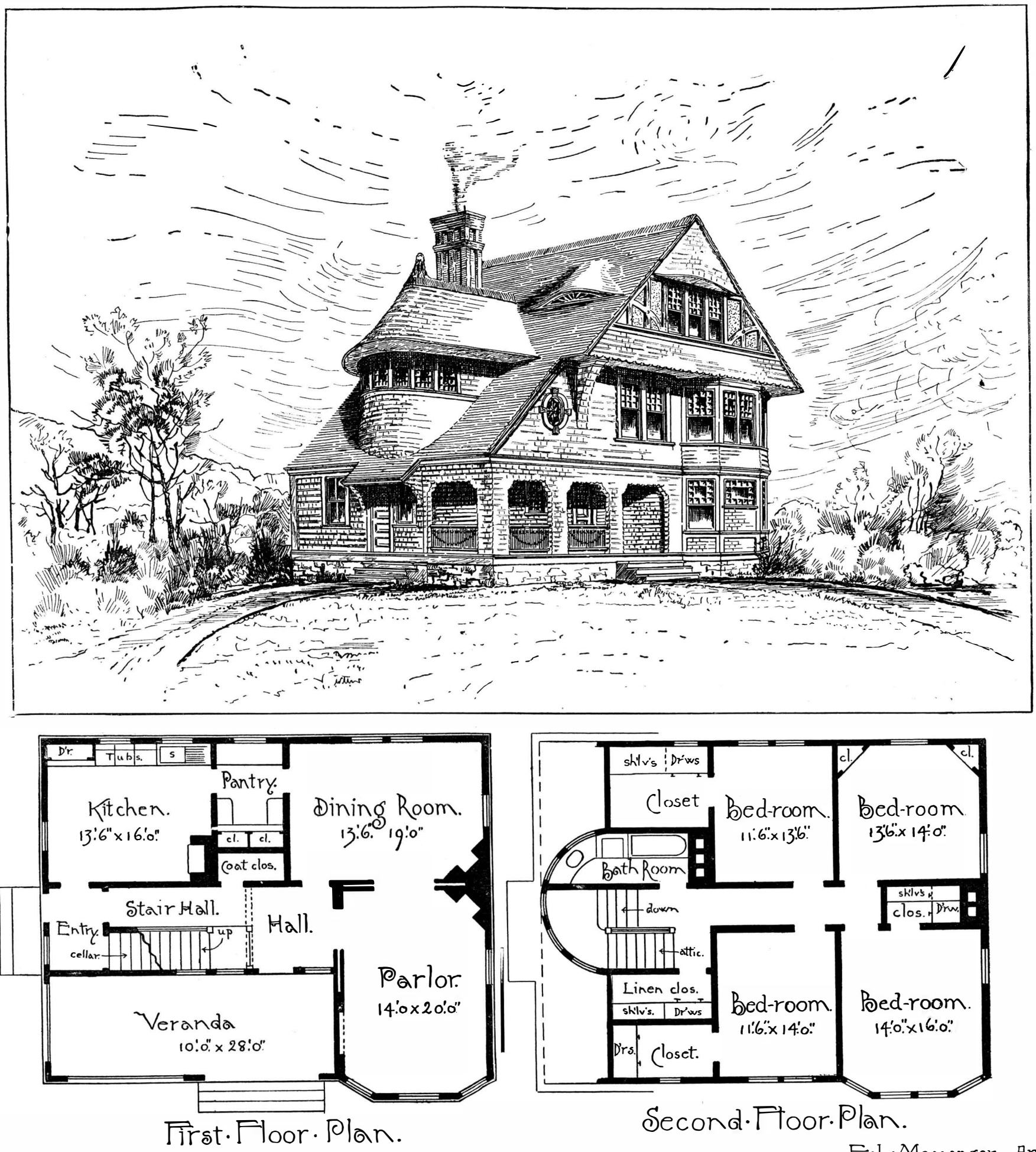
A FORTY-FIVE HUNDRED DOLLAR DWELLING.

We give the perspective and plans for a house costing about $4,500, designed by E. L. Messenger, architect, Orange Valley, N. J. Is a convenient and comfortable dwelling.

Sand in Plaster.

In Paris the mode of using plaster is to employ it pure and free from mixture. The very low price at which it is sold and the comparatively high price of sand dispense with the motives of economy which render mixtures almost indispensable in our case. While the practice in France is to use plaster pure, I am disposed to think that the mixture of sand, so far from being prejudicial, is even desirable, if confined within reasonable limits. We find that in reassuming the state of hydrated sulphate of lime the plaster goes through an imperfect crystallization, and this action is accompanied by a singular rearrangement of the molecules. This causes the plaster to swell when used alone, and to such an extent that it is impossible even to finish a ceiling close up to a wall at once. Now, the introduction of a body so full of inequalities as the coarse, sharp sands must afford room for the free action of this expansion, and, at the same time, the facets of the sand must offer, as it were, nuclei which cannot but be favorable to the crystallization. It is, doubtless, on these principles that we can explain the superiority of the plaster containing wood breeze, which does become harder than the purer plasters if used alone. Too large a proportion of sand should be avoided; but very fair work can be executed even with a mixture in the proportions of two of sand and one of plaster. Under any circumstances the finishing coat should be pure. Subsequent experience will decide whether the use of two materials of this kind does not expose the work to unequal contractions, likely to cause fissures or cracks.—*G. R. Burnell.*



A FORTY-FIVE HUNDRED DOLLAR DWELLING.

MESSRS. MUNN & CO., SCIENTIFIC AMERICAN office, 361 Broadway, N. Y., are assisted by able architects in the preparation of plans and specifications for all descriptions of buildings. Terms very moderate. We aim to make our estimates accurate and our plans complete, so that when placed in the builder's hands no difficulty is experienced in the construction. Our work goes to all parts of the country, and gives very general satisfaetion. We shall be pleased to hear from those who contemplate building.

One Safe Theater.

The new Flemish theater in Brussels will afford every guarantee of safety which the most timid playgoer could desire. The materials employed in its construction are stone and iron; and, though it will be impossible to dispense with woodwork altogether on the stage, all the timber used will first be rendered absolutely incombustible. Two broad flights of stairs, one at each side of the main entrance, lead to the grand circle and the *foyer*, which are on the first floor. The three upper tiers have each its own independent stair way opening directly on the street. The building is provided with twelve different outlets—nine for the egress of the spectators and three for that of the *personnel*. But the most original feature in the construction is the system of external balconies or outer galleries, corresponding to those in the interior of the building, with which they communicate by no fewer than a hundred different doors—twenty-five to each tier. These balconies are further connected with each other by iron stairs of good width and easy descent, and the lowest of the four is capacious enough to give standing room to the entire audience.—*St. James' Gazette.*

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AN ENGLISH DOUBLE HOUSE.

We give, from the *Building News*, illustrations of an English double house of the cottage style, and moderate cost. The estimate for construction here is $3,000 in stone and $2,200 in wood.

How to Increase Your Wages.

Every thinker knows that the man who would succeed must do more work than he gets paid for, in every profession and trade. We take it for granted that the man who will do only twenty dollars' worth of work a week because his salary is but twenty dollars will never get more than twenty dollars a week, for the simple reason that he has never shown his employer that he is worth more. We figure it that an employe who means to succeed has to do from ten to twenty per cent more work than he gets actual pay for. This he has to do until he reaches a certain point, and having reached that point, he will find that by as much as his income has increased by so much has the demand for amount and intensity of his labor diminished. To put this theory into figures, we will say that a boy receiving three dollars a week should do four dollars' worth of work; the boy receiving five dollars a week should do seven dollars' worth of work; when he gets to be a man and receives twenty dollars a week, he should do thirty dollars' worth of work; a man receiving thirty dollars should do forty dollars' worth of work, and so on until, say, the salary reaches seventy-five dollars, and then the laborer can give himself somewhat of a rest—that is to say, about fifty dollars' worth of work will satisfy his employer. Labor brings its market value, and is seldom overpaid, oftener underpaid. It is the experience, the "know how," that brings the money.—*Philadelphia Ledger.*

Good Water Promotes Good Health.

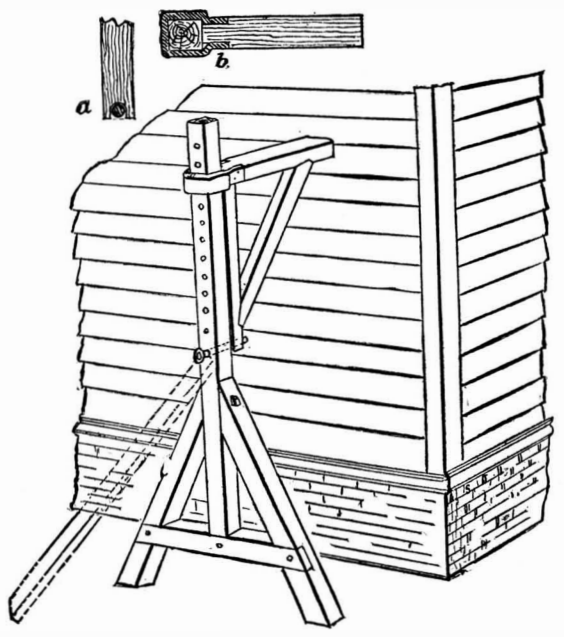
Hoboken formerly shared the water supply of Jersey City, but in 1882 changed to an independent supply drawn from the Hackensack River at New Milford. For the seven years (1875–81) previous to this change, the total average death rate of Hoboken was 26·9 per 1,000, against 23·5 for Jersey City, or a comparative excess of 3·4 per 1,000—a result which might be expected, other things being equal, since the site of Hoboken is naturally more unhealthy than that of Jersey City. But for the five years (1882–86) following the change of water supply, the death rate of Hoboken was but 22·6, against 22·9 for Jersey City, a gain upon Jersey City's rate of 0·3 per 1,000, or a total change and saving to Hoboken of 4·3 lives per 1,000 annually. Further, the average rate per 1,000 per year for the first quarter of 1887 is, Hoboken 20 deaths, Jersey City 22·73 deaths per 1,000; while the April report of the Hudson County health board gives death rates as follows: Jersey City 22·6, Hoboken 18·9 per 1,000. In other words, Jersey City's annual death rate under the use of Passaic water has remained practically steady at about 23 per 1,000 for the past twelve years, while Hoboken's rate has been steadily decreasing since purer water has been introduced, having fallen from a long annual average of 26·9 to an actual return at the rate of 18·9 for a single month, or a difference of 8 lives per 1,000 per year—a decrease of 30 per cent.—*Fire and Water.*

A PORTABLE SCAFFOLDING.

To the Editor of the Scientific American:

I send you a sketch of a portable scaffolding I use in my work in suburban building. I find it convenient and saving of considerable lumber and time in effecting changes, which can be done by two men around the whole of a building in half an hour, and this without splitting lumber or using nails.

The sketch will indicate the general construction of



the scaffold, which consists of the main upright standard, about 3 in. by 4 in., and of any desired length, supported on the two legs, spreading some 6 feet, and strengthened by the horizontal brace, the parts being bolted together or connected in some other convenient manner. The bracket is formed of 2″×3″ and 2″×2″ stuff and is from 3½ to 4½ feet long on the upper arm. To this arm is attached an iron yoke (as shown at *b* in the sketch), which slides up and down the standard. The bracket is supported on a one-half inch iron pin, passing through holes in the standard, the end of the upright being slotted as shown at *b*.

As a rule, I use 1½ in. planks for scaffold boards, placed upon the horizontal arm of the bracket. The scaffold is supported by leaning against the building, the weigh on the boards throwing it in that direction, while the spreading legs entirely prevent it falling sideways. If it should be thought necessary in any particular case, a strut might be placed at the back, as shown by dotted lines, to prevent its falling in that direction, but this is rarely required.

When it is desired to alter the position of the scaffold, it is not necessary to remove the boards. One man takes a pole, and placing it beneath the bracket, raises it sufficiently to clear the pin, while another man takes the pin out and places it in a higher or lower position in the standard as may be required.

This scaffold can be used for any description of building, and effects a considerable saving.

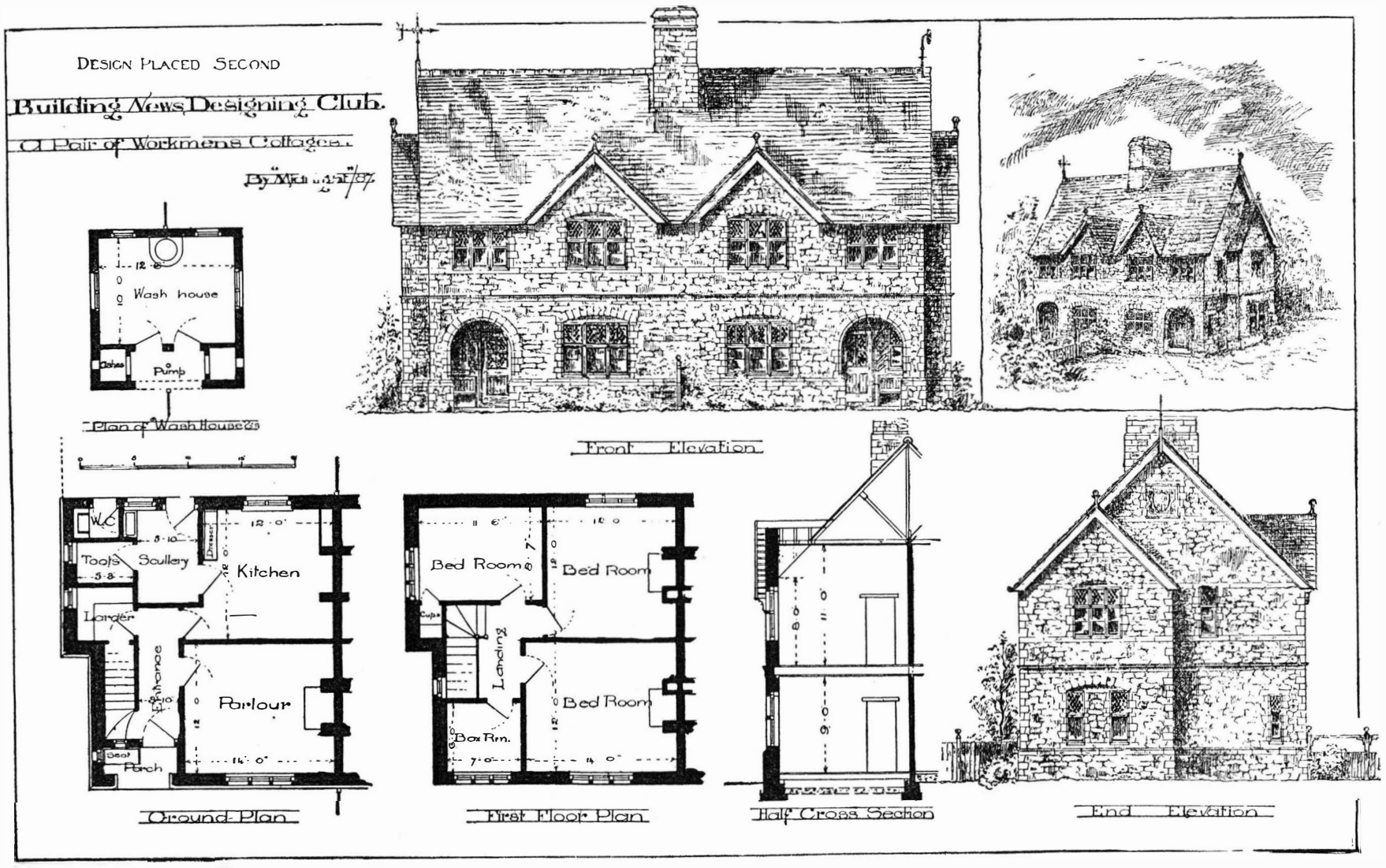
C. J. Dietrich.

La Grange, Ill.

A New York House.

The Marquand house is situated in Madison Avenue, and, as the name implies, is the residence of Mr. H. G. Marquand. Externally the house may be described as French Renaissance in character, though in detail this style is not adhered to. It is quiet and unpretentious in general effect, the lower part being of warm-colored sandstone, while the upper portion is built of red brick with stone dressings, and the roof covered with green slates. The main entrance is at the side, with outside steps leading to open porch, the ceiling of which is formed of richly colored old tiles from Spain, set in panels. The door opens into an ante-hall, which has a high dado of dark color, with a deep frieze of gold forming the background for figure decoration. It contains upholstered seats, and from it are two wide doorways, one leading to the guest stairs, the other to the hall. These guest stairs give access to retiring rooms, which are in close proximity to the first gallery of the hall and the main staircase. The larger hall, which may be called Renaissance in design, is the full height of house, and lighted from roof, with staircase of light oak, having richly carved notch board, and at each floor level a gallery with open balustrade. On the walls of part of the lower portion are panels of fine old Moresque tiles, with the intervening spaces covered with old Spanish leather. Valuable old English and other tapestries cover portions of the wall space, and on the higher landings large pictures are hung. For the furnishing of the hall old English carved oak has been used, a finely carved center table from Chester being a prominent feature. In the fireplace is a large dog grate, and in the spandrel of the first flight of stairs is small fernery and miniature waterfall and fountain.

At the right hand side of hall is the entrance to the salon, which is designed and carried out on the basis of the Greek style. It is an oblong apartment, with the door in the center of the long side, windows at one end, and the fireplace at the other. Opposite the entrance is a recess, divided from room by marble pillars, and through glazed openings behind may be seen a small conservatory filled with flowering plants and ferns. Round the room is a low dado of polished, warm-colored marble, formed in panels. The architraves and linings to recesses of windows are of warm, yellow-toned marble, moulded and carved, and round the whole room a sculptured statuary marble frieze extends, which was executed in Rome by eminent Ital-



AN ENGLISH DOUBLE COTTAGE OF MODERATE COST.

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ian sculptors. The walls are hung with silvery gray silk, forming the background to many valuable pictures, including works by Rembrandt and other old masters, together with works by Alma Tadema, R.A., including his "Reading of Homer." In the center of ceiling is large panel, with beautiful figures on a gold ground, painted by Sir Frederic Leighton, P.R.A. This formed his most important contribution to the exhibition of the Royal Academy last year. Round it, as the center, is paneling of cedar wood, oiled, so as to be of dark tone. The open fireplace has a marble mantel the full height of the room, with classic busts in the panels of the upper part, and on the parquet floor are fine skins.

The exquisite furniture for this salon was made in England, being designed by Alma Tadema to harmonize with the general style of the room. It is all very elaborate and distinctively Greek in form, with the framing generally of ebony, beautifully inlaid with carved ivories and mother-of-pearl and boxwood; the mouldings and carvings are particularly refined and delicate. The long settees and chairs have coverings of silvery gray silk, embroidered with patterns which are reproductions of classic examples.

The grand piano is similarly made and inlaid, and the music cabinet is a magnificent piece of furniture. There are two tripod tables, with Algerian onyx tops of great beauty.

The conservatory, which leads from the salon, is filled with ferns and flowering plants, arranged on ornamental rockwork, over which run streamlets with miniature pools and waterfalls, all very effectively lighted in the evening by electric lights. The windows are elaborately painted with Renaissance designs, so as to obscure the view from the avenue.

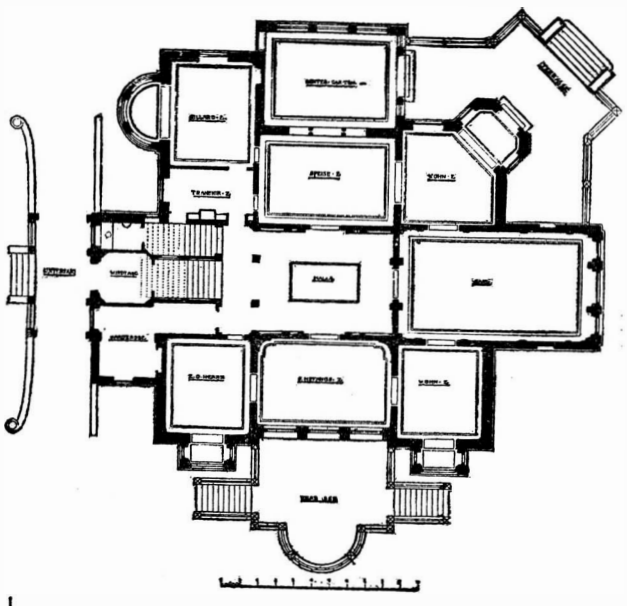
A small withdrawing room from the salon is a wondrously beautiful example *a la* Alhambra. The mantelpiece is of delicately colored marble, richly carved, and the walls, greatly enriched in low relief, are decorated in cream and gold, with frieze and ceiling of old Moresque tiles of magnificent color, set in panels. Some pieces of low-toned, but gorgeous, lusterware pottery aid the chaste and rich effect of the room.

Again entering the hall, a large doorway on the opposite side to the salon entrance leads to the parlor, which is bewildering in its richness and lavish profusion. Here the style chosen is Japanese of a very pronounced type, and carried out with close attention to detail. It is a perfect marvel of ingenuity and quaint conceits, magnificently carried out. Mr. Marquand has for many years been an ardent collector of Japanese curios, old carved ivories, wondrous specimens of lacquer work, embroideries, pottery, etc., and these have been incorporated in the design. The room is oblong, with bay window at one end and fireplace in semi-recess at other.

The walls at side for about seven feet high have continuous open cabinets made of "quebrache wood," from Brazil. This wood, when polished, is of a dull terra cotta red color, and is one of the very hardest obtainable. There is great difficulty in working it, but this has not been taken into consideration in the design, which is crowded to the utmost with elaborate detail—cut and carved and moulded with infinite variety. Recesses of various sizes are formed, panels of lacquer work being let in the backs. In these recesses are placed rich and rare Japanese and Chinese pottery, mostly vases of beautiful and curious forms, and of rich self-colors—turquoise and celadon perhaps prevailing.

The fireplace in recess at end is a wonderful piece of design and a marvel of work. It almost defies description, and it must suffice to say that it would be utterly impossible to elaborate it further than it is at present. Some splendid old Japanese bronzes have been incorporated in the design with excellent effect. At the side is a richly stained glass window, painted in strong and vigorous colors by La Farge, and illuminated from behind by the electric light.

Round the room is deep frieze of specially manufactured silk, which was embroidered in Japan. The ceiling is of paneled wood. Richly embroidered silks of beautiful and delicate colors are used as hangings, and in the furniture the Japanese feeling has been carried out; but comfort has not been sacrificed. Altogether the room is quite unique, and at every turn there is an astonishing amount of variety and interest.



En suite with this gorgeous parlor is the dining room, which has been designed and decorated after the manner of the Elizabethan houses in England. The room is wainscoted, and in the large, open fireplace is old fashioned dog grate. The furniture is all in the same style, darkened oak being used throughout, and to insure accuracy of form and detail the whole of the appointments were sent from England, special care having been taken to follow old examples in the designs.

Service to the dining room is from the butler's pantry adjoining it, as is usual in almost all American houses. Here the fittings are of polished mahogany, while all the conveniences for working are of the most complete description. The kitchens, etc., are in the sub-basement, and are fit adjuncts to the house, marble being freely used and the walls tiled.

On the first floor and throughout the house the same lavish profusion reigns. The library and boudoir, though not quite so striking as the apartments already described, are richly decorated and splendidly appointed. The principal sleeping apartments are very elaborate, with beautifully finished dressing and bath rooms adjoining. Each of these suites of rooms is finished in a different style, as much care having been exercised in them as in the reception rooms. They are fitted and finished in various kinds of wood, the walls hung, in many cases, with old and costly silks, or richly decorated by well known American artists. On the walls of the rooms and corridor are valuable etchings and engravings, besides many water colors from English exhibitions. The numerous fixed wardrobes or clothes closets are fitted up with cedar wood.

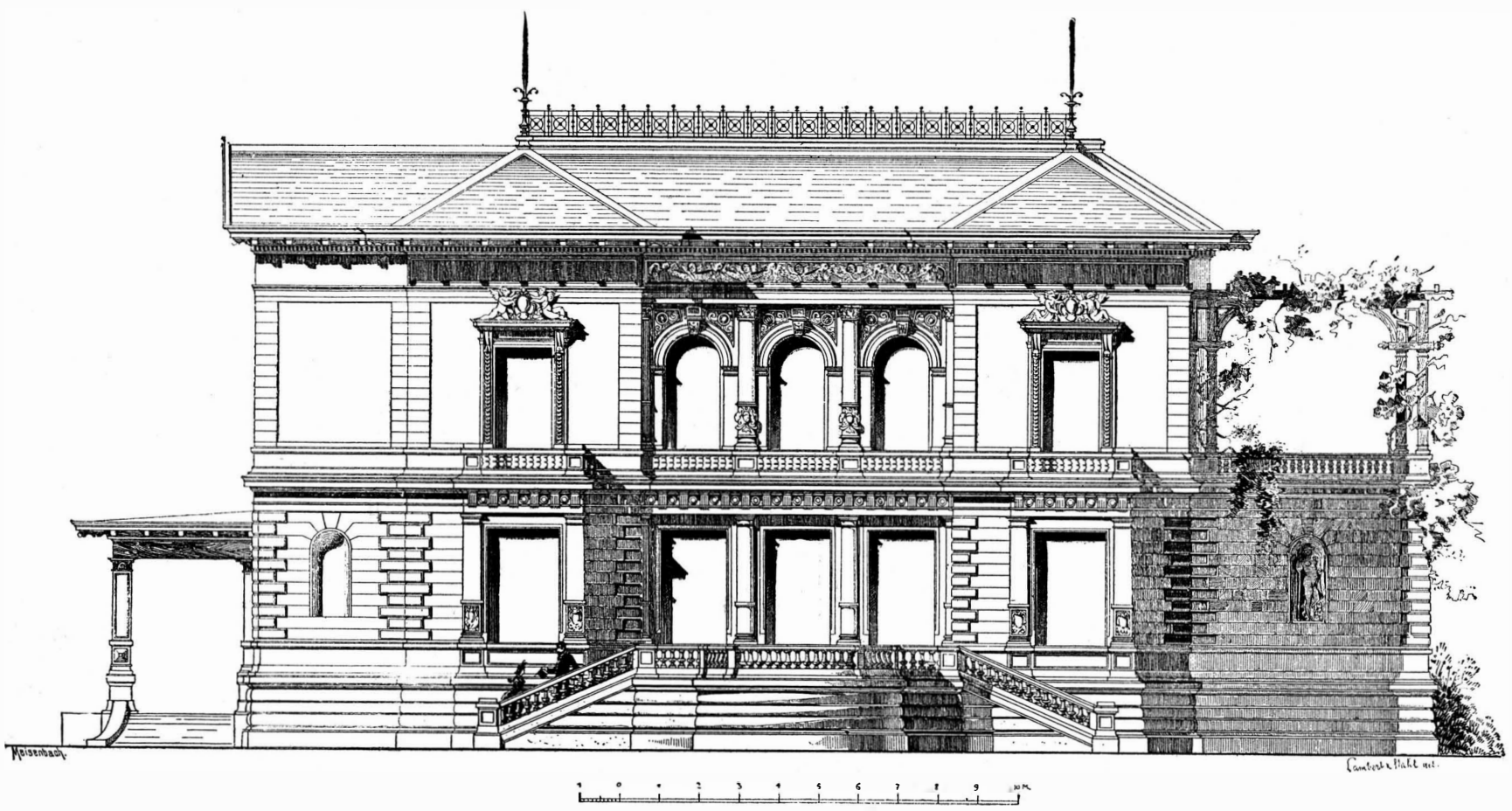
Mr. R. M. Hunt, of New York, was the architect of the Marquand house.—*John B. Gass, A.R.I.B.A., Building News.*

Etruscan Tombs.

Etruscan sepulchral chambers resemble very closely the early crypts, by which they probably may have been suggested. Like the tombs of the Greeks, they were always below ground. In fact, where this was difficult to accomplish from the flatness of the country, a circular apartment was built, and the earth piled over it so as to completely cover it. The Greek tomb was generally a sort of chamber to inclose the body, sometimes a mere stone coffin, sometimes very like our own family vaults, but without the arch. The Etruscan tomb, on the contrary, was the banqueting hall of the departed spirits. Hewn out of the solid rock, the ceiling was nevertheless carved to resemble the timber rafters of a chamber, the walls paneled like wainscot. Benches, armchairs, footstools, tables, all hewn from the solid rock, fill the chambers, while the walls are hung with weapons and tripods, lamps and other utensils lie about, and the panels are filled with pictorial representations and stucco figures. There is, in fact, little doubt that the Etruscan subterranean chamber was a complete copy, in design, decoration, and arrangement, of an Etruscan dwelling house. A plan and interior view of the famous tomb at Tarquinii, commonly called that of the Cardinal, is given by Canina. The plan is that of a square chamber, cut out of the solid rock, the ceiling or roof of which is supported by four solid piers, strongly resembling that of some of the early mediæval crypts.—*A. Ashpitel.*

A CONTINENTAL COTTAGE.

Our engraving shows the Helbing Villa, in Wandsbeck, built by Puttfarcken and Janda, architects, of Hamburg. Built in 1885. In the basement are the kitchen, storerooms, etc. On the first floor are the living and drawing rooms, dining room, etc., and the upper story contains only sleeping rooms. The owners gave positive directions for the arrangement of the plans, according to which seven rooms of the first floor were to be connected, in consequence of which the entrance and the vestibule had to be included in one room. The building is finished in cement and has a wooden roof. The interior is finished in the richest manner; the hall being completed in stucco, and the dining room, billiard room, and gentlemen's rooms are provided with wooden panels and wooden ceilings. The ceilings of the other rooms are plastered and richly frescoed. All the furniture and decorations were made from plans drawn by the architects. The cost of the building is about $40,000, and of the furniture about $20,000.—*Architektonische Rundschau.*



A CONTINENTAL COTTAGE—PUTTFARCKEN & JANDA, ARCHITECTS.

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FLOORS AND CEILINGS: ANCIENT AND MODERN.

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

(*Continued from page* 136.)

IV.—THE FLOOR COVERINGS OF JAPAN.

Japanese house mats, *tatami*, are as neat, refined, and soft a covering for the floor as the finest Axminster carpet. Miss Bird gives their dimensions as 5 ft. 9 in. long by 3 ft. broad and 2½ in. thick. The dimensions generally given are 6 ft. long by 3 ft. broad. The frame is solidly made of coarse straw, matted and bound to-

Fig. 6.—A CARD PARTY.

gether, and this is covered with very fine woven matting, as nearly white as possible, and each mat is usually bound with dark blue cloth. Professor Morse says the edges are trimmed true and square, and the two longer sides are bordered on the upper surface and edge with a strip of black linen an inch or more in width. The surface of these mats in rooms, and mattings of the best quality in general, are made of the *Juncus effusus* (the pith of which is used for candles and lamp wicks in the province of Oomi), of the *Isolepis* in Bingo, and of the *Cyperus rotundus* in Satsuma and Bingo.

For the common mattings, rice straw and also different kinds of rushes are used. For the benefit of botanical readers, we append their names: *Scirpus lacustris*, *L. hydropirium latifolium Griseb.*, and *typha*. These plants grow almost everywhere. Temples and rooms are measured by the number of mats they contain, and rooms must be built for the mats, as they are never cut to fit the rooms. They are always level with the polished grooves or ledges which surround the floor. They are soft and elastic, and the finer qualities are exceedingly beautiful. They are as expensive as the best Brussels carpet, and the Japanese take great pride in them. One of the drawbacks connected with this very thickness, which accounts somewhat for their softness, is the place of refuge which they offer to myriads of fleas.

The Japanese architect invariably plans his rooms to contain a given number of mats. According to Professor Morse, the rooms are planned to contain mats in the following numbers: two, three, four and one-half, six, eight, ten, twelve, fourteen, sixteen, etc. In the two-mat room, the mats are laid side by side. In the three-mat room, the mats may be laid side by side, or two mats one way and the third mat crosswise at the end. In the four and one-half mat room, the mats are laid with the half mat in one corner. The six and eight mat rooms are the most common sized rooms. This will serve to indicate the Japanese fondness for littleness. In the illustration of a design for a twelve-mat room, if the two mats at the right and left hand ends be omitted, the remaining mats will be properly arranged for an eight-mat room, or twelve by twelve feet.

The six-mat room would be nine by twelve feet In adjusting mats to the floor, the corners of four mats are never allowed to come together, but are arranged so that the corners of two mats abut against the side of a third. They are supposed to be arranged in the direction of a closely wound spiral.

In the houses of nobles, says Professor Morse, the border strip of black linen has figures worked upon its face in black and white. The mats fit tightly. The floor upon which they rest is generally made of rough boards, with open joints. As you step, the mat yields slightly to the pressure of your foot. Old mats become slightly uneven and hard from usage. Shoes are invariably left at the door or entrance to the house, as it is considered a mark of great impropriety to wear shoes in a house. The hard heel of a boot or shoe not only leaves indentations on the upper surface of these soft mats, but it crushes and breaks the straw body of the mats, and would rapidly ruin them. Upon these mats the people eat, sleep, and die. They represent the bed, chair, lounge, and sometimes table, combined. In resting upon them, the Japanese assumes a kneeling position. A very good view of this position is shown in our illustration, Fig. 6, "A Card Party," where a profile of the figure in the foreground represents it admirably. The legs are doubled up at the knee, the haunches resting upon the calves of the legs and the inner sides of the heels, the toes being turned in so that the upper and outer part of the instep bears directly on the mats. It is only with a great deal of practice that a foreigner can become accustomed to this position. In this attitude they receive their friends at ceremonious repasts, as shown in our drawing, Fig. 7, which is a *cha-no-yu*, or tea party, showing all the participants in the kneeling position alluded to. The little black boxes in the illustration are the *hibachi*, made of wood, and contain a small earthen vessel for holding hot coals. In the making of the tea the utensils are used in a most precise and formal manner. The tea ceremonies have had a profound influence on many Japanese arts. Professor Morse has given us a very interesting description of the ceremonious etiquette observed in conducting them. In the study of a design for a twelve-mat room, which we show in Fig. 8, the illustration indicates merely the geometric design. The outside border of mats, six in number, are composed of a fine light orange colored straw, bound on the long edges by a deep blue band of cloth an inch wide. The basket work mats at either

Fig. 7.—A CEREMONIOUS TEA PARTY.

side of the center piece are in light dove color, of the same general tone as the border mats. The dark squares noticeable near the corners are plaited in with a decided dark gray straw. In the two center mats, which are so designed as to appear like one mat instead of two, the four deeply outlined small squares are woven separately of old turkey blue colored straws, lined with bands of bright yellow finely plaited straws. The border line of the two center mats is interplaited, as indicated in the design, with black and orange colored straws, the intervening space consisting of two rows all around, excepting where intercepted by the four little squares, and adjoining the border just described, is plaited in a dark dove colored straw. The large square, which is apparently in the center of the two central mats, is arranged into two patterns, diagonally, as indicated in the design. The upper right hand diagonal half is in black and yellow straws,

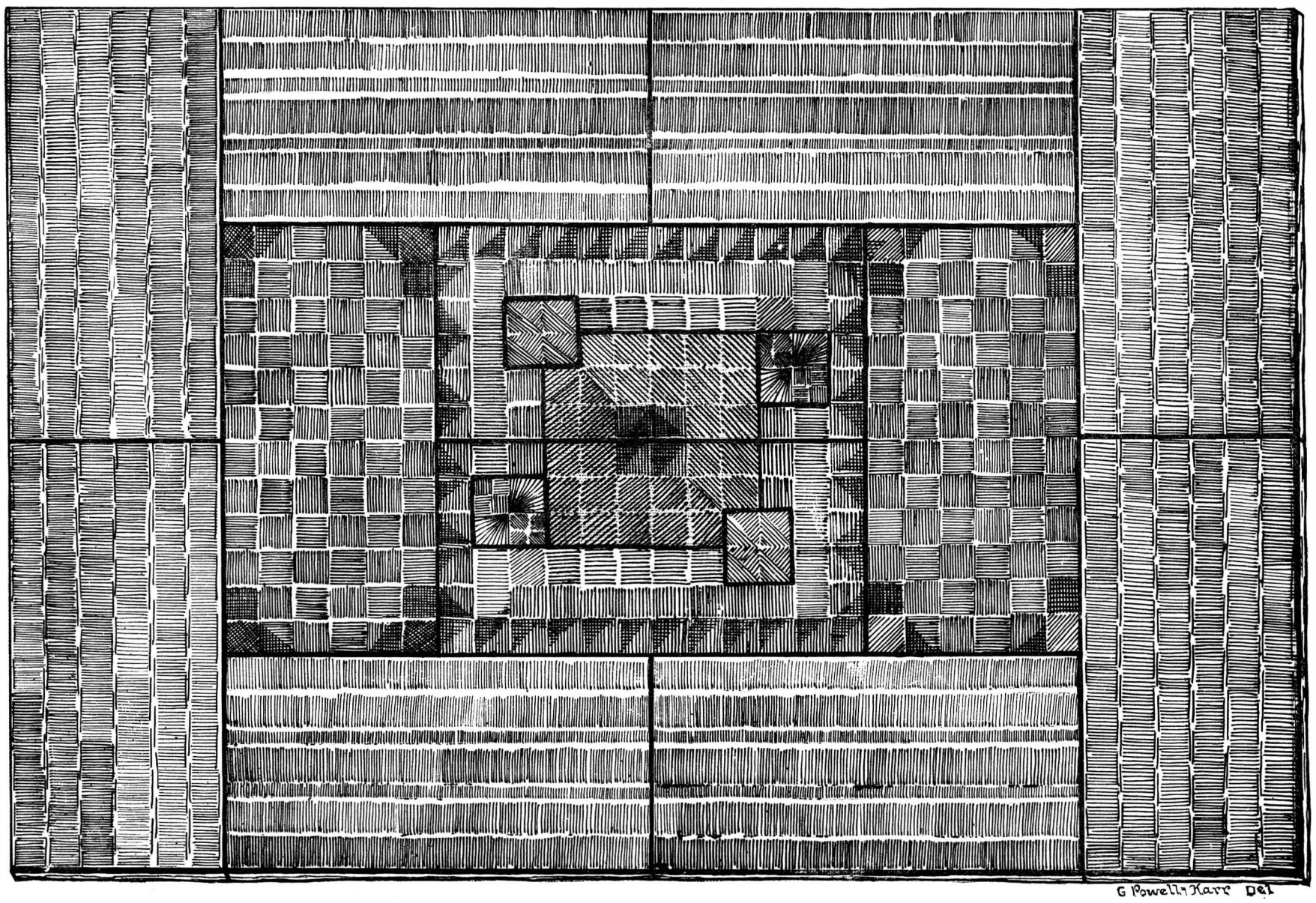

Fig. 8.—STUDY OF A DESIGN FOR A TWELVE-MAT ROOM.—BY C. POWELL KARR, ARCH.

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alternately arranged, and the lower left half is in blue and yellow plaitings, and in the center square of all on the upper side, yellow pierces the black half diamond by interplaiting, and on the lower half blue pierces yellow, the shaded quarter points being yellow.

The size of room corresponding to this number of mats is 18 ft. by 12 ft. In the above design, the high lights are struck in the orange and yellows, the shadows in the black and grays, and the harmonizing tones in the dove shades.

In Japan a good quality of mats can be made for one dollar and a half apiece, though they sometimes cost three or four dollars, and even a higher price for a special design. The poorest mats will sell from sixty to eighty cents each. No description can do justice to the beauty of the plaiting, the dexterous workmanship, the luxurious yielding to the foot as it presses onward in a stride, for our impressions of a mat are derived from the coarse Chinese mattings, with which all of us are more or less familiar. To name the two types of mattings in the same breath is to vulgarize the one and refine the other.

The floors of most rooms are permanently covered with mats, and, as a consequence, the material is of rough boards, and laid without consideration as to regularity. In this way very poor lumber is used, and wide spaces between the boards are not inadmissible. In halls or vestibules the floor is composed of wide planks and the surfaces are polished and glassy, and kept so with remarkable skill. Polished wood floors in portions of front rooms are quite common in country houses and in many instances reflections of surrounding objects may be seen mirrored in their burnished faces. In country inns, the floor in the forward part of the house is sometimes laid with plank. In merchants' houses, bordering the street, the matted floor, according to Professor Morse, properly terminates a few feet within the sill, the space between being of earth. The floor being raised, the space between the edge of the floor and the earth is generally filled with plain panels of wood, though sometimes designs of flowers or conventional figures are cut in the panels. The kitchens, in every case, have wood floors, as do the halls, verandas, and all passageways. The ground beneath the floor is, in the houses of the better class, prepared with gravel and mortar mixed with clay, or macadamized.

APPARATUS FOR TESTING LIME AND CEMENTS.

The apparatus herewith figured permits of rigorously establishing the relations that exist between the progress of solidification of hydraulic products and the different phases of their manufacture. It permits likewise of comparing the products with each other as regards initial energy, and that too at every instant for several days. Finally, by means of this little instrument, it is possible to establish certain relations between the initial behavior of a product and its ultimate resistance.

The figure represents the apparatus reduced one-half. The device consists of a hollow rod weighing an ounce and a half, which slides without friction in a tube provided at the base with a disk 1¼ inch in diameter. The tube is provided at the side with an adjusting screw that prevents the rod from sliding. The rod is terminated beneath by a steel needle of 0·04 inch section and one inch in length. Besides this, it is provided above with a shoulder that permits of its weight being progressively increased by placing on it disks of zinc, each weighing an ounce and a half.

If the apparatus be placed upon a plane, hard, horizontal surface, and the screw be slowly and progressively loosened, the extremity of the needle will come into contact with the plane surface, and the zero of the vernier will coincide with that of the divisions in millimeters of the rod.

The face of the rod that touches the extremity of the screw is inclined upon the longitudinal axis in such a way that the descent is always slow and progressive in measure as the screw is loosened.

The apparatus is used as follows: The soft paste is put into a mould, and made to assume the form of the latter. At the moment the test is to be made, the hardened paste is removed from the mould and placed in a convenient position for operating. The zeros coinciding, and the needle being unloaded, the apparatus is placed upon the hardened paste, and held thereon by slightly pressing the disk with the thumb and forefinger of the left hand, placed each side of the tube. The screw is gradually loosened, and the reading n is made. Then the screw is tightened, and, without moving the left hand, the needle is loaded with m disks with the right hand. Then the screw is slowly loosened, and the reading N is made. $N - n$ will be the depth of penetration at 50 m grammes (1½ m ounce), and 5 $(m + 1)$ the pressure due to the needle per square centimeter (0·155 square

It is possible to effect the following results with this apparatus:

(1.) To determine the progress of the setting of a cement as a function of the time and weight, and thus obtain a diagram analogous to that shown in No. 1 (Fig. 2).

(2.) To determine the penetration as a function of the time, the weight of the needle being fixed; and thus obtain a diagram similar to that in No. 2.

(3.) To determine the penetration as a function of the weight after fixed periods; and obtain a diagram analogous to No. 3.

From a practical standpoint, diagram No. 1 evidently presents the most interest. To learn when the setting begins, nothing but the 1½ ounce rod withdrawn from the tube will be used. The setting begins when, the rod being placed quickly on the paste, the friction

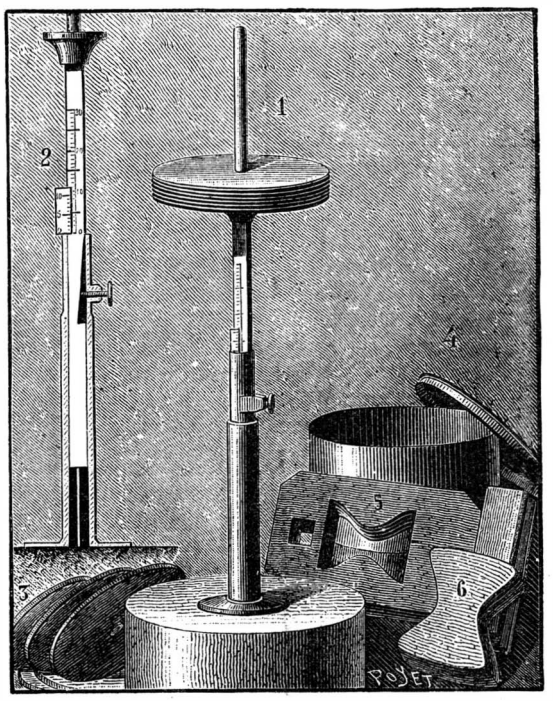

Fig. 1.—APPARATUS FOR TESTING CEMENT.

due to the nascent cohesion prevents it from entering the paste completely.

In Fig. 1, 1 is a general view of the apparatus; 2, details of the device; 3, disks; 4, box for the latter; 5 and 6, mould and core.—*La Nature.*

THE HOME OF MILTON.

CHALFONT ST. GILES AND MILTON.

The quiet rural village of Chalfont St. Giles, in Buckinghamshire, eight miles north of Uxbridge, was the retreat of John Milton in 1665, when the great plague raged in London. It is twenty-one miles from London

The early Friends or "Quakers" had personal and local connections with that neighborhood, and Thos. Ellwood, whose very interesting autobiography has lately been republished in Prof. Henry Morley's series of the "Universal Library," engaged a "putty box" at Chalfont for the temporary dwelling of the blind immortal poet.

Milton's town residence, at that time, was in Jewin Street, Aldersgate, and he was then composing "Paradise Lost." He finished this poem at Chalfont, and Ellwood, who had invited him there, invited him to begin the sequel, "Paradise Regained."

The cottage shown among our sketches of Chalfont St. Giles is the only house now remaining which Milton is known to have occupied.

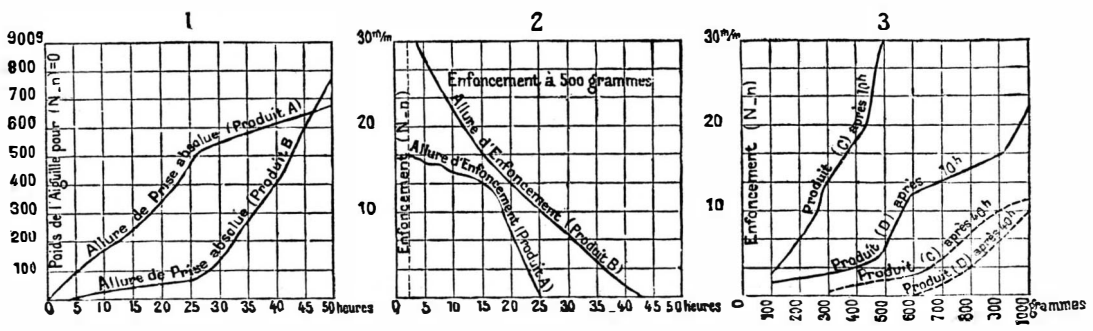

Fig. 2.—GRAPHIC CURVES OF THE SETTING OF CEMENT.

Mr. Laurence Hertlon tells us, in his "Literary Landmarks of London," that although John Milton was born and died in the metropolis, received part of his education and was thrice married there, and lived in many houses, within the bills of mortality, there is left to-day hardly a trace of anything that he touched or that is in any way associated with him.

He was born in Bread Street, Cheapside, in December, 1608, and was baptized in the church of All Hallows. Both house and church were destroyed by the fire of London in 1666.

As a boy he was sent to St. Paul's School, which also vanished in the conflagration of 1666.

After graduating at Cambridge and taking a Continental tour, Milton returned to London in 1639, and hired lodgings in St. Bride's Churchyard.

The house remained intact until 1824, when it was burned down, being at the time occupied by a hairdresser. Milton removed to Aldersgate Street, but no vestige of the house occupied by him there now remains. His next removal was in 1644, to the Barbican, where he afforded shelter to his first wife's relations, who were royalists.

The house No. 17 Barbican was in existence so late as 1864. A modern warehouse now occupies its site.

From the Barbican, Milton repaired in 1646, to a small house on Holborn, opening backward into Lincoln's Inn Fields.

It was too remote from Whitehall to suit Cromwell's convenience, to whom Milton was then secretary. The Lord Protector summoned the poet to Scotland Yard, whence he migrated to a pretty garden house in "Petty France," Westminster.

The site forms part of the lawn of Queen Anne's mansions. An old tree was shown which he was said to have planted with his own hand.

In the house at Westminster, Milton lost the use of his eyes.

He was driven from it in 1660, upon the restoration of Charles II., which forced him to take shelter in Bartholomew Close, Duke Street, Aldersgate.

Before long he could return to Holborn, where he took a house in Red Lion Fields, now Red Lion Square.

His next move was to Jewin Street, Aldersgate, where he lived with his third wife and his daughters. The Jewin Street of that day has also passed away.

The declining years of Milton's life were passed in Artillery Walk, Dunfield Fields, where he dictated to his daughters his "Paradise Regained" and "Samson Agonistes."

Here he died in 1674.

The house of two centuries since has entirely disappeared. The nearest approach to Artillery Walk, in name, is Artillery Place, Bunhill Row.

The remains of the great poet were consigned to the chancel of St. Giles, Cripplegate, where a monument has been erected.

The Rev. Pownoll W. Phillips, Rector of Chalfont St. Giles, Mr. James Gurney, and Mr. S. Sanders are trustees of Milton's cottage, which has, with the cottage adjoining, been obtained at a fair price from the owners, Mr. and Mrs. Tomson, of Sandhurst. The trustees, with Mr. T. Newland Allen, lord of the manor, and Colonel Phipps and Mr. W. Gurney, church wardens, form a committee to provide for its preservation.

Their intention is to set apart Milton's cottage as a reading room and museum for objects connected with the poet, and for other matters of historic interest to the parish and neighborhood.

A fund has been instituted to enable them to pay for the cottages, to repair them, and to maintain them for these purposes.

The sum of £400 or £500 is required, and subscriptions may be sent to the rector or church wardens, or may be paid to the London and Westminster Bank, 1 St. James' Square, S. W., to the account of the honorable treasurer of the "Chalfont St. Giles Jubilee Milton Memorial Fund," Samuel Sanders, Esq., J. P., of The Grove, Chalfont St. Giles, Bucks, and 7 De Vere Gardens, South Kensington.

As the intention to use part of one of the cottages as a reading room and museum has been adversely criticised, it should be explained that this particular use of the house is necessary, owing to the law of mortmain; but every care will be taken to prevent injury to the building. A reading and recreation room already exists in the village.

The cottage would not be kept as Milton left it, if it remained as an ordinary village dwelling, to be occupied by a laborer's family.

Our illustration of Milton's cottage, page 51, is copied from a drawing from Mr. Wilfrid Ball. —*Illustrated London News.*

Whitewash and Fire.

Whitewash has many uses, political and moral (or immoral rather), as well as economic. But as a fire extinguisher it has not been hitherto generally recognized here. "Do you know," said a scientific gentleman the other day, "that it is next to impossible to burn a whitewashed fence? And do you know further, that in France, to protect the frame and interior of other buildings from fire, the walls, beams, joists, and the underside of floorings are thickly coated with lime wash before they are placed in position? It is so, and if this course were adopted here it would save many a house, many a village, from destruction. I do not mean to say that it will prevent the spread of a fire once under great headway, but from its uninflammable character, it is a guard against the prime ignition that often leads to dire results." This little hint set the writer to inquiring, and the doctor's words were confirmed.—*Am. Analyst.*

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Why Pipes Burst.

The principal cause for burst pipes is frost. Water has the greatest density, that is, it occupies the least space, at a temperature 39·2° F. Above that temperature it expands, and below that temperature it expands until it reaches the freezing point, 32°. When the freezing point is reached, the water begins to solidify, until all the heat is expelled and ice is formed. The water has expanded nine per cent. in the operation. Below the freezing point, the ice contracts again.

After the first freezing occurs and the pipe is swelling, the ice next to the pipe contracts or breaks, and allows more water to come in contact with it. This, in turn, freezes, expands, swells the pipe a little more, and then contracts. This operation is continued until the pipe bursts. When this occurs, there is a movement of the softer ice to the break, and the space left fills with water and freezes, thus enlarging the fissure a great deal. This soft ice frequently runs out on the pipe and forms icicles.

This expansion of water may be illustrated by taking a basin even full of water and exposing it to a temperature lower than the freezing point. When the temperature of the water reaches 39·2°, it begins to expand, and will run over until it is frozen. After the surface is frozen, the solidification of the lower portion of the water causes the center to rise above the level—a phenomenon which is often seen. The mere fact that water when frozen is less dense than when liquid is proved by the floating of ice.

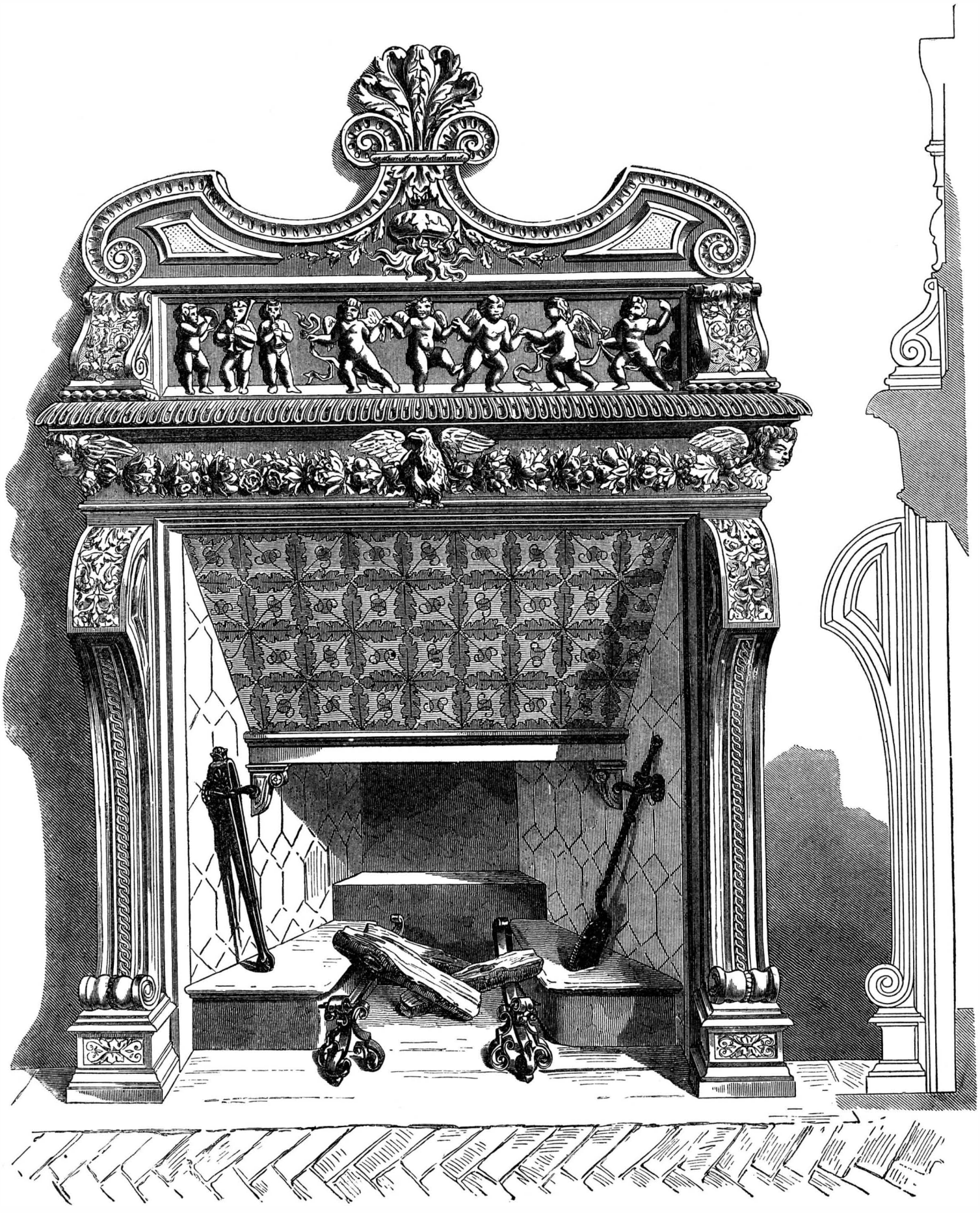
Another cause for the bursting of lead pipe is water hammer. Under direct pressure systems of water supply, the water hammer is sometimes very forcible, and its continuation often develops a burst at some weak point in the pipe. A remedy to prevent this consists of a rubber cushion, which gradually breaks the force of the blow.—*Sanitary News.*

How Lamp Chimneys are Made.

First they use pure white sand, found in but few localities, which, when thoroughly washed and dried, is almost white as snow. Then the potash (purified) and the lead, in the form of oxide, perfectly pure, are added to the sand, and thoroughly mixed until the batch resembles ordinary sugar in grain, but is quite red in color. It is now ready to go into the pots—twenty-four in number, made of a peculiar kind of clay, being from 42 to 48 inches in height and about the same in width. These pots are closed at the top to prevent the fire from injuring the melted glass, with the mouth on the side near the top. The furnace being circular, the pots when placed in position, and covered with fire brick, present their open mouths only, and when looked into resemble a hot summer's sun.

When in this condition, the pot is filled with the mixture above mentioned, closed tight, and in about twenty-four hours is ready for work. A workman called a gatherer dips his pipe into the melted mass, and gathers enough on its end to make a chimney. This he rolls on a smooth iron plate to get it evenly on end of pipe, when he blows it about the size of a boy's top, and hands it to another workman, who further blows it up, and proceeds to make the lower part of the chimney, which fits the burner. This he does by forming a small knob on the end of the now pear-shaped bulb, giving it a sharp stroke with his shears, breaking the knob off, leaving a small hole in the bottom of the bulb.

It is now heated red hot again, and the lower end of the chimney formed by the blower whirling and spreading the glass with a tool resembling sheep shears, but longer and narrower blades. The chimney is now broken off the pipe and put into a "snap," an instrument which holds it as one would clutch an apple firmly in the hand, and heated red hot. The top is finished by machinery.—*Cin. Grocer.*



DESIGN FOR A MARBLE FIREPLACE.

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.

Plans for the alteration and enlargement or improvement of buildings are also supplied.

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A COTTAGE OF MODERATE COST.

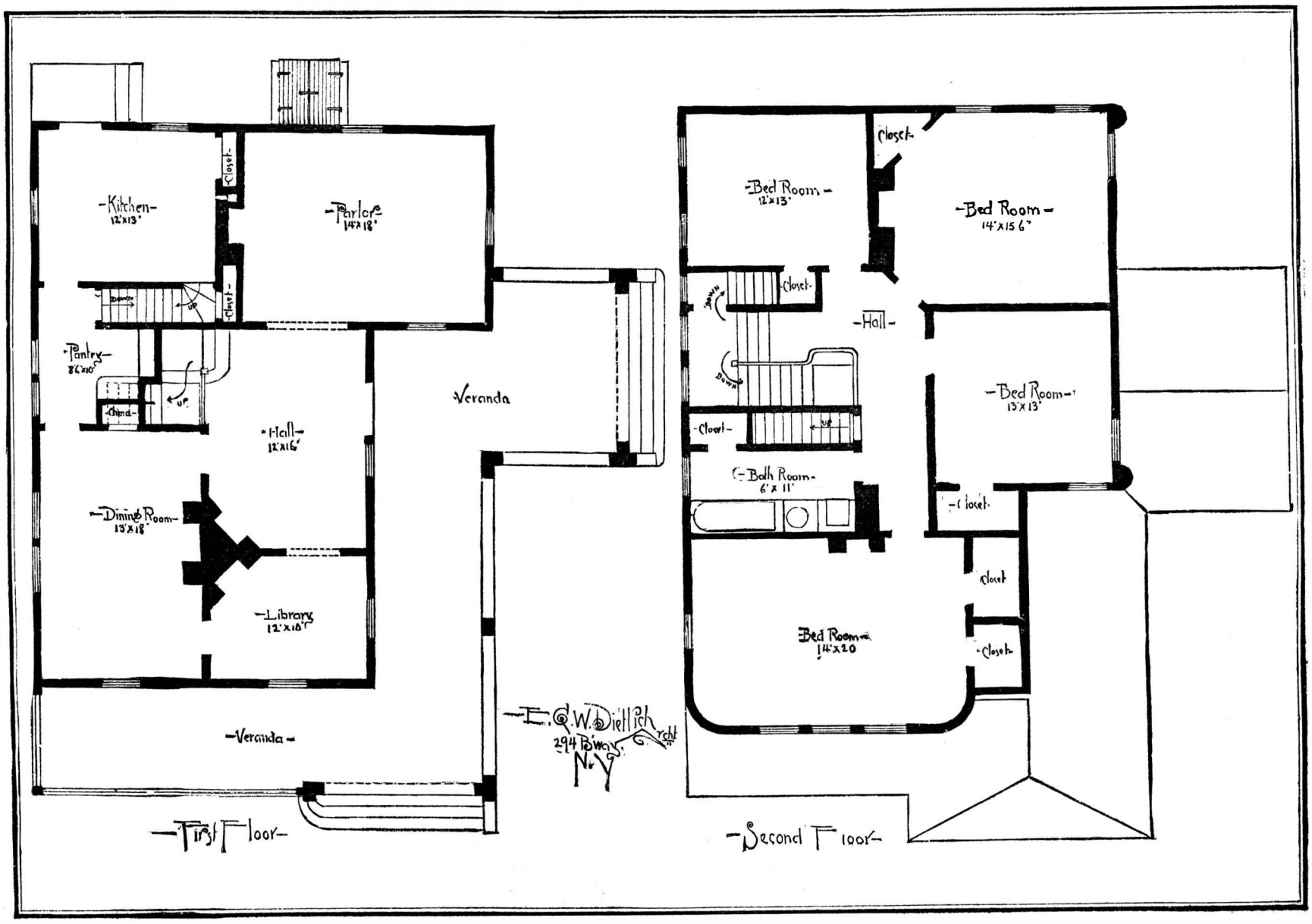
Our plate exhibits a cottage designed by E. G. W. Dietrich, architect, N. Y. Our engravings are from the *Builder and Woodworker*. About five thousand dollars is our estimate for the cost of this dwelling. This is a very handsome structure, cozy and homelike.

The Largest Vase in the World.

Whatever supremacy may be truthfully claimed by America in the line of all kinds of implements, watches, and jewelry, England leads the world in the line of art pottery. A well known English manufacturer of pottery has the honor of producing the largest and one of the most beautiful vases in the world. This vase consists of a pedestal, which, rising from a square plinth, supports a globe representing the earth surmounted by a figure of Ceres, who, together with a group of cupids, are showering gifts of fruitfulness upon the earth. Around the center of the globe runs a frieze, divided into four panels, on which are cupids, busy in the pursuits typical of the four seasons. The subjects are separated by bracelets, on which are other figures emblematic of the season. The pedestal contains a splendid frieze, on which are represented something more than sixty cupids occupied in rural work. The plinth is artistically ornamented in keeping with the general design. The color of the globe is a shade of green called celadon, the figures are china bisque, and the other decorations white china.

The whole stands eleven feet in height, and the diameter is six feet four inches, and, notwithstanding its proportions, this vase is elegant, chaste, and thoroughly artistic. The cost of this huge ornamented piece of pottery is $16,500.

A RURAL novelty has been introduced into France, and is called a plant tent. It is of quite fairy-like dimensions, something like a lamp shade or toy parasol, which is placed over delicate young plants as a protection against hoar frost and hail. The cost of a thousand is but 50s., and the device should be useful to place over young tobacco plants, or many other delicate nurslings transplanted from frame beds into open gardens.



A COTTAGE OF MODERATE COST.

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A CHURCH OF MODERATE COST.

We give a design for a church of moderate cost, say $5,000, by C. A. Dunham, architect, Burlington, Iowa. It has 308 seats, built of wood, ceilings of pine, finished roof timbers, stained glass windows.

An English Laundry.

The following account of a large English laundry is condensed from the columns of an English paper. English laundries present several distinguishing features when compared with those of this country. In England, it is rather the rule than the exception that laundries should be owned by joint stock companies, while here the proprietors are usually individuals or firms. Over there, it is considered almost indispensable to have a lady in charge of the operations, and the British manageress occupies the place held here by the manager or foreman. Another difference is that manual labor is employed to a greater extent than in the American laundries, where machinery does nearly all the work.

The laundry to be described is that of the London and Provincial Steam Laundry Co., with works at Battersea Park road, in the suburbs of London. These are said to be the largest laundry works yet opened in England, and cover a space of upward of an acre and a half, and afford employment to some twenty-five men and one hundred and eighty employes of the fair sex. This laundry is now turning out from eighty to ninety thousand pieces of all descriptions every week.

The buildings are sky-lighted throughout, and care has been taken to give them a pleasing architectural effect. The works are entered by double gates, which give admittance to a covered courtyard, where the wagons or "vans" as they are termed in England can discharge and receive freight, a very important provision in a rainy climate. There are neat offices, a large dining room for the employes, and suites of apartments for the manageress and officials—the whole of the arrangements being made to secure perfectly healthy conditions and the maximum of comfort for all employed in the building. The main body of the building, in which the laundry operations are carried on, consists of one principal range, with an area of 154 feet by 140 feet, and two smaller blocks are devoted to the stabling and van department. One block, admirably isolated from every other part of the building, is set apart for the exclusive dealing with infected linen, no single article of which is ever allowed, from the moment of its entrance into the company's premises to that of its departure from them, to approach within a considerable distance of that portion of the building devoted to the washing of articles with a clean bill of health. So much attention has lately been devoted to sanitary measures having for their object the prevention of contagion, that it is worth while to show how the London and Provincial Laundry Company to some extent anticipated the most recent improvements. The vans, which at rare intervals bring infected linen to the Battersea works, are lined throughout with zinc. The articles are collected, not in baskets, but in open wirework crates, which are delivered direct into the proper house, and forthwith bodily inserted, without unpacking, into the disinfecting chamber, where they are subjected to dry heat, the only thoroughly effective process yet discovered. Even when thus dealt with they are not free from quarantine, the whole process of washing, etc., being carried on in the same isolated house. The severest penalties are demanded and enforced, not only against any person sending infected articles without giving notice, but against any person employed on the premises who shall fail to acquaint the managers of any case of infection with which he or she may be brought into contact. An unpleasant, but important, subject may be dismissed with the assurance that the management of this department is simply perfect.

The receiving room is about thirty feet square, into which the sturdy square baskets in which the linen is collected are brought unopened. Each of these baskets is devoted to the use of a separate customer, who keeps one of the duplicate keys of the rather elaborate padlock by which it is secured, the other being retained on the premises. The baskets having been opened and contents checked and marked, they pass into a second compartment containing seven cells, each occupied by a young woman, who sorts out the different pieces for the wash room.

The general wash house is a lofty apartment, with an area of about fifty by thirty feet, having down the center a double row of washing machines of various sizes. Along the north wall is a range of large sized pigeon holes or racks, each capable of containing, when duly folded, just so many articles as can be cleverly introduced at one time into the open mouth of the washing machine, thus seriously economizing the time occupied in charging them. Along the opposite wall is a range of washing and boiling troughs for such articles as may require such methods of handling, with an ingenious tramway arrangement by which the manipulation of the hot and dripping articles under discipline is much facilitated. At one end are tanks of boiling soap solution, cunningly compounded after a recipe which, without the use of chemicals, produces in some half dozen turns of the ponderous machine a lather of remarkable thickness and fineness. At the opposite end are "hydros," in which, when washed and rinsed, the various articles are whirled round and round at the rate of four hundred revolutions per minute.

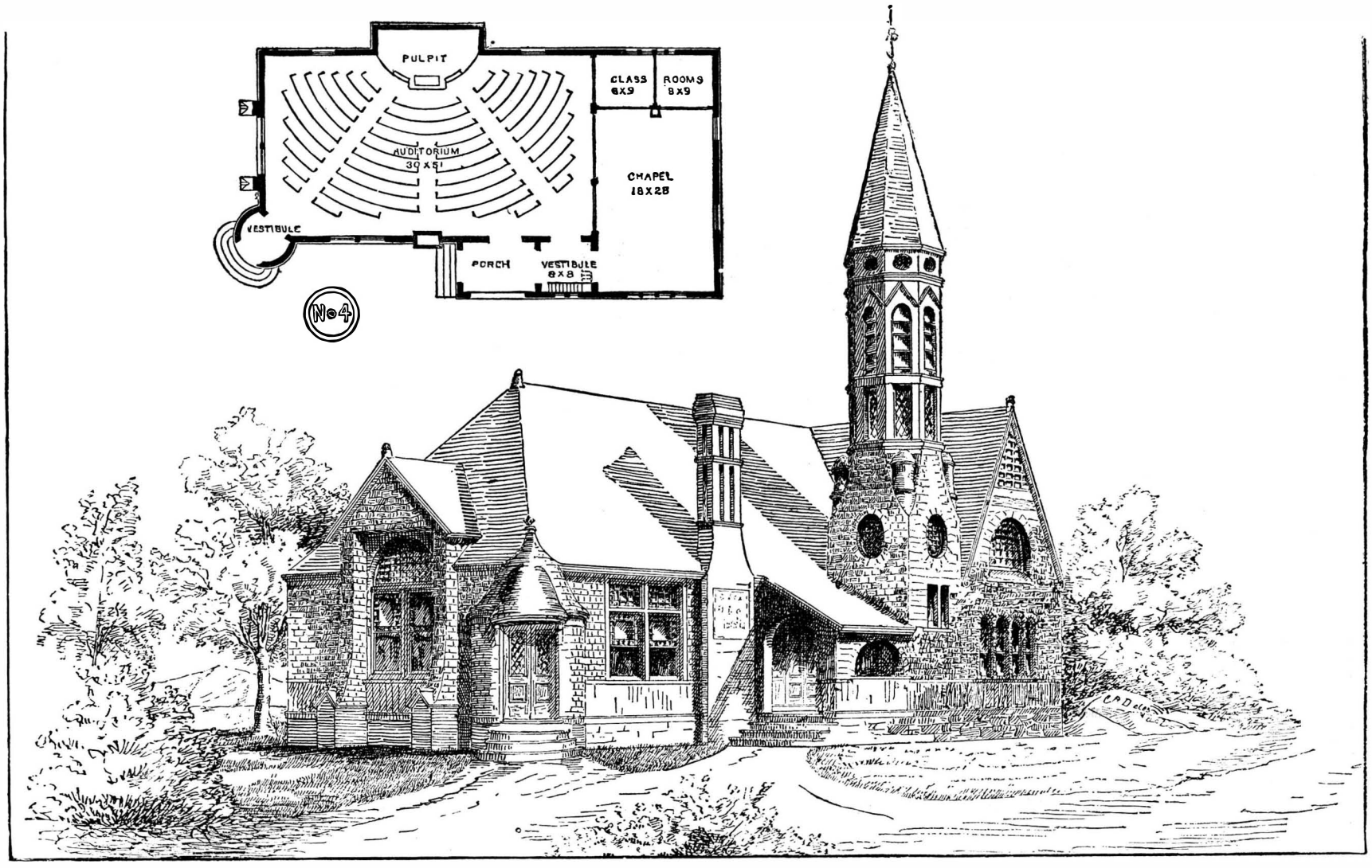
The mangling or calendering department contains, besides the usual machines, a calender said to be the largest ever constructed, carrying a "glosser" capable of manipulating the largest sized table cloth unfolded. In the ironing rooms scores of young women are employed, and we are informed considerable difficulty is experienced in obtaining an adequate supply of help for this kind of work, though good wages are paid. For curtains, lace, and the like, there is a separate room, in which these fragile and unwieldy articles are neither ironed nor mangled nor calendered, but carefully strained on frames over a vast range of steam pipes.

An important part of all washing operations is the drying, which is here done in a fine open yard of nearly an acre in extent, provided with wide stretches of lawn for bleaching purposes. When the weather is unpropitious, the necessary operation is carried on with equal expedition in a spacious drying room, opening into the mangling and calendering room, and fitted with a magnificent range of drying frames, each twelve feet in length by seven feet high. The drying ground is fitted with an arrangement of ornamental iron posts and strong galvanized wires, specially designed to preserve the articles intrusted to them from the damage frequently inflicted under the old system of cords and clothes pegs.

The boiler house, engine room, stables, and sheds for vans do not call for particular mention.

One of the most important features of the entire establishment is the well, over four hundred feet in depth, sunk in the yard at a cost of something over £600, and extending into the chalk, from which it extracts a supply of water running to eighteen or twenty thousand gallons per diem, and described as admirably soft. The laundry uses in a year fifteen tons of soap and about forty-two tons of starch. The net profit realized by the company last year was $12,000, which allowed the payment of a dividend of six per cent.

Some of the figures given are rather surprising, such as the extractor making only four hundred revolutions per minute. In this country a much higher speed is given, and cases are recorded of extractors being run at 1,800 and even 2,000 revolutions per minute. This is dangerous and altogether unnecessary, for as we have pointed out in a former issue, the limit of effective power is reached at 1,500 revolutions in a minute. Nothing is gained by a higher rate of speed, and the risk of bursting is vastly multiplied thereby.—*Nat. Laundry Journal.*



DESIGN FOR A CHURCH OF MODERATE COST.

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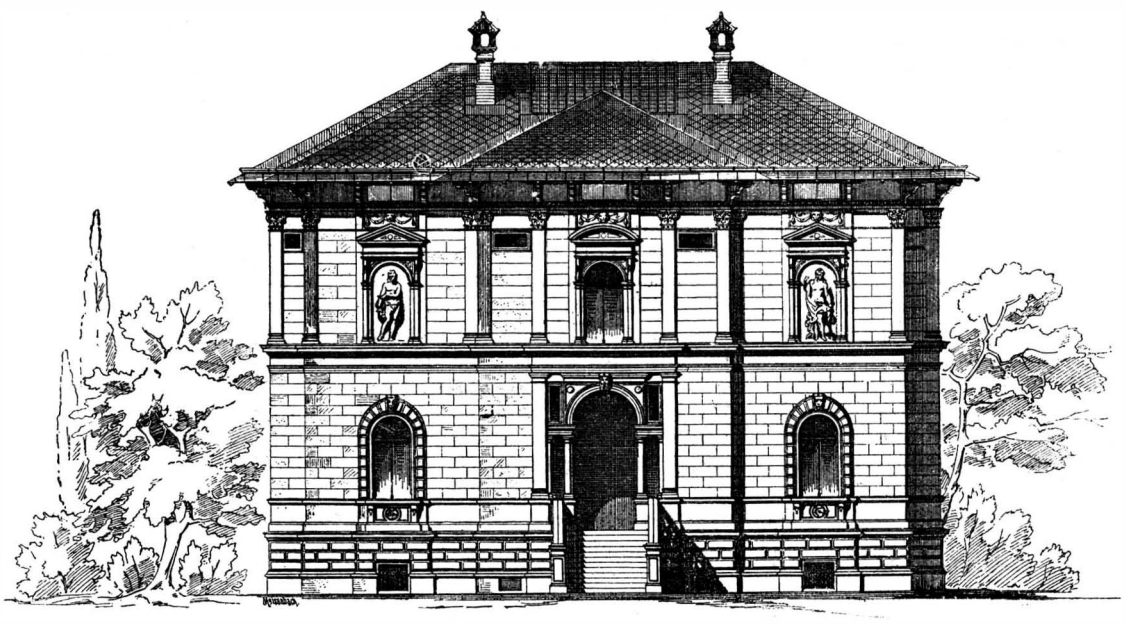
AN AUSTRIAN VILLA.

We give two elevations and a floor plan of an Austrian country house, at Bozen, by L. Theyer, architect, of that place. From *Architektonische Rundschau.*



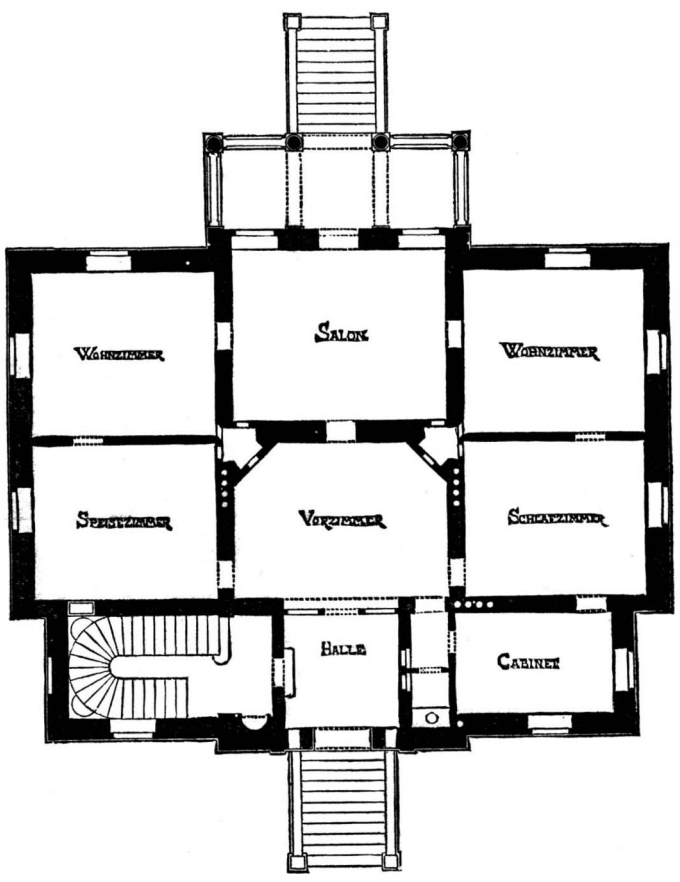
Mud Architecture in Persia.

Whether the Persian architecture was contemporaneous or derived from the Assyrian, Egyptian, or Indian, is a question into the investigation of which I am at present not prepared to enter; but certain it is, judging from the voluminous writings of competent men, that the Assyrian and the Egyptian were the most ancient styles which formed the groundwork of all others that adorn the various parts of the globe. Until recently it was supposed that the Persian architecture owed its origin to the Indian, but the study of the archæological remains of the various Eastern countries has enabled the specialists engaged in the work to fix the date of the former structures far anterior to that of the latter or Indian. The birth of the Roman and Grecian styles, their semblance and peculiarities, are no longer invested with doubts or involved in mystery, which had so long exercised the minds of the enthusiastic students and travelers of the old and the new worlds. The arch semicircular, Gothic with their many variations—the pillar, the capital, the dado, the architrave, and the various details of ornamental construction—are no longer ascribed to accidental observations or similitude, but have descended to us from remote antiquity as the triumphs—though rude—of the Assyrian and Egyptian structural art. The evolutionary process which the art has, during its progressive descent to us, passed through has given to the world architectural beauties unapproached in the annals of ancient architecture.

If architecture is correctly defined as being nothing more or less than the art of ornamental construction, then I am bound to say that of all Oriental nations the Persians appear the most advanced in the art wherein mud or earth plays a most important part. Any one journeying through or sojourning for a short period in Persia cannot avoid being struck with the high excellence which mud, common mud, can be made to attain in its employment in architectural works. Forts and fortresses, courts and country houses, palaces and public offices, colleges and convents, mosques and minarets, towers and temples, caravansaries and crown buildings, bazars and breakwaters, are all made of mud—despicable mud, whose qualities in the constructive art are only appreciated and acknowledged when moulded into bricks and burnt in a kiln. This is not all, for even culverts or bridges of small span are also made of mud, a single arch of 10 to 12 ft. spanning the water's course from bank to bank at springings whose line is far above the highest water level. Nearly all the buildings in Persia are built of mud and sun-dried bricks ornamented with gatch or gypsum, and a short account of building and construction after the Persian fashion will not be out of place in your journal.

The principal materials which enter into the composition of a mud building are straw, quicklime, gypsum or gatch, and stone pebbles. Any one desirous of having a residential house in or out of town has only to give notice of his intention to the mehmarbashi or the principal architect of the city or town—generally a Persian—who either repairs to the party himself or deputes his assistant or bannabashi to ascertain the size, style, and description of the building required. This obtained, the mehmarbashi or architect prepares a plan which he personally takes to the saheb; and, after explaining to him the general outside features and internal arrangement, and the cost probable, he leaves it to him to decide when, where, and how the house should be built. No building is started unless the day is auspicious—rozikhair—and when that day is determined upon, as also the size, style, etc., fixed by the future owner of the building, the mehmarbashi is sent for, and the hukum or order given.

Thereupon the builder commences operations. Brick making being the first thing, he sends his falehs or assistants to proceed with that work. The bricks are made of clay previously prepared. This is done by first digging the ground and allowing the clay to remain exposed for two or three days in the sun. It is then saturated with water and exposed for two days longer, when it is subjected to the operation of treading or tempering. The clay is then moulded into bricks 9″ × 9″ × 2″, and the surface is luted over with water mixed with chopped straw or kah, of which seven seers are used for every 1,000 bricks moulded. This superficial plastering of straw is intended to prevent the newly made bricks from cracking. A single moulder can manufacture from 2,000 to 2,500 bricks per diem of six hours. The cost varies from 8 annas to 12 annas per 1,000, and sometimes more when they are intended for the kiln. When the bricks (sun-dried) are ready, the mehmarbashi marks the foundations according to the rung or plan, and the pits or trenches are then dug, and the whole exposed for several days, generally one week, until the trenches and debris from the same are quite dry. The clay thus dug is of very tenacious character, and is called roost, a kind of fire clay. The foundation is laid in with this clay, mixed with quicklime. It is well treaded and rammed, and then allowed to stand over for a week. The thickness of walls is determined by the weight and height of the superstructure, and is invariably spoken of as so many fingers breadth. The walls are built with unburnt bricks and clay, and the arches with the same bricks and gatch or gypsum. A bannabashi or a mason seldom uses the rule or plumb line when building a wall, his guide to straightness and verticality being the eye and the trowel.

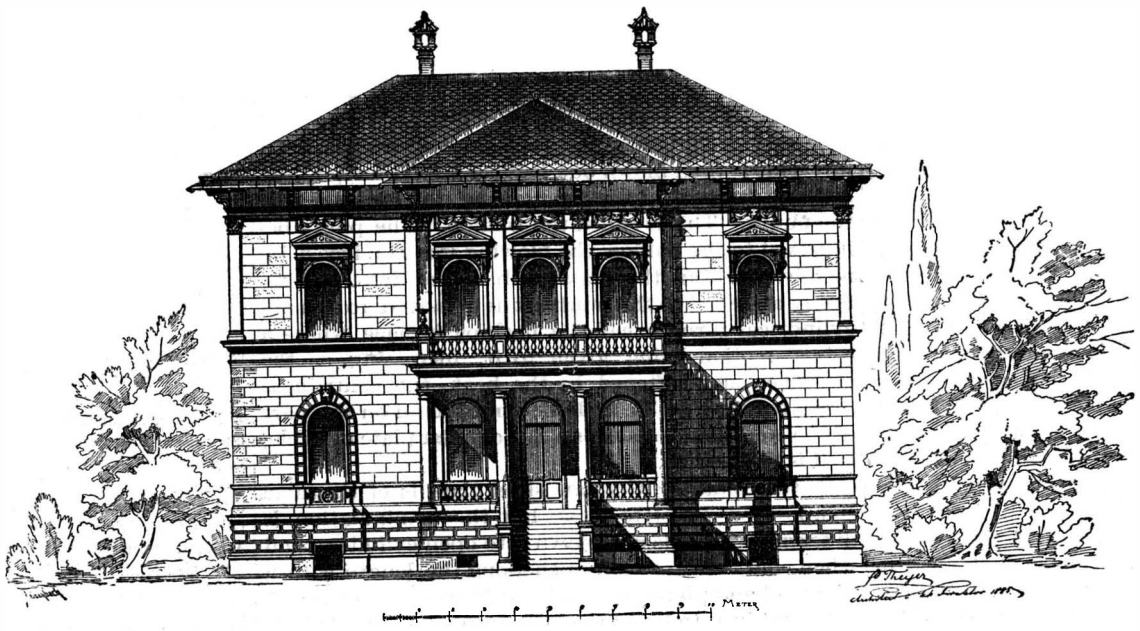


The small arches, of which there are many varieties, are never built with centerings, as in this country. It is sufficient when the first ring is made; all others follow it endways until the whole arch is completed in. It is made of a single brick on edge, and kept in position in course of construction by means of the gatch and wedges of pebbles. The gatch dries as soon as applied on the edge of the bricks, which are pressed or placed in position before it dries or dies. The pebbles are used as wedges only in the extradol joints of arches, where the joint is wider than in the soffits. The circularity of the arch is determined by means of a line or string from the center of a bar placed along the springing of the arch, or, rather, span, or parallel to it, the said string being equal to the radius of the circle of which the arch is a part.

Where arches exceed 10 ft. in span and 30 or 40 ft. in length, arched ribs are put in over centerings, placed 10 ft. apart, and the arch work of the spaces is filled in, as before, with bricks on edge, single, but without the help of centerings. Except in tarbi, or extra strong arches, where the bricks are used on their planes or flat, *i. e.*, endwise, all other kinds of arches, such as the gabri or Parsi, which is never or seldom built without shaloob or centering, the almaztrash or diamond-shaped, and the ghace or pointed—Gothic—are invariably built of single brick on edge.

When the arches or domes are completed, the spandrels, or sandooghas, are filled up with broken bricks, carefully arranged. Over this is laid fine, loose earth, which is rammed down to the required level preparatory to receiving the khahgil plaster, which is prepared in the following manner: The clay, to which is added chopped straw, is first made and well tempered by the feet. It is then allowed to stand for several days, with water just covering the top of the clay, which is mixed in small tanks. When thus prepared, it is laid over the loose earth which had been rammed level previously, and thus the roof is completed.

The thickness of the khahgil plaster for the roof ranges between 3″ and 4″. After the roof is completed the parapet walls facing the streets and the neighboring buildings are raised 5 and 6 ft above the level of the roof, tapered, and similarly plastered with khahgil. The facade of the building is either plastered over with khahgil of finer quality colored with red or yellow ocher and lined and paneled out in gatch or gypsum or entirely plastered with the latter and ornamented with mouldings of the same material. The interior of the building—the rooms—are generally plastered with khahgil of the finest quality, called sungil, which is composed of fine clay, the husk of wheat, horse or cow dung, and the coloring matter. These are mixed in large vats and allowed to stand for several days—seven or eight days—when the clay is considered ready for use. It is then applied to the wall with a trowel, care being taken that it is uniformly laid. The projecting angles of walls and recesses are picked out in gatch and colored to suit the



AN AUSTRIAN COUNTRY HOUSE.

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khah or rather sungil plaster. A single mason will lay in 2,000 bricks for a day's work. When the wall rises beyond the reach of assistants or bearers of bricks and clay, the bricks are not taken up in hod or basket, but are thrown up from hand to hand to men placed on scaffoldings or stages until they reach the bricklayer. Leather gloves are worn by the throwers to save their hands from injury arising from the constant friction between the bricks and the palm of the hand.

Gatch is only used in building of arches or mouldings, and is never mixed up in larger quantities than a few seers at a time when employing it as a cementing material or for mouldings. When in course of preparation for these works, it is kept in constant motion to prevent it from dying or getting flat, and therefore useless. The gatch is much appreciated for its quick setting and adhesive properties. It is the only and best cement used in arched masonry and mouldings.

The inclosure walls of the house are sometimes carried to great heights—30 to 40 ft.—as a protection against thieves. They are built solid about two-thirds of the height, the remaining portion being built in sandooghas or chambers which run along the length of the wall—generally of enormous thickness at the base and gradually tapering to a point or edge.

This is the modus operandi of building an ordinary dwelling house; and though the same method is observed in the construction of more pretentious buildings, public or private, the difference is only in the choice of materials. There are huge buildings three and four stories high, built of sun-dried bricks faced with burnt bricks and the joints filled in with lime or fire clay and glazed green or blue. Vaulted bazars are entirely built of sun-dried bricks, decorated with figures and flowers in gypsum. The perfection to which clay has been carried in the constructive art is evidenced in the former and the present capital of Persia, by the magnificent caravansary known under the name of Caravanserai Mukhlis; the buildings in Charbagh or four gardens; the public buildings in Maidanishah; and last, but not the least, the Halfdast or the royal palaces, old and new.—*Zulpah, Indian Engineering.*

TOMB OF COLONEL HERBINGER, MONT PARNASSE CEMETERY, PARIS.

This monument to the unhappy Colonel Herbinger was erected last December, by his mother. The base, measuring 3 ft. 8 in. × 7 ft. 4 in., is placed above the family tomb. Above it rises a statue of Joan of Arc, from whose family Col. H. descended, and a column surmounted by a bronze bust of Colonel Herbinger. Below the statue, upon a cushion, lies the wreath of victory, and upon that is thrown a broken sword. M. Etex, sculptor.—*La Semaine des Constructeurs.*

TOMB OF COLONEL HERBINGER, MONT PARNASSE CEMETERY, PARIS.

Window Glass.

The base of all glass is silica. The most convenient form in which it is found is in fine sand. Upon the due proportion of this substance in glass depends its compactness of body, brilliance, and capacity to withstand sudden changes. It often happens, either on account of want of sufficient heat in the furnace, or in order to save time in the melting or founding, that too small a proportion of silica is employed. Glass which has this fault may be known by its rapidly attracting moisture. Plate glass is composed of sand, carbonate of soda and chalk, with small quantities of arsenic and manganese. The proportions vary at different works, but the general proportion is: Lynn sand, 400; carbonate of soda, 250; ground chalk, 35—by weight.

The quality of the glass depends upon the quality of the alkali. Plate glass is melted in large open pots. The furnaces are square, containing sometimes four, sometimes six pots each. When the glass is melted, which takes twenty-two hours, it is removed to another furnace, where the pots are smaller, of a cylindrical form. Here it is fined, which occupies four to six hours, and when free from air bubbles and impurity, the pot with the glass is removed bodily from the furnace by means of a crane, and hoisted to the end of the casting table, upon which the glass is emptied. A large iron roller which works inside the flanges of the casting table is then made to pass over the melted glass in order to flatten it out. It is then removed upon a wooden table on wheels to the annealing arch, which is now at a high temperature, and here it is excluded from the atmosphere until cold. The glass is rough and uneven, but it is afterward cut flat by machinery, and then smoothed and polished.

It is these processes which render plate glass so costly. Crown or window glass is of much the same composition as plate glass, except that a cheaper description of alkali is used. The ordinary mixture is: 500 cwt. of Lynn sand, 2 cwt. of ground chalk, and 1 cwt. each of sulphate and carbonate of soda. The square furnace and the open pots are used, there being generally six pots on each furnace. It takes from fourteen to twenty hours to melt this glass, and it then requires to stand four to eight hours to allow it to become free from all air bubbles and to cool sufficiently for working.

Window glass is formed by blowing. Upon the blowing iron is gathered at three several times (the fluidity of the glass never allowing fewer) the weight of glass necessary to produce the table, and which weighs 11 lb. This is then blown out, leaving a solid lump at the farthest extremity from the blowing iron for attaching the punty. This is called the bullion. The punty being fixed to the bullion, the blowing iron is relieved by merely touching the glass with a wet iron. Being firmly attached to the punty, it is removed to a small cylindrical furnace, called a flashing furnace, where a rotary motion being given to it, increasing as the glass becomes softened by the heat, the centrifugal force, together with a little sleight of hand on the part of the workman, produces a flat circular plate or table, as it is then called.

British plate or German sheet glass is of the same composition as plate glass, but the manipulation is different. The glass is blown into open cylinders, and when cold these are cut open along the length with a diamond and placed in a flatting furnace, which is at a sufficient heat to bring the glass into a semi-fluid state, so that it falls quite flat. The sheets thus made are afterward cut flat and polished. The size of the sheet is restricted to what can be blown and worked by one man. It is cheaper than plate glass, because all waste is avoided and less cutting is required.—*A. Pellatt.*

Basswood.

Basswood is commonly ranked among woods as a scalawag. It is not so much of a scalawag, however, as some people think it is. For certain uses it is admirable. For organ keys, trunks, several kinds of small boxes, carriage bodies, woodenware, paper pulp, and for many articles which are turned, it is just the thing. In some sections of the country, as a matter of economy, it figures as a building wood, but when used on the outside of a structure, the builder in due time discovers that it is false economy. A Wisconsin manufacturer is making basswood doors which he sells as a No. 3, and calls them linn, another name for basswood. Basswood is also known as linden, and in some sections it is called the bee tree, from the fact, undoubtedly, that its flower is a favorite with the honey bee. There is a curious story current in Wisconsin sash, door, and blind circles that is worth repeating. A manufacturing concern shipped a Western customer a car or so of doors with basswood panels. It was probably an experiment to the extent that the doors were sent out as a feeler to ascertain if the average retail dealer in the "rowdy West" could tell a basswood from a pine panel. In this case he knew it wasn't pine, for on receipt of the doors he wrote the Wisconsin men, asking them what they took him for. They didn't tell him what they took him for, but, presumably before the letter was received, a representative of the house started for the Western customer, and before the customer had time to make any complaint the representative informed him that his house had made a mistake. It had made to order for an Eastern man a lot of doors with applewood panels. By mistake these doors were shipped to this Western customer; the doors were expensive; the representative trusted that the customer would at once see the point, and, so far as he could, correct the mistake of the house. The customer saw the "point," and promised to pay an extra price for the doors, and is probably dealing them out to builders as an extra choice article. If the story is founded on fact, it is a decidedly rich one.

The worthlessness of basswood for some purposes and its value for others shows simply that it was intended that man should go around with his eyes open. If he puts basswood in a weight-bearing position, or makes a handspike of it, he will get left. But it is a necessary cog in the wheel, and if rightly used in the right place, the machinery runs along without a hitch.

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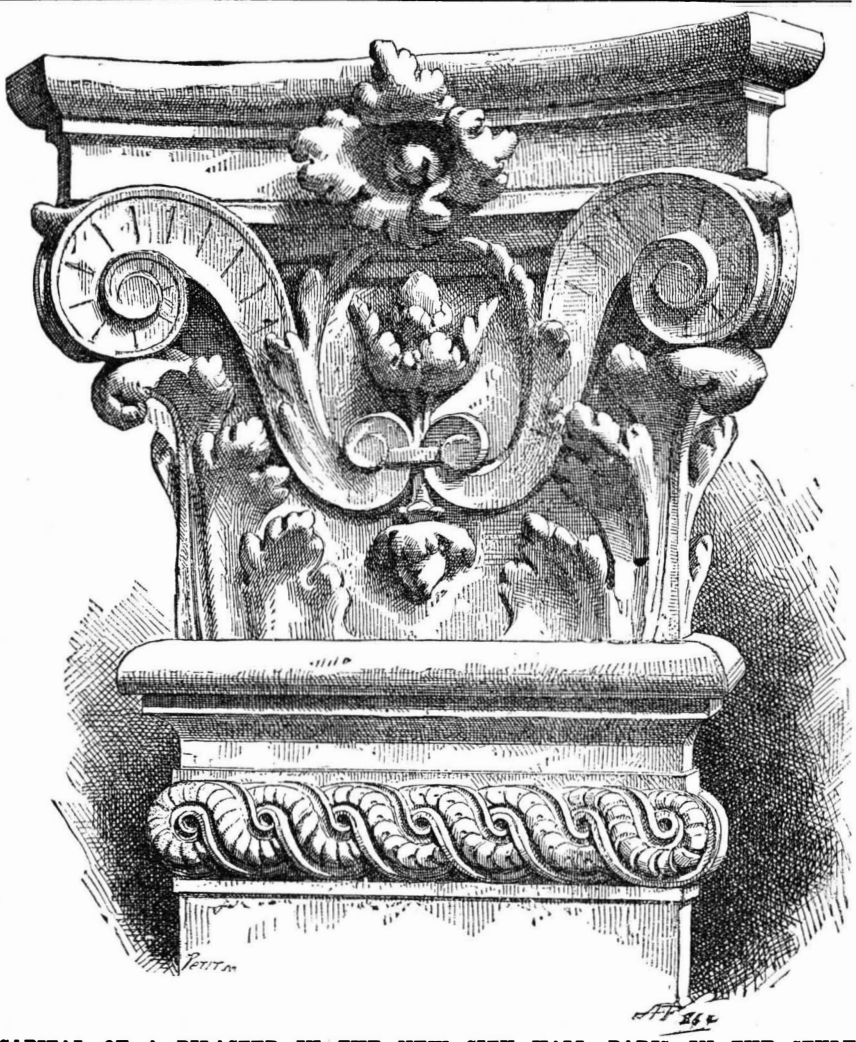
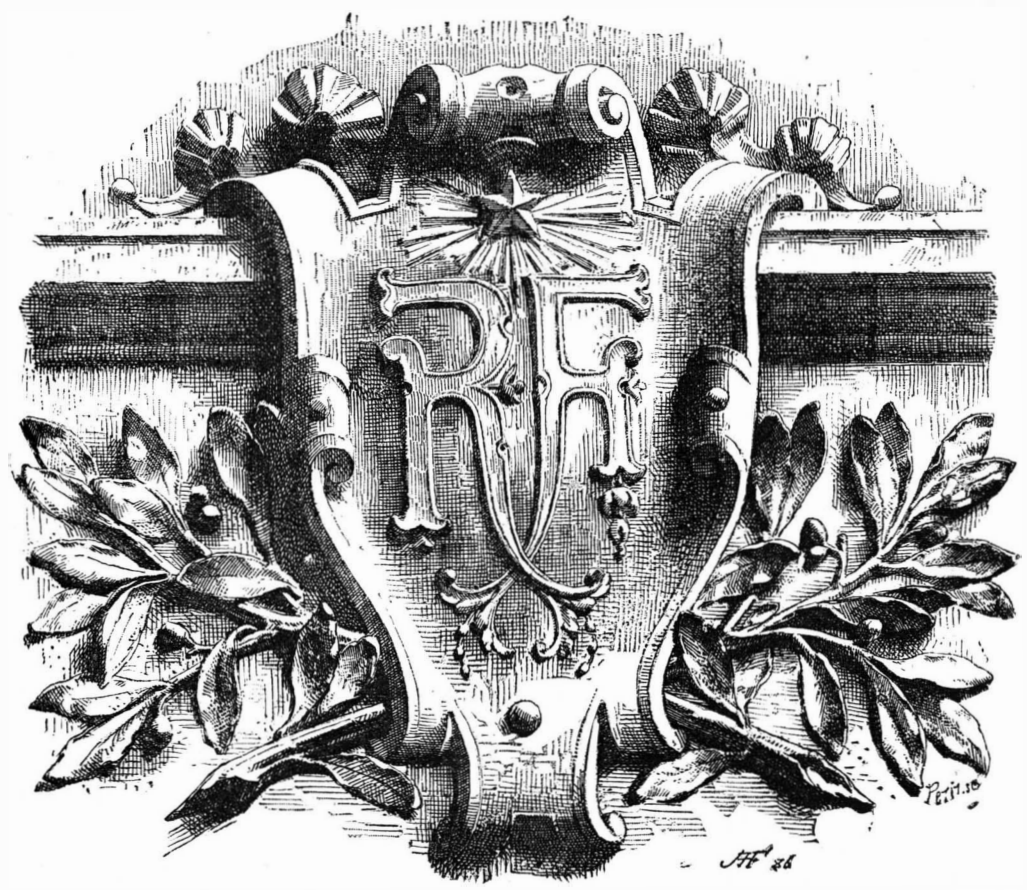
INTELLIGENT FORCE—CARYATID ORNAMENTING AN INTERIOR DOOR IN THE HALL OF ST. JOHN, NEW CITY HALL, PARIS.



CAPITAL OF A PILASTER IN THE NEW CITY HALL, PARIS, IN THE STYLE OF THE TIME OF FRANCOIS I.

BRACKET SUPPORTING THE CLOCK, CITY HALL, PARIS.



MONOGRAM (REPUBLIQUE FRANCAISE) FOR THE NEW CITY HALL, PARIS—CARVED IN STONE.

PLENTY—CARYATID ORNAMENTING AN INTERIOR DOOR IN THE HALL OF ST. JOHN, NEW CITY HALL, PARIS.

SELECTIONS OF CARVED WORK FROM THE NEW HOTEL DE VILLE, PARIS.

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Painted Plate Glass Mirrors.

This style of painting, which has lately become so fashionable, appears to be of Roman or Venetian origin, and in many old palaces on the Continent traces of it, dimmed by the lapse of ages, may be met with. At the present time the art has been to a considerable extent revived in Rome, and the artist Fornari's work is esteemed to be superior to that of the old specimens. His designs are in the old Cinque Cento style, and are remarkable for the richness and variety of the flowers and arabesques introduced. The work is not difficult, and can be satisfactorily accomplished by any amateur who has a good knowledge of flower and bird painting. It is done upon deeply beveled looking-glass, which is then framed in wide, ebonized frames, or in a china mount, or in Salirati's celebrated raised and colored glass frames. When framed in ebonized wood, the painting is so designed as to droop over the glass from one side, and to be carried on over the side of the frame.

By this means the reflection of the painting is clearly seen, and yet the glass is useful for other purposes. Brackets and long mirrors for boudoirs are mostly ornamented in this way, while plate glass stove screens and other large articles have their ornaments springing from the bottom, from which the design rises and spreads evenly over a great part of the mirror. Such subjects as apple blossoms, cherry blossoms, and hawthorn are the most suitable for brackets, while tomtits, goldfinches, butterflies, and bees are introduced either upon the branches or hovering about the flowers. For fire screens, water lilies and their leaves, flags, mixed with the flowering rush, meadow sweet, and purple loose strife are good, with kingfishers, moor hens, and dragon flies as their accompaniments.

Draw out the design in outline upon cartridge paper, then take some lithographic ink and a lithographic pen, and with these trace the outline upon the glass, keeping to the prepared design as a guide. When the outline is dry, fill in the design with a coat of flake white oil paint, which mix with a little *siccatif de Courtray* as a drier. Use a red sable hair brush, and work the oil paint on it quite smoothly. Then proceed as in ordinary oil painting.

Flour Adulterations.

Of the many substances with which flour is adulterated, those in most frequent use are plaster of Paris, the dust of burnt bones, pea or bean meal, and potato flour. An easy general mode (writes an expert) of testing the purity of flour is to squeeze it in the hand. The cohesiveness of wheat flour is very great, and consequently the lump so squeezed in the hand will be a longer time before it breaks and falls if of wheaten flour than if the flour be adulterated. Plaster of Paris, the dust of burnt bones, and pototo flour are also much heavier than wheaten flour, so that adulteration by them may be easily detected. A sack which will contain two hundredweight of wheat flour will hold three of potato flour, so that, should the flour be adulterated with any amount of potato flour, it may be detected by means of its weight.

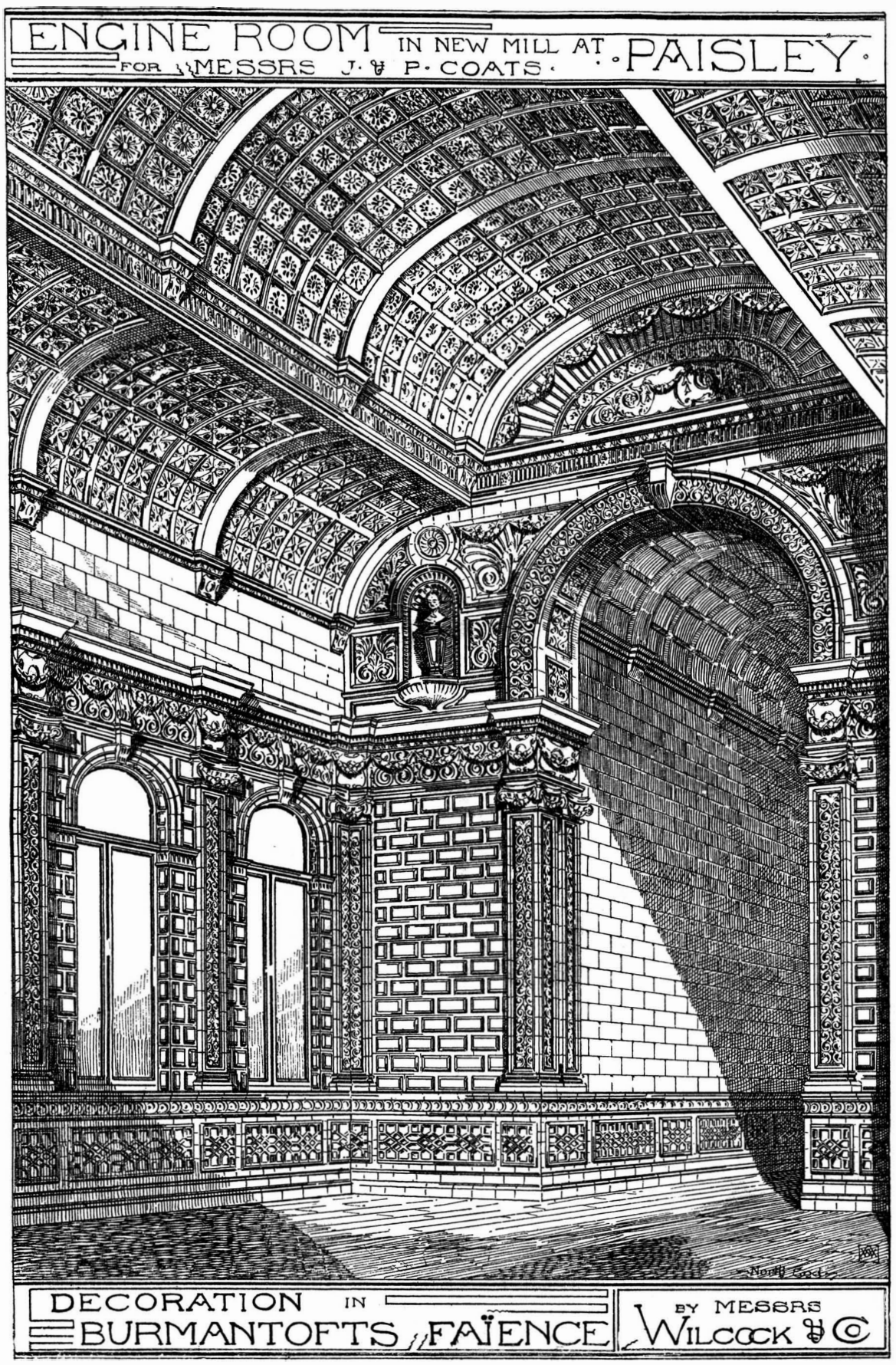
Should pea or bean meal be mixed with the flour, it may be detected, if in any considerable quantity, by pouring boiling water upon a cupful of the flour, or by toasting a piece of bread made of it, the odor of the pea or bean being sure to rise while the meal or bread is hot.

Adulteration by means of the flour of inferior grains is more difficult of detection, but may be ascertained by pouring upon a spoonful of flour a little pure spirits of hartshorn. If the flour be wholly of wheat, the hartshorn will render it of a yellow color; but if it be adulterated with corn, the hartshorn will turn it to a pale brown, and if it be adulterated with pea or bean flour, it will become a darker brown.

Adulteration by means of potato flour may be detected by means of acids. Take a spoonful and pour upon it a little nitric acid; if the flour be of wheat, it will be changed to an orange yellow; if wholly of potato flour, the color would not be altered, but the flour formed into a tenacious jelly; if, therefore, the flour be adulterated with potato flour, it will not be difficult to decide. Again, take a spoonful of the flour, and pour upon it a little muriatic acid; if the flour be of pure wheat, it will be changed to a deep violet color, without odor; but if potato flour be mixed in it, it will then have an odor like that of rushes.—*Roller Mill.*

The Chinese Wall.

An American engineer, who has made the subject a special study on the spot, has calculated that the Chinese wall has a contents of eighteen million cubic meters (6,350 million cubic ft.) The cubic contents of the Great Pyramid is only 241,200 meters. The material used in the construction of the Chinese wall would be sufficient to build a wall round the globe 1·8 meters (6 ft.) high and 0·6 meter (2 ft.) thick. The same authority estimates the cost of the Chinese wall to be equal to the railway mileage of the United States (128,000 miles). The stupendous work was constructed in the comparatively short period of twenty years.



Engine Room at Ferguslie Mills, Paisley.

Our illustrations show views of the new engine room connected with the magnificent mills just completed at Ferguslie, near Paisley, for Messrs. J. & P. Coats, the well known thread manufacturers.

The erections which have just been completed are to supplement works which have been carried on successfully upward of a century, and mark a distinct development, not only in the production of thread and sewing cotton, but in the erection of premises and machines to produce the same.

The mills just completed are probably the finest mills existing in the world, and Messrs. Coats have spared neither thought nor expense in carrying through the whole of the work in the most perfect and complete way possible. The new mill is 400 feet long by 130 feet wide, contains five floors, and is about 100 feet in height. An ornamental parapet is carried round the whole of the building, and is embellished with turrets at the angles, which are used for ventilating purposes, also by towers over the staircases. Below the base the structure is of stone, and above this point it is constructed of pressed brick.

The mill is lined throughout with glazed bricks, a dado of brown running through each room to a height of about five feet. The floors are in the best form of fire proof construction, being formed of wrought iron girders, and laid in cement concrete. Over this are laid ordinary floor boards, and over these again floors of half inch maple boards. The iron beams are all cased up with perforated zinc, and plastered. The columns are all incased with wire, and plastered. They have also ornamental moulded capitals, and the whole of the ceilings and ironwork are painted with enamel paint. The cleanliness, lightness, and general air of brightness and cheerfulness thus obtained is noteworthy, and forms a distinguishing feature of the salient points Messrs. Coats have had in view in their method of construction. Although the rooms are so wide, yet they are admirably lighted with natural light throughout, and in the absence of natural light, an ample provision of electric light is made.

Our illustrations refer to the engine house only, and it will at once be obvious that this is no ordinary structure. It is detached from the main building. The interior dimensions are 80 feet long, 40 feet wide, and about 80 feet high. The engines themselves are what are denominated compound tandem engines, of 1,500 horse power, the fly wheel being 35 feet in diameter, and having forty grooves for ropes, these ropes working on to pulleys in the main body of the mill, through the rope race.

The whole of the interior of the engine house is lined with Burmantofts faience, treated semi-constructionally, both the method of construction and the design being unique and specially adapted to give solidity and breadth of effect. The floor is laid in ceramic mosaic, the windows are of decorated glass, the window frames and all the woodwork being walnut and teak. The color scheme adopted throughout has been directed to secure thorough harmony of result. The dado is carried out mainly in browns and sage greens. The enriched band of the dado is treated in sage green and rich yellow brown, with the mouldings of deeper brown. The wall surface is a deep rich brown ivory in tone, and the effect of the rustication is considerably enhanced by the beautiful deeper tones of the color

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developed by it. The mouldings of the pilasters are in rich teapot brown, the panels being picked out with yellow greens, yellows, and browns. The caps are picked out to harmonize with the pilasters, and the frieze, which is in strong relief, running all round the engine room, is freely treated in harmonious tints of yellow greens, brown, and yellow. The ashlar above the frieze is treated in pale yellow, with brown mouldings above and below. The corbels are also treated in brown. The general effect of the ceiling is a combination of brown mouldings and light tones of yellow in the panels. The mouldings of the ceiling are all in walnut, and the upper frieze band is in a quiet tone of faience. We are not aware that so elaborate an engine house has been erected in connection with any undertaking either in this or any other country, and, in adopting the use of Burmantofts faience, Messrs. Coats were actuated by the intention of having primarily a material essentially suitable in its cleanliness and durability, and, secondarily, of securing as complete an artistic result as could be secured, and so make their engine house not only a show place in the best sense, but one worthy of containing the magnificent engines which form the motive power for their new works.

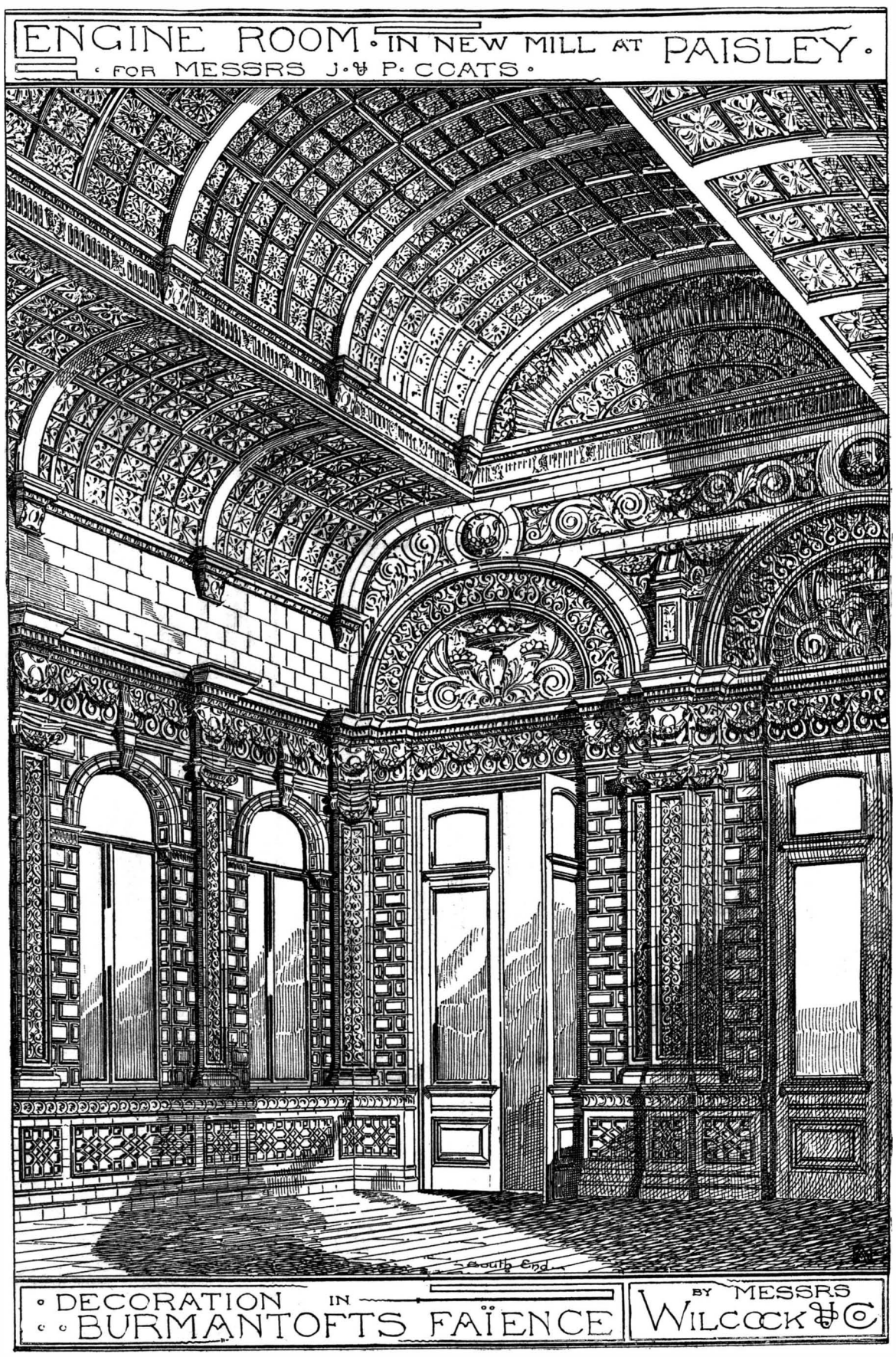
The architects of the new mill and engine house are Messrs. Morley & Woodhouse, of Bradford and Bolton, and the Burmantofts faience has been supplied and fixed in their best style by Messrs. Wilcock & Co., of Burmantofts, Leeds, and may be taken as a favorable illustration of the successful application of their now well known specialty to a purpose outside the ordinary run of decoration, but a purpose for which it has proved itself to be most admirably adapted.—*The Architect.*

About Kerosene Oil.

Why does oil stink in use in the lamps? With the best oil that is made you can produce a gas in your house that will make the atmosphere as disagreeable as it is unhealthy. In all lamps where proper and complete combustion is maintained, there is no perceptible odor from any quality of oil sold in the market. But the trouble is, when people want to leave a house or a room for a time and keep a light burning, they turn down the wick. This is done for economy in most instances, but there is not only no economy in it, as I shall show you, but there is also a danger to health and life. Now, when you light a lamp, there is at first a time when the flame will not burn high without smoking; but after the lamp and chimney are properly heated, and a full supply of oil is established through the capillaries of the wick, a strong flame can be maintained. Now, if, with this supply established, we turn down the wick, owing to its decrease of burning surface, the supply of oil continues in the same ratio, what is not consumed in the flame being volatilized into gas, which is carried out with the ordinary products of combustion into the air of the room, vitiating it and making it very unhealthy to breathe. Now, here, in my opinion, is the basis of lamp explosions, and if the proper proportion of atmospheric air gets into a chimney, or is blown into it, an explosion is sure to result. In my opinion, most of the explosions of lamps, so called, occur by explosions in the chimneys. A lamp should never be turned down. It can be easily extinguished by blowing across the top of the chimney, and a very little practice will show that this is the easiest and best way. After blowing out, the wick should be turned down inside the tube, to prevent the oil flowing over. A close attention to the methods I have indicated will, I am sure, prevent most, if not all, the accidents from explosion of kerosene oil, and save many lives, as well as many thousands of dollars' worth of property every year.—*Boston Herald.*

A Confectioner's Building.

Mr. Charles F. Gunther, the confectioner, has for the past year been engaged in building a magnificent six story confectionery establishment, practically fireproof, and supplied with all modern improvements. The building is of unique and original design, and is located at No. 212 State Street, Chicago.



The interior decorations of this beautiful store have never been surpassed in this country, or, perhaps, in the world. Artistic design, pure taste and harmony in tone are all apparent, and the fact at once impresses itself on the eye and mind of the beholder. From the front or east door of the store the visitor looks down a broad vista to the grand staircase. The vision is unbroken. There is not a line or reflection to mar the beauty of the scene. The ceiling is an arched canopy of purely original design, and the coloring is of soft, warm lemon tints, relieved by glace blue. The motive of the ornament of the ceiling is the *acanthus leaf*, of which the panels and cornices are formed. The clustered lights, which are unique in design, are placed along the sides of the room, so that their rays are thrown directly across the ceiling, giving a most beautiful effect. This ceiling would do honor to the Vatican at Rome, so celebrated for its magnificent work of this kind.

The materials used in decorating are onyx, jasper, agate, and Lisbon marbles, and hand cut glass in all the delicate lemon shades.

The side wall of the room is ornamented with 2,000 feet of plate glass mirrors, so tastefully broken with brass lines and toned down by the soft colors of the surroundings that there is none of the loud or vulgar effect so frequently produced by this class of decoration. The harmony is so perfect that they simply serve to attract the visitor's attention by reflecting the beautiful lights of the ceiling, instead of blinding him with a blaze of garish light.

The grand staircase at the west end of the room and its magnificent stained glass window are also triumphs of artistic taste. The staircase leads to the upper floor of the building, and is not surpassed by anything in Paris, that city of grand staircases and regal magnificence. The steps are of the choicest rose colored marble, broad and low, with gold tinted and enameled panels and railings. On the sides are handsome Italian arches, draped in mottled silk plush, and on the newel posts large, polished brass figures hold tapers that, when lighted, add to the beauty of the scene. The staircase is illuminated by a magnificent stained glass window, containing 500 square feet of hand cut glass, with polished jewels, a most pleasing feature of this thoroughly artistic work. The broad flood of soft light that streams in through this window spreads far into the building, greatly enhancing the general effect. From the first landing of the stairs the visitor obtains a superb view of the store in all its exquisite beauty. This is the point of vantage, and it will unquestionably be sought by all who enter this novel place of business and who have an eye for beautiful effects. The vista is not dazzling in its brilliancy, but it is nevertheless brilliant. The massing of light and shade and the soft coloring stand out prominently and make the view one of surpassing loveliness.

The furnishing of the store is in full keeping with the adornment. The upholstering is of rich silk velvet, and the shelves and cases of the neatest and most convenient kind.—*Conf. and Baker.*

A Waterproofing Process for Stone.

A waterproofing process for application to stones and mortars has been introduced by Messrs. Faure, Kessler & Co., under the name of "fluatation," and is favorably mentioned in the *Genie Civil.* The process consists in the application to stones, either before or after use in building, of various preparations of hydro-fluosilicates.

The operation is said to be very simple, consisting in the application of the solution by means of a brush, sponge, or hand pump. Three coats are put on during as many successive days, and the result is to make the stone and mortar as hard as the finest marble. Several preparations are made for special purposes, but they all harden limestone. One darkens the stone, another bleaches it, another preserves the original color, while others again are made the medium of staining the stone indelibly. "Fluatation" may be applied to old structures as well as to new buildings, and is preservative to a greater degree than any other known process. Reservoirs, baths, and other structures requiring to be water-tight can be made of stone so treated, and no ordinary liquids attack the preservative coating. Any stone, mortar, or cement may be "fluated," provided it is more or less calcareous.

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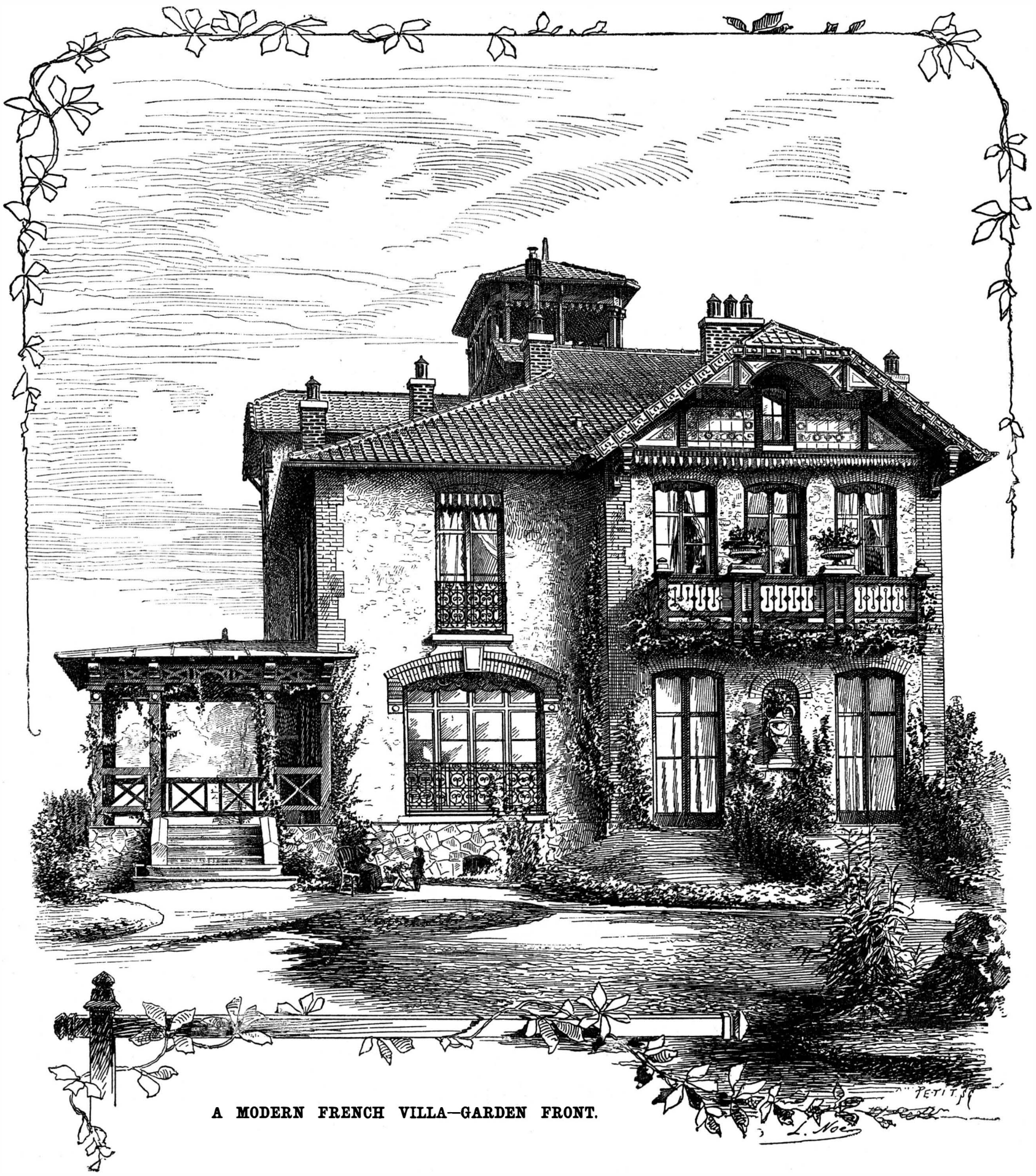
A FRENCH VILLA AT ENGHIEN-LES-BAINS, FRANCE.

Our illustrations are from *La Semaine des Constructeurs*, a weekly architectural French publication of acknowledged ability.

This villa was recently constructed at Enghien-les-Bains, upon the plans and under the direction of M. Friese, and is an example of the originality permitted and suitable for the country where located.

The foundation is of concrete, and the walls are of the same construction, but with stone work exposed, openings faced with brick, sills and lintels of cutstone.



A MODERN FRENCH VILLA—GARDEN FRONT.

The wood finish is of chestnut. Roof covering of tiles.

The cost of construction was:

Grading, mason work, and paving	$6,000
Wood work	1,900
Iron work	1,880
Plumbing and roofing	2,800
Painting and glazing	1,000
Chimneys	400
Furnace	400
Decoration	320
	$14,700

Oil stains may be removed from paper by applying pipe clay powdered and mixed with water to the thickness of cream; leave on for four hours.

Paper Car Wheels.

The following particulars were recently given in *Harper's Magazine:*

The paper car wheel was the invention of Richard N. Allen, a locomotive engineer, afterward master mechanic of the Cleveland & Toledo Railroad, who took for his aim in life the production of a better car wheel than those in use. His first set of paper wheels was made in Brandon, Vt., in 1869, and after much scoffing he was graciously permitted the use of a wood car on the Central Vermont road, under which they were tested for six months. The Pullman Palace Car Company, in 1871, gave the first order for 100 wheels; ten years after, the Allen Paper Car Wheel Company, with great shops at Hudson, N. Y., and Pullman, Ill., produced and sold 13,000 in a single year. One of the set first experimented with under a "sleeper" is shown at Hudson, with a record of 300,000 miles travel. It is the body of the wheel only which is of paper. The material is a calendered rye straw "board," or thick paper, made at the Allen Company's mills, at Morris, Ill. This is sent to the works in circular sheets of 22 to 40 inches diameter. Two men, standing by a pile of these, rapidly brush over each sheet an even coating of flour paste, until a dozen are pasted into a layer. A third man transfers these layers to a hydraulic press, where a pressure of 500 tons or more is applied to a pile of them, the layers being kept distinct by the absence of paste between the outer sheets. After solidifying under this pressure for two hours, the 12-sheet layers are kept for a week in a drying room heated to 120° Fahr. Several of these layers are in turn pasted together, pressed, and dried for a second week, and still again these disks are pasted, pressed, and given a third drying of a whole month. The result is a circular block, containing from 120 to 160 sheets of the original paper, compressed to 5½ or 4½ inches in thickness, and of a solidity, density, and weight suggesting metal rather than fiber. The rough paper blocks are turned accurately in a lathe, when shavings like leather and a cloud of yellow dust fly off, to a diameter slightly greater than the inner circle of the tire. The hole in the center is also made on the lathe, and after the paper has received two coats of paint to prevent moisture working its way within, the cast iron hub is pressed through by the aid of the hydraulic press, and the wrought iron back plate is clamped on. The suasion of enormous hydraulic power now drives the paper center into the tire by help of the bevel.

Hemlock laths are not to be despised. In the West they are hated by the carpenters because their slivers have a sting, and nails do not puncture them easily. But hemlock laths are making their way against prejudice. A White Lake, Mich., concern has this year handled 1,500,000 hemlock laths, shipping them to Indiana points. They are straight grained and clear of knots, and give good satisfaction.

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Blistering.

The season is at hand when our semi-tropical weather makes everything fairly smoke. The sun's beams glance down upon us, and sap all life and activity from our bones. So great and intense is the heat, that at times both man and beast are prostrated unto death.

Is it any wonder that so soft a material as varnish should be heated to the point to raise into blisters, when a carriage stands for hours exposed to both direct rays and reflection from the pavement?

And the higher the grade of varnish, the more liable is it to be raised into blisters, for its very elasticity is its weakness under great heat. Work painted during the winter, and that has had plenty of time to harden, is pretty secure from blistering. It is the carriages that were finished late in the spring that need most careful guarding. That heat will raise varnish into blisters is proved by using flame to remove the old paint from any painted surface.

If there is any oil left, it will manifest itself by expanding into a gaseous form, and as it cannot readily escape, it forces the resistant outer skin into sacs.

Blisters are caused by heat of greater or less intensity. Even in the case of blistering caused by poor japan or other material there is a chemical change, a burning which causes the paint to rise up in patches. Our flesh blisters under the action of both natural and artificial heat and through fever. It will be seen, then, that a blister cannot be made unless by confined vapor or gas in an aeriform state, produced by heat. Moisture or the sap in wood will cause blistering when the surface is heated sufficiently to penetrate and cause evaporation. It is foolish to say that it is impossible because water does not boil and form steam below 212° Fahr. Damp boards gives off vapor under an early morning sun, and the same will occur whenever the dampness is small in quantity. Oil does not boil under 400° or 500°, but it does not take a degree of solar heat above 80° or 90° to cause soft varnish to raise into blisters, when long exposed. We remember, when a boy, seeing the paint on steamboats that ran from Cincinnati to New Orleans badly blistered, and the degree of heat that caused it was not much above 100°.

Paints containing little or no oil when laid over thoroughly dry wood seldom blister, for there is nothing for the heat to vaporize.

Some wonder why it is that a panel or panels will blister in a few places instead of over the entire surface exposed. The same is true under the effect of a burning iron surface or flame, which is probably due to the fact that the vapor is drawn from the parts adjoining the blisters and concentrates in them. A blister here and there on a panel shows that the conditions of the under surface were more favorable to evaporation at those places. Painting that is allowed time to harden thoroughly between coats, and that contains excellent material, is well nigh proof against blistering.

Sometimes the roof of a coach will blister in spots, which may be caused by drops of water, which act as lenses to concentrate the heat in those spots.

Grease in spots that have been painted over is another cause of blistering. The parts of a carriage that are never exposed to the direct rays of the sun do not blister, and an under panel standing at an angle is proof against blistering, except when it is exposed to reflected heat from the pavement. Blisters are more unsightly than cracks, because the former rise above the surface, and are more distinctly visible, and are less easy to hide; for when they are removed they leave round patches lower than the level of the varnish, which require to be puttied and retouched with color for hurried work, and to thoroughly remove them, the paint must be burnt off. A few blisters may be corrected by pricking them and pressing the varnish back to the level; that is, when the operation is performed at once, for when the sac hardens it will shell off.

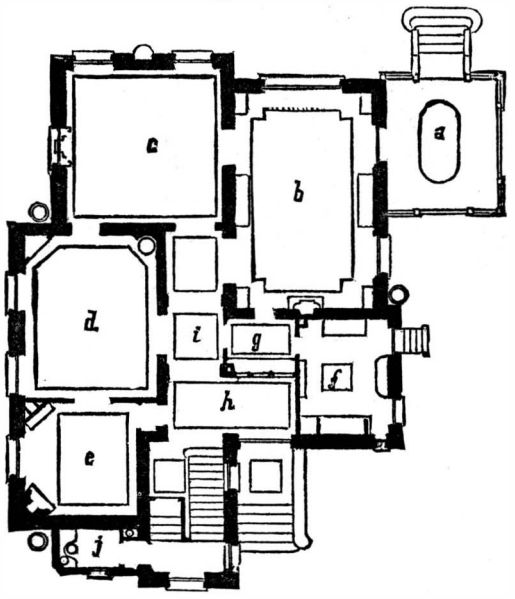


Fig. 1.—GROUND FLOOR.

a. Veranda. *b.* Dining Room. *c.* Parlor. *d.* Billiard Room. *e.* Sitting Room. *f.* Kitchen. *g.* Office or Waiting Room. *h, i.* Halls. *j.* Water Closet.

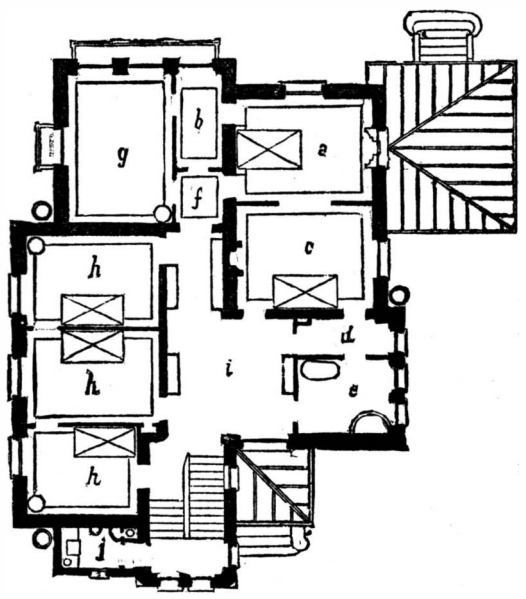


Fig. 2.—SECOND FLOOR.

a, Chamber. *b.* Dressing Room. *c.* Chamber. *d.* Dressing Room. *e.* Bath Room. *f.* Hall. *g.* Office or Workroom. *h h h.* Chambers. *i.* Hall. *j.* Water Closet.

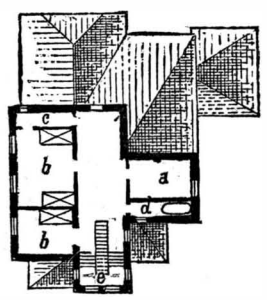


Fig. 3.—THIRD FLOOR.

a. Workroom. *b b.* Chambers. *c.* Closet. *d.* Water Tank. *e.* Stairs to Cupola.

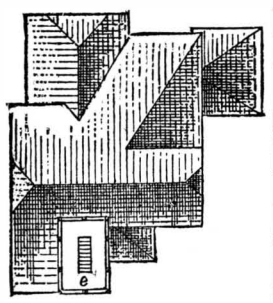


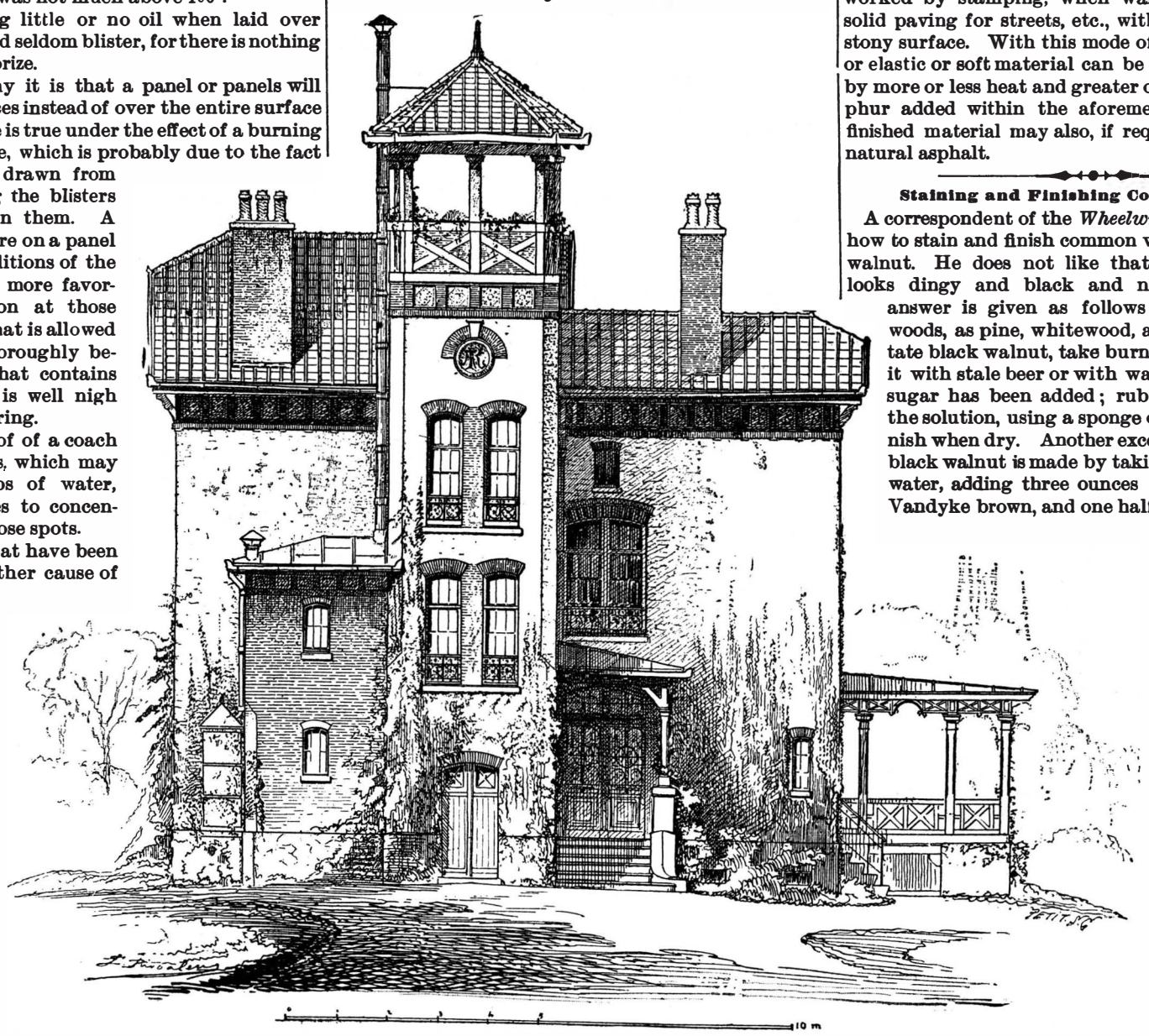
Fig. 4.—ROOF.

When the wood is free from moisture, either inherent or absorbed from the atmosphere just before the priming is applied, and the under painting is bone dry, the liability to blistering is removed to the last coat of varnish.—*Painters' Magazine and Coach Painter.*

Artificial Asphalt.

Natural asphalt has generally hitherto been used for paving and other purposes, being either employed alone or mixed with more or less limestone, sand, or other substance, according to its quality and the amount of bitumen in it. An asphalt has also been produced by mixing pure natural bitumen with limestone. The improved process of Dr. Paul Jeserich, of Berlin, dispenses, it is said, with natural asphalt or natural bitumen, and consists in the production of a material having the necessary qualities of the natural asphalt. The artificial asphalt is thus produced: Tar or other semi-liquid or viscid hydrocarbons with a high boiling point are heated in an iron boiler, if possible, with indirect firing, to a temperature of 130 to 200 degrees Centigrade, at which the material is maintained. Meanwhile sulphur is added by degrees in small quantities, according to the nature of the hydrocarbon employed, the sulphur being in proportion of about 5 to 20 per cent. of the hydrocarbon. The less volatile the hydrocarbons are, and the higher their boiling point, the less is the percentage of sulphur required. The sulphur dissolves in the hot liquid hydrocarbon with a powerful reaction and energetic evolution of sulphide of hydrogen and other sulphides.

After the reaction is finished, and the mass has obtained a consistence which is somewhat more fluid than the natural asphalt, it is transferred, while warm, into a mixing apparatus, and thoroughly mixed therein, under continuous agitation, with pulverized limestone, silicate, or the like. About 75 to 94 per cent. of pulverized stony material are required therefor. The product thus obtained is transferred to a kiln, where it is dried at a temperature of about 120 to 150 Centigrade, with frequent movement and turning over of the material, for half an hour to one and a half hours, according to the quantity of material and the proportions of mixture. The mixing apparatus may be so constructed as to be adapted to be heated, and therefore to serve at the same time as a drying apparatus. The powder obtained by drying has the qualities and appearance of natural asphalt, and may be easily worked by stamping, when warm, for producing a solid paving for streets, etc., with a thoroughly hard, stony surface. With this mode of manufacture a hard or elastic or soft material can be obtained at pleasure by more or less heat and greater or less amount of sulphur added within the aforementioned limits. The finished material may also, if required, be mixed with natural asphalt.



A MODERN FRENCH VILLA—PRINCIPAL FRONT.

Staining and Finishing Common Woods.

A correspondent of the *Wheelwright* desires to know how to stain and finish common woods in imitation of walnut. He does not like that kind of work, but it looks dingy and black and not at all nice. The answer is given as follows: To stain common woods, as pine, whitewood, ash, oak, etc., to imitate black walnut, take burnt dry umber and mix it with stale beer or with water to which a little sugar has been added; rub the wood over with the solution, using a sponge or rag, and then varnish when dry. Another excellent stain to imitate black walnut is made by taking two quarts of rain water, adding three ounces sal-soda, four ounces Vandyke brown, and one half ounce bichromate of potassa, and boiling the mixture for fifteen or twenty minutes. It can be applied with either a brush or sponge. When dry, varnish (hot or cold). Woods that are stained will finish up nicely if the first coat of varnish be a shellac varnish, which, being a spirit varnish, assimilates better with the stain coat and enriches it. It also prevents the copal finishing or rubbing varnishes from striking in.

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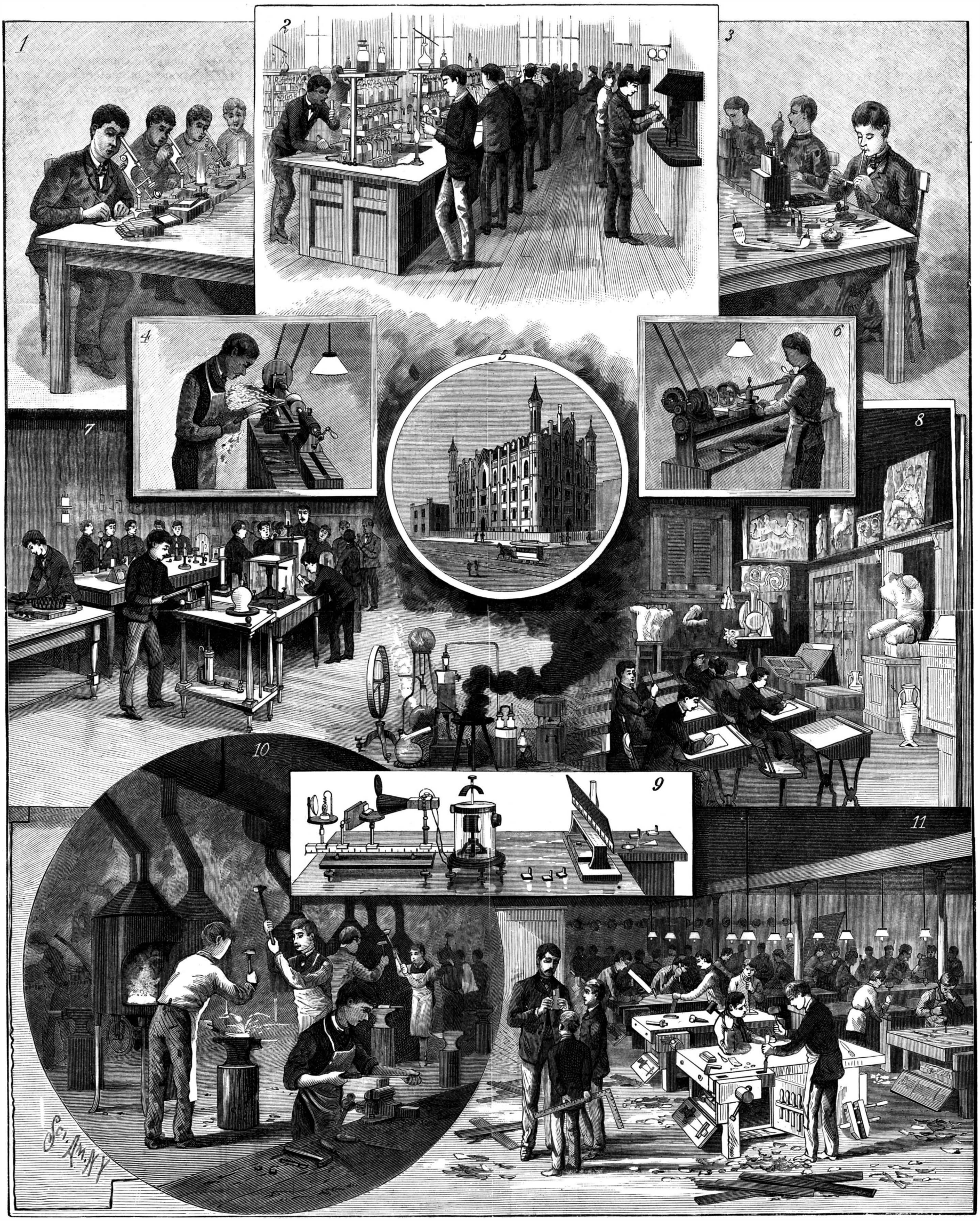
THE COLLEGE OF THE CITY OF NEW YORK—THE TECHNICAL COURSE.

The tendency of modern educators is every day more directed in the way of manual training. The first steps in children's education by the kindergarten method of Froebel, and the followers and amplifiers of his system, consist in a training of the faculties of observation and manual accomplishment. It is claimed that by this system a child need only commence to learn to read when seven or eight years of age, and that, owing to his kindergarten training, he will pass by one who may have learned reading several years earlier, but who never had a regular course of object lessons. The object system being established as a foundation for educational training, the extension of the same system to the higher courses seems only logical. A strong movement to effect this has become prominent here and in other cities during the past year. In New York the project of establishing such classes in the public schools has been successfully carried out. Considerable notice has been taken of the attempts. The work of the students has been publicly exhibited, and commented on in the papers. While this has been going on in the grammar schools, and before this period, the College of the City of New York has unobtrusively, and without attracting any notice, carried out a similar advance. Manual and technical education is firmly established there. From blacksmithing and carpentry up to chemistry and physics, the leading branches of technical training have a place in the course.

The president of the college, General Alexander H. Webb, saw from an early period the necessity in a college course of making men think for themselves. Thus, to render the lectures in ancient art and history concrete, reference could be made by the professor to the college collection of pictures and models. If the Venus Victrix or Apollo Belvedere was spoken of, a picture or cast of the statue was at hand for illustration. Athens



THE COLLEGE OF THE CITY OF NEW YORK—THE TECHNICAL COURSES.

1. Microscopy. 2. Chemical Laboratory. 3. Blowpiping. 4. Wood Lathe. 5. View of College. 6. Iron Lathe. 7. Physical Laboratory. 8. Drawing Room. 9. Melloni's Apparatus. 10. Blacksmith Shop. 11. Carpenter Shop.

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and its Acropolis became more than names when the views of the city and its buildings were presented to the student. The courses in chemistry and physics, from the beginning of the college, were profusely illustrated by the experiments of Professor Doremus, who, in his reputation of a demonstrator, is without rival in this country. Thus the eye has always been appealed to as well as the purely intellectual faculties, and this was the beginning of the advance. Within a few years the practical lessons of the laboratory, workshop, and drawing room have been added and made a part of the course. Some views of these are given in our illustrations.

The main college building is familiar to all residents of our city. It is situated on the southeast corner of Lexington Avenue and 23d Street. South of it a new building, devoted principally to the natural history department, was erected some years ago, and more recently a building devoted to the technical work of the students was erected to the east of the main building. These new departments are the ones illustrated in this issue.

Recognizing the practical, every-day importance of the microscope, the students are instructed in its use. The substances examined by it are principally commercial products. The obvious intention is to give the students a lesson that may be of service in business life, where these products are dealt in. The same is to be said for the blowpipe class, where mineralogy and examination of ores is studied. The construction of the blowpipe from a clay pipe, a cork, and a bit of glass tube will be familiar to some, but probably new to the greater number of our readers. These branches are in the charge of Prof. William Stratford.

For the study of practical and analytical chemistry a laboratory that in many respects is superior to any in the city is provided. The ceiling is very high, and rises in a series of parallel gables running east and west and glazed upon the north slope. These act as a series of skylights, admitting the north light only, and excluding all direct sun light. The effect is the most perfect illumination for work. The room is filled with laboratory tables, each table having its own set of reagent bottles, with name and symbol blown upon the glass of each. At the end of the room is an elevated platform, with lecture table and blackboard, for the use of the professor or instructor in charge of the laboratory. Various details about the desks are worthy of notice. No separate funnel or filtering stands are used, a series of sockets being provided that hold movable supports for the funnel. For every four desks a sink and water faucets are supplied, a distinct advance upon the old system of a single sink for a whole laboratory. Qualitative analysis is taught here; quantitative analysis as yet being given to but few of the students. Balances are, however, provided, so that the laboratory is equipped for both classes of work.

Physical science, as a rule more quickly appreciated by students than chemistry, is practically studied in laboratories devoted to it. Air pumps, gas analysis apparatus, electrical apparatus, gasometers, apparatus for illustration of heat and light, are here all used and handled by the students themselves. Radiant energy is worked at by sections of four or five students at a time with Melloni's classic apparatus. Those who have attended a good course of lectures in physics may form some idea of the work when it is stated that practically the students themselves repeat all the experiments incident to such a course.

Prof. Doremus, in whose charge these two departments are, lectures on the subjects of chemistry and physics, with all the illustrations the college's collections afford. His lecture room, as not appertaining to the students' personal work, is not shown. It is provided with every imaginable appliance, including the great air pump driven by steam.

The practical division, including the laboratories, is directed by Dr. Charles A. Doremus, together with Dr. L. H. Friedburg. The work of inspiring an army of students day in and day out with the magnetism necessary for their work is a most trying one, as any educator can testify. Upon the work of the laboratories, and upon this inspiration, the success of the course depends.

The instruction in drawing on the blackboard, and on paper from relief models, and from memory, is a necessary feature of the programme. Besides relief models, natural history is made to supply subjects. On the boards the structure of mollusks and other types are drawn. In this way the art may be made the exponent of a branch of natural history, and by such reference acquire a new spirit of life and reality.

What we have thus far described is the work in the natural sciences. Practical and useful though the design is, a more striking, because on its face a lower and more every day, form of manual training is next to be considered. In an extensive workshop, wood and metal working are thoroughly taught. Some of the scenes are illustrated.

The treatment of iron begins with forging. The general principles of the art are given by the instructor, with blackboard illustrations. The students then don their aprons, light up their own fires, and in groups work at the assigned tasks. A number of portable forges with hand blowers keep all the students at work. On the occasion of our visit, all the class were occupied chain making. Another day, some other piece of forging would be executed. In this way a knowledge of this most artistic work is acquired. In no art can effects more characteristic of the pure work of the hand be produced. The achievements of the old time blacksmiths in decorative forgings can stand comparison with the work of any artificers.

The blacksmith shop is next to the lathe or turning shop. Here a large number of lathes for metal turning, both speed and engine lathes, are in daily use. Having learned how to forge his material, and acquired some idea of vise work, filing, etc., the final work of turning is taught. From our illustrations, owing to limited space, only an imperfect idea of the number of lathes and completeness of the equipment can be obtained. Between the lathe shop and blacksmith shop is an electric plant for supplying electricity for the general needs of the scientific department.

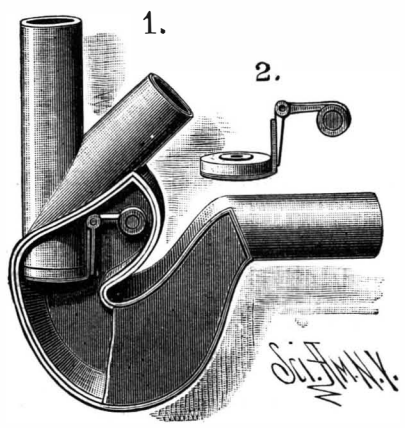
Next to the metal turning lathes come the wood lathes. There are about the same number of these. The students who have gone through the carpenter shop, and have learned joinery, are ready for wood turning. All the lathes are driven by power.

Finally, the carpenter shop is shown. A number of complete benches, with full outfit of tools, give every facility for good work. In this connection the subject of sharp tools is not lost sight of. The students receive special instruction in sharpening their saws, plane irons, etc. For the lessons in saw filing, strips of brass are supplied, which the student files into teeth for practice. This economizes material, and really affords, if anything, a better substance for a criterion of the student's work. The making of the different joints, such as mortise and tenon and dovetail, with other points in carpentry, are features of this course.

Thus it will be seen that the city of New York affords to the sons of her citizens a complete technical training free of all expense. With great judgment the students are not restricted to the regular hours for work in the shops. Late in the afternoon they may be seen bending over the lathes, or carpentering, or doing some other class of work. Yet we believe we risk little in saying that we are disclosing what is to many a new fact—the existence of such an opportunity for the poorest as well as the richest of the city's future citizens. The work of the college has been done so quietly and unostentatiously that less is known of it than should be.

PLUMBER'S TRAP.

The annexed engraving represents an improved plumber's trap, especially designed to prevent sewer gas from entering the house through the waste pipe. The horizontal waste pipe extends from one arm of the D-trap, while the vertical main outlet pipe enters the other arm. From near the end of the outlet pipe extends a branch overflow pipe. One side of the trap is closed by a plate which may be removed for clearing the trap or repairing the valve. The upper part of the trap, where it connects with the waste pipe, is on a higher level than the lower end of the outlet pipe, which is, therefore, always water sealed. The trap is formed with an upper chamber, within which the valve is placed. The valve proper, Fig. 2, is composed of a plate bent at right angles. Secured upon the upper surface of the lower portion is a packing of leather or other soft material to form a tight joint with the lower end of the outlet pipe when the valve is closed. The upper portion of the plate is connected to the



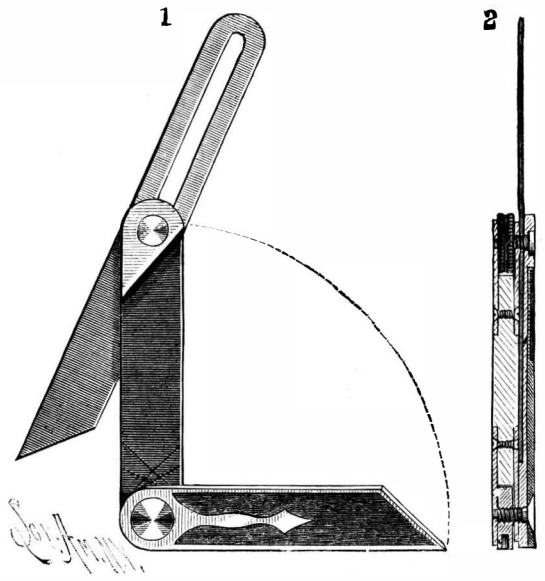
GERSTENBERG'S PLUMBER'S TRAP.

lower arm of a bell crank, through the angle of which the valve is pivoted to a stud projecting from one side of the chamber. The other arm of the bell crank is provided with a weight which overbalances the lower part of the valve, so that the latter will close automatically when the water stops flowing from the main outlet or overflow pipe. Any gas that may find its way through the water retained in the trap will be prevented from entering the outlet pipe, and any pressure that might result from accumulated gas in the trap would only serve to force the valve more firmly against the end of the pipe.

All further particulars concerning the invention may be obtained from the patentee, Mr. F. C. Gerstenberg, of 1107 First Avenue, New York City.

IMPROVED BEVEL.

Upon each side of the body at the ends is secured a brass plate having a circular projecting portion. The plates upon one side are formed with circular apertures centrally made in the projecting portions, while the plates upon the opposite side are formed with square



WITTER'S IMPROVED BEVEL.

apertures. Pivoted upon a screw bolt passing through these apertures are the two blades, shaped as shown in Fig. 1; Fig. 2 being a sectional view, showing the blades folded in suitable recesses provided in the body. Each bolt is provided with a circular thumb nut, having milled edges and a groove cut centrally around its edge to facilitate turning. The nuts may be further tightened by means of a nail set inserted in a hole made in their edges. The blades will be securely held in any desired position by these nuts. Near the pivotal point of the short blade, the top plate of the body is provided with gauge lines, to which the blade may be adjusted when it is desired to cut on a square or at an angle. The short blade is especially useful in working from plans, as both blade and handle are brought close thereto. Then, as the bevel is turned over to mark the wood, the thicker part of the handle is brought against the board to be cut. By the use of two blades in conbination, almost any angle may be obtained, and in cutting hips, valleys, and jack rafters the small top blade will be found especially useful. It will be seen that the means for tightening the blades are entirely out of the way, and not liable, therefore, to form an obstruction in handling the tool or become broken or disarranged from a fall.

This invention has been patented by Mr. Frank E. Witter, of Brooklyn, Conn.

Naval Architecture During the Last Half Century.

The annual lecture under the auspices of the Greenock Philosophical Society, to commemorate the birth of James Watt, was delivered in the Watt Lecture Hall, Greenock, on January 14, by Mr. Robert Duncan, shipbuilder, Port Glasgow. The title of Mr. Duncan's paper was "Evolution in Naval Architecture during the Reign of Queen Victoria." After referring to the early history of marine engineering, and to the intimate connection of Greenock and the Clyde with its initial stages, Mr. Duncan went on to say that up to the date of her Majesty's accession in 1837, no systematic attempt at ocean navigation by steam had been made. In 1812 steamship building began, but it was not till 1838 that the first Atlantic steam communication began. The Sirius and the Great Western made the voyage to and from New York at the same time, in the middle of that year, in fourteen and seventeen days respectively, under steam all the way. Mr. Duncan then traced rapidly the evolution of the iron ship, through the various modifications of design and proportion, and the simultaneous and consequent evolution of crafts to adapt themselves to the rapidly changing conditions. Mr. Duncan also described the influence upon the forms of ships of maritime law and of Lloyd's rules—evolution in size from the short square boxes of the early periods to the long narrow vessels of to-day; the Enterprise, for example, the first steamer to make the voyage to India by the Cape of Good Hope, being only 122 feet long, while now the cargo carrrying steamer is over 400 feet long, and the express passenger ocean steamer over 500 feet. Mr. Duncan considers it possible that, ere her Majesty's reign closes, the Flying Scotchman of the sea will reach a length of 800 feet, and a speed of twenty-five to thirty miles an hour. The evolution of the man-of-war was next described, an interesting sketch given of the science of naval architecture, and a bibliography of the subject.

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Best Effects in Paper.

Many of our subscribers have asked us to reprint our article on the best effects in papers, and in accordance with their desire we herewith insert it.

"*Bedrooms.*—Small-figured light paper touched with gold, and a border not too dark for the walls. For the ceiling, a single point, or a delicate tint with small figure. If stile and decoration are used, the effect is better to match the color of the decoration and side wall border as closely as possible. The stile may be a trifle darker than the center.

"*Dining Room.*—Lincrusta Walton, leather, or, if something cheaper is desired, some imitations of these are very good. This room can bear and will be improved by a much heavier finish than most others. Paneled ceilings, with corners or squares containing game or fruit pieces, trimmed with binders, or wood mouldings, are handsome and popular. A well covered center is serviceable for the ceiling. If a dark carpet is used, the paper should be at least three shades lighter. Never put on a Pompeiian shade of paper with a bright red or maroon ground carpet, as one color kills the other.

"*Library.*—The most *recherche* style for this 'heart of the house' is Pompeiian red paper with frieze of gold or yellow figures, and copper moulding for hanging pictures under it. A ceiling with center of light buff, stile of mustard yellow, decoration of Pompeiian red, or blue and gilt, with figures of the opposite color on it, cornice in tints of Pompeiian red, yellow, mustard and blue.

"*Hall.*—The prettiest and most desirable papers now in use for our halls are geometrical figures in light colors and gilt. A very popular shade nowadays is called 'biscuit (just the color we like to see our soda biscuits as they come smoking from the oven). It is used with a frieze of flowers, or a Persian design, matching the side wall in color.

"*Parlor.*—This, of course, is the best room in the house, usually, and should have the best paper, and your customers, no doubt, will be more particular with this than any other room.

"A good plan is to go by the woodwork, as, for instance:

"*Maple Wood.*—Use a yellow, ivory colored paper, with a ceiling paper of bluish tint and a little gilt.

"*Cherry, Natural or Colored.*—Advise your customers to use old gold paper or 'metals' for side wall, and blue or white ceiling.

"*Mahogany.*—A light terra cotta pink for side wall, and a paper for ceiling with a light silver green metal in it.

"These suggestions are the proper thing for the parlor, as in this room, especially, the colors should harmonize.

"One very important thing in this room is a frieze, as it bears the same relation to a side wall as a cornice does to a house. It should give dignity to a room, and should be wide enough to admit of ornament that will not seem cramped or insignificant when seen from the floor.

"If the ceiling is nine feet high, use a frieze of eight or nine inches wide; if ten and one-half or eleven feet, you can use a frieze of fifteen or eighteen inches in width. Do not use a conventional design above a wall paper whose pattern is flowered, or *vice versa*.

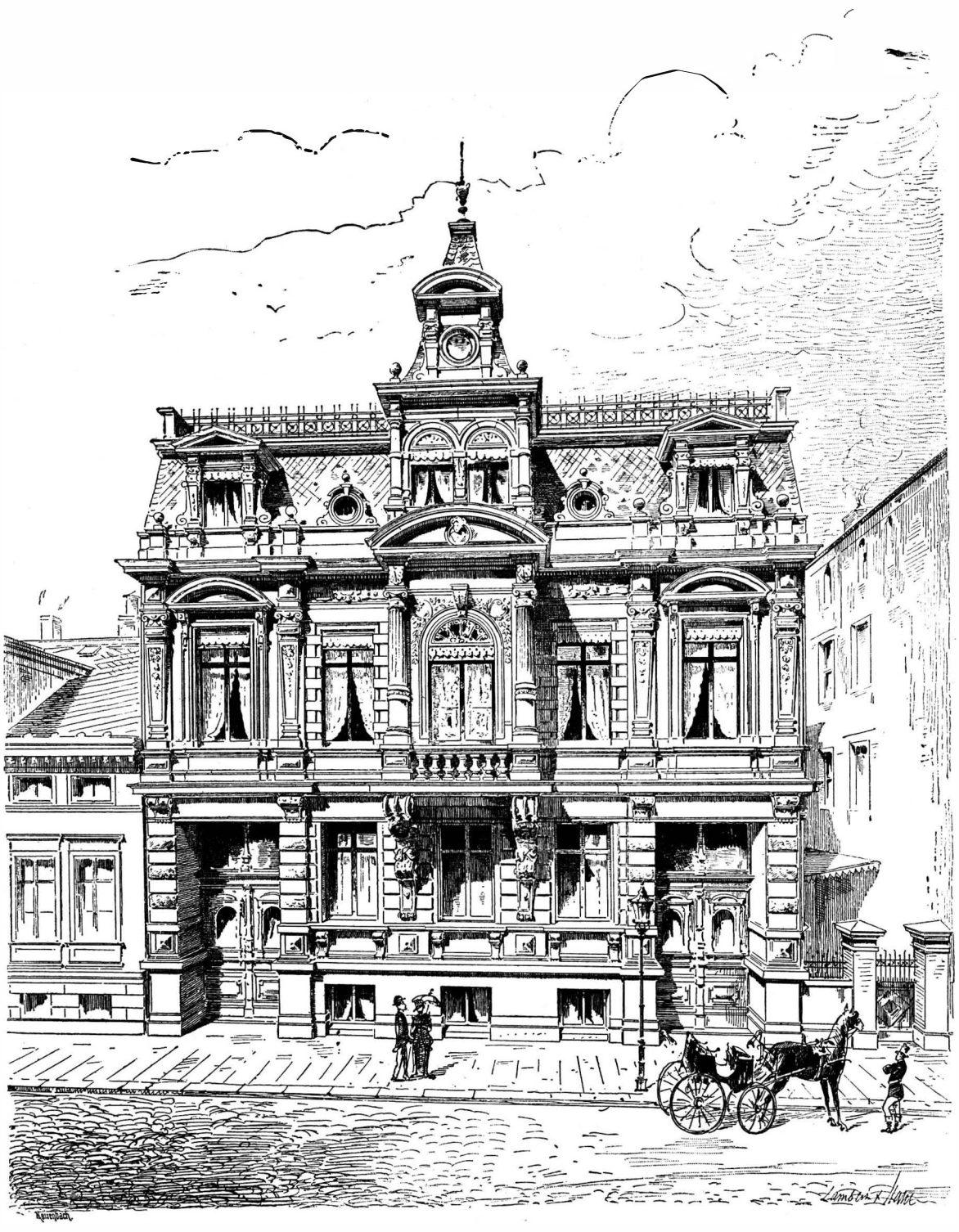
"*Kitchen.*—Last, but not least. There you may depend pretty safely on 'Biddy's' ideas. For know, O ye paper men! that if you please the cook, your men will not go out of the house hungry, especially if they *happen* to finish the kitchen to the very last scrap of papering about dinner time."—*Wall Paper T. Journal.*

It has been calculated that if 32,000,000 persons were to clasp hands, they could reach around the globe.

Bedroom Decoration.

In the best apartments paper hangings are generally selected chaste and handsome, with satin grounds, the figures in subdued colors, yet to harmonize with the hangings; the borders, at top and bottom of the rooms, of paper, unless India paper is used; in that case, gold moulding. I have to notice the prevalence, of late years, in leaving out borders entirely to papered rooms. This arose from two motives, viz., economy and the previous use of extravagant heavy broad borders, which certainly were too preposterous to continue in favor; these causes led to an extreme change, by borders being excluded altogether. This erroneous style is now corrected, persons of acknowledged taste adopting chaste, embossed kinds, such as are in imitation of gimp, shaded lines, moulding, etc., for giving a finishing effect to the tops and bottoms of papered rooms, the paper being fitted close to the sides of doors and windows.

The materials suitable for hangings to bedrooms are so various, it is needless to particularize them, further than that those for the family use may be of highly glazed chintz, of which we have now many beautiful patterns, or of damask, or morone; the colors, crimson, barre, deep yellow, and light morone; these give a warm effect to the apartments. Light green and blue are also frequently used. The fitting up of these apartments may be plain, but full and handsome; if moreen is the material, folded valances are appreciable, in preference to drapery; but damask being soft and pliable, it is well adapted to form any drapery that may be desired. Silk fringe and trimmings, in the same colors, are quite as elegant, and more tasty, if not so showy, as contrasts.—*Paper Hanger's Companion.*



GERMANY—CITY RESIDENCE OF HERR WINDESHEIM, AT HALLE—F. THIERICHENS, ARCHITECT.

Prof. Vaughan's discovery of a very poisonous ptomaine in cheese, ice cream, and milk undergoing certain chemical changes has been confirmed by a number of investigators in various parts of the country. Vaughan's suggestion that tyrotoxicon may be found to be the poison which produces cholera infantum opens up a new field for investigation, in which every physician must of necessity be interested.

An American's Jubilee Gift.

There is now being built in the Rother Market, Stratford-on-Avon, a structure to combine within itself drinking fountains for men, cattle, and dogs, and a four-dialed illuminated clock, with chimes, the whole being presented by Mr. George W. Childs, of Philadelphia, an American citizen, as a jubilee gift to Stratford-on-Avon. The monument, which is being carried out by Mr. Bridgeman, of Lichfield, according to the design and under the superintendence of Mr. Jethro A. Cossins, architect, of Birmingham, will be about fifty feet high to the summit of the vane. It is composed of three stages, and is crowned by a circular spire of concave outline, flanked by four spirelets, each with gilded terminals. The structure is square in plan, with massive diagonal buttresses at the corners. In the base are the troughs and basins of the fountain, all of polished Peterhead granite. Over these, on the four sides, are pointed moulded arches on columns with carved capitals. The tympanum of each arch is filled in with geometric traceries and carved foliage. In each of the four rectangular spaces beneath the springing lines of the arches are inscriptions, all of which were selected and arranged by Dr. Macauley. In the second story are arcades of three arches, with circular turrets at the corners, and in the upper story the four dials of the clock, under enriched gablets, with finials representing mustard-seed, cobweb, moth, peas-blossom. The buttresses of the lower story terminate in lions and eagles alternately, bearing shields with the arms of Great Britain and with the stars and stripes of the United States. With the exception of the granite basins, steps, and plinth, the whole is to be erected in a fine-grained, very hard, and durable stone, of a delicate gray tint, from Bolton Wood, in Yorkshire. The memorial stone near the base was recently laid by Lady Hodgson.

Planting of Trees and Shrubs.

More failures occur, in my opinion, through deep planting than from any other cause, and yet it is far wiser to err on the right side, and plant too shallow than too deep, for in the former case the plant can assist itself, in the latter it is helpless. The roots of plants, as well as the parts above ground, want air and warmth, and if properly accommodated, will soon adapt themselves to the place in which they are to grow. If the surface soil is naturally dry, the roots will run down after moisture, and if it is wet, they will spread near the top, but in no case can a tree or plant, except such as strike root at every joint, flourish if the collar is much below the surface. In planting small trees or shrubs, over which the wind has no power, there is no excuse for deep planting, not even the plea of saving trouble, yet we often meet with even small shrubs planted far too deep.

Of course, all trees over a certain height require to be made firm by staking, or some other method, to secure them from the effects of high winds; otherwise much injury frequently occurs.—*The Garden.*

Disinfection for the Household.

The importance of disinfection of bedding, clothing, and other personal and household articles in contagious diseases demands that health authorities should have under their control establishments where disinfection can be carried out on a large scale and at public expense. Such institutions are now in use in Berlin, Dusseldorf, Gottingen, Strassburg, Breslau, Leipzig, Danzig, and other cities in Europe. The results are pronounced to be exceedingly beneficial. Steam under pressure is regarded as the best disinfectant.

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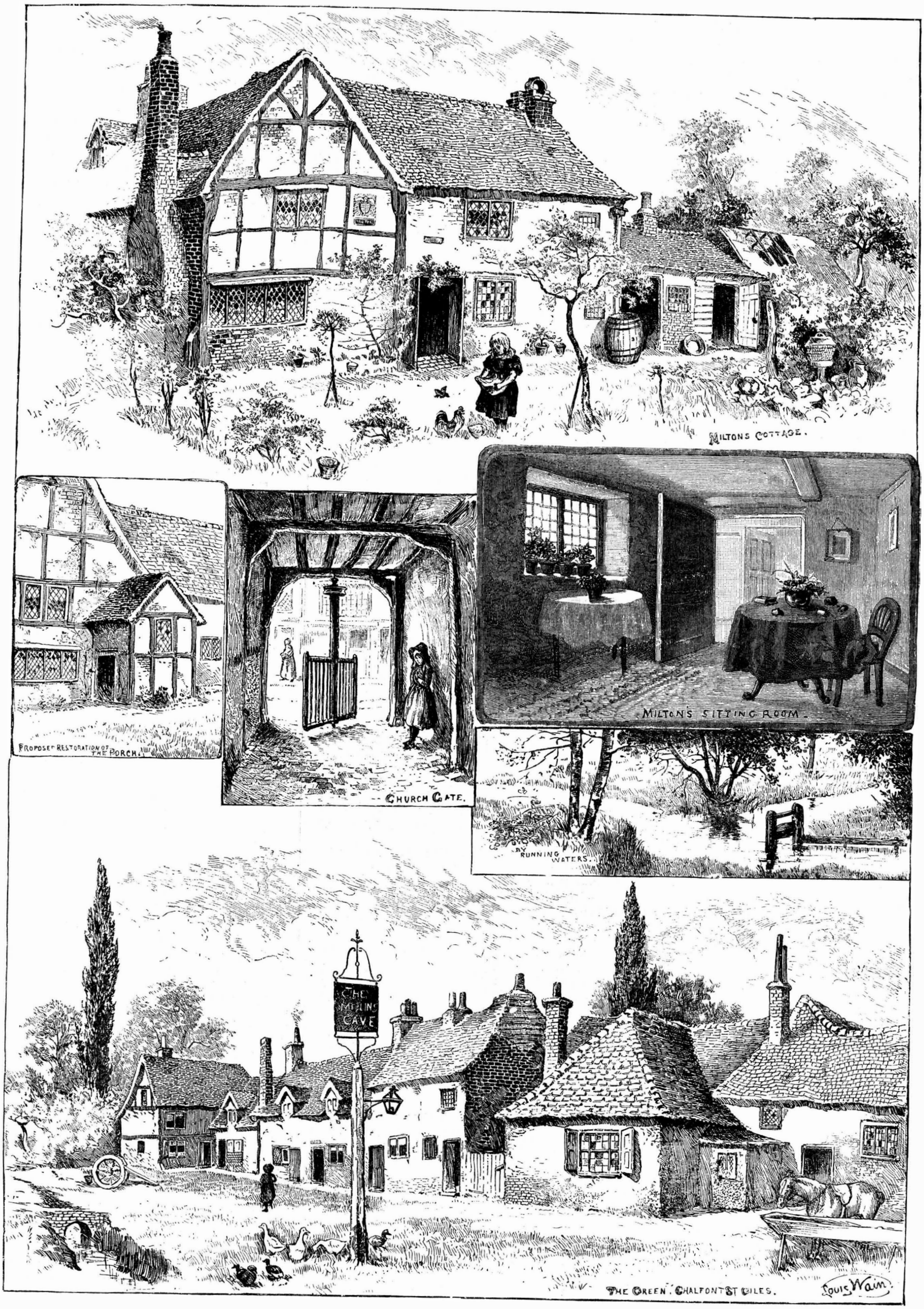

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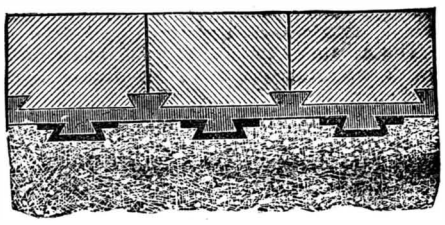
The special features claimed are:

1. Perfect, direct keying of the wood to the concrete (not the bitumen) by means of a hard setting mastic or bituminous composition, which runs into the undercut recesses, both of wood and cement, and dovetails them securely together (see illustration).

2. The difficulty of cutting or making satisfactorily the undercut grooves in the cement is overcome in some cases by introducing specially made corrugated iron channels, and fixing them into the stratum of cement while the latter is still plastic, the very shape of the iron channels holding them firmly in the cement, the straight flange of the iron effectually protecting the edges of the latter against breakage while the



builder's work proceeds. The iron channels are not intended for removal.

3. The "Hydrofuge" is a system by which a "parquet," or wood block, floor can with safety be laid on a concrete foundation, as there is no possibility of detachment, even if the blocks or parquet should shrink.

LADDERING A TALL CHIMNEY.

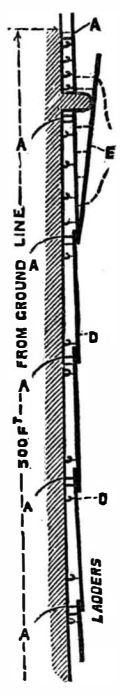
Fifty years ago Messrs. P. Dixon & Sons, of Shaddongate Cotton Mills, Carlisle, built a tall chimney shaft, which is a landmark for miles around, in connection with their factory. This shaft is described in Bancroft's treatise on "Tall Chimney Construction" as being of the following dimensions:

Height from foundation to top, 320 ft. 6 in., and from ground line, 300 ft.; outside measurement at ground line, 17 ft. 4 in., and inside measurement, 9 ft. 6 in.; outside dimension at top, 9 ft., and inside at top, 6 ft. 8 in.; built to a batter of 1 in 72. Being the fiftieth year of this tall shaft, Mr. Robert Todd, woolen manufacturer and present occupier, is having it repaired, and a new copper rope lightning conductor fixed up the outside. Mr. Joseph Ball, known as a chimney and spire restorer and lightning conductor fixer, of York Castle, Oldham, is doing the work.

In carrying out this difficult undertaking, the ascent to the top of the shaft has been made by fifteen wooden ladders of the ordinary type, as used by painters, specially made light and strong for the purpose, and weighing from 20 lb. to 50 lb. each, according to their length, and of the average width of 11½ in. at bottom, and tapered to about 10 in. at top. Distance pieces of wood are fixed at the back of the ladders at top to keep them from the brickwork, thus providing a good foot and hand hold for the workmen.

The procedure of laddering is as follows:

The first length or section of ladder is placed at the base of the chimney shaft, and a hooked wrought iron dog or holdfast, made from ⅞ in. round rod, about 9 in. long, is driven firmly into the brickwork 4 ft. from the bottom of the ladder, and a second iron dog driven into shaft about 4 ft. down from top of the ladder, to which dogs the ladder is firmly lashed. The dogs are formed so as to prevent the lashing of the ladders from slipping when any strain comes upon them—see the annexed engraving. Having lashed the first length, the next step is to place a free ladder against it. This the workman climbs until he can reach about 4 ft. above the fixed length. Here he drives into the brickwork an iron dog, and attaches a pulley block to the same; then one end of the rope reeved round the sheave is brought half way down a second loose section of ladder placed by the side of the first, the rope being fastened; the second length is hauled up by workmen at the base of the shaft until it is half its height above section No. 1; it is then temporarily lashed to the fixed length, and Steeple Jack climbs up and drives another holdfast into the brickwork 4 ft. above its (the second length's) top. He then shifts the pulley block to the upper holdfast and descends. Length No. 2, still attached to the rope at its middle, is then hoisted above the first length fixed, which it overlaps two rounds, and the top of No. 1 and bottom of No. 2 are then securely lashed together, and No. 2 then forms a continuation of the first fixed length. The climber mounts No. 2 length, which is still held by the pulley block and rope, and drives in a holdfast above, shifts the pulley block, and proceeds with No. 3 as he did with section No. 2, and so on until the under side of cap is reached, and here a difficulty presents itself. In Messrs. Dixon's shaft, at about 10 ft. down from the top, a stone cornice



projects 3 ft. The length of ladder coming close underneath this cornice or cap was fixed very firmly. Another length was hauled up until its top was about 5 ft. above the cornice, and then this slanting length was secured to the length below at its foot, at intermediate points, and also close underneath the cornice, by lashings or ropes specially made. In climbing this slanting length the workman's back is toward the ground. A last length of ladder is hauled up and fixed above the cornice, reaching to the top of shaft, and to the bottom of this the top of the slanting ladder is firmly fixed as an additional security, thus completing the laddering of this tall chimney shaft. The whole operation of thus climbing the 300 ft. was accomplished in five hours.

The shaft is now being pointed with mastic about 50 ft. down, and two cracks which are on opposite sides of the chimney, and extend to the bottom, are being repaired.—*The Engineer.*

Stained Glass.

The nineteenth century has witnessed great advancements in the art of making stained glass windows.

The recent improvement in the manufacture of colored glass enables the artist of to-day to reproduce his designs in glass without the aid of enamels or heavy brush work. The result is an increased brilliancy and gem-like quality of his work.

But in order to put his designs in glass, the artist must have an especial training for it, and give his personal supervision to the work.

When, therefore, artists who have had a long and careful training in their specialty and personally attend to the reproduction of their designs, the conditions are favorable for the very best work. The productions of Messrs. Bray & Breck, of 37 Province St., Boston, point to just such conditions. Their careful training in every department of art stained glass, and their personal attention to every detail of their business, enable them to turn out excellent work.

By their invention on glass mosaics, which they have patented, they can reproduce the most beautiful designs without the aid of brush work.

They also manufacture brass and copper faced glass mosaics for hall lanterns, etc.

Adamant Wall Plaster.

From the remotest time the material now in use as a wall plaster seems to have been the only preparation used for finishing the interior walls of buildings.

That the varying proportions of quicklime, sand, and hair, with the too frequent unsatisfactory result of their combination, should have so many years afflicted a long suffering people is truly a wonder. It was reserved for Prof. Carl Straub, of Syracuse, N. Y., to perfect, after years of experimenting, a wall plaster in which none of the disappointments of the ordinary mortar occur. This material, which the inventors called Adamant Wall Plaster, is now being manufactured by the Adamant Manufacturing Company, of Syracuse, N. Y.

From the strong testimonials given by all persons who have used it, including architects, builders, contractors, and property owners, we are convinced that this adamant is destined to revolutionize the business of house plastering. The Adamant Company manufacture all grades, from the sand or common finish to the finest grade of marble or hard finish.

Some of the advantages which the adamant possesses above the other plaster is the extreme hardness of the wall. It will neither crack nor crumble, it is a strong support to a building, it does not swell timbers by an absorption of the moisture, as the material itself absorbs most of it, it dries so quickly after it is applied to the wall that in a few hours the frost does not affect it, it can be used without interfering with other mechanical work, it is ready to put on at a moment's notice, avoiding delay in waiting for lime to slake, and it can be mixed in the room where the plasterers are at work.

The extraordinary tests to which the adamant has been subjected to prove its strength and density will strongly commend it for use in churches, school houses, asylums, hospitals, and in all places where there is danger from falling ceilings, or removal by carelessness, or absorption of germs of disease. The adamant is much stronger than ordinary mortar, at the same time it is not nearly as heavy, that is, does not require so great bulk. It adheres to wood, iron, brick, or stone, and becomes as hard as stone in a few hours after it is applied.

Passenger Lift for the Eiffel Tower.

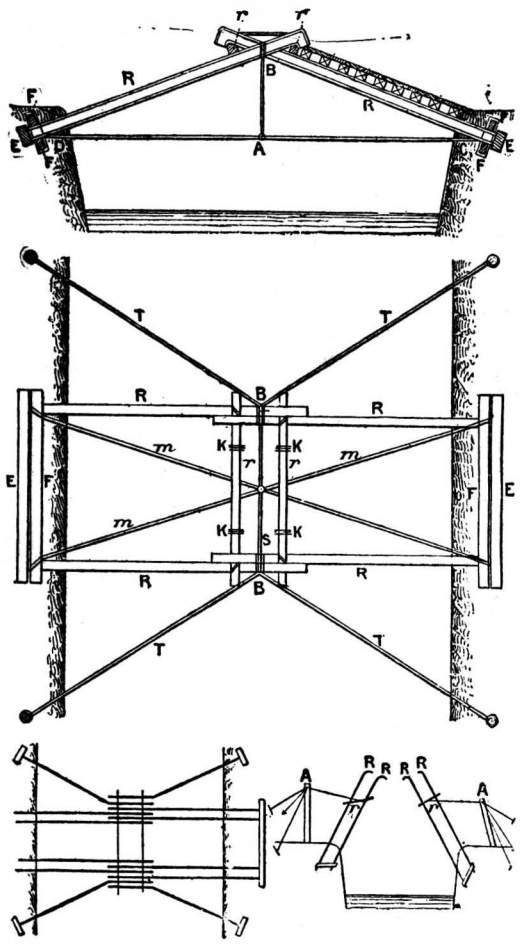
The enormous height of this tower renders a hydraulic lift, in which passengers could perform the whole journey in one operation, quite impossible; and a succession of shorter lifts, requiring frequent changes, would naturally be considered too cumbersome by the public who will use the tower. On the other hand, the employment of a winding engine and a lift similar to those used in mines would not be sufficiently safe, and for these reasons M. Eiffel has devised a new type of lift, in which the whole ascent can be made in one journey, while at the same time it presents absolute safety. The main idea of the lift is that of a huge screw and nut. Below the lift cage is placed a trolley, with three or more wheels running upon an equal number of rails, which ascend spirally, and thus form a screw having so many threads. The trolley will be revolved either by an electric motor or by a water engine; but the cage will be prevented from revolving by guide bars. Thus the passengers will not feel anything of the rotary motion of the trolley underneath, and by selecting the pitch of the screw sufficiently small, any degree of safety against a too rapid descent can be obtained.

TEMPORARY BRIDGES.

While in the field, in European countries, the army always has rails, ties, and telegraph poles at hand. It is by means of these three objects that I have undertaken to construct a simple, strong, and quickly built bridge.

I would remark that iron rails are not indispensable, and that, with pieces of wood of proper dimensions, we may reach the same result.

Say we want to cross a river, and have the above named materials. It may be readily seen from the annexed figures how the bridge is built. As the rails, R R, are connected in pairs, the distance apart, D C, cannot increase much. At all events, abutment cross ties, E E, and two cables, *m m* and *m m*, are there to preserve such distance. The cables may, if desired, be easily and substantially made of iron wire. If the case is urgent, an article good enough for ordinary use may



be manufactured *in situ* with no other tools than a stick and two pickets. The transverse distance from R to R is maintained through ties placed between F and F, and kept close against the rails by other cables that may be readily stretched. So too, above *r* and *r*, there are other ties which are fastened to the latter with wires, K K, and which the cable, S, holds tightly pressed against R and R. T, T, T, T are guys for steadying the structure.

It will be remarked that, taken at other points, these arrangements may be extended or reduced. I give the principle only.

If we admit a pitch of one meter, and a loss of one meter at each extremity of the rails, we shall have: Half span $x = A\,c = \sqrt{25 - 1} = \sqrt{24} = 4{\cdot}8$ meters. Span = 9·6 meters.

Now, such a length seems too great for anything stable. We may, nevertheless, consider five meters as capable of being passed over conveniently. For great loads, all that has to be done is to double, or even treble, each side, R R, in the following way, and (since, as I have said, I do not use 9·6 meters) to employ the following artifice for giving still further stability: As we are supposed to have wire in quantity at our disposal, it is useless to say that we can render the system thoroughly steadfast. A word as to the simplicity of construction. A and A are two short sheers that serve for bringing opposite each other the two systems, R and R, which at once fit into each other. The cross piece, *r r*, has been fixed, and serves to connect, lay, and support R R. Instead of being of wood, *r r* may be pieces of rail. The pieces, R R, may be bent at the end, as shown in Fig. 3, by means of a forge.—*E. D., in La Nature.*

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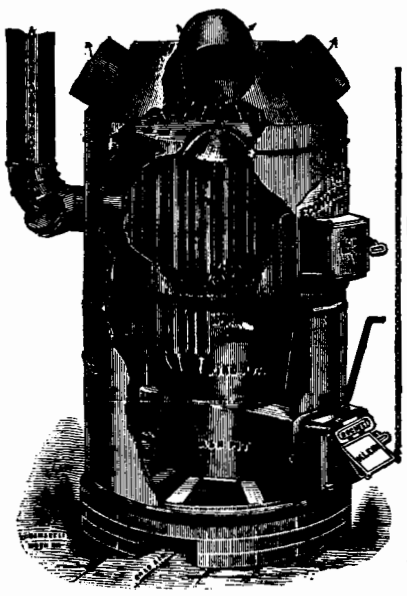

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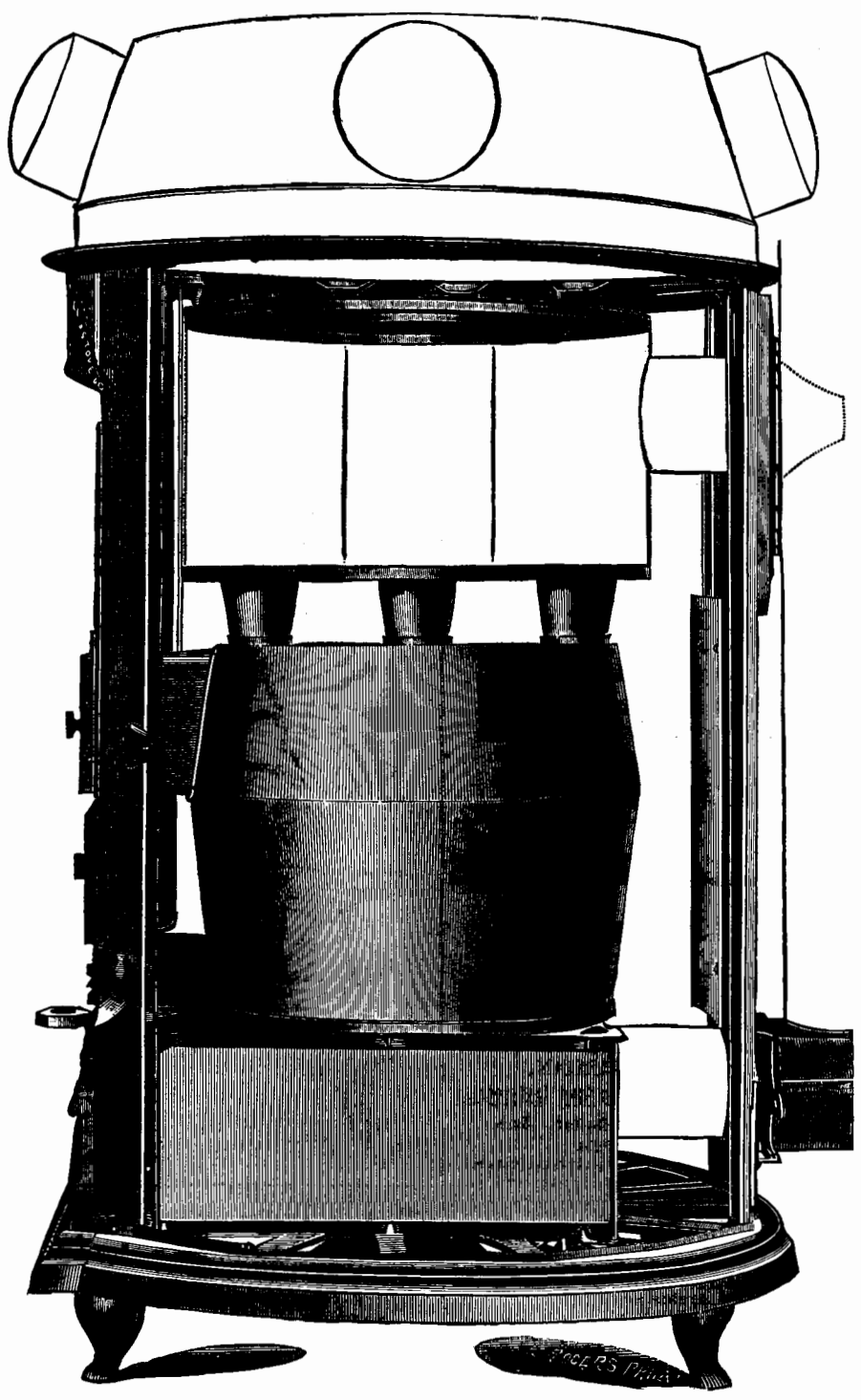

Solar Iron Clad.

This is a Cast Iron Casing, lined with tin or galvanized iron, to prevent direct radiation of heat in cellar; four loose panels lift out, so as to give access to furnace for repairs or renewal, if necessary, without disturbing the Hot Air Pipes; it has sliding panels for feed door and smoke pipe to allow for expansion; it has also a dust flue and flue door for Damper. We claim this to be the most complete, durable, and convenient cold case made, equal in efficiency to Brick set, with much less room required and less expensive, besides the facility for access for repairs, without requiring, as in a brick set, so large a space to work in. It is much superior to the ordinary sheet iron casing, both for durability and efficiency. It is not necessary to remove the casing or Hot Air Pipe to clean out, or repair, or even renew or change the heater.

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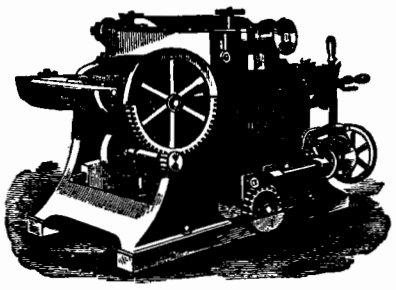

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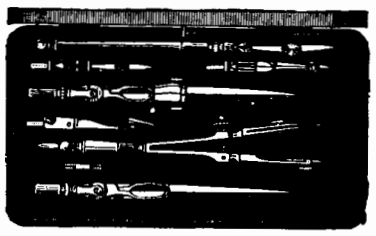

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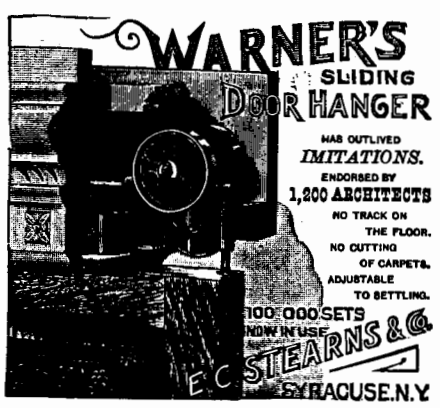

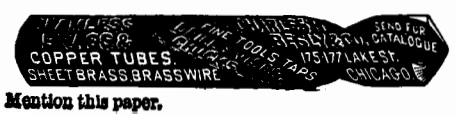

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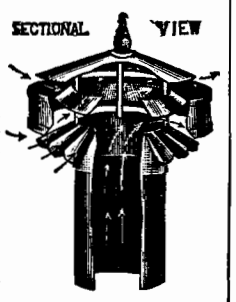

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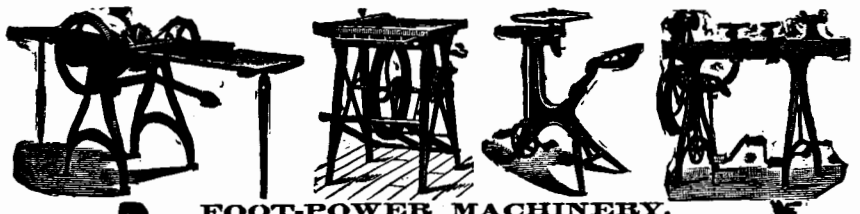

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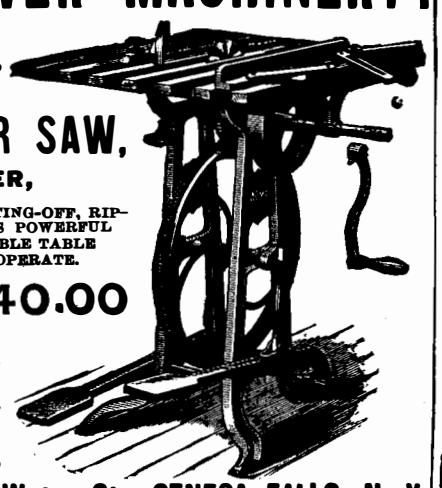

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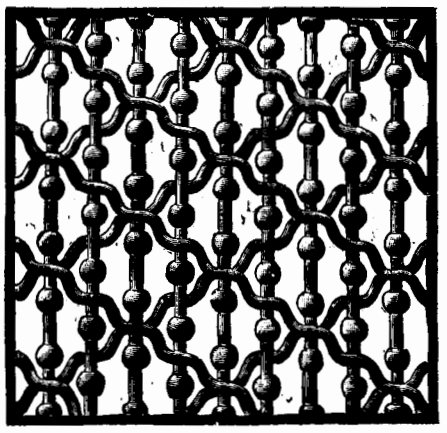

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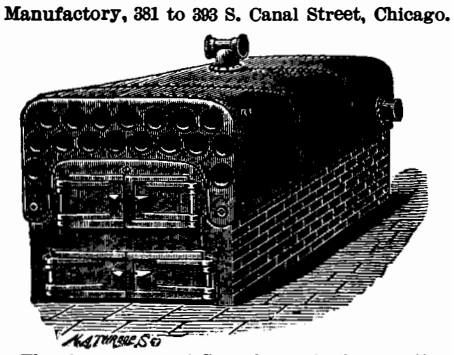

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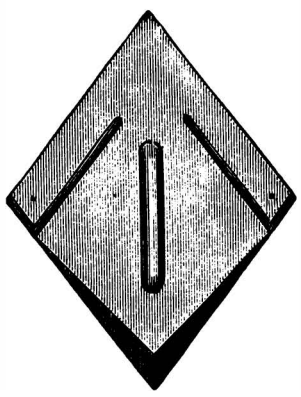

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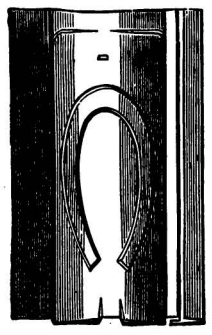

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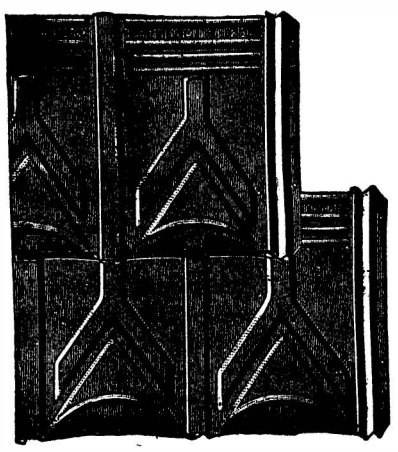

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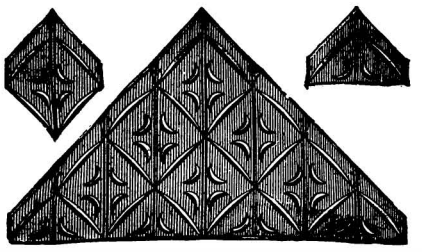

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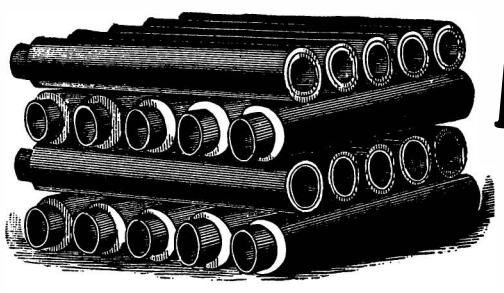

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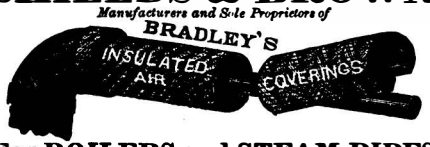

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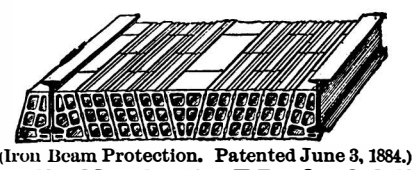

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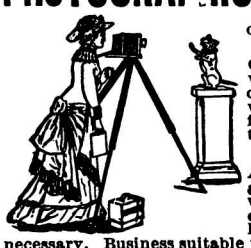

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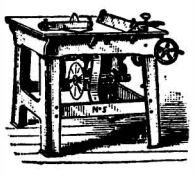

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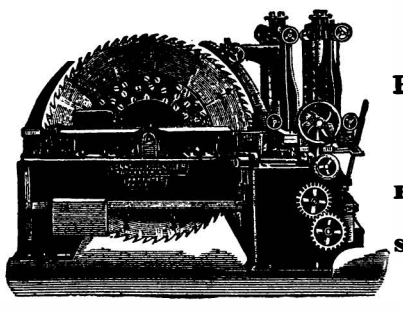

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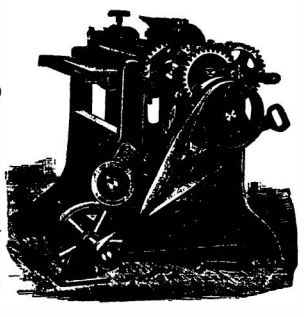

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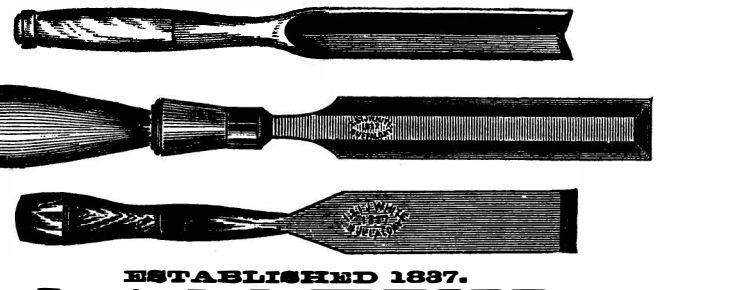

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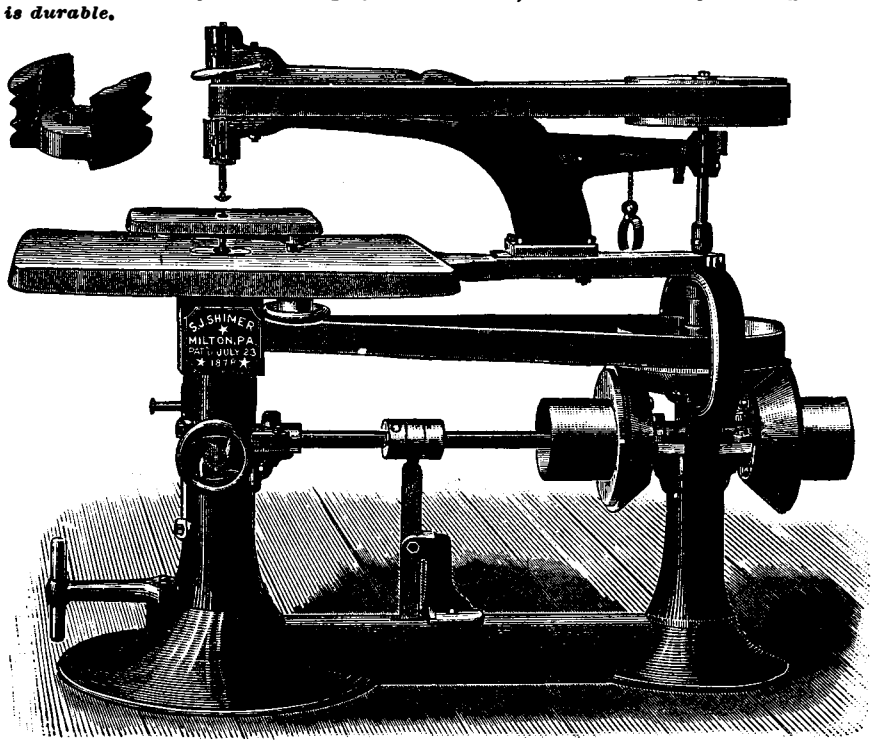

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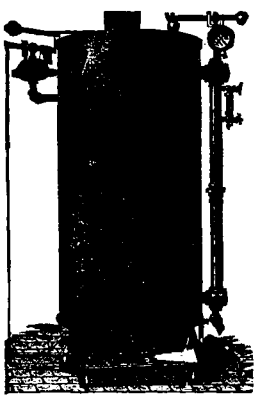

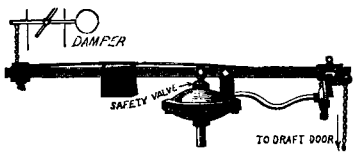

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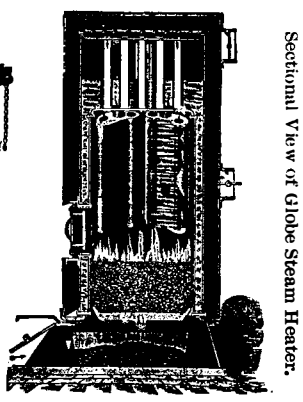

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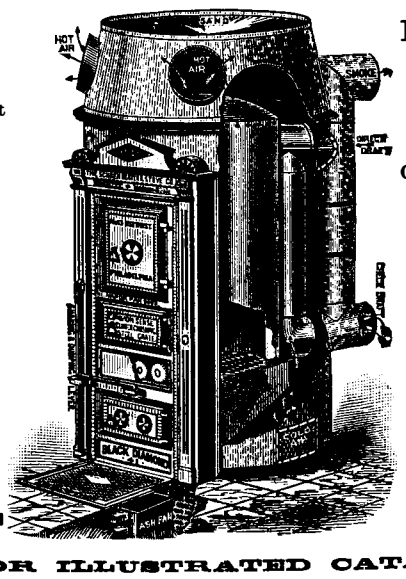

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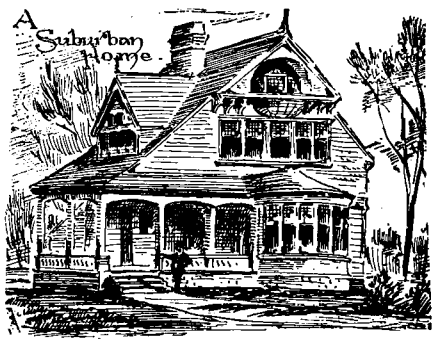

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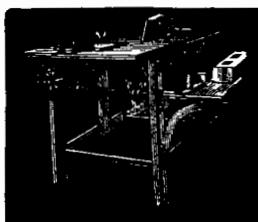

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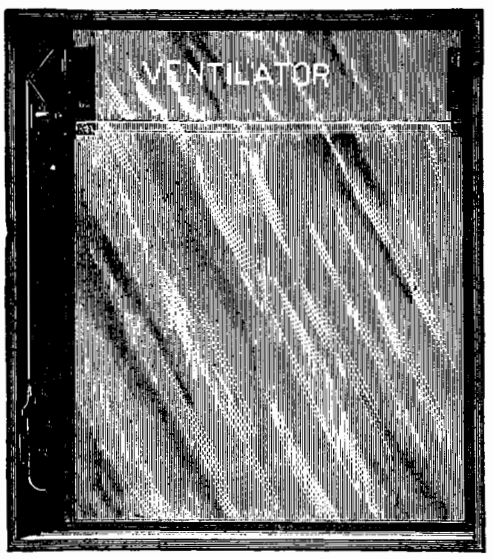

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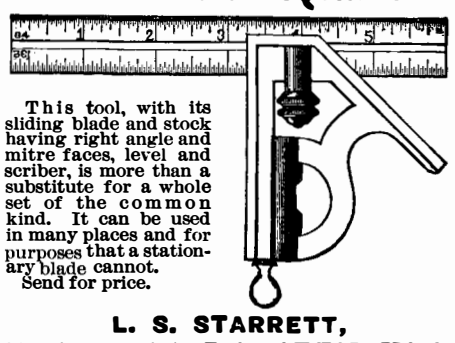

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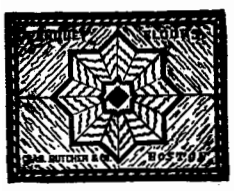

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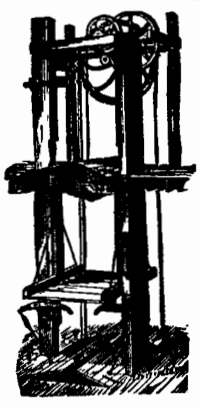

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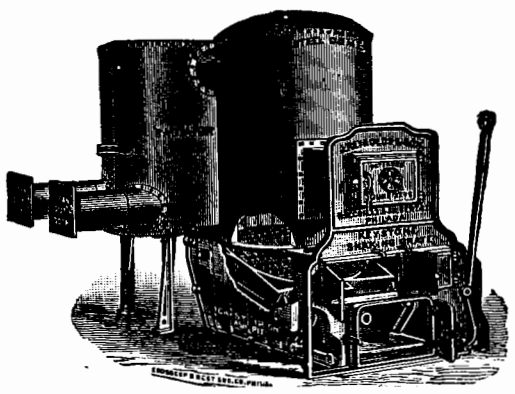

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Notes & Queries

HINTS TO CORRESPONDENTS.

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

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

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

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Minerals sent for examination should be distinctly marked or labeled.

(1) W. W.—Polished granite is much more durable than hammered granite. The polished stone prevents the lodging of moisture and foreign matter.

(2) W. H. H. asks if old putty in old window sash can be softened so as to be easily taken out. H. W. says: It can be done very easily. Take a piece of iron (I use a stove poker), heat red hot, and apply to the old putty, when it can be quickly and easily removed with chisel or pocket knife.

(3) C. R. W. asks information with regard to the curing of hickory, oak, and ash timber, to keep it free from the worms. A. Your cheapest method is to saturate the timber with a solution of bichloride of mercury (corrosive sublimate). Make a tight box of sufficient size, pack in the timber, and pour in the solution so as to cover all several inches deep. Let it remain twenty-four hours, and remove it. You will find that no worms will touch it. The expense is not great, for one part of the bichloride in a thousand of water is sufficient. The solution is of course poisonous, and must be kept with care, but the timber when dried is not in any way injurious to workmen or others.

(4) P. H.—Chimneys with draught elbow on top draw only when the wind blows; at other times the draught elbow is of no value. Chimneys may be in height from 20 to 100 times their interior diameter, and should ordinarily be of equal interior size throughout.

(5) J. H. writes: I wish to construct an elevated tank to supply my house with water. I have thought I would build it of cypress; is there any preparation that I can use that is harmless, to prevent the water penetrating the wood, and that is tasteless? A. Do not know of anything that will be an improvement upon the clean cypress. You may oil the wood with boiled linseed oil, or paint it with Prince's metallic paint (oxide of iron) and boiled linseed oil. Let it thoroughly dry before using.

(6) J. F. A. writes: I have a detached house with brick foundation walls, in soil of a clayey nature. The cellar is well concreted, but I find that after a heavy rain there is water in the cellar. How can this be effectually remedied? A. Possibly your yard is low next to the house and drains into the cellar; this you should be able to see by inspection in stormy weather. Every yard should be graded so that the storm water runs from the house, toward cesspools or a sewer connection. A cemented bottom will not resist the coming in of water when there is any head, as when the soil is saturated for some feet above the cellar bottom.

(7) J. M. G. asks (1) how a crust of whitewash can be removed from the ceilings of rooms? A. Whitewash can readily be removed by scraping the ceiling or else by washing it off with water. 2. What system of shorthand would you advise a young man to learn? A. Either Graham's or Munson's system is good. Both are extensively used.

(8) W. C. G.—Kalamein is not a metal, but only a name for a tinning process on iron, the alloy of which is composed of tin and lead like the common tin that is called Terne plate.

(9) E. S. G. asks what are "tatties" or "tatty," something to cool houses, used in India. A, "tatta" is a bamboo frame or trellis hung at a door or window of a house, over which water is suffered to trickle, with a view of cooling the air as it enters.

(10) L. J. S. writes: We have built several ice houses, and in some of them we built the walls with air spaces, and would like to know which is the best—to have the walls closed on top, so there is no circulation whatever in the air space, or is it just as good if the air space is open on the top of the wall? A. If the top of the air space opens inside the ice house, there is no need of closing it. If the open top is exposed to wind, it should be closed, as the wind blowing across it will produce a circulation.

(11) D. C. A. says: I have a cellar dug 4 ft. below ground and troubled with water a great deal. Have dug it out 2 ft. deeper and filled up 2 ft. 3 in. with large stones, filled in with broken stone and Portland cement, making the bottom solid. The water now comes in through the sides. They have been cemented, but the pressure of the water scales off the cement. Do you know of any way I can fix them water tight? I cannot get fall enough for a sewer without going a great distance, which will be too expensive for me. Would tarring be of any use? A. The cement on the inside, if well done, and has had time to set, ought to keep the water out. To make a thorough job, you must dig down to bottom of cellar on the outside and cement foundation wall on the outside. Tarring will not avail.

(12) W. A. G., of Elkin, N. C., wishes to know (1) how near to the house is it safe to empty the slops from the kitchen through a pipe, which, being too small, becomes frequently choked. A. If it is desired, as we should infer from the query, to discharge the house wastes on the surface of the ground, we should want the discharging end of the pipe so far away that the scheme would be wholly impracticable. 2. Is it safe to have such a pipe coming directly up into the house without sink or sink trap? A. It is decidedly dangerous to have an untrapped waste pipe enter the house. As our correspondent evidently is living in the country, where sewers are unknown, we should suggest building a cesspool, at least 100 ft. distant from the nearest point of the house. The cesspool should be built perfectly tight, so as to prevent its contents leaking. It should be provided with a ventilating flue at least ten inches square in cross section, hooded over at the top by a small pent roof, to prevent rain or snow finding an entrance to the pool. In addition to this, it should be provided with a regular cesspool pump for emptying its contents at intervals. The soil pipes should not drain into it, but into a separate receptacle. The waste pipe from a kitchen sink should be at the very least 1½ inches inside diameter. There should be a grease trap beneath the sink, and the main waste pipe should be ventilated by a pipe running to the top of the house above the roof, and not opening near a window. The drain from the house to the cesspool may be made of the best Scotch glazed tile, laid with cement joints. Diameter four or six inches inside measurement.

(13) J. P. W., of Kinsley, Kansas, desires to acousticate a court house room 40 by 40 by 18 feet. Wires have been stretched in various positions, but to no purpose; the tones of a speaker are indistinct in various parts of a room, and occasionally an echo is heard. A. The room is very badly proportioned for acoustic effect; it is practically a square box, and it is difficult to silence an echo in such a room, but it can be done by taking off one foot in width, by building a partition against one wall, the entire width of the room (40 feet), and its wall surface just one foot away from the original wall surface it replaces. Or if that cannot be done, take six inches off two opposite walls of the room, by means of a partition running the whole length

(*Continued on page* x.)

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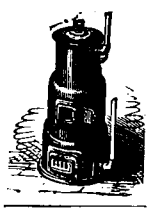

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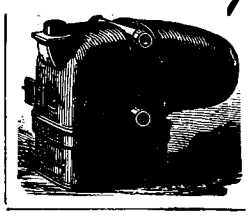

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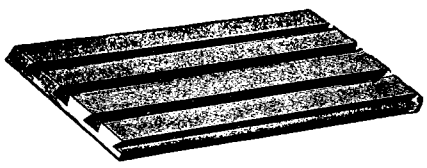

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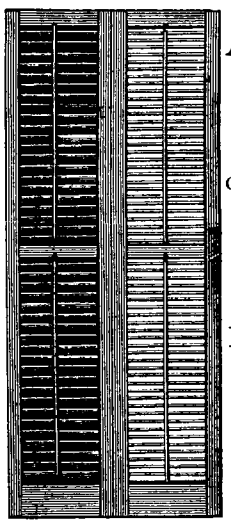

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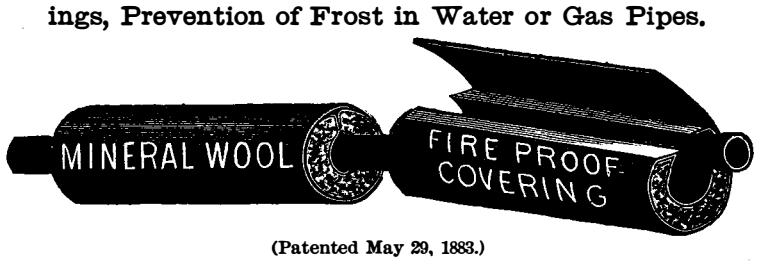

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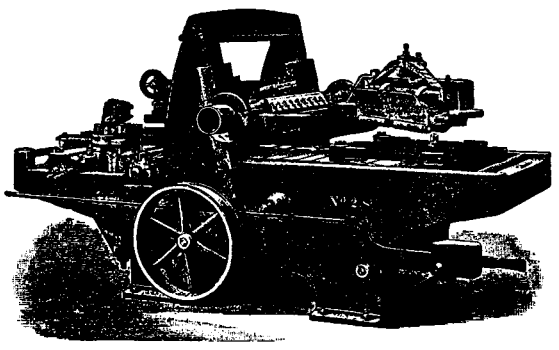

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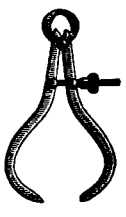

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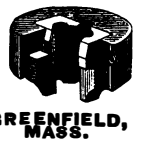

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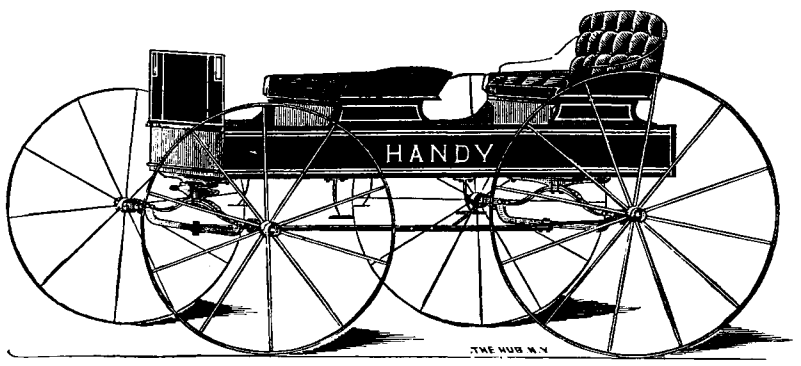

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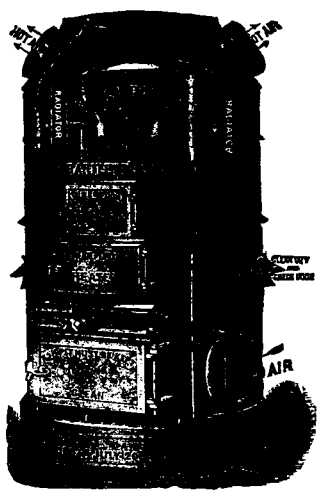

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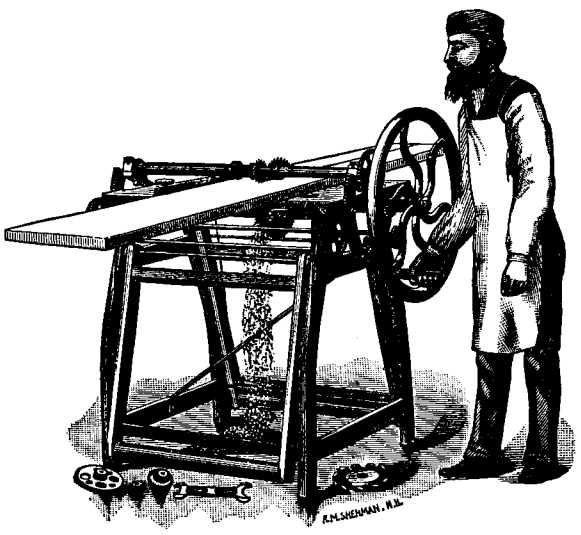

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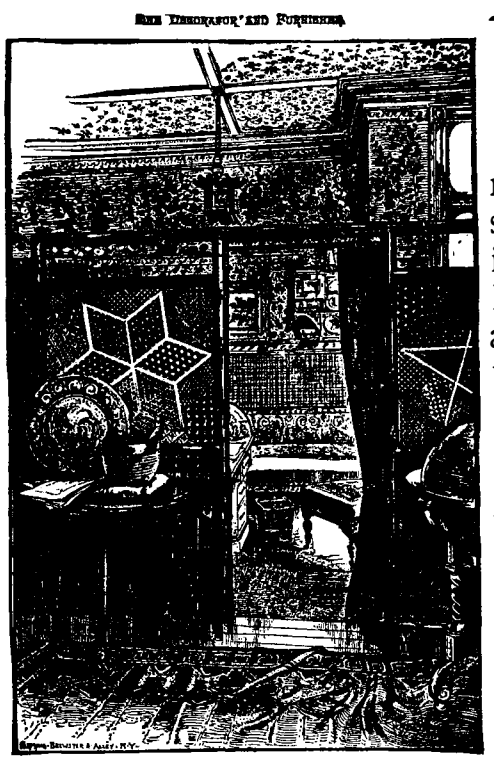

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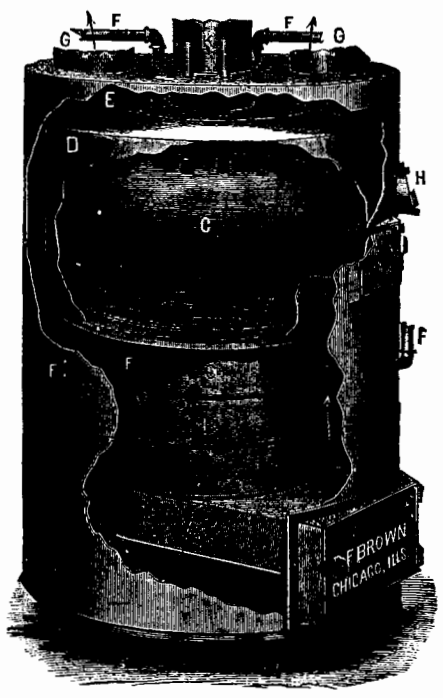

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Notes and Queries.

(*Continued from page* vi.)

of the wall, so as to make the room 39 by 40 by 18; or, if that cannot be done, add two feet to the height of the room, either by lowering its present floor or raising its present ceiling, so as to make the room 40 by 40 by 20. The writer would prefer the latter plan. If the platformed end of the court room be wainscoted with stained white seasoned pine, and the ceiling laid with matched white seasoned pine or corrugated iron, it would probably clear up any indistinctness of sound and remove the unpleasant echo without changing the present dimensions of the room. The best plan would be to consult an acoustician, or specialist.

(14) W. K. C., of Baltimore, Md., says the floor of his factory is below the level of the outside ground, while directly alongside the windows runs a fifteen foot alley, from the far side of which a bank begins to ascend at an angle of about 45° to the natural level of the ground, some fifteen feet above the top of the windows, and a high whitewashed fence has been suggested as a means of obtaining more light; but this would only reflect direct sunlight, and, if the windows referred to are in the north wall of the factory, very little benefit would be derived from it. The better plan would be to rely upon the reflected light from the sky itself, and not try to get direct sunlight, as the latter would only be available for a small portion of each day. To use the light which is always reflected from the sky all day long, construct a light frame of wood, just the width and height of each window, and directly opposite each window, and cover each frame with waterproofed canvas, painted or coated on the face toward the factory with zinc white or white lead mixed in linseed oil, or use gutta percha white paint or, rather, a coating, now successfully prepared by many firms. The frame is to be laid directly on the bank, inclined at an angle of 45° with the horizon, and the bottom of each frame is to be on a level with the basement window sill. The light from the sky will strike the inclined surface of each window shield at an angle of 45°, and will be reflected off at an of forty-five degrees directly into the windows. The best method would be to make the shields of opaque window glass painted white with zinc white or white lead, or the new enamel white which is now being so largely used for shop window signs, but this method is the most expensive, both in first cost and maintenance, on account of the risk of breakage.

(15) S. A. C., of Turner's Falls, Mass., desires to know which of two plans would be the most effective in making a frame house warm, viz., the old method of filling the space between studding with brick, or plaster on lath, so as to have two dead air spaces between the studs. A. The latter is the better plan, and is largely in vogue in the Northwest, but a much better plan is to back plaster on the inner face of the studs and fur out with seven-eighth inch strips for the finished plastering. The advantage of this plan is that the back plastering is not then affected by any shrinkage of the studs, and an unbroken surface will be more likely secured.

(16) E. H. B., of West Rupert, Vt., complains of a sweating chimney, and says that where a chimney flue starts from a second or third story, the trouble is more frequently met with. A. The difficulty, we apprehend, with such flues is the lack of air circulation. After a fire has died down or gone out, the chimney is permitted to remain in disuse for a longer or shorter period, as the case may be. The dampness of the external air is deposited or condensed upon the flue walls, and finally collects in such quantity as to cause the unpleasant phenomena of sweating. The remedy is obvious. Chimneys that are open from top to bottom seldom sweat. Where a chimney cannot be extended to the basement, the best plan is to put in the external face of the flue one or two air bricks, which will permit of a circulation of air in the chimney when the flue is not in use, and which may be closed so as not to interfere with the draught when a fire is being started. The Pennycuick air brick is admirably adapted for the purpose, or any good mason can build an air flue, which may be closed by a damper, worked by a lever from inside the room. This air inlet should be at the base of the flue.

(17) W. D. G., Jr., of Presque Isle, Me., asks for the best way to get rid of the waste from a small house in a town where there is no system of sewerage. A. Use Moule's dry earth system for the removal of excreta, and a cesspool, built of Portland cement concrete, situated at least 30 ft. from the house, to receive the sink and bath room wastes. The cesspool should have a ventilator, and its contents should be frequently removed.

(18) F. W. K., of Bagley Source, desires to know which of beams possesses the greatest lateral and tensile strength, both cylindrical in section, and having like diameters, but one is hollow and the other solid. A. In both cases the solid rod or bar is the strongest on account of its excessive area of cross section, but if the sectional area of metal in both cases were each say one inch square and one foot long, the breaking weight of the solid cylinder would be 573 lb. and that of the hollow cylinder, whose greater diameter is twice that of the lesser, would be 794 lb., or a difference in transverse or lateral strength of 221 lb. in favor of the hollow beam. In regard to tensile strength, the form or disposition of the metal with reference to its own cross section has but little, if any, bearing upon the strength. For equal areas, the tensile strengths would be equal. Also would like to know the relative torsional strengths of an inch and a half square solid bar and an inch and a half gas pipe. A. The inch and one half square solid bar would be the strongest, but if both the bar and the pipe had equal sectional areas, the strength of the square bar to that of the gas pipe would be as 1 is to 1·16.

(19) R. K. T., of Unadilla, N. Y., inquires if it is practicable to build chimney tops of cement, and how it is done. A. Best plan is to form a mould or frame of wood of the desired shape. Set it in position. Mix up a stiff paste of Portland cement mortar, composed of sand and cement 1 to 1, and to this add three parts of fine chips of stone. Stir well, so as to get each chip as far as practicable coated with cement. Fill the frame flush to the top, and smooth and true up with a trowel. Leave the frame in position for twenty-four hours.

(20) L. D. A., of Kansas City, Mo., desires to know what "greenheart" is, where it can be obtained and its price. A. Greenheart (Nectandra Rodiæi) is a tree of British Guiana, and yields a very strong and durable timber, and is considered especially desirable for ship building, and for all kinds of carpentry. It does not grow in this country, and as to price, write to some hardwood dealer in New Orleans, or to Jamaica, West Indies.

(21) C. E. M., of Detroit, desires to know the seating capacity of the largest theater in the world. A. The largest one we call to mind among modern theaters is that of the Teatro del Liceo, Barcelona, which will seat 4,000 persons.

(22) J. A. D. writes: About a year ago I built a fence, using three 8 by 8 inch posts, which were supposed to have been seasoned. I primed them with ready mixed white paint, and afterward gave them two coats of white lead (Atlantic) and linseed oil; in a few weeks the paint blistered and cracked off. I sandpapered them and gave them another coat, but the same thing happened again. It has fallen off four times. Can you tell me the cause, and what will stop it? A. Probably the ground is wet, and the posts absorb water. The sun, heating the paint, may vaporize the water under it sufficiently for blistering. Try covering the parts of the posts underground with tar.

(23) O. S. writes: 1. Is it to be taken for granted that a wooden house on clayey loam is damp, even if location be well drained? A. A house on clayey loam is not necessarily damp because of its situation. Such soil is generally more damp than a sandy soil, yet thorough ventilation of cellar, as well as drainage, is a vital point in its sanitary condition when so situated. 2. Does a cistern of water covered with boards, in a cellar where there is a furnace, add, by evaporation, to the dampness of a house, even if the board covering is dry and there is no sign of moisture about the cistern? A. A cistern should not be tolerated in a cellar, according with modern sanitary practice. They are a source of miasma. 3. Of two houses or more, situated on the same street, with same foundations, cellar, and soil, and built alike in every respect, apparently, is the one which shows the most frost on the windows, during winter, the dampest house, or is there some other way to account for the frost? A. Frost on windows in freezing weather indicates a moist atmosphere within, but does not always indicate a damp house. There are many reasons for a damp atmosphere within a house, such as the evaporation of water on stoves or furnaces, the use of baths, etc. The kitchen on a wash day is enough to soak a whole house. The hygrometric condition of the atmosphere within a house should correspond with the mean hygrometric condition of the outer atmosphere in fair weather, or from 60° to 70° of saturation. 4. What is the proper temperature for living rooms during the winter months? A. 65° to 75°, according to the vitality of the persons occupying the rooms. 5. What is the proper temperature for sleeping rooms? A. 45° to 55°, for reasons in fourth question.

FULL plans and specifications for any of the various buildings illustrated in this work may be obtained, on very moderate terms, at this office. These include churches, schools, dwellings, enlargements, extensions, wings, etc. The two volumes for the past year, which may be purchased for $3, contain nearly 200 elevations and many plans. Address Munn & Co., 361 Broadway, Architects and Builders Edition SCIENTIFIC AMERICAN.

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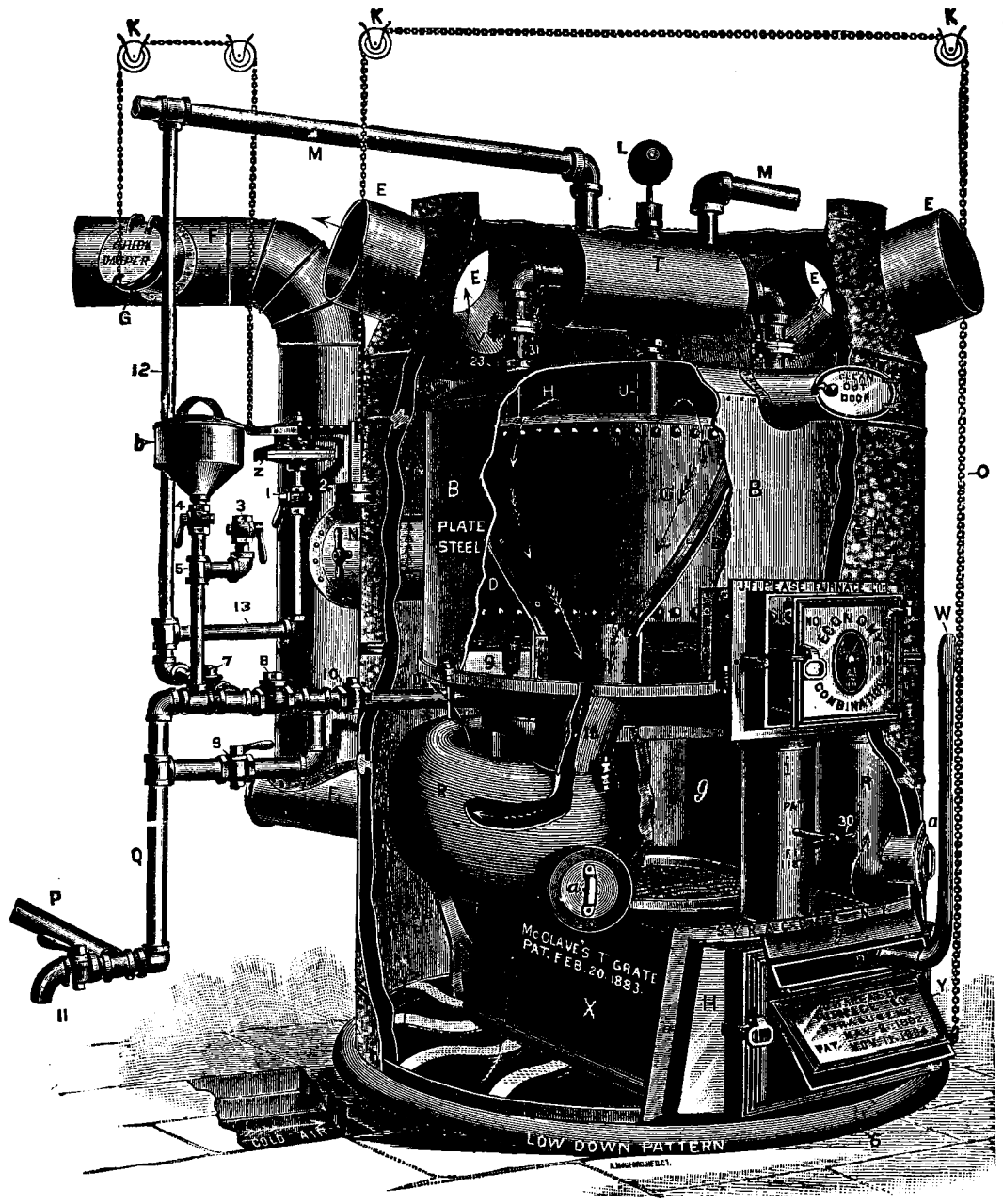

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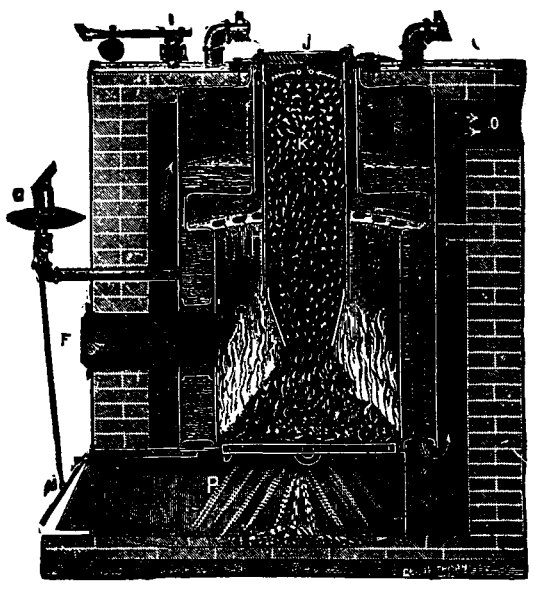

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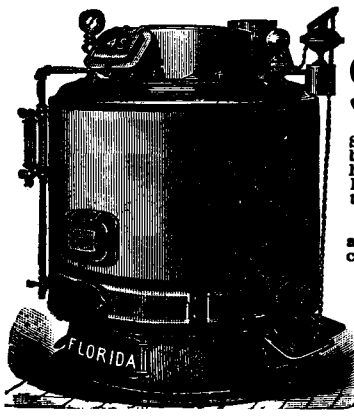

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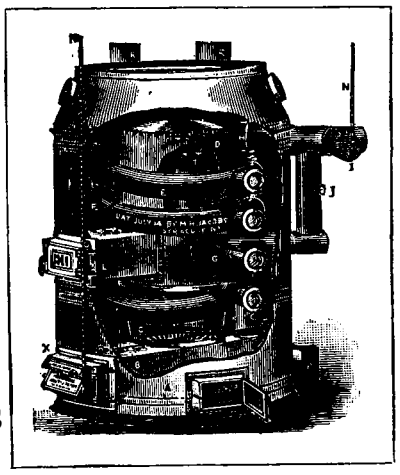

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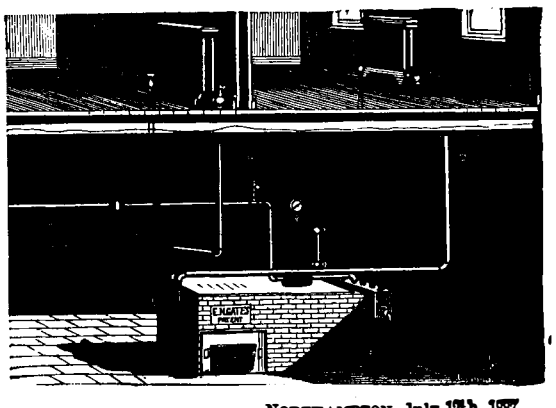

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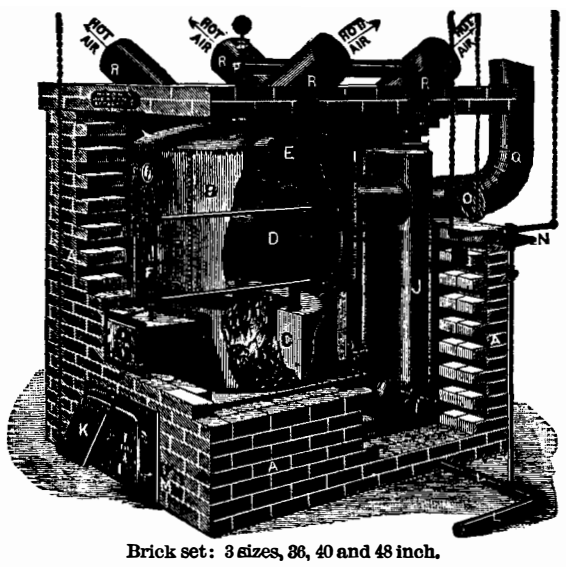

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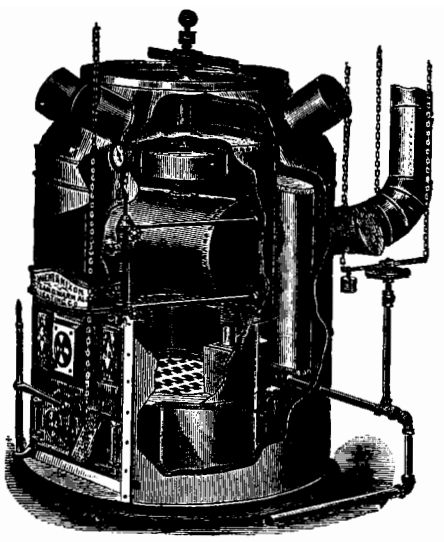

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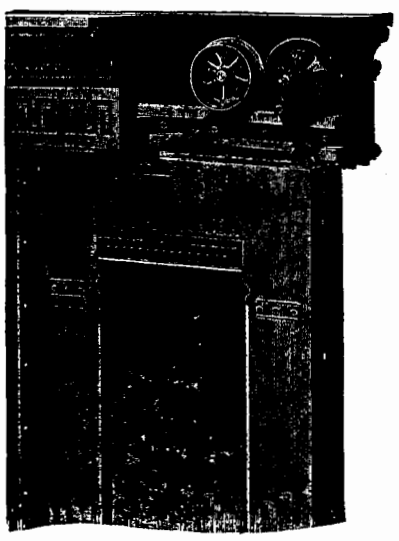

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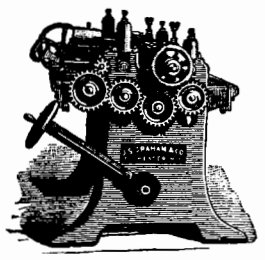

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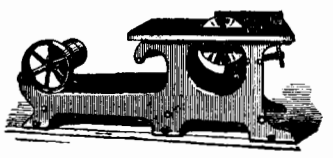

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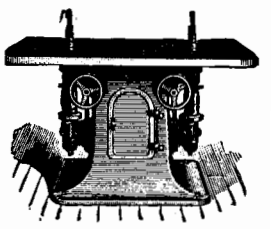

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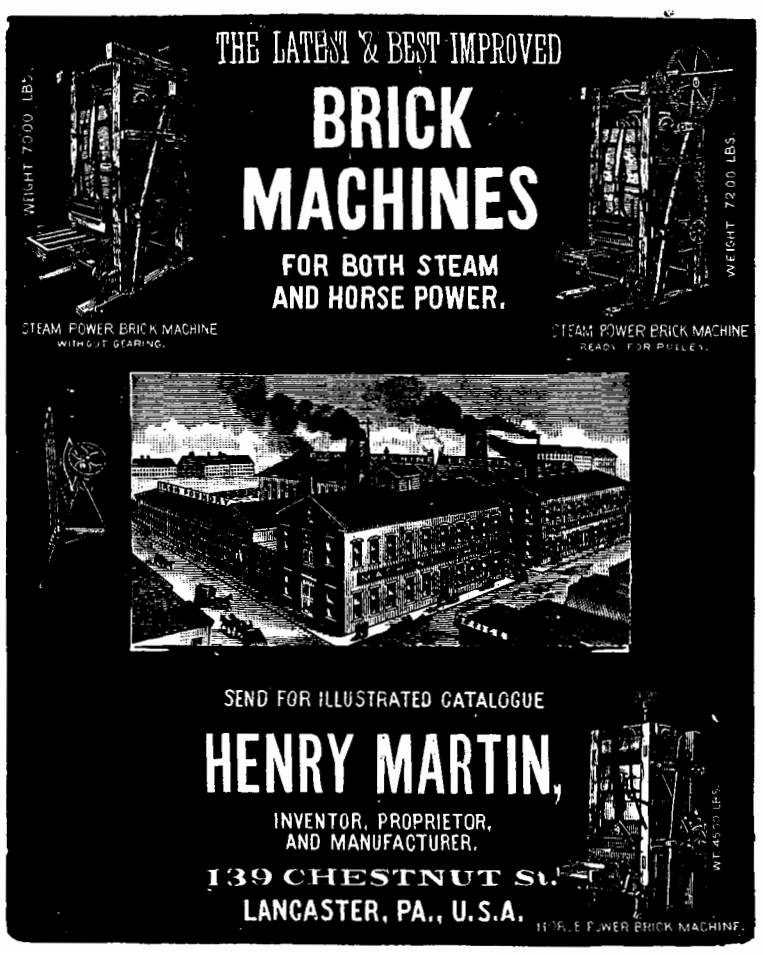

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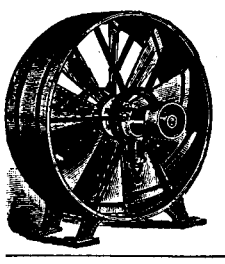

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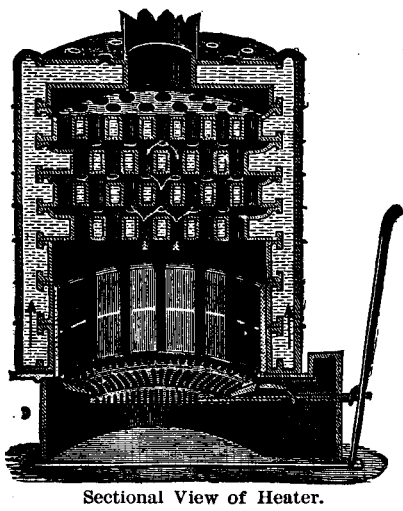

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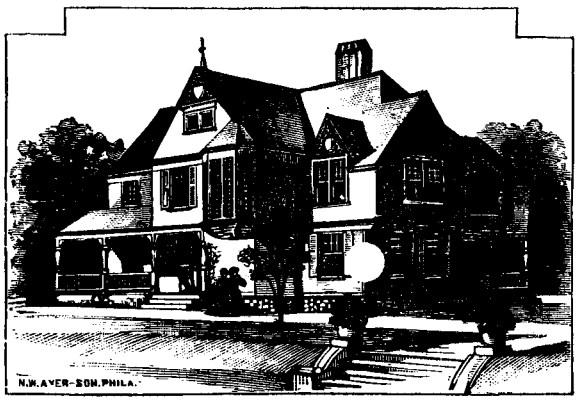

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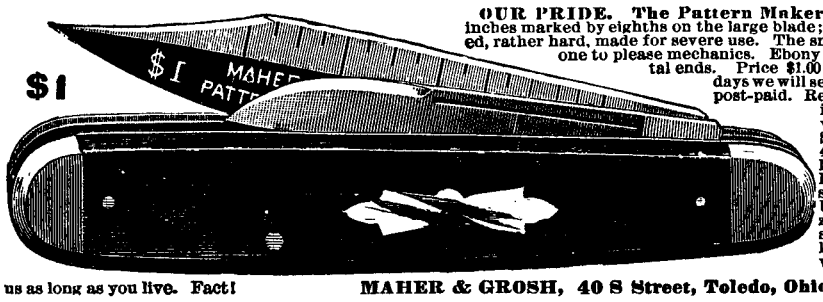

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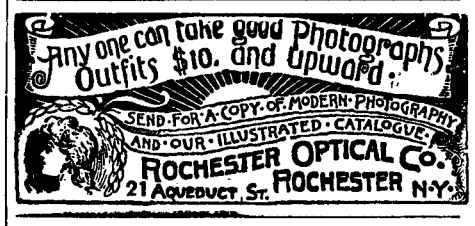

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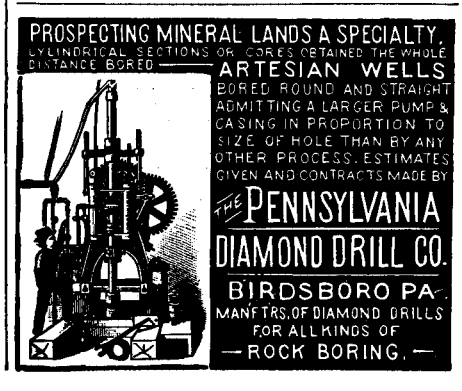

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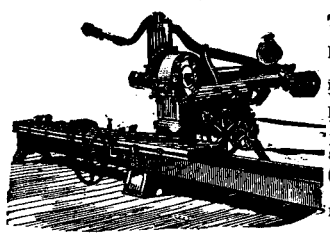

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