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CONTENTS.

THE many alumni of the Massachusetts Institute of Technology whom we count among our readers will have heard, before they receive this, of the sudden death of Professor William B. Rogers while in the very act of delivering the farewell address to the graduating class of 1882 in the great hall of the Institute. Notwithstanding his infirm health, which has prevented him from taking a very active part in the affairs of the Institute of late, Mr. Rogers had consented to be present at the graduation exercises, and to say what it was felt might be the last words which he would speak in public in behalf of the Institute. On rising in response to the President's invitation, he was observed to be more feeble than usual. His voice for a few minutes was hardly audible, until with an effort he summoned strength to make himself heard, and turning to the audience which filled the hall he began to speak with something like a return of his old vivacity and enthusiasm. But in the very midst of a sentence he was seen to falter; he placed his hands a moment for support upon the table before him, then murmuring a few words, the strength which even his resolute spirit could no longer sustain failed, and he fell to the floor. Help was immediately at hand, but consciousness could not be restored, and before the audience, dismissed immediately upon the interruption of the exercises, had left the building, the last feeble pulsations of the heart had ceased. The Government and members of the Institute with many others remained for a long time near, reluctantly leaving at last the body of their dead friend, guarded by a deputation from the graduating class, to await in the building which owed its existence to him, and which was the scene of his noblest work, the last sad offices which affection and respect could render.

ALTHOUGH the Massachusetts Institute of Technology claims, with reason, to have been in a peculiar degree the object of Professor Rogers's most earnest solicitude and most assiduous labors, its interests have occupied only the latter portion of a long life of activity, and his highest distinctions were already won before technological teaching was thought of in Massachusetts. Born in Philadelphia in 1805, his early years were spent at home and in Virginia, where he graduated at William and Mary College, and remained as Professor of Natural Philosophy in the University of Virginia, and Director of the State Survey, until 1853, constantly gaining in reputation in the United States and abroad as a geologist, a chemist, and a writer on physics and mechanics. Removing to Boston in that year, his unceasing energy and enthusiasm in behalf of science soon led him to associate himself eagerly and most effectively with those who were endeavoring to establish there a school of practical and experimental science, and he drew up the scheme for such an institution which has since been substantially carried out. At first as Professor of Physics and Geology, and afterwards as President, his best work was thenceforth given wholly to the Institute until, a year ago, the exhaustion of a constitution never very strong compelled him to relinquish a part of his responsibility to others, retaining nevertheless, as Emeritus Professor, and a member of the Committee of the Corporation on the School, a share in its management which continued to be constantly, though unobtrusively felt. In the performance of the duties, too great, as it now appears, for his strength, he spent what remained to him of life, and with the final act of the academic year, his resolute spirit departed, to find, perhaps, that rest of which it had known little on earth.

WE are called upon to perform the sad duty of recording the death of one of the best and most favorably known architects in the United States, — Mr. James P. Sims of Philadelphia. Young as he was, for he was only in his thirty-third year at the time of his death, Mr. Sims had already distinguished himself by his activity in all the highest duties of professional life, and was always among the leaders in any movement to promote mutual acquaintance and improvement among his fellow architects. Under his brother, the lamented Henry Sims, he received, after his graduation from the University of Pennsylvania, an excellent technical training, supplemented by a period of travel and intelligent study in Europe, which completed his preparation for a professional career of great activity and success. Within the four years which had elapsed since the commencement of his practice, he had designed and executed, among other buildings, four important churches: the Holy Trinity Memorial Chapel, and Christ Church Chapel in Philadelphia, Christ Church at Germantown, and the new Episcopal Church at Morristown, and was at the time of his decease engaged upon a fifth at Roxborough. The manner of his death, though distressing in its suddenness, was perhaps mercifully painless. While sitting in his office, to all appearances in perfect health, with the exception of a slight cold, he was observed to put his hands suddenly to his head, and fall upon the floor. Medical aid was immediately brought, but he expired in a few minutes. The cause of death is supposed to have been apoplexy, or the rupture of an artery in the brain. Sadly as he will be missed by his friends and the members of the profession, who will long cherish the memory of his high character and pleasant ways, we have perhaps some reason for thankfulness that he was still unmarried and leaves therefore no wife or children to suffer from a bereavement which might well have proved too great to be borne.

A NEW and promising scheme for an elevated railway is under discussion in Chicago, and a company has already been incorporated for carrying it out. We do not understand from the description given in the Chicago *Tribune* whether the track is to be supported on a single or a double row of posts, but the construction is intended to be very light, and instead of locomotives and long trains single cars only will run over it, impelled by electricity conveyed to a small motor in the car, after the method already successfully employed by Messrs. Siemens and Halske at Berlin. The cost of construction as well as the expense of maintaining a track designed only for such trifling burdens will be but a fraction of that needed for a road like that in New York, and as the condition will be much more favorable for applying electricity as a motive power than they are at Berlin, where the system has long been in operation, it seems reasonable to suppose that the new road may prove completely successful. To avoid obstructing important streets, it is proposed to carry the track as far as possible through passageways and alleys, — a concession to the rights of the public which can hardly involve a great sacrifice on the part of the corporation, and should gain for it popular gratitude and favor.

THE Director of the Massachusetts Bureau of Statistics of Labor, whose official writings, it must be confessed, are apt to read a good deal more like the effusions of a sunday-school superintendent than the deductions of a profound statistician, has had apparently the misfortune in his report of the present year as well as the last one to make some unintentional errors of statement, which have been loudly disputed by those who felt aggrieved by them. A year ago great offense was given to the French Canadians, of whom there are many in the manufacturing towns of the State, by a portion of the report which made a very unfavorable comparison of them with those of other nationalities, calling them "the Chinese of New England," and accusing them of caring only to amass a small sum of money by over-working themselves and their children for small pay, and to carry it back, when they had enough, to their native

districts. It is hardly necessary to say that this remarkable piece of information, founded apparently on little else than the foolish assertions of a few English and Irish mill-operatives, brought out a cloud of affidavits and statistics, which showed incontestably that the French part of the population of the Massachusetts towns, at least, is quite equal in sobriety, intelligence and liberality to any other portion. All these overwhelming proofs of the inconsiderateness of the previous statement were faithfully published in the Report of the Bureau for the present year, with a conscientious meekness which was most amusing to observe; but the lesson was apparently not taken to heart, for the same report which contained this abject apology for a statement which ought never, even if true, to have found a place in an official document, presented several others quite as questionable, to say the least, which are now meeting with the contradictions which they deserve. There is something to be said in favor of the warmly enthusiastic mode of dealing with such subjects, but even enthusiasm should be tempered with common sense, and deductions in regard to the comparative condition of cities which, like Fall River, Lowell and Lawrence, contain fifteen and twenty thousand operatives apiece, founded upon evidence derived from gossiping with a dozen "sober and industrious operatives" in each place, — the soberness being, we suppose, inferred from the color of the noses, and the industry from the assertions of the witnesses, would be of little value even if their evidence were not so contradictory as to be perfectly worthless.

Labor troubles still continue among the iron-workers in Cleveland, apparently rather to the satisfaction of the owners, who find the cessation of business very convenient for making repairs, and introducing some labor-saving machinery, which, when they commence operations again, will enable them to dispense with a large part of the force heretofore employed. Two of the strikers from a certain foundry, vexed, apparently, at finding that their services were not so indispensable as they supposed, have vindicated the dignity of labor by pounding two other moulders on the head with clubs and shooting at them with pistols. This conduct, so suggestive of the Universal Brotherhood which is, we are told, to prevail among workingmen after the grand general strike by which they are to get the upper hand of Capital, was unfortunately misunderstood by the police, who promptly lodged one of the brutes in jail, while the other ran away. In other places no very serious disturbances appear to have occurred, probably on account of the evident and growing depression of business, which makes even workingmen apprehensive about the future. In Paris, where the employers are much more closely united than here, a recent strike of workmen in two manufactories of iron was instantly answered by the closing of all the establishments in the city, and the oft-repeated misery and bitterness of an industrial war appear inevitable, not so much, as it seems to us, through the fault of the men as of the manufacturers, who by turning out those of their employés who are willing to work do a wrong greater than that inflicted by the strikers, besides uniting and embittering their opponents, and cutting off the opportunity for that gradual defection which the wily leaders of labor unions fear more than anything else, from a knowledge of its potent effect in destroying the power and audacity of such associations.

Inspector Olhaber of Cincinnati still perseveres in his good work of repressing the defilement of the atmosphere by unnecessary smoke, and finds, as at first, the manufacturers almost without exception, disposed to second his efforts as far as possible. Some interesting observations have been made, as for instance, that in steam boilers where a uniform power is required, there is little or no difficulty in introducing effective smoke-consuming devices; but where the heat must necessarily be varied at different times the task is much more difficult. Among the culprits who are still occasionally brought before the courts for violation of the ordinance was recently one who had already tried two appliances, and was all ready to introduce a third if the inspector should require it, but felt somewhat aggrieved, and with reason, we think, because Mr. Olhaber refused to recommend any particular device, but condemned successively all that he put in. It would of course be a delicate matter for the inspector to urge the general adoption of any special appliance on his own responsibility, but if he could be sustained by the opinion of a commission of experts, authorized to examine all inventions offered, and to reject entirely the unsatisfactory ones, a great deal of money might be saved to the boiler-owners, which is now wasted in fruitless experiments, and the persons who are now encouraged to incur expense in the manufacture of worthless articles would have no reason to be sorry if their true character could be authoritatively fixed before any considerable amounts had been invested in them.

Some interesting work has been going on recently in the Hudson River Tunnel, which is now completed to a distance of nearly one thousand feet from the New Jersey shore, and is making rapid progress from the New York terminus. On this side was encountered what will probably prove to be the most serious obstacle on the line,—a bed of loose sand through which the water passes freely. On entering this formation the serious question presented itself, whether it was practicable to employ in it the force of compressed air for keeping back the exterior soil and water, which served so good a purpose in the comparatively impervious silt of the western part of the river bed. General Smith, the former engineer of the work, although believing this practicable, regarded the experiment as too dangerous to be attempted, but he was finally overruled, and with some modifications intended to secure the rapid completion of the work behind the advancing heading, the same system has been pursued as on the New Jersey side, and so far has met with gratifying success, the pneumatic pressure of two-and-a-half atmospheres proving sufficient to hold the treacherous quicksand in position around the excavation until the iron plates which form its permanent lining can be adjusted and secured. Between three and four hundred feet from the New York bank, the silt will again be reached, and with the experience already gained, it is probable that there will be little further hindrance to the successful completion of the undertaking.

A very important discovery has been made by Dr. Koch, of Berlin, who has succeeded, as he thinks, in isolating the specific poison of tuberculosis, this name including, besides pulmonary consumption, scrofula, hydrocephalus, and other tubercular affections of the lungs, brain, or general system. It is now well established that consumption is a contagious disease, and the infection has been ascertained to be connected in some way with the transfer of certain minute organisms from one living body to another, but it has been left for Dr. Koch to obtain an accurate knowledge of the organisms themselves. After many experiments upon the tuberculous organs of diseased men and animals, he found the tubercles in all cases infested with a small, rod-shaped, living parasite, somewhat similar in form to the *bacillus anthracis*, or the parasite of splenic fever, but less tenacious of life. On inoculating healthy animals with tuberculous matter, the disease was in every instance reproduced, and on further experiment it was found that the bacilli of the tubercles could be propagated outside of the body, in a carefully-prepared nutritious liquid, and after many successive generations in fresh portions of this inert medium, extending over several months, the introduction into the circulation of healthy animals of a few of the purified microphytes, which had never been connected in any way with a diseased body, was followed in each case by the development of tuberculosis, usually in a violent form. To determine a point hitherto considered doubtful Dr. Koch examined the mucous expectoration of persons affected with pulmonary disease, and found it always filled with the bacilli, while in that of persons not thus afflicted they were never present. Inoculation with the parasitic matter so derived reproduced the disease immediately, and even drying for weeks or months did nothing to diminish the virulence of the poison. In view of the discovery of Pasteur, that the bacillus of splenic fever, or the malignant pustule of cattle, can be so altered by cultivation as to produce by inoculation a mild, instead of a violent form of the disease, and that, just as in the case of vaccination, the mild form of the fever confers immunity from the virulent type, the demonstration of the similar origin of tubercular affections is of the highest importance. If, as from this analogy would seem not impossible, the inestimable blessing of vaccination, which has nearly extirpated one of the most horrible of diseases from civilized communities, can be so extended as to afford a protection equally certain against consumption and scrofula, the two principal scourges of the human race, all the discoveries made in medicine since the time of Jenner will be insignificant compared with those of Koch and Pasteur.

BUILDING SUPERINTENDENCE.—XVIII.

SPECIFICATION OF LABOR AND MATERIALS FOR DWELLING-HOUSE TO BE BUILT ON FAIRFIELD STREET, MELROSE, N. Y., FOR JAMES JOHNSON, ESQUIRE, FROM THE PLANS AND UNDER THE SUPERINTENDENCE OF EDWARD TYRO, ARCHITECT, 13 RIALTO STREET, ALBANY.

GENERAL CONDITIONS.

EACH contractor is to provide all materials and labor necessary for the complete and substantial execution of everything described, shown, or reasonably implied in the drawings and specifications for his part of the work, including all transportation, scaffolding, apparatus and utensils requisite for the same; all materials to be the best of their respective kinds, and all workmanship to be of the best quality.

Each contractor is to set out his own work correctly and is to give it his personal superintendence, keeping also a competent foreman constantly on the ground, and no contractor is to sublet the whole or any part of his work without the written consent of the owner. The architect or his authorized representative is to have at all times access to the work, which is to be entirely under his control, and may by written notice require any contractor to dismiss forthwith such workmen as he deems incompetent or careless, and may also require any contractor to remove from the premises such of his materials or work as in his opinion are not in accordance with the specification, and to substitute without delay satisfactory work and materials, the expense of doing so and of making good other work disturbed by the change to be borne by the said contractor; and each contractor is also at his own cost to amend and make good any defects, settlements, shrinkage or other faults in his work arising from defective or improper materials or workmanship which may appear within twelve months after the completion of the building, and is to clear away from time to time the dirt and rubbish resulting from his operations, and cover and protect his work and materials from all damage during the progress of the building, and deliver the whole clean and in perfect condition. All work and materials are to comply in every respect with the building laws, city or town regulations and the directions of the Inspector of Buildings, and such building laws, regulations and directions are to be considered as a part of this specification and the contract to which it relates. Each contractor is to give to the proper authorities all requisite notices relating to work in his charge, obtain official permits and licenses for temporary obstructions, and pay all proper fees for the same and for use of water for building, and entrance into sewers or drains, and is to be solely answerable for all damage, injury or delay caused to other contractors, to neighboring premises or to the persons or property of the public, by himself or his men, or through any operations under his charge, whether in contract or extra work.

The contractor for the mason-work is to have the care of the premises subject only to the right of other contractors,—the owner and the architect or his representative to have free access thereto,—until the *sill* is on, and is to provide and maintain all requisite guards, lights, temporary sidewalks and fences during that time; afterwards the contractor for the carpenter-work is to take the care in the same way until the whole is completed.

Each contractor is to carry on his work at all times with the greatest reasonable rapidity, under the direction and to the satisfaction of the architect. The several portions are to be completed on or before the following dates:

Foundation to be ready for sill	*November* 1, 1883.
House to be entirely enclosed	*December* 1, 1883.
Chimneys and piers to be finished	" 7, 1883.
Back plastering	" 10, 1883.
Outside finish completed and interior ready for plastering	*January* 20, 1884.
Plastering completed	*February* 10, 1884.
Interior wood-work done	*April* 1, 1884.
Painters' work completed	" 15, 1884.

MASON.

EXCAVATION, ETC.

Set proper batter-boards and mark out the building accurately under the direction of the architect.

Batter-boards.

Take off the sod and loam from site of house and for eight feet additional in width all around. Excavate the cellar to a depth of five feet below the highest part of the ground covered by the building, making the excavation eight inches wider all around than the outside of foundation-walls; excavate trenches for all walls two feet below cellar bottom, and for footings of piers and chimneys eight inches below cellar bottom; excavate for posts and piers of porches and piazzas four feet below present surface; excavate trench four feet deep and *one hundred* feet long for drain-pipe, and excavate cesspool eight feet in diameter and twelve feet deep. Excavate for dry well to each rain-water leader where directed, eight feet from the house and five feet deep, and for trench four feet deep from each dry well to house.

Excavation.

[AREAS, CISTERNS, ETC.]

Separate the loam and stack by itself where directed, and dump the other earth from the excavations wherever directed within two hundred feet of the building. Clear away and remove all rubbish entirely from the premises at the completion of the building. Refill dry wells and around cellar walls with small stones or gravel. Refill with ordinary earth around cesspools, posts, piers, and pipes. Ram thoroughly or puddle with water all filling material every foot in height; spread and grade neatly the remainder of the material from the excavation as directed, forming gravel-walks and drive-ways neatly, and elsewhere spreading the loam evenly on top, sowing in the best manner with blue-grass seed and rolling, and finishing with two feet in width of the best sods on each side of gravel-walks and drive-ways, and three feet in width around house and piazzas, all to be done in the best manner, properly cared for and kept in order until the house is delivered.

Other Excavation.

If any blasting should be necessary for making the excavations above specified [*seven*] cents per cubic foot will be paid by the owner for blasting, breaking up, and removing the stone: but all stone so removed which may be suitable shall be used in building the cellar-walls or piers, and for all stone so taken from the excavation and used in the building, the contractor shall pay the owner at the rate of [*seven*] cents per cubic foot.

Blasting.

Furnish and lay in the best manner from outside of cellar-wall to cesspool [*one hundred*] feet of first quality [*Portland, Akron, Scotch*] five-inch glazed earthenware drain-pipe, all uniformly graded, the bed hollowed for the hubs, and all jointed with clear, fresh Portland cement, and the joints scraped smooth inside as laid. Leave the line of pipes open until inspected and approved before refilling the trench. Include in the line of pipe a five-inch running trap of the same make, with hand-hole, to be placed not less than six feet from the house, and the hand-hole closed by tight cover; and include also a 5″ x 5″ T-branch where directed, between the house and the trap, the branch of the T to be turned upward, and a vertical five-inch pipe of the same make to be brought to the surface of the ground and covered with a proper earthenware ventilating cap, all jointed with cement.

Drain-Pipe, etc.

Trap.

Foot Ventilation.

Furnish and lay four-inch glazed earthenware pipes of the same make, all jointed in cement, from each dry well to the rain-water leaders. Each pipe to turn with a quarter-bend at the cellar wall and to be brought upward to the surface of the ground to receive the foot of the leader.

Underground Pipes for Rain-Water.

FOUNDATIONS.

All the lime used in the mason-work throughout to be Extra No. 1 [*Rockland, Canaan, Glen's Falls,*] and all cement except that used for jointing drain-pipes to be best fresh [*Rosendale, Akron, Louisville,*] of the [*F. O. Norton*] brand. All sand to be clean and sharp, and used in proper proportions.

Lime and Cement.

Furnish all materials and build the cellar-walls 18 inches thick to the underside of sills of good ledge or other approved stone; the first 18 inches to be laid dry in the trenches, and the remainder to be laid in mortar made with lime and cement in equal parts and clean, sharp sand in proper proportions; the whole to be laid to a line on each face, well bonded, the joints filled with mortar and all to be thoroughly trowel-pointed inside and outside the whole height, holding the trowel obliquely so as to weather the pointing on the outside. Set the best face of the stones outside, both above and below ground. Set stone footings for piers and chimneys and foundations for range and boiler. Level up carefully and bed the sill in cement-mortar and point up around it inside and outside, and bed and point up around frames of basement windows. Build piers of dry stone for front granite step. Leave openings for drain, gas and water pipes, and fill up around them afterwards.

Sand.

Walls.

Build the cesspool with circular wall of dry stone eighteen inches thick. Draw in the top and cover with three-inch planed blue-stone, two feet square, with man-hole and grated cover, set in cement four inches below finished grade, and the sod neatly turned down upon it. Build in the drain-pipe properly.

Cesspool.

Furnish and set one step of best clear [*Connecticut*] granite at front porch, to be eight feet long, sixteen inches wide on top, and twelve inches high, seven inches to be above ground; the part above ground, top and ends, to be pene hammered.

Stone Steps.

All the bricks used in the building except for fireplaces, hearths, and setting of range, furnace and boiler to be the best hard common brick, to be carefully culled for facing of chimneys above roof, and all to be new, well-shaped, and of uniform size. All to be laid wet except in freezing weather, with joints thoroughly flushed up with mortar, and all well bonded. All brickwork to be afterwards plastered is to have rough joints, other work to have the joints neatly struck; and all work visible outside the house to be washed down after completion with muriatic acid.

Brickwork.

Build piers in cellar and for outside work as shown on plans, all to be 12″ x 12″, laid in mortar made with equal parts of lime and cement and wedged tightly up to underside of timbers with slate chips in mortar.

Piers.

Build the chimneys as shown on drawings, with flues 8″ x 12″ or 8″ x 8″ as shown, of hard brick in mortar made with one part cement to two parts lime to underside of roof boarding; above roof to be of selected brick, formed according to drawings and details and laid in mortar made with equal parts of lime and cement, colored with Venetian red to a light red color, and the upper four courses to be laid in clear cement. The brickwork of chimneys to be kept in all cases at least one inch clear of any wood-work. All withs to be four inches thick, well bonded into the walls, and all flues to be carried up separately to the top. Plaster every flue smoothly inside to the top, and clean out at completion, and plaster the outside of each chimney from basement floor to underside of roof boarding. Build in lead flashings, to be provided by the carpenter, and provide and build in eyes and set strong wrought-iron stays, as directed, to all chimneys rising more than fifteen feet above the roof. Provide and set eight-inch iron thimble in furnace-flue, sixteen inches clear below underside of beams, and five-inch thimbles and covers with ventilating arrangement in laundry, two feet clear below ceiling, and in two attics, to be three feet clear above floor unless otherwise directed. Provide and set also 8″ x 8″ iron cleaning-out door and frame in furnace-flue, two feet above basement floor; and a 12″ x 12″ door and frame in each ash-pit, close to basement floor; and 8″ x 12″ black japanned ventilating register in kitchen. **Chimneys.**

Turn 4-inch trimmer-arches on centres to all fireplaces, to be two feet wide by the length of the breast; turn also trimmer-arches in front of range and wash boiler to support hearths not less than 20″ wide in front of each. Level up with cement-concrete, or brickwork, to receive hearths. **Trimmer Arches.**

Build the fireplaces with the rough brickwork only at first, making the opening three feet high above top of beams, and putting in two ½″ x 2″ wrought-iron chimney-bars to each opening, each bar to be eight inches longer than the opening. After the house is plastered provide all materials and build fireplaces and hearths according to detail drawings, and cover securely with boards for protection until the building is delivered. The fireplace in parlor is to be lined with ornamental cast-iron plates, of pattern to be selected by the owner, and to cost ten dollars per set, exclusive of putting up; and to have facings of French majolica tiles, to be selected by the owner and to cost twenty-five dollars per set exclusive of putting up, and hearth of royal blue glazed American tiles in three-inch squares with border of two rows of one-inch black glazed tiles, with one row between of Low's three-inch Chelsea tiles, of pattern to be selected by the owner; the hearth to be 20″ wide and 5′ 6″ long, inclusive of border. All to be executed in the best manner by skilled workmen, the tile facings to be secured in place with polished brass angle-bars, and the hearth to be laid in Portland cement, and all to be thoroughly backed up with brick and mortar. Make the hearth within the fireplace of good face-brick. The dining-room fireplace is to be lined with Philadelphia glazed brick to be selected by the owner, and is to have facing of Italian griotte marble, 4″ wide and ⅞″ thick, with cavetto moulding around the opening, and hearth, 20″ by 5′, of American unglazed red tiles without border, all executed in the best manner and thoroughly backed up with brick and mortar, and to have face-brick hearth within the fireplace. **Fireplaces.**

All the other fireplaces in the building are to be of selected pressed brick with borders of moulded brick, as per detail drawings, and hearths of 16″ width by length as directed, of pressed brick laid flat, with border of brick moulded with half-round on the edge, mitered at the angles and set with the half-round projecting above the floor, all laid in red mortar and neatly pointed. All fireplaces to be built in the best manner, with ½″ x 2″ chimney-bars, 8″ longer than the opening, to support those shown with square openings, all well backed up, and the joint between old and new work thoroughly broken to prevent the escape of sparks. Provide and set neat ash-grates to all first-story fireplaces, without dampers.

Set the range, to be provided by another contractor, in pressed brick in the best manner, to show a 12-inch pier on each side, and carrying up the face-brick setting to the ceiling, with lintel of rubbed blue-stone, five courses high by the whole length of the breast, to hold the brickwork above. Make hearth to the same 20″ wide by the full length of range and piers, of pressed brick laid flat in cement. **Range.**

Do all excavation and other work necessary and furnish all materials, and set in the best manner in pressed brick the furnace, to be provided by the contractor for the heating. Make cold-air chamber under furnace not less than eighteen inches deep, all of hard brick in clear cement, with bottom of the same, and make cold-air box, ten feet long, under cellar floor for supplying the same, to be 18″ deep by 3′ wide, with bottom and sides of hard brick in clear cement, and all plastered with cement, and covered with 3-inch flagstones with close axed joints. Connect the cold-air box complete and make tight all around it, and leave the whole in perfect working order. **Furnace.** **Cold-Air Box.**

Provide and set in laundry where directed a 35-gallon [*Steeger's*] best heavy-tinned copper wash-boiler with dished soapstone top, grate, ash-pit, and doors complete, and with steam-pipe connected properly into flue. All to be set in pressed brick in the best manner, and to have hearth 20 inches wide by the length of the boiler, of pressed brick laid flat in cement. **Wash-Boiler.**

Lay two courses of rough brick in mortar on top of foundation-walls behind sill all around the building, and fill up with four courses of the same between beams on top of sill. Lay four courses of the same on top of all dropped girts and caps of partitions which carry beams in every story between the beams and studs, and build a vertical 4-inch wall of the same from the plate all around to underside of roof-boarding. After the partitions are bridged lay one course of brick in mortar between studs on top of all the bridging throughout. Lay one course of brick in mortar on top of under floor in each story around all chimneys and between the furring studs of the breasts, filling the whole space from brickwork of chimneys to outside of studs. **Brick Filling.**

Level off the cellar floor, roll or settle thoroughly, and concrete the whole three inches thick in the best manner, the concrete to be made with one part fresh [*F. O. Norton Rosendale*] cement to two parts clean sharp sand, and three parts washed pebbles or broken stone, and the portion not covered by wooden floor to be smoothed off neatly, and all left perfect at the completion of the building. **Concreting.**

The mason is to assist the other mechanics employed in the building wherever his help is necessary, and is to do all cutting and jobbing required without extra charge, and leave all perfect. **Miscellaneous.**

CRUSHING STRENGTH OF BRICKS AND OF BRICK PIERS.

THE following tests on the strength of bricks and brick piers were recently made under the direction of Mr. F. E. Kidder for the Massachusetts Charitable Mechanic Association. We quote the following from Mr. Kidder's report to the Committee on Building Materials:

The bricks tested were as follows:

Three Philadelphia face-bricks.

Four New England pressed bricks.

Four ordinary Cambridge (Mass.) bricks.

Three bricks from Boston Terra-Cotta Company.

One brick of Selenitic cement and coke.

One porous terra-cotta brick.

Two bricks of Selenitic cement and sand.

The specimens were tested in the government testing-machine at Watertown, Mass., and great care was exercised to make the tests as perfect as possible. As the parallel plates between which the bricks were crushed are fixed in one position, it is necessary that the specimen tested should have perfectly parallel faces. The bricks which were tested were rubbed on a revolving bed until the top and bottom faces were perfectly true and parallel, or as nearly so as it was possible to make them. The preparation of the bricks in this way required a great deal of time and expense, the latter amounting to two or three dollars for a single brick, in many cases.

Philadelphia Face-Brick: — These bricks were furnished by Waldo Brothers, 57 Kilby St., Boston. They were very perfect in form, but quite soft, being the softest clay brick tested.

First brick measured 8.23″ x 4.1″ x 2.32″ thick. It was crushed flatwise, as were all of the bricks. The brick was first subjected to a pressure of 50,000 lbs., which was gradually increased. The brick commenced to crack under a pressure of 145,000 lbs., or 4,303 lbs. to the square inch. The cracks first appeared on one edge, and then the other edges soon cracked. Before the brick was finally crushed it was cracked badly, and several pieces had fallen from the outside. *The brick failed under* 204,300 *lbs., or* 6,062 *lbs. per square inch.*

Second brick measured 8.3″ x 4″ x 2.3″ thick. This brick commenced to crack under 113,000 lbs., or 3,400 lbs. to the square inch, *and failed under* 193,600 *lbs., or* 5,831 *lbs. per square inch.*

Third brick measured 4.1″ x 8.3″ x 2.25″ thick. It commenced to crack under 98,000 lbs. pressure (2,879 lbs. per square inch), and was badly cracked under 154,000 lbs. pressure. *Net strength* 199,500 *lbs., or* 5,860 *lbs. to the square inch.*

Common Brick (from Mr. M. W. Sands's brick-yard, Cambridge,

Mass.) : — These bricks represent good Eastern brick, and were very hard, containing considerable flint. It was so difficult to rub down the faces of these bricks to parallel surfaces that only one whole brick was prepared, and the remaining specimens were half-bricks.

First brick measured 7.88″ x 3.27″ x 1.97″ thick; cracked slightly under a pressure of 150,000 lbs., but the cracking did not increase until after the pressure had reached 200,000 lbs. *The net strength of the brick was* 333,500 *lbs., or* 12,940 *lbs. per square inch.*

First half-brick measured 3.25″ x 3.35″ x 2.02″ thick. Commenced to crack under 40,000 lbs. pressure (3,670 lbs. per square inch). *Net strength* 107,000 *lbs., or* 9,825 *lbs. to the square inch.* The brick cracked most on the sides which had been the outside edges of the whole brick.

Second half-brick measured 3.25″ x 3.9″ x 2.1″ thick. Cracks first appeared under 43,000 lbs. pressure (3,393 lbs. per square inch). *Net strength* 148,000 *lbs., or* 11,681 *lbs. to the square inch.*

Third half-brick measured 3.4″ x 3.95″ x 2.05″ thick. This brick did not fit between the plates of the machine very perfectly. Commenced to crack under 51,000 lbs. pressure (3,797 lbs. per square inch.) *Net strength* 192,000 *lbs., or* 14,296 *lbs. to the square inch.*

NEW ENGLAND PRESSED BRICK, made in Danvers, Mass. : — These samples were selected from a lot of brick exhibited at the recent fair of the Association by the New England Pressed Brick Company.

These bricks, being made under hydraulic pressure are extremely hard (so hard that it was almost impossible to cut them with stone-cutters' chisels), and are very regular in shape. All the specimens of this kind of bricks were half-bricks cut from whole ones.

First brick measured 3.5″ x 3.7″ x 1.98,″ thick. Cracks were first observed, while the brick was under a pressure of 50,000 lbs. (3,862 lbs. per square inch.) *Net strength* 133,000 *lbs., or* 10,270 *lbs. per square inch.*

It was observed while testing this brick, that while the edge face of the brick that had been the end of the whole brick cracked and fell off in pieces, the face which had been at the centre of the brick remained intact.

Second brick measured 3.75″ x 3.52″ x 2.1″ thick. First crack appeared when the brick was under a pressure of 108,000 lbs., or 8,180 lbs. per square inch. *Ultimate strength* 178,600 *lbs., being* 13,530 *lbs. to the square inch.* This brick did not crack very badly.

Third brick measured 3.5″ x 3.8″ x 1.91″ thick. First crack appeared when the pressure reached 33,000 lbs. (2,480 lbs. per square inch), *and the brick failed under* 174,000 *lbs., or* 13,082 *lbs. to the square inch.* Very much of the outside of the brick scaled off, before the brick was crushed.

Fourth brick measured 3.8″ x 3.54″ x 2.12″ thick. It commenced to crack under 61,000 lbs., pressure (4,535 lbs. per square inch), *and was crushed under a pressure of* 176,000 *lbs., or* 13,085 *lbs. per square inch.*

BRICK MANUFACTURED BY THE BOSTON TERRA-COTTA CO., (Messrs. Lewis & Lane, Proprietors) : — These bricks are made from finer clay than the common brick tested, and were more uniform in quality.

First brick. This brick was nearly in the form of a square, with one corner cut off; the brick measured 3.82″ x 3.78″ on the long sides, and was 1.36″ thick. The area of the compressed surface was only 11.46 square inches. The brick did not fit between the plates of the machine very perfectly, so that it was necessary to use very thin brass packing. The brick cracked a little at one corner, under a pressure of 40,000 lbs., but this was owing to imperfectly fitting the machine, and the crack did not increase until the pressure reached 132,000 lbs., 11,518 lbs. per square inch. *Net strength of the brick,* 158,400 *lbs., or* 13,839 *lbs. per square inch.*

Second brick. This brick was shaped like an ordinary brick with one corner cut off, except that it had a slight depression in one face. This depression was filled with plaster-of-Paris, that being the best material at hand; the depression was not more than one-tenth of an inch. The brick had an area on its face of 25.6 square inches and was 1.86″ thick. It commenced to crack when under a pressure of 220,000 lbs. (8,593 lbs. per square inch), *and was crushed under* 272,000 *lbs., or* 11,406 *lbs. to the square inch.*

Third brick. This brick was of the same shape as the previous brick, and the depression in its face was filled in the same way. It is very probable that the strength of these two bricks was lowered by the depression filled with plaster-of-Paris. The area of the face of the brick was 28.88 square inches, and it was 1.9″ thick. The brick commenced to crack while under a pressure of 3,530 lbs. per square inch. *Net strength* 253,000 *lbs., or* 9,766 *lbs. to the square inch.*

The tensile strength of brick of this manufacture was determined, by testing 4 briquets of the usual form, to be about 520 lbs. to the square inch, being equal to that of the best Portland cement a year old.

BRICK OF SELENITIC CEMENT AND SAND :—These bricks (furnished by the Patent Selenitic Cement Co., of Boston), were exhibited at the recent fair of the Association. These brick are only dried, not baked, and are not very hard.

First brick measured 8.5″ x 4.3″ x 2.05″ thick, and weighed 5½ lbs. Owing to imperfect fitting it was necessary to use brass packing at two corners. The brick commenced to crack under a pressure of 656 lbs. per square inch, *and failed under* 56,600 *lbs.,* or 1,548 *lbs. per square inch.*

Second brick measured 4.35″ x 8.54″ x 2.2″ thick; commenced to crack under a pressure of 1,284 lbs. per square inch, *and was crushed under* 55,900 *lbs., or* 1,504 *lbs. per square inch.* Both of these bricks were so disintegrated by being crushed that they could be crumbled into a powder between the fingers.

BRICK OF SELENITIC CEMENT AND COKE :—This is a fire-proof brick manufactured for the Patent Selenitic Cement Co. This brick measured 4.35″ x 8.5″ x 2.15″ thick, and weighed 4 lbs., being both soft and light. It commenced to crack when under a pressure of 24,000 lbs. (650 lbs. per square inch). *and failed under* 47,700 *lbs., or* 1,290 *lbs. to the square inch.*

BRICK OF POROUS TERRA-COTTA, (manufactured for fire-proofing, for Mr. S. E. Loring, under his patents) : — This brick is of a low grade of fire-clay, mixed with saw-dust and burnt. The saw-dust burning out leaves the brick very porous. The specimen tested measured 3.7″ x 7.85″ x 2.25″ thick. It cracked at 9,000 lbs., and would stand no more pressure: hence *its net strength was* 9,000 *lbs., or* 309 *lbs. to the square inch.*

The following table shows the strength of each brick tested, with the area of the face to which the pressure was applied, and the average strength of the different makes of bricks.

NAME OF BRICK.	Area of Face in □″.	Commenced to crack under lbs. per □″.	Net strength per □″.
Philadelphia Face-Brick, . .	33.7	4,303	6,062
" " " . .	32.2	3,400	5,831
" " " . .	34.03	2,879.	5,862
Average,		3,527	5,918
Cambridge Brick (Eastern), . .	25.77	7 760	12,941
" " " . .	10.89	3.670	9,825
" " " . .	12.67	3 393	11,681
" " " . .	13.43	3,797	14,296
Average,		4,655	12,186
New England Pressed Brick, .	12.95	3,862	10,270
" " " .	13.2	8,180	13,530
" " " .	13.30	2,480	13,082
" " " .	13.45	4,535	13,085
Average,		4,764	12,490
Boston Terra-Cotta Co.'s Brick,	11.46	11,518	13,839
" " " "	25.60	8,593	11,406
" " " "	28.88	3,530	9,766
Average,		7,880	11,670
Selenitic Cement and Sand, . .	36.55	656	1,548
" " " . .	37.15	1,284	1,504
Average,		970	1,526
Selenitic Cement and Coke, . .	36.97	650	1,290
Porous Terra-Cotta, ...	29.04	309	309

Comparing the strength of the hard-burned brick, we see that the weakest is 9,766, while the strongest is 14,296 lbs. to the square inch.

Mr. Trautwine gives the strength of brick at from 777 lbs. to 4,662 lbs. per square inch, and the average strength as 2,720 lbs. per square inch.

Hence in using the figures given by Mr. Trautwine for the strength of our common Eastern brick, we use a value which is at least one-third smaller than it should be.

The tests just described, being made on full-size bricks, selected at random, and with a very perfect testing-machine, are worthy of considerable confidence.

TESTS OF THE STRENGTH OF BRICK PIERS, LAID WITH VARIOUS MORTARS.

These tests were made for the purpose of testing the strength of brick piers laid up with different cement-mortars, as compared with those laid up with ordinary mortar. The brick used in the piers were procured at M. W. Sands's brick-yard, Cambridge, Mass., and were good ordinary brick. They were from the same lot as the samples of common brick tested, as described.

The piers were 8″ x 12″, and nine courses, or about 22½″ high, excepting the first, which was but eight courses high.

They were built November 29, 1881, in one of the storehouses at the United States Arsenal in Watertown, Mass. In order to have the two ends of the piers perfectly parallel surfaces, a coat of about half an inch thick of pure Portland cement was put on the top of each pier, and the foot was grouted in the same cement.

March 3, 1882, three months and five days later, the tops of the piers were dressed to plane surfaces at right angles to the sides of the piers. On attempting to dress the lower ends of the piers, the cement grout peeled off, and it was necessary to remove it entirely and put on a layer of cement similar to that on the top of the piers. This was allowed to harden for one month and sixteen days, when the piers were tested. At that time the piers were four months and twenty-six days old. As the piers were built in cold weather the bricks were not wet.

The piers were built by a skilled brick-layer, and the mortars were mixed under his superintendence. The tests were made with the Government testing-machine at the Arsenal.

Pier No. 1. (Bricks laid in common lime-mortar, two days old.) This mortar was part of a lot prepared for use in the erection of a building then being built in Boston, and was such as is commonly used in building.

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 8 *courses*. . . . . 20⅜ *ins.*
Weight . . . . . 144 *lbs.*
Age . . . . . 4 *mo.* 26 *days.*
Ultimate strength . . . . . 150.000 *lbs.*
Time of test . . . . . 45 *min.*

Under a load of 80,000 lbs. a longitudinal crack was opened in first and second courses; 90,000 lbs. extended the crack across four courses, also opening crack on the opposite side of the pier across seven courses. The pier sustained the maximum load five minutes, rapidly developing longitudinal cracks, and crushing some of the bricks.

Pier No. 2. (Brick laid in mortar composed of one part Portland cement and three parts lime-mortar.)

Size, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 22½ *ins.*
Weight . . . . . 161 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 200.000 *lbs.*
Time of test . . . . . 55 *min.*

A load of 180,000 lbs. opened a longitudinal seam in the fourth course. Sustained the maximum load one minute. The pier failed by opening longitudinal seams, and did not break up when removed from the machine.

Pier No. 3. (Bricks laid in mortar composed of one part Newark and Rosendale cement and three parts lime-mortar.)

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 22½ *ins.*
Weight . . . . . 159 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 245.000 *lbs.*
Time of test . . . . . 20 *min.*

At 130,000 lbs. compression longitudinal seams appeared in the second and fourth courses. Rapid development of seams occurred under 220,000 lbs. The pier sustained the maximum load one minute, failing by splitting and crushing the bricks.

Pier No. 4. (Brick laid in mortar composed of one part Orchard Roman cement and three parts lime-mortar.)

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 22⅛ *ins.*
Weight . . . . . 158 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 195 000 *lbs.*
Time of test . . . . . 25 *min.*

At 100,000 lbs. pressure three bricks cracked, and at 150,000 lbs. pressure there were cracks in sight on each of the four faces. It sustained the maximum load one minute, and failed by cracking and crushing the bricks.

Pier No. 5. (Bricks laid in cement mixed in the proportion of one part Portland cement and two parts sand.)

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 23 *ins.*
Weight . . . . . 166 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 240,000 *lbs.*
Time of test . . . . . 30 *min.*

At 125,000 lbs. pressure a crack appeared in the third course, and one in the fifth course. The pier failed by opening longitudinal seams. It did not break up when removed from the machine.

Pier No. 6. (Brick laid in cement composed of one part Newark and Rosendale cement and two parts sand.)

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 23 1-16 *ins.*
Weight . . . . . 167 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 205.000 *lbs.*
Time of test . . . . . 20 *min.*

At 68,000 lbs. pressure cracks were perceived in the third courses from each end. Failed by opening longitudinal seams.

Pier No. 7. (Bricks laid in cement composed of one part Orchard Roman cement and two parts sand.)

Size of pier, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 23½ *ins.*
Weight . . . . . 164 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 185,000 *lbs.*
Time of test . . . . . 20 *min.*

Commenced to crack when under 170,000 lbs. pressure. Failed by opening longitudinal seams and crushing the bricks. Pier did not break up when taken from the testing machine.

Pier No. 8. (Four courses laid in Newark and Rosendale cement one part and sand one part; remaining five courses laid in Portland cement one part to two parts of sand.)

Size, 8″ x 12″ . . . . . *Area*, 96 *sq. ins.*
Length, 9 *courses* . . . . . 23 1-16 *ins.*
Weight . . . . . 167 *lbs.*
Age . . . . . 4 *mos.* 26 *days.*
Ultimate strength . . . . . 225,000 *lbs.*
Time of test . . . . . 25 *min.*

Under 135,000 lbs. pressure the third course laid in Newark and Rosendale cement began to break off. When the pier failed the end laid in Newark and Rosendale cement was thoroughly cracked, while the opposite end (laid in Portland cement) had four longitudinal seams, one in each face. This shows that the mortar composed of one part Portland cement to two parts of sand is stronger than that of Newark and Rosendale cements mixed in the proportion of one part cement to one of sand.

The following table is arranged so as to show at a glance the strength of the piers laid with the different mortars, and to afford a ready means of comparison. It is interesting to compare the figures obtained from the tests, with those given in the hand-books. Mr. Trautwine, who is considered as good authority as any one, says that ordinary brickwork cracks with 20 to 30 tons per square foot, which is equivalent to 311 to 466 lbs. to the square inch. The *larger* number is *less than half* the pressure per square inch, which produced the first crack in the pier laid with lime-mortar.

8″ x 12″ Pier. Common bricks laid in—	Ultimate strength of pier.	Pressure per sq. in. under which pier commenced to crack.	Ultimate strength per sq. in.
	lbs.	lbs.	lbs.
Lime-mortar	150,000	833	1,562
Lime-mortar, 3 parts; Portland Cement, 1 part	290,000	1,875	3,020
Lime-mortar, 3 parts; Newark and Rosendale Cements, 1 part	245,000	1.354	2,552
Lime-mortar, 3 parts; Roman Cement, 1 part	195,000	1,041	2.030
Portland Cement, 1 part; sand, 2 parts	240,000	1,302	2,500
Newark and Rosendale Cements, 1 part; sand, 2 parts,	205,000	708	2,135
Roman Cement, 1 part; sand, 2 parts	185,000	1,770	1,927

For first-rate brickwork in cement, Mr. Trautwine gives numbers which correspond to 770 to 1,088 lbs. to the square inch. These numbers are also very much less than those obtained from the tests of the piers laid in cement. The Portland cement used in building these piers was the kind known as Brooks, Shoobridge & Co.'s cement, and this with the other brands were furnished for the tests by Messrs. Waldo Bros., Boston, Mass.

After making the tests above described, a block of Selenitic concrete consisting of two plates of Selenitic cement, 20″ x 12″, 1⅜″ thick, placed about 7″ inches apart, and filled in with concrete, was tested under compression. The plates were dovetailed into the concrete. This block was exhibited at the recent fair of the Association.

Compression Area . . . . . 180 *sq. ins.*
Weight . . . . . 103 *lbs.*

Brass packing was used to secure an even bearing. The pressure was applied to the long sides of the block parallel to the faces. At 50,000 lbs. pressure, 277 lbs. to the square inch, one of the facings cracked. The block finally crushed under 120,000 lbs., 666 lbs. to the square inch, the facings being wedged off, and the central part crushed.

In making these tests I received much valuable assistance from Mr. Howard, Engineer in charge of testing-machine."

THE ILLUSTRATIONS.

NEW HOTEL AT ROANOKE, VA. MR. GEORGE T. PEARSON, ARCHITECT, PHILADELPHIA, PA.

THIS hotel has just been built at a cost somewhat less than $14,000. The basement, containing bar and billiard rooms, barber-rooms and lavatories, is built of stone with brick fireplaces; above this the building is wood, with red shingle roof. The number of bedrooms is fifty-five, and the form of roof has been made so as not to interfere with the proper appearance and convenience of such of these rooms as are in the third story. The dining-room, kitchens, parlors, etc., have been planned to suit a larger number of guests than can be accommodated in the present structure, as it is the purpose of the company to erect an additional wing so soon as the present contract is executed. The water-closet and bath-room fixtures are the same as are usually placed in such buildings. The dining-room, hall, smoking-room, and parlors are finished with wainscot and wooden ceilings made of yellow pine, and all the fireplaces are built of rough brick in brown mortar.

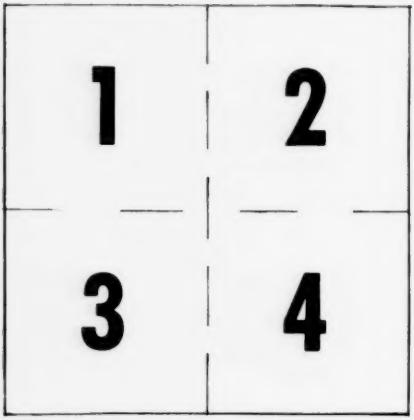
CLUB-HOUSE OF THE BOSTON ART CLUB, BOSTON, MASS. MR. W. R. EMERSON, ARCHITECT, BOSTON, MASS.

A Water-Proof Lime-Wash.—A German paper contains a formula for a wash which can be applied to lime walls and afterward become water-proof, so as to bear washing. Resenschek, of Munich, mixes together the powder from three parts silicious rock (quartz), three parts broken marble and sandstone, also two parts of burned porcelain clay, with two parts freely-slaked lime, still warm. In this way a wash is made which forms a silicate if often wetted, and becomes after a time almost like stone. The four constituents mixed together give the ground color to which any pigment that can be used with lime is added. It is applied quite quickly to the wall or other surface, let dry one day, and the next day frequently covered with water, which makes it water-proof. This wash can be cleansed with water without losing any of its color; on the contrary, each time it gets harder, so that it can even be brushed, while its porosity makes it look soft. The wash on calcimine can be used for ordinary purposes as well as for the finest painting. A so-called fresco surface can be prepared with it in the dry way.

Club House of the Boston Art Club.

Mr. Wm. R. Emerson, Architect.

Maps on this order too large to be
are filmed clockwise beginning in th
right and top to bottom as many fra
diagrams illustrate the method.



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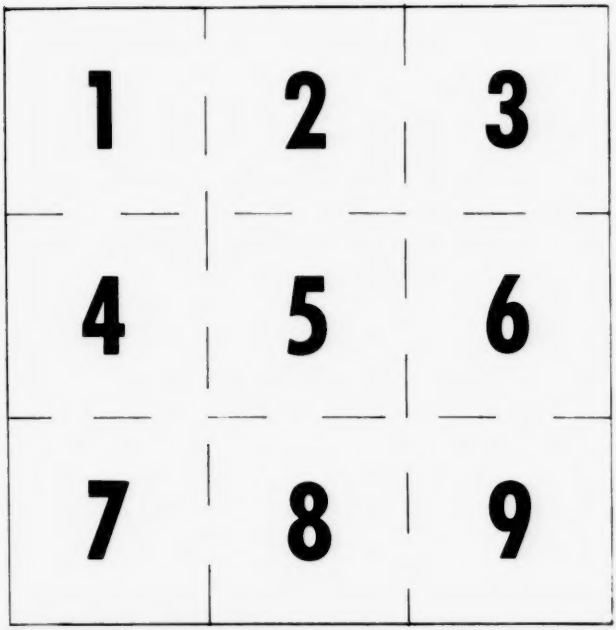
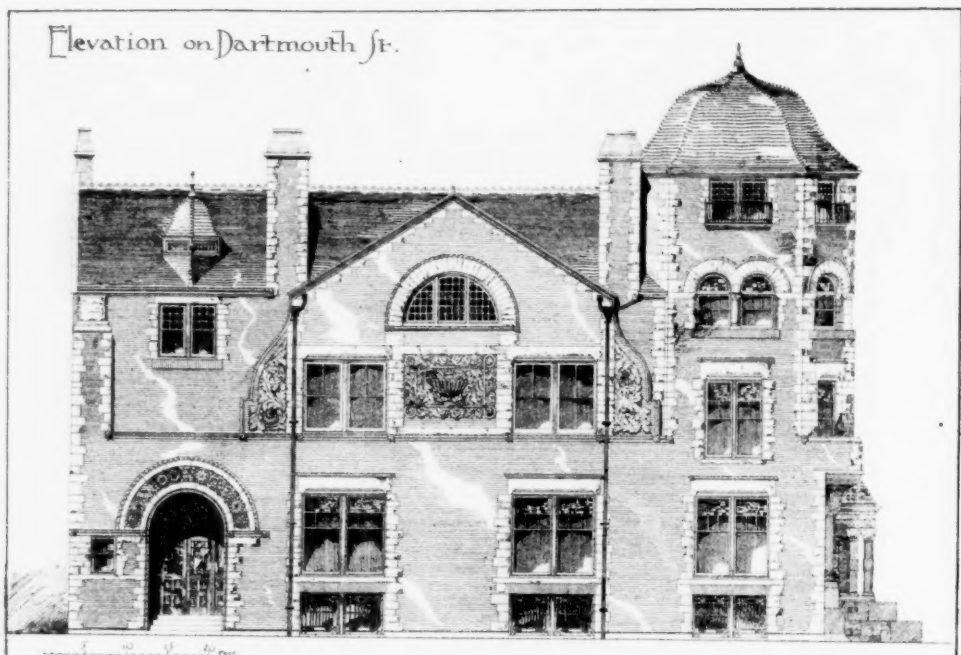
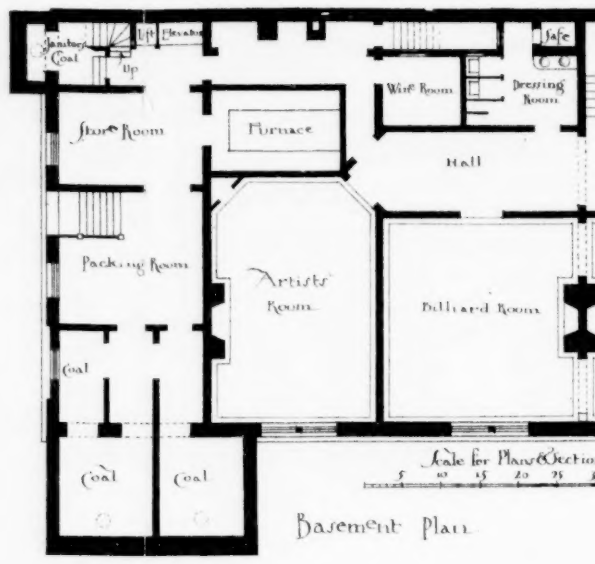


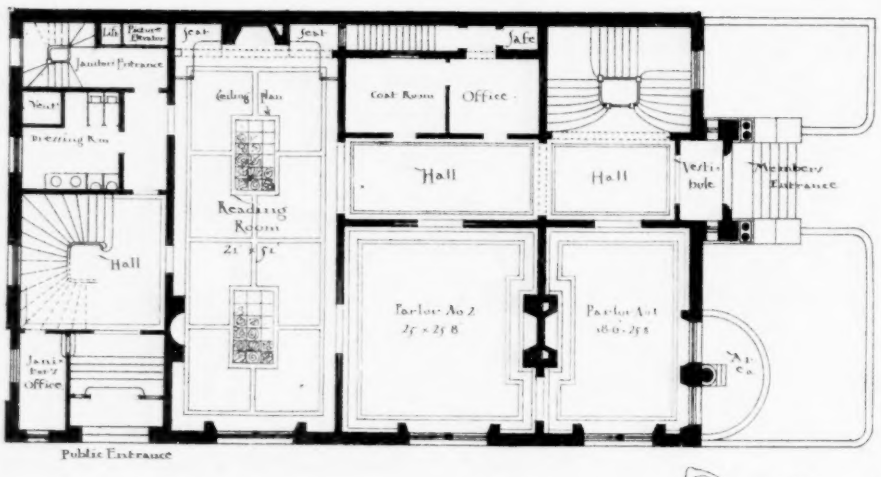
Elevation on Dartmouth St.



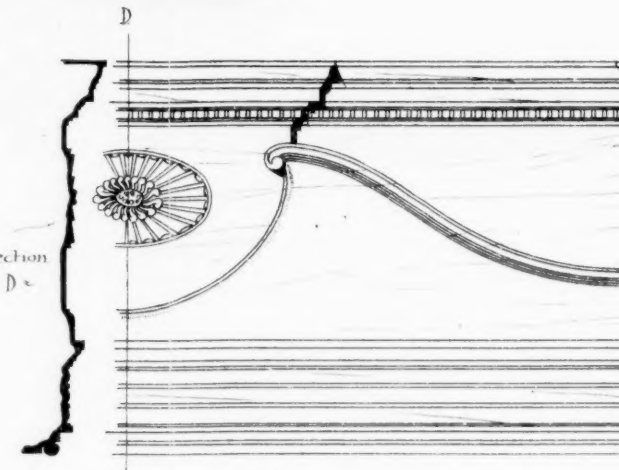
Basement Plan



Grovnd Plan



Section D

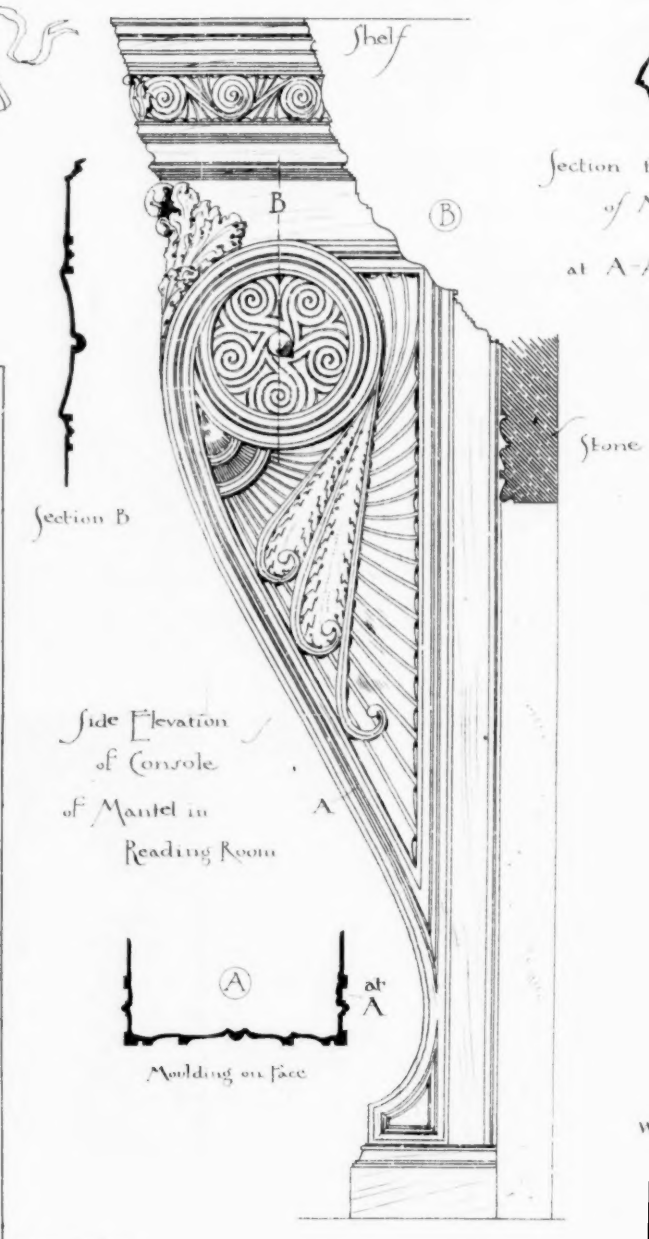


Elevation of Finish over Hall Door (Members Entrance) Hall Side. (B)

Club House of the Boston Art Club

Cor. Dartmouth and Newbury Sts.

Mr. Wm. R. Emerson, Architect, Boston, Mass.



D. A. Gregg del.

Hall

Store Room

Committee Room

Section
25 30 35 40 45

Detail of Iron Staircase in Hall & Public Entrance.

Mahogany Rail

Iron Balusters

A

Rosette

Square

Face of Riser

Sheathing

B

Section thro' String

Ornamentation of Face of Risers and Upper side of Treads.

Third Story Plan

Open Areas

Bed Room

Bed Room

Kitchen

Dining Room

Janitor's Apartments

Sky Light

Dining Room

Passage leading to Kitchen over Janitor's Apartments &c.

Iron Grille - Front Basement Windows.

B

Section thro' Shelf & Mantel

A-A

A

Tiles

C

B B

Executed in Mahogany

Elevation of Mantel in Parlor No 1

Wall Surface

A

Tile

Plan at B-B

Iron Grille in Balcony.

Oak

B

Post at Landings

Rail

C

Plan at C

B

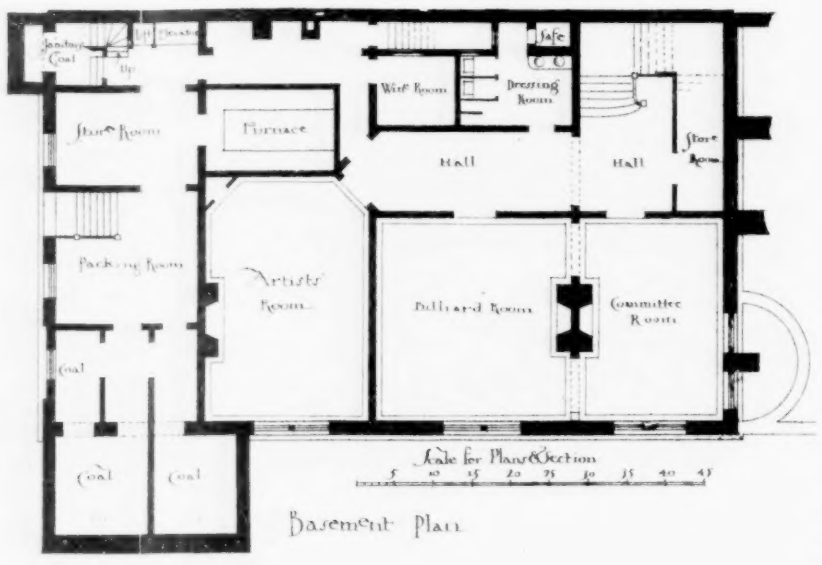
Oak Stair Newel and Balusters in Hall. (Members' Entrance.)

Executed in Cherry

B

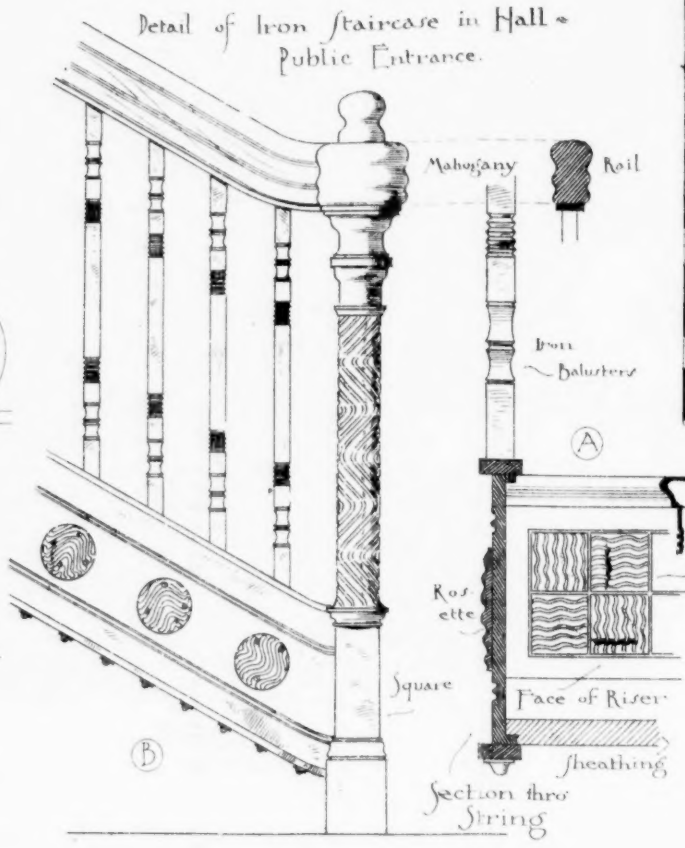
Side Elevation of Console of Mantel in Parlor No 2

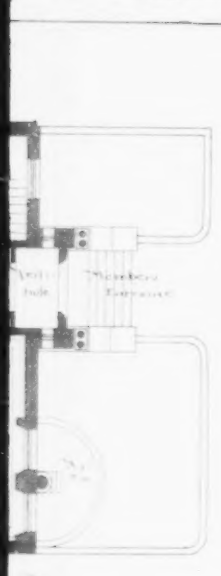
SCALES FOR

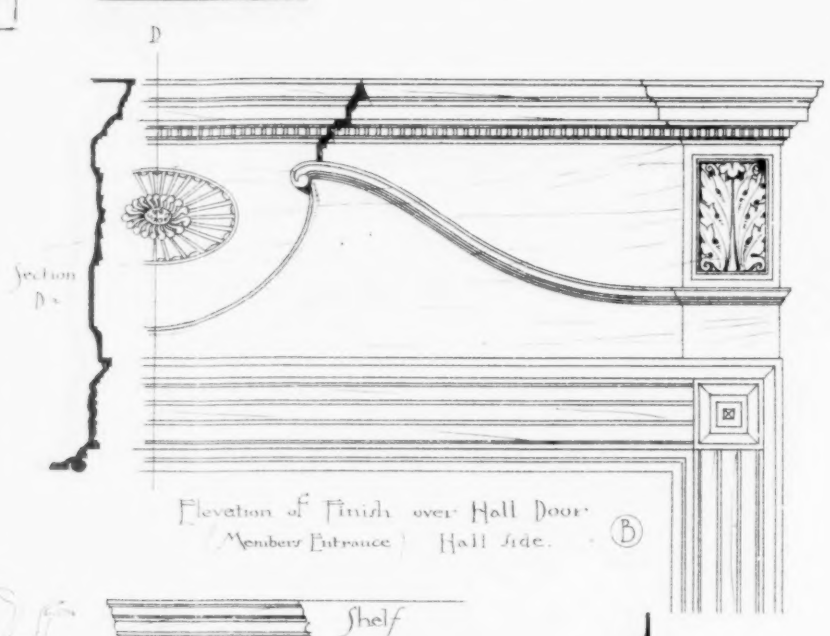


Basement Plan

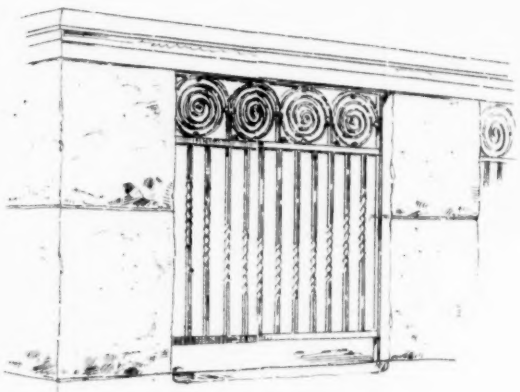
Detail of Iron Staircase in Hall. Public Entrance.



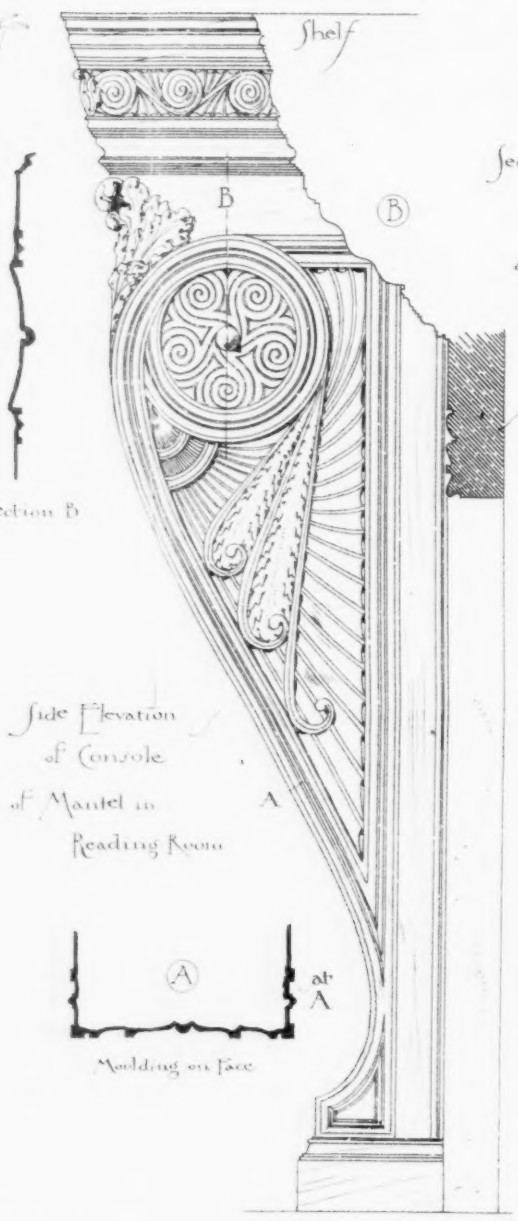




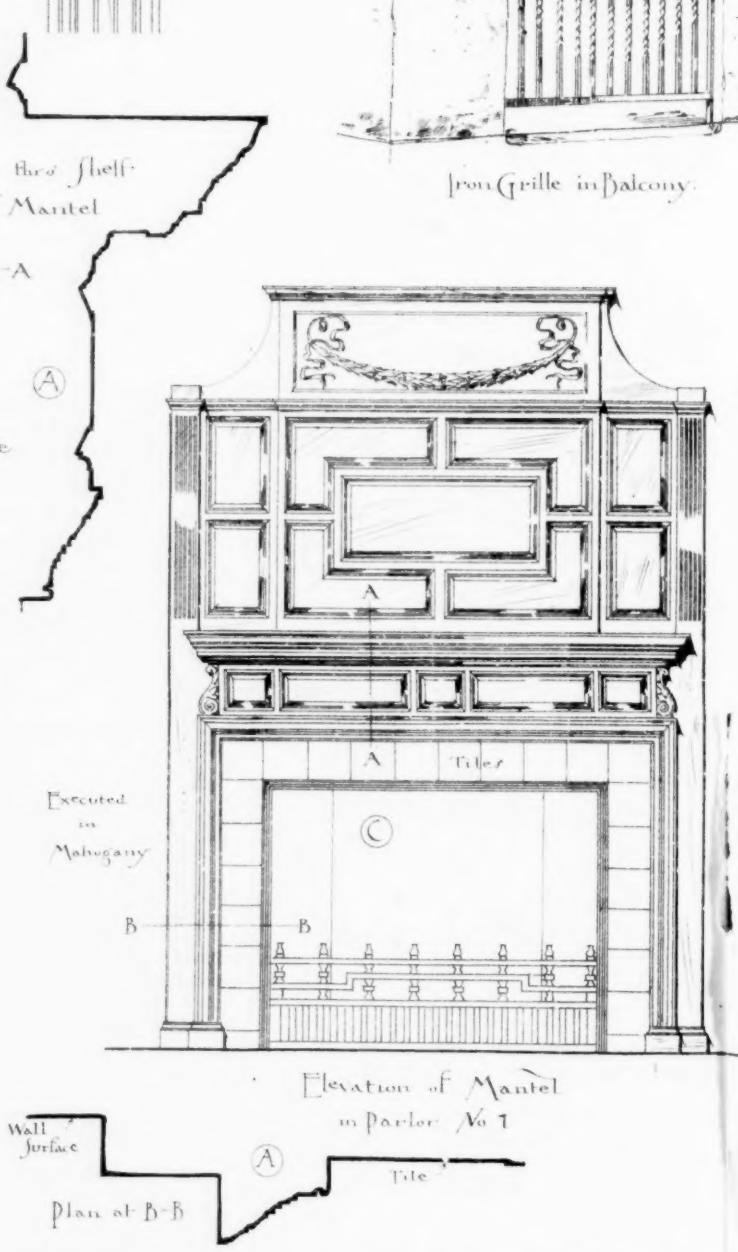
Elevation of Finish over Hall Door (Members Entrance) Hall Side. (B)



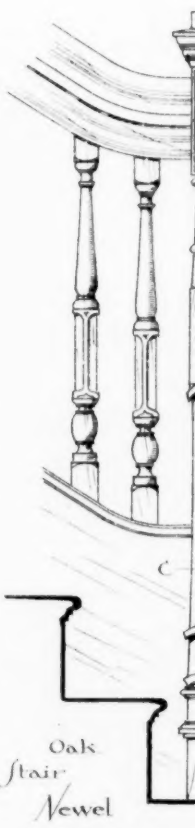
Iron Grille in Balcony



Moulding on Face

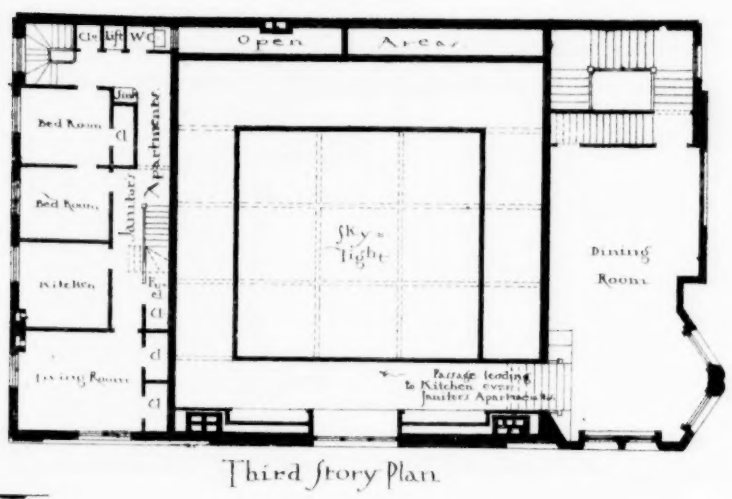


Elevation of Mantel in Parlor No 1

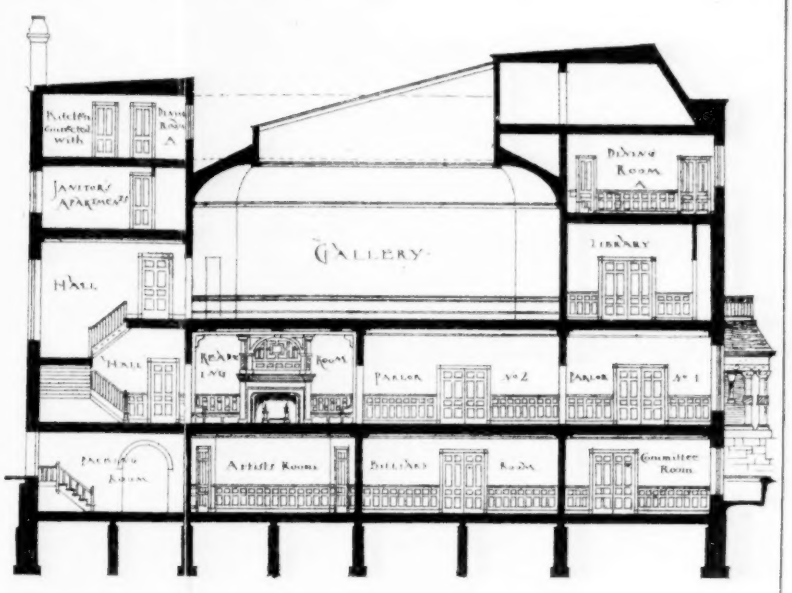


Oak Stair Newel and Balusters in Hall. (Members' Entrance)

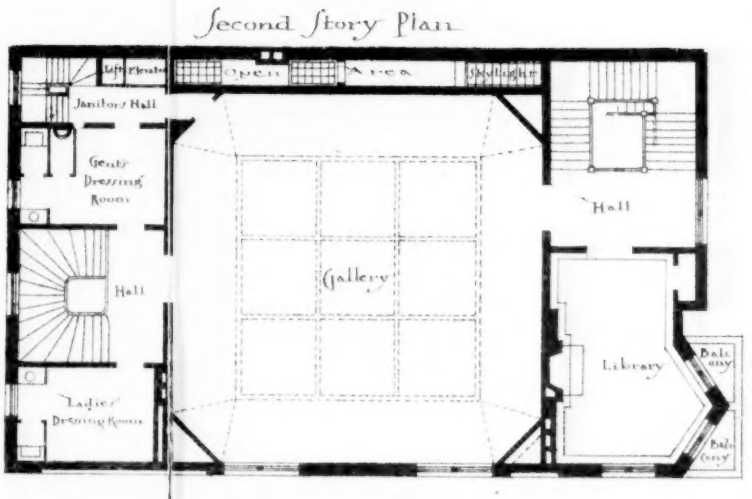
J. A. & R. C. O. del.



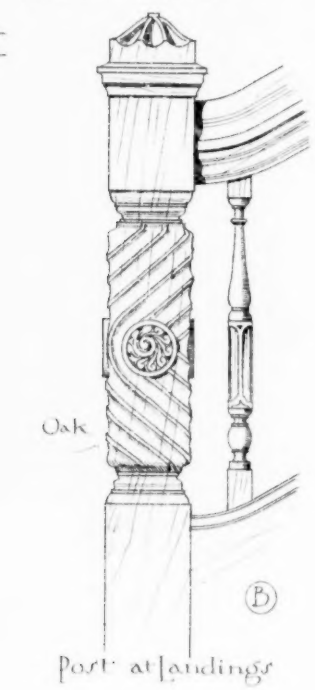
Third Story Plan



Second Story Plan

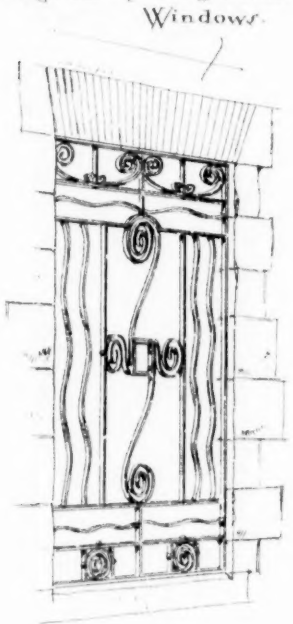


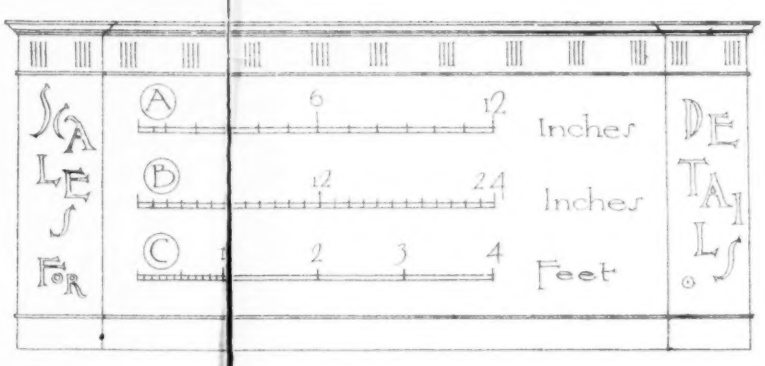
Ornamentation of face of Risers and Upper side of Treads

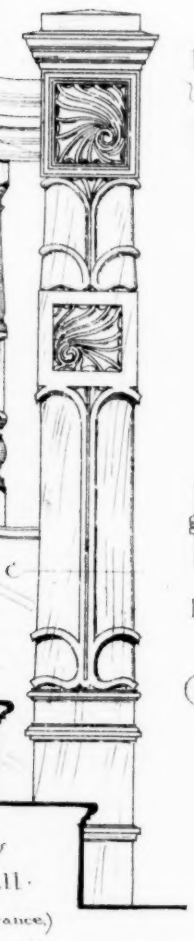


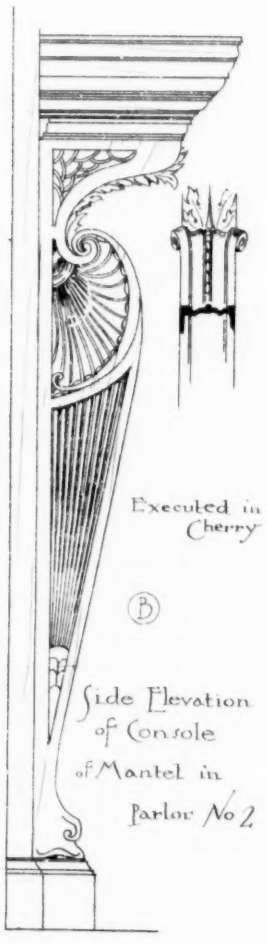
Post at Landings

Iron Grille in Front Basement Windows









Side Elevation of Console of Mantel in Parlor No 2

New Hotel in Roanoke Va
for the Roanoke Land & Improvement Co.
Geo. T. Bisson, Architect

SOME PRACTICAL NOTES ON BUILDING WOODS.

EVERY user of mahogany knows perfectly well that the soundest, and the most highly-figured wood is nearly always to be found on the outside of the logs. By the system, therefore, which is in practice of squaring the logs, a great portion, and in fact the greatest portion, of *the most valuable* wood is wasted. Why such a ridiculous and wasteful form of manufacturing mahogany logs should be adhered to would appear to be incomprehensible, and indeed is only to be accounted for on the supposition that in a square form the logs are the most suitable for transit. Surely, however, an octagonal form would meet the difficulties of transit. By adopting such a plan of hewing the logs, if all the valuable portions of the wood were not preserved for use, yet a much greater quantity than is at present retained would be preserved.

The shippers abroad and the foreign saw-mills have, however, not been alone in matters relating to the waste of wood: perhaps the greatest offenders have been the architects on this side. The losses which, through want of intelligent manufacture, shippers have caused have for the greater part been borne by themselves. The losses that architects are daily causing, either by their carelessness or by their lack of knowledge, fall entirely upon the builders. In no cases do these losses occur more flagrantly and frequently than in those where weight-carrying beams are specified to be of what we will term "unequal sizes." It is necessary to define in the first instance what we mean by "unequal sizes." All log-timber is hewn and all sawn pitch-pine timber is sawn, into equal squares, *i. e.*, if a log squares 12″ on one side, it will square 12″ on all its sides. It is the same in every case, whatever the size of the log may be. Of course a long pitch-pine log may taper in its length very much, but at each end its sides will be equal. To insure economy, therefore, such unequal sizes as 12″ x 7″, 14″ x 9″, 18″ x 10″, or 12″ x 5″, and 14″ x 8″ should never be specified unless it be imperatively necessary that such "unequal sizes" should be specified. It is obviously more economical to specify 12″ x 6″, 14″ x 7″, and 18″ x 9″, as then it will at once be seen that by simply giving one deep cut to a log two "equal-sized" beams are secured. It may possibly occur to some architects that the piece or pieces cut off a log may be of considerable service to the builder, who may use them up for joiner's work. This, however, albeit a popular supposition, is quite an erroneous one. The thick slabs cut off the outside of logs in the conversion of beams are all but useless in most cases, in consequence of their surface manufacture as well as through being either too coarse or too sappy. The slabs which come off hewn logs that are required to have sawn sides are valueless, and are not therefore as a rule sent with the sawn logs, but are retained at the saw-mill at the timber ports, and there used as fuel. The advantage, therefore, that architects can confer upon builders by specifying their beams to be of "equal sizes" is very apparent. Architects should also take care never to specify their beams to be of longer length than is quite necessary (*i. e.*, when the lengths exceed, say 20′ to 25′), because the price of log timber per foot or load is largely regulated by the cubical contents of each log, it advancing in proportion just as the cubical contents of each log increase.

The same remarks apply, of course, equally to the size of the beams as to the lengths. Pitch-pine is the cheapest and the safest wood to specify for beams. By the safest we mean that, it being a wood of more uniform quality than the others, it is more likely to be secured free from sap, knots and shakes. We do not refer to its relative strength, tenacity or durability, which, of course, is another question altogether.

The main sizes in which sawn deals and boards are shipped to us [England] are as follow, and we place them in a tabulated form for the more convenient reference of architects. They are: —

4″ × 12″	2½″ × 7″	1½″ × 6″
4″ × 11″	3″ × 9″	1½″ × 7″
4″ × 9″	2″ × 7″	1½″ × 6″
3″ × 11″	2″ × 6″	1″ × 7″
3″ × 9″	2″ × 5″	1″ × 6″
2½″ × 9″	1½″ × 7″	1″ × 5″

There are other sizes of sawn wood that are also fairly common, but they come forward in smaller quantities than do the sizes we have enumerated above, and, as a consequence, they are somewhat more difficult to meet with, although, as we shall presently point out, they are, because less frequently called for, sold at a cheaper rate. We do not, however, on this account advise architects to specify their use, because should special lengths be required the builder may have great difficulty in meeting with the lengths. What may be termed as the second category of sawn wood consists of the following sizes: —

4″ × 8″	2½″ × 5½″	1½ and 1½″ × 5½″
4″ × 7″	2½″ × 5″	1½″ × 4½″
3″ × 12″ and up.	2″ × 8″	1½″ × 4″
3″ × 10″	2″ × 6½″	1″ × 11″
3″ × 8″	2″ × 5½″	1″ × 9″
2½″ × 9″	2″ × 4½″	1″ × 8″
2½″ × 8″	2″ × 4″	1″ × 6½″
2½″ × 6½″	1½ and 1½″ × 9″ and up.	1″ × 5½″
2½″ × 6″	1½ and 1½″ × 8″	1″ × 4½″
	1½ and 1¼″ × 6½″	

Further than the above there are what in the timber trade are termed "off sizes," that architects need not, however, take cognizance of, insomuch as they come forward only in very small quantities.

We are convinced that true economy will be attained by specifying the standard sizes that are enumerated in the first list, because by specifying those sizes, builders will have the opportunity offered to them of the cheapness which is always to be found in the competition that a large stock to select from affords.

The question of economy as to building woods involves many considerations.

It has often, as a case in point, been discussed whether broad or narrow flooring-boards are the most economical at their respective prices. 1″ x 7″ may be taken to be one of the standard sizes of flooring-boards. As 7″ is a well-known width, there is a great demand for it, and in consequence it is the most expensive width, although a narrower board costs more preparing per square or per standard. The usual difference in price between a 1″ x 7″, and say, a 1″ x 5″ flooring-board, ranges from 20*s.* to 25*s.* per standard, or 1*s.* to 1*s.* 3*d.* per square. Against this, the saving in the first cost of a 5″ board, however, comes in, and the way losses, which do much towards lessening, if, indeed, they do not fully reduce, the first apparent difference of cost. There is a loss of wood of from ½″ to ⅝″ upon each 7″ board laid down to make a floor, and of course, there is precisely the same loss incurred in each 5″ board. Thus, reckoning the loss at the lowest estimate of half an inch, there is a loss of a tenth incurred in using a 5″ board as against a loss of only a fourteenth in using a 7″ board. As a matter of fact, the English planing-mills nearly always take off at least five-eighths of an inch when tonguing and grooving flooring-boards. In planing American-spruce boards, which are rarely parallel, this may be a necessity; but it is not a necessity as a rule, and, as a piece of advice to builders, we would suggest that, when ordering their flooring-boards, they demand that not more than half an inch of wood shall be wasted in the tonguing and grooving, which, indeed, should be abundantly sufficient. The loss of wood, however, incurred in using narrow in place of broader boards is not the only expense necessitated: it takes just the same number of nails to fasten down a 5″ board as are required to fasten down a 7″ inch board, and so the cost of the extra nails required for the 5″ boards represents an additional cost in that particular, and seven required for the broader, as against five only wanted for the narrower size. Then, of course, the labor of driving home the nails must be divided in the same proportion.

Doubtless, a 5″ board is somewhat lighter to handle than a 7″ board; but practical men tell us that it takes really the same length of time to lay a 5″ as it does a 7″ board. Whether this is exactly the fact may be doubted; but, at any rate, the difference does not appear to be appreciable. It is quite certain, however, that a floor made of 7″ boards can be laid down in much less time than can one made of 5″ boards. Thus to rank as against the saving in the reckoned price of 20*s.* to 25*s.* per standard, or 1*s.* to 1*s.* 3*d.* per square, in the using of 5″ boards, there is, first, the loss of wasted wood, by the increased number of joints; secondly, the cost of the extra nails, necessitated by the increased number of boards required to cover the same space; thirdly, the extra labor necessitated by the handling of the greater number of boards, and the driving home of more nails. Further than this there is the finishing off of a larger number of joints. On the whole, it may be taken that the saving of 20*s.* to 25*s.* per standard, or 1*s.* to 1*s.* 3*d.* per square, does not cover the loss, and also pay for the extra labor which the narrow boards necessitate. It would seem that a margin in price of something like 40*s.* per standard, or 2*s.* per square, would be required for the purpose. Of course, the narrow board supplies a better floor, but we have been considering the question of cheapness only, which is often the main consideration.

Four-inch deals are more costly than are 3″ deals, because there are fewer of them to be got. It will be readily enough understood that it requires larger and better trees to cut 4″ deals from than are

required for the making of 3″ deals, and thus the larger deals are less plentiful. Descending the scale, we find by the same rule that 3″ x 11″, and 3″ x 9″ deals are more costly than are 3″ x 7″, and 2½″ x 7″ battens.

The difference in value between deals and battens of carpentry-quality ranges usually from 15*s.* to 20*s.* per standard, or from 10 per cent to 15 per cent. The term "deals" is applied to any sawn wood that is 3″ or 4″ in thickness and more than 7″ in width. The term "battens" is applied to any sawn wood that is 2½″ and not more than 3″ in thickness, and that is 7″ and under in width.

Sawn wood that is less in thickness than 2½″ is termed "board." Small stuff of square or nearly square sizes is termed "scantlings." "Timber" is a term applied *only* to logs.

It is worth while for architects to give their passing attention to these remarks, as the terms "timber," "deals," "battens," "boards," and "scantlings" are frequently more or less misapplied by them.

A correctness of definition on the part of architects when specifying the materials they require to be used is likely to give to the builder confidence in their ability and general knowledge, and so they will be likely to take fewer liberties with them.

Insomuch, as we have pointed out that battens range in price from 10 per cent to 15 per cent less than deals, it is obvious that economy is insured by architects specifying their spars and other "scantling" sizes to be of such dimensions as can be symmetrically cut out of battens, instead of, as they are usually specified, such sizes as can only be got out of deals.

A saving of 10 to 15 per cent in any one item is no little matter.

Economy in building, it will be admitted, is to be made up only by the savings extracted out of a number of items. It is not possible to largely reduce the cost of any particular material without too injuriously affecting its worth. Intelligent economies, however, may be practised in a thousand-and-one cases, and it is to the minute economies that are to be attained in the intelligently using of wood that these papers hope to usefully direct attention.

Allied with this desire is the wish to convey to architects a better knowledge of the building woods of commerce generally. With the ever-varying conditions of the wood markets, architects have little or nothing to do. They have, indeed, not sufficient time to bestow in that direction. It is to be expected of them, however, that they shall make themselves acquainted with some of the every-day terms of the trade, so that when using those terms as definitions they shall employ them in their proper and understood sense. — *The Builder.*

HOW TO PREVENT THE PASSAGE OF SOUND THROUGH FLOORS AND WALLS.[1]

In these days of the telephone and microphone sounds are transmitted to enormous distances, or the slightest sound is magnified so that it is clearly audible. But among these wonders which are every day being made more perfect and astounding, we learn nothing as to the *non*-transmission of sound. If we seek for any means of preventing sounds from passing through our party-walls which divide our houses, we are positively without any reliable knowledge whatever; yet anyone living in London, or in any other densely-populated district, cannot fail of being struck with the great importance of the subject. Among all the thousands of houses which are yearly erected in our large towns, how many are there where any precautions whatever are taken to prevent sound from passing through floors and walls? This, then, appears to me to be a very desirable practical question to be discussed among our "Friends in Council," and it is to be hoped that it may be a means of eliciting valuable information, and suggesting some efficient remedies.

We go on listening to our neighbors poking their fires, which is actually heard louder in the next house than it is in the very room where the poker is used; we are almost driven out of our senses by pianos being strummed in the houses on both sides of us; and we have to put up, as best we can, with all the various noises which are made over our heads in the floor above. Nor are houses any better on the Continent, for the noise of "frotting" the floors in the flat over our heads, in Paris, is something awful, especially if it happens early in the morning, as it frequently does, and we are awoke out of our sleep by it.

What, then, are the known remedies for this state of things? Pugging the floors? If we search in "Gwilt's Encyclopædia of Architecture," where we might naturally expect to find some reliable information upon the subject, we are informed that "*pugging* is plaster laid upon boards, fitted in between the joists of a floor, to *prevent the passage of sound* between two stories, and is executed in coarse stuff." Many architects, trusting to this apparently simple cure, have done what I did. I was requested (now a number of years ago) by a client, in building a house for him, to take care that the sounds made in the bedroom above should not be heard by his guests when sitting quietly sipping their wine in the dining-room below. I was desired by my client himself to build everything in the most *solid* and substantial manner, so as to prevent the passage of all sound. I assured him, innocently enough, that I would take care to do so, and would have all the floors properly pugged, which was then supposed to be an effectual remedy. He further told me a tale of a builder, a former acquaintance of his, who, in building a house for himself, had built it so well and so solid that a pistol fired off in one apartment could not be heard in the next. He was not sure that this desirable state of things had been attained, but he did not doubt but that it had, and it showed the necessity of doing the work in the most *solid* manner. Consequently the floors were carefully and solidly pugged, but, to my astonishment, sounds made in the rooms above were heard distressingly plain in those below. I then ascertained, by actual experiment, that "pugging," instead of "preventing the passage of sound," was, on the contrary, a very powerful conductor, and that with floors not pugged the sounds heard through them were much more subdued than where "pugging" was used.

Now this word "solid" is simply a deception; for it is a fact that the more solid a building is made, the more sonorous it becomes, and the more sounds are conducted through walls and floors from one apartment or house to another. A fire-proof house, which is built with concrete floors or brick arches, rings like a bell, and sound made in one part is clearly heard throughout. For instance, if an entrance-hall has a fire-proof ceiling, a person situated in an apartment above it will distinctly hear the footstep of any one approaching up the steps to the front door. Sound is increased and conducted by the connection and contact of hard materials, as in the ordinary musical tuning-fork. If we strike it and hold it in the fingers, the sound is scarcely heard, but if we rest the end of it upon the table the note is brought out strong and clear.

A complaint was made respecting the fire-proof houses in Belgravia, when they were first built by the late Mr. Thomas Cubitt, that the sounds passed through the floors to such an extent that they were almost uninhabitable, but that a plan had been adopted which had cured them. I therefore made inquiries as to this remedy, and I found that a layer of cockle-shells had been put in under the floors. My informant, however, assured me that they never had been cured, although the cockle-shells probably did some good; but this having been done, the inhabitants became more reconciled and put up with the evil.

Some years ago I had a case of forming apartments for an invalid lady over some servants' offices, and I was requested to adopt every means in my power to prevent the sounds from below disturbing the invalid above. From the various and numerous experiments which I made at the time, I arrived at these results: —

That all solid hard materials, such as glass, iron, brick and stone, facilitated the passage of sound through them; that hard, well-burnt bricks conducted sound better than half-burnt place bricks; that woodwork not only carried sound, but also reflected it and made it sonorous; and that all soft, loose materials were the best non-conductors of sound; hence wool, hair, saw-dust, cork cuttings, and other similar substances were the best non-conductors which could be found; that it was a great mistake to imagine that solid materials would make any construction sound-proof, and that a six-inch layer of wool would stop the passage of more sound than an eighteen-inch brick wall. Wool is the best for the purpose, but it is impossible to use animal wool without its being a means of breeding all kinds of vermin, and probably causing such a disagreeable smell as to render the rooms highly unpleasant.

In the case mentioned above, I commenced by forming the floor double; the ceiling below, which was formed with thick kamptulicon instead of plaster, was two feet below the floor, and the joists were kept quite distinct and unconnected with those above. Upon the ceiling joists a rough floor was laid, and upon this a layer of well-broken crockery, one foot deep, was placed. Upon the joists above were nailed strips of thick felt, before laying the floor-boards; and finally, a layer of thick kamptulicon below the carpet. But after all the care and trouble, the result was only partially successful. The broken crockery was used as the nearest approach that could easily be obtained to cockle-shells. The house being in the neighborhood of the Potteries, broken crockery could be had for the mere trouble of carting it away. The principle upon which the cockle-shells were supposed to act was the formation of a vast number of air-cells, by which the passage of the sound would be retarded. But it is a question whether the connection between the shells, from their being deposited upon one another, would not counteract any benefit from the air-cells, and be the means of readily conducting the sound; and if it would do so in the shells, it would equally do so in the broken crockery.

Hair-felt, no doubt, is a good non-conductor, but it would be an expensive one, as several thicknesses of the thickest felt made would be necessary to form anything like a perfect non-conductor. Mineral or slag wool, however, is a much better material for the purpose, and is much less costly. Mr. George Martin Huss, speaking of house construction in the *Century Magazine* for March last, says, respecting floors, that they "ought to be 'deafened' with 'mineral wool,' which, from its antiseptic and non-inflammable qualities, is a most valuable, and at the same time an inexpensive adjunct to good building. Mineral wool is prepared by passing superheated steam through ordinary iron slag, the resulting product being a

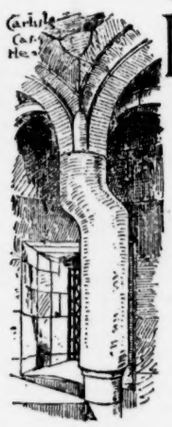
[1] By James K. Colling, in "Friends in Council," in the *British Architect.*

white, almost weightless, woolly substance, which is death to insects or vermin that enter it." This he recommends as a fire-stop and a non-conductor of sound, to be laid on boards in the same manner as "pugging," about one inch in thickness. Instead of one inch, however, it would be necessary for it to be laid not less than six inches in thickness. It cannot reasonably be expected that a layer so thin as one inch can possibly stop much sound.

If, therefore, floors were made double, the ceiling-joists being wholly disconnected from the floor-joists above, and six inches of mineral or slag wool laid upon the upper side of the ceiling and embedding the ceiling-joists (the boarding is better omitted), the result would be a pretty tolerably sound-proof floor. I would still use the strips of felt nailed upon the upper edge of the floor joists, to disconnect them from the floor-boards. It is very important that the ceiling-timbers should be kept quite separate from the timbers of the floor, for any connection between the two acts in the same manner as the sound-post in a violin, and makes the whole construction sonorous.

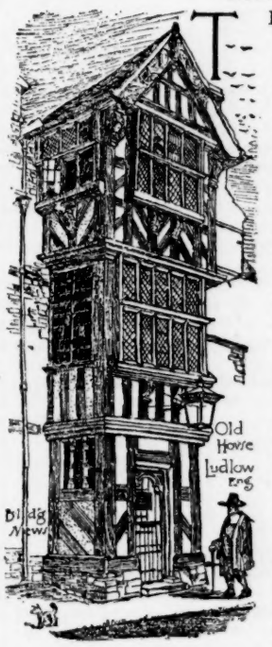
Party-walls between houses, to make them more impervious to the passage of sound, should be built hollow and of a greater thickness than they are ordinarily built. What would be still better, however, would be to build two distinct walls a few inches apart. But party-walls are more difficult to know how to treat than floors, as the additional space and necessary extra cost for double walls would not be likely to be adopted unless insisted upon by Government, and made imperative by a building act. In populous districts the extra space required would be a great objection. The thickness for double walls could not be less than twenty or twenty-one inches, as two nine-inch walls would be necessary; but in the suburbs, where the semi-detached house is of such frequent occurrence, the double walls might be adopted with great advantage, instead of the plan of detaching every other house. The houses would then necessarily be in rows, but the effect of detachment from noise would be more perfect than in the semi-detached house; for, although in a semi-detached house you are relieved from the noise made on one side, you are closely buckled to your neighbor on the other.

CONCRETE FLOORING.



IT would be very desirable if manufacturers of cement and concrete were to supply the profession with the results of experiments on the strength of concrete slabs. There are, it is true, a few published statements respecting the strength of concrete, which are sufficient to show the value of the material for floors and bearing surfaces, but they lack the authority that would be given if a few well-instituted tests were made and published. It is with regard to tensile strength that the profession would like to be informed more particularly, since the use of concrete for floors, stair-cases and landings is increasing. Some experiments by Mr. Reid, made to determine the tensile value of "rock concrete" pipes showed an average in several series of tests of 443.6 lb. per square inch. The highest strength recorded was 700 lbs. per square inch, and the lowest 213 lbs. These experiments were made upon briquettes cut out of concrete pipes that had been rejected; and they are sufficient to show what resistance may be expected from concrete beams and slabs of the material. Mr. Hyatt's experiments in the same direction may be mentioned as showing the great strength obtained in embedding iron, in the forms of ties, in concrete. The results of some experiments by Mr. Kirkaldy to ascertain the resistance to a gradually increased bending stress of concrete beams constructed with a flat bar embedded near the bottom, are very satisfactory. They at least proved that the compressive resistance of Portland cement-concrete was in excess of the demands of the tie-metal introduced, and that by the union of tie-metal with concrete, results equal to riveted or rolled beams are obtainable; but the architect is fully cognizant of the value of combining these two materials, and for floors requiring great strength, such a composite system is excellent. The question, however, is not so clearly answered how a slab of simple concrete of a certain superficial area and thickness will stand a given load. What is the weight it will bear as a dead weight and as a live load without fracture? A few tests upon concrete slabs supported on two edges would not be sufficiently reliable; the experiments ought to be numerous, different kinds of cement and aggregate should be experimented on, and vibration taken into the account. The resistance offered by concrete tubes has been found to be very great, the mean of several cracking tests upon pipes packed in clay, as in the case of a sewer-pipe, being 4.393 lbs. A more valuable case to the architect is mentioned in Mr. Reid's treatise on concrete. A slab of "granitic breccia," stone made by Mr. Buckwell many years ago, was cut to a size of 3 feet, by 2 feet 4 inches; its thickness was 3 inches. It was supported on two timbers with 3-inch bearings. "Upon it was placed a weight of 3 tons, 5 cwt. 3 qrs. 17 lbs., which it sustained for about 5 hours, when it broke with a fracture about midway through its length. This was equal to 1,054 lbs. per square foot." The composition of this concrete was Anston stone, of large and irregular size, with a heavy dark Porland cement. Strength is insured by weight and fineness of grinding, and these essentials ought to be required for concrete construction. It may be useful to know that arches of 10 feet span, with a rise of 10 inches only, and 5 inches thickness of crown, have sustained working loads of 2 cwt. per square foot. As we have said, however, greater research and more experiments are demanded before architects can safely introduce concrete floors without iron, and of any considerable area. They now use concrete in landings and stair-cases, and for these purposes it has answered all expectations. The intimate admixture of the cement and the aggregate, and the use of materials of the very best kind, are required in all works in which the concrete is made by the contractor. The usual breaking strain specified is from 350 to 450 lbs. per inch, and these high standards can be met by mixing and hard burning. We are glad to find a committee has been appointed by the American Society of Civil Engineers for the purpose of devising a uniform system of tests for cements, the principal difficulty experienced being that the experiments should be conducted with sand of the characteristics found in different localities.—*Building News.*

THE FATE OF THE CENTENNIAL EXHIBITION BUILDINGS.



THE Main Centennial Building now in course of demolition in Fairmount Park, Philadelphia, is the last to be removed of the many buildings erected solely for the great Exhibition. Like its less pretentious companions, it was sold for a mere trifle of its original cost, and will in the future serve the purposes of trade. The Main Building cost $1,726,456.71, and at the close of the Exhibition sold for $250,000. The purchaser was John S. Morton, on behalf of the Permanent Exhibition Company, which, in turn, sold the structure last summer to B. C. Mitchell for $97,000. Mr. Mitchell is reported to have doubled his money in selling the materials of which the building was constructed. The iron-work was bought by McIntosh, Hemphill & Co., iron-workers of Pittsburgh, and already the eastern section of the mammoth structure is in the Smoky City. It will be used for the superstructure of iron mills and stations along the Pennsylvania Railroad, a portion being reserved for building purposes where it can be used advantageously. The glass, tin-roof, wood-work, and in fact, everything that entered into the construction of the building have been sold. Machinery Hall, which next approached the Main Building in size, cost, $736,424.61, and was sold to W. C. Allison, the West Philadelphia car manufacturer, for $24,000. The building was cut into sections, one portion entering the car-works, another furnishing the roof for the market-house on Chestnut St., below Thirty-second, (which, however, has never been used for that purpose), while a third section was used in rebuilding the Atlantic Oil Refinery, after the great fire at Point Breeze.

Agricultural Hall cost $264,045, and was purchased by Richard Dobbins for $13,000. It still administers to the amusement of Philadelphians, its new name being Industrial Art Hall, and its new location being on Broad Street, above Vine. Another section of the building was used in the market-house at the corner of Broad Street and Columbia Avenue. Mr. Dobbins also bought the Shoe and Leather Annex for $3,000, and what portions of it could not be used in decorating the Industrial Art Hall, were removed to Long Branch and converted into pavilions and bath-houses. Memorial Hall, which cost the city $500,000 and the State $1,000,000, and Horticultural Hall, on which $263,573.39 was expended, were designed for permanent structures. The cost of the Women's Pavilion was guarded with jealousy by the Board of Control, and was never trusted to masculine ears. However, it sold for a mere song, $1,325 being all that was paid for it by H. H. Yard, who removed it to the seashore, near Atlantic City, where it was transformed into a hotel. The decorations in Judges' Hall were transferred to the Main Building when the Permanent Exhibition was opened, but the greater portion of the structure was taken to Morton Station, on the Philadelphia and West Chester Railroad. It was purchased by John S. Morton for $1,500. The United States Government expended $578,500 upon its building, and received $6.500 for it. The Department of Public Comfort, upon which $22,500 was expended, realized $1,000. It was removed to Sea Girt, N. J., by James Hunter, and transformed into cottages.

The Pennsylvania Salt Manufacturing Company re-erected the Wagon Annex at Greenwich Point, paying for it $850. The Centen-

nial National Bank building still stands in West Philadelphia in the shape of small buildings, having been sold to H. Crouse for $600. The New Jersey State building is now doing service at Haddonfield, N. J., while the structure occupied by the Centennial Board of Finance shelters Philadelphians visiting Atlantic City. $1,000 was realized upon the Mineral Annex, it being removed to Cape May by its purchaser, William King, and made into bath-houses and cottages. The Chilian building was utilized by the Pennsylvania Railroad Company as a freight building.

The Music Pavilion was purchased for $100 by John Walsh, who donated it for public purposes. Others of the buildings are now used for hotel purposes at Coney Island, Cape May, Asbury Park, Ocean Grove and other resorts. Some were used for private summer cottages, and two are yet standing in Germantown. Those erected by the various State governments, foreign nations or societies were sold upon private terms, which were not made public, and in many instances neither their owners nor present locations are known. Most of the buildings used for business purposes by the holders of privileges were removed by the owners, but in some cases they were abandoned and left to be demolished by the wreckers. The buildings have become nearly as widely scattered as the goods they once contained. — *The Metal-Worker.*

SLAG-BRICK.

Boston, May, 1882.

To the Editors of the American Architect: —

Dear Sirs, — Having read in "*The American Architect*" of last week's impression (May 20) a short notice of a paper read before the Society of Arts by Mr. Charles Wood, in May, 1880, upon the subject of "The Utilization of Blast-Furnace Slag," I cannot but think that the subject must be one of vast importance to the proprietors of large iron works in this country. The writer, about six years ago, was engaged in the interest of the Selenitic Cement Company of London in experimenting with iron slag for brick-making and concrete at the works of the Cleveland Slag-Working Company in Middlesboro'-on-Tees, Yorkshire.

Mr. Charles Wood, the gentleman already mentioned, was then engineer and manager of a large iron works, and interested in the management of the brick company; he was also the inventor of the different methods of treating iron slag by which it is reduced to a sand.

Several different limes and cements were tried, but none succeeded so well as the Patent Selenitic Cement, which was being largely used for building purposes all over England, consequently this cement was adopted from that time up to the present with every success. Vast quantities of slag bricks are made every year, and largely used in London. They are a very superior brick, having immense strength, and have stood a crushing test of 33 tons to the square foot when three months old, and 81 tons per square foot at two years.

Selenitic cement is now manufactured in this country, and is being largely employed about Washington and Baltimore. The proportions adopted by the Cleveland Slag-Working Company were three parts slag sand, one part selenitic cement, mixed in a semi-dry state, and made in a pressed-brick machine, such as is supplied by the New England Press Brick Manufacturing Company.

I most certainly can testify to the adaptability of iron slag for brick-making or for concrete. I enclose a circular of the Slag-Working Company, which you can make use of as you like. The insertion of this letter may be interesting to some of your readers.

Yours very truly, Robert Jackson.

BOWLING ALLEYS.

Boston, May 23, 1882.

To the Editors of the American Architect: —

Dear Sirs, — Can you inform me through the columns of your paper (*American Architect*) where I can get some information in regard to the construction of bowling alleys, also racquet buildings?

Yours truly, A Subscriber.

[There is nothing of the kind in print that we know of, but some hints can be gathered from various sources, as, for instance, from the plan and section of the bowling alley at the Harvard College Gymnasium, published a year or so ago in this journal.

"Subscriber's" best way would be to inspect the best rooms of the kind within his reach, and form his own conclusions. — Eds. American Architect.]

BALLOON ENGINES.

Washington, May 26, 1882.

To the Editors of the American Architect: —

Dear Sirs, — In an article on the progress of ballooning, in the 4th February issue of your journal, you mention a remarkably light steam-engine of thirty horse-power, weighing complete with boiler only 309 lbs. Would you kindly state the source of your information in regard to the engine, that I may learn more about it, and oblige? Yours, etc. Max Hansmann.

[The article was suggested by a paragraph in *Le Génie Civil*, if we recollect rightly, which again referred to an English periodical. The name of the maker of the engine was given, we think, but no further details. If that would be of any service to our correspondent, we will try to look it up. — Eds. American Architect.]

A BADLY-TREATED ARCHITECT.

May 25, 1882.

To the Editors of the American Architect: —

Dear Sirs, — A case of this kind has been brought to my notice: An architect was engaged by certain officers of a company to make plans and designs, specifications, etc., for certain of their buildings, no price stipulated. He makes preliminary sketches — two or three different designs — by request, and sends them to be acted upon (as to choice of design) at a meeting of said company. It is to be understood in meantime the plans have met hearty approval of officers who ordered them. He awaits the result of the meeting, expecting daily to be called upon to complete the papers ready to receive bids, when he sees the work advertised for proposals, said company having employed engineering draughtsmen to complete, or to revise the work. What should said architect do about it? Yours truly, S.

[If the architect is sure that he can prove his employment to make "plans, specifications, etc.," and has already partially fulfilled his agreement, and stands ready to complete it, we think that his clients would be held to have no right to refuse to perform their part, or to prevent him from performing his, and that he can collect at law his full compensation for the services which he agreed to render, whether his clients choose to abandon the contract or not. If no price were stipulated for his services, the customary commission would be implied. Whether he could collect damages in addition for injury to his reputation by such treatment would depend upon circumstances. If he could show that he had actually suffered loss on this account, he could certainly recover compensation, and indemnity for his costs, witness fees, and other expenses of collection would be added to the rest. A case almost exactly similar is now pending in Massachusetts, and we shall be glad to put the parties to both in communication with each other if they wish. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Submarine Telephony. — In raising the vessel *La Provence*, which sank in the Bosphorus, the telephone was added to the diver's dress, thus greatly facilitating the communications. One of the glasses of the helmet is replaced by a copper plate, in which a telephone is inserted, so that the diver has only to turn his head slightly in order to receive his instructions, and report what he sees. Besides, in case of danger or accident, lives may now be saved which would otherwise have been sacrificed.

Big Roof Truss. — The big trusses of the steel-mill roof at Indianapolis are 120 feet long — the largest span in the State — with a pitch of 20 feet or near it, and as the huge triangle slowly mounts to its place it gives to an intelligent observer a good idea of engineering forces employed in modern work. Each of the three sides of the triangle is formed of five heavy timbers, breaking joints and studded with the heads of bolts compacting them as solidly as if they were a single stick, and far more strongly. They are strong enough to make sills for a railroad bridge. — *Engineering News.*

Lincoln Memorials at Chicago. — The three commissioners appointed by the will of the late Eli Bates to disburse his bequest of $55,000 for a monument to Abraham Lincoln and a fountain in Lincoln Park, Chicago, have set aside $40,000 for the monument and $15,000 for the fountain. They have solicited from prominent sculptors here and abroad designs which must be submitted by August 1. A final settlement of the estate has not yet been reached, but doubtless will be before the money is wanted.

Hindu Plan of Purifying Rooms. — Dr. Fred. J. Mouatt, formerly Professor of Medicine in the Medical College at Calcutta, says in a recent lecture: The Hindus of every part of India with which I am acquainted have from time immemorial possessed a means of purifying the atmosphere of their rooms and huts, by spreading a light coating of a mixture of earth, containing organic matters, on their walls and floors. The process is called "leoping," and is usually performed by the women of the household. With a view to submit this proceeding to a practical test, I had four cells in the Presidency jail of Calcutta, each containing 480 cubic feet of air, and practically unventilated, carefully prepared. Two of them were lime-washed throughout, and the two others "leoped." I had four healthy prisoners locked up in them at night, one in each cell. On opening the cells next morning, the two which were lime-washed were stuffy and offensive, redolent of the peculiar animal odor exhaled by native prisoners in such circumstances. The two others were as fresh and as pure as if no one had slept in them. — *Medical and Surgical Reporter.*

An Important Insurance Decision. — It appears from the account of the New York *Times* that the house of Mrs. Hepsabeth C. Shaw, of that city, having been damaged by fire, the New York Equitable Insurance Company, which insured it, chose to rebuild and restore it to its previous good condition rather than pay outright in money the losses caused by the fire. After the building had been repaired and handed over to Mrs. Shaw she objected to it as not being as good as it had been. The insurance company refused to do more than it had done, so she sued it for damages. In her complaint she asserted that green timbers had been put into the house, and that, generally, in construction and ornamentation it was inferior to the building as it stood before the fire occurred. She also claimed damages because the work of rebuilding had been unreasonably delayed. The trial of the case occupied three weeks before Judge Van Vorst and a jury, in the Supreme Court, Circuit. In the course of the trial Judge Van Vorst ruled that the insurance company was bound, after it had chosen to rebuild, to make the new house as good in every way as the old one, although not to make it necessarily a fac-simile of the old one, and that it could not limit the cost of repairs to the amount of the insurance, but must expend whatever sum was necessary to make the building perfect. The jury gave Mrs. Shaw a verdict for $1,021 damages.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

258,211. SAFETY-ELEVATOR FOR HATCHWAYS.—John B. Atwater, Chicago, Ill.

258,225. CALIPERS.—Henry Foerster, Newark, N. J.

258,231. ILLUMINATING-TILE.—Joshua K. Ingalls, New York, N. Y.

258,247. FIRE-ESCAPE.—Peter A. Nicholson, Philadelphia, Pa.

258,282. VENTILATOR FOR WINDOWS.—Hugh H. Craig, Baltimore, Md.

258,293. BOTTLE-BREAKING FIRE-EXTINGUISHER.—Almon M. Granger, Boston, Mass.

258,329. SCREW-DRIVER.—Cal Thomas, Terre-Haute, Ind.

258,344. SHUTTER-FASTENER.—Charles Altemiller, New York, N. Y.

258,374. STEAM-RADIATOR.—John Chapman and Robert Brass, Brooklyn, N. Y.

258,390. REAMER.—George W. Dudley, Waynesborough, Va.

258,391. ELBOW-FITTING FOR DRAINAGE-PIPES.—Caleb W. Durham, Chicago, Ill.

258,402. MANUFACTURING GLASS FOR USE IN ILLUMINATED WINDOWS.—Alphonse Friedrick, Brooklyn, N. Y.

258,403. CRANE.—Mark Frisbie, Orland, Ind.

258,406. WALL-PAPER-HANGING DEVICE.—William Geist, Pittsburgh, Pa.

258,431. LATCH.—Joseph Kaye, Kirkstall, England.

258,433. WATER-CLOSET.—David Smith Keith, Toronto, Ontario, Canada.

258,441. FIRE-ESCAPE.—John R. Koons, Shickshinny, Pa.

258,453. EAVES-TROUGH HANGER.—Richmond E. Mallory, West Salem, O.

258,458. BURGLAR-ALARM.—Peter Moran, Philadelphia, Pa.

258,468. CHIMNEY-CAP.—William H. Payne, Camden, N. J.

258,486. COMBINED WEATHER-STRIP AND DOOR-SILL.—Joseph Singer, Wayne, Ind.

258,510. SPRING-HINGE.—Cornelius S. Van Wagoner, Brooklyn, N. Y.

258,539. THEATRE-STAGE.—Charles A. Needham, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report 23 permits have been granted, of which the following are the more important: —

Moses Fox, three-st'y brick building, mansard roof, s w cor. Bond and Baltimore Sts.

Josephine Lideman, three-st'y brick building, No. 310 Aliceanna St., bet. Washington and Wolf Sts.

W. A. Hanway, 5 three-st'y brick buildings, commencing at n w cor. Druid Hill Ave. and Roberts St.

White & Meyers, two-st'y brick building, Rice Alley, bet. Calhoun and Stricker Sts.

Jas. D. Smith, one-st'y brick office, in rear of No. 190 George St., bet. Fremont and Brune Sts.

Dr. E. T. Henkle, 3 three-st'y brick buildings, Edmondson Ave., e of Arlington Ave.

D. F. Haynes & Co., one-st'y brick building, 36′ x 36′, s w cor. Nicholson and Decatur Sts.

Union Passenger Railway Co., two-st'y brick stable, Pratt St., bet. Smallwood and Ackworth Sts.

A. Frankenstine, 2 two-st'y brick buildings, McHenry St., e of Payson St.

Herman H. Vordenberge, two-st'y brick stable, in rear of No. 276 Howard St., bet. Hamburg and Cross Sts.

Maryland Pavement Co., frame structure, 50′ x 125′, for the manufacture of asphalt blocks, Fulton Station, Baltimore; cost, abt. $15,000; Mr. George Archer, Architect; Mr. John Waters, contractor.

Boston.

BUILDING PERMITS.—*Brick.—Pearl Pl., Nos.* 25-31, cor. Hartford St., Ward 12, for Horace B. Taylor, mercantile, 40′ and 40′ 6″ x 53′, five-st'y; Vinal & Dodge, builders.

Wood.—Allandale St., rear of, near Centre St., Ward 23, well-house, 15′ 8″ x 15′ 8″, for H. W. Wellington; H. A. Ayers, builders.

Walnut St., junction Neponset Ave., Ward 24, for Harriet B. Harding, dwell., 15′ and 48′ x 50′ and 56′, two-st'y; C. Moody & Co., builders.

West Cottage St., No. 14, rear of, Ward 20, for James L. Taylor, stable, 20′ x 25′; Lanning & Drisco, builders.

Rutherford Ave., rear of, nearly opp. Miller St., Ward 5, for Thomas L. Bishop, stable, 35′ x 80′; John Bell, builder.

Blake St., near Boston St., Ward 15, for John Souther & Co., stable, 18′ x 38′; Isaac Dunn, builder.

Shepard St., rear, near Washington St., Ward 25, for Mary Blaney, stable, 15′ x 35′; Daniel McKenney, builder.

Gurney St., near Tremont St., Ward 22, for Ruth H. Thompson, store and storage, 18′ and 20′ x 40′, two-st'y; E. W. Sanborn, builder.

Central Ave., cor. Orange St., Ward 23, for Adam Schuster, dwell., 19′ and 22′ x 28′, two-st'y; G. F. Bennink, builder.

Walnut Ave., Ward 21, for W. S. Robinson, dwell., 32′ 8″ x 35′ 8″, two-st'y hip; W. S. Robinson, builder.

Unnamed Court, off Warren St., near Dale St., Ward 21, for Reuben Greene, 2 dwells., 22′ and 28′ x 32′, two-st'y; Chas. H. Blodgett, builder.

Linden St., near Fairington Ave., Ward 25, for Wm. J. Tirrill., 2 dwells., 14′ and 20′ x 50′, two-st'y; H. M. Perry, builder.

Curtis St., rear, near Boylston St, Ward 23, for Thomas Navy, dwell., 18′ x 28′, two-st'y; Douglass McDonald, builder.

Unnamed Pl., from Rand St., Ward 20, for Bernard Foley, 2 dwells., 20′ x 30′, two-st'y; H. J. Bartlett, builder.

Brook Ave., Ward 20, for Freeman Smith, 2 dwells., 14′ 6″ and 19′ 6″ x 42′, two-st'y and mansard; John Horsfield, builder.

Devon St., near Warren St., Ward 21, for George W. Elliott, dwell., 25′ 2″ and 26′ 8″ x 47′, two-st'y; L. Henry Stephenson, builder.

Bainbridge St., No. 39, Ward 21, for Susan B. March heirs, dwell., 20′ and 25′ x 39′, two-st'y hip; Thos. J. Tobin, builder.

Marginal St., No. 264, rear of, Ward 21, Simpson's Dry-Dock Co., shipwright building, 25′ x 45′; Wm. C. Chick, builder.

Virginia St., Ward 20, for J. H. Besarick, dwell., 26′ x 35′, two-st'y hip; Charles B. Blodgett, builder.

Neponset Ave., near Boutwell Ave., Ward 24, for Frank O. Nash, dwell., 34′ 8″ x 42′, two-st'y hip; Wm. G. Blazo, builder.

Neponset Ave., near Clay Ave., Ward 24, for Frank O. Nash, dwell., 16′ and 32′ x 16′ and 40′, two-st'y; Wm. G. Blazo, builder.

Brooklyn.

BUILDING PERMITS.—*Forrest St.*, s s, 300′ e Central Ave., 12 two-st'y frame dwells.; cost, each, $1,000; owner, J. G. Jenkins, Broadway, near Belvidere St.; architect, John Brown.

Sixth St., bet. Seventh and Eighth Aves., four-st'y brick hospital; cost, $300,000; owner, Seney Hospital; architect, John Mumford; builder, Cornelius Cameron.

Myrtle Ave., n e cor. Adelphi St., four-st'y brick stores and tenements; cost, abt. $15,000; owner, Thomas D. Carman, cor. Willow and Columbia Sts.; architect and carpenter, George L. Lowden; mason, Thomas B. Rutan.

Greene Ave., n s, 350′ e Bedford Ave., 3 three-st'y brownstone dwells.; cost, each, $7,500; owner and builder, Andrew Miller, 1527 Pacific St.; architect, Amzi Hill.

Lynch St., n s, 80′ w Lee Ave., 5 three-st'y brick dwells.; cost, each, $4,000; owner and builder, Richard Healy; architect, J. D. Reynolds.

Atlantic Ave., No. 1767, n s, 43′ w Hunterfly Road, two-st'y frame dwell.; cost, $2,000; owner, C. Noll, 1771 Atlantic Ave.; builder, J. Polman.

Bedford Ave., s e cor. Jefferson St., 2 four-st'y brownstone stores and flats; cost, $9,000 each; owner and carpenter, S. E. C. Russell, 58 Hancock St.

Fourth Pl., s s, 24′ 6″ e Henry St., three-st'y brick tenement; cost, $3,000; owner and mason, Thomas Keogh, 149½ Nelson St.; carpenter, P. Gilloon.

Greene Ave., n s, 90′ e Bedford St., 3 three-st'y brownstone dwells.; cost, each, $7,000; owner and carpenter, C. H. Smith, 170 Montague St.; mason, E. N. Wood.

Boerum Pl., No. 27, being 160′ s Livingston St., three-st'y brick office-dwell.; cost, $3,000; owner and builder, C. Dietrick, 24 and 25 Boerum St.; architect, G. R. Dietrick.

Stagg St., s s, 525′ w Waterbury St., two-st'y frame dwell.; cost, $2,000; owner, Jos. Dorman, Meserole St.; architect, Geo. Hillenbrand; builder, M. Metzen.

De Kalb Ave., s e cor. Evergreen Ave., one-st'y brick carriage-house and stable; cost, $4,500; owners, Little Sisters of the Poor; architects, Parfitt Bros.; builders, S. Rippingale, Jr., and C. H. Doolittle.

Myrtle St., Nos. 61, 63 *and* 65, n s, abt. 150′ e Myrtle Ave., three and four st'y club-house; cost, $12,000; owner, Brooklyn Labor Association, 69 Myrtle St.; architect, H. H. Fabian; builder, E. Loerch.

South Eighth St., s s, 75′ w Second Ave., four-st'y brick dwell.; cost, $12,000; owner, Joseph Applegate; architect, E. F. Gaylor; builder, S. J. Burrows.

Cranberry St., s s, 150′ w Hicks St., two-st'y brick stable; cost, $4,000; owner, J. P. Robinson; architect, H. Turner; builder, C. J. Heavy.

ALTERATIONS.—*Clark St.*, n w cor. Henry St., repair damage by fire; cost, $5,000; owner, Jacob Campbell, on premises; architect, J. B. Snook; builder, Henry Wallace.

Navy St., No. 153, two-st'y brick extension; cost, $2,000; owner, F. Goldsmith, on premises; builder, W. J. Kerrigan.

Hanson Pl., s w cor. Portland Ave. add one st'y, also four-st'y brick extension; cost, $5,500; owner, Dr. Freeman, on premises; architect and builder, J. N. Smith.

Chicago.

BRICK-MAKERS' STRIKE.—It is fully expected that this week will see the end of the controversy between the brick manufacturers and the employes, when many plans now held in abeyance will be pushed forward.

BUILDING PERMITS.—A. M. Billings, Gas Works, irregular building, containing 636,968 cubic feet, cor. Division St. and Elston Ave.; cost, $600,000.

E. N. Blake, two-st'y barn, 28′ x 36′ Ashland Ave. and Van Buren St.; cost, $2,500.

Mrs. Sophia Metzgar, two-st'y store and dwell., 21′ x 40′, 204 Blue Island Ave.; cost, $5,000.

W. P. Smith, two-st'y stores, flats and stable, 60′ x 140′, Cottage Grove and Thirty-second St.; cost, $16,000.

F. A. Huntington, three-st'y stores and flats, 60′ x 138′; Wabash Ave. and Sixteenth St.; cost, $40,000.

Isaac Wolf, three-st'y store and dwell., 25′ x 75′, 2940 South State St; cost, $9,000.

C. M. Fitch, three-st'y dwell., 28′ x 43′, 645 Monroe St.; cost, $5,000.

T. Mikkelsen, one-st'y cottage, 22′ x 51′, 609 North Ave.; cost, $2,600.

W. A. Walter, two-st'y and cellar dwell., 25′ x 60′, Prairie Ave. and Thirty-first St.; cost, $4,000.

W. Kreft, two-st'y dwell., 21′ x 62′, 250 Augusta St.; cost, $5,000.

W. Twichell, two-st'y dwell., 18′ x 24′, Western Ave. and Augusta St.; cost, $3,000.

H. Hebard, two-st'y dwell., 22′ x 43′, 643 Monroe St.; cost, $5,000.

Miss K. Oleson, two-st'y dwell., 22′ x 60′, 371 Twenty-fifth St.; cost, $4,000.

Wm. Schaar, two-st'y dwell., 21′ x 56′, Ashland Ave. and Van Horn St.; cost, $3,000.

Chas. Peterson, three-st'y dwell., 26′ x 59′, 20 Evergreen Ave.; cost, $6,500; Mr. C. O. Hansen, architect.

F. Steiner, two st'y dwell., 20′ x 56′, 731 Loomis St.; cost, $3,200.

John Novak, two-st'y store and dwell., 24′ x 56′, 299 West Twentieth St.; cost, $3,700.

John Uhlie, two-st'y dwell., 21′ x 56′, 113 West Eighteenth St.; cost, $3,600.

Mrs. Kelly, 96 Edgar St.; fine, $50.

Michael Costello, 53 Commercial St.; fine, $25.

Kansas City, Mo.

A. F. M. Strogg on Main St., two-st'y brick dwell., 50′ x 50′; cost, $3,000.

W. H. Raymond, Independence Ave., two-st'y brick dwell., 53′ x 75′; cost, $9,000.

Isabella S. Goodman, on East Twelfth St., two-st'y brick dwell., 41′ x 46′; cost, $6,000.

M. V. Doherty, on Walnut St., two-st'y brick dwell., 20′ x 54′; cost, $2,000.

J. Haglebury, at n e cor. of St. Louis Ave. and Mulberry St., two-st'y brick dwell., 40′ x 80′; cost, $5,600.

Nancy Bainbridge, on Summit St., three-st'y brick dwell., 22′ x 55′; cost, $3,500

N. M. Seamans, on Charlotte St., two-st'y brick dwell., 20′ x 35′; cost, $2,500.

Alonzo Haggerty, a two-st'y frame, 14′ x 22′, at 1110 Pacific St.; cost, $2,000.

Mrs. N. M. Lemane, a two-st'y brick dwell., 20′ 8″ x 38′, on Charlotte St.; cost, $2,500.

New York.

BUILDING PERMITS.—*East Fifteenth St., Nos.* 14, 16 *and* 18, 3 six-st'y brick and brownstone stores and lofts; cost, each, $25,000; owner, Mary S. Van Beuren, 21 West Fourteenth St.; architect, F. S. Copley.

Vesey St., No. 41, five-st'y brick store; cost, $18,000; owner, L. J. Callanan, 124 West Eleventh St.; architects, Thom & Wilson.

Avenue A, e s, 78′ s One Hundred and Twenty-Eighth St., 2 three-st'y brownstone dwells.; cost, $8,000; owner, John C. C. Gilsey, Avenue A, bet. One Hundred and Twentieth and One Hundred and Twenty-first Sts.; architect, C. E. Hadden.

West Forty-sixth St., Nos. 433, 435, 437 *and* 439, 4 five-st'y brownstone tenements; cost, each, $17,000; owners, Wm. Rankin and P. Hauseman, 306 West Forty seventh St. and 510 West Fiftieth St.; architect and builder, Wm. Rankin.

First Ave., s w cor. Eighty-eighth St., and a house on rear of lot, 2 five-st'y brick tenements; cost, $15,000 and $17,000; owner, Fred. W. Johnson, 48 Chatham St.; architect, R. Rosenstock.

Hudson St., n w cor. Charlton St., five-st'y brick and Belleville stone stores and tenements; cost, $30,000; owner, Corporation Trinity Church, 5 Church St.; architect, C. C. Haight; builders, Robinson & Wallace and L. H. Williams.

Charlton St., No. 97, five-st'y brick and Belleville stone tenement; cost, $12,000; owner, architect and builders, same as last.

One Hundred and Twenty-sixth St., n e cor. Seventh Ave., three-st'y brownstone dwell.; cost, $17,000; owner, Charles Batchelor, 75 East One Hundred and Twenty-seventh St.; architect, Carter & Ferdon; builder, not selected.

One Hundred and Twenty-sixth St., n s, 16′ 8″ e Seventh Ave., 4 three-st'y brownstone dwells.; cost, each, $15,000; owner, architect and builder, same as last.

One Hundred and Twenty-sixth St., n s, 84′ 8″ e Seventh Ave., three-st'y brownstone dwell; cost, $12,000; owner, etc., same as last.

Bowery, s e cor. Grand St., five-st'y brick stores and warehouses; owner, estate of S. Brush, 31 Nassau St.; architect, Robt. Mook; builders, A. Woodruff's Sons and W. Germond & Co.

West Fifty-eighth St., Nos. 38 *and* 40, three-st'y brick and granite stable and dwell.; cost, abt. $50,000; owner, Wm. Rockfeller, Fifth Ave., n e cor. Fifty-fourth St.; architect, O. J. Berg; builder, Jno. Banta.

Lexington Ave., n w cor. One Hundred and Third St., five-st'y brick apartment-house; cost, $23,000; owner, Thomas Smith, 874 Lexington Ave.; architect, J. C Burne.

First Ave., w s, 57′ 4″ s One Hundred and Seventh St., two st'y brick factory; cost, $10,000; owner, George Chase, 344 East One Hundred and Seventh St.; architect, J. M. Dunn; builders, J. & W. C. Spears and O. T. Mackey.

One Hundred and Twenty-third St., s s, 136′ e First Ave., 8 four-st'y brick tenements; cost, each, $10,000; owner and builder, Joseph Murray, 315 East One Hundred and Sixteenth St.; architect, J. H. Valentine.

One Hundred and Twentieth St., s s, 90′ e Fourth Ave., 6 four-st'y Connecticut brownstone tenements; cost, each, $12,500; owners, Hutchinson & Rooney, 415 East One Hundred and Fifteenth St. and 2242 First Ave.; architects, Cleverdon & Putzel.

ALTERATIONS. *Pike St., Nos.* 13 *and* 15, three-st'y brick extension; cost, $8,000; owner, Congregation Sons of Israel, on premises; architect, John Brandt; builder, not selected.

Madison Ave., No. 850, two-st'y brick extension; cost, abt. $6,000; owner, A. R. Whitney, 850 Madison Ave.; architect, W. H. Hume.

Madison Ave., No. 309, three-st'y brick extension, etc.; cost, $3,000; owner, Agnes P. Brown, 309 Madison Ave.; architect, H. Palmer.

Fourth Ave., Nos. 94 *and* 96, raised one st'y, interior alterations, etc.; cost, $20,000; owner, Grace Church, Broadway, cor. Tenth St.; architect, J. Renwick.

Leonard St., No. 108, two-st'y brick extension; cost, $2,500; owner, Merchant's Club, 108 Leonard St.; architect, J. M. Slade; builders, J. S. Smith and H. Powers.

West One Hundred and Twenty-eighth St., No. 317,

2 three-st'y brownstone dwells.; cost, each, $7,000; owner, architect and builder, Samuel G. Lynch, 275 West One Hundred and Twenty-eighth St.

East Seventh St., No. 138, add two stories to ex. tension, etc.; cost, $2,600; owner, Joseph Kerr, 368 Third Ave.; builder Geo. Mulligan.

Fifth Ave., No. 433, one-st'y brick extension; cost, $3,000; owner, T. R. Butler, on premises; architects, D. & J. Jardine.

East Thirty-second St., No. 43, repair damage by fire; cost, $6,250; owner, W. P. Esterbrook, 150 East Thirtieth St.; builder, Geo. Mulligan.

Bleecker St., No. 202, alter basement for store, iron-work, etc.; cost, $2,000; owner, Joseph Laemmie, 97 West Houston St.; architect, Chas. Sturtzkober.

Sixth Ave., No. 297, front and interior altered; cost, $2,000; owner, Cath. A. Crowe, 316 West Fifty-fifth St; architects, W. H. Beers; builders, A. T. Clarkson and Erskine & Macbeath.

Broadway, Nos. 1141 *and* 1143, one-st'y brick extension, etc.; cost, $2,450; owner, Miss H. M. Drake, 452 Lexington Ave.; lessees, Wilhelm & Graaf; builders, B. Conley & Son and D. C. Westervelt.

Fifth St., Nos. 305 *and* 307, two-st'y brick extension; cost, $3,500; owner and builder, Geo. S. Miller, One Hundred and Twelfth St., bet. Ninth and Twelfth Aves.; architect, Ralph S. Townsend.

Philadelphia.

Houses. — Mr. D. B. Wendle, having purchased the old Fairhill Mansion property, bounded by Sixth, Seventh, York and Cumberland Sts., will erect thereon 128 first-class ten to twelve room houses.

Building Permits. — *Cotton St.*, w s, n of Wood St., three-st'y dwell., 17′ x 50′; Harmer & Gilbert.

North Eleventh St., No. 1539, two-st'y stable, 16′ x 40′; Lewis Walker, owner.

Howard St., n w cor. Germantown Ave., 3 three-st'y additions to buildings, 20′ x 34′; J. G. Hanvi, owner.

Fifth St., e s, n of Butler St., two-st'y store and dwell., 18′ x 26′; W. Tecklenberg, contractor.

Townsend St., n s, between Cesar and Memphis Sts., 3 two-st'y dwells., 13′ x 44′; A. T. Richards, contractor.

East Thompson St., No. 714, 2 two-st'y dwells., 15′ x 28′; Geo. Kessler, contractor.

Walnut St., Nos. 411 *and* 413, six-st'y office-building, 38′ x 80′; Pennock Bros., contractors.

Orianna St., e s, s of Lehigh Ave., 8 two-st'y dwells., 12′ x 28′; J. R. Pyle, contractor.

Preston St., e s, n of Myrtle St., 4 three-st'y dwells., 16′ x 46′; Lewis Smith, contractor.

Front and Wharton Sts., one-st'y shed, 65′ x 276′; Pennsylvania R. R. Co., owners.

Market St., No. 1319, four-st'y store, 24′ x 177′; J. B. Doyle, contractor.

Point Breeze, two-st'y boiler-house, 47′ x 67′; Atlantic Refining Co., owners.

Kensington Ave., w s, n of Huntingdon St., 2 three-st'y stores and dwells., 18′ x 48′; J. Leitz, contractor.

College St., n s, between Twenty-first and Twenty-second Sts., three-st'y building, 52′ x 54′; A. W. Haines, contractor.

Gray's Ferry Road, between Thirty-fifth and Thirty-seventh Sts., two-st'y factory, 45′ x 73′; Geo. W. Graeff, contractor.

Cook St., s s, between Tulip and Memphis Sts., two-st'y stable, 18′ x 34′; Geo. W. Graeff, contractor.

Gray's Ferry Road, between Thirty-fifth and Thirty-seventh Sts., two-st'y factory, 45′ x 73′; Harrison Bros. & Co., owners.

Industrial.

Milford, Mass. — The Hopedale Machine Company are about erecting three new buildings, the floor-space aggregating 40,000 square feet.

Minneapolis, Minn. — The plans for the new Excelsior Flouring Mill show a building of stone, 40′ x 105′, and six stories in height.

Moncton, N. B. — The Record Foundry and Machine Co. are to build a new brick building.

New Britain, Conn. — The Stanley Rule and Level Company are adding to their works a brick building, 33′ x 153′.

Northampton, Mass. — An addition is being built to Belding Brothers silk mill.

Pascoag, R. I. — A. Hopkins & Co. are building an addition, 35′ x 95′.

St. Louis, Mo. — J. F. Voght & Bro. are building a new three-st'y brick factory.

St. Thomas, Ont. — A case warehouse will be built by the Cochrane Manufacturing Co.

Toledo, O. — The Noteman Rotary Engine and Pump Company propose building works in the autumn.

The Gendron Iron Wheel Company is soon to build a new four-st'y factory, 60′ x 100′.

Turner's Falls, Mass. — Extensive additions are about being made in the Montague Paper Company.

Vassalboro, Me. — The Portland Packing Company have decided to build a factory for canning sweet corn.

Waterbury, Conn. — The Farrel Foundry and Machine Company are building an addition, 40′ x 150′.

Watertown, Mass. — The Hall Rubber Company of Boston will build extensive works.

Wooster, O. — The Wooster Stove Company proposes an addition, 40′ x 70′.

York, Pa. — A large factory is being built for the Weaver Manufacturing Company.

Bids and Contracts.

Hamilton, O. — The contract for repairing the City Building has been awarded to J. F. Bender, at $4,-945.

Huntingdon, Pa. — Bids are being received for the State Industrial Reformatory building to be erected now, being Ward "B" and school building; also, the Guard or Central Building; Wilson Bros. & Co., architects, Philadelphia.

Lancaster, Wis. — The contract for building the new county insane asylum has been awarded to Menges & Liefeldt, of Prairie du Chien, for $16,400.

Philadelphia Pa. — At the s w cor. Wayne Ave. and Germ. Branch of P & R. R. R. at Wayne Junction station, Messrs. Thos. P. Cope, Jr., Geo. W. Emlen, Jas. Emlen and Alfred Cope, propose erecting the following manufacturing buildings, viz.: M. B. 54′ 8″ x 167′ 10″, and one building, including dye-house and finishing rooms, 42′ 6″ x 136′ 6″; office buildings, 14′ 8″ x 41′ 10″; engine-house, 15′ 6″ x 42′; boiler-house, 28′ 4″ x 37′ 6″.

Washington, D. C. — Contracts for furnishing marble mantels for the north wing of the State, War and Navy Departments building have been awarded as follows: Charles E. Hall & Co., of Boston, for mantels of Belgian black, Glen's Falls black, Tennessee, Sienna (Italian) and Knoxville marbles; A. Klaber, of New York, for mantels of Formosa (Italian) marble; A. L. Fauchere, of New York, for mantels of blue Turquin (Italian) marble.

Public Buildings.

Congress has appropriated money for government buildings at the following places:—

Louisville, Ky., $500,000; Hannibal, Mo., 75,000; Detroit, Mich., $600,000; Council Bluffs, $100,000; Syracuse, N. Y., $200,000; Poughkeepsie, N. Y., $75,-000; Rochester, N. Y., $20,000; Galveston, Tex., $125,000; Detroit, $600,000; Jackson, Tenn., $50,000; Denver, Col., $300,000; Greensborough, N. C., $50,000; Council Bluffs, Ia., $100,000; Lynchburg, Va., $100,-000; Galveston, Tex., $125,000; Peoria, Ill., $225,000.

PROPOSALS.

HYDRAULIC ELEVATOR.

[At Washington, D. C.]

Office of Building for State, War and Navy Departments, Washington, D. C., June 1, 1882.

Sealed proposals for furnishing and erecting in place complete a Hydraulic ash-lift or elevator in the area of the North Wing of the Building for State, War and Navy Departments, in this city, will be received at this office **until 12 M., June 20, 1882,** and opened immediately thereafter, in presence of bidders.

Specifications, general instructions to bidders, and blank forms of proposal will be furnished to established builders of hydraulic elevators upon application to this office. THOS. LINCOLN CASEY,

337 Lt.-Col. Corps of Engineers.

SCHOOL-HOUSE.

[At Alexandria, Minn.]

Sealed proposals for building a school-house at Alexandria, Douglas County, Minn., will be received by the undersigned **until June 10, 1882.**

An approved bond in the sum of $7,000 must accompany each bid.

Plans and specifications may be seen at the office of L. S. Buffington, Fire and Marine Building, St. Paul, until the 20th day of May; at 411 Nicollet Ave., Minneapolis, until the 30th day of May, after which they will be at my office.

The right is reserved to reject any and all bids.

By order of the Board of Education.

337 GEO. S. CAMPBELL, Secretary.

STATE CAPITOL.

[At Madison, Wis.]

Sealed proposals in the form of a contract will be received by the Commissioner, for the construction of two transverse wings to the State Capitol Building in Madison, Wis., **until Thursday, the 15th day of June next, at 10 o'clock,** A. M., for the erection of two wings to the present Capitol-building in Madison, Wis., designed by D. R. Jones, architect Plans and specifications will be on exhibition at the office of D. R. Jones, in Madison, on and after the 25th day of May. The performance of the contract, on the part of the builder, must be secured by the bond of two or more freeholders, citizens of Wisconsin, who shall verify to their responsibility in the aggregate sum of $50,000 over and above legal exemptions, and in the form furnished (blank) by the Commissioners. To secure uniformity and fairness in bidding, and avoid complications, all blanks will be furnished by the Commissioners. Proposals and contracts *must be on the printed forms furnished*, inclosed in a sealed envelope, indorsed "Contracts for Capitol-building," and addressed or delivered to the Governor of Wisconsin, or to N. B. VAN SLYKE, Secretary.

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SCHOOL-HOUSE.

[At Luverne, Minn.]

Sealed proposals for the erection of a school-house in the independent school district of Luverne, Rock County, Minn., according to plans and specifications which may be seen at the clerk's office in said district. will be received by the Board of Education of said district at the clerk's office in the village of Luverne **until the 8th day of June,** A. D. **1882.**

The contractor to furnish material and labor for the completion of the building. The building to be completed on or before October 1, 1882.

A contract with security to be approved by the board will be required. The right to reject any and all bids is reserved. W. H. HALBERT, Clerk.

Dated Luverne, Minn., May 17, 1882. 336

RIP-RAP.

[On the Des Moines Canal, Io.]

United States Engineer Office, Keokuk, Iowa, May 19, 1882.

Sealed proposals, in duplicate, will be received at this office **until 12 M., June 8, 1882,** for the following work at the Des Moines Rapids Canal:

1. Furnishing about 6,000 cubic yards stone for rip-rap face.

2. Dredging about 100,000 cubic yards

Specifications, forms of proposals, instructions to bidders, etc., may be had upon application to this office. A. MACKENZIE, Capt. of Engineers. 336

IRON BRIDGE.

[At New Haven, Conn.]

Sealed proposals will be received by the undersigned for the City and Town of New Haven, Conn., **until 4 o'clock, P.M., on Thursday, June 15, 1882,** for the construction of an iron bridge on Chapel St., over West River, at New Haven, Conn. Drawings and an abstract of the specification, and also blank forms of proposal, upon which all proposals must be made, will be furnished upon application. No proposals will be received after the time specified, and the right to reject any or all proposals will be reserved.

337 CHARLES E. FOWLER, City Engineer.

PROPOSALS.

IRON STAIRS, ETC.

[At St. Louis, Mo.

Office of the Supervising Architect, Treasury Department, Washington, D. C., May 18, 1882.

Sealed proposals will be received at this office **until 12 M., on the 8th day of June, 1882,** for furnishing and fixing in place complete the iron stairs and floor-lights required for the U. S. Custom-House, etc., at St. Louis, Mo., in accordance with drawings and specifications, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

336 JAS. G. HILL, Supervising Architect.

WROUGHT-IRON.

[At Washington, D C.]

Office of Building for State, War and Navy Departments, Washington, D. C., May 20, 1882.

Sealed proposals for furnishing and putting in place five ornamental wrought-iron fronts, for the elevator well in the North Wing of the Building for State, War and Navy Departments, in this city, will be received at this office **until 12 M., on June 7th, 1882,** and opened immediately thereafter, in presence of bidders.

Specifications, general instructions to bidders, and blank forms of proposal will be furnished to established manufacturers of this class of work, on application to this office. THOS. LINCOLN CASEY,

336. Lt.-Col. Corps of Engineers.

COURT-HOUSE.

[At Wyandotte, Kan.]

Sealed proposals will, **on the 20th day of June, A. D., 1882,** and up to the hour of 12 M., on said day be received at the office of the County Clerk of the County of Wyandotte, in Wyandotte City, Kansas, for the furnishing of material and the erection of a Court-House for said Wyandotte County, Kansas, in accordance with the plans and specifications, which may be seen at the office of said County Clerk, and at the office of E. T. Carr, in Leavenworth city. Each bid must be accompanied by a deposit of $300 in cash or a certified check for that amount, as a guaranty that the party bidding will, within ten days, if his bid be accepted, enter into a contract for the completion of said work, and give a satisfactory bond for the faithful performance of the work thereby awarded to him. Each bidder will be required to make a separate bid for the erection and inclosing of the building as per instructions to bidders, and for the full completion of the building as per plans and specifications. The right to reject any and all bids is hereby reserved.

By order of the Board of County Commissioners.

337 D. R. EMMONS, County Clerk.

CHURCH.

[At Minneapolis, Minn.]

Sealed proposals for building Gethsemane Church, Minneapolis, according to plans and specifications to be seen in the office of E. S. Stebbins. 409 Nicollet Avenue, will be received **until June 6,** proximo, by W. D. Lawrence, 27 South Washington Avenue. The right is reserved to reject any or all bids.

336 W. D. LAWRENCE, Secretary.

COURT-HOUSE.

[At Cleburne, Tex.]

Consolidated sealed proposals for the building of a new brick court-house for Johnson County, will be received at my office, in the City of Cleburne, Texas, **until 12 o'clock,** M., **Saturday, June 17, 1882.** Bidders will be required to file a bond for $20,000, forfeitable if, after the contract is awarded, the bidder should fail to enter into contract with the court for the building of the court-house. Payments will be made in cash upon estimates made by the architect, as the work progresses, the court reserving 20 per cent upon each payment until the completion and acceptance of the building. Plans and specifications can be seen at the office of W. C. Dodson, architect, in Waco, Tex., until Tuesday, the 6th day of June, and at my office in Cleburne, Tex., from the 7th to the 17th day of June, 1882. W. J. EWING,

337 Judge County Court, Johnson County.

BRIDGE ABUTMENTS.

[At Salem, Mass.]

Proposals will be received at the office of the county commissioners in Salem **until the 12th of June at 12 noon,** for the building of the stone piers and abutments of the proposed bridge across the Merrimac River from Deer Island to Salisbury; also for removal of old bridge and piers at same point; plans and specifications can be seen at said office after May 17; the right reserved to reject any or all proposals. JOHN W. RAYMOND, GEORGE J. L. COLBY, ZACHARIAH GRAVES, County Commissioners. 336

SEWERAGE SYSTEM.

[At Pietermaritzburg, Natal, Africa.]

The Town Council of Pietermaritzburg, Natal, invite plans and specifications, with approximate estimate of cost, of a complete system of sewerage suitable for the city. A premium of £100 (one hundred pounds) stg. will be awarded to the author of the selected plan, such plan to become the absolute property of the Corporation, all others being returned free of expense. Plans under motto or *nom de plume* (competitor's real name to be inclosed in envelope), addressed to Mr. E. Wilshire, Town Clerk, Town Office, Pietermaritzburg, Natal, and indorsed "Plans for Sewerage of City," will be received at the Town Office **up to 12 noon on the 4th September.** A plan of the city can be seen and further information that may be required obtained on application any day during office hours to Walter Peace, Esq, Natal Emigration Agent, 21 Finsbury-circus, London, E. C.; John A. Roos, Secretary, Town Council, Cape Town; W. P. Perin, Esq., Town Clerk, Port Elizabeth; John A. Boag, Esq., Town Clerk, Kimberley; and the Town Clerk, Pietermaritzburg. 340