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A SEVERE outbreak of typhoid fever which occurred last year at Nahant, a rocky peninsula near Boston, inhabited during the summer by a small number of very rich cottage-owners, was followed by an investigation of which the results are made public in an article by Mr. E. W. Bowditch in the *Boston Medical and Surgical Journal*. In such cases contamination of drinking-water is usually the principal cause of the spread of the disease, and the wells and cisterns which supply the houses were first examined. Water was taken from one hundred and ninety of these and analyzed. Eight of the samples were pronounced "excellent," and seventy-one others "permissible," or "good." One hundred and eleven were classed as "suspicious," "very suspicious" or "bad." About eighty cases of fever occurred, nearly all of which could be accounted for by the actual condition of the drinking-water used in the houses inhabited by the patients. In a few others the filthy surroundings furnished a probable source of infection, although the water appeared pure, as in one instance, where analysis failed to detect any serious pollution in water taken from a well situated within ten feet of one leaching cesspool and fifteen feet of another, both overflowing, and of course ready to furnish an occasional supply to the well during dry seasons or under other circumstances. One or two more were probably explained by the fact that the ice used in the household was brought from a foul pond in the vicinity; and only one seemed quite inexplicable, unless perhaps the infection might have been brought by milk contained in cans which had been rinsed in foul water. Mr. Bowditch's suspicion, that the infection was communicated in certain cases by contaminated ice, is strengthened by the fact that a very severe and fatal epidemic of typhoid fever was unquestionably caused in this way not long ago at a seashore hotel in New England; and it is worth asking whether the public authority might not be employed with advantage in exercising some sort of surveillance over the collection and sale of an article which may become, and perhaps already is, far more dangerous than the trichinous pork, or immature veal, against which so many precautions are taken. In one place that we know of thousands of tons of ice are annually gathered at the very edge of an extensive and well-filled cemetery, which slopes somewhat rapidly toward the water; and we have seen the winter product of a little pool formed by the overflow of what was practically the drain of a cluster of squalid houses regularly sold to customers.

SOME one connected with the Pennsylvania Academy of Fine Arts possesses a remarkable talent for what we may call executive enterprise, as well as a great familiarity with the opinions and habits of artists. The exhibition of the Academy for 1881 was made signally successful by the happy thought of inviting contributions from American artists living abroad, and this season the invitation is to be repeated. Next year some novelty will be acceptable to the public, and this has already been provided for in the shape of a competition, open to all American artists, for a picture upon a subject suggested by some incident of the Revolutionary War. Prizes of money are to be given, together with medals of gold, silver, and bronze. The choice of judges will be the most difficult and important part of the scheme. According to the New York *Times*, the jury is to be made up of connoisseurs, to be chosen, perhaps, from the principal artistic societies, but is not to include any professional artist. With all possible deference to the wisdom of the managers of the Academy, we hope that they will think twice over the matter before making such a decision. Important as it is to exclude the influence of the local and personal jealousies of artists, the whims and prejudices of connoisseurs are still more earnestly to be guarded against, and the award of such a jury would command neither the respect of the artists nor of the public. It is a maxim much despised among us, but true nevertheless, that the way to understand an art thoroughly is to study and practise it, not to read about it in books, or to have "thoughts" or "aspirations" in regard to it; and none are more likely to be thrown off their balance by a name, or what is the same thing, a characteristic manner, than those who know enough to recognize the touch, but not much more. If the Philadelphia Academy wishes to make its competition really successful, it might well imitate the French plan, and have the jury chosen by the ballots of the competitors. Probably it would be best to have the votes cast only by actual contributors, and their suffrages might fall on some of the competitors themselves; but there are few artists who would not regard such a selection, with the honor of having their pictures shown with the mark "H. C.," as quite equivalent to a prize, and the great object in such contests, an award which no one could question or dispute, would be secured.

A SIMPLE way of cooling the air of a room is described in the New Orleans *Picayune* of a recent date. The composing room of the *Picayune* is situated in the upper story of its publication house, just under the roof, and in summer is extremely hot. This season an inspiration seems to have come to one of the oppressed occupants, and in accordance with it a vertical wooden box was constructed in the corner of the room, with openings at the floor and ceiling, and furnished with a pipe for supplying water at the top, and a pan and drain at the bottom for receiving the flow and carrying it safely away. The supply-pipe was bent over the upper end of the shaft, and fitted with a rose like that of a watering-pot, so as to deliver a shower of spray instead of a solid stream. On connecting it with the service-pipe, the movement of the water was found to cause an active circulation of the air in that part of the room, which was drawn in at the upper opening of the shaft and issued again, cool and fresh, at the floor level. The most surprising thing about the experiment seems to have been the effect of the water in cooling the air to a degree much below its own temperature. With Mississippi water which when drawn from the service-pipe indicated a temperature of eighty-four degrees, the air of the room, in which the thermometer at the beginning of the trial stood at ninety-six, was cooled in passing through the length of the shaft to seventy-four degrees, or about twenty degrees below the temperature at which it entered, and ten degrees below that of the water which was used to cool it. Of course the absorption of heat by the evaporation of a portion of the water accounts for its refrigerating effect, but the result seems to have been so easily and inexpensively attained that the experiment would be well worth repeating in other cases.

THE *Scientific American* calls attention to certain risks attending the use of incandescent electric lamps, which are generally supposed to be incapable of setting fire to anything. Quite recently an employé in a Philadelphia drug-store, in which Maxim lamps were used for lighting the basement, discovered the wires of one of the lamps at a white heat, while the paraffine with which the insulating covering was saturated was blazing up against the floor-beams above. Seizing an axe, he promptly severed the wires, and on investigation discovered that one of them had become detached from its connection with the brass shell of the lamp, to which it seemed only to have been tied with a bit of copper wire, and dropping down had come in contact with the other wire, establishing a short circuit through the inflammable insulating substance, which set it on fire at once. Two or three other lamps were found in which the wires were held insecurely, either from careless original construction or through the melting of the drop of solder which was intended to keep them in position. In another Philadelphia store, where Jablochkoff candles were used to illuminate the front windows, a careless attendant forgot in adjusting the candles to screw on the brass cup which is usually placed below them, and as soon as the current was turned a shower of sparks and incandescent particles fell from the candles upon the light goods below them, which instantly burst into a blaze.

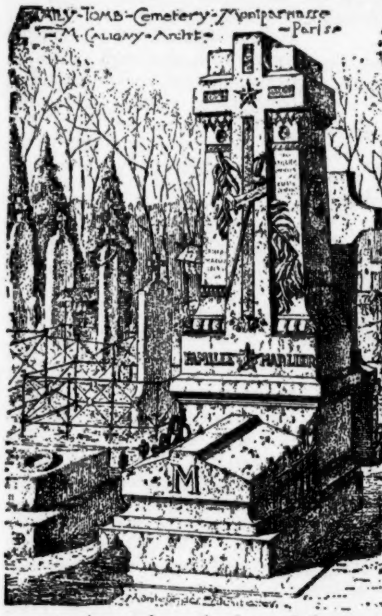
A meeting was held in Berlin last month which seems to have been remarkable in more than one way. A rumor having become generally current that some German manufacturers of Portland cement had adopted the practice of mixing their product with various foreign substances, such as ground chalk, limestone, trap, and blast-furnace slag, a special session of the Association of German Cement Manufacturers was called to consider the report. The importance of the subject, according to the *Bauzeitung*, brought a large number of manufacturers and dealers to the meeting, which was presided over by Herr Doctor Delbrück-Stettin. The question to be debated was immediately announced, — whether the mixture of foreign substances, particularly of iron slag, should be considered an improvement or an adulteration of the compound known as Portland cement. In regard to such substances as gypsum, trass, and limestone, the opinion of those in attendance was practically unanimous, that except in very small quantity they injured the quality of the cement to which they were added, but the admixture of iron slag was defended by three members, two of whom were directors of a large manufactory. These claimed that the latest investigations showed the addition of ground slag to be useful in increasing the tensile strength of the cement, as well as in reducing the tendency to shrink or swell after setting. They claimed therefore that such an addition could not properly be called an adulteration of the cement, and wound up by the suggestive declaration that in order to enable German cement to keep the markets of the world against English competition it was necessary to sell it more cheaply, and that the mixture of slag afforded a means of reducing the cost of production very materially. It is creditable to the other manufacturers that they opposed these arguments with energy. If the addition of powdered slag increased the strength of cement, it was, to say the least, strange that no one else had heard of it, and the general opinion was that its effect, if it had any, could only be that of other inert powders, which often increase the apparent strength of clear Portland cement by furnishing an aggregate around which the active particles of cement can group themselves, but really serve only the purpose of so much sand, and detract accordingly from the value of the cement when used in mortar. The sale of German cement, moreover, the other manufacturers contended, now depended, not on its cheapness as compared with the English brands, but on its undisputed superiority, and any attempt at lowering its cost at the expense of its quality would result in casting distrust over the whole manufacture, since it would be almost impossible to detect adulteration of this kind without chemical analysis. A resolution was then adopted, declaring that the sale under the name of Portland cement of a product to which foreign substances of less value than the cement had been added after burning should be considered as a fraud upon the purchaser, unless distinct information were given him of the character and proportion of the admixture. The addition, however, of foreign substances to an amount not exceeding two per cent by weight of the cement, in order to give it special properties, would not be considered to be an adulteration within the meaning of the resolution. The executive committee of the Association was empowered to take such steps as it should deem proper for making known this action to other cement manufacturers and the public.

According to the investigations of M. Chatellier, who has studied with the microscope the phenomena of the setting of cements, the main element in the process is the crystallization of various compounds of silica, lime and alumina. In the aluminous cements, which include Portland, Rosendale, and most other varieties used in masonry, the setting is accompanied by the formation of a very great number of long, needle-like crystals, which interlace in every direction, and evidently serve to give great tenacity to the mass. These crystals contain a considerable proportion of water, some of which may be removed by evaporation without destroying their form, both these indications agreeing perfectly with the theory of setting generally accepted. With some non-aluminous cements crystallization was observed to take place in hexagonal plates, the interlacing of which may have an effect similar to that of the spicular aluminous crystals.

Something of a novelty in competitions is announced in *La Semaine des Constructeurs*. The Municipal Council of Paris, having resolved to erect a statue of that picturesque individual, Etienne Marcel, on an open space near the river, invites sketches, at one-tenth the full size, which are to be delivered at the city offices in the Champs-Elysées, on or before December 5 next. After a public exhibition of ten days the jury will select three sketches, whose authors are then to prepare models at one-third the full size, and from these models a second selection will be made. The author of the model placed first in this trial will be entitled to the execution of the work at the usual commission. The second in rank will receive a premium of five thousand francs, and the remaining one will receive four thousand francs. The design and execution of the pedestal is to be confided to an architect to be chosen by the victor in the competition for the statue. We venture to predict that this invitation will call forth something better than the Nightmare-Mauresco-Japanese designs which have so afflicted the art-loving souls of the subscribers to the San Francisco Garfield Memorial, and although the awards offered to the successful competitors may seem lavish to the frugal Californians, the Parisians willingly pay them for the sake of obtaining a monument which they are sure will not expose them to the derision of strangers.

We have received another letter of inquiry from a participant in the competition for the Cleveland School-House, who says that he has received no acknowledgment of the receipt of his drawings, and no advice as to the result of the competition, and he appeals to us "to protect the members of the profession from such lawlessness as appears to have been perpetrated." Concerning the result of the contest we are in a position to satisfy him. At a meeting of the Cleveland Board of Education, held June 5, 1882, the joint committee appointed to examine the competing plans presented a report in which it says among other things that "there seems to have been a lack of understanding by many of the competitors of the details of school management in our city, and most of the designs suffered for that reason. For instance, one of the best designs not accepted showed that the author expected the girls and boys to occupy different parts of the building, entirely separate from each other, and several of the plans contained serious defects, necessitated by providing separate cloak-rooms for boys and girls." These and other defects led to the rejection of nineteen out of the twenty-four plans, and of the remainder one bearing the motto "*Palmam qui meruit ferat*" was subsequently unanimously chosen as the best, and was recommended for adoption, subject to certain modifications. We suppose that some of our readers will ask whether such eccentric "details of local school management" as the provision of common dressing-rooms for boys and girls might not in fairness have been mentioned in the circular of instructions to competitors, so as to put the architects at a distance who accepted the general invitation on an equality with those nearer the scene; or whether those who undertook to prepare designs without a knowledge of such details did not simply throw away their time and money from the first; and to these questions we confess that we can find no satisfactory reply. Some of the competitors, we hope, are sufficiently rewarded by the experience they have gained for their pecuniary loss, but those who need another lesson can easily obtain it by engaging in the next competition of a similar kind, that is, in which the jury are to be persons outside of the architectural profession. So long as architects consent to send designs at random to be judged by laymen, they must put up as best they can with the losses and mortifications which inevitably follow; and if they feel themselves aggrieved by the apparent contempt with which their work is in such cases generally treated, they may as well reflect whether they can expect others to put a greater value upon it than they apparently do themselves.

NOTES ON HOUSE-DRAINAGE. – III.[1]



THE most serious defects in the better plumbing work of the present day lie in the leaky joints of soil-pipes, in a great complication of the work, and in the attendant great multiplication of plumbing conveniences, leading to a multiplication of outlets, waste-pipes and overflow pipes from the various basins, bath-tubs, sinks, etc., which are so widely distributed throughout the house. These outlets are almost always too large: large far beyond the power of the stream they are to carry to keep them clean, and supplied with traps which are almost invariably what they are called in Scotland, "cesspools." The moment we descend from work of the very best class to that done by ordinary plumbers, especially on contract jobs and in houses built for sale, the whole system is riddled with imperfections. Wherever the saving of money is a leading object, and especially where this is coupled with the desire to make an attractive house for sale, skimping and scamping are the rule, and weakness and danger are the necessary results. Another defect which perhaps it would not be improper to put at the head of the whole list, and one which is rarely absent from any house, is not at all the fault of the plumber, but of the architect and the builder. The whole system of soil-pipes, water-closets, branches to distant basins, etc., and the arrangement of these appliances themselves, constitutes necessarily a sort of venous system running parallel with the arterial system of supply-pipes, from each point where water is used to the ceiling of the cellar, where the pipes are located in a cluster. So far as the location of the pipes themselves is concerned this is of course proper; but the whole arrangement leads to a free and open communication between the cellar, the urine-slopped spaces about water-closets, and the leakage and dust and untidiness under kitchen sinks, and basins and baths, and the whole hidden space in the house between floors and ceilings and behind partitions. Ordinarily everything is boxed in tightly so that its condition cannot be seen, so that there is no local ventilation, and so that the air tainted by the sources above indicated is diffused throughout the interior space of the whole house, escaping by every crack in wood-work and plaster. The difficulty in this case is not an easy one to remedy. At the same time it is possible so to close the openings through which pipes pass from the cellar and from floor to floor that there shall be no communication of air from one story to another, and no lateral communication in the spaces under the floors. If to this there be added an entire exposure or a very thorough ventilation of all spaces under sinks, wash-basins and water-closets, and about soil-pipes, all tendency to taint will be neutralized at its source.

It is not proposed that these notes shall be in any respect a treatise on the draining of houses. We have already a sufficient cataloguing of the various appliances and processes of the art. I shall notice here only such methods and such apparatus as seem to me to be the best for use under different circumstances and at different scales of expense. The selection will be made, of course, only according to my own judgment, and there will necessarily be omitted many things which I consider entirely safe and admissible. In this connection there arises a certain embarrassment due to the fact that nearly everything that is good in plumbing is patented, and that I am myself interested in patents protecting some of the articles recommended. It is quite possible that in some cases I give the preference to devices of my own which, were I not biased by personal interest, I might not consider better than some of their competitors. All that I say on this subject must, therefore, be taken with this qualification. It is, however, proper for me to say that during the many years that I have devoted to sanitary engineering I have naturally had always in mind the improvement of the appliances and conditions of the work. As my motive has been professional rather than philanthropic I have patented whatever has seemed to me to be important. Some of these inventions have been abandoned and withdrawn from the use for which they were intended. Others I have done my utmost to promote as a matter of business. Some writers, notably the editor of the *Sanitary Engineer*, assume that an article which is protected by a patent ought not to be recommended or referred to in papers written for the information of the public. There is a strong sentimental justification for this view of the case, but another view which seems to me to have weight is that the first duty of a writer is to give his readers the best and latest information on the subject of which he is treating, and that he does less than his duty if he withholds from them the knowledge of new and valuable improvements, whether patented or not. This consideration seems to me a controlling one, and, while recognizing the criticism that may well be raised on the score of good taste, I shall act upon it in these papers. Everything that is new and good being patented, I think that the sensitive policy of that able journal, if consistently carried out, is open to the criticism that its information must always be to a great extent seventeen years behind the times.

[1] By Geo. E. Waring, Jr., Newport, R. I. See *American Architect*, Nos. 342 and 343.

PRACTICAL DETAILS.

The manner of disposing of the wastes of a house after they shall have passed through the foundation-walls, that is, the construction of the drain which is to carry them to the public sewer or to another destination, will be discussed and illustrated at the close of these papers. We will first consider the interior work of the house in detail.

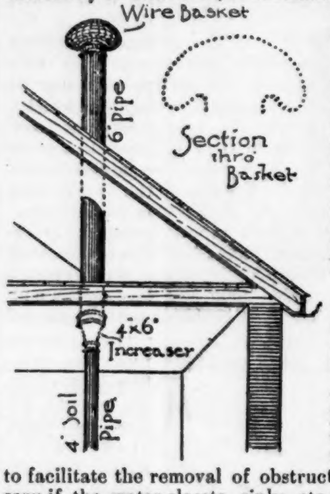
Cellar-Drainage. — Storm-water, or what is the same thing clean water escaping from the ground about the cellar of a house is not, it is true, a waste of domestic life, but its treatment is so generally a necessary part of the work of a house-drainer that it should be considered in this connection, and, along with it, the exhalation of moisture from a damp soil under or about the house, or a dampening of the foundation-walls in contact with earth which while damp may not be so saturated as to deliver a stream of water into the cellar.

A common method of cellar-drainage is to lay drains, usually of considerable size and in various directions, under the cellar-bottom, and to deliver their flow to the sewer or house-drain through an intervening "mason's trap," — a large box of brickwork with a dip-stone. This trap, being also used for the discharge of surface-water of the cellar, is brought into communication with the house. It is usually so circumstanced as to become foul from the accumulation and decomposition of organic dust and from the absorption of the foul air of the outer drain with which it is connected, so that it is often more than a minor source of tainted moisture in the air of the cellar. This form of trap is a very persistent survival of a system of drainage most of whose details have been condemned and abandoned. Here, as well as anywhere else about the premises, it is important to restrict the dimensions of the trap as well as of the drain, very nearly to what is necessary for the office to be performed. If a tight cellar were surrounded by a porous soil filled with water to its surface, a hole through the cellar floor one inch in diameter would admit a sufficient stream to fill it in a short time. On the other hand, if a tight cellar standing in a porous and well-drained soil were filled a foot deep with water, and if its bottom were pierced with a hole the size of the finger, in a few hours it would become dry. I have never seen in the excavation of a cellar, save where there was a vigorous rock spring, such an amount of water running into it from all sides as would fill a one-inch pipe. I have never seen a cellar which could not be perfectly drained by the smallest tile, nor have I seen a case where the smallest trap was not amply large for the purpose. I should therefore advise in all cases that the subsoil drainage of a cellar be done with the smallest tiles available. While an ordinary water-trap is a sufficient protection where there is a constant dampness sufficient to counteract evaporation, this condition of constant saturation is so rare that it is wise, in view of possible drying of the trap during the summer, to deliver the cellar-drain into a barrel or cask of coarse sand or fine gravel having an outlet above the level of the inlet to carry off the water as it rises in the porous material. This will most effectively prevent the return of the air of the outside drain to the drain under the cellar. Ordinarily the best position for a cellar-drain is around the foot of the entire foundation and about two feet inside of it, the tile being laid, where a sufficient outlet can be secured, from one to two feet below the bottom of the footing. If properly laid at this depth, with the joints well secured against the intrusion of sand and loose earth, the drain need have no fall: it will deliver what it receives with sufficient rapidity if laid level. Where the excavation is in rock, leaving the bottom irregular and with seams which may distribute water under different parts of the cellar, the depressions should be connected by channels cut for the purpose, and the whole space should be brought to a certain level with a uniform filling of gravel or other very porous material, this stratum, which will serve as a universal drain, being connected with a line of tiles extending a few feet inside of the foundation wall. The cellar being drained according to either of the above methods, it is ready for any treatment which would be given to a permanently dry bottom. Perfect work would include an asphalting of the outside of the foundation-wall, and a concrete bottom covered with an asphalt flooring, but details concerning this portion of the work would be out of place here.

The Soil-Pipe. — There is no doubt that the adoption of cast-iron in the place of lead for soil-pipes marked a great and important advance in the right direction. Lead is, for more reasons than one, a material the use of which should be reduced as much as possible in disposing of house-wastes. Cast-iron of sufficient thickness, especially when properly coated with tar or enamel outside and inside, is much better. Until quite recently I should have said that a soil-pipe jointed with caulked lead was one of the complete elements of satisfactory house-drainage. Recent experience in testing such pipes, by closing their outlets and filling them with water, has led to the conclusion that of all the lead-jointed iron soil-pipe now in existence in American houses, not one in a hundred would fail to leak a considerable amount of water under this test; that not one in fifty would fail to leak badly at many points; and that not one joint in ten is perfectly tight. I have recently had occasion to test the soil-pipes of a large house of the best class, where the greatest effort was made to secure tight work, where the joints were so exposed that there was no difficulty in caulking them thoroughly, and where there was every reason to suppose that every joint was absolutely tight. On closing the outlets and filling the pipe with water, the whole system leaked like a sieve. Owing to the height of the building the pipes were divided into two sections in order not to apply an unfair strain in the lower portions. My assistant in charge of the examination reports with regard to the upper section: "A joint that does not leak badly is an exception." In some cases in driving up the caulking to make the joints tight the pipes were split owing to cracks previously existing and which a casual hammer-testing would have discovered. This result puts an entirely new aspect on the whole question, and points clearly to a radical defect of the manner in which all of our soil-piping is done. As an inheritance from the old custom of laying socketed vitrified pipes for drains, it is the custom to put the socketed end of the soil-pipe at the top, the spigot end passing an inch or more below the top of the socket. With this arrangement, any leak that may exist will not be disclosed in ordinary use by an escape of water. Indeed, the pipe would carry its water completely with no packing of the joints. The making of the joints is much easier if the lead can be poured in at the top instead of being made to rise from a clay dam below, and generally the caulking may be most easily done from the top. These considerations perhaps warrant a continuance of the old arrangement; but it is clear that very much more thorough work must be done, and especially in the use of light soil-pipe. Sufficient strength for thorough caulking can be secured only by increasing the thickness of the hubs. So far as the architect and the owner are concerned it is not necessary to go farther than to insist on the water-pressure test being applied and the perfection of joints being thus demonstrated before a single pipe is covered from sight. The test should have for its object not only the testing of the joints, but also of the absence of cracks and sand-holes, which are by no means exceptional. Work which has not passed this ordeal cannot be trusted, whether in an old house or in a new one: work which has passed it may be trusted to be and to remain perfectly tight, the tendency of use and age being to fill existing crevices and leaks with rust rather than to increase them.

The iron soil-pipe should extend from a point well outside of the foundation-wall, at least several feet beyond any excavation and refilling, where settlement is almost certain to occur with sufficient force to disturb the cement joint of an earthenware pipe. Wherever it is possible to avoid placing a water-closet or other vessel at the level of the cellar-floor, the soil-pipe should pass through the foundation above that floor, and should be carried along the wall, or should be supported from the ceiling to the point where it turns up through the house. In its vertical course it should be exposed to view so far as possible throughout its entire length, though if it has been shown by the water test to be perfectly tight, it may, at points where it would be unsightly, be concealed behind a casing or enclosed in a wall. It should continue of its full diameter to a point near the roof of the house, or at least to the garret or attic floor. From this point it should be extended through the roof with an increased diameter. At least five feet of its upper end and all of it that passes through the roof or that is exposed to excessive cold should be fully six inches in diameter. The elaborate experiments at Kew, referred to above, established the fact that the most efficient means for securing a *constant* increased movement of air through a pipe is to increase its diameter at the top. Another controlling reason for this increase of diameter in all northern climates lies in the fact that the vapors rising through the soil-pipe are in cold weather congealed and deposited around the interior circumference, so that it is by no means unusual to find a two-inch pipe entirely closed and a four-inch pipe so much reduced in diameter as to have its ventilation very seriously interfered with.

The market is filled with stationary and movable ventilating cowls in great variety. All of these that have come to my notice are objectionable. All of them under certain conditions of wind certainly exercise a marked tractive force on the air of the soil-pipe, but during periods of calm they all act as obstructions and lessen the natural flow. It is never important nor even desirable to establish a *strong* current through a soil-pipe; but it is of the utmost consequence that a constant movement be maintained, so that fresh air may always be furnished with sufficient frequency to renew the atmosphere of any part of the pipe before it shall have lost its oxidizing and diluting effect. It is most common in New York to finish the upper end of the soil-pipe by using what is called a "return bend," being a length of the pipe bent to a half-circle, so that it shall open downward. It is a common practice in Boston to cap the upper end of the pipe with a hollow hemisphere lifted a little above it. Both of these devices cause a decided retardation of the current, both increase the accumulation of frost in cold weather, and both are always and absolutely objectionable during a calm. Their chief good office is to prevent the introduction into the pipe, mischievously or otherwise, of substances which might obstruct it. The same protection will be afforded by a wire basket such as is used to keep leaves from being washed from eaves-troughs into rain-water leaders. As these baskets have some tendency to become clogged with snow they should be made of a mushroom or hemispherical shape, the space between the wires of the horizontal under portion being not less than three-fourths of an inch.



The branches built into the soil-pipe to receive the outlets of water-closets and other vessels should, where practical, be Y-branches or half-Y branches; though there is no serious objection to the use of T-branches on vertical pipes. The trap-screws and hand-holes provided to facilitate the removal of obstructions in soil-pipes are not necessary if the water-closets, sinks, etc., are of such a character as to deliver a strong cleansing flow at each use. With the flushing that is afforded by a good water-closet or by the flush-pot of a kitchen or pantry sink, anything that can enter it is sure to be carried through the pipe if a reasonable inclination is given to its horizontal runs. This ought not to be less in any case than about one in twenty-five, and it should always be as much as proper head-room in the cellar will allow. If the pipe can be carried along the straight wall of the cellar it had better start at the ceiling and leave the house near the floor.

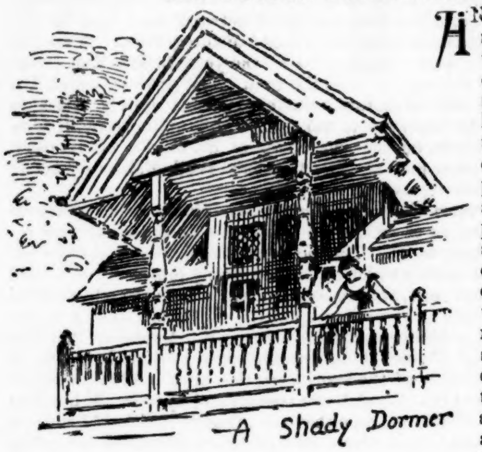
In rare cases it becomes necessary to lay a drain for a considerable distance under the cellar floor. The usual directions given in such cases are that a channel of masonry covered with wood or stone shall be provided for its whole course. This arrangement furnishes an ideal harbor for vermin and is quite sure, if accessible at all, to become filled with dust, and so to become objectionable. When it is necessary to lay such a drain it should be made of heavy cast-iron soil-pipe properly coated and so thoroughly caulked that when its lower end is closed and it is filled with water with a head nearly to the height of one story of the house, it shall prove absolutely tight at every joint and in every part, water standing for at least ten hours without the least subsidence. Thus laid the drain may be trusted probably for all time, and it had better be solidly enclosed in strong cement-concrete with no crevice for the admission of even a cockroach.

A most important recent addition to the efficiency of the soil-pipe is a means for supplying ventilation at its foot, so that there shall be throughout its whole length a free communication with the atmosphere. With even a tolerably good sewer it is in my judgment best to admit the ventilating air at the foot by the omission of the usual trap separating the house-drain from the sewer. If the sewer is very foul, or if the delivery is into a cesspool, the trap should be used and inside of the trap there should be inserted a T-branch of the full diameter of the pipe, extended to the outer air and opening at some position not subject to obstruction by snow or litter. A good position for this fresh-air inlet in city houses is under the grating over the light-shaft of the cellar, or it may be carried to a sufficient height up the side wall of the house. In a country house it may be led to a little distance and turned up two or three feet above the surface, preferably in shrubbery. In any case this opening should be protected like the top of the pipe with a wire basket. To lead the fresh-air inlet to the edge of a sidewalk, to the surface of the area or to the ground-level, as is usually indicated in illustrations of the system, is open to the serious objection that in such positions it is at all times liable to be clogged with rubbish, and is quite sure to be closed by heavy snow.

The size of the soil-pipe is a matter of much importance, and it is one concerning which there is much diversity of opinion. I have never found it necessary, in the largest house with which I have had to do, to use a larger diameter than four inches, the capacity of a pipe of this size being far beyond the capacity of any number of fixtures liable to be used at the same time, even in a hotel, to fill it anything like half full. So far as the removal of wastes is concerned, a diameter of three inches would always be ample, and it is always to be borne in mind that the smaller the pipe the greater the flushing effect of a given stream passing through it, and therefore the less the deposit within it. Another consideration, however, is important. Under no ordinary circumstances, perhaps under no conditions that are likely to arise in practice, will the traps of the vessels connected with a four-inch pipe be disturbed by "siphonage" if the pipe is open at the top. The current through a three-inch pipe would be more likely to produce such a disturbance of its atmosphere as to cause siphonage. It seems warrantable, therefore, to adopt in this case a hard-and-fast rule and to say that the soil-pipe of any house where there are fixtures on the different floors should be four inches in diameter, unless the traps have "back ventilation," when three inches will suffice. I think that I have had sufficient observation of drainage works in a great variety of houses, and under a great variety of conditions, fully to justify this statement.

The vertical portion of the soil-pipe should be secured to the walls along which it passes in such a manner as to prevent any disturbance of its position and any vibration due to the sudden discharge of water-closets; but it should be strong enough in itself to maintain its integrity without such aid. Where the ground on which the house is built is of a firm and solid character, it will be sufficient to support the vertical pipe by a pillar of masonry or a post firmly planted on a solid footing. So, too, the horizontal run of the pipe in the cellar may be supported either by hooks secured to a wall along which it passes, or by piers or posts placed under it. If, on the other hand, the land is subject to subsidence, as it is for instance in the "made" lands of Boston, while such piers and posts may be used, they must not be entirely depended upon, and the pipe must be supported by strong hangers secured to the beams of the floor above.

OLD BOSTON BUILDINGS.[1]



"ANOTHER Landmark gone." "A noted Relic of the Past removed." Hardly a week passes that we do not come upon a paragraph in some daily paper headed with some similar caption and each time that we see it a mild regret makes itself felt that we did not know of the existence of such a building and the destruction that impended, that we might have made at least an attempt to preserve some record of its architectural existence by inviting the aid of the nearest architect, draughtsman, or photographer — professional or amateur. These "relics of the past," these homes of our ancestors should not be allowed to pass away without leaving a record of themselves; not a mere photograph preserved in the family archives or an amateur's sketch, of such little interest that when in after years it comes to light it only excites our impatience because it only half tells its story and that half so imperfectly as to be unintelligible; but a more or less elaborate architectural drawing, measured where circumstances seem to require it and certainly detailed; for the character of a building depends vastly more on its detail than artist or amateur ever suspect. It is this absence of reliable detail which make the charming wood-cuts illustrating the various articles on our old homesteads that have appeared in *Scribner's* and *Harper's* during the past few years, of less practical value to the profession than even the rough outline sketch of an architect would have been; they are too impressionist; they elaborately conceal often the very things the architect most wishes to know, and when they do undertake to tell the tale they often tell it falsely.

It is a pity that a properly organized effort is not made to compile a record of these ancestral homes with their Spanish, Dutch, English, and French characteristics, and the varied history of their builders and subsequent inhabitants before fire, dry-rot, the reckless abuse of the proletarian classes into whose hands so many of them have fallen, and that feverish American passion for things new and novel — for the newest style, the latest improvement — sweep them away. Such an effort would be as deserving of support as the expedition to Assos, or the explorations among the pueblos, and would yield results immeasurably more interesting and of more living value.

Who will take it in hand and preserve the records of our architectural history before it is too late? We do have an architectural history, and one in which Americans may take a pride in spite of the scoffs of those of our countrymen who, having travelled abroad and seen the greater glories of the architecture of the eastern continent, are blinded to the less ambitious claims of our own structures.

The interest in the deeds of our forefathers excited by the Centennial Exhibition, and the craze for Queen Anne work stimulated many individuals and some societies to investigate these records of the past. Amongst others the Rhode Island Chapter of the American Institute of Architects in 1879 issued the prospectus of a species of competition, and offered prizes for the best set of drawings of the colonial work still remaining in the State of Rhode Island. We never heard that this effort had any result, and we fear that this department of the archives of the State is still represented only by empty portfolios.

Individuals, too, have attempted the task: Mr. Little did what he could to minimize the interest that centres about the old houses of eastern Massachusetts and New Hampshire, and Mr. Whitefield has wandered on foot here, there, and everywhere over New England making tame little lithographic sketches, often out of drawing but always interesting, of all the houses of the period that came in his way: modest cottages, decrepit farm-houses, and more stately mansions with their spacious and well distributed out-buildings are treated carefully with what skill he could command, and sincere thanks are due for the time and patience he has expended on what will be, whatever may be its own demerits, an invaluable guide-book for the fortunate possessors of more skilful and artistic hands. Mr. Tolman's is the latest as well as the best endeavor in this field, and every one who sees the neat portfolio of artistic sketches of some of the old buildings in Boston will hope that he will follow up the same line of work before the harvest, which is still fairly abundant, is reaped by the hands of time and the destroyer.

The buildings which form the subjects of these dozen sketches were selected after long search and comparison, because the internal evidence they offered seemed to prove their antiquity. Subsequent investigation has shown that not only was the selection a proper one on architectural grounds, but that many of the buildings have an historical importance or at least an anecdotal interest which a more thorough research into the traditions which still hang about them, despite the plebean uses to which they have sunk, would probably greatly enhance. But it is hardly to be expected that washer-women and the keepers and occupants of sailors' boarding-houses are posted on the histories of the buildings that now in a certain sense are desecrated by their presence, or that even the respectable owners — if there are such — are descendants of the original builders, or if they are not, have kept such record of their purchase that would enable a more experienced antiquarian than perhaps Mr. Tolman is to trace out their histories in all their interesting particulars. Still, if these sketches lack something of the glamour which would be thrown about them by a descriptive history which should give them all the benefit of local coloring, and the accessory interest of contemporary incident, they are interesting and valuable to layman and architect alike.

To have remained standing to this late day in a city so often swept by fire, and to have kept, in spite of the base uses to which they have of late years been put, so nearly what must have been their original condition, would seem to prove that they must be among the best of their class, the best built, the most sturdy, the homes of men who in those days could afford to pay for honest and substantial work; and the air of sobriety and reserve that hangs about such houses as are shown on plates II, V, VIII and IX, dimly suggest what must have been the home life in Boston in the days when streets were unpaved and grass-grown, and the tide-water washed where now are our busiest streets and most imposing warehouses; when the quiet of the seventh day differed but little from the mild bustle of the other six; when the apprentice felt that he had time to learn his trade thoroughly, and those who taught him appreciated the social dignity that a perfect mastery of their trade implied. Many of these houses were built slowly because they had to wait for the next ship to arrive from England with brick, perhaps, or nails, or fittings of one sort or another, and the mechanics had time, as well as understanding, to do their work thoroughly as those who labor in the feverish days of railroad and electric communication do not have; when bricks may be ordered and delivered within ten days to any part of the country, before the mortar has set in the joints of the last batch; when nails may be iron ore at the beginning of a week and be driven home into a balloon-frame at the end of it. It would be unwarrantable to prophesy that of the better class of wooden buildings built by the average mechanic now-a-days with average materials in the ordinary way not one would be in existence two hundred and twenty-odd years after its completion, but it would be proper to hazard the surmise that if an amount of money equal to that which would be necessary to keep such a building in good repair during this time, should be expended on the old Wells House on Salem Street, shown on plate III, the comparative depreciation of the two buildings structurally considered would be far greater in the first case than in the last.

One of the legends attaching to the Wells house is that during the persecution of the Baptists, one of the leading ministers was concealed in it; if, therefore, this legend is true, this must be the oldest building in Boston — older even than was the Dock Square building which was destroyed in 1860 — for the persecution of Baptists was actively aggressive only between 1650 and 1680, and the house must have been built before or during this period, and the date commonly assigned to it by tradition, 1660, is probably the true one.

THE ILLUSTRATIONS.

COMPETITIVE DESIGNS FOR THE NEW PARLIAMENT HOUSES AT BERLIN.

WE reproduce from the *Deutsche Bauzeitung* perspective views of the two designs which received first prizes, one of the second-prize designs, and plans of many of the designs which received award in the late competition. The two first prizes were awarded to Paul Wallot, of Frankfort, and Friedrich Thiersch of Munich; the three second prizes fell to Kayser & von Grofzheim, of Berlin, Cremer & Wolffenstein, of Berlin, and Heinrich Seeling, of Berlin; three of the third prizes were assigned to Buese & Schwechten, of

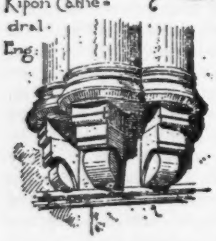
[1] Twelve Sketches of Old Boston Buildings. By George R. Tolman: 1882, Boston.

Berlin, Giesse & Weidner, of Dresden, and Ende & Böckmann, of Berlin. The ground plans only are shown, and as their general scheme is sufficiently plain even to those who cannot understand the German abbreviations used, we have not attempted to re-letter the plans. One thing only we will draw attention to, the *ja* and *nein* doors on either side of the hall which some of the designers have provided to facilitate the taking of a vote when a division is found to be necessary.

THE ELWOOD MEMORIAL BUILDING, ROCHESTER, N. Y. MR. JAMES G. CUTLER, ARCHITECT, ROCHESTER, N. Y.

AS TO THE DURABILITY OF BUILDING-STONES.

Corbel in Choir: Ripon Cathedral. Eng.



BEING fully aware of the general attention that has in all times been directed to the durability of stone, we yet question whether the subject has been anywhere exhaustively treated, either in England or on the Continent. Although holding closely to the need of experience, we yet should not forget that both chemical analysis and other methods of scientific investigation have made great strides of late, and that it may become essential to the architect to inquire how far they may throw light on the question of durability. We may practically know the difference in the durability of Bramley Fall and Portland stone, but if we know not only the fact, but its causes we have made a step in advance. This consideration will have more weight from some observations to which we shall have to refer as to the durability of granite.

For a contribution of much value to this investigation we are indebted to the Director-General of the Geological Surveys of the United Kingdom, Dr. Archibald Geikie, F. R. S. It is from the note-books of geological rambles, and as regarded from the stand-point of geologists, that the observations to which we have to refer have been extracted. None the less, it strikes us, do they form a very valuable beginning. Our own experience, and we do not doubt that of many a reader, is enough at once to contribute some examples to those which have been elaborately investigated by Dr. Geikie; and we look forward with confidence to the preparation, sooner or later, of a comprehensive scientific work on the durability of building materials, in which chemical and lithological science shall have their due parts, side by side with the verdict of experience.

Dr. Geikie's researches have, in the first instance, been directed to the older burial grounds in Edinburgh; the reason, of course, being, that as tombstones are usually date-bearing monuments, the means of comparing the progress of decay and the lapse of time are unusually precise. To these humble slabs we take leave to add, especially for the benefit of architectural travellers on the Continent, the category of scutcheons and armorial bearings. Many ancient buildings, especially in Italy, are adorned with stone armorial bearings. Of these the herald will be in many cases able to indicate the date with considerable accuracy. And, speaking now only from memory, we should say that a study of lithological degradation in Italy, based on dated works of this kind, will give results so widely different from those obtained by Dr. Geikie in Edinburgh as to point to the primary canon,—that the first division of any study of the subject must be topographical, or, rather, climatological.

Dr. Geikie points out that the effect of weather in a town is likely to be in some measure different from that which is normal in nature. The disengagement of sulphuric acid from the reek and smoke of chimneys is one of the causes of the more rapid decay of stone-work in urban, as compared with rural, localities. On the other hand, the range of temperature is likely to be less active in a town. And the incrustation of the surface of the stone with dust, smoke, and other inorganic as well as organic matter, in town buildings, has to be borne in mind, although there may be a question as to the action of such incrustation on the interior substance of the stone.

Around Edinburgh the materials used are of three kinds,—1st, calcareous, including marbles and limestones; 2d, sandstones and flagstones; 3d, granites.

With few exceptions, the calcareous limestones in the Edinburgh church-yards are constructed of ordinary white saccharoid Italian marble. There may also be observed a pink Italian shell marble, and a finely fossiliferous limestone, containing *foraminifera* and fragments of shells.

The marble occasionally is employed as a monolith, in the shape of an urn, vase, or the like; but it has been usually fixed in a frame-work of sandstone. And it is as to its behavior in the latter case that the observations we have to mention will prove to be novel to most of our readers. Dr. Geikie has, in the first instance, subjected specimens of the marble, both when freshly cut and when long exposed to the weather, to microscopic examination. His view of the process of degradation is that it is of a threefold character. The process of weathering, he says, in the case of this white marble, presents three phases, sometimes to be observed on the same slab, viz., — superficial solution, internal disintegration, and curvature with fracture.

With superficial solution we are tolerably familiar. It becomes apparent in the gradual dimness that comes over the polished surface of the marble. This is effected by erosion, partly by the carbonic acid, and partly by the sulphuric acid contained in the atmosphere, and notably in the rain that falls in towns. The rapidity of the process in Edinburgh depends very much upon aspect and exposure to rain. Exposure for not more than a year or two to the prevalent westerly rains is enough to remove the external polish, and to give the surface a rough character. The granules of pure calcite, which have been cut across or bruised in the cutting and polishing process, are first loosened or dissolved, and then drop out of the stone. An obelisk erected in 1864, in Grey Friars' church-yard, is cited as an example in which the surface has already become so rough and granular that it might be taken for sandstone. The grains are so loosened that a slight movement of the finger will rub them off. The internal structure of the marble begins to reveal itself. The harder knots and nuclei of calcite project above the surrounding surface, and irregular channels, from which the lime has been carried away in solution by the rain, resemble the bleached and furrowed aspect of the rocks on the side of a mountain.

Solution, or decay of some kind, seems rather to be hidden than prevented by the formation of a surface-crust. This Dr. Geikie considers to form most rapidly where solution is most feeble in its apparent action. Beneath it the stone turns to a loose crumbling sand. In time the crust cracks into a polygonal network, and rises in blisters, exposing the under material to rapid disintegration. A marble urn erected in the same church-yard in the year 1792 is thus crumbling into sand, although it faces the east. The process, which Dr. Geikie describes with elaborate minuteness, must closely resemble that which may be observed to take place with oolite stone in London: as, for example, on the south face of St. Paul's, where thick cakes of a black color may at times be seen to shell off, leaving partly disintegrated stone exposed to view.

It is the third form of decay, which Dr. Geikie describes as curvature and fracture, as to which, we think, the observations now recorded are the most novel. The most remarkable phase is to be observed in slabs of marble which have been firmly inserted into a solid frame-work of sandstone, and placed either in an erect or a horizontal position. It appears as a swelling-up of the centre of the slab, which forms, as it were, a blister that finally ruptures. A case is cited of a slab 22″ x 30″, and ¾″ thick, built into the south wall of Grey Friars' churchyard. The date of the last inscription on it is 1838, at which time it is presumed that the slab was smooth and upright. It has now escaped from its fastenings on either side, though still held firmly at top and bottom, and projects from the work like a well-filled sail, to the distance of 2½ inches. A series of rents, one of which is one-tenth of an inch in width, has appeared along the crest of the fold. In another case, that of a tomb erected in 1799, facing south, and protected by overhanging masonry from the weather, the inscription has become partly illegible, the stone has bulged out in the centre, and cracks begin to riddle the blister. On another slab, twenty years older, dated in 1779, on the west wall, the process of destruction has advanced to a further stage, and, since it was sketched by the author of these notes, has altogether fallen out and disappeared.

It is the opinion of Dr. Geikie that this mode of destruction is due to the action of frost. As to this we are disposed fully to agree with him, and that from observations of our own which bear on the subject. One set of these regard the durability of marble where frost is unknown, or rare. For example, we can cite a large marble tablet built into the wall by the eastern gate of the little archiepiscopal city of Sorrento, which contains (or did some years ago) a long and perfectly legible Latin inscription, of the date of the Spanish rule in Naples. Again, on the gates of the City of Naples, and on the Castle Nuovo in that city, are scutcheons of arms which have been defaced on some occasion of change of dynasty, and on which the marks of the chisel are so fresh that it is clear that the absence of armorial bearings is not due to the lapse of time, but to political causes and purposed violence. In these instances, to which a very moderate acquaintance of Southern Europe can no doubt add many more, we have ample proof of the monumental durability of marble, although freely exposed, in a climate where frost is very rare, and never of sufficient intensity to get good hold of the surface of the ground. The other observations refer to the curious permeability of limestone to wet. It may be said, perhaps, that the water which collects on the interior surface of a limestone or marble wall does not percolate, but is condensed by the cold of the wall from the atmosphere. Weeping through solid stone seems, indeed, incredible; but we can cite one instance of a wall made of mountain limestone, thoroughly well built, and 3 feet thick, in H. M. Dockyard, Pembroke. It is the wall of a smithy. When it was newly built, when the rain drifted on it from the west the wet ran down within the buildings as if the walls had been of chalk, or some porous substance. We do not assert that the wet did come through the walls; but it appeared so to do. And, at all events, this and other experiences point to a hygrometric condition in the purest and densest limestones which is likely to have a very destructive effect in the event of the occurrence of frost directly after rain.

Dr. Geikie comes to the conclusion that the lowering of the surface of marble by superficial solution may amount to ⅓″ in a century: a reduction to a pulverulent condition in about forty years; and a total disruption by curvature and fracture in a century. We only add the condition that this must be where frost is energetic in its action.

The endurance of sandstones and flagstones is a question of selection. In those which consist almost wholly of silica, the durability

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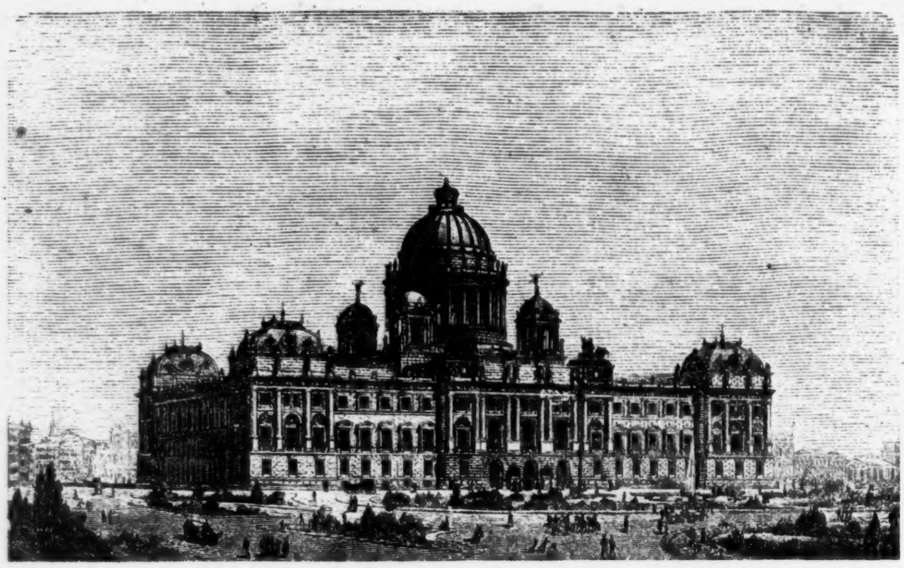

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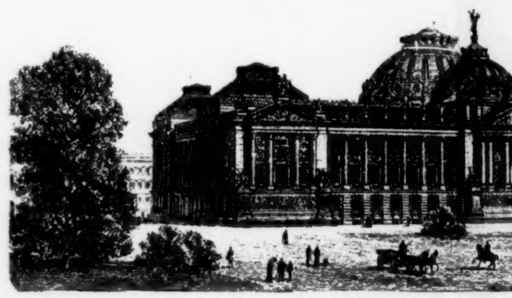
Perspektivische Ansicht vom Königsplatze.



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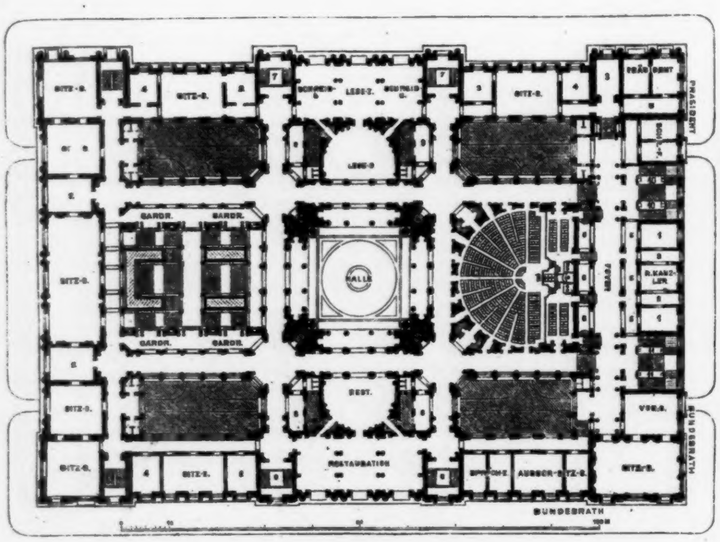

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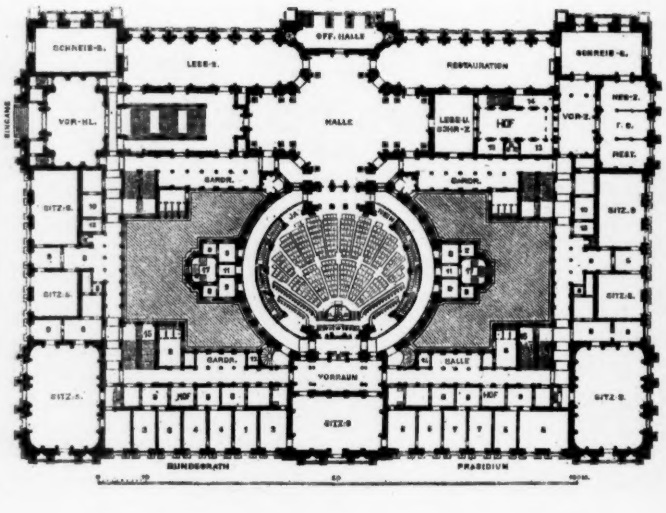

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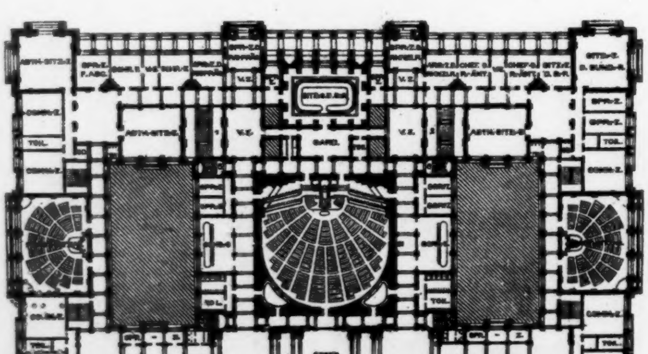

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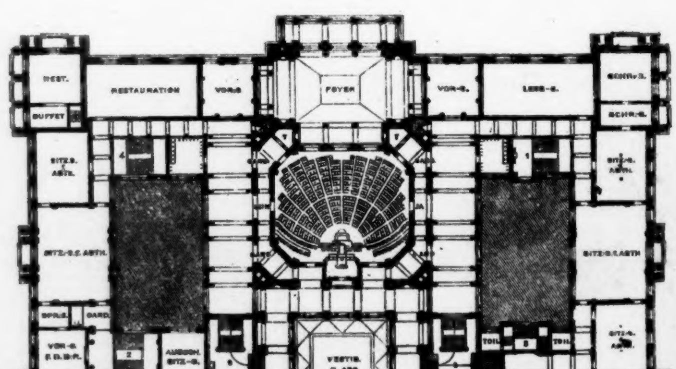
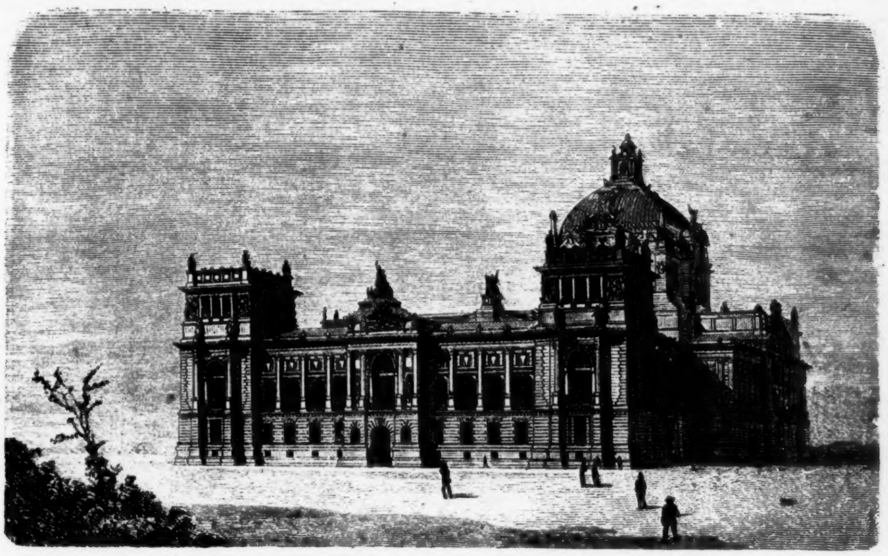


Entwurf von Busse & Schwechten in Berlin. Dritter Preis.

COMPETITIVE DESIGNS FOR THE BER

n Grofzheim in Berlin. Zweiter Preis.
Ansicht vom Brandenburger Thor her.



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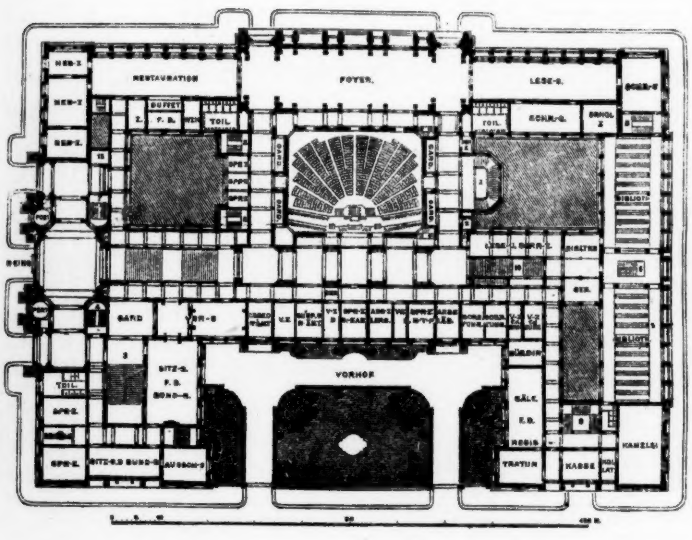
Perspektivische Ansicht vom Brandenburger Thor her.



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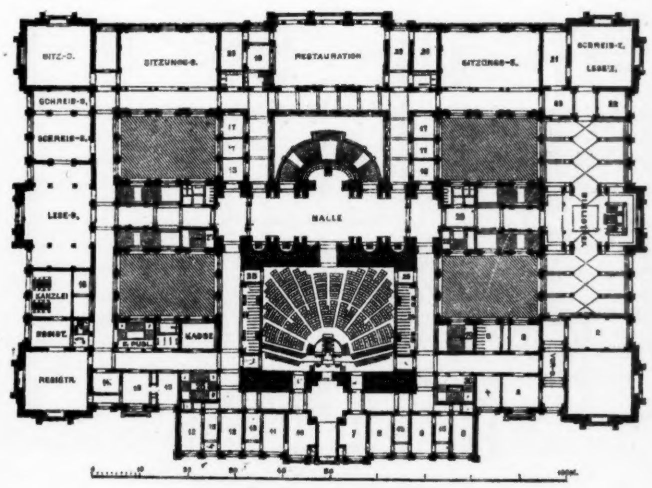

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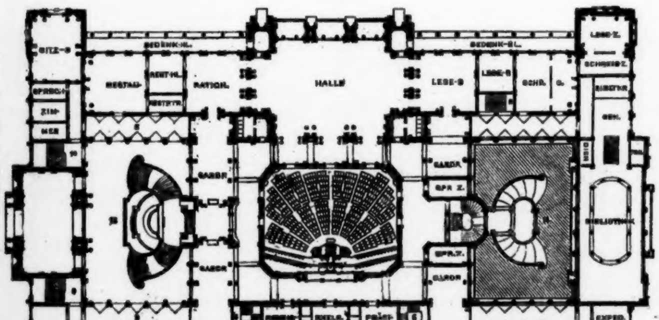
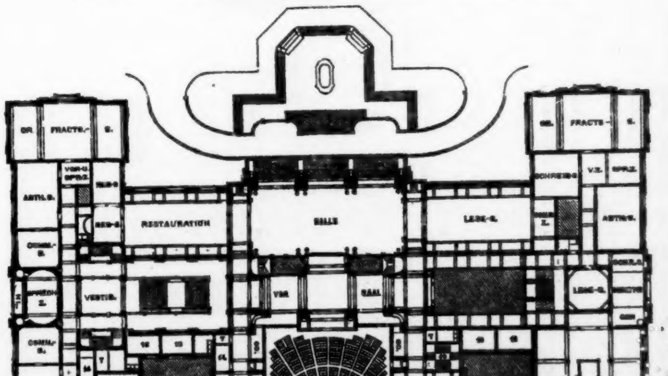


Entwurf von Heinrich Seeling in Berlin. Zweiter Preis.



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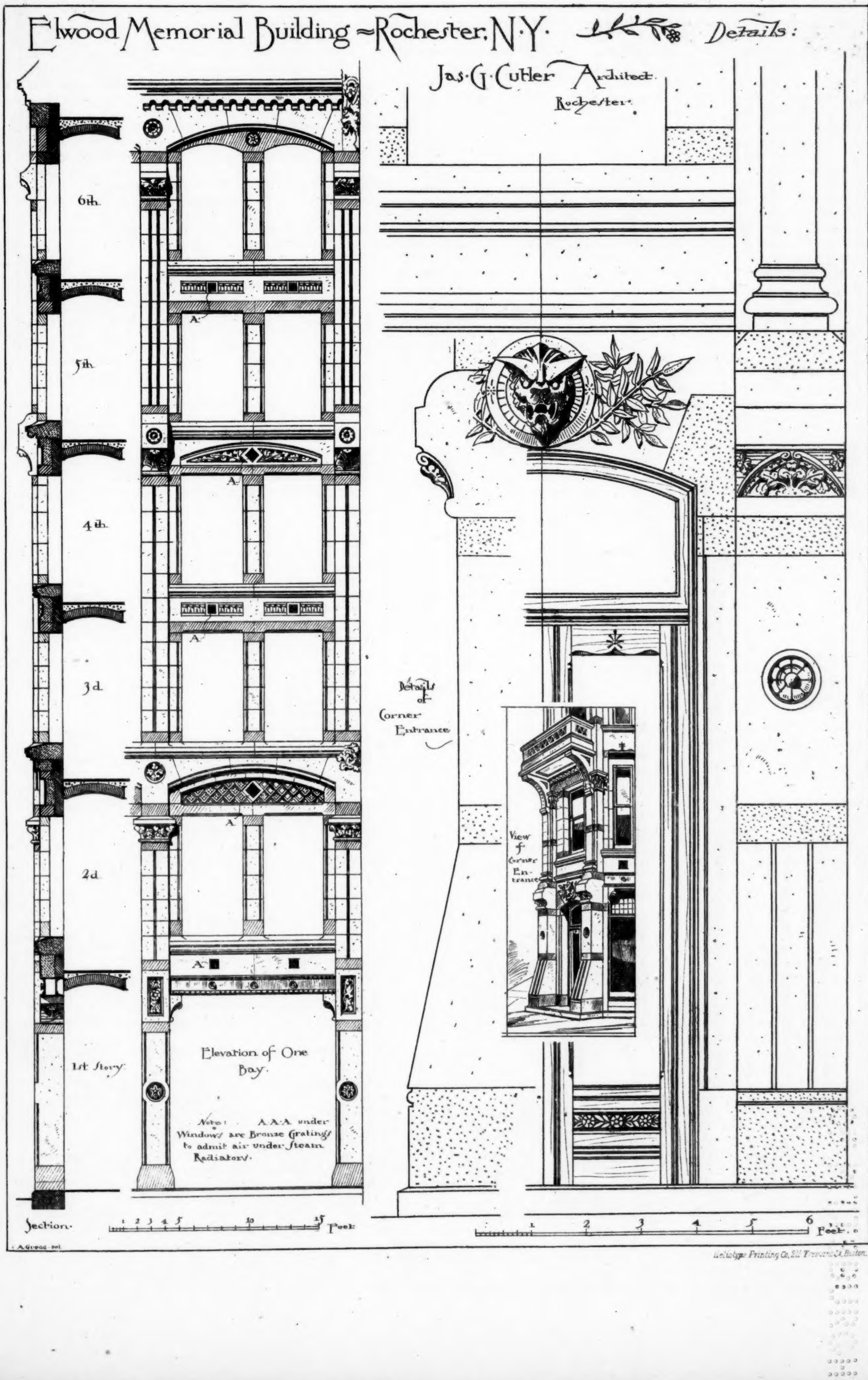
THE BERLIN HOUSES OF PARLIAMENT.



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is very great. Some of these stones contain as much as 98 per cent of silica. A tomb of this material is cited which was erected in 1646, and ordered by the Scottish Parliament to be defaced in 1662. The original chisel-marks are still fresh on the surface of the stone (as in the case of the scutcheons at Naples), on which the lapse of two hundred years has produced little effect, except that of somewhat roughening the exposed faces on the west and north sides.

In cases, however, of striated or colored sandstones, destruction goes on by solution of the cement or matrix in which the particles of silica are embedded. The most common kinds of matrix are clay, carbonates of lime and of iron, and the hydrous and anhydrous peroxides of iron. In one case of a stone of this kind an inscription cut in 1863 is no longer legible. We should like to know the depth to which the letters were originally cut: ⅛″ at least has been removed from the stone in sixteen years, which is at the rate of nearly ¾″ in a century.

The well-known propriety of the rule for setting stone on its natural bed is illustrated by the degradation of laminated flagstones when set on edge. Dr. Geikie cites an instance in the case of stones thus treated of the loss of ⅓″ in thickness in forty years, which rather exceeds ¾″ in a century. A curious instance is also given of pillars of a concretionary sandstone, which exposure to the air for one hundred and fifty years has hollowed out into positive troughs, with hollows from 4″ to 6″ deep, and from 6″ to 8″ broad.

As to granite, we are referred to the experiments of Professor Pfaff, of Erlingen, described in the *Allgemeine Geologie als exacte Wissenschaft*, p. 317, on granite, syenite, Solenhofen limestone and bone. From the limestone the Professor found the loss to amount to the removal of a uniform layer of 0.04 millimetre in three years, which gives .52″ in a century. The annual loss of granite he estimated as 0.0076 millimetre per year from unpolished, and 0.0085 millimetre per year from polished surface. This difference of more than 10 per cent against the latter is contrary to what would have been expected, and it has to be asked for what period of time the more rapid weathering is supposed to continue. The slower rate amounts to .30″ per century. Granite has been employed monumentally in Edinburgh for too short a time to allow of the measurement of its rate of decay there; but in connection with the subject we may be allowed to recall remarks made in the columns of the *Builder* nearly twenty years ago on the subject of the rough and granulated surface of the granite on the west face of Waterloo Bridge. The arches and exterior face of that bridge are built of Cornish granite, from the vicinity of Penryn, and the balustrade is made of fine gray Aberdeen granite. A careful and exact admeasurement of the projections of this bridge, compared with the original dimensions, would enable the student to arrive at a correct estimate of the rate of weathering of these two kinds of granite in London. The bridge was opened in June, 1817.

The close of this interesting specimen of the "Geological Sketches" of Dr. Geikie refers to the fact that in the towns and villages in the northeast of Scotland, where the population is sparse, and where comparatively little smoke passes into the air, the marble tablets last longer than they do in Edinburgh, but still show everywhere indications of decay. They suffer chiefly from superficial erosion, but cases may be observed of curvature and fracture.

In contrast to the perishable character here ascribed to granite, to marble, and to any but the purest silicious sandstone, is the durability of the humble material, clay slate. This is employed for monumental purposes in Aberdeenshire. It contains cubes of pyrites, which might have been anticipated to prove sources of destructive chemical action, but which seem to be inert. The stone is easily dressed in thin smooth slabs. A tombstone of this material erected in the old burying-ground at Peterhead, between 1785 and 1790, retains its lettering as sharp and smooth as if only recently incised. The stone is soft enough to be easily cut with a knife. The cubes of pyrites are covered with a thin film of brown hydrous peroxide. The slate is slightly stained yellow round each cube, but its general smooth surface is not affected. While neighboring marble tablets, one hundred to one hundred and fifty years old, present rough granular surfaces and half-effaced inscriptions, the lapse of nearly a century has produced scarcely any appreciable change upon the clay slate.

The durability of this material, when prepared by nature for the stone-cutter, may be compared with that of the even humbler, but equally durable, substance of artificially baked clay. In the dry and frostless air of Egypt, marble and granite are almost perennial in their duration. But the main revelation of the forgotten history of the past is derived from the baked clay inscriptions of Assyria. The inertness of this substance, its hygrometric resistance, and feeble chemical affinity with any element with which it comes in contact, is the cause of its indifference to the passage of time, or rathe to the recurrence of those changes of temperature and of moistur which accompany the revolution of the year. If the value of clay slate as a material for monumental inscriptions had been better and more largely known, how much would our churches and church-yards tell, which is now wholly unrecorded?

The chief cause of the interest which we took, from the first hint of this publication, that reached us by chance, in these researches of Dr. Geikie was the hope that they would throw some definite light on what we regard as the most difficult and one of the most interesting questions relating to any monuments in Europe, viz.: the age of Avebury and of Stonehenge. Nor are the remarks without direct bearing on that subject. The stone known as "Sarsen" fulfills the requirements above shown to be conducive to the most permanent durability. It is compact, uniform, close-grained silex. We cannot cite any chemical analysis of the stone; but we do know that the Wiltshire farmers have found it so indestructible by the usual instruments of agricultural violence, that they had recourse to the barbarous plan of roasting these priceless monoliths, heaping faggots on them to make a bonfire, and then throwing on cold water to crack the stones! This argues wonderful resisting power in the "Sarsen," and no one can be familiar with the stone in question without seeing that it affords the least possible advantage to the tooth of Time. Time, indeed, as Dr. Geikie observes, is not an agent, except indirectly, in the matter. Mere duration from day to day has little or nothing in it that is destructive, as we see in Egypt. It is because the revolution of the year and the succession of the seasons expose a monument to the successive and ever-repeated attacks of rain, of frost, of perhaps the scoring draughts of wind-driven sand, and because the incessant repetition of these small causes of decay produces a great accumulated effect, that we regard time as destructive. But too much attention cannot be given to the consideration that it is the action of severe frost on stone containing water that is the main cause of decay, and we venture to suggest, as a subject for careful chemical analysis, how far the existence of water or the elements of water, not as moisture but as chemically combined with lime, magnesia, or other elements, in a stone, may render it susceptible to the attacks of frost. That idea is perhaps a new one; but we feel certain that the hygrometric relations of marble and compact limestones are not by any means clearly understood. The effect of frost on these stones has been shown. This view of the case makes it the more necessary to repeat and to comprehend the experiments of Professor Pfaff on granite. In anticipation any one would have said that polished granite would be the most durable; and the idea that it would most thoroughly throw off the rain and thus escape soaking and subsequent frost-splitting concurs with this anticipation. If the case really proves to be the reverse we can see no explanation for it, except in the possibility of the bruising of individual molecules of felspar in the process of polishing, so as to make them more readily absorbent. But this is a subject that will repay the most careful experiment.

As to the Wiltshire monoliths, we think that the whole inquiry above mentioned points in the direction of their immense antiquity. The only chance, so to speak, of Time for attacking them is when they are so set as to expose the ends of what really is, though not visibly, the bed-course. Those who know Avebury will remember the marks of decay on some of the 18-foot monoliths that form the sides and roofs of the cellæ. The inference, seen from the light of the Edinburgh observations, points to enormous age. Let us add that, at a distance from the spot, we have no means of determining the chemical constitution of the "blue stones" in the inner ring of Stonehenge, or their present condition as compared to that of their giant brethren in the trilithons. Here is a subject for careful observation, analysis and record, and it may prove that a comparison of the chemical constitution and lithological condition of these two kinds of stone may enable the man of science to construct something of an archæological calculus that will throw light on the date of Stonehenge. — *The Builder*.

CYPRESS.

KNOWING that what we said last week about the attempt now making to introduce cypress as a building wood to the relief of our lessening supply of pine would make our readers desire to know as much of it and its characteristics as possible, we reproduce from the *Northwestern Lumberman* the following account:

The cypress tree (*Cupressus disticha*) is one of the most interesting of its genus for the varied application of its wood, and also for its extraordinary dimensions in a favorable soil and climate. In Louisiana it is called cypre or cypres, and in the older southern states cypress and sometimes bald cypress. The names of black and white cypress in the Carolinas and Georgia are founded entirely on the quality and color of the wood. It is not found above the latitude of 39°. About the first appearance on the eastern coast is on the banks of Indian River, in Delaware, and farther southward it becomes more abundant in the swamps. In Maryland and Virginia it is confined to the vicinity of the sea, where the winters are mild and the summers' heat intense. Beyond Norfolk its limits coincide exactly with those of the pine barrens, and in the Carolinas and Georgia it covers a great portion of the large swamps bordering upon the rivers after they have left the mountains. The great Dismal Swamp of Virginia and North Carolina extends from near Norfolk a distance of about forty miles, with an average width of twenty-five miles, and this abounds in cypress, plentifully interspersed with white cedar. Since the war the primitive methods of lumbering have been abandoned, and now there is a canal running north and south through the swamp, which is used for transporting logs to Norfolk. In some places the old corduroy road has given way to tramroads, and the mule carts have disappeared.

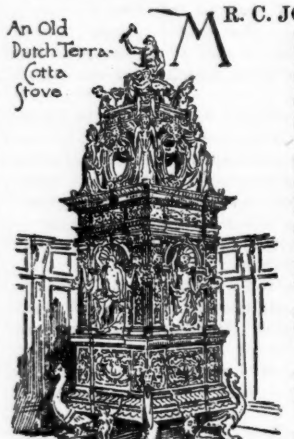
The Mississippi River, from the delta to the mouth of the Arkansas River, is bored with marshes, which, at each annual overflowing, forms a vast expanse of water. In Louisiana those parts of the marshes, where the cypress grows almost alone, are called cyprieres, or swamps, and sometimes there are thousands of trees in a tract. In these swamps of the sunny southern states, from Florida to Texas, where, on the deep, miry soil, a rich layer of vegetable mold is every year deposited by the floods, the cypress attains its greatest development. The largest trees are 120 feet in height, and from 25 to 40 feet in circumference above the conical base, which at the surface of the earth is always three or four times as large as the continued diameter of the trunk. Those felling the trees build scaffolds five or six feet high, upon which they stand to chop down these huge southern vegetable monsters. The base is usually hollow for three-fourths of its bulk. Its surface is longitudinally furrowed with deep channels, the ridges of which serve as cramps to fix it more firmly in the loose soil. Upon the largest roots are conical protuberances 18 to 24 inches long, and sometimes four to five feet thick. These are hollow, and the surface is covered with a reddish bark, like the roots, which they resemble. These curious growths exhibit no signs of vegetation, and no cause can be assigned for their existence. They are peculiar to this tree, and begin to appear when the tree attains an altitude of 20 or 25 feet. They are not without value, as they are used for bee-hives — the famous bee-gum of the Americanized Ethiopian. Amidst the pine forests and savannas of Florida is seen, here and there, a bog or a plash of water filled with cypress trees, the squalid appearance, even when they exceed 18 or 20 feet in height, showing how much they are affected by the barrenness of a soil which lacks a layer of vegetable mold.

The wood is fine grained. After exposure to the air it becomes of a dim reddish color. It possesses great strength and elasticity, and is lighter and less resinous than the wood of the pines. To these properties is added the faculty of long resistance to the heat and moisture of a southern climate. The color of the bark and properties of the wood vary with the nature of the soil. Trees growing near the natural bed of rivers, and surrounded half the year with water to the height of three or four feet, have a lighter colored bark than those standing where water does not reach them, and the wood is whiter, less resinous, and lighter. These are called white cypress. The others are darker, and so called black cypress.

In the preparation of the wood both varieties should be cut in winter, and seasoned until perfectly dry. Where the wood abounds it is extensively used for building purposes. Roofs covered with cypress shingles from timber cut in winter will last for forty years. The boards are preferred to pine for the inside work of brick houses in the South, and for window-sashes and panels of doors exposed to the weather. Cabinet-makers in the South use it for the inside of mahogany furniture. It has been used for the sides of vessels, and to a limited extent for masts. Large trunks are frequently made into canoes, some of them thirty feet long and five feet wide. They are more solid and durable than those of any other tree. It makes the best pipes to convey water under ground, especially the black variety. There is some difficulty in the manufacture of the lumber. Many trees are quite defective, hollow and shaky. The green wood is very heavy, and will not float. They are sometimes girdled one year before felling in the swamp, to get them free from the sappy fluid, after which they can be rafted.

This truly excellent wood is now used for various purposes, and there is an increasing inquiry for it. Boat-builders use it to a considerable extent. Many of the small boats belonging to the men-of-war in the United States service are constructed of cypress; much is used for water-tanks on account of its durability; some enters into the construction of houses and house-finishing, it being excellent in ceiling, and large quantities are made into shingles and railroad cross-ties. The Lehigh Valley Railroad Company ordered 75,000 of these ties to be used upon its road this season. In some instances the shingles are manufactured with the large end finished round and octagonal, that the roof may present a finer appearance. These kinds are used upon churches in the rural districts, and upon villas where the builders wish to display some taste in lines that vary from the ancient, straight and conventional methods. Some claim that shingles, properly prepared, will last one hundred years. They are certainly very durable. Wood taken from submerged swamps, which has been in contact with the decaying influences of mud and water for untold centuries, is found to be in an excellent state of preservation. Cypress logs have been taken from the soil deep underneath New Orleans in good condition. Evidences are abundant and conclusive in regard to the lasting properties of the wood. Hence it is gradually creeping into use more and more each year. Already it is being used in many houses in New York city in finishing, with calls for more. Five million shingles is the estimated amount of consumption in the New York market, with an increasing demand. The most of these are manufactured in North Carolina and Virginia. At least 3,000,000 feet of wood will be required to supply the market in railroad ties the present year, and about 2,000,000 feet of lumber for general use. It is exported to some extent to various ports. Railroad ties have been sent to Cuba, France, and England. Lumber has been sent abroad, but in no great quantities.

ON THE PREVENTION OF FIRES IN THEATRES.[1]



MR. C. JOHN HAXAMER recently read a paper on this subject before the Franklin Institute which has been published in the *Journal* of that society and from which we make the following excerpts:

First, as to the number of theatres in general: Europe contains 1486 theatres, of which France has 337; Italy, 296; Spain, 178; Great Britain, 164, and Austria, 152. The United States have 567 (about). Paris has 40; London, 32; New York, 21; Naples and Milan, 31 each. Philadelphia, 12, and Rome, Turin, and Brussels, each 10.[2]

Comparing the number of theatres with the population we find the following ratios:

Italy, one theatre for every 75,000 inhabitants. United States one theatre for every 90,000 inhabitants.

Spain,	one	theatre	for	every	93,000	inhabitants.
France,	"	"	"	"	110,000	"
Great Britain,	"	"	"	"	184,000	"
Austria,	"	"	"	"	235,000	"
Russia,	"	"	"	"	1360,000	"
Turkey	"	"	"	"	2,000,000	"

Theatre-fires can have but two eventualities; either the fire is extinguished in a few minutes, or the entire theatre destroyed. This is easily accounted for by the extraordinary danger, from fire, of our modern theatres.

In the large space called the stage (of which the audience sees comparatively little) we find immense masses of laths, boards, and other wood-work, which, by long heating, are entirely dry, and may, therefore, be instantly inflamed. Among these we find great quantities of gauze, coarse canvas, and other easily inflammable goods. Furthermore, ropes, paper soaked in varnish, paste-board, etc., in short, a mass as readily inflammable as could well be found.

In the midst of these is the more or less well-arranged heating apparatus; also a great number of gas-flames, each forming a dangerous sphere around itself.

The danger is still increased by these combustible materials not remaining stationary. They are let down, drawn up, shifted about, and are, therefore, more liable to come in contact with the gas-flame. At times it is necessary to provide illuminating effects temporarily, as, for instance, where the chandelier of a ball-room scene which is fed by a rubber hose, must be removed during a change of scene.

We are particularly careful in places filled with combustible materials to enter them with closed lanterns only, eschewing open lights and candles. On the stage, to the contrary, guns are fired off, torches swung, fire-works set off, while, at the same time, scenes of laths and canvas are let down, as, for example, in the last scene of "Sardanapalus." A German writer on this subject says: "One who has been behind the scenes during the performance of a spectacular piece, and found himself suddenly enveloped in a sea of fire, and has noticed how a score of men are engaged in extinguishing (by means of wet rags suspended on long poles) the sparks which have settled on the scenery; who has noticed how, notwithstanding all care, fiery objects fly from their prescribed course, or has seen how a piece of fire-work too strongly loaded throws everything into confusion; one who sees this for the first time cannot overcome the feelings of astonishment and fear; and this, when viewed from the audience, is no more than is common in spectacular pieces."

These circumstances, not taking into account criminal negligence, show how readily a stage may be set on fire; and how if not extinguished immediately, or at most in the first minute, it must spread with immense rapidity and destroy the whole building. After this time the most strenuous efforts are futile. During such intense heat the, so-called, fire-proof constructions become useless, the strongest walls are destroyed, marble is burned into lime, cast-iron disintegrates, wrought-iron loses all tenacity, and the entire building is destroyed. . . .

The time of day at which such fires occur is a consideration of great importance. It has been calculated that 13 per cent of all the thea-

[1] [A paper read at the Stated Meeting of the Franklin Institute, held June 21, 1882, by C. John Hexamer.]

[2] The above statistics were taken several years ago. An article in the *Daily News* a short time ago, shows that London, at present, has 57 theatres, 408 music halls and 475 other places of amusement, which can, on the average, accommodate daily 3?2,000 persons. The average daily attendance at the theatres is about 126,000.

tre-fires occur in day-time, before, or during rehearsals, which are generally held by gas-light; two per cent in the evening before the audience has entered; 21 per cent during the performances; 48 per cent during the two hours following the performances; and 16 per cent later at night. The statement may excite surprise that nearly one-half of all theatre-fires occur two hours after the performances; and that it is this period which is the most dangerous. It has been stated above that, in theatres, flames spread with lightning speed, but in case a spark has settled on a piece of canvas, it may glow for a long time unnoticed, until a sudden draught causes it to burst into flames. This cause combined with the poor, or entirely neglected, watching of stages at night-time explains this seemingly peculiar fact. . . .

Of all the better known theatre-fires, it has been found that 23 per cent were isolated, and on this account the further spreading of the flames was impossible; 36 per cent greatly endangered the surrounding buildings, and these were only saved by the most strenuous efforts, and 41 per cent (nearly half) extended to other buildings. Theatres should, therefore, not expose other buildings. . . .

The most frequent cause of fire is carelessness. An instructive example is afforded by the destruction by fire of the "Grand Opera House" at Dresden. With incredible carelessness workmen had been ordered to repair some rubber hose with a benzine solution; the garret in which they worked being dark, they lighted it by candles. These inexperienced people carried on this dangerous business for some time, until at last, on the 21st of September, 1869, one of the workmen, in lighting a candle, lit the benzine on his hands, and at the same time some rags: in a short time the whole building was in flames, and totally destroyed. With such management it may not excite surprise to learn that during the fire all water reservoirs were empty, and that the wire curtain was rusted fast, and could not be let down.

The question is frequently asked, "What can be done to diminish the combustibility of materials employed on stages?"

This is not an easy question to answer; that the heating and lighting appliances, divided over manifold points of the stage, as well as manipulations with open lights, and even fire-works, are necessary for modern theatrical performances, there is no doubt. In themselves they are not dangerous; but the danger lies in the great quantity of wood-work, gauze, coarse canvas, and other readily combustible materials of which scenery is made. If we remove the ready combustibility of these objects, not every spark and flickering gas-flame will endanger the existence of the entire theatre, and the special danger of the stage and loft-rigging is immediately overcome.

The experiment of making certain pieces of decoration of an incombustible material has been tried many times, and with considerable success. Especially the flies, as being most exposed and hanging among the border-lights, have in some cases been made of fine wire gauze. The interstices were then filled with an incombustible substance, and the flies were then painted in the usual manner. This method certainly gives entire security against fire, and the greater amount of first cost is more than counterbalanced by their greater durability; but the inconvenience of handling such pieces is greatly increased by their greater weight, making them practically impossible for drops, and larger wings and flats.

Another device is to protect the wood and canvas by painting it with suitable materials, and thus to make it incombustible.

After the rebuilding of the "Opera House" at Munich (destroyed by fire, 1823) the wood-work was given a few coats of water-glass. This kept well for twenty years, but later trials showed that the coating of water-glass had changed its *chemical composition, and gave no further security.*

Water-glass is further objectionable on account of the gloss it imparts to scenery, thereby reflecting light, and spoiling the artistic effect of the painting.

The impregnation of scenery, before painting, has been strongly advocated, and especially of the afore-mentioned flies. Some of the different substances used for this purpose are alum, sodium sulphate, borax, the soluble fluorides, and calcium sulphate. It was claimed that by impregnation canvas became so far incombustible that it could neither propagate flames, nor glow for any length of time, and even under great heat would only char.

After the fire at the "Berlin Opera House" the authorities ordered the soaking of all scenery in a solution of alum.

The same question was raised, and given a commission to decide, some twenty-five years ago, in Paris. On account of the report of this commission an ordinance was issued enforcing the impregnation of all scenery. This was carried into effect in several theatres until, unexpectedly, some impregnated gauze was set on fire by the heat of a candle. The mayor had the case investigated. It was found that the ingredients used had lost their protective power, and had changed the chemical composition of the paint.

The writer ascribes the failure of these experiments to the manner in which the process was conducted: the canvas being in all cases, merely soaked in the solution, and then dried and painted. If a piece of canvas is soaked in water-glass, and allowed to dry, the liquid, in losing its water, will contract more and more, until finally the solid particles will sit loosely on the *yarn* of the canvas.

Again, sodium tetra-silicate (water-glass being soluble in water) is dissolved on coming in contact with water. The water-colors used in scene-painting may, therefore, have dissolved the greater part of the silicate at the start.

To obviate this the author would suggest the following: After thoroughly soaking the canvas in water-glass it should be placed in a dilute solution of hydrochloric acid: this would precipitate the silica inside of the *fibres* of the yarn itself. The reaction being the formation of silica, sodium chloride, and water; viz.: $Na_2Si_4O_9 + HCl = 4SiO_2 + 2NaCl + H_2O$. The silica, being insoluble in water, could not be washed out, and, on account of its precipitation in the fibres, could not readily be thrown out, this process being a parallel case to the use of a mordant in dyeing; the linen in that case being first soaked in color, and this then precipitated (made fast) by the mordant. As silica has no gloss this process would also get over that difficulty.

Of course, any other incombustible substance precipitated into the fibres will answer as well as the above.

Other solutions recently recommended for purposes of impregnation are: Versmann's and Oppenheim's, who advise a solution of 2 parts of sodium tungstate with 3 parts of sodium phosphate; Nicoll, one consisting of 6 parts of alum, 2 parts borax, and one part dextrine dissolved in soap-water; Siebdrath uses 5 parts of alum, 5 of ammonium phosphate, and 100 parts of water; Patera, 15 parts borax, 11¼ parts of sodium sulphate, and 100 of water; Martie, 8 parts ammonium sulphate, 2½ of sodium carbonate, 3 parts boracic acid, 2 of borax, 2 of starch, and 100 of water. And very recently it has been suggested to use a solution of magnesium chloride. . . .

All doors contained in "fire-walls" should have springs or weights attached to them, so as to be at *all* times closed. Fire-doors can be shut automatically by a weight which is released by the melting of a piece of very fusible solder employed for this purpose. "So sensitive is this solder that a fire-door has been made to shut by holding a lamp some distance beneath the soldered link and holding an open handkerchief between the lamp and link. Though the handkerchief was not charred, hot air enough had reached the metal to fuse the solder and allow the apparatus to start into operation."

These solders are alloys more fusible than the most fusible of their component metels. A few of them are: Wood's alloy consisting of:

Cadmium, ...	1 to 2 parts.
Tin, ...	2 parts.
Lead, ...	4 parts.
Bismuth, ...	7 to 8 parts.

This alloy is fusible between 150° and 159° Fahrenheit. The fusible metal of d'Arcet is composed of

Bismuth, ...	8 parts.
Lead, ...	5 parts.
Tin, ...	3 parts.

It melts at 173.3°. We can, therefore, by proper mixture, form a solder which will melt at any desirable temperature.

PAINTING IRON SURFACES.

CONTINUALLY growing in importance as iron becomes more and more an every-day building material is the best method of preserving it by paint, the various chemical methods of rust-prevention being as yet too imperfect and too expensive for ordinary use. The following extracts from a paper read by Mr. William Meeking, before the Civil and Mechanical Engineers' Society, London, furnishes some technical points of interest in relation to this subject. It says:

Of the varieties of lacquers and paints used it is needless to speak at length as the all-important point is the actual state of the iron surface when the first coat is laid on. If that is not in proper condition no subsequent application, however good in itself, has any chance of being permanently preservative, and I think that that proper state is found when there has been formed upon the whole surface of the work a thin layer of the first or black oxide, which has been, while hot, thoroughly permeated by and incorporated with a resinous and tarry covering. Once formed, everything goes well. Additional coats of paint may be applied from time to time to renew the thickness of the original covering, but the iron underneath remains unattacked. If, on the contrary, a film of hydrate oxide (ordinary rust from exposure) be once allowed to form, the successive coats of paint are thrown off sooner or later, and, in the meantime, the rust has spread under the paint. A striking instance of this may be generally seen after outdoor riveted work has been in place for some time. As a rule all the riveting is done before the final painting is commenced, and each rivet-head has in the meantime been exposed to a damp atmosphere: the paint invariably commences to peel off the rivet-heads long before it leaves the adjacent plates, and when this has once taken place nothing but a thorough scraping off of the surface will give the paint any chance of adhering. So slight are the differences of manipulation which determine whether a given piece of work shall or shall not rust away, that I think they may all be found in the different methods of manufacture pursued now and formerly. Taking the case of a piece of ornamental iron-work, which in so many instances has come down to us in unimpaired beauty and condition, it would be now probably forged in detail in one part of a factory, drilled, filed and fitted in another, and when completely finished be painted "in three coats of best oil paint." Formerly the smith who forged the work punched the necessary holes at the same time, fitted his various pieces together as he went on, completing each piece as he proceeded, doing all the work with his hammer, and, to quote an old book of direction to good smiths, "brushing his work over with linseed oil, and suspending it for some time over a strongly smoking wood fire." This will give at once a sort of elastic enamel coat, perfectly adherent, calculated to preserve the iron to the utmost.

To come to practical uses: it appears to me, first, that in all cases where iron is used externally there should be the most careful provision made for draining off water, and preventing any lodgment in inaccessible places; second, that the iron used should be in the largest and most compact masses possible, with a due regard to the necessities of construction, avoiding, by all means, such designs as are calculated to provide the largest possible surface for a given weight of metal; third, to take care that, before the metal leaves the iron-works, and while heated, it receives a coat of some protective substance, such as tar or linseed oil, which shall be allowed to incorporate itself with its external surface and form a durable substratum for future coverings.

MONTHLY CHRONICLE.

July 1. Wind-storm strikes Coalville, Pa. Two persons killed, twenty-five wounded.

July 4. The "*Scioto*," excursion steamer, is run into and sunk on the Ohio. About sixty lives lost.

July 6. At Buenos Ayres, during the celebration of memorial services for Garibaldi, a fire catches a lodge curtain and causes a panic. Twenty persons killed.

July 11. Death of Arthur Gilman, architect, of New York.

Alexandria is bombarded by the English fleet.

July 12. A three-story brick building at Texarkana, Ark., being struck by lightning falls onto and crushes an adjoining saloon, which then takes fire. Thirty lives lost.

Serious gas explosions in Paris. Twelve houses destroyed. Twenty persons killed and many injured.

July 13. Preliminary dedication of the Hôtel de Ville, Paris.

July 19. Severe earthquake shock felt in the city of Mexico. Many walls fall. No one injured. The shock was more severe in towns farther south.

July 20. Slight earthquake shock felt at Cairo, Ill.

July 24. Death of Robert Briggs, C. E.

CARPET DESIGNS.

Brooklyn.

To the Editors of the American Architect: —

Dear Sir, — Can you tell me to what scale carpet designs are usually drawn, and in what essentials designs for ingrain carpets differ from those for moquettes and velvets?

Yours, C.

[Ingrain carpets are designed at one-half the full size. Brussels designs are usually as near the full size as the dimensions of the paper will admit, about ¾. The essential difference between designs for ingrain carpets and moquettes and velvets is that the number of colors in the latter is unlimited, while in the former it is restricted to the comparatively small variety which can be introduced in the warp and filling of a two or three ply fabric. — Eds. American Architect.]

NOTES AND CLIPPINGS.

A Peculiar Electric-Light Accident. — A London exchange tells how an accident of a peculiar character occurred lately at Brighton. While the members of the local volunteer fire-brigade were proceeding up North road with their fire-escape, it came in contact with the electric-light wire overhead, and the electric fluid descending the wire-work of the escape, caused those volunteers who were holding it to lose their control. Another member, thinking the machine was falling, grasped the steering-rod, and received the full force of the electricity, which was so powerful as to bend him double and disable him for upward of an hour.

Over Five Thousand Electric-Lights in One Building. — The Mills Building, Wall and Broad Streets, New York, has been wired for 5,588 Edison lamps. As this is the largest enterprise of the kind ever undertaken the details may prove interesting. The conductors consist of 1,650 feet of Edison's patent electric tubes, 628 feet of lead pipe containing taped wires thoroughly insulated, 23,658 feet of zinc tubes, 75,909 feet of wire conductors, and 24,162 feet of wooded receptacles, placed between the floors, to hold the system of distributed wires. The total amount of wires used was 3,774 pounds, besides 48 vertical main cut-outs, and 253 division cut-outs. — *Scientific American.*

A Memorial Tablet to Garibaldi. — A striking bit of history is told by the inscription on the marble tablet erected the other day in a room of a house in Velletri, Italy, by the authorities of that notable little city: "In this chamber," it reads, "Ferdinand II, of Bourbon, on the night of XVII May, MDCCCXLIX, in face of a few regiments of volunteers, in vain sought to sleep in the midst of an army. Here reposed victorious, on the following night, Giuseppe Garibaldi. Pius IX, returning from Portici to Rome, here dreamt of grandeur and stability of government among foreign swords. Here returned in MDCCCLXXV, and here, the country free and secure, slept Giuseppe Garibaldi. And here no one will ever sleep again."

Flameless Combustion. — A new theory of combustion was practically illustrated by Mr. Thomas Fletcher, of Warrington, at a soirée of the Society of Chemical Industry at Owens College, the results being so totally unexpected that many present would, and in fact did, go away with the impression that some deception was being practised. Mr. Jacob Reese, the inventor of the Reese fusing disc, has stated his belief that if it were possible to produce combustion without flame, the temperature and duty obtained from any fuel would be enormously increased. It has remained for Mr. Fletcher to not only prove the possibility of flameless combustion in more than one form, but also to demonstrate practically the enormously high temperatures which can be obtained by this means. Taking a ball of iron wire about three pounds in weight, Mr. Fletcher placed it on a slab of fire-clay, and directing a blowpipe flame on it for a few seconds he suddenly blew the flame out. The temperature increased so rapidly that in a few seconds the wrought-iron fused and ran into drops, and this temperature was steadily maintained. The room was darkened, but the closest examination did not show a trace of flame, although the fact that the gas was burning was proved by repeatedly relighting and extinguishing it. The same experiment was repeated in another form by directing the flameless heat into a small fire-clay chamber, in which a refractory clay crucible, made specially for nickel melting, was partially fused and worked into a ball like soft putty, the sides of the fire-clay chamber being at the same time fused. The heat was so tremendous that the blowpipe laboratory, which was given up to Mr. Fletcher for the evening, was much too hot to be agreeable, in spite of open windows and ventilators. How far this discovery can be utilized remains to be seen, but it would appear that the presence of flame, usually considered to be a sign of combustion, is really an indication of imperfect results, and the best duty is to be obtained only when flame is totally absent. It is certain that such temperatures as those obtained by Mr. Fletcher without flame have never previously been obtained with the fuel used, which was nothing more than a small gas-supply for a quarter-inch pipe, assisted by an air blast. — *The Architect.*

The Earthquakes in Italy. — A correspondent at Sienna gives us further details of the earthquakes in Tuscany. Between thirty and forty shocks were felt during the visitation, lasting from the morning of Tuesday, the 11th, until Wednesday night. The earthquake began about 10 o'clock on Tuesday morning with two slight shocks, followed half an hour later by two others so strong that the soldiers were all turned out of the barracks, and the people rushed out of the houses on to the Lizza for safety. The houses rocked; the plaster came tumbling down the chimneys. The shocks were repeated, some strong, some weak, throughout the day at intervals of a quarter to half an hour. Sienna was in a panic: the bells were rung; the thrice-holy Madonna del Vuoto was uncovered. Some of the nobility, afraid of their own houses, had their carriages dragged on to the Lizza and slept there in the open air. At 2 o'clock in the morning there came a shock so strong and terrifying it was as if a mine had been sprung under the city. After that the force of the concussions decreased. On Wednesday the shocks were slighter and less frequent, as though an invisible charge of cavalry was passing by. By night there was no rocking, the bells had ceased to peal, the prayers became less stringent; and so (says our correspondent) you may safely "recommend the uncovering of the Madonna as a good recipe. As to the causes of the phenomenon, there can be no doubt that it was owing to the municipality having put up two tablets to Garibaldi the week before." — *Pall Mall Gazette.*

Discovery of Mural Paintings near Corinth. — Eastward from the site of Corinth workmen in making a road broke through a tomb at a place called Megali Porta. Three sides were destroyed, and the tomb was empty. The fourth side offers a very rare specimen of Greek art — namely: mural paintings. The wall is divided into four parts, of which the uppermost has squares containing pictures of grapes and birds. In the third row are three small niches with three well-preserved paintings of figures between them. In the fourth and lowest division are fruits in baskets, and birds which eat or drink from vessels. In the second row is a continuous series of scenes. One represents the funeral feast. A table is the centre, around which a helmeted figure and others are lying in the attitude assumed by the ancients at their meals. He is nude to the waist, and has a white cloth over his legs. Another male figure (nude) stands at the foot of the couch. Other figures appear to be in violent emotion, perhaps of grief. The Archæological Museum of Athens has had a copy made by Professor Lytras in order to preserve a record of the color of the paintings, as well as of the scenes in so far as they can be made out. — *Chicago Tribune.*

Old Wooden Bolts in Housebuilding. — Why do you make so lavish a use of nails in the carpenter's work of our houses, to the exclusion of the honest old oaken pin? Pull down any building, if it be merely a barn, of more than two hundred years old, and you will not find a single nail in the original work: rafters and joists were all bolted together so stoutly as almost to defy the tools of the destroyer. Many an old manor barn, when pulled down of late years — as unfortunately only too many of them have been — has shown itself to have been better built than most palaces are now. There are arguments in the way of economy of time and so on in favor of the use of nails in housebuilding, but they are as nothing compared with the solid advantages of using wooden bolts. The iron nails in time canker and rot rafters and floors, but bolts hold them together "like grim death," and render a house practically indestructible. — *Exeter Flying Post.*

The London Custom-House. — It is said that the Custom-House at London is to be sold, although the site upon which it stands has been used for the purpose for five centuries. The present building was erected sixty-eight years ago and cost £2,500,000.

A Berlin Tenement. — It is said that in one building in Berlin — a lofty double house with a rear house connected — 1,258 persons make their home.

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.]

261,838. HEATER. — Stephen Ducolin, Norwood, N. Y.

261,843. FIRE-LADDER. — David Friedheim, New York, N. Y.

261,847. FIRE-ESCAPE. — John Graff, New York, N. Y.

261,874. FIRE-LADDER. — George W. Rich, Portland, Me.

261,877. SASH-BALANCE. — S. Howland Russell, New York, N. Y.

261,879. APPARATUS FOR HEATING AND VENTILATING BUILDINGS. — Isaac D. Smead, Toledo, O.

261,880–881. ELEVATOR. — William Stephens, Philadelphia, Pa.

261,884. HEATER. — Robert M. Weir, Boone, Io.

261,911. BRICK-MACHINE. — Jas. C. Conroy, Allegheny, and Henry D. Kilgore, Pittsburg, Pa.

261,921. VENTILATING WINDOWS. — Herman Hart, Muncie, Ind.

261,925. SCREW-DRIVER. — Eduard Herzie, Jersey City, N. J.

261,932. SAW-HANDLE. — Carey W. Knapp, Geneva, O.

261,945. HOT-AIR REGISTER. — Walter C. Munson, Brooklyn, N. Y.

261,968. KNOB-ATTACHMENT. — Warren H. Taylor, Stamford, Conn.

261,972. WATER-ELEVATOR. — John S. Wallace, Nelsonville, O.

261,974. WATER-CLOSET. — Peter White, St. Louis, Mo.

261,991. WASH-STAND. — Nathan O. Bond, Fairfax Court-House, Va.

262,005. DOOR-SPRING AND PNEUMATIC DOOR-CHECK. — Walter C. Clark, Auburndale, and Edward W. Gillon, Boston, Mass.

262,007. SUBTERRANEAN DUMB-WAITER. — John L. Connable, Xenia, O.

262,038. SASH-FASTENER. — William P. Hayhurst, Argentine, Kan.

262,068. DOOR-HANGER. — Timothy Lynch, Dundee, N. Y.

262,120. DOOR-HANGER. — Henry E. Richards, Ottawa, Ill.

262,133. ARTIFICIAL PAVING AND BUILDING MATERIAL. — Alexander L. Scott, Philadelphia, Pa.

262,154. ELEVATOR. — Charles H. Vincent, Lynn, Mass.

SUMMARY OF THE WEEK.

Baltimore.

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

T. H. Morrow, 2 two-st'y brick buildings, Comb Alley, between Hill and York Sts.

C. H. Pindell and T. H. Frisby, 8 two-st'y brick buildings, Paca St., between West and Stockholm Sts.

W. A. Hanway, 5 three-st'y brick buildings, Roberts St., between Druid Hill Ave. and Etting St.

G. F. Bachman, 3 two-st'y brick buildings, Poultney St., e of James Alley.

Boston.

BUILDING PERMITS. — *Brick.* — *Chardon St.*, near Hawkins St., Ward 7, for S. H. Beals, six-st'y mercantile, 85' x 114' and 118'; T. J. Whidden & Co., builders.

Columbus Ave., B. & P. R. R. yard, for B. & P. R. R. Co., Truck offices, 17' 6" x 32'.

Washington St., Nos. 2151-2163, cor. Winthrop and Winslow Places, Ward 19, for Wm. Sheafe, five-st'y stores and tenements, 51' 9" and 52' 8" x 150'; J. W. Coburn & Co., builders.

Winthrop Pl., near Washington St., Ward 19, for Wm. Sheafe, four-st'y dwell., 44' and 47' x 46'; J. W. Coburn & Co., builders.

East First St., rear, opposite N St., Ward 14, for City of Boston, two-st'y mansard stable, 36' x 56'; Dady & Flint, builders.

House of Correction Grounds, two-st'y mansard stable, 36' x 56'; Dady & Flint, builders.

Atlantic Ave., rear 366 Foster's Wharf, Ward 12, for Foster's Wharf Co., three-st'y stable, 32' x 34'; Wm. M. Rumery & Co., builders.

Brooklyn.

BUILDING PERMITS. — *Berkeley Pl.*, s s, 150' e Sixth Ave., 2 three-st'y brownstone dwells.; cost, each, $9,000; owner, M. M. Vail, 151 East Sixty-first St., New York; architect, M. J. Morrill; builder, Thos. Ward.

Stagg St., e s, 200' n Bushwick Ave., three-st'y frame tenement; cost, $4,000; owner, Ellen Wilson, 250 Stagg St.; architect, G. Wilson.

Kosciusko St., s s, 125' w Tompkins Ave., three-st'y frame factory; cost, $3,000; owners, Joseph Wild & Co.; architect, J. D. Reynold; builder, T. E. Greenland.

Fourth Ave., e s, 23' n Prospect Ave., 3 two-st'y frame dwells.; cost, $1,200; owner, J. H. Watson, 421 Grand Ave.; builder, J. H. Edwards.

Stanhope St., n s, 125' e Central Ave., three-st'y frame tenement; cost, $3,000; owner, architect and builder, C. Isbill, 593 Herkimer St.

Marcy Ave., s e cor. Park Ave., one-st'y frame church; cost, $9,000; owner, Tompkins Ave. Congregation Soc.; architects, Parfitt Bros.

Herkimer St., s s, 47' e Columbus Pl., 2 two-st'y frame dwells.; cost, each, $2,300; owner, Helena Bossong, 256 Houston St., New York; architect, —— Gilbert; builders, A. Bossong and John Frye.

Greene St., No. 206, s s, 175' w Oakland Ave., three-st'y frame tenement; cost, $2,875; owner, J. Hogan, on premises; architect, —— Gamble; mason, J. Hogan; carpenters, Port & Gamble.

Chicago.

HOSPITAL. — St. Luke's Hospital will build five new buildings for hospital purposes from plans by Treat & Folz. They will be the administration building, the autopsy and kitchen buildings, and two pavilions. They are to be built on Indiana Ave., s of Fourteenth St., and to cost $150,000.

FACTORY. — Johnson & Arneson will build a four-st'y furniture factory of brick, 50' x 156', on Noble St., between Ohio and Indiana Sts., from plans by C. O. Hausen, to cost $11,000.

BUILDING PERMITS. — E. B. Sheldon, three-st'y brick flats, 25' x 40', 747 Wells St.; cost, $6,000.

Wm. Sebastian, three-st'y and basement brick stores and flats, 40' x 64', 353 and 355 Sedgwick St.; cost, $12,000.

Mrs. M. Mund, one-st'y brick store, 22' x 64', 593 Clybourn Ave.; cost, $4,000.

C. Kahles, three-st'y brick store and flats, 1019 West Madison St.; cost, $9,000.

Thomas Deady, three-st'y and basement brick store and dwell., 24' x 62', 1211 Blue Island Ave.; cost, $5,500.

Davis Studley, two-st'y brick dwell., 20' x 58', 107 Winchester Ave.; cost, $4,000.

Wm. Flanneforth, two-st'y brick store and dwell., 25' x 59', 506 Chicago Ave.; cost, $3,500.

Thorson & Tollakson, five-st'y brick factory, 60' x 70', 37–39 Armor St.; cost, $15,000; C. O. Hansen, architect.

James Otis, two-st'y brick dwell., 20' x 40', No. 2421 Michigan Ave.; cost, $7,000.

L. Warlich, additional story, 20' x 40', 39 North Clark St.; cost, $3,000.

John Beidner, three-st'y brick store and dwell., 25' x 70', 580 Blue Island Ave.; cost, $7,000.

R. M. Cherrie, two-st'y brick barn, 26' x 50', 2541 Wabash Ave.; cost, $3,500.

F. Larned, 6 two-st'y and basement brick dwells., 40' x 120', Stanton Ave.; cost, $12,000.

L. Endres, three-st'y and basement brick store and dwell., 23' x 56', 2350 Cottage Grove Ave.; cost, $7,500.

Joseph Roubick, three-st'y and basement brick store and dwell., 25' x 64', 239 West Twelfth St.; cost, $8,000.

Julius Zuehlke, two-st'y and basement brick store and dwell., 25' x 50', 1101 Milwaukee Ave.; cost, $3,000.

E. B. Sheldon, three-st'y brick flats, 37' x 45', 14 and 16 Lincoln Ave.; cost, $8,000.

Walker & Berk, four-st'y brick brewery, 48' x 80', Desplaines and Indiana Sts.; cost, $28,000.

J. W. Perine, two-st'y brick dwell., 40' x 42', 815 and 818 Hinman St.; cost, $4,000.

Rev. C. Mauerman, 2 three-st'y and basement brick dwells and stores, 50' x 70', Twenty-fourth St. and Wentworth Ave.; cost, $16,000.

J. H. Wren, two-st'y and basement brick dwell., 30' x 53', 2915 Prairie Ave.; cost, $4,000.

M. D. Wells, one-st'y addition, 65' x 99', Madison and Market Sts.; cost, $5,500.

Fred. Fraun, two-st'y brick dwell., 22' x 64', 40 Fremont St.; cost, $3,500.

Mrs. M. Topping, two-st'y brick store and dwell., 21' x 50', 1041 West Madison St.; cost, $4,000.

I. Schladweiler, three-st'y brick wagon-shop, 25' x 70', 379 West Lake St.; cost, $3,000.

John Breen, two-st'y brick store and dwell., 26' x 70', 3700 South Halsted St.; cost, $5,500.

A. M. Garner, 5 two-st'y brick dwells., 39' x 96', Selden St., near Twelfth St.; cost, $12,000.

J. E. Pritchard, two-st'y brick dwell., 21' x 46', 1230 West Jackson St.; cost, $2,500.

H. H. Nash, three-st'y brick dwell., 50' x 61'; Jackson & Roby; cost, $16,000.

Peter Johnson, three-st'y brick store and dwell., 24' x 70', 490 West Chicago Ave.; cost, $5,500.

W. Boesen, three-st'y brick dwell. and store, 22' x 36', 300 Mohawk St.; cost, $3,500.

F. Schwicktenburg, two-st'y brick dwell., 22' x 56', 680 Holt St.; cost, $2,900.

John Coughlan, two-st'y brick dwell., 24' x 47', No. 24 Meridian St.; cost, $3,500.

Ed. Ely, two-st'y brick dwell., 15' x 32', 208 Twenty-eighth St.; cost, $2,500.

J. W. Gehring, two-st'y brick flats, 40' x 60', 54 and 56 South May St.; cost, $9,000.

Frank Kaspar, three-st'y brick dwell. and store, 23' x 60', 483 South Canal St.; cost, $7,000.

F. W. Faberberg, two-st'y and basement brick store and dwell., 74 East Chicago Ave.; cost, $6,000.

Henry Beckerman, three-st'y brick dwell., 22' x 53', 28 Granger St.; cost, $4,500.

C. D. Talcott, two-st'y brick dwell., 21' x 45', No. 231 Thirtieth St.; cost, $3,000.

M. Gunderson, three-st'y brick dwell., 23' x 50', 96 Park St.; cost, $6,000.

D. V. Thomas, two-st'y brick dwell., 22' x 45', 902 Warren Ave.; cost, $3,000.

Cincinnati.

DEPOT. — Proposals will be received at the office of the Engineer and Superintendent to-day, August 12, for all labor and material required in building the foundation and first story for the new Union depot, on the southwest corner of Third and Central Aves. Work to include masonry, cut-stone, and carpenter work.

STORES. — Mr. F. Lamping is to build two stores 45' x 105', three-story, on the s w corner of Vine St. and Madison Pike; cost, $12,000; Mr. George W. Rapp, architect.

MALT-HOUSE. — Mr. Wm. Stichtennoth is remodelling his malt-kiln and ventilators on Twelfth and Clay Sts., according to plans prepared by Mr. George W. Rapp.

HOUSES. — J. M. Brunswick has commenced work on a new house on Grand View Ave., Walnut Hills. The house is to be of pressed brick and freestone. Cost, about $30,000; S. E. Des Jardins, architect.

W. H. Blymyer is to build a pressed brick dwelling-house on Beecher St., Walnut Hills. Cost, $12,000; S. E. Des Jardins, architect.

S. E. Des Jardins is preparing plans for a frame dwelling-house to be built on Lincoln Ave., Walnut Hills, for W. R. Teasdale, Esq. Cost, about $9,000.

BUILDING PERMITS. — During the past week the following permits have been issued for new buildings:

Henry Rerching, three-st'y brick dwell., Sherman St., near Dalton Ave.; cost, $5,800.

F. Hassman, three-st'y brick dwell., 116 Gest St.; cost, $2,200.

Emil Dehler, three-st'y brick dwell., Liberty St., near Elm St.; cost, $3,000.

Fred Bawmhter, three-st'y brick dwell., Gest St., near State Ave.; cost, $4,000.

E. Dalbro, one-st'y frame dwell., cor. of Freeman and Sloo Sts.; cost, $2,000.

H. Metke, three-st'y brick dwell., Poplar St., bet. Western and Dalton Aves.; cost, $4,000.

Herman Wahking, two-st'y brick dwell., Reading Road, near Shillite St.; cost, $6,000.

Six permits for repairs; cost, $6,800.

New York.

BUILDING PERMITS. — *East Ninetieth St., No.* 161, four-st'y brick and stone flat; cost, $30,000; owner and builder, John F. Gleason, 163 East Ninetieth St.; architect, L. B. Wheeler.

East Ninetieth St., No. 159, four-st'y brick and stone flat; cost, $20,000; owner, architect and builder, same as last.

West Fifty-fourth St., Nos. 149 *and* 151, 2 two-st'y brick stables; cost, each, $10,000; owner, Wm. B. Baldwin, 145 West Fifty-fifth St.; architect, Geo. B. Pelham; builders, David Kennedy and E. Corbett.

Seventy-seventh St., s s, 250' w First Ave., 3 five-st'y brick flats; cost, each, $20,000, owner and architect, Wm. F. Burroughs, Jackson Ave., near One Hundred and Sixty-first St.

West One Hundred and Twenty-fourth St., Nos. 222 *and* 224, 2 four-st'y brick tenements; cost, each, $9,000; owner, Mary McKaegney, 224 West One Hundred and Twenty-fourth St.; architect, M. L. Nugrich; builder, Patrick McKaegney.

One Hundred and Twenty-sixth St., n s, 200' e Seventh Ave., 3 three-st'y and basement brick and stone dwells.; cost, each, $8,000; owner, Adelaide Wilson, 215 West One Hundred and Twenty-sixth St.; architect, John F. Miller; superintendent, Thos. Wilson.

Ave. A, e s, 32' 3" s One Hundred and Twenty-first St., three-st'y brownstone front dwell.; cost, $8,000; owner, John C. C. Gilsey, Ave. A, between One Hundred and Twentieth and One Hundred and Twenty-first Sts.; architect, C. E. Hadden.

One Hundred and Sixteenth St., n s, 85' e Third Ave., 3 five-st'y brick flats; cost, each, $20,000; owner and builder, E. C. Coggeshall, 224 East One Hundred and Eighteenth St.; architects, Thom & Wilson.

Madison Ave., n w cor. One Hundred and Ninth St., 5 four-st'y brick tenements; cost, each, $12,000; owner, Marian E. Moore, 56 East One Hundred and Tenth St.; architects, Cleverdon & Putzel.

Third Ave., s e cor. Ninety-ninth St., 4 four-st'y brick tenements and stores; cost, each, $10,000; owner, John McGarry; architect, Andrew Spence.

Ninety-ninth St., s s, 75' e Third Ave., four-st'y brick tenement; cost, $9,500; owner and architect, same as last.

Division St., Nos. 192 *and* 192½, five-st'y brick tenement and store; cost, $12,000; owners, Sobel Bros., 162 Greenwich St.; architect, Henry Dudley; builders, Joseph Schaeffler & Son.

East Eighty-fourth St., No. 430, three-st'y brownstone front dwell.; cost, $12,000; owner, Edward H. Wallace, 420 East Eighty-fourth St.; architect, John McIntyre; masons, Robinson & Wallace.

Willis Ave., w s, 75' s One Hundred and Forty-third St., three-st'y brick dwell.; cost, $5,000; owner, Chas. Weiffenbach, 285 Penn St., Brooklyn; architects, Kerby & Archer.

West Fifty-second St., Nos. 643 *and* 645, two-st'y brick stable; cost, $4,000; owners, Canda & Kane, foot of West Fifty-second St.; builders, Murphy & McGinty.

Fifty-second St., s s, 200' e Ninth Ave., four-st'y brownstone front tenement; cost, $12,000; owner, James Gillies, 353 West Fifty-first St.; architect, Wm. Kuhles; mason, Ph. Canfield.

East Twenty-fifth St., No. 223, three-st'y brick engine-house; cost, $18,000; owner, City of New York; architects, N. Le Brun & Son.

East Ninth St., Nos. 735, 737 *and* 739, rear, four-st'y brick factory; cost, $6,000; owner, W. F. Youngs, 143 Rodney St., Brooklyn; builders, Richard Shapter and Guy Culgin.

Pier No. 28, *North River*, foot of Laight St., one and two st'y frame and galvanized iron freight-shed; cost, $30,000; lessees, Pennsylvania R. R. Co., Jersey City; architect, Jos. M. Wilson.

Tenth Ave., w s, 60' s One Hundred and Sixth St., 2 four-st'y tenements; cost, each, $10,000; owner, James McGay, 34 Greenwich Ave.; architect, Robert Black.

Sixth Ave., w s, 20' s Fifty-seventh St., 3 four-st'y brick and stone flats and stores; cost, each, $18,000; owner, Louis Leypoldt, 34 West Thirty-seventh St.; architects, Thom & Wilson; builders, John P. Schweikert and F. Beinhauer.

Tenth Ave., w s, 54' 4" n Seventy-fourth St., five-st'y brownstone front flat and store; cost, $25,000; owner, August Mehler, 813 Ninth Ave.; architects, Thom & Wilson; builders, Peter Kay and Wm. P. Mitchell.

First Ave., s e cor. One Hundred and Seventh St., four-st'y brick flat and store; cost, $15,000; owner, John Norton, 1945 Third Ave.; architect, Barth. Walther.

Third Ave., w s, 60' s of One Hundred and Fifty-second St., three-st'y brick tenement; cost, $8,700; owner, John Menches, Third Ave., near One Hundred and Fifty-second St.; architect, Henry Pierney.

ALTERATIONS. — *South Fifth Ave., Nos.* 132 *and* 134, five-st'y brick extensions; owner, Amos R. Eno, by Amos F. Eno, 8 Pine St.; architect, Robert Mook; builder, James Rue.

Baxter St., s w cor. Walker St., front and gable walls to be rebuilt and interior alterations; cost, $4,500; owner, John Hooper, 65 Centre St.; lessee, Jacob Cohn; architect, John Brandt.

Tenth Ave., No. 933, four-st'y brick extension and interior alterations; cost, $5,000; owner, Emma A. Furber, 249 West Fifteenth St.; architect, R. Rosenstock.

Monroe St., No. 332, new store front; cost, $700; owner, Patrick Carraher, 2 Goerck St.; builders, James Hamel & Son.

West Thirty-eighth St., No. 30, two-st'y brick extension; cost, $3,000; owner, Jane Jacobs, guardian, on premises; architects, Thom & Wilson; builders, C. W. Klappert's Sons.

Third Ave., e s, cor. One Hundred and Sixty-third St., two-st'y brick extension; cost, $2,500; lessees, Hebrew Orphan Asylum, Seventy-seventh St., between Lexington and Third Aves.; architects, H. J. Schwarzmann & Co.; builders, List & Lennon and C. W. Klappert's Sons.

West Fifty-second St., No. 39, one-st'y brick extension; cost, $3,800; owner, Alexander Waldron, on premises; builder, J. C. Miller.

Philadelphia.

BUILDING PERMITS. — *Gerritt St.*, s s, w of Nineteenth St., 3 two-st'y dwells., 15' x 49'; M. B. Stackhouse, contractor.

Allen St., No. 429, two-st'y stable, 33' x 50'; Wm. Cummings, owner.

Eighth St., e s, n of York St., two-st'y greenhouse, 16' x 80'; Chas. Schuck, owner.

Thirty-sixth St., s w cor. Spruce St., three-st'y dwell., 21' x 74'; W. S. Kimball, contractor.

North Fourth St., No. 923, three-st'y dwell., 19' x 64'; A. T. Richards, contractor.

Front St., e s, s of Willow St., one-st'y addition to warehouse, 32' x 58'; Reading R. R. Co., owners.

Eleventh St., s e cor. Market St., four-st'y addition to Bingham House; cost, $50,000.

Paul St., w s, s of Sellers St., 2 three-st'y dwells., 16' x 48'; E. R. Welsh.

Broad St., w s, between Reed and Dickinson Sts., 15 three-st'y dwells., 17' x 58'; W. R. Maschett, owner.

Forty-sixth St., s s, s of Baltimore Road, two-st'y stable, 20' x 52'; W. L. Atkinson, contractor.

North Ninth St., No. 2416, three-st'y dwell., 14' x 30'; Pat Byrne, owner.

Fifth St., e s, n of Cambria St., 5 two-st'y dwells., 15' x 43' and 20' x 43'; Thos. L. Kelly, contractor.

Sumac St., near Wissahickon Station, 2 three-st'y dwells., 19' x 30'; Jas. Dobson, owner.

Clearfield St., n s, e of Twenty-ninth St., 8 two-st'y dwells., 16' x 42'; Robert Manly, contractor.

Scott's Lane, near Ridge Ave., three-st'y dwell., 16' x 42'; Robt. Manly, contractor.

Philip St., w s, n of Berks St., two-st'y stable, 25' x 40'; A. Beitney, owner.

Westminster St., s s, w of Fifty-fifth St., 7 two-st'y dwells., 14' x 40'; Jas. Dobbins, owner.

Fifty-nine-and-one-half St., e s, s of Lansdown Ave., 2 two-st'y dwells., 14' x 30'; Jno. Diggle, owner.

Paschall St., s s, e of Fifty-second St., three-st'y dwell., 18' x 46'; Peter Gray, owner.

St. Louis.

BUILDING PERMITS. — Forty-two permits have been issued since our last report, twenty-one of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows, viz.: —

Jno. J. Steffen, two-st'y dwell.; cost, $3,500; contractor, Jno. J. Steffen.

Mrs. Mary Kelly, two-st'y dwell.; cost, $2,756; contractor, Michael Lane.

T. Ritchey, two-st'y dwell.; cost, $4,500; owner, Chas. Wehking.

Fred. Wetrecht, two-st'y dwell.; cost, $4,650; architect, C. H. May; contractor, Wm. Kerksieck.

J. C. Nuelsen, three-st'y dwell.; cost, $4,000; contractors, Beckmeier & Reithmann.

S. M. Taylor, two-st'y dwell.; cost, $4,500; architect, J. B. Legg; contract sub-let.

S. M. Taylor, two-st'y dwell.; cost, $4,500; architect, J. B. Legg; contract sub-let.

Board of President and Directors of St. Louis Public Schools, one-st'y school house; cost, $7,000; architect, Kirchner; contractors, Beckmeier & Riethmann.

Dr. Morgner, two-st'y tenement; cost, $3,500.

H. F. Bubke, two-st'y dwell.; cost, $5,000; contractors, Grünewald & Winde.

J. W. Fitzgerald & Co., two-st'y dwell.; cost, $5,000.

St. Louis Gas-Light Co., two-st'y stable; cost, $5,000.

H. Wiehe, two-st'y dwell.; cost, $3,000; contractors, Torwegge & Wamhoff.

J. Tutlow, two-st'y dwell.; cost, $2,500.

J. Pullis, 3 two-st'y dwells.; cost, $11,000; contractor, S. H. Hoffman.

Mrs. Myers, 3 two-st'y dwells.; cost, $10,900; architect, A. Beinke; contractor, M. Kirkwood.

H. Reichardt, two-st'y dwell.; cost, $2,600; contractor, Wm. Gahl, Jr.

General Notes.

BATH, L. I. — The private hotel of Mr. Joseph Lowry is to have a three-st'y and basement addition, 50' x 200', which will include a ball-room, billiard-room, etc. The extension will give a frontage on the ocean of 260'; Mr. Jas. Stroud, of New York, architect.

LAWRENCEBURGH, IND. — Mr. Samuel Godley, architect, of Cincinnati, is preparing plans for the following work in this city:

Church for the Presbyterians, 30' x 50', brick, seating 250; cost, $8,000.

Christian Church, brick, to seat 250; cost, $5,000.

Two brick houses for the city authorities, for steam fire-engine purposes, costing, each $4,000.

PUTNAM, CONN. — Rumor says a block is to be built on the lot where the post-office now stands.

UTICA, N. Y. — A two-and-one-half-st'y frame dwelling-house, measuring 38' x 60', is to be built on Park Ave., for Mr. V. B. Stewart, at a cost of $6,000; Mr. F. H. Gouge is the architect; Messrs. Bamigan & Weber are the contractors for mason-work, and Walter Embley the contractor for carpenter-work. Work is begun.

A stone church for the West Utica Presbyterian Society, measuring 54' x 86', is to be built on Court and Garden Sts., at a cost of $25,000; Mr. Fred. H. Gouge is the architect; Messrs. Hughes & Jones are the contractors for the mason-work, and Messrs. Williams & Roberts contractors for carpenter-work. Work to begin immediately.

WALLINGFORD, PA. — Dr. Essig has commenced to build a three-st'y dwell.; first story of brick, and frame above; to cost about $10,000; A. W. Dilks, architect, Philadelphia; G. W. Parlett, contractor.

WESTMINSTER, CARROLL COUNTY, MD. — Additional record rooms to court-house, to be fire-proof, built of brick and stone, and have concrete covering with asphalt roof; Mr. Thos. Dixon, Baltimore, architect.

WYOMING, O. — Mr. A. C. Nash, architect, of Cincinnati, is preparing plans for a Baptist church, to be built at Wyoming, near Cincinnati. The building will be frame, 35' x 81', with lecture-room attached; cost, $8,000.

PROPOSALS.

SCHOOL-HOUSE. [At Boston, Mass.]

Sealed proposals will be received at the office of city architect **until Tuesday, August 15, at 12 o'clock,** M., for furnishing all materials and doing all the labor required to build and complete a grammar school-house, of brick, on Kenilworth St., Ward 21.

Separate proposals required for carpentry and masonry.

Proposals to be addressed to the undersigned and indorsed "Proposal for building grammar school-house, Kenilworth Street."

The committee reserve the right to reject any or all proposals received.

For plans and specifications apply at the office.

For the committee,

346 WILLIAM WOOLEY.

CITY HALL. [At Kansas City, Mo.]

CITY CLERK'S OFFICE,
CITY OF KANSAS, KAN.

Sealed proposals will be received at the office of the undersigned **until 12 o'clock, noon, of August 16, 1882,** for excavating, furnishing materials and completing a city-hall building for this city.

Plans and specifications on file in this office, and also in the office of the architect, George L. Carman, 14 Journal Building, Kansas City, Mo.

Each bid must be accompanied by a certified check in the sum of $300, as a guarantee that the bidder will enter into contract with the city in the event of its award to him.

The council reserves the right to reject any or all bids.

346 H. C. STOUT, City Clerk.

STEAM-HEATING. [At New York, N. Y.]

Proposals will be received at the office of the Department of Public Charities and Correction, No. 66 Third Ave., **until August 18, 1882,** for steam-heating and plumbing work to be done in the east wing to insane asylum on Ward's Island. For full information see *City Record*, for sale at No. 2 City Hall.

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HOOK-AND-LADDER HOUSE. [At New York, N. Y.]

Sealed proposals will be received at the office of the Fire Department **until August 16th, 1882,** for building a house at No. 195 Elizabeth St., for Hook and Ladder Co. No. 9. For full information see *City Record*, for sale at No. 2 City Hall. 346

LUMBER, ETC. [At New York, N. Y.]

Proposals will be received at the office of the Department of Public Charities and Correction, No. 66 Third Ave., **until August 18, 1882,** for groceries, dry goods, leather, straw and lumber. For full information see *City Record*, for sale at No. 2 City Hall.

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RAILROAD SHOPS. [At Ionia, Mich.]

Sealed proposals will be received **until 6 P. M., August 15, 1882,** for building and finishing new shops, etc., at Ionia, Mich., for the Detroit, Lansing & Northern Railroad, consisting of a machine-shop, 110' x 250'; a transfer pit and table, 60' x 278'; a car repair and paint shop, 80' x 280'; a boiler-house, 45' x 45', with chimney 100' high; and round house 250' in diameter, and a store, 20' x 100'; also, sewers, steam-heating, etc.

Plans and specifications can be seen at the office of the engineer, at Ionia, on and after August 5, 1882.

No proposal will be considered unless accompanied by a bond of $1,000, with at least two good sureties, to be approved by the general manager of the road, that the parties bidding will enter into a contract, and furnish satisfactory security in the sum of $25,000, that they will complete the work at the prices stated in their proposal.

The company reserves the right to reject any or all proposals.

The proposals to be endorsed "Proposals for Ionia shops," and addressed to J. J. McVean, engineer, Ionia, Mich., or to the undersigned at Detroit, Mich.

For further information apply to the engineer of the company at Ionia, or to E. B. Arnold & Co., architects, Bay City, Mich.

J. B. MULLIKEN,
346 General Manager.

BRIDGE ABUTMENTS. [Near Miami, O.]

AUDITOR'S OFFICE, HAMILTON COUNTY, O.,
CINCINNATI, July 28, 1882.

Sealed proposals will be received at the Office of the Commissioners of Hamilton County, O., **until Wednesday, August 23, 1882, at 12 o'clock,** M., for the building of abutments and wing walls of a bridge over the C., I., St. L. & C. R. R., on Cliff Avenue, in the hamlet of North Bend, Miami Township, Hamilton County.

The work is to be done in accordance with the specifications on file in the office of the County Commissioners. The right to reject any or all bids is reserved. W. S. CAPPELLER,

347 County Auditor.

PROPOSALS.

COURT-HOUSE, ETC. [At Washington C. H., O.]

WASHINGTON C. H., August 2, 1882.

Notice is hereby given that sealed proposals will be received at the Auditor's office at Washington C. H., O., **up to 1 o'clock, P. M., on the 31st day of August, 1882,** for the furnishing of materials and labor required in the construction of a court-house, jail and sheriff's residence for Fayette County, O., as per plans and specifications by D. W. Gibbs & Co., architects, now on file at the Auditor's office of said county.

Each proposal must be accompanied by a good and sufficient bond in the sum of one thousand dollars, conditional that if awarded the work, he or they will enter into contract and give the bond required in specifications. Blank bids will be furnished by the Auditor.

Court-house to be fire-proof, and will be constructed separate from jail and residence.

The right reserved to reject any or all bids.

By order of the Commissioners.

347 J. P. ROBINSON, Auditor.

WATER-WORKS. [At Sherburne, N. Y.]

SHERBURNE, N. Y., July 22, 1882.

Sealed proposals will be received **up to 12 M., of August 19,** by the Board of Water Commissioners, for the material and labor necessary in constructing the proposed water-works, at which time the bids will be publicly opened and announced.

Bids to be made on forms furnished by the Commission, and to be accompanied by a certified check or draft, payable to Treasurer of Sherburne Water Commission for two hundred and fifty dollars ($250); in case of an award the party will be required to enter into contract, or forfeit the above amount.

Amount of expenditure contemplated, about $25,000.

Specifications can be obtained from the Commission, and plans and drawings inspected at the Powell House, in the Village of Sherburne, on and after July 25, 1882.

The Board reserves the right to reject any or all bids, should they deem it for the interest of the village so to do.

ISAAC PLUMB,
SYLVANUS C. WATERS,
WM. M. BULLIS,
WM. E. DAVIS,
JESSE H. SHEPARD, } Commissioners.

P. H. BAERMANN,
346 Consulting Engineer, Troy, N. Y.

IRON ROOF. [At Albany, N. Y.]

NEW CAPITOL,
OFFICE OF THE SUPERINTENDENT,
ALBANY, N. Y., July 20, 1882.

Sealed proposals will be received at this office (where proposal blanks can be procured) **until 12 o'clock, noon, Friday, August 18, 1882,** for furnishing and putting up all the iron-work required to build the roof of the west front (including both pavilions) of this building, in accordance with plans and specifications now to be seen at this office. Said work is to be completed on or before the 1st day of February, 1883.

Each bid must be enclosed in an envelope, addressed to the undersigned, indorsed "Proposal for Iron Roof," and must be accompanied by bonds of two sureties, residents of the State of New York, each to the amount of $10,000.

Said sureties are to guarantee that the bidders will execute a contract if it is awarded to them, and will perform the same faithfully in accordance with the plans and specifications. The right is reserved for the Superintendent, with the concurrence of the New Capitol Commission, to reject any or all bids, and, after a contract is entered into, to declare said contract forfeited, whenever, in their judgment, it is not being performed for the interest of the State.

JAMES W. EATON,
346 Superintendent New Capitol.

RIP-RAP. [At Nantucket, Mass.]

UNITED STATES ENGINEER OFFICE,
NEWPORT, R. I., July 31, 1882.

Sealed proposals in triplicate, addressed to the undersigned, will be received at this office **until 12 o'clock, M., August 16, 1882,** for about 16,000 tons of rip-rap granite, in lots of 2,000 tons or more, for the jetty at the entrance to Nantucket Harbor, Mass.

For form of bids or any other information apply to this office. G. K. WARREN,

346 Lieut.-Col. Engineers, Brevet Maj.-Gen. U. S. A.

BUILDING. [At Benton Harbor, Mich.]

On and after August 3, 1882, we will be prepared to receive bids for the erection of a two-st'y and basement brick building, 85' x 125', at Benton Harbor, Mich. Plans and specifications can be seen at our office in Benton Harbor.

345 PITCHER, JONES & SONNER.

SCHOOL-HOUSE. [At Dunkirk, O.]

Sealed proposals will be received at the office of the Board of Education **up to 12 M., August 31, 1882,** for furnishing materials and performing work in the erection of and completing a union school-building according to plans and specifications to be on file at said office on and after August 23, 1882.

Each proposal for the several parts of the work to be made separate, as follows: —

Excavation.
Brick, rubble and cut-stone work.
Carpenter and joiner work and iron-work.
Galvanized iron, slate and tin work.
Painting and glazing.
Plastering.

The contract to be let separate or under one contract, the Board reserving the right, also, to reject any or all bids.

The names of the sureties to accompany each bid, that a contract may be entered into in case said contract is let. For further information address JOSEPH H. SWORLIM, Clerk; or J. C. HOLLAND, Architect, Ada, Ohio. 346