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THE burning of the Park Theatre in New York has called out much comment, and its rapid destruction after all the effort which has been made in that city to enforce the regulations for the protection of theatres against fire seems rather remarkable. It appears, however, that the apparatus in the theatre might as well have been altogether absent, since it could not be used. The men employed in the building understood their duty, and were quickly at their posts, but they had nothing to work with. There was a system of pipes on the stage, which proved to be out of order at the time of the fire, and according to one account, an automatic fire-extinguisher, which ought by itself to have flooded the building with water, failed to act. For some reason the alarm was slow in reaching the proper station, and all these circumstances concurred in permitting what should have been a trifling blaze to develop into a terrible conflagration. There can be no doubt that a great part of the theatres, not only in New York but in all other large cities, would be found in case of fire to be similarly unprotected. Whether a remedy for this state of things can be found in periodical inspections of fire-extinguishing apparatus, such as is proposed in several newspapers, is very doubtful. To say nothing of the inconvenience of testing such a contrivance as the automatic sprinkler every month or so on the stage, a few years of security would make even the inspection seem burdensome and useless, and it would soon become a mere form. The suggestion of Mr. Esterbrook, the Chief Inspector of Buildings in New York, that the law should oblige all theatres to be built of fire-proof materials throughout, would, if adopted, be the most effectual solution of the problem, but the difficulties in the way are almost insuperable, and the best practical substitute is probably the amendment to the building statutes proposed by Mr. Esterbrook himself last year, which embodies the best modern practice in theatre-building, and would insure a degree of safety infinitely greater than has ever yet been attained in this country.

THREE more fires in theatres have been recorded within a few days, one in Providence, where the Theatre Comique caught fire just before a matinée performance, but was saved by the automatic sprinklers, which extinguished the flames after a part of the scenery had been consumed; and another in New York, where the Alhambra Theatre, a small structure, frequented by a disreputable class of patrons, was completely destroyed by a conflagration which lasted only thirty minutes, from the time of the first alarm until everything within the walls had been swept away. Fortunately, the theatre was unoccupied, and no one was injured. The third fire was in Baltimore, where the Arlington Variety Theatre was partially burned, one person suffocated, and two more injured by jumping from windows and roofs. The fire occurred at three o'clock in the morning, and seems to have originated on the stage.

THE so-called "competition" for the Lincoln monument at Chicago, on which forty thousand dollars of trust money is to be expended, has resulted in the submission of three models, two of which are by sculptors residing abroad, who were paid a certain sum in cash for their trouble, while the third was, as we learn from the Chicago *Tribune*, "sent in at a venture" by a young artist of that city. This last design seems to have attracted the favorable notice of the *Tribune* reporter, who informs us that "although rough and unfinished, it is in many respects the most artistic and desirable of the lot." The sculptor's conception, it appears, presents the great President as a "stout figure," "hardly recalling the tall, gaunt form of Lincoln," with no particular features, since the face is "only indicated," "standing in an easy attitude upon a barrel-shaped pedestal," and "robed in a long, loose coat, thrown back upon the shoulders and falling down in free and easy lines." We might imagine that the artist had offered by mistake a sketch for King Gambrinus instead of the lamented President, were it not for the rest of the description, which informs us that a "spirited and vigorous group of figures surrounds the pedestal and rests upon the base, which tells the story of the Civil War in a distinct and forcible manner." The competing designs, though "very carefully and elaborately finished," do not please the reporter. One of them shows Lincoln as "a very austere and dignified figure," dressed in a "Prince Albert coat," and "polished boots," "balanced very uneasily upon a slender shaft, with one hand resting on a column, over which hangs the drapery of the stars and stripes." The pedestal is embellished with "female figures in bas-relief, typifying War and Peace, Emancipation, Sacrifice, Justice and Education." This description, we must confess, seems to justify the reporter's opinion of the design as "a stiff, conventional idea, very stiffly carried out," and although we hardly like to think of seeing Lincoln represented as standing on a barrel, it is by no means certain that this is not preferable to a pedestal guarded by an assorted collection of meaningless virtues. The third design is said to be very similar to the second, but better as a portrait. What the Bates trustees will do with the models remain to be seen. It is reported that they intend, if they do not like any of them, to throw them all aside, and institute a fresh competition. We imagine the present competitors will have something to say in that event, and that an attempt to get rid of them by any summary process may lead the trustees into trouble, so that we trust one of the models may suit them well enough to be adopted.

THE Telephone Despatch Company of Boston, encouraged by the success of the experimental cable laid last year between two stations on the Old Colony Railroad, has obtained authority for placing underground-wires in all the principal streets of that city, and is now engaged in laying cables of various kinds in the region immediately around its central office. In all cases the cables are enclosed in wrought-iron tubes, four inches in diameter, and buried in concrete, eight tubes being laid side by side in the same trench. The cables, some of which consist of a single wire insulated with paraffine and encased in lead tubing, while others comprise a number of copper wires insulated with rubber and protected with a wrapping of galvanized wire, are drawn through the permanent tubes and can be changed as often as desired. When everything is ready, comparative tests of the cables will be made, and although the officers of the Company do not expect to be able as yet to substitute subterranean for overhead wires, they may gain information which will hasten the time when such substitution may be possible.

A SOMEWHAT noted case, in which the firm of Viti Brothers was compelled to pay a duty of fifty per cent *ad valorem* on certain pieces of statuary imported from Italy, instead of ten per cent, which the importers claimed to be the proper duty, has just been decided against the Government, the judge of the United States Circuit Court holding that the meaning and intention of the law is that all statues, whether originals or copies from antiques, shall be admitted to this country under a duty of ten per cent. This is a decision of very considerable importance, as the Spartan severity with which the collectors of customs generally choose to interpret the statutes regulating the importation of works of art already bids fair to end in totally excluding such vanities unless of native manufacture.

AN interesting book on the Lake-dwellings of Scotland has been recently published by Dr. Robert Munro, who has made a long study of these singular structures. As his investigations show, the artificial islands of Scotland, instead of resting on a cluster of piles, like those of the Swiss lakes, had a solid foundation, made by means of a frame or platform of oak logs, which was loaded with stones and earth until it sank to the bottom. Into mortises previously made in the logs of the platform upright posts were then fitted, which were braced in various directions, the process of filling-in continuing until the mass reached the surface of the water. The outer edge was next revetted with a sloping breakwater of logs secured to the rest of the framework, and a platform of logs put over the whole upper surface of the island, which was then ready to build huts upon. In almost every instance a causeway or platform seems to have been built to connect the island with the main-land, but as this would afford access to enemies as well as friends, Dr. Munro conjectures that it may have been constructed below the water-level, so as to form a secret approach in case the canoes of the villagers should be lost or destroyed. As the water-level of most of the Scottish lakes has changed materially since these islands were built, it is impossible to determine how much probability there may be in this supposition, which certainly seems a little strained. Notwithstanding the primitive construction of the lake-dwellings, Dr. Munro thinks that most of them date only to the time of the Roman occupation of Britain, or rather, to the period after the withdrawal of the Roman armies, when the inhabitants of the more peaceful districts, no longer able to defend themselves against the warlike savages of the north, were compelled to seek refuge in habitations fortified after such simple modes. For many years, however, after the tattooed Picts had become tamed into rather unruly citizens, some of the Lowlanders whom their ancestors had so terrified continued to occupy their artificial islands, and a few of them are believed to have been occupied down to the sixteenth century. In Ireland, which was always at least a hundred years behind Britain in civilization, the lake-dwellings or crannogs, built in a manner precisely similar, are known to have been in use at or near the time of the commotions under Charles I. and Cromwell.

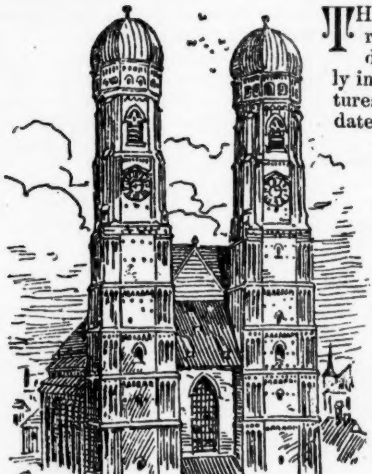
Mr. John C. Havemeyer writes from Yonkers to the New York *Times*, describing what he thinks a "simple, inexpensive and complete solution of the problem of keeping sewer-gas out of houses." The "solution" consists, in brief, of establishing in the cellar of the house a tight iron tank large enough to receive the entire drainage of the house for one day, connected to the sewer by a trapped pipe, and vented by a pipe to the outer air. Every day, after the tank is full, the valve connecting it with the sewer is to be opened, and at the same time a cock is to be turned which will admit water from the street mains for flushing. In order to show whether the tank is properly emptied, he proposes to place a float in it, which by means of a chain and dial in some convenient place would indicate the height of the water. This suggestion, which is not entirely new, has a specious air, but it is hardly necessary to point out to those experienced in such affairs that the receiving-tank would form a cesspool within the house, from which gases would arise far more concentrated and offensive than those from an ordinary sewer. To flush it would be practically impossible, and to disinfect it still more so, while it would be perfectly useless in any event, since any soil-pipe or system of pipes which would prevent the vapors from such a tank from issuing into the house would be equally secure against gases from the sewer. It seems rather late in the day to have to repeat that no reservoir whatever of drainage-matter is admissible within a house. To make sure that all decomposable substances shall be swept beyond the walls as quickly and surely as possible is the prime object of modern sanitary science, and with modern sanitary appliances it is practically secured; and the introduction of tanks or reservoirs of any kind on the drainage lines would be a retrograde step which there is no occasion for taking.

During the session of Parliament which has just closed authority was given to various railway companies for expending in the construction of new lines sums which amount in the aggregate to a very large capital. The total estimated cost of the projects authorized in the present year is more than double that for 1881, showing that the fever of railway construction now so prevalent here has its counterpart on the other side of the ocean. Not content with a very large expenditure for stations and other buildings in 1881, the railway companies already in operation asked for and obtained in 1882 authority for building and equipping five hundred and ninety-one miles of new road, at a cost of about thirty-seven million pounds; while new companies were incorporated and authorized to build seven hundred and eighty-nine miles more, at an expense of forty-six million pounds. Taking old and new companies together, the number of miles of railway authorized by the late Parliament is one thousand three hundred and eighty, of which the estimated cost is eighty-two million, six hundred and sixty-two thousand pounds, or about four hundred and ten million dollars. The most expensive new line in proportion to its length is the Regent's Canal, City and Docks Railway, which is to be nineteen miles long, and will cost fifty-two millions of dollars; and the next is a city railway in Glasgow, which will be three miles long, and is to cost nearly four million dollars. One of the most interesting of the new projects is one for an electric railway from Charing Cross to the Waterloo Station of the London and Southwestern Railway Company. This line is to be entirely underground, and will pass from Charing Cross under the new Northumberland Avenue to the River Thames, and by a tunnel under the river to the Waterloo Station, three-quarters of a mile from the starting point.

At the third annual meeting of the American Society of Mechanical Engineers, held in New York last week, the astonishing statement was made that six thousand dangerous defects had been found in steam-boilers in one year, within a district whose extent does not seem to have been specified. If we assume a factor of safety of ten as the ratio between that weakness of a boiler which causes it to be classed as dangerous and that which leads to its actual failure, it would appear that two explosions a day should be the normal rate; but perhaps a larger factor is required in such cases. In regard to such explosions a novel theory has been advanced, the deductions from which have considerable practical value. Every one knows that water, after long boiling, loses its capacity for quiet and steady ebullition, and assumes a violent and intermittent mode of evaporation, the temperature of the water often rising quietly to a point far above the nominal boiling point, and then suddenly falling, with the instantaneous liberation of a considerable volume of steam. This condition, which has not been very satisfactorily explained, undoubtedly exists at the time of many boiler explosions, and it is desirable to find some means of avoiding it. This end may be accomplished, it is found, by restoring to the water the dissolved gas which is eliminated by boiling, and the particles of which seem to form nuclei around which steam-bubbles can form rapidly and quietly. In one form of apparatus air is injected forcibly into the water of the boiler, and serves to maintain a quiet and uniform evaporation, and a chemical substitute for the mechanical addition of permanent gas is said to have been successfully applied by the simple process of placing pieces of zinc in the boiler. This, coming in contact with the iron shell, forms a voltaic pair, the current of which decomposes the water about it, producing free oxygen and hydrogen, which serve, like air, to determine the rapid and steady boiling of the unchanged portion of the water.

Nearly three years ago, in April, 1880, a grant was made by the Commonwealth of Massachusetts to the Boston Public Library of thirty-three thousand square feet of land at the corner of Dartmouth and Boylston Streets, in a very central and conspicuous position, as a site for a new library building, the present one, half a mile or so distant, being now far too restricted in dimensions, as well as inconvenient in plan. The gift was made upon the condition that the work of constructing the new building should be begun within three years from the date of the grant, but hitherto no very serious attempt has been made to raise funds for its erection, and the Boston newspapers are beginning to call attention to the fact that only five months now remain of the period within which operations must be actually commenced, or the land, worth at present prices at least a quarter of a million of dollars, will be forfeited. It is not impossible that the time may be extended by the favor of the State Legislature, but those interested in the library ought hardly to take the risk of losing a property which others stand ready to claim if opportunity offers. So far as we are aware, no steps have been taken even toward the preparation of plans for the new building, and as out-door work will probably be impracticable during at least three out of the ensuing five months, energetic action is needed to prevent disappointment to many persons.

FROM BAYREUTH TO RATISBON.—NOTES OF A HASTY TRIP.—II.


Cathedral at Munich. Bavaria.

THE chief buildings of Bayreuth — those which give it a distinctive character scarcely influenced by the older structures which of course exist — date from the last century only. There are one or two late Gothic churches which have some points of interest for the professional student, but which are devoid of the picturesqueness that makes such buildings attractive to the general eye: comparatively plain on the outside, large and bare on the inside. Their bareness is due, of course, in great part to modern "restorations;" but buildings like the Magdalena Church of Bayreuth, for example, which abound all through the central parts of Germany, can never have had the characteristics of the best examples of the style. They have never had either perfection of proportion, or beauty of material, or wealth of detail to recommend them. This church was begun in 1483. The elaborate vaulting of the nave is its most interesting feature, and it contains a good Renaissance pulpit supported by a figure of Samson, and a fine font of the same period. The towers were destroyed by fire in the seventeenth century and rebuilt in the heaviest *baroque* style. The chief building of Renaissance days is the old palace, built (1564–1588) by Karl Philipp Dieussart, a stately enough structure with a tower and the busts of the emperors along the façade. Some fine private houses also date from this century. In the eighteenth century the town found its most brilliant period as a princely residence. The Margrave married Wilhelmine of Prussia, the sister of Frederick the Great, and his capital beautified itself to the best of its ability, after the fashion of the day. The new palace, begun in 1753, has three great portals crowned, as are the windows, by broken gables with seated allegorical figures; the interior we had no time to visit. No one stops at Bayreuth for the shortest period, however, without seeing the inside of the old theatre, built in 1747. But few theatres survive intact from so early a day: none in Germany, so far as I know, save one in Munich which dates from about the same time, and is, like this, an example of the most florid Rococo decoration. It is said to be superior to the Bayreuth building, but I could not see it while in Munich, and so can draw no comparisons. If the utmost elaboration of Rococo is suitable for any purpose, it may surely be held suitable for a theatre interior, provided it be, like this one, on a small scale, and destined not to the more serious, but to the lighter of dramatic purposes. The greatest purist could hardly deny that this interior must have looked admirably gay and pretty and appropriate when all its elaborateness was fresh from the hands of wood-carver, painter, and gilder. It is far from fresh to-day, and even in the somewhat dim light that was turned on for our benefit it looked painfully — well, "seedy" is the word that came first to mind. It is not a dignified word, I will allow, but there is nothing either dignified or gloomy or pathetic about the decay of such architectural work as this; it affects one in about the same way as would the half-tattered remains of the powdered wigs and flowered Watteau gowns the fair dames of Bayreuth must have worn on its opening night. It has not been used for many years, and it has not been touched by the decorator's brush, nor apparently by broom or duster, for an equally long period. Naturally its fragile decorations of color and gilding are hopelessly shabby, and the elaborate woodwork of its boxes and balconies is greatly injured; but, as I have said, it must have been immensely pretty in its first perfection. It is very small and exceedingly effective in plan, with a great high *loge* facing the stage, and smaller boxes and projecting galleries at the sides, with little staircases leading down into the parquette, all elaborately carved in wood, and in their diversity very pleasing to the eye after the tamer regularity of the modern play-house: a sumptuous little interior, where a patched and powdered audience must have looked very brilliant and felt itself very cosily at home.

In the immediate neighborhood of the city are the summer palaces, which are also elaborate Rococo buildings, but earlier in time and better in decoration than the theatre. This last was built, as I have said, toward the later years of the Rococo period, and brilliant though it must have been, its decorator's ideas were a little coarse and unimaginative, compared with those of the men who built the *Phantasie* and the *Ermitage*, in the first quarter of the century. In the gardens which go by the latter name is a round "Temple of the Sun," with figures and shell decorations and water-works, that must count among the most cleverly fantastic and Oriental-looking structures of the time. I should add, indeed, that it is only in the interior of the theatre that true Rococo forms are adhered to. In the exterior, as in the exterior of the new palace which I have already mentioned, we find much more sobriety, distinct evidence of the advent of the simpler but more mechanical, less original and less interesting style to which the Germans give the name of *Zopf*—the style which formed the transition between the Rococo of Louis Quinze and the neo-classicism of the period known to us as the "Empire."

The most interesting of the monuments with which Bayreuth is adorned — they are not many — is a group erected at the end of the seventeenth century to the Margrave Christian Ernst. It was the work of one Elias Raentz, and shows, in the theatrical style of the period, which is yet apt to have something grandiose about it even when most convulsed, the mounted figure of the prince riding over the contorted body of a Turk who typifies his eastern enemies. On one side is his favorite court dwarf, and at the corners of the pedestal are symbolical figures of the Four Quarters of the Earth. Such figures are so common in sculpture of this and later periods as to win, most often, little more than a tired, unwilling glance from the passer-by; but our Bayreuth sculptor showed some originality in his allegories. Each figure is accompanied by an animal which seemed to him typical: Europe by an ox, to denote cultivation; nomad Asia by a horse; and savage Africa by a lion, and an American tourist may find himself repaid for a few moments' pause before this extraordinary conglomeration, by seeing that his fatherland was then considered such a fabulous region as to be fitly characterized by a griffin fresh from a fairy tale. One wonders for what beast the artist would see fit to exchange his griffin could he come to life to-day — perhaps for a neat little group of a bull and a bear. The statue to Jean Paul Richter need not detain any one's steps; it is by Schwannthaler, and we shall have enough and more than enough of him when we get to Munich. More interesting and more impressive, as bringing us nearer to the memory of the man, is his tomb in the suburban cemetery; for after living many years in Bayreuth, he died and lies buried there. It is simply a great slanting block of stone, overgrown with ivy and bearing a modest inscription cut upon it — a memorial of so much appropriateness and good taste that one hopes no future Philistine, desiring to do him honor, will ever replace it by some costly monumental futility. This graveyard, by the way, would not be unworth a visit even did it not hold the dust of the "only one." It is crowded and not very well cared for; overrun on this August day with a high growth of golden-rod, a plant I had never seen in the more northern parts of Germany, and which seemed to breathe out a whiff of transatlantic air. One had an impulse to pluck a piece and toss it up to the sculptured America on the square, that she might feel a bit less lonely and homeless with her fantastic griffin. Most of the tombstones were of uninteresting sorts, but among them were some large slabs with good seventeenth-century carvings.

Of course there is no old German town where a student who chose to potter and dig about for a week could not unearth continual objects of interest; but I have, I think, named everything that is of importance in Bayreuth. Nothing remains but that which must, in spite of its architectural simplicity, be the centre of attraction to every traveller—Wagner's new theatre. It has been described so often and so minutely that I may not be justified in even referring to it here. I will only say that nothing could be more perfectly adapted for its purpose — for the purpose of allowing every person in a large audience to enjoy equal rights, to see and hear with equal perfectness, and to sit comfortably at the same time. Though very plain and without the slightest pretension to ornament of any kind, — it is only a temporary structure, we Wagnerites believe — and though built with the greatest possible economy, the effect of the interior is far from unpleasing. Of course one aim of other playhouses, that of "showing off" the audience and producing a brilliant general effect, was not at all planned for; indeed, just the reverse was the case. Most music-lovers will, I think, share with Wagner the idea that this is just what a theatre devoted to serious works ought *not* to do. It ought to be a comfortable place to listen in — not a place to show one's self or to meet one's friends, or to doze in dusky corners. This theatre is simply a great rectangular room, hardly suggesting the time-honored amphitheatre, as the rows of seats curve but very slightly. Each row is raised so that one sees quite over the heads in front, and at the back is a line of boxes devoted to the use of the master himself and his most distinguished guests. The seats expand somewhat toward the rear, the front row being just the width of the stage. The triangular side spaces thus left between the seats and the wall are filled with great Corinthian columns, which are doubled as the space becomes wider toward the stage. If one has a side seat, the eye is led along a vista of these columns until it reaches those which immediately frame the stage, and thus this effect, as of a frame surrounding the picture on the boards is never lost or interfered with. No one accustomed only to ordinary theatres, with their proscenium-boxes and visible orchestra, and over-vivid foot-lights, and gaudy decorations, can quite imagine how much the effect of the scene is enhanced by thus making it the only thing, so to speak, that is in sight. The orchestra is hidden: the hood which curves over the lowered place where it sits meeting (to the eye, though of course not in fact) the line formed by the front of the stage. There is no prompter's box, no mass of unmeaning curtains hanging from above across the proscenium. There is nothing but just the stage itself and then the rows of great columns, neutral in color, which start from either side of it and recede toward the back of the house. The average theatre-goer would not care to spend every evening in such a building; but the true music-lover goes back with regret to the elaboration and disturbing architectural features of other opera-houses.

I trust I shall not be referring to matters of too trivial or ephemeral a nature to be fitly spoken of in an architectural journal if I give a word to the simulated architecture of one of the scenes in Wagner's drama given this year on these boards. It is so very seldom that one sees an even approximately correct bit of architectural decoration on any stage, that such a brilliant exception as the interior of Monsalvat — the chief scene in *Parsifal*, and twice brought upon the stage — deserves a line of commendation. At the great German theatres much attention is paid to the setting of important dramas, and an effort is made to make them correct as well as brilliant. It is strange, in view of this effort and of the antiquarian knowledge which seems to come more easily to Germans than to any other people, that correctness should be so seldom attained. Of course the scenes are far more truthful than the travesties and hashes to which we are accustomed on our own stage; but it is odd that with their models so close at hand German decorators cannot do even better. In Dresden, for example, the stage settings are of extraordinary richness and elaborateness, are always most effective, and often exceedingly beautiful; but I did not see one among very many that was quite correct in detail. The nearest approach was in the second act of *Lohengrin*, where the street-scene with the cathedral and the palace was a marvel of truly pictorial beauty, and where a rather late type of Romanesque architecture was carried out with approximate correctness. The time of the play falls in the early years of the tenth century, and the architecture was of course too late in date; but it was consistent with itself, and the ruder, earlier style could hardly have been made so effective for scenic purposes. One would needs be the worst sort of a purist to cavil at so slight and excusable an anachronism. The scene at Bayreuth to which I refer was far and away the most beautiful I have ever seen on the stage. It represented the interior of an Hispano-Moorish building of the most magnificent sort. I will not say it was absolutely correct in detail, for I am not familiar enough with the style to set myself up as a competent critic; but it looked correct all through. There was no visible slip either in form or color, and both in form and color it was most beautiful. The front of the boards was a wide open space, beyond which one saw, in the centre of the stage, a great circular colonnade supporting a dome which curved up far out of sight; on either side were rows of smaller columns forming long, radiating vistas. The details of carving and painting were most elaborate, and the color so rich and so harmonious that one was affected as by the sight of a beautiful actual architectural example. Within the open circle of columns were ranged the tables at which the knights sat to partake of the holy meal. In the centre was the altar, raised on three steps, and behind it the high seat for the king. When the processions entered, and the personages — one could hardly consent to call them *actors* — took their places, the result was the finest I have ever seen. All were costumed alike, in admirably selected tones of grayish blue and dull lightish red, and every detail was carefully planned, down to the graceful yet apparently unstudied attitudes in which the pages grouped themselves on the steps of the altar. Not only one's ear was captivated and one's mind impressed by the scene, but one's eye completely satisfied. One waited for the next movement of any individual upon the scene, sure that it would be a movement of perfect harmony, of perfect grace or dignity. I have wandered away from architectural matters, I confess; but when *Parsifal* is fresh in one's memory, and when one has begun to speak of its scenery, it is hard to stop short therewith.

M. G. VAN RENSSELAER.

GIRDERS. — V.

II. — DETERMINATION OF SECTION AT ANY POINT OF GIRDER.

Portal of the Palace Court. PRAGUE Bohemia

AFTER finding the bending moment M, the stiffness or value of the moment of inertia I, and the additional area for resisting shearing required at any point, we have next to determine the actual dimensions of the corresponding section of the girder.

The general form of section must be assumed, suitably for the material of which it is to be constructed.

Several methods are available for finding the dimensions of the required section, either of which may be used as found most convenient for the special case.

I. — Direct methods by calculation.

These are only applicable to simple and symmetrical forms of section, or to those whose parts have a certain fixed relation to each other.

a. By means of algebraical formulæ.

This method is only preferable for those sections whose upper and lower portions are symmetrical to each other about the neutral axis of the section, and the centre of gravity is at the mid-height of the section. When this is not the case the formulæ become very complex and tedious and the indirect method is to be preferred.

Formulæ for I and d'.

1. Solid rectangular section. Fig. 74.

$$I = \frac{b\ d^3}{12}. \qquad d' = \frac{d}{2}. \qquad (10.)$$

2. Hollow rectangular section. Fig. 75.

$$I = \frac{b\,(d^3 - h^3)}{12}. \qquad d' = \frac{d}{2}. \qquad (11.)$$

3. Solid square section. Fig. 76.

$$I = \frac{s^4}{12}. \qquad d' = \frac{s}{2}. \qquad (12.)$$

4. Hollow square section. Fig. 77.

$$I = \frac{s^4 - s'^4}{12}. \qquad d' = \frac{s}{2}. \qquad (13.)$$

5. I, L, or Z sections. Figs. 78, 79, 80.

$$I = \frac{b\ d^3 - b'\ b^3}{12}. \qquad d' = \frac{d}{2}. \qquad (14.)$$

6. Open section. Fig. 81.

$$I = \frac{b\,(d^3 - h^3)}{12}. \qquad d' = \frac{d}{2}. \qquad (15.)$$

In applying these formulæ, the required value of I, obtained by means of Formula 4, 7, or 8, must be substituted for I in the formula corresponding to the desired form of section; then values must be assumed for all the other quantities in the formula excepting one, which may then be found by reducing the equation to its simplest form. A sufficient area must then be added to the section to safely resist the shearing strain acting at that point.

b. By means of Moll & Reuleaux's sections and formulæ.

These formulæ are only applicable to sections of the exact forms and proportions given in the corresponding figures; are only intended for cast-iron girders, and the sections are so proportioned that the compression at top of girder is just double the tension at the bottom; consequently, the centre of gravity is found at one-third the height of section from bottom.

FORMULÆ FOR MOLL & REULEAUX'S SECTIONS.

1. For inverted T-girders as shown in Figure 82.
$$I = 278.3\ b^4. \qquad d' = 8\ b. \qquad (16.)$$
2. For inverted T-girders as shown in Figure 83.
$$I = 269.4\ b^4. \qquad d' = 8\ b. \qquad (17.)$$
3. For inverted T-girders as shown in Figure 84.
$$I = 294.8\ b^4. \qquad d' = 8\ b. \qquad (18.)$$
4. For Hodgkinson girders as in Figure 85.
$$I = 922.9\ b^4. \qquad d' = 9\ b. \qquad (19.)$$
5. For box-lintel as in Figure 86.
$$I = 1284.6\ b^4. \qquad d' = 10\ b. \qquad (20.)$$

The required value of the moment of inertia I is substituted in the formula corresponding to the section, and the value of the unit of proportion b then found; it is then very easy to design the section according to the proportions given in Figure 86, since these are all multiples of the unit b. Sufficient area must then be added to resist the shearing strain, as before, and preferably to the web.

The same system of proportion might be applied to other forms of section for iron girders, and the corresponding simple formulæ for I and d' obtained; but this has never yet been done, so far as known to the writer.

II. — The indirect method.

By this method the section is first assumed, drawn, and its corresponding values of I and d' found and compared with the required value of I; if too large or too small, a second section is assumed more closely approximating the desired one, its value of I found and compared, etc.

It will usually be found that this process of approximation will require but few repetitions, and that there is less liability to error than by the use of the formulæ for complex sections. The method is principally graphical, requires only the ordinary instruments, is also perfectly general; being applicable to all forms of section and all materials, no matter how complex the sections may be, or whether formulæ have ever been deduced for them or not.

After finding the required section, the area for resisting must be added to it.

For a demonstration of the correctness of the graphical or indirect method see Ott's Graphic Statics, p. 109, or Clarke's Graphic Statics, pp. 111, 112.

The principal steps in the application of the method are as follows: —

a. Assume the form and dimensions of the section and draw it to as large a scale as possible, preferably full size.

b. Divide this section by horizontal lines into strips of equal or unequal height; find the area in square inches, and the centre of gravity of each strip.

c. Assume that a horizontal force, numerically equal to the area of the strip, acts horizontally through the centre of gravity of the strip, on a vertical beam, whose clear length equals the height of the section, and draw the lines of action of these forces.

d. On any convenient horizontal line lay off the areas of the strips or the horizontal forces in order, from left to right and from top to bottom of the section. This line may be termed the load or "area" line.

e. Through the ends of this "area" line, draw lines inclined at 45° and intersecting in a point below the line, which will always be the required pole, which cannot in this case be assumed at random, but must be found only in this way; draw strings from this pole to each division of the area line.

f. Commencing anywhere on a horizontal through top of section, draw the equilibrium polygon parallel to these strings, and afterwards, the equilibrium curve, constructing them exactly as already explained for girders under continuous loading.

g. Produce the first and last sides of equilibrium polygon, which will also be tangents at the ends of the equilibrium curve, to intersect at a point. Through this point draw a horizontal line across the section.

h. Find the area included between the equilibrium curve and its tangents, in square inches, using the same scale for measuring as that of the section. This area between the curve and tangents may be termed the "inertia" figure.

i. The value of d' for the given section always equals the vertical distance from the horizontal drawn through the intersection of the two tangents, to the furthest fibres of the section, in inches.

j. The value of I for the section always equals the product of the area of the section into the area of the "inertia" figure, both taken in square inches.

k. The centre of gravity of the section will always lie in the horizontal drawn through the intersection of the tangents.

If the section be symmetrical about a vertical axis, the centre of gravity will be at the intersection of this axis and the horizontal. If unsymmetrical, the same method may be applied a second time, and at right angles to the first, so that a vertical line will be obtained, also containing the required centre of gravity, which must then be at its intersection with the horizontal.

The area of the "inertia" figure may be determined in several ways.

1. *By the method of equidistant ordinates.*

Draw a series of horizontal lines across the figure, at equal distances from the horizontal previously drawn through intersection of the tangents and from each other. Measure the length of that portion of each line included between the equilibrium curve and the tangents. Take the sum of half the upper and lower ordinates and the entire intermediate ones; multiply this sum by the vertical distance between two adjacent ordinates. This product will be the required area, though slightly in excess, because practically substituting a polygon with short sides for the equilibrium curve; it differs very little from the true area, which it approximates the more closely, the closer the horizontals are drawn to each other.

2. *By the Planimeter.*

The area of the "inertia" figure may be very quickly and accurately obtained by using Amsler's Polar Planimeter.

3. *By weighing.*

The figure may be transferred to sheet-lead, wood, etc., by tracing, cut out, and its area then determined by accurately weighing, and dividing this weight by the weight of one square inch of the same material, of the same thickness.

The lengths of the ordinates must be measured by the same scale as that of the section, so as to obtain the same area as if the section were drawn full size.

To fully elucidate the use of the graphical method, it has been applied to several of the more common forms of section.

Example 1. Solid rectangular section. Fig. 65.

The section is 4" x 16", consequently its area is 64 square inches. It is divided into four strips of equal height. The equilibrium polygon and curve are drawn as for a loaded girder, excepting that the pole must always be located at the intersection of lines drawn at 45° through ends of the "area" line.

The horizontal through intersection of tangents passes through centre of section, hence $d' = 8''$.

The ordinates are here drawn one inch apart and are measured at same scale as the section. They are found to be 0, .05, .23, .55, 1.00, 1.57, 2.26, 3.06, 4.00, 3.06, 2.26, 1.57, 1.00, .55, .23, .05 and .0. Their sum = 21.44, and this multiplied by 1, the distance between ordinates, = 21.44 square inches, the required area of the "inertia" figure. Since the area of cross-section = 64 square inches, the required moment of inertia $I = 21.44 \times 64 = 1372.16$.

Example 2. Box-lintel. Fig. 66.

The section is 12 inches high and wide, with metal 1.5" thick. The bottom is taken as one strip, and the remainder divided into four strips of equal height. The equilibrium curve and tangents are found as before.

Centre of gravity is found to be 7.48" from top of section, which is the value of d'.

Area of inertia figure is found to be 14.41 square inches. Area of section = 49.5 square inches. Hence $I = 14.41 \times 49.5 = 713.4$.

Example 3. Z-girder. Fig. 67.

Also 12 inches high; lower flange 12 inches wide with edge turned up 3 inches; upper flange 6 inches wide; metal 1.5 inches thick.

Value of $d' = 7.3''$

Area of inertia figure = 19.09 square inches; of section = 42.75 inches.

Hence $I = 19.09 \times 42.75 = 816$.

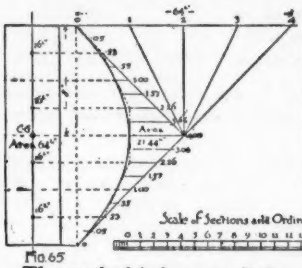


FIG. 65

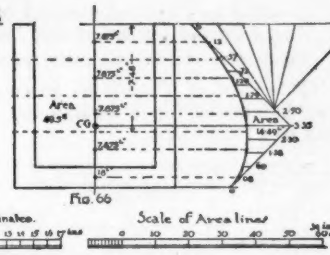


FIG. 66

The method is here applied a second time and at right angles to the first, to find the exact location of the centre of gravity. But this is not necessary, for the value of d' can be measured from the horizontal through intersection of tangents, as this must pass through the centre of gravity of the section.

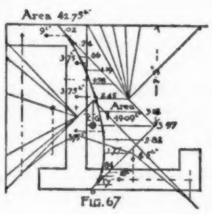


FIG. 67

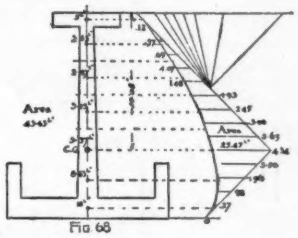


FIG. 68

Example 4. Hodgkinson girder. Fig. 68.

Height 15 inches; lower flange 12 inches wide and 1.5 inches thick; upper flange 1" x 5"; web 1 inch thick at top, 1.5 inches thick at bottom. The centres of gravity of the strips of the web vary but slightly from their geometrical centres, and at which they are assumed to act.

Value of $d' = 10.08''$.

Area of section = 43.63 square inches; of inertia figure = 25.47".

Hence $I = 43.63 \times 25.47 = 1111.2$.

Example 5. Inverted Y-girder. Fig. 69.

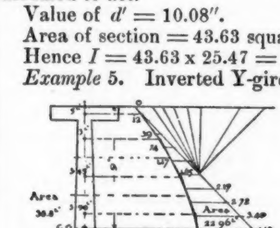


FIG. 69

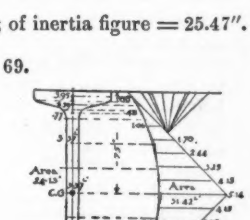


FIG. 70

Height 15 inches; upper flange 1" x 5"; base 12 inches wide; metal 1.5 inches.

Value of $d' = 9.00$ inches.

Area of section = 38.8 square inches; area of inertia figure = 22.96 square inches.

Hence $I = 38.8 \times 22.96 = 690.7$.

Example 6. Carnegie Brothers' 15-inch 80 lb. beam. Fig. 70.

Value of $d' = 7.5$ inches.

Since the beam weighs 80 per foot, its sectional area = 24 square inches.

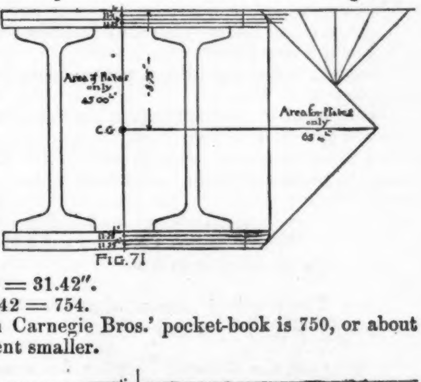


FIG. 71

Area of inertia figure = 31.42".

Hence $I = 24 \times 31.42 = 754$.

The value given in Carnegie Bros.' pocket-book is 750, or about one-half of one per cent smaller.

Example 7. Box-girder. Fig. 71.

Composed of two 15-inch 80-lb. I-beams, with top and bottom plates each 18 inches wide and 1.25" thick.

As the value of I has been obtained for the I-beams in the last example, it will only be necessary to find that for the top and bottom plates. That portion of the equilibrium curve lying between the plates will be a straight line, as in the figure.

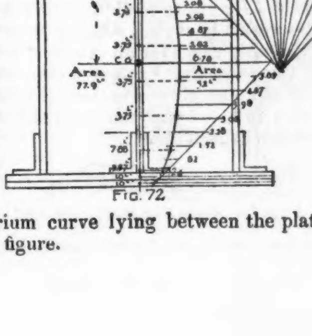


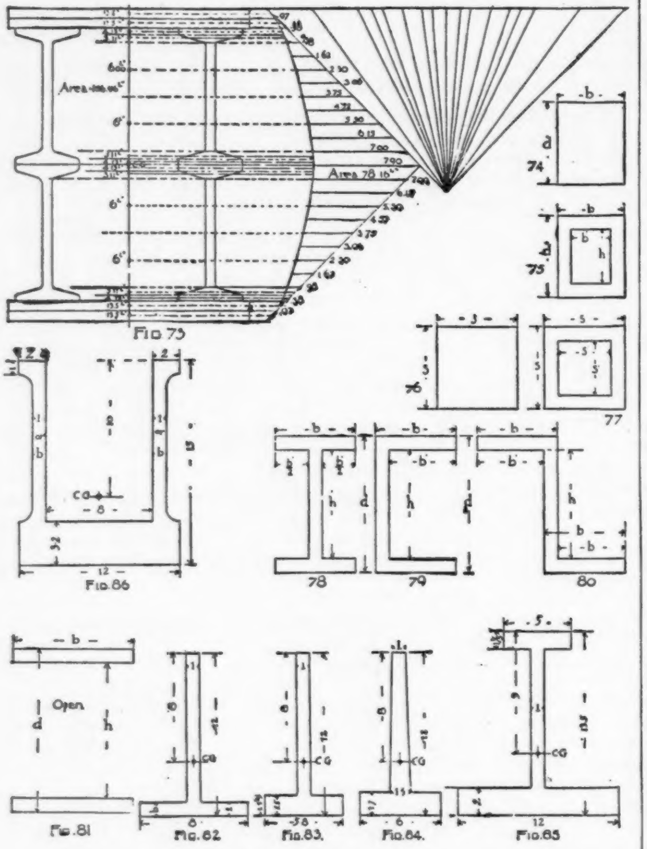
FIG. 72

As the total height of girder $= 17.5$ inches, $d' = 8.75$ inches.

Area of inertia figure $= 65.4$ square inches; of top and bottom plates, 45 square inches.

Hence, I for plates only $= 65.4 \times 45 =$	2943.5
And, I for two I-beams $= 2 \times 754 =$	1508.0
Total value of I for the entire section $=$	4451.5

This value of I would be lessened by the rivet-holes, but these can be allowed for in determining area of the strips, or the girder can be a little wider.



Example 8. U. S. Girder. Fig. 73.

Composed of four Carnegie Bros.' 10-inch 45-lb. I-beams, with top and bottom plates 18 inches wide, and 1.5 inches thick.

Value of $d' = 11.5$ inches.

Area of inertia figure $= 78.16$ square inches; of section $= 106.96$ inches.

Hence, $I = 78.16 \times 106.96 = 8360$.

The last example can also be solved by calculation.

1. For top and bottom plates, by formula 15, $I = 6250.5$.
2. For the four I-beams.

According to Carnegie Bros'. pocket-book, I for one I-beam of the given section $= 187$.

This moment of inertia is taken about an axis passing through its centre of gravity and horizontal. When its moment of inertia is required about any other axis, parallel to the first, the given value of I must be increased by the product of the sectional area of the beam into the square of the distance between the two axes.

Or, let $A =$ sectional area of the beam in square inches.

Let $d'' =$ distance between the two parallel axes, in inches.

Let $I =$ moment of inertia about axis passing through centre of gravity.

Let $I' =$ required moment of inertia about the new axis.

Then, $I' = I + A\,d''^2$. (21.)

In this case, the distance between the axes $= 5$ inches, and the sectional area of one beam $= 13.5$ square inches.

Hence, for one beam $I' = 187 + (13.5 \times 5 \times 5) = 524.5$; and for the four beams $I' = 524.5 \times 4 = 2098$.

Total value of I for entire section $= 6250.5 + 2098 = 8348.5$.

Though this result is slightly smaller than that obtained graphically, it is sufficiently exact for all practical purposes.

In solving the preceding examples, the sections were drawn one-third full size: more nearly correct results would have been obtained if they had been full size and the ordinates taken nearer to each other, say one-fourth inch apart.

GIRDERS. — III.

(Erratum. Page 192, ninth line from bottom of left column.

"3. On the vertical depth of the section," the resistance to bending "varying directly as the cube of this," and resistance to breaking, directly as its square.)

THE WICKED VERMONTER.

THE humorist of the New York *Times* gives in his own peculiar and veracious style further particulars of the building dispute between a church society and an owner of adjacent property, which we mentioned in a recent issue: —

The plan for the reorganization of the Egyptian army which has recently been drawn up by Baker Pasha and approved by the English authorities may be an admirable one, so far as the interests of England are concerned, but it reminds one very suggestively of the History of the Baptist Meeting-house and the Wicked Vermonter.

The Vermonter in question was a very wicked man, who had voted no less than twelve successive times the entire Democratic ticket; who was notoriously addicted to cider-brandy strong enough to cause a corrugated-iron boiler into which a pint of it had been placed to double up in cramps, and who particularly disliked the leading Baptists of his native town.

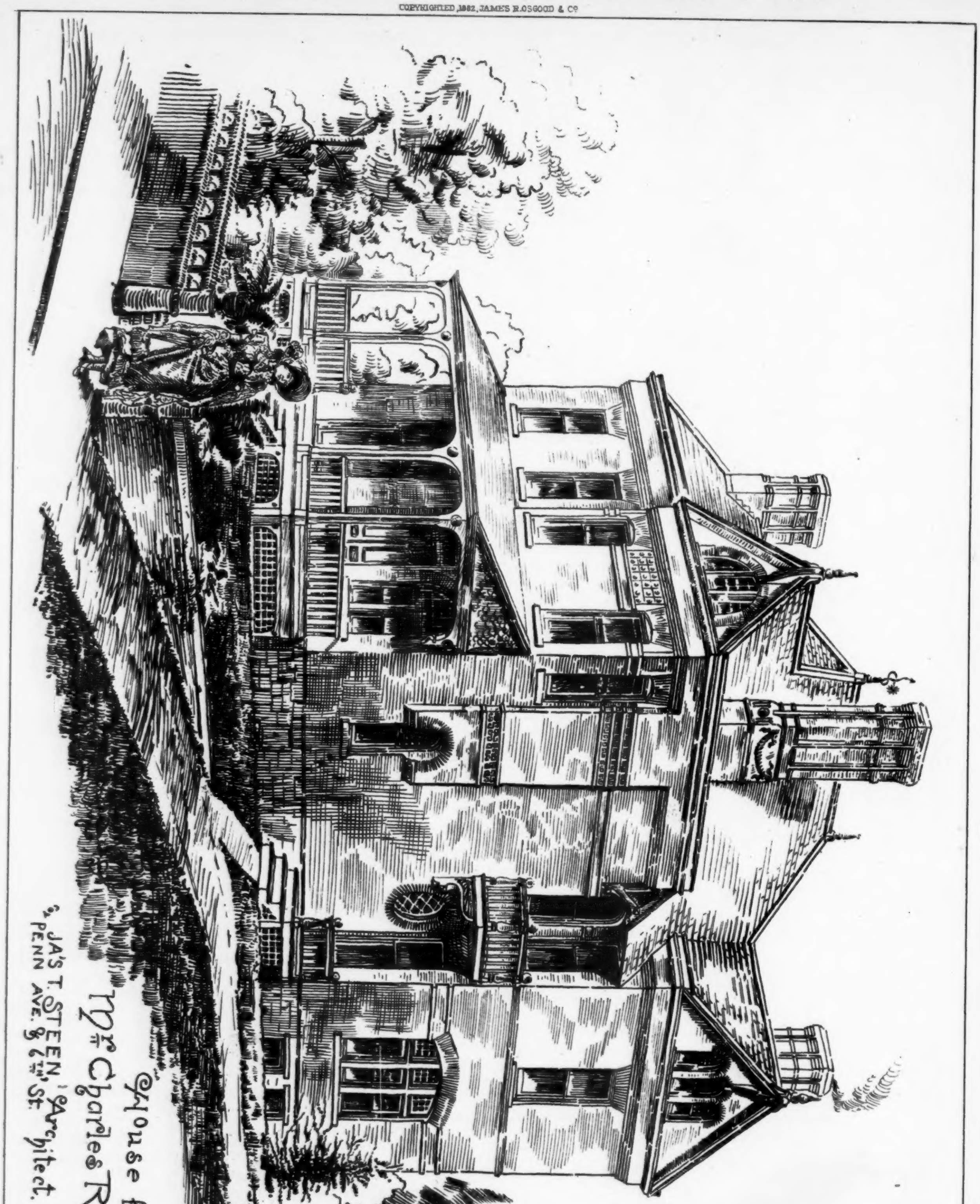
About a year ago the Baptists, who had until that time held their weekly services in a building belonging to the local hose-company, decided to build a meeting-house on a piece of land immediately adjoining the Wicked Vermonter's back yard. With a view of bringing the gospel as near to him as possible, they resolved to build the west wall of the meeting-house close to the Wicked Vermonter's fence, leaving a distance of only ten inches between the two. The windows of the meeting-house would thus overlook the Wicked Vermonter's garden, and he could hardly fail to hear a good deal of the sermon, no matter how carefully he might stay away from the services.

While the workmen were laying the foundations of the meeting-house the Wicked Vermonter was removing his fence and building in its place a stout stone wall. He placed the wall within two inches of his boundary line, and by the time the Baptist workmen were ready to begin to build the west wall of their meeting-house his private wall was already four feet high.

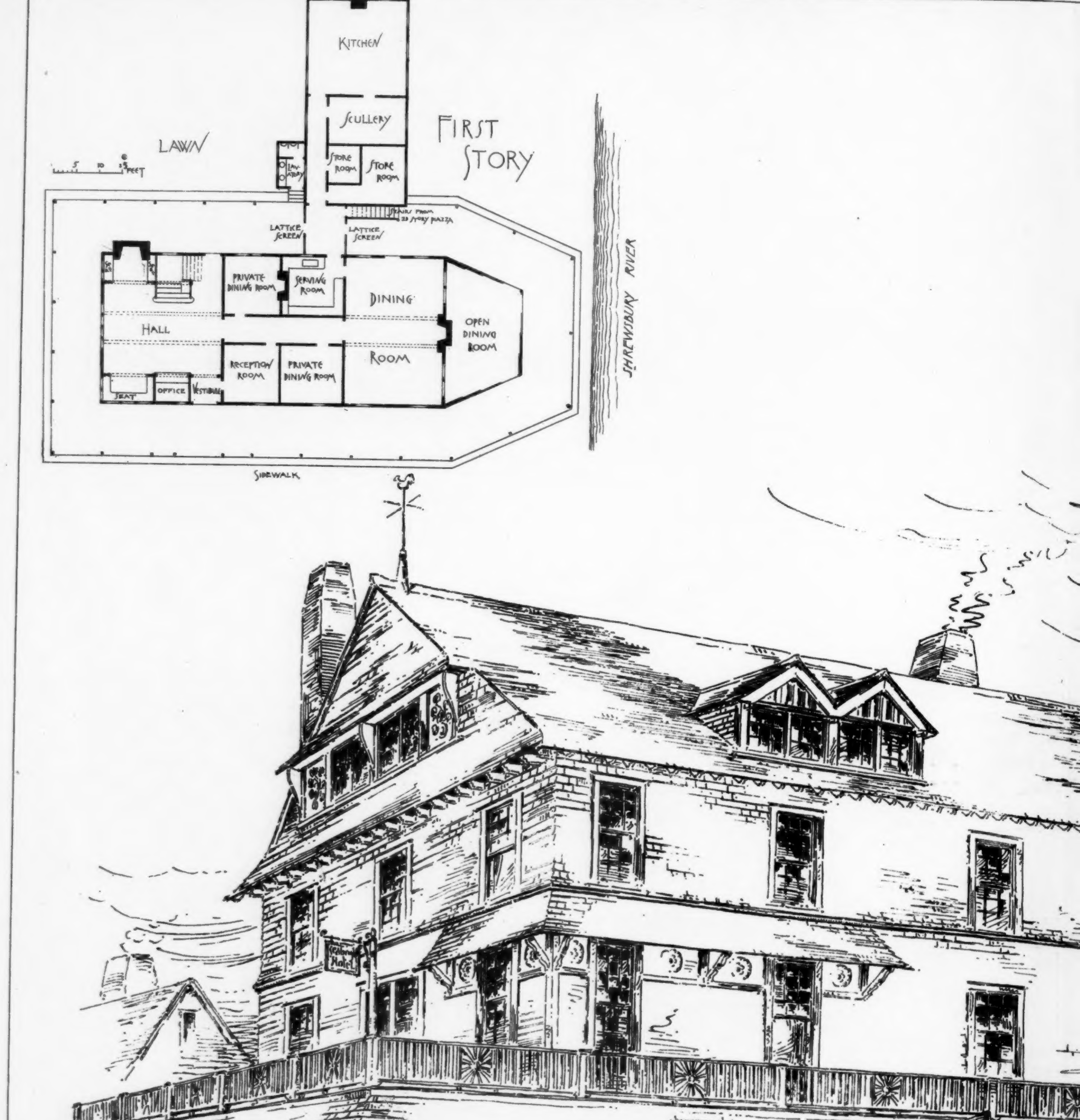
Between the two walls there was just room for one person to pass, and as a matter of course the Baptist workmen had to pass that way continually. The Wicked Vermonter, with diabolical cunning, inserted a large number of stout iron barbed hooks in the outer surface of his wall for the purpose, as he afterward declared, of preventing boys from scaling the wall and stealing his apples. The immediate effect of this peculiar method of wall-building was that on the first day after the hooks were placed in position no less than nine Baptist workmen were caught. The hooks penetrated their clothing and, in some instances, their flesh, and when, toward evening, the superintendent of the work came to see what progress had been made during the day, he was dismayed to find nearly all his workmen securely fastened to the wicked man's wall, and work on the Baptist meeting-house practically suspended.

A lawsuit instantly followed. The Baptists claimed that the Wicked Vermonter had obstructed their ancient lights by erecting his wall, and that it was therefore a nuisance which must be abated. The Wicked Vermonter in reply urged that as the Baptists had not as yet constructed any building on their land they had no lights, modern or ancient, which could be obstructed by his wall. Moreover, he set up the counter-claim that the new meeting-house, were it to be completed and used, would interfere with his ancient cats, who had from time immemorial enjoyed the right to walk over his fence and to indulge in evening concerts with no one to molest them; whereas, the constant singing of hymns in the new meeting-house would annoy the cats, and there would be great danger that hymn-books would be thrown at them out of the gallery windows on Sunday mornings by irreverent and objectionable Baptist boys. The court overruled this plea on the ground that the privileges of cats did not come under the head of easements. It refused, however, to give judgment as desired by the Baptist petitioners, and permitted the wicked man's wall to stand, although it required him to remove his hooks.

The Wicked Vermonter removed his hooks, but he continued to build his wall, always keeping it at a foot higher than the Baptist wall, so that it could not be said that it obstructed any existing window of the meeting-house. The Wicked Vermonter explained that it would not be his affair if the Baptists were to be guilty of the



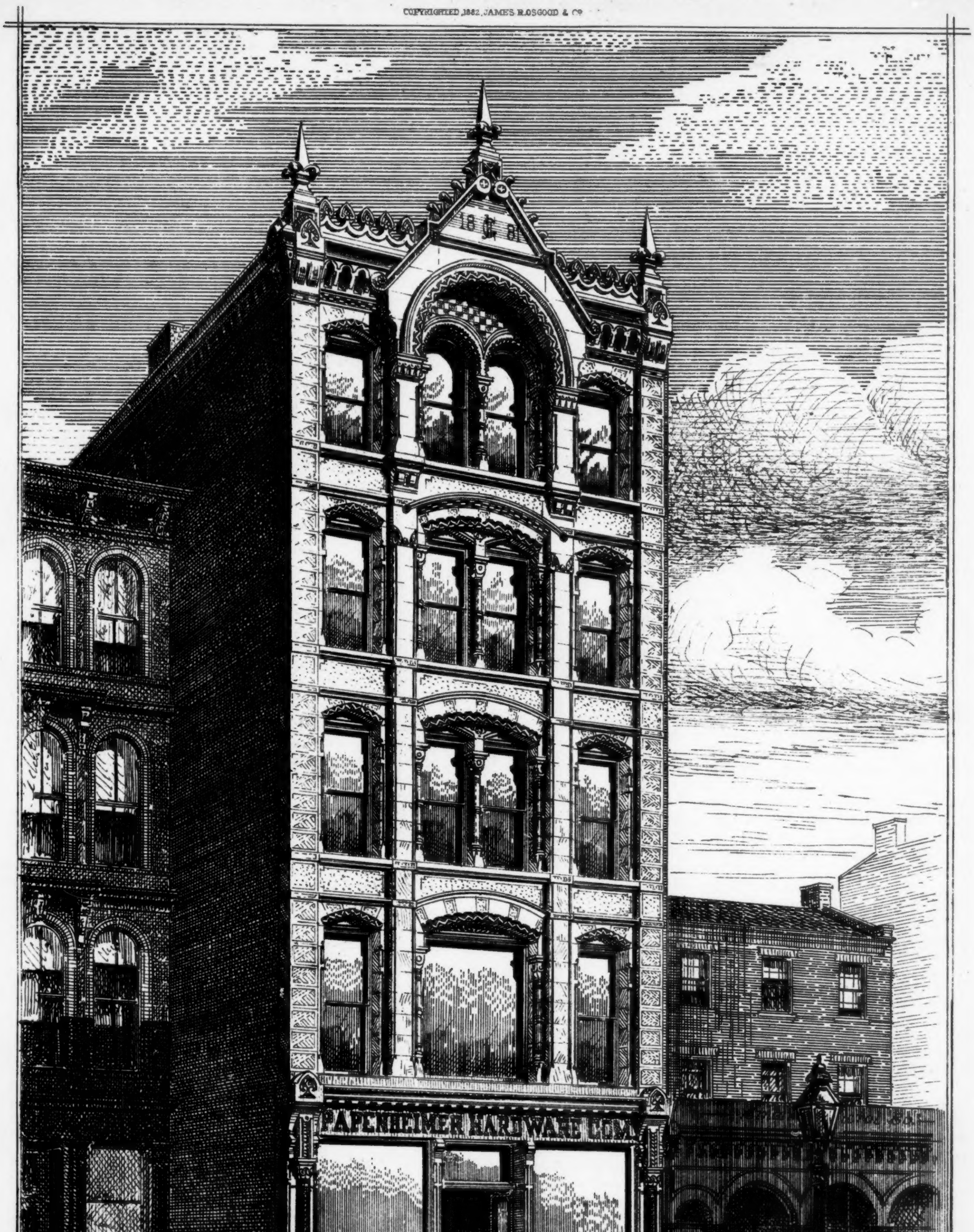
Heliotype Printing Co. 211 Tremont St. Boston.


FIRST STORY
KITCHEN
SCULLERY
STORE ROOM
STORE ROOM
LAWN
5 10 15 FEET
STAIRS FROM 2D STORY PIAZZA
LATTICE SCREEN
LATTICE SCREEN
PRIVATE DINING ROOM
SERVING ROOM
DINING ROOM
OPEN DINING ROOM
HALL
RECEPTION ROOM
PRIVATE DINING ROOM
SEAT
OFFICE
VESTIBULE
SHREWSBURY RIVER
SIDEWALK
H.E.F. des et del
Jan. 82

Interior of Entrance Hall: Seabright Hotel: H: Edwards-Ficken: Architect.

The Seabright Hotel: Seabright N.J: Rebuilt by H. Edwards-Ficken. Architect:

Heliotype Printing Co. 211 Tremont St Boston



Store Building at Cincinnati, O.
E. Anderson, Archt.

folly of putting windows where they would command a view of nothing but his wall, and in such case he could only regret the folly and blindness of his adversaries.

When the wicked man's wall had reached the height of fifteen feet he decided to cover it with a coating of powdered glass, in order to preserve it from the elements, and as a first step he covered the stones with a composition far more sticky than shoemaker's-wax. In the course of the next day about one-half of the local Baptists were firmly stuck to the wicked man's wall. They had visited the site of the new meeting-house with a view of celebrating the laying of the corner-stone, the celebration having been delayed because of the absence of several leading Baptists at the time when the corner-stone was actually laid. The Baptists caught by the Wicked Vermonter were of all ages and assorted sexes, and several hours were spent in the painful process of prying them loose. A new lawsuit was brought, but the Baptists were defeated, the court holding that the Wicked Vermonter had a right to put a sticky composition on the outside of his wall as a necessary preliminary to coating it with powdered glass. The result was that the Baptists pulled down the wall which they had already built, and began the construction of a new one twenty feet from the Wicked Vermonter's wall, and the latter sat almost continually on the summit of his own wall and taunted the Baptist workmen with their defeat, in a way that would certainly have produced a breach of the peace had the latter been other than exceptionally good men.

There is hardly room to point out the resemblance of this history to the reorganization of the Egyptian army, but fortunately the resemblance is so close that it hardly calls for explanation.

THE ILLUSTRATIONS.

SEABRIGHT HOTEL, SEABRIGHT, N. J. MR. H. EDWARDS FICKEN, ARCHITECT, NEW YORK, N. Y.

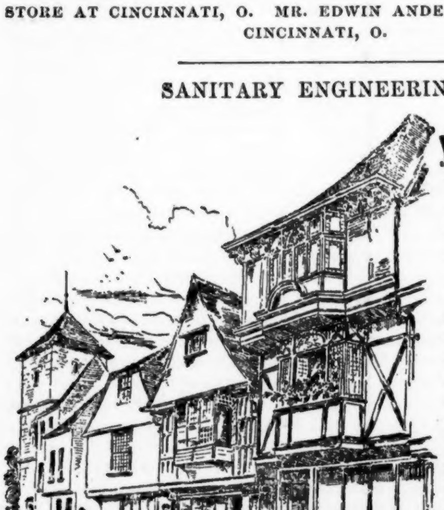
THIS is the old Emory Hotel, which formerly stood on the opposite side of the road, moved across to its present location, raised to give an almost new story under, and having a new attic story added to it. The main feature of the alterations and additions, however, is the open octagonal dining-room on the end facing the Shrewsbury River. This room is enclosed on all sides by large sliding sash-doors, which can be thrown back to make the room an open piazza in fine weather, while it loses none of its attractiveness in bad weather, when closed up, by still retaining its openness to the beautiful views obtainable all round through the sash-doors. The enlargement of the building includes a kitchen out-building with the usual offices, and other smaller buildings for stables, laundry, ice-house, gas-house, etc. The entrance-hall shown in the accompanying drawing is finished in white and yellow pine, merely oiled and waxed, the balustrade of the stairs only being of ash.

HOUSE FOR CHARLES R. DALLAS, ESQ., PITTSBURGH, PA. MR. JAMES STEEN, ARCHITECT, PITTSBURGH, PA.

The walls are built of good selected red brick laid in red mortar. The roof is of painted shingles, and the interior is all finished in clean white-pine, shellacked and varnished. The cost is $5,000.

STORE AT CINCINNATI, O. MR. EDWIN ANDERSON, ARCHITECT, CINCINNATI, O.

SANITARY ENGINEERING.[1]



THE late meeting at Newcastle of the Sanitary Institute of Great Britain was presided over by Captain Douglas Galton, C. B., whose inaugural address was delivered on Tuesday evening. We regret that pressure on our space prevents us from publishing this address *in extenso*, for it is truly a valuable contribution to the literature of hygienic science; we must, however, content ourselves with considering a few of its salient features. While some of the leading and important laws of health have been as well known as they have been generally neglected, at all events since Moses formulated his famous sanitary rules and regulations, it is only of very late years that the causes of disease are becoming understood, and the researches of Pasteur, Tyndall and others, which are still in progress, are rapidly tending to demonstrate a common origin to that wide class of diseases called zymotic, the limits of which are not yet defined. To the well-known saying that "dirt is only matter in the wrong place," may be added another, that disease, and death itself, is but life in the wrong place. The phenomena of fermentation and putrefaction have been shown to be due to the presence of almost infinite and ever-present numbers of germs of elementary life, ready to spring into activity under favorable conditions, and to develop those phases of vital energy known to us as fermentation and putrefaction, and which in some of their indefinitely numerous varieties assume forms of disease in the lower animals and in man, such as typhoid, cholera, tubercular disease, diphtheria, malarial fever, etc. The minuteness, number, and rapidity of reproduction of these — to the higher forms of life — fatal organisms entirely pass beyond our powers of conception, as is illustrated by the famous experiment of Pasteur. This physicist discovered that if the point of a needle be dipped in the blood of a fowl suffering from chicken cholera, and the minute portion thus removed be transferred to pure chicken soup kept free from contamination by air-borne germs, that after a short time the solution becomes turbid with the mass of organisms developed, and if a minute portion be removed in the same way with the point of the needle and transferred as before to another solution, the same process is repeated with a similar result. In this way a hundred generations of "microbes" may be reproduced, and if fowls be inoculated with, or caused to swallow, a small quantity of the last solution, the disease is at once developed in all its original force. Time, however, plays an important part in this experiment. If the solution containing the germs be kept for a period of weeks or months, the conditions of vital energy are so far changed that the inoculation produces far less violent consequences, diminishing with the length of time the solution has been kept. A very interesting experiment, made by M. Gustave le Bon, illustrates another phase of the same phenomena of these obscure forms of life. M. le Bon, by steeping finely hashed meat in water, produced a liquid swarming with bacteria. This liquid injected under the skin of a frog speedily proved fatal, though the animal could breathe the offensive effluvia arising from the mixture without coming to harm. On the other hand, after the liquid had been kept for two months, combining it with the blood of the frog by injection produced no apparent effect, while the animal was killed by inhaling the gases arising from the mixture. Whether death in this case arose from a more subtle form of antagonistic elementary life, or whether the effect was purely toxical, it would probably be impossible to prove.

These two experiments appear to illustrate some of the great and constant dangers to which human life is exposed by disease. The infinite number of vital germs, their easy reproduction, their sustained vitality through long series of generations, their undiminished energy so destructive to the higher forms of life, their easy transmission, reception, and assimilation by the system, are all indicated in Pasteur's wonderful experiment. On the other hand, the gradual change that takes place in the energy of a mixture charged with bacteria, not free to reproduce beyond the restricted limit in which they are first developed, is shown in M. le Bon's experiment. In this latter, the emanations, whether they be new forms of life developed from the extinct bacteria, or only chemical compounds, contain the fatal elements, while the residual and once deadly mixture becomes harmless. Inevitably these invisible but powerful agencies are always at work destroying vitality, or rather converting that form of it with which we are most familiar into other combinations of matter and energy, which after a long series of changes may assume again the condition of motion inherent and inseparable from the phenomenon of life, and so on in an apparently ceaseless round.

Sometimes, as with Pasteur's chicken broth, the germs, after completing their destructive work in one organism, are transferred in their descendants to another, developing typhoid, cholera, and other epidemics in those persons who offer suitable elements for their development and extension. Sometimes, as in Le Bon's experiment, the more apparently active germs having disappeared, the subtler but equally sure elements of destruction are disseminated, and may develop malarial fever or other diseases such as may be induced by breathing the emanations from old cesspools or sewage-impregnated soil.

As it is the duty of the physicist and physician to investigate the causes, and endeavor to combat the results of the too frequent encounters with their invisible foe, so it is the work of the engineer to remove as far as possible all facilities for the reproduction and dissemination of the germs, by insuring a constant and ample supply of pure water and pure air. We have a powerful ally in this perpetual struggle. It is not in every organism that the bacteria finds a congenial resting-place, and nature is a rapid and never-tiring purifier, converting the dangerous energy of this form of life to other and more neutral phases. Crowded centres afford the most striking illustration of what can be done both in the way of developing disease-generating germs, and also in destroying them or averting their effects as shown by the death statistics of cities under varying conditions of sanitary efficiency. Thus in London the death-rate during the five years following 1868 was 27.0; during the same number of years ending in 1881 it was 23, and last year it was only 21.7. The city of Munich offers, perhaps, the most striking illustration of the effects of sanitary efficiency. Between 1854 and 1859, when there was a total absence of all attempts at sanitation,

[1] From *Engineering*.

the death-rate from enteric fever was 24.2 per million; from 1860 to 1865, when the porous sides of cesspools were cemented to stop the filtration of sewage into the ground, it was reduced to 16.8; from 1766 to 1873, when the drainage system was partly complete, it was 13.3, and by 1880, when the works were complete, it had sunk to 8.7. In the same way the statistics of many other cities might be adduced to show the results which follow the prompt removal of sewage, instead of allowing it to remain and develop into active energy the latent forms of elementary life with which it teems.

In the course of his address Captain Galton devoted considerable time to the consideration of the effects produced on public health by pure air and ventilation, and he prefaced his remarks by referring to the labor of a number of investigators: Mr. Aitken, Mr. Langley, Professor Chandler Roberts, Professor Tyndall and others. It will be remembered that Mr. Aitken has conducted a series of experiments on dust in the air, especially with reference to the cause of fog, which he considers is due to the existence of particles of solid matter floating in the air, upon and around which, as a nucleus, vapor condenses and becomes visible; air deprived of its dust cannot produce visible vapor. Mr. Langley, during his valuable solar investigations, which are not yet completed, has detected the existence of dust at a height of fifteen thousand feet above the sea. This was partly due to particles of matter transmitted through the higher strata of the air by wind-currents, and also partly to the meteoric dust which is constantly falling onto our earth from interplanetary space. Carrying the question further, Professor Tyndall has shown how even on the summit of the Alps the dust in the air contains bacteria germs, and he has developed them in infusions from which all organic life had been previously removed. M. M. Davy, of the Montsouris Observatory, Paris, has found that the air in crowded places and near sewer-openings contains more bacteria germs than the air outside the city, and he has also proved that there are fewer of these elements of life in rainy and in very dry periods. In winter, too, the number is at a minimum, and at a maximum in autumn. Little beyond the fact of their plentiful existence is known of these organisms, but it is reasonable to assume that they are not all of the same character and that they produce different effects upon the higher forms of life, some resulting in disease, and others being innocuous. It is even supposed that there may be varieties capable of useful assimilation by complex organisms. It is found that there is a striking correlation between the more or less plentiful development of this elementary life, under certain conditions of climate and atmosphere, as already carefully observed, and the prevalence of those diseases which recent investigations show to be the visible result of this noxious energy. In hot climates these relations are especially evident, and in the military statistics of the British army at home, a very striking instance is given of the reduction that can be effected in mortality by a reduction in the quantity of germs. Not many years ago, when sanitation was little understood or heeded, the deaths from tubercular disease amounted to 10 per 1,000; that is the present percentage of deaths from all causes in the army at home. Now, the number of deaths from this particular malady is 3 per 1,000: a satisfactory proof of the results attending the removal of germs from the air of the barracks and hospitals; for, as Professor Tyndall has recently shown, tubercular disease is one of those dependent upon, and propagated by, the existence and development of living organisms. Air and water are the media for the passive existence of these beings, and for their transmission to congenial soil, and in every instance the removal of causes favorable to their development is followed by a diminution of disease and death. In towns and villages where ignorance and indifference combine to encourage the one, the other follows as a necessary result. In various parts of London, old, ill-ventilated, and unsanitary houses, in which the rate of mortality was as high as 50 per 1,000, have been removed, and in their place improved dwellings have been erected. A special feature of the more recent of these tenement-houses is the provision of ample space around them for the free circulation of air and unobstructed ventilation. In these the rate of mortality has sunk to 13 in the 1,000.

The conclusion to be drawn from the experience obtained and investigations carried out, and to which Captain Galton called especial attention, was that by proper attention to sanitation the death-rate among the lower classes of city populations may be reduced to 15 or 16 per 1,000. Upon this subject of longevity some interesting details were given, taken from the statistics compiled by Mr. Chadwick and Dr. Richardson. In these statistics the lives considered are divided into five classes as follows: gentry, salaried classes, retail dealers, artisans and laborers, and domestic servants. Out of 100 deaths of the first class 6 were of children in their first year and 9 of children before their fifth year. In the artisan class the corresponding leaths were 22 and 39 respectively. The average length of life of the first class is 55 years 8 months; of the working class, 28 years 9 months. Of course infant mortality reduces the totals to a high degree; yet, excluding them, the averages tell a melancholy story of the effects of inefficient sanitary arrangements, although of course the habits and necessities of the working classes aid greatly in reducing the term of artisan life. In London the mean term for the highest class, exclusive of those dying before the age of 20, is 61; while that of the working class is 47 years and 3 months. It is very truly pointed out that "a low standard for the mean duration of life n the wages-earning class is not a necessity. It is controllable by the surroundings in which they live, and the fact of how largely the death-rate is influenced by their surroundings is evidenced by the condition of health in Improved Industrial Dwellings." Further statistics than those already quoted are available. In London the death-rate taken over a series of years in the buildings of the Metropolitan Association for Improving the Dwellings of the Laboring Classes has varied from 14 to 17 per 1,000, and in those of the Improved Industrial Dwellings Company they have been during a term of thirteen years 16.2 per 1,000. In Newcastle similar results are obtained: for the year ending June of 1882 mortality in improved dwellings has been only 12 per 1,000; while that for the rest of the city was 21 per 1,000. During the five years ending June, 1882, nearly twenty thousand prisoners passed through the prison at Newcastle-on-Tyne, and although there were during this period epidemics of scarlatina, typhus and small-pox in the town, no deaths arose from either of these causes. The deaths among these prisoners, exclusive of those suffering from disease when admitted, was, in 1881, only .021. But it is needless to multiply instances of the results of neglect of sanitary laws, or of the consequences of obedience to them; they are now well known, and their application is growing year by year of wider extent, with, amongst other beneficial consequences, that of insensibly leading the lower classes to the appreciation of a higher condition of physical life. The work remaining to be done is almost incalculable, and the average of human life must, for many years to come, remain at an unnecessarily low figure; but in our day in this city epidemics such as those which have ravaged London in the past are practically impossible.

The rapidly-increasing knowledge now being acquired as to the causes of a large range of diseases, our better acquaintance with those mysterious elementary organisms which depend for life upon the death of higher developments, should lead, not perhaps to a suppression of their existence, but to some sort of control over them: but certainly to a modification of their nature and influence. Already Pasteur, Tyndall, and others have opened a new path for medicine to advance upon, and when once the pioneers of science have advanced in any direction it is impossible to hazard a guess, in these days of rapid progress, how far they will go or when they will stop. There is a vast field for exploration in this invisible world of vital energy, the lowest, so far as we now know, in the scale of development, but which nevertheless plays a most important part in relation to the highest phase of life.

PNEUMATIC DRAINAGE.

A NEW system for the protection of houses from the infiltration of sewer-gas and the disposal of town sewage has been introduced at Paris and Lyons by M. J. B. Berliez, civil engineer, and former director of the Compagnie des Vidanges, of Lyons. An illustration of this new system can now be seen in working order at the barracks of the Pépinière, Boulevard Malesherbes, where a thousand soldiers are quartered, and with the permission of M. Berliez we were able to examine every detail of the process. Underneath the closets the old cesspool has been emptied, thoroughly cleaned, and converted into a cellar. Here we found M. Berliez's apparatus. From each closet above, a pipe communicates with an iron cylinder or drum. Within this first receptacle there is an iron basket which will retain a hard substance, such as a brush, or even an infant if thrown down the drain. The detection of crime is thus facilitated, and the obstruction of pipes rendered impossible. A portable handle, affixed from the outside, is used about once a week to impart a strong rotary motion to this basket; the presence of any hard substance is then detected by the sound, and any accumulation of softer substances macerated and driven out-

From this first receptacle, and by natural gravitation, the liquefied sewage flows into a second iron receptacle placed close at hand, within a yard or so. A large ovoid floater occupies the greater part of the space within, the pointed end fitting hermetically an opening at the bottom, where the pneumatic suction keeps the floater in its place. It is not till the receptacle is almost full of water that the floater is able to disengage itself from this suction, and rising enables the sewage to escape by passing under the floater into the pipes, where the pneumatic suction carries it away. This suction is produced by a steam-engine situated in the suburb of Levallois-Perret, and the iron pipes, placed within the main sewers, communicate not only with the Pépinière barracks, but with several private houses, and with a depot at the Place de la Concorde, where the contents of many cesspools are brought and emptied. The total distance is 4,600 metres. It is, therefore, on an extensive scale that the experiment has been tried, and so far has worked well, giving rise to no sort of nuisance, and instead of allowing sewer-gas to ascend house-drains, drawing it, on the contrary, away.

It is proposed to place these apparatus under all the houses of Paris instead of cesspools; to draw by pneumatic action all the sewage to depots situated in the open country outside Paris, and there pump it forward distances varying from ten to fifty miles, where it may be used either to irrigate farms or be precipitated and converted into solid manure. It is calculated that the sale of this manure and an annual tax of £2 8s. for every house where the system is applied will cover working expenses and yield a large profit. This tax would be an economy on the present cost of emptying cesspools, and the sanitary advantages secured would be an inestimable benefit. The principal objection to the system, so far as its application to towns such as Paris is concerned, rests in the fact that the iron used for the pipes must corrode under the action of sewage-matter, and the slightest leakage would cause a total collapse of the whole system. Careful, constant supervision and prompt repairs would be indispensable. Then, the avoidance of nuisance depends on the frequent usage of the closets, as fermentation would set in if the receptacles were left half-full for a few days. Families leaving home would have to carefully flush their closets the last thing before their departure; for though each house would be thoroughly protected from sewer-gas, it would not be protected from any noxious gas arising within the receptacles. Fortunately these receptacles are very small, and must, in ordinary households, be frequently and automatically emptied during the day; so that, generally speaking, there would be no time for mischief to arise. — *Lancet.*

MONTHLY CHRONICLE.

OCTOBER 1. A heavy hurricane does much damage in Ireland.

October 4. Fall of a platform crowded with spectators during the Procession of the "Veiled Prophet," at St. Louis. Many persons injured.

A "line-man" killed by an electric-light wire in New York.

October 5. The accidental dropping of the iron fire-curtain of the Berlin, Germany, Opera-House causes intense panic. Several persons seriously crushed.

October 8. Burning of the West Street Concert Hall, Brighton, Eng.

October 10. Slight earthquake shock felt at Montreal, Canada.

October 11. Slight earthquake shocks and tidal waves at Panama.

October 18. An oil-lamp chandelier in the Baptist Church, Roxboro, N. C., falls during service. Several persons dangerously burned and crushed during the consequent panic.

October 19. A series of gas explosions takes place in the sewers of Philadelphia. No damage done.

A three-story brick house at Frankford, Pa., demolished by the explosion of benzine. One person dangerously burned.

October 21. Typhoon at Manilla makes 60,000 families homeless. Loss of life comparatively small.

October 24–27. Bicentennial Celebration at Philadelphia of Penn's landing.

October 26. Reed's Opera-House and Hotel at Salem, Oregon, burned.

Unveiling of the statue of Thomas Carlyle on Thames Embankment, London.

October 26–27. Annual Convention of the American Institute of Architects, at Cincinnati, O.

October 28. Burning of the Flint Mill, Fall River, Mass.

October 29. Village of Grindelwald near Berne, Switzerland, nearly destroyed by a hurricane.

October 30. Three four-story brick houses on Eighth St., Philadelphia, fall during alterations. One woman injured.

October 31. Burning of the Park Theatre, New York, before the play. Two lives lost.

A portion of the Riverside Paper Mill at Lafayette Station, Pa., falls down. Two persons injured.

Burning of the Massini Theatre, Barcelona, Spain. No lives lost.

CALCULATING GIRDERS.

ILLINOIS INDUSTRIAL UNIVERSITY,
CHAMPAIGN, ILL., October 21, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Your readers are certainly under obligation to Mr. Berg for his clear presentation of the arithmetical method for finding the maximum bending moment acting on a girder. (Vol. 12, page 186.) His mode of procedure is a general one: better than those usually found in the text-books, and more convenient than the graphical method when the loading is uniform or concentrated at but few points. But the graphical method has been preferred in the essay on girders, for the following reasons: —

It is perfectly general, employing the same general mode of procedure for a loading arranged in any manner; the diagrams are readily drawn, requiring no instruments other than those in the hands of every draughtsman; the necessary computations are as few and simple as possible; an acquaintance with the mathematical theory of the resistance of materials is not necessary, though always preferable (this theoretical and mathematical knowledge is not possessed by large numbers of architects and draughtsmen in the United States); after the diagrams are once drawn, the shear at any point can be found by measuring the length of a line, and the bending moment by multiplying the length of another line by a constant, the pole distance; serious errors are less likely to be made graphically than arithmetically by most persons, and if made are much more easily detected; the shear and bending moment can be found at as many points as may be required, each only requiring the measurement of two lines and a single multiplication; while by the arithmetical method the moment of each force on one side of the point about the point must be computed and their algebraical sum taken.

Besides, the graphical method has never received the attention which it deserves, since it is usually only applied to the determination of the bending moment and shear, and students are at a loss how to proceed to obtain the moment of inertia or dimensions of the corresponding section required for the girder.

It is usually the case that the maximum bending moment is alone necessary, since most girders are of uniform section from end to end; but this is not true of cast-iron girders, where the bending moments and shears must be found at several points. When wrought-iron girders are built up with top and bottom plates, these can be made of several thicknesses of metal, diminishing in number from centre to ends of girder, thus securing greater economy of material and cost, quite important in very heavy girders.

For several years past I have found it preferable to express length in feet and loads in net tons, making the proper changes in the ordinary formulæ; for this renders the formulæ more simple, the co-efficients are smaller, and fewer figures are required in the computations, though if logarithms are employed, the gain is not as marked. The value of the moment of inertia is unchanged if the formulæ are properly modified, since the dimensions of the cross-section are always taken in inches.

As an illustration, take the following example: —

A white-pine floor-joist is 20 feet in clear length, 2 inches thick, spaced 16 inches between centres, and supports a floor whose total weight with its load is 90 lbs. per square foot. We will assume the maximum permissible deflection of the joist to be .03 inch per foot, or .6 inch at the centre. Required the minimum safe depth of this joist by the formula for flexure.

$$1.\quad d = \sqrt[3]{\frac{270 \times 1.2 \times 20^3}{858. \times 2 \times .6}} = \sqrt[3]{\frac{270 \times 1.2 \times 8000}{858 \times 2 \times .6}} = 13.6 \text{ inches.}$$

$$2.\quad d = \sqrt[3]{\frac{5 \times 2400 \times 240^3}{32 \times 1716000 \times 2 \times .6}} = \sqrt[3]{\frac{5 \times 2400 \times 13824000}{32 \times 1716000 \times 2 \times .6}} = 13.6 \text{ inches.}$$

The saving in labor of computation is certainly very marked.

The modified formulæ for transverse strength and flexure will be given in a subsequent portion of the essay.

The letter W is used merely to represent the load on the girder in net tons, without regard to its mode of arrangement. I am aware that different symbols are usually employed for loads concentrated at centre and uniformly distributed; but the advantages of this course are not apparent to me, as the student must remember to use the proper formula in either case, and is likely to be confused by the different symbols.

Mr. Berg's proposed use of capitals and small letters in formulæ is a good idea; still, formulæ should be written with the fewest symbols possible, so that professional men shall be least likely to err in making hurried computations.

I employ W, U, L, C and T in the same sense that he does, but use B instead of K, L in place of Δ.

Yours truly, N. CLIFFORD RICKER.

THE FEE FOR EXTRA SUPERINTENDENCE.

NEW YORK, November 2, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Nine months ago I was sent to this country by a foreign company, to superintend a building they were going to erect in this city. Their contracts were made in Europe with a firm which undertook to do all the work according to full specifications and plans furnished by the company's architect abroad, and for a sum of $———, all payments to be made directly to the contractor's agent here. My duty was therefore to see that said contract was faithfully carried out and to report home. I had no responsibility either as architect or agent, and received a monthly salary for my services, my office expenses being paid; and I was to be free to do any other work, provided it did not interfere with my duties.

Since my arrival I have been the only person in this country acting for the company. I have been obliged to alter the plans to comply with the laws of the city, increasing thereby the expense considerably and modifying the plans. The nature of the soil obliged me also to make very expensive and difficult foundations, building stone piers fifteen feet below the soil under very dangerous circumstances, the whole work involving very great responsibility. Besides, I was ordered to add several important parts onto the building, and to make all the plans, full detailed estimates, make and sign contracts; and besides all this I was obliged to act as authorized agent and attend to general business, despatching goods, paying taxes, etc. All money has also been sent to me directly; I had to make all payments, etc. My acts have been endorsed by the company, but they refuse to admit my claim for payment for all the extra work of every kind not accounted for in our previous agreement. As a subscriber to your paper I request that you should kindly inform me at earliest possible period what fees are allowed to architects in such cases, for the professional services of different nature stated, for general management as agent, and for the management of the funds. You would greatly oblige

Yours very truly, C. M. J.

[WE know of no rule whatever for determining the proper rate of compensation in such cases, where there is no previous understanding. Superintendents in our large cities are often paid from two to four per cent on the cost of the work under their charge. Architects generally consider the superintendence, if it is included in their duty, as constituting about two-fifths of their work, and allow that proportion of their regular commission of five per cent for it. As to being entitled to any compensation above the stipulated salary it depends entirely on the legal construction of the contract existing between you and your employers. — EDS. AMERICAN ARCHITECT.]

AUTOMATIC SPRINKLERS FOR BOSTON THEATRES.

BOSTON, November 7, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I beg to call your attention to a curious coincidence. Yesterday the Police Commissioners of Boston established an ordinance by which the proprietors of every theatre in Boston are to be required to protect the stage and all other combustible parts of the building with automatic sprinklers similar to those which have done so much service of late in the factories.

In this morning's *Herald* an account is given of the extinguishing of a fire in the Providence Theatre Comique, during a play, by the automatic sprinklers — with so little injury, even to the scenery, that the performance was not stopped.

The attention of the Fire Commissioners of Boston was called to the expediency of making this requirement some time since, and the public may feel grateful for their judicious energy, and to the Police Commissioners for the establishment of this ordinance by their joint action. E. A.

NOTES AND CLIPPINGS.

ARCHITECTS WITHOUT PLANS. — The interesting testimony of Sir George Birdwood to the fact that the architects of India are not in the habit of using plans in the erection of their buildings, though not exactly bearing on Mr. Morris's original statement respecting the builders of Santa Sophia, is one that can be amply borne out by every one familiar in any way with Mussulman countries. Certainly in Egypt the traditional absence of plans is of great antiquity. Some recent research on the history of the art of the Arabs having led me to consult the Arab historian Abdal Latif's "Account of Egypt," not in the Latin translation of Pococke, the son of the famous old Oxford Orientalist, nor in that of his successor, White, but in the French translation of Silvestre de Sacy, the following passage, to be found in the fifth chapter, as the testimony of the writer of the twelfth century, seems curiously to confirm Sir George Birdwood's statement respecting the Indian builders: "When a palace or other edifice has to be built, the architect to whom the execution of the building has been confided is called in. He visits the spot, plans it out in his mind according to the nature of the building required, after which he successively undertakes the different portions and terminates them one after the other, so that each may be used and occupied as it is completed." Prisse d'Avennes, our latest authority respecting Arab art, tells us that the Arabs commenced the construction of a house by tracing the general plan on the earth with the aid of a sack of dry plaster, and to show how tenaciously the tradition has been handed down to our days, relates an anecdote of Mehemet Ali's treasurer, who, seeing the plans of his palace thus being laid out, angrily ordered the plaster to be replaced by flour, as the symbol of fecundity. — *The Athenæum.*

A PLEASANT MEDIÆVAL BOROUGH. — Mr. Henry Armstrong, medical officer of health for the city, gave a history of Newcastle from a health point of view. Having regard to the many difficult sanitary problems to be dealt with, he urged that it was necessary to remember the extreme antiquity of the borough. In the thirteenth and fourteenth centuries, epidemics, which lasted from one to three years, occurred in the borough. In the time of James I. so little regard was had to cleanliness, that the "dunghill" within the castle precincts "had increased to such a size and bigness that it was in length 98 yards, the depth of it was 10 yards, and the breadth of it 32 yards," some 27,000 tons of filth having thus been allowed to accumulate. In the seventeenth century the great plague was one of eleven epidemics; it alone caused seven thousand deaths, and it led, by the almost complete desertion of the town and port, to a ruined trade and wasted treasury. Even in 1853, at the date of the then prevailing cholera epidemic, it is reported that the town so abounded in narrow yards, lanes and "entries," that in one district alone there were streets exceeding a mile in length, which had an average width of some four feet only. Since then rapid progress has been made, and although much remains to be done, yet the reduction of the yearly death-rate per one thousand by ten in as many years, and the diminution in the same time of typhus to one-fifth of its prevalence in the period immediately before, are matters of congratulation and tangible results of good work effected. — *Paper read at English Lamlay Institute.*

REMAINS OF THE WALL OF PHILIP AUGUSTUS. — There still exist in Paris considerable remains of the great wall with turrets which Philip Augustus began before he joined Richard of England in his Crusade. The positions of some of these relics are pointed out by *Galignani* as follows: "In the Cour de Rouen, near the Passage du Commerce, is the lower portion of a turret still intact, with a piece of wall covered with ivy. It forms part of the playground of a school, and children may be seen climbing over this relic of the past. In the Rue Clovis is another fragment bordering on the Rue des Fossès Saint-Victor. At the bottom of the courtyard of the house No. 31 Rue Dauphine is a turret almost entire, which serves as a warehouse and residence. In the Rue Guénégaud, 31, are also the remains of a tower which was joined to that in the Rue Dauphine by a wall which ran in one direction to the Tour de Nesle, and in the other to the Porte Dauphine. It was recently used as a forge. On the right bank of the Seine the enceinte had a wider circumference. Several houses still contain fragments incased on their walls or inclosed in their gardens."

STONE-DRESSING BY STEAM-POWER. — According to the *Baugewerks-zeitung*, the use of facing-stones of terra-cotta will in future experience the competition of natural stone dressed by steam-power. The new invention of Herr Schmidt has apparently been proved by trials to combine simplicity of mechanical arrangement with economical and rapid working. Former attempts in this direction have been based on the idea of imitating stone-dressing by hand, and the machinery has been devised for the purpose of producing a smooth surface by the removal of all uneven portions, but Herr Schmidt has worked on a different plan. He has applied the principle of a saw with as great a power as can be obtained to the production, at the same time, of two surfaces ready for use. The inventor seems to have been to some extent influenced by the stone-boring machine, which was the means of accomplishing the gigantic tunnelling works of St. Gothard and Mont Cenis. He seems to have reasoned that by the judicious application of the principle of this machine it ought to be a matter of no insuperable difficulty to produce a stone-dressing machine able to supersede manual labor. A provisional machine, of limited size, was constructed, in which a small steam-cylinder imparted a vertical striking motion to a pair of steel chisels of equal width. A stream of water was used in conjunction with this appliance, and as the chisels penetrated the block of stone, two regular and even surfaces were produced. This trial was made with the hardest syenite granite. An ordinary stone-dresser, working with a hand-saw, can produce in a day of eleven hours, according to the journal named: —

Square feet of cut surface.	
4.30 to 6.45	in sandstone.
1.82 to 2.15	in marble.
0.21 to 0.32	in granite.

The smallest machine on Herr Schmidt's principle, with one small steam-cylinder, can produce in the same time 43 to 65 square feet of cut surface of granite, and therefore represents the daily labor of 200 workmen. It is the same thing to the machine whether hard granite or soft sandstone is given to it to cut, but the quality of work done varies, of course, according to the hardness of the material. The machine is, therefore, a reliable test of the exact comparative hardness of various descriptions of stone. The piston only requires a limited stroke of 1½ inches to 2 inches, and gives about one thousand blows per minute without the chisels heating, as a continuous stream of water serves the double purpose of keeping them cool and of carrying away the minute particles of stone, etc., which are constantly accumulating. This is a considerable gain to the workmen from a sanitary point of view, as there is no stone-dust thrown off. There is provision made for the stone-dust being deposited by the water which flows away, in such a manner that it can be easily removed. It is used in the ceramic industry, and is therefore of some value. The inventor delayed bringing his machine in a prominent manner before the industrial public until it had been subjected to the most difficult tests.

ASBESTOS IN ITALY. — The mining for asbestos in Italy is as yet limited to the Provinces of Sondrio and Turin. The asbestos in the former occurs in regular strata, varying in thickness from 3 to 4 inches, though in some cases it has been found 20 inches thick. The enclosing rocks are chloritic and talcose schists of a greenish color, and the asbestos is found chiefly in fibrous masses of a yellowish-white color. In some cases the fibres are long and firm, resembling a skein of thread of a yard or more in length. It has also been found that asbestos abounds in the fissures of serpentine rocks, and is often accompanied by other minerals, among which garnets of a green color have been found in minute crystals, to which the miners have given the name of "Semenize Dell'Amianto," meaning seeds of asbestos The excavations are carried on in forty different places, and as a rule the enclosing rock is quarried by blasting. In some cases where too much material would have to be removed, the workings are driven forward in the asbestos-yielding stratum, leaving pillars here and there to support the roofs of the workings. In the Province of Turin asbestos is obtained in the mountainous districts and serpentine rocks, and occurs in veins varying in thickness from ½ inch to 4 inches The length of these veins in some cases amounts to about 20 yards, their depth, however, being very limited. Various qualities are found but unfortunately the asbestos having the largest and finest fibres is often decomposed so as to make it useless for many purposes. In 1878 the workings in the Province of Sondrio yielded about 80 tons of the material, and gave employment to 200 persons during seven or eight months, while those in Turin furnished 100 tons and employed 200 hands The industry, which is now rapidly increasing, is in the hands of six firms, two of which are English companies. One of them has established a manufactory near Rome, while the others work up the raw material at Turin. The products furnished are principally card-board for steam-joints, packing for steam-engines, covering for steam-pipes and boilers, fire-proof paper and incombustible cloth. It is estimated that the industry now gives employment to about 500 persons, 400 being in the mines and 100 in the factories. — *Iron Age.*

LLANTHONY ABBEY. — Father Ignatius has made reply to Walter Savage Landor's recent sharp note concerning the restoration of Llanthony Abbey. His point is that the old residence of the author Landor is not Llanthony Abbey at all, but an "old priory," and that the only Llanthony Abbey in existence is quite another and more modern structure. "I have never attempted," he writes, "to collect money to restore Llanthony Abbey, for the simple reason that until I built the present abbey there was no such building in existence as Llanthony Abbey. Neither am I collecting, nor have I collected, funds for building Llanthony Abbey. The funds have all been provided by three members of our own order. The only Llanthony Abbey that ever existed belongs to me, and not to Mr. Landor. I have built it on land the title-deeds of which are in the hands of my lawyer. I have not attempted to do anything for the old priory which Mr. Landor temporarily possesses, except to pray to God for its restoration to His service in His own time and in His own way."

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.]

266,600-601. DOOR-BOLT.—Arthur C. Blayney, Chicago, Ill.

266,604. DOUBLE-SEAMING MACHINE.—Orrin W. Burritt, Weedsport, N. Y.

266,606. PORTABLE ADJUSTABLE WINDOW-BALCONY.—George W. Cannon, Poughkeepsie, N.Y.

266,613. HOT-AIR GENERATOR FOR FIREPLACES.—Jesse S. Deardorff, Canal Dover, O.

266,623. TENONING-MACHINE.—William D. Herschel, Philadelphia, Pa.

266,642. REVERSIBLE SCREW-DRIVER.—Frank R. Partridge, Augusta, Me.

266,658. TRESTLE.—Daniel E. Teal, Oneida Castle, N. Y.

266,671. PLUMB-BOB.—William L. Bergen, Batavia, Ill.

266,691. WINDOW-PLATFORM AND FIRE-ESCAPE.—Frank H. Heimsath, Chicago, Ill.

266,706. AUTOMATIC FIRE-ALARM.—Morris Martin, Malden, Mass.

266,730. WEATHER-STRIP.—Theodore Steckel, Klecknersville, Pa.

266,758. COMBINED LOCK AND LATCH.—Richard F. Bridewell, San Francisco, Cal.

266,763. METHOD OF CORRUGATING WOOD.—John J. Burk, Buffalo, N. Y.

266,795. PNEUMATIC DOOR-CHECK.—Gilbert R. Elliott, Boston, Mass.

266,799. SASH-FASTENER.—Louis Felsburg, New Haven, Conn.

266,809. DRAIN AND SEWER.—Henry B. Greenleaf, Boston, Mass.

266,816. HEATER FOR DWELLING-HOUSES.—James B. Harris, Jr., Geneseo, N. Y.

266,829. BARN-DOOR.—James L. Johnston, Columbiana, O.

266,863. LATCH AND LOCK COMBINED.—William Michel, Mount Sterling, O.

266,870. WATER-CLOSET VALVE.—Emil Moellman, Cincinnati, O.

266,871. BENCH MORTISING-MACHINE.—William S. Morgan, Evansville, Wis.

266,876-877. FIRE-EXTINGUISHER.—Daniel Parham, Tyngsborough, Mass.

266,878. COMPOUND FOR ARTIFICIAL STONE.—Antonio Pelletier, Washington, D. C.

266,887. CLAMP.—Thomas Reno, Detroit, Mich.

266,903. DOOR-FASTENING DEVICE.—Jules T. Schertser, Jefferson Barracks, Mo.

266,918. MANUFACTURE OF GLASS WATER-CLOSET BOWLS.—Junius A. Talmadge, Meriden, Conn.

266,920. CLAMP.—Harrison H. Taylor, Detroit, Mich.

266,933. FIREPLACE.—Charles A. Wellington, Lexington, and Albert Chase, Boston, Mass.

266,947. LOCKING-LATCH.—Joseph Zerfas, New York, N. Y.

10,224. (*Reissue.*) HYDRAULIC ELEVATORS.—Cyrus W. Baldwin, Chicago, Ill.

SUMMARY OF THE WEEK.

Baltimore.

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

Emanuel M. E. Church, South, stone church, s w cor. McCollough and Presstman Sts.

Ansley Gill, 4 two-st'y brick buildings, s s Ramsey St., w of Addison Alley.

Frank E. Davis, 4 four-st'y square brick buildings, w s Carrolton Ave., n of Lanvale St.

Pindall & Frisby, 6 two-st'y brick buildings, s s West St., w of Paca St.

John M. Getz, 5 three-st'y brick buildings, Biddle St., between Valley and Wilcox Sts.

C. C. Rumpf & Co., three-st'y brick building, 40' x 42', n s Portland St., w of Green St.

Robt. Garrett & Sons, iron-covered shed, 13' x 230', O'Donnell's Wharf, in front of Maryland Sugar Refinery.

Wm. Butzler, three-st'y brick building, e s Valley St., between Biddle and Chase Sts.

Wm. Hyeser, 2 three-st'y brick buildings, e s Valley St., between Chase and Biddle Sts.

Henry Schermer & Aug. Hanneman, 2 three-st'y brick buildings, n w cor. Washington and Jefferson Sts., fronting w s Washington St.

George M. Wirth, two-st'y brick building, William St., between West and Cross Sts.

Wm. Bowman, two-st'y brick building, 44' x 50', n e cor. Eden St. and Hammond Alley.

Boston.

BUILDING PERMITS.—*Brick.*—*Commonwealth Ave., No.* 264, Ward 11, for John W. Shapleigh, three-st'y mansard dwell., 25' x 60'; Antoine Xavier, builder.

Washington St., near Neponset St., Ward 24, for Boston Gas Light Co., one-st'y hip governor house, 24' x 24'; Wm. C. Whyte, builder.

Western Ave., rear of, near Harvard St., Ward 25, for Solarized Rubber Co., one-st'y flat engine-house, 30' x 30'; Patrick Grace, builder.

Harrison Ave., nearly opposite Haywood Place, Ward 12, for Cyrus T. Clarke, four-st'y flat dwell. and store, 12' x 56' 6".

Beacon St., No. 322, Ward 11, for R. D. Evans, four-st'y pitch dwell., 28' x 71'; Woodbury & Leighton, builders.

Beacon St., No. 166, Ward 11, for Geo. O. Shattuck, four-st'y flat dwell., 30' x 72'; Woodbury & Leighton, builders.

Mayo St., Ward 16, for Boston Building Association, four-st'y flat tenement, 36' x 42'; Albert J. West, builder.

East Second St., near H St., Ward 14, for Henry Souther, four-st'y flat storage, 36' x 125'; Arthur C. Brastow, builder.

Lehigh St., rear of, near South St., Ward 12, B. & A. R. R. yard, for B. & A. R. R. Co., two-st'y pitch iron signal-house, 10' x 34'; J. G. Wheeler, builder.

Howard Ave., near Harlow St., Ward 20, for City of Boston, two-st'y pitch primary school-house, 37' and 71' 2" x 78'; Robert R. Myers, builder.

Wood.—*Neponset St.*, cor. Washington St., Ward 24, for Boston Gas Light Co., one-st'y pitch exhauster building, 26' 4" x 29' 6"; ell, 20' x 29' 6"; Benj. Tarbox, builder.

Marginal St., near Jeffries St,, Ward 2, for Abiel Gove, one-st'y pitch storage, 16' x 20'; Abiel Gove, builder.

Centre St., rear of, near La Grange St., Ward 23, for Samuel B. Dana, executor, two-st'y pitch storage, 24' x 27'; ell, 24' x 28'; Geo. A. Spear, builder.

Tremont St., near Oak Sq., Ward 25, for Patrick Carr, one-st'y pitch stable, 14' x 18'.

Atwood Ave., No. 2, rear, Ward 22, for Theoda H. Crosby, one-st'y pitch storage of plants, 10' x 25'; R. D. Ward, builder.

Border St., No. 420, Ward 1, for Isaac Pratt, Jr., et. al., two-st'y flat storage, 22' x 32'; N. Littlefield, builder.

Arion St., No. 4, near Davenport Ave., Ward 20, for Guy A. Clifford, two-st'y pitch dwell., 28' x 32'; Guy A. Clifford, builder.

Arion St., No. 6, near Davenport Ave., Ward 20, for Guy A. Clifford, two-st'y pitch dwell., 28' x 32'; Guy A. Clifford, builder.

Vinton St., near Dorchester St., for J. D. Thompson, one-st'y pitch mechanical, 18' x 26'; Isaac H. Dunn, builder.

Boylston St., near Lamartine St., Ward 23, for Henry P. Jordan, one-st'y flat wagon-shed and office, 26' x 50'; Henry P. Jordan, builder.

Keyes St., near South St., Ward 23, for John Gately, one-st'y pitch mechanical, 20' x 30'; John Gately, builder.

Pleasant St., near Downer Ave., Ward 24, for T. W. Hoxie, 2 two-st'y flat dwells., 21' 6" x 39'; Wm. T. Eaton, builder.

Everett Ave., near Cushing Ave., Ward 24, for Frank P. Nash, two-st'y hip dwell., 31' 6" x 34' 8"; W. A. Blazo, builder.

Everett Ave., cor. Cushing Ave., Ward 24, for Frank P. Nash, 2 two-st'y hip dwells., 22' x 31'; ell, 14' x 18'; W. A. Blazo, builder.

Tudor St. No. 75, Ward 13, for Patrick Hanlon, three-st'y flat dwell., 24' x 40'; Patrick Hanlon, builder.

Dunstable St., Ward 5, for J. A. Pearson; one-st'y flat harness-maker's shop, 17' x 30' and 32'; G. M. Starbird, builder.

Rockwell St., near Milton Ave., Ward 24, for Mrs. M. E. Moulton, two-st'y pitch dwell., 22' and 28' x 32' 6"; E. F. Moulton, builder.

Cushing Ave., near Everett Ave., Ward 24, for Frank O. Nash, two-st'y hip dwell., 31' 6" x 34' 8"; W. A. Blazo, builder.

Harvard Ave., near Farrington Ave., Ward 25, for Samuel W. Shorey, 2 two-st'y pitch dwells., 14' and 20' x 50'; Henry M. Perry, builder.

Clay Ave., near Commercial St., Ward 24, for O. C. R. R. Co., one-st'y pitch passenger station, 22' x 40'; ell, 15' x 18' 6".

Rockland St., near Washington St., Ward 23, for Allin Cong. Church, Dedham, one-st'y pitch wagon-shed, 20' x 25'; Tucker & Co., builders.

Train St., near King St., Ward 24, for Frank O. Nash, two-st'y hip dwell., 25' and 31' x 34' 6"; ell, 17' 9" x 20'; W. A. Blazo, builder.

Brooklyn.

BUILDING PERMITS.—*Hall St.*, w s, 160' s Willoughby Ave., two-st'y brick stable; cost, $3,500; owner, Mr. Coverly, Washington, D. C.; architect and carpenter, Ed. Van Vooris; mason, S. L. Keeney.

St. John's Pl., s s, 100' e Seventh Ave., 5 three-st'y brownstone dwells., tin roofs; cost, each, $8,000; owner and builder, Thomas Fagan; architect, R. Dixon.

South Elliott Pl., e s, 100' s Fulton St., 2 three-st'y brownstone dwells., tin roofs; total cost, $17,000; owner, Charles Cheesborough, Northport, L. I.; architect, C. A. Snedeker; builders, T. B. Rutan, and E. Snedeker.

Bergen St., n s, 200' e Fifth Ave., four-st'y brick tenement, tin roof; cost, $8,000; owner, Miss Ann McCarty, 100 De Kalb Ave.; architect, S. W. Osmun.

Suydam St., e s, 112' s Bushwick Ave., two-st'y frame dwell.; cost, $3,000; owner, F. Freidlein, Hopkins St., near Throop Ave.; builder, J. Rueger.

Metropolitan Ave. No. 44, s s, 289' 8" w Olive St., two-st'y frame dwell.; cost, $3,500; owner, Edmund Peek, 52 Metropolitan Ave.; architect, J. B. Harned; builder, O. H. Doolittle.

Broadway, e s, ——n Furman Ave., 2 two and three st'y frame dwells., tin roof; total cost, $5,500; owner, Martin Euler; architect and carpenter, George Distler.

Seventh St., Nos. 207 *to* 211, n s, 80' w Fifth Ave., 4 two-st'y brick dwells., tin or gravel roofs; cost, total, $12,000; owner and carpenter, Edward H. Mowbray, 162 Centre St.; architect, P. H. Gilvarry; mason, J. J. Cody.

Sands St., s s, 151' 4" e Jay St., four-st'y brick store and tenement, gravel roof; cost, $12,000; owner, John Romayne, 130 Sands St.; architect, M. J. Morrell; builder, P. J. Carlin.

George St., Nos. 40, 42, *and* 44, near Central Ave., four-st'y brick and bluestone ice-house, tin roof; cost, $40,000; owner, Leonard Eppig, 32 George St.; architect, Chas. Stoll.

Macomb St., n s, cor. Fifth Ave., 8 three-st'y brick tenements, tin roofs; cost, $——; owner, Henry Lansdell, Ninth St., cor. Fifth Ave.; builders, J. M. Brown and C. B. Sheldon.

Chicago.

FACTORY.—Carey, Ogden & Parker have just commenced building a paint and oil manufactory, to cost $25,000, from designs by Jaffrey & Scott.

HOUSES.—J. H. Bell is to build a house on Drexel Boulevard, pressed brick, with stone trimmings, to cost $12,000; and Louis Lloyd a building for flats, on Winchester Ave., to cost $10,000, from plans furnished by L. G. Halberg, architect.

Dr. Earle is about to build a house on West Washington St., to cost $15,000; designed by C. P. Thomas, architect.

BUILDING PERMITS.—A. W. Rudwick, two-st'y and basement brick dwell., 22' x 60', 105 Blackhawk St.; cost, $4,500.

H. Smyth, two-st'y and basement brick store and dwell., 25' x 58', 676 Larrabee St.; cost, $5,000.

C. Zrerker, two-st'y brick dwell., 22' x 45', 81 Le Moyne St.; cost, $2,500.

C. L. Dix, three-st'y brick dwell., 28' x 60', Indiana Ave., near Twenty-second St.; cost, $4,000.

C. L. Jenks, 5 three-st'y and basement brick stores and dwells., 50' x 150', Nineteenth and Clark Sts.; cost, $25,000; Cass Chapman, architect.

Herman Repennery, three-st'y brick store and dwell., 429 Ogden Ave.; cost, $7,000.

F. Worst, two-st'y brick dwell., 20' x 36', 381 Fifth Ave.; cost, $4,000.

John Cowey, two-st'y and basement brick store and dwell., 23' x 60', 637 South Ashland Ave.; cost, $4,500.

John T. Davis, 12 two-st'y and basement brick dwells., 56' x 264', 288 to 326 Bissell St.; cost, $50,000.

J. W. Litchfield, two-st'y and basement brick dwell., 25' x 40', 761 and 733 Monroe St.; cost, $14,000.

F. Heid, three-st'y brick dwell., 22' x 60', 583 Wells St.; cost, $5,500.

James Grace, one-st'y cottage, 21' x 40', 331 Hudson Ave.; cost, $3,000.

Smith, Gaylord & Cross, six-st'y and basement brick store, 91' x 162', 111 to 117 Michigan Ave.; cost, $90,000.

John S. Oehman, three-st'y and basement brick dwell., 50' x 70', 2245 and 2247 Wentworth Ave.; cost, $10,000.

Geo. C. Hutchinson, three-st'y and basement brick factory, 50' x 150', 196 and 198 Desplaines St.; cost, $20,000.

A. E. Bournique, four-st'y and basement brick dancing-academy, 60' x 127', 2324 Calumet Ave.; cost, $30,000.

E. H. Valentine, three-st'y brick dwell., 50' x 72', 288 to 292 South Ashland Ave.; cost, $18,000.

John Jecel, two-st'y brick dwell., 21' x 56', 760 Eighteenth St.; cost, $3,000.

Cincinnati.

FACTORY.—Messrs. Snider & Co. Preserve Works are to build a six-st'y factory on Augusta St., 80' x 134'; cost, $25,000; E. Anderson, architect.

BUILDING PERMITS.—J. M. Brunswick, five-st'y brick factory, St. Clair Alley; cost, $7,000.

Peter Lane, 4 two-st'y brick dwells., Eighth St., near State Ave.; cost, $20,000.

J. E. Burdge, two-st'y brick dwell., Sherman Ave., near Western Ave.; cost, $5,000.

Wm. Mulluly, two-st'y frame dwell., Warsaw Pike; cost, $2,000.

F. W. Handy, repair four-st'y brick, 183 West Second St.; cost, $2,300.

Total permits to date, 624.

Total cost to date, $1,852,900.

Denver, Col.

HOTEL.—W. H. Cox, five-st'y brick and stone hotel, 125' x 150', Stout St.; cost, $160,000; E. P. Brick, architect.

BUILDING PERMITS.—W. J. Kinsey, three-st'y brick building, 125' x 125', Wynkoop St.; cost, $20,000; F. E. Edbrooke, architect.

H. C. Brown, two-st'y brick dwell., 53' x 63', Sherman Ave.; cost, $20,000; Wm. Quayle, architect.

Frank Church, double brick dwell., 40' x 49', South Fourteenth St.; cost, $8,000; F. E. Edbrooke, architect.

H. C. Sargeant, two-st'y brick dwell., 40' x 60', Lincoln Ave.; cost, $10,000.

P. T. Hughes, two-st'y brick business block, 75' x 125', Holladay St.; cost, $22,000.

H. E. Peck, two-st'y brick store, Larimer St.; cost, $7,000; L. A. Heard, architect.

Mrs. H. A. Chichester, double two-st'y brick dwell., 42' x 63', Glenarm St.; cost, $10,000; J. H. Littlefield, architect.

R. H. McMann, terrace of 6 two-st'y brick dwells., 47' x 125', Twentieth St.; cost, $20,000; J. H. Littlefield, architect.

W. L. Ward, brick dwell., 40' x 70', Grant Ave.; cost, $13,000; H. R. Marshall, New York, architect.

W. L. Ward, terrace of three-st'y brick dwells., 39' x 125', Lincoln Ave.; cost, $2,600; H. R. Marshall, New York, architect.

Colorado Mortgage & Investment Co., one-st'y brick stores, 75' x 115', Larimer St.; cost, $31,500; J. W. Roberts, architect.

G. W. & Wm. Clayton, four-st'y business block, 50' x 125', Larimer St.; cost, $60,000; J. W. Roberts, architect.

New York.

BUILDING MATERIALS.—Brick and cement have advanced; other materials are steady at quotations.

RESIDENCES.—For Mr. Michael Duffy, 41 five-st'y houses, to be built of brownstone and brick, are to be erected on First Ave. and Ave. A, between Seventy-ninth and Eightieth Sts., from designs of Mr. Andrew Spence.

OFFICE-BUILDING.—The Mutual Life Insurance Co. will have a fire-proof office-building erected on the site of the old post-office building recently purchased by them; plans have not yet been decided on.

APARTMENT-HOUSE.—An apartment-house is to be built on Seventeenth St., w of Second Ave., for Mr. Thos. Osborne.

STEWART STORE.—The alterations and the raising two stories of the Stewart store, cor. Chambers St., will require five million brick.

Work on the new St. Mary's School, at Garden City, will begin in the spring.

BUILDING PERMITS.—*Cherry St., No.* 359, four-st'y brick tenement, tin roof; cost, $5,000; owner, Ellen Abrahams, 180 Henry St.; architect, And. Spence.

Lewis St., No. 123, five-st'y brick tenement, tin roof; cost, $8,000; owner, Daniel F. Linehan, 294 Stanton St.; architect, Wm. Graul.

Mott St., Nos. 35 *and* 37, four-st'y brick factory, tin roof; cost, $7,000; owner, James Naughton, 46 Mott St.; architect, Andrew Spence.

Fifteenth St., n s, 95' 6" w Avenue B, five-st'y brick flat, gravel roof; cost, $50,000; owner, Hugh Smith, cor. Broadway and Thirty-fourth St.; architect, Stephen D. Hatch.

Twentieth St., n s, 225' e Eleventh Ave., 4 brick buildings, foundry, pattern-shop, stable, core-rooms and ovens, gravel roofs; cost, $15,000; owner, James L. Floyd, 740 Greenwich St.; architect, Jos. M. Dunn; builders, Jeremiah Smith and Chas. E. Hume & Co.

West Fifty-seventh St., Nos. 514 *and* 516, six-st'y brick malt-house, tin roof; cost, $60,000; owner, Conrad Stein, 521 West Fifty-seventh St.; architect, Wm. Jose.

Seventh Ave., s w cor. Fifty-fifth St., six-st'y brick and stone apartment-house, slate and tin roof; cost, $55,000; owner, Estate of Edward Clark, James Meehan, exr., 215 East Sixty-first St.; architect, H. J. Hardenbergh; builders, Moran & Armstrong, and Grissler & Fausel.

Seventy-sixth St., n s, 225' w Third Ave., two-st'y brick and stone church and rectory; owners, Trustees of Church St. John the Baptist, by Chas. De La Croix, 120 West Twenty-fourth St.; architects, N. Le Brun & Son; builder, Jas. Murphy.

East One Hundred and Fourteenth St., No. 170, one-st'y brick chapel, tin roof; cost, $5,000; owner, Elizabeth Lohr, on premises; architect, Gustavus Bofinger.

One Hundred and Sixteenth St., n s, 65' e Third Ave., five-st'y brick flat, tin roof; cost, $15,000; owner, Chas. Laughran, 225 East One Hundred and Twenty-fourth St.; architect, And. Spence.

Lexington Ave., e s, from One Hundred and Sixth to One Hundred and Seventh St., and n s One Hundred and Sixth St., 83' e Lexington Ave., 17 four-st'y brownstone front flats, tin roofs; cost, each, $19,-000; owner, Sam'l H. Bailey, 186 East One Hundred and Fourth St.; architect, F. T. Camp, Jr.

Lexington Ave., n w cor. One Hundred and Seventh St., 9 four-st'y brick tenements and store, tin roofs; cost, corner, $15,000; others, each, $12,000; owner, C. Johnson, 101 East One Hundred and Nineteenth St.; architect, R. Rosenstock.

Second Ave., No. 1414, four-st'y brick workshop, tin roof; cost, $5,500; owner, Helen Fremberger, on premises; architect, Geo. Fremberger; builders, James Shannon and Geo. Fremberger.

Second Ave., w s, 120' n One Hundred and Sixteenth St., 2 five-st'y brick tenements, tin roofs; cost, $10,000 and $13,500; owner and builder, Peter Somers, 1248 Park Ave.

Fourth Ave., s e cor. Eighty-seventh St., 4 five-st'y brick flats; cost, one, $16,000; three, each, $20,000; owner, Jennie I. Christie, 239 West One Hundred and Twenty-sixth St.; architect, Wm. Christie, builder, Louis Rossi.

Eighty-seventh St., s s, 102' 9" e Fourth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, each, $20,000; owner, architect and builder, same as last.

One Hundred and Twenty-ninth St., n s, 175' e Seventh Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner and builder, E. G. Coggeshall, 224 East One Hundred and Eighteenth St.; architects, Thom & Wilson.

One Hundred and Thirty-first St., n s, 135' e Sixth Ave., 2 five-st'y brick apartment-houses, tin roofs; cost, each, $48,000; owner, John L. Brewster, 156 Broadway; architect, M. J. Merritt.

One Hundred and Thirty-ninth St., s s, 56' w Morris Ave., three-st'y brick factory, tin roof; cost, $7,-000; owner and builder, Ed. Gustaveson, One Hundred and Thirty-ninth St., w Third Ave.; architect, John Rogers.

One Hundred and Fortieth St., n s, 481' 6" e Alexander Ave., three-st'y frame dwell., gravel roof; cost, $4,468; owner, Samuel M. Pattison, 43 East One Hundred and Thirty-third St.; builder, Thos. Kepple.

Avenue A, n w cor. First St., Fordham, three-st'y frame dwell., tin and slate roof; cost, $4,000; owner, Christopher Boehme, Fordham; architect, Ernest Hoffmann.

ALTERATIONS.—*Fourth Ave.*, s w cor. Sixty-fourth St., four-st'y brick extension, tin roof; cost, $3,000; owner, Henry T. Smith, 58 East Sixty-fourth St.; architect, M. C. Merritt.

Wall St., No. 50, to be raised one story; cost, $25,-000; owner, Royal Ins. Co., Benj. B. Sherman, chairman of Trustees, Nos. 31 and 33 Wall St.; architect, D. Lienau; builder, Wm. W. Owens.

White St., Nos. 83 *and* 85, to be raised one story; cost, $3,000; owners, William P. Dixon, et al., 29 Wall St.; architect, J. Morgan Slade.

West Thirty-fourth St., No. 428, three-st'y brick extension, and alterations in top floor and roof; cost, $4,000; owner, Julia R. Hunt, on premises; architect and carpenter, Sam'l McSkinin.

Portland, Oregon.

HOUSES.—Mr. Higgins is putting up a three-story brick house, 50' x 80'; cost, $13,500; Mr. James Toley, contractor; Mr. J. Krumbein, architect.

Mr. F. Everding, a residence costing $4,000. Mr. W. H. Williams, architect.

Capt. Menzies is having plans prepared for a residence: cost, $2,500. To be built by C. W. Sears.

STORES.—Mr. Hamilton is building a four-story brick store, 50' x 100', on corner of —— St.; James Foley, contractor; J. Sherwin, architect.

Prinkman & Wolf are building a three-story brick building for business purposes; cost, about $16,000. R. Robinson, contractor: W. H. Williams, architect.

Geo. T. Greene is building a three-story brick building for business purposes, 50' x 100'; cost, $32,000; Wm. Deburgh, contractor; J. Krumbein, architect.

HOTEL.—Messrs. Lewiston & Higgins are putting up a three-story frame building for hotel purposes; cost, $16,000. W. O. Anderson, contractor; Wm. Stokes, architect.

Philadelphia.

FREIGHT DEPOT.—*Beach St.*, n e cor. Laurel St., the Penn. R. R. Co. are about to build a one-st'y freight depot, 50' x 200'; F. W. Tweed, contractor.

HOUSES.—Mrs. Mary Agnew is having erected on Cambridge St., below Sixteenth St., 4 dwells., 17' 6" x 40'; J. J. Deery, architect.

STABLE.—Dr. W. K. Brown has begun to build a stable and coach-house, 19' x 28' and 30' x 32' at Front and Diamond Sts.; John J. Deery, architect.

Frankford R'd., e s, n of Alleghany Ave., 2 three-st'y dwells., 16' x 40'; Owen Mountney, contractor.

Penn St., cor. of Foulkrod St., 2 two-st'y dwells., 16' x 40'; E. K. Welch, contractor.

BUILDING PERMITS.—*Second St.*, n w cor. Berks St., two-st'y store, 10' x 50'; Jos. Parker, contractor.

Watt St., e s, n of Federal St., two-st'y dwell., 16' x 28'; R. B. May, owner.

Edgemont St., e s., n of Anthracite St., two-st'y dwell., 16' x 40'; Geo. McCouch.

Third St., w s, n of Venango St., 2 two-st'y dwells., 15' x 40'; Wm. McCluskey.

Connaro St., s s, bet. Ridge Ave. and Mitchell St., 2 three-st'y dwells., 15' x 28'; Chas. M. Horner, contractor.

North Twenty-first St., No. 222, three-st'y dwell., 20' x 30'; Jno. Blackburn, owner.

Eighth St., n w cor. McKean St., 8 two-st'y dwells., 18' x 44'; J. C. D. Smith, contractor.

Twenty-third St., cor. Cherry St., third-st'y addition to front and back building, 20' x 45' and 20' x 50'; Richards & Shourds, contractors.

St. Louis.

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

Missouri Car & Foundry Co., one-st'y iron-clad; cost, $5,000.

Missouri Car & Foundry Co., one-st'y iron-clad; cost, $6,000.

Missouri Car & Foundry Co., one-st'y iron-clad; cost, $4,000.

E. G. Scudder, dwell.; cost, $9,000; J. B. Legg architect; J. B. Lindsley & Son, contractors.

C. A. Katz, dwell.; cost, $5,000; O. J. Whilhelm, architect.

Dr. Thos. O'Reilly, store and dwell.; cost, $28,000; H. G. Isaacs, architect; P. Weber & Co., contractors.

J. Garvin, dwell.; cost, $2,500; S. H. Hoffmann, contractor.

St. Louis Mutual House-Building Co. No. 3, dwell.; cost, $2,848; Mortimer, architect.

St. Louis Mutual House-Building Co. No. 3, dwell.; cost, $3,173; Mortimer, architect; J. H. Dunlap, contractor.

J. Gilsler, dwell.; cost, $7,800; J. Ratz, contractor.

General Notes.

ALBION, N. Y.—County clerk and surrogate's office; cost, $25,000; J. G. Perry, Binghampton, architect.

E. K. Harts, pump factory, brick and cut stone; cost, $18,000; W. V. N. Barlow, architect.

Pratt Block, artificial stone front; H. B. Gleason, Rochester, architect; cost, $10,000.

Two-st'y dwell. for S. W. Smith; cost, $3,500; F. Goodnow, architect.

BRYN MAWR, PA.—Stone house for Geo. Vaux, Esq., two-and-one-half-st'y, 37' x 70', to be finished next May, (1883).

CHARLESTOWN, MASS.—The Committee on Fire Department has approved the plans for the new $25,-000 engine-house to be located on Bunker Hill, near Main St., in the Bunker Hill District.

CHARLOTTE HALL, MD.—Chapel of Potomac-stone, with terra-cotta and blue-stone finish, 34' x 70'; cost, $10,500; T. B. Ghequier, architect, Baltimore, A. M. Carroll, builder.

COLUMBUS, GA.—The Swift Manufacturing Co., of Nashville, have begun a new cotton mill.

DANVERS, MASS.—Queen Anne cottage for Postmaster Hood; cost, $4,000; H. W. Rogers, architect.

DORCHESTER, MASS.—Messrs. Ion Lewis & H. P. Clark are architects for a stable for E. G. Merrihew, on Melville Ave.; also making additions to residence; Edw. C. Wheeler, builder.

ELM WOOD, ILL.—E. E. Barker, cottage; cost, $2,500; David S. Hopkins architect, Grand Rapids, Mich.

GIBBSBORO, N. J.—The corner-stone of the new P. E. Church, which will cost $6,000, has been laid.

HAVERHILL, MASS.—The First Baptist Church Society is building a $70,000 church.

HOPKINTON, MASS.—Last week the Congregationalists laid the corner-stone of their $30,000 church edifice, to take the place of the one destroyed by fire last April.

INDIANAPOLIS, IND.—The State House Commissioners have filed a report of the progress of work on the new State House, showing that the cost of the entire work, according to present plans and contracts, will be $1,762,207,58. This leaves the Commissioners a balance of some $230,000, which can be used, at their discretion, in making changes and improvements in the building. The third story will be reached when the season closes.

KANSAS CITY, MO.—The architect of the new city-hall, which will cost $20,000, is Mr. George Carman.

LAWRENCE, L. I.—A frame house is to be built for Mr. I. F. Scott, to cost about $8,000, from designs of Mr. H. Edwards Ficken, of New York.

LYNN, MASS.—Residence for F. S. Pevear; cost about $6,000.

Brick tenement-house for H. W. Gordon; cost, $9,-000.

Brick factory, 40' x 70', three-st'y, for J. M. Taylor; cost, $5,600.

House for F. P. Drown, Queen Anne style; cost, $4,500.

Brick boiler-house, 40' x 40', and brick octagon chimney, 150', for A. B. Martin & Co.; cost about $4,500.

Store for N. W. Edson; cost about $6,000.

Tenement-house for C. W. Wilson; cost, $6,200.

Residence for F. W. Cross; cost, $4,300.

Residence for C. W. Marsh; cost about $3,000.

Residence for C. A. Lovejoy; cost, $4,600; H. W. Rogers, architect for all the above.

MARION, MASS.—Alterations and additions to "Holly Lodge," Blake's Point, for Lyman R. Blake, Esq.; cost, $2,000.

RYE BEACH, N. H.—Queen Anne cottage for H. Sawyer; cost about $5,000.

RYE NECK, N. H.—A cottage is to be built for Mr. G. M. Taylor, from designs by Mr. Ed. H. Kendall of New York.

SHELBURNE FALLS, MASS.—Mr. J. T. Montgomery has offered to build a stone church for the Episcopalian Society. The building will have a seating capacity of about 300, and cost from $15,000 to $20,-000. The work will be begun next spring.

SOUTHBORO, MASS.—H. H. Mawhinney & Co. are erecting a four-st'y brick shoe-manufacturing establishment at Fayville, Southboro.

WALLINGFORD, CONN.—Eight tenements for the workmen of the Wilson sewing-machine factory are to be built by W. W. Scoville, of Hartford.

WARWICK, N. Y.—Alterations and additions are to be made to the residence of Mr. R. P. Fowler, at a cost of $8,000; from designs of Messrs. R. C. Romeyn & Co.

WHEELING, W. VA.—Mr. S. M. Howard, of this city, is the architect of St. Luke's Episcopal Church, now building on the Island.

PROPOSALS.

BOILER FOR Q. M. STEAMER "RESOLUTE."

BOSTON, MASS., October 31, 1882.

Sealed proposals will be received at the office of the Depot Quartermaster, U. S. Army, No. 159 High St., Boston, Mass., **until 12 o'clock, M., of Thursday, November 30, 1882,** for the furnishing and fitting of a new boiler for the Q. M. Steamer "Resolute," plying in Boston Harbor.

Specifications of the work may be examined at the office above-named.

The Government reserves the right to reject any or all proposals, and preference will be given to an article of domestic manufacture, condition of price and quality being equal.

Envelopes containing proposals should be marked "Proposals for Boiler for Steamer 'Resolute,'" and addressed to the undersigned.

THEO. J. ECKERSON,
360 Major and Q. M. U. S. Army, Depot Q. M.

HOT-WATER HEATING-APPARATUS.
[At Paducah, Ky.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, November 4, 1882.

Sealed proposals will be received at this office until **12 M., on the 27th day of November, 1882,** for furnishing and fixing in place complete in the Court-House and Post-Office at Paducah, Ky., a low-temperature hot-water heating-apparatus, in accordance with drawings and specification, copies of which, and any additional information, may be had on application at this office, or the office of the Superintendent. JAS. G. HILL, Supervising Architect.

PENSION OFFICE-BUILDING.
[At Washington, D. C.]

OFFICE OF SUPERVISING ENGINEER AND ARCHITECT. DEPARTMENT OF THE INTERIOR.
No. 1316 N Street, n w.
WASHINGTON, D. C., November 1, 1882.

Separate sealed proposals will be received at this office till **noon on Saturday, the 2d day of December, 1882,** for furnishing and delivering at the site of the new Pension Building on Judiciary Square in this city, foundation-stone, broken stone for concrete, bricks, cement, lime, sand, coloring matter for mortars, terra-cotta consoles, brackets and pilaster caps, and for excavation and grading, for all labor in laying concrete foundation, for all labor in building foundation and cellar walls of rubble.stone, and for all labor in laying bricks required for the construction of a fire-proof building for the United States Pension Office. Specifications may be obtained from this office.

M. C. MEIGS, Supervising Engineer and Architect.
361 Bvt. Maj.-Gen'l. U. S. A.

YELLOW-PINE TIMBER.

NAVY PAY OFFICE,
17 State St., NEW YORK, October 31, 1882.

Proposals sealed and endorsed on envelope "Bills for Supplies Advertised," will be received at this office **until 12 o'clock, November 15, 1882,** for the following supplies of the best quality, to be delivered within forty-five days from date of order, free of expense, at the Navy Yard, Boston.

"Bureau Construction and Repair."

20,000 cubic feet fine-grained yellow-pine timber.

Full specifications can be obtained by applying to this office.

The right is reserved to reject any or all bids that may not be deemed advantageous to the Government.

Two responsible sureties required for the prompt and faithful delivery of the supplies awarded.

Blank forms will be furnished at this office.

Bids not properly signed and certified will not be considered.

THOMAS T. CASWELL,
359 Pay Inspector U. S. Navy.

GLASS. **[At St. Louis, Mo.]**

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 8, 1882.

Sealed proposals will be received at this office **until 12 M., on the 23d day of November, 1882,** for furnishing and delivering, ready for fixing in place, all the plate, double-thick sheet and double-thick ground glass, required for the Custom-House and Post-Office at St. Louis, Mo., in accordance with specification, schedule and diagrams, copies of which and any additional information may be had on application at this office or the office of the Superintendent

360 JAS. G. HILL, Supervising Architect.