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THE so-called Belmont bill, providing for the reduction of the present duty upon works of art imported into this country, was brought before Congress a few days ago, and rejected by a large majority, so that we shall be obliged to go on paying an import of about thirty per cent upon our pictures and statues until the rulers of this nation learn something more about art and artists. The more intelligent members of the House of Representatives seem to have reflected that the American artists, nearly all of whom, at home and abroad, have petitioned, protested, argued and inveighed against the present state of affairs, ought to know whether they need protection against foreign competition or not; but this reasoning was lost upon the others, and a large majority, carried away by the ridiculous sophistry of certain demagogues, who accused the promotors of the new bill of endeavoring to reduce the tax upon the paintings and statuary of the rich men, while the sufferings of the poor, compelled to pay heavy duties on their chromos and plaster casts, were neglected, voted for rejection. The idea that original pictures, sketches or etchings are only for the rich, while the poor man must content himself with chromos, is a novel one, and is likely, we imagine, to commend itself more to the individuals who sell three cents' worth of printed bad drawing and ugly coloring for two dollars, than to poor people of taste. In fact, the most obvious effect of the increase in the tariff upon works of art seems to have been to multiply the profits, and foster the industry of the meanest class of picture peddlers, who manufacture "sunset scenes," "marine pieces," "views in the Alps," and so on, painted in oil on canvas by the hundred, at a cost of seventy-five cents or a dollar apiece, and sell them, in Dutch metal frames, at ten, fifteen or twenty dollars, according to the ignorance and gullibility of their customers.

THE ELECTRIAL EXHIBITION, which opens in Philadelphia on the second day of next September, promises to be of great interest. The classification of the exhibits includes every device concerned in the production or utilization of electric force, and as at the present day the fittings of almost any well-built house include two or three batteries for various purposes, those who direct the construction of such houses will be glad of the opportunity which will be afforded for making themselves more thoroughly acquainted with inventions of the kind. The first section of the exhibition is devoted to apparatus for the production of electricity, including the old-fashioned Leyden jars and frictional machines, as well as the modern combinations of revolving magnets and armatures. Voltaic batteries also find a place in this section, and room is to be found for all the varieties and improvements in them which telegraphic practice has given occasion for making. The second section, which will possess special attractions for experts, includes only conductors, such as wires, single and compound, of simple or alloyed metal, submarine and subterranean cables, insulating materials, conduits for underground wires, and with them the devices for laying cables, supporting lines above ground, braiding wires with cotton or silk, combining conductors to prevent induction, and so on; with all improvements in the modes of connecting conductors.

SECTION Three is rather the scientific section, containing only apparatus for measuring the quantity, direction and intensity of currents, both primary and induced, the resistance of conductors, the brilliancy of electric lights, and the force produced or transmitted by the numerous devices for changing electricity into motion. Section Four, which includes all the applications of electricity, is divided into two sub-sections, the first containing only apparatus employing currents of comparatively low power, such as telegraphs, telephones, fire and burglar alarms, annunciators, electric clocks, apparatus for automatic registration of time, of temperature, rainfall, velocity of wind, speed of railway trains and other phenomena, and railway block-signals; besides all varieties of electro-medica apparatus, and applications of electricity to warlike purposes, as for firing guns, torpedoes, and military signalling. Electrical organs, toys, and miscellaneous apparatus also find place in this sub-section. The second division is devoted wholly to devices requiring powerful currents, these being divided in general into apparatus for the production of electric light, and for the electrical deposition of metals on surfaces prepared to receive them. The first of these divisions will naturally include the most attractive portion of the whole exhibition for the general public, and all varieties of arc and incandescent lamps will be shown. Provision has been made for displaying the most recent applications of the incandescent light to practical purposes, as, for instance, to submarine illumination, which is now practiced to a certain extent in fishing, and in explorations under water, as well as for the humane purpose of lighting buoys floating over dangerous reefs or shoals. The second division will comprise, besides electro-plating apparatus, other devices for the application of electricity to industrial processes, as to bleaching, by the liberation of nascent elements, to ripening wines, and so on; and in it are included all forms of storage-batteries, electro-motors, and inventions for transmitting power by electricity. The fifth section includes objects relating to natural, or rather terrestrial electricity and magnetism, such as lightning-rods, mariners' compasses, dipping-needles, and various kinds of natural and artificial magnets. The last two sections are historical and bibliographical, comprising the rudimentary and intermediate forms of electrical apparatus, and books, models, and educational appliances.

ON account of the important part which good motive machinery plays in the successful operation of electrical apparatus, arrangements have been made for a thorough test of the steam-engines to be shown at the exhibition, under the supervision of a committee of the Franklin Institute, which has general charge of the whole affair. Application for the admission of engines to the test must be made by their owners, but, once admitted, all will be subjected to the same trials. Each engine will be rated for economy of steam, regularity of speed, concentration of power, durability of construction, simplicity of design, perfection of proportion, and finish of parts. Indicator and friction diagrams will be taken under various circumstances, the variations in speed during one minute, and during a single stroke, will be repeatedly tested by chronographs, and the temperature and weight of water used and condensed will be registered, as a criterion of the economy and efficiency of the engine. Even if there were no other exhibition, this comparative trial of large engines, ranging to seventy-five horse power in size, would be of great interest. As every one knows, only the best engines, giving the greatest steadiness of motion and the highest efficiency, can profitably be employed for electric lighting, and a competitive trial of those intended to be used for the purposes of the exhibition will be virtually a contest between the most perfect engines which have yet been made.

THE work upon the foundation for the great statute of Liberty has proceeded so far that the concrete footing is now complete, and the first courses of granite will be laid in a few weeks. The concrete base, as finished, weighs twenty-four thousand tons, and is said to be the largest mass of artificial stone above ground in the world. The form of the base is that of a stepped pyramid, ninety-one feet square at the

bottom, and sixty-seven at the top; the sides falling back in steps each three feet high. The pyramid is entirely solid, with the exception of two arched passageways, each ten feet wide, which pass through it, at right angles to each other, forming a square chamber at the centre, which is continued vertically upward to the top. An extension of the inner shaft will occupy the middle of the granite superstructure, and will connect directly with the cavity in the statue, so that an elevator can run, as is intended, from the ground line to the head of the figure, a distance of three hundred and fifty feet. The concrete block itself, being rather unsightly in appearance, will be concealed, when the work is finished, by a vaulted passageway, which is to be built around it, and covered with earth and grass, so that the granite upper portion of the pedestal will appear to stand on a low pyramid of earth, covered with sod, and occupying the whole space now enclosed within the stone walls of the redoubt in the centre of which the statue is to be erected. The vaulted passageway, which should rather be called a series of rooms, is thirty-five feet wide, and thirty-five feet high, all formed of concrete half-arches, leaning against the main concrete mass. Although in a measure protected by the covering of earth and grass, these concrete vaults will be in a position very trying to artificial stone, and if they resist the effects of weather, to which they will be somewhat exposed, the engineer who designs and constructs them will have reason to be proud of his skill.

THE fifth annual Report of the Executive Committee of the Archæological Institute of America contains an unusual amount of matter, as befits the record of the constantly increasing business of the association whose work it represents. The number of regular members of the Institute is now three hundred and forty-seven, the list including perhaps as distinguished a collection of names as has ever been brought together in this country in so small a space; and the history of the efforts which have been made under its auspices, limited as they have necessarily been, indicates a good judgment on the part of the directing officers, and a corresponding intelligence and zeal on the part of their agents, which promise well for the future. During the past year the explorations of the Institute expedition at Assos have been brought to an enforced close, through the expiration of the official license, which terminated by express limitation on the first of May, and could not be renewed. The excavations were carried on during the latter part of the time with all the force that the resources of the expedition could provide, particular attention being given to the necropolis, which promised a greater variety of interesting discoveries than any other portion of the ruins would be likely to afford in so short a period. The result proved the wisdom of this disposition; a great number of figurines, vases, coins and other objects being secured, in addition to the interesting details of sculpture and architectural forms which the tombs afforded.

FOR several months after active operations were suspended, the members of the expedition remained on the ground, arranging the materials for their report, collating fragments, and securing memoranda of all kinds. The terms of the firman, or official permit to excavate, required that the antiquities taken from the ruins should be shared between the Expedition and the Turkish Government; and a commissioner was sent by the latter to Assos, with whom a fair and amicable division was made. It has been common in such cases for the Turkish Government to sell the whole or a part of its share of the antiquities, either to the exploring party or to other persons interested; and in anticipation of this the Trustees of the Boston Museum of Fine Arts had forwarded two thousand dollars, to be used in the purchase of such objects as might be most interesting in the Government's share of the Assos treasure; but within a year or two the attention of the Turkish authorities has been called to the value of the classical remains in their possession, and the sale or exportation of such curiosities is now forbidden, so that no purchases whatever could be made. After the division was completed, it was necessary to pack and ship to its destination the American part of the spoils, and as Assos affords no facilities for such work it was not until the twenty-first of October that the last case was despatched, and Mr. Bacon left the ruins to their former desolation. It is interesting to learn that the whole cost of this most fruitful exploration, which is, indeed, not yet complete, since the results are not fully prepared for publication, has been a little more than nineteen thousand dollars, counting every expense directly or indirectly connected with the expedition, since it was first seriously undertaken, three and a half years ago.

THE fashion of cremation seems to be spreading rapidly, but there are indications that some objectionable features may in future be introduced into the rite. In England, for instance, not long ago, a child died in the house of a certain William Price. There were suspicious circumstances about the matter, and no medical certificate of the cause of death was registered, as the law requires, so that the coroner of the district notified Mr. Price that unless the certificate was brought before a certain day, it would be his duty to hold an inquest. On the day appointed for the inquest the certificate had not been filed; but a few hours before the arrival of the coroner Mr. Price held a private cremation ceremony, which consisted in taking the body of the dead child, with a ten-gallon barrel of petroleum, to a field near by, putting the corpse in the oil, and setting it on fire. This performance, not unnaturally, attracted the attention of the passers-by. A crowd collected; the flames of the oil were extinguished, and Mr. Price was conducted to jail to await trial. The statutes of Great Britain seem to have failed to contemplate eccentricities of this kind, and upon the trial no evidence, satisfactory to the jury, could be found to show that a man was not entitled to fry the members of his family like doughnuts, under the eyes of the whole town, if that process appeared to him a desirable way of disposing of their remains. Even the circumstance that Mr. Price was unable, or unwilling, to produce a doctor's certificate as to the cause of death, and endeavored to hurry the corpse out of the way before the coroner's arrival, did not, to that charitable jury, seem sufficient cause for imputing to him any wrong thoughts, and he was triumphantly discharged.

THE Cleveland *Herald* contains a lively description of the designs submitted for the Garfield monument in that city, which are now exposed to public view in a room in Ryder's building. The award has not yet been made, or, at least, is not known, and the report says that, as we thought was probable, certain sculptors "have agents here working with all the eagerness of ward wire-pullers in behalf of their principals." One of these business-like artists, who has sent "an intimate friend" several times to Cleveland, has been so incautious as to contribute to the competition, but the "intimate friend," as the *Herald* thinks, has done what he could to counteract the bad effect which the sight of his principal contending with the common herd would otherwise have, by surrounding the model with an expanse of miniature grass, made of fresh moss. This admirable device should not be lost upon sculptors who propose to take part in future competitions. We will suggest, as an addition to the moss, that tiny flowers might be stuck in here and there, and perhaps a few small dolls could be disposed in natural attitudes about the central feature. This would be certain to charm the ladies at least, which would be a great point gained. Although none of the other sculptors show quite as much ingenuity as that displayed by the "intimate friend" of the author of design number one, a good deal of realistic skill has been bestowed upon the various models. One, for instance, by Mr. John Turini, of New York, has been made to imitate at a small scale the granite and bronze in which it is intended to be finally carried out; while another, the work of an artist from the interior of New York State, represents a structure furnished with windows, which are indicated by tiny panes of glass, backed with blue paper. We should be sorry to think that these curiosities fairly represented the designs submitted in competition for the most important work of art ever erected in the United States; and, judging from the *Herald's* account, there are a few compositions of real merit. Among these seems to be one which represents "a church steeple with carved brackets extending up the corners of the four sides," standing on a "ground arch," under which is a figure of President Garfield, with folded arms, while a statue of Peace occupies the summit of the "steeple." Another of the good designs is one which consists of a "four-cornered column," ornamented with a semi-circular peristyle at the base. The structure is situated at the top of a slight eminence, and in ascending to it, by means of an inclined plane, one "encounters a statue of Garfield." This design is said to be "in the Romanesque style," and although the description hardly seems to suggest this, a "neat book printed expressly for the occasion" by the designer, doubtless explains such technical points correctly.

FOUNTAIN'S ABBEY.

IN almost every English or European country there are two things that strike one almost universally: the soldiery and the priesthood. As some one remarks, "a soldier to every man, a priest to every woman in the land" is not an uncommon thought to every traveller. The homes, then, of this latter class are no less interesting than the history of the monastic system itself, and our sketches show the ruins of one of them.

Although an important factor in the country, the system is seldom seen in the grandeur of its former days, but the ruin upon ruin that fill the land testifies to their former grandeur, while their architecture puts to shame the generally ugly and tawdry sumptuousness of modern works of their kind.

We have included European countries, but although across the Channel such beautiful remains as St. Georges-de-Boscherville, Jumièges, Cluny, St. Michel, and a thousand others, are not to be forgotten, yet England rightly bears the palm for picturesque monastic ruins, and marks her as the abbey country. A visit repays one abundantly, for nothing exists in our own country to compare with them. Some are solemn and majestic in their Romanesque architecture, some graceful and refined in the Early English, others highly Decorated in its own peculiar style, and not a few are in the striking richness of the Perpendicular. Overgrown with ivy, often lonely, away in the recesses of the forests, left to fall, piece by piece, under the destroying influence of time, or nurtured and guarded by loving hands — they all bear record to the rise, prosperity, and fall of the monastic system. We would not have it reign in the land to-day, yet we may not forget the service it has rendered.

The old stage rumbled away from the little depot at Ripon, and, upon looking around, we observed near us a lady and gentleman who gave unmistakable evidences of Fatherland, both by their words as well as their actions, and finding them apparently well acquainted with the little village and neighborhood, and utterly ignoring that youthful adage of "speak when you are spoken to," we at once struck up an acquaintance, which strangely enough was resumed months hence, away over in Bavaria, hundreds of miles distant, and at that singular performance, the Passion Play.

"Oh, yes," they said, "we know all this neighborhood, for it is our third trip here; the beauty of Fountain's Abbey enchants us, and we are never tired of returning to it."

And so it is a most enchanting place. Of all the abbeys in England, it is a question whether it is not the finest. Nor is Ripon itself a place totally devoid of interest. Picturesquely situated, a tramp through the town brought to light at least two things. The cathedral, very complete, and the smallest in England, and, as some one remarked, "decorated with a thousand skulls," which my chum remarked was not particularly remarkable, being simply sk(color) decoration.

Not far from it was the ruin of a little church, which must have been a gem in its day, but which is now allowed to run to ruin at its own sweet will. We came upon it in a little triangular lot of land, near a row of cottages recently erected. An old lady sat on the doorstep of one of them, and, as we commenced looking around, measuring and sketching, became much interested.

"And what do you see, good sirs, that interests you there?" said she.

"Why, madam," we said, "this bit of a church here must have been built hundreds of years ago, and the horny-handed sons of toil who labored to erect this monument of piety must have long ago returned to elementary particles."

We threw off this bit of eloquence to overcome the rather tramp-like appearance of our blue shirts and sprouting beards.

"Land alive, you don't say so," replied she; "why them rocks, you know, do make the best stone wall you ever see," verifying her remark by pointing to a stone wall in front of her door, made from the columns and capitals of the little church.

"And just look at these elegant houses, sirs," she went on; "why don't you draw them instead of that old rubbish?"

And so the old lady ran on, while we sketched and measured "the rubbish."

These honest old people had made free with almost all the nave walls, but had as yet left the chancel walls unmolested. Our rules showed it to be eleven feet six inches wide, by twenty feet long, and on the walls was seen the spring of the roof, just eight feet six inches from the pavement, which was broken and overgrown with grass and weeds. The chancel arch yet remained whole, heavily moulded, and springing from a curious cap, seven feet from the pavement, and shown in the sketch. There was the little piscina, built into the wall, and from whose bowl sprang a bunch of weeds and grass. The font, too, stood on a block of stone, directly under the arch, octagonal in form, with small panels and scooped top, which was also filled with weeds, and at the end of the chancel the altar was untouched, a moulded slab of stone upon two stone brackets. Outside, the walls were covered with ivy, and disclosed the remains of a battlement wall, which must have been extremely picturesque. How one would like to take the thing bodily and transport it to his own grounds as a relic of bygone days!

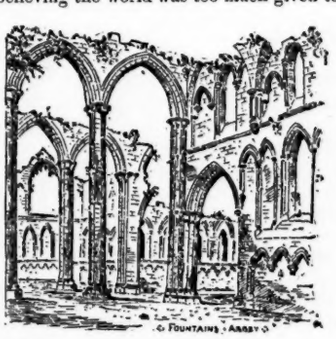
The next day we started for a walk to Fountain's Abbey: a walk that we can never forget, since it impressed the mind with the wonderful beauty of English foliage, which has been so often remarked. A little foot-path marks the way, after leaving the town, through forests and glades, where the drooping trees often form beautiful arcades hundreds of feet long, and then immerge upon grassy plateaux carpeted with moss. The property is owned by an English earl, who counts it a pleasure to keep the natural beauty of the place unmolested.

Stopping at the gate-lodge a moment, and chatting with the keeper, we then pass on through the grounds, and follow the course of a little stream, well stocked with swans, who disport themselves upon its surface. Every few moments we pass a group of deer, who look up with half frightened glance, and bound away among the trees. Everything is calm, quiet and peaceful, and we can well understand why the monks should choose such a place for their retreat. It seems in very truth a fairy land. Legend says it was a resort of the famous Robin Hood, who,

meeting a monk there, in his hatred of their very cloth, engaged in combat with him, and not only overcame him but slew him upon the spot.

Presently an old mill is passed, and then breaks into view a most enchanting view: an immense tower, broken walls with traceried windows, moulded arches, high columns, and a mass of ruins covering three of the former ten acres in extent.

Looking back more than seven hundred years ago, we see a colony of monks from York, who, believing the world was too much given to gaiety and mirth, settled in these forests, and with hardly a cover to their backs or sufficient food for their support, laid the foundations for one of the largest Cistercian establishments in England.



Before you rises a square tower, massive and stately in its ruins, and one hundred and sixty feet high. The buttresses, hooded on each story, are in good state of preservation, the windows are almost complete, and around the upper story runs an ornamental band, on which seems to be a carved motto. The huge arch below is unbroken, all the mouldings whole, and the capitals and columns unbroken. A most impressive scene it is, with the church nave stretching away three hundred feet, its inlaid pavement broken and covered with a velvety floor of turf, ivy clambering up the sides,

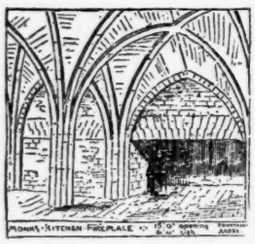
over the tops of the broken walls, or weaving itself around the mullions of the windows, and everywhere the spirit of peaceful solitude.

Perhaps the most beautiful feature in the whole are the two slender octagonal columns at the cross, once having small columns on the faces of the octagon, but leaving now only the simply-carved capitals, and possessing an airy elegance which seems to threaten their fall. But no, the connecting arches look as firm as when first laid, and only in the gray color and the mossy tops is seen any signs of decay.

The chancel of the Nine Altars is conspicuous, in the style of the Early English, and, like Melrose, the great east window is partly stripped of its tracery; yet one can well imagine here, as there, Sir Walter Scott's admiration at the pale moon's shadowy forms upon the mossy pavement below.

The aisles are still connected to the nave by their arches, but the roof has long since dropped out, leaving bits here and there, to which the ivy clings, showing itself no respecter of persons.

We walk thus for hours through these ruins, visit the chapter-house, the "*domus conversorum*," the cloisters, the dormitory, the refectory, and lastly the kitchen. Here, indeed, the old monks have left a tell-tale. Two huge fireplaces, each fifteen feet wide in the opening, span across the side, and show that there was no lack of provender. Emerging, and expecting to find a mammoth old chimney as a natural outgrowth, we found instead—sly rogues that they were—a small chimney, which might show to the world no indication of the huge barbecues which were prepared below for the delectation of the abstemious old fellows. It was ever thus, thought we: for ways that are dark and tricks that are vain, the ancient old monks had no equal.



Pass back again to the cloister court, through the chapter-house with its three beautiful arches of the Norman type, heavily moulded and carved, into the church, and by going out at the south doorway,

a perfect network of foundations and broken walls appear, from which the plan can easily be traced, and which verifies the assertion that the abbey covered over ten acres of ground, and was indeed one of the largest, as it was also the finest, in England. C. A. R.

The Human Hair as a Hygrometer.—In the base of the Capitol at Washington is the enginery by which the House, the Senate and the committee rooms are warmed and ventilated, and the gas lighted by electricity. It is altogether a big apparatus, consisting of three immense fans, four engines and eight boilers, with the necessary appliances for regulating the temperature and moisture of the air supplied to the nation's legislators. The instrument which tells whether the air is too moist or too dry is operated by a single human hair. A perfectly dry air is put at 0; saturated air, that is, air carrying all the moisture it will hold, is put at 100. A dial with a hand like that of a clock represents the different degrees from 0 to 100. The human hair absorbs moisture like a rope, and like a rope, it becomes shorter when wet. The differences in length between a hair six inches long when wet and the same hair when dry is made to represent the hundred degrees of moisture on the dial, and the hand or pointer moves backward or forward as the moisture in the hair varies. If it becomes too dry, more steam is thrown in; if too moist, less steam is allowed to escape, and thus the atmosphere for the nation's statesmen is regulated and kept at the healthful point, which is about 50.—*Exchange.*

ARRANGEMENTS FOR THE PREVENTION AND EXTINCTION OF FIRES IN THEATRES.[1]

THEATRES should be entirely fire-resisting, and have nothing in their construction that will readily ignite, so that the ordinary methods of extinguishing fire will suffice. This can be attained by giving due consideration and study to the planning and the materials of which the building is constructed. How these buildings can be planned and constructed, carrying out a safer system than at present, is what I would wish to try and point out in as brief a manner as possible, touching, it is feared butt imperfectly, on only some of the most important points. When the principal material employed in the construction is thin wood, as is, or perhaps I should say was, so often the case, no possible hope of safety could be entertained either for the building or the public frequenting it.

That a theatre can be made safe in spite of special dangers from the class of business carried on in it, there cannot be a doubt in the mind of any one who has given attention to the subject. Like every other class of building the special risks attending it can only be known by becoming thoroughly acquainted with the business carried on in it, and the special mode of conducting such business, with the accompanying dangers. Until this is ascertained no one can possibly plan a theatre to avoid these risks, and insure the safe and easy working of the house. A theatre, of all buildings, should have a place for everything, and everything in its place; and it is necessary to know what this everything is before the place for it can be provided.

The first step to be taken is to provide such means in the planning of the house as to enable the people to get out of the building in the shortest possible time, at the slightest provocation, in every way lessening the dangers from panic. Then the construction of a theatre, and the materials used, should be such as to render it wholly fire-resisting; this can be aided greatly by the manner in which the various departments are placed with relation to each other.

As a theatre can be made fire-resisting, no house should be allowed to remain open which is not so. It is no good to patch up the old wooden edifices with sheet-iron and pugging, and expect that the buildings will be any the safer. If such theatres still exist in any part of the kingdom they should be closed, even if the loss is sustained by the public themselves. When the slightest fire commences in one of these flimsy structures, as was seen at the fire at the Alhambra, no efforts, either from external or internal aid, can possibly extinguish it.

Judgment in the choice of materials with which to construct the building requires such great care and study that too much importance cannot be placed on this branch of the subject. The materials employed for the erection of places for the assembly of the public, whether for amusement, instruction or devotion, must be in every sense of the words "the best of their several kinds." The scantlings, or thicknesses, must be far in excess of what would appear to be necessary for the actual or present work which they have to perform, so that they may resist any shock or pressure that may from any cause be brought on them.

In short, a theatre must of necessity, in comparison with other buildings, be exceedingly costly. In this I refer only to the structural portions, leaving all decoration out of the question. In dealing with buildings where human beings are "packed," surely more care should be bestowed upon their construction than upon warehouses or factories. But as long as cheap theatres are erected danger will be rife.

Planning and Construction for Prevention of Fire.

No theatre should be allowed to stand that is "hemmed in on all sides with a narrow entrance, as a frontage in a public thoroughfare sufficient to carry a flaming gas device." The dangers accruing from the surrounding property are often as great as those in the theatre itself. In no case should people be allowed to live and sleep in or about this class of buildings; the many risks necessarily attending them, through their own special trade, should not be increased by the dangers generally to be met with in the dwellings of the lower class; and a building, or part of a building, not designed for the special business of a theatre should never be used for such purposes, as it is nearly sure to be unfit for them.

The site should be isolated on all sides, wide streets running all round the building; but as this is difficult to obtain in crowded cities a theatre might be designed with comparative safety having one side touching other buildings. To obtain perfect safety a site isolated on all sides should be insisted on.

[1] A paper by Ernest A. E. Woodrow, A. R. I. B. A., submitted for the Fothergill prize. The prize was not awarded, but this paper, with one other, was ordered to be printed in the *Journal* of the Society of Arts.

The most important item in the planning is what might be called the party-wall system, making every division of a theatre a separate building, with as few openings connecting the various sections and sub-sections as the smooth working of the house will allow. Commencing with the back of the building, I should place the workshop section, divided from the main building by an open area; then the stage, with dressing-rooms and wings on either side; then, of course, follows the auditorium, the corridors, the staircases, and the offices and saloons. Each of these many sections must be divided from the other, vertically, by strong brick walls, with the openings closed by fire-resisting doors, and horizontally by fire-resisting floors.

The various divisions within each section should be again separated by brick walls and strong, fire-resisting floors, so that, should one room be burnt out no other part of the building would suffer. This system applies throughout the whole building.

The position of the workshops should be such as to insure an entirely separate building, connected with the theatre by one opening only, which should be closed by a double fire-resisting door, which door should on no account be allowed to open during a performance. Should space permit, the open area should be made twelve feet wide between the theatre proper and the workshops.

Where no area can be obtained, a thick brick wall passing through and above the roof should divide the workshop section from the stage section.

All stores for scenery, properties, etc., not in immediate use should be in this building.

The painting gallery might be placed over the workshops, getting a top studio light, which should be protected by strong wire guards against falling sparks or materials. There is no special danger from scene-painting, oil not being the medium used, as is sometimes supposed.

The stage is too often used as a carpenters' shop. This should never be allowed; the many dangers thus incurred need no pointing out; yet it is strange that seldom is a special room provided for the carpenters. The work in some houses was carried on over the auditorium ceiling, but this is happily stopped. A special workshop should always be provided.

Dressing-rooms might be placed on either side of the stage for males and females, being divided from the stage horizontally by brick arches, and vertically by brick walls. Fire-resisting staircases, and separate exits into the street are necessary for each wing, as also for the workshop.

The fireplaces, where provided in the dressing-rooms, should be protected by tall wire guards. A complete system of heating throughout by hot-water pipes is, however preferable to open fireplaces.

The stage floor and sliders must of necessity be of wood, for setting the scenes, but much of the machinery might be made of iron, keeping somewhat the same forms now used in wood, and making a stiffer stage, which could be more easily manipulated.

On a level with the stage floor there must be ample room for scene docks, for storing the scenes in nightly use, while shifting from one set to another. The mezzanine and cellars should be used only for the machinery for working the stage, and on no account should the stowage of rubbish or scenes be allowed here — it never would if proper provision were made for it elsewhere. It is here that the stage-carpenter does such infinite harm with his match-board erections, after the building is out of the hands of the architect.

The band and other rooms are at times but portions of the mezzanine, match-boarded off, as if they had been forgotten when making the plans (which is more than likely). Proper accommodations must be supplied for band, band-master, stage-manager, firemen, bill-sticker, property-master, etc., etc.

The gridiron above the stage must be made sufficiently strong to carry the weight of the cloths, etc. Cases have been known where it has given way under the weight of the scenery, and let everything in dangerous confusion down on to the stage. The construction of the gridiron, flies and fly-rails should be of iron. Communication is necessary from the flies to the stage, to enable the flymen to escape.

The stage should be divided from the auditorium by a thick, solid brick proscenium wall, which wall should go between the orchestra and mezzanine, and be arched over the opening, passing through and above the roof. There need only be one opening in this wall, in addition to the large proscenium opening, namely, a pass door from the stage to the auditorium.

A separate fire-resisting passageway should be provided for the exit of the orchestra, so that the musicians may avoid passing either through the audience or under the stage to gain the street.

The stage should undoubtedly be cut off from the auditorium by some sort of fire-resisting or smoke-proof curtain. The failure of some of the iron curtains used on the Continent and in America has shown that they are not always to be relied on, but they must be of some use in retarding the progress of the flames. A double-thick felt or cloth curtain, made bag-shaped, with a water-spray along the top that would damp the curtain whenever it was lowered, suggests itself as a method for shutting off the stage. Water-curtains have been proposed, but as these could not be periodically tested on account of the destruction of property that would ensue they cannot be recommended. Whatever is adopted must be in constant use, for anything designed to act only in case of need, or upon the outbreak of fire is often liable to fail at the very moment it is most needed. Everything in and about a theatre must be always in use to be of any good. Where automatic appliances are provided people are apt to put such faith in them that they ignore the ordinary and essential means of fighting against fire, and become careless of the importance of the great danger. An "emergency" curtain coming down unexpectedly, in the middle of a performance, would be but the signal for a panic. Appliances requiring the presence of the flames, which they are supposed to extinguish, before they can act cannot be too strongly condemned.

I repeat, and cannot insist upon it too strongly, all appliances must be made so that there will be no way out of using them nightly. Therefore the smoke-proof curtain and the painted act-drop should be made to fall always together.

The scenery should be protected by applying some of the numerous solutions recommended by our chemists, and all drapery should be similarly treated.

The wood-work in and about the stage should be periodically painted with asbestos paint, or other fire-resisting liquid, and no precaution left untried to mitigate the danger from fire.

In dealing with the stage we have to contend with that portion of the house where there is the most danger from fire, the immense amount of gas used nightly, and sometimes in a careless manner, as pipes are being constantly connected and disconnected during the performance, causing small escapes near naked lights, makes one wonder that accidents occur as seldom as they do.

All lights must be protected by wire guards, and an arrangement should always be used whereby the gas is automatically cut off at the place where the union is made during the process of shifting various battens, ground-lights, etc.

The gas should be under the control of a practical gas man, with a sufficient staff of subordinates. This man should be stationed at the gas-plate, which is fixed on the stage during the performance, on which plate each cock should be labelled indicating what section of the light it governs, so that no error can possibly be made, and the wrong part of the house put in darkness.

The mode of lighting up should be by the electric spark, and not by naked lights. The "flash" system should be applied to all battens and hanging lights, avoiding the use of the spirit, cotton and cane moving among the scenery. When the electric-light is used many of the dangers of stage illumination will be done away with; yet great care will have to be taken in the manipulation of the light, which need not be touched on here.

The gas-meters should be placed in a specially prepared and ventilated room. The supply-pipes must be of hard metal, visible, and coated to prevent corrosion. There should be a cut-off tap near the stage-door to turn off the gas from without in case of fire. Separate meters should be provided for every section of the house, and a double supply laid on to each. Every set of staircases, corridors, offices, dressing-rooms, workshops, as well as the stage and auditorium, should have a dual system of lighting.

Every burner should be protected by an incombustible guard, and fixed away from wood-work or inflammable material, with a metal flue over it. In the parts of the house frequented by the rougher class the lights should be encased, or locked up, or placed out of reach.

Sun-burners are preferable to gaseliers; they must be periodically cleaned, and no wood-work fixed near them. Access should be provided to them from the roof.

Oil lamps should be placed about the building in all sections, in conspicuous positions, but out of the reach of the public, to take the place of gas on its extinction. Colza oil has been found preferable to any other. Red lamps, with the word "exit" in white, should be placed over the exit doors. All lamps should be lit and in their places before the doors are open, and the gas, both on the stage and in the auditorium, should be lit before the audience is admitted.

Gas-burners fixed so that they can be tampered with are among the most prolific sources of producing fire. There should be no jointed brackets or swinging pendants; every fitting must be fixed, and all joints and appliances examined and approved before the house is licensed.

Proper precaution should be taken in the manipulation of the lime light, and the bags kept outside the buildings.

Provision for plenty of light should be made to enable the use of artificial light being discontinued during the day, thus avoiding one of the greatest risks in theatres, namely, the careless handling of lamps, candles or matches. It is a frequent habit to drop the end of a semi-burnt match, and one to which great danger is attached. There could never be a greater mistake than making a theatre dark. The business could be better carried on if there were plenty of daylight, and the accumulation of the dirt of years would not then be suffered to remain unremoved, ready to flare up on coming in contact with the slightest spark. A theatre, for everybody's comfort, should be clean; but as long as it remains dark it will be dirty and dangerous. Therefore, the removal of rubbish should be insisted on daily, or an external furnace provided in which it could be consumed.

The roof should have easy access from various points, and be provided with cat-ladders, leading from the different levels, to enable firemen to get about with ease. There should be a parapet wall all round to protect the firemen. The construction of the stage-roof should be of iron; if of wood, the constant changes of temperature to which it would be subject, and the enormous heat, would desiccate the trusses and rafters, and convert them into something little better than touchwood, which would readily ignite.

A better mode of constructing an auditorium roof could not be cited than that of the new Alhambra theatre, where iron and concrete, with a covering of asphalt, are the materials used. The ceiling of the auditorium should be formed of fire-resisting materials, such as Jackson's fibrous plaster, and never of canvas. There should be no space over the ceiling available for store or workshop.

The several divisions of the audience should each have their separate entrances, exits, passages, corridors, staircases, saloons, lavatories, etc. The best method of planning this portion of the house, having in view the safety of the people, would be to bring everybody as near the level of the street as possible. To do this, place the dress circle on the street level, go down to the pit, and up to the upper circle and gallery. By adopting this method the various sections of the audience would have a better chance of gaining the street, the distances being more distributed. The fact of the building not being so high as it would be if the pit were on a level with the street would give a better chance of aid in case of fire; and as the parts occupied by the administrative offices need not be carried so high as the main building, an intermediate roof could be obtained, whereby the principal roof could be easily reached from without. The people in the pit, being below the level of the street, would not be in any danger, as in going upstairs a crowd is not likely to stumble, there not being the same risk as when coming down stairs.

Each section of the audience should have two entrances and exits, one on each side of the house, such exits and their approaches leading directly into the street, and these should be used only by that section of the audience for which they are designed, there being no pass-doors or emergency exits leading from other parts of the house into them. A door that is known as an "emergency door" is only a trap; when opened it, as a rule, leads into a corridor or staircase already full of people from another part of the house. All exits must be entrances, and entrances exits, and used nightly.

Staircases and passage-ways should be from four feet six inches to five feet wide. Where this width is insufficient for the number of people an extra staircase should be provided rather than additional width being given beyond the five feet. The corridors immediately outside the various tiers should be of sufficient width to take the people occupying such tiers without crushing. These corridors must be divided from the auditorium by brick walls, and the openings fitted with fire-resisting doors.

There should be no winders or steps at half-landings in the staircases, as all such are dangerous in a moving crowd. The flights should not be of more than eight or ten steps, and the treads and risers should be of easy and uniform go throughout. All steps and landings must have at least four and one-half inches bearing on solid brick walls at both ends, and arches should be turned under the landings.

Strong hand-rails on brackets built into the walls should be fixed to both sides of all flights of steps and landings, leaving a space of three inches clear between the wall and hand-rail. To acquire this a chase should be cut in the wall so as not to lessen the width of the staircase or passage-way by the projection of the hand-rail.

No single step, or flights of two or three should be admitted, slopes should take their places.

The private-box staircases should be made as important as the other staircases, with exits into the street, and communication at each level. As a rule, they are narrow or corkscrew staircases, only available for the private-boxes.

There should be no unshipping of barriers; they should be made permanent, and hung so as to open outwards, and close against the wall.

No pay-box or barrier should be placed to obstruct the exits; the moveable box so often seen should be abolished, and the pay-box made part of the permanent building.

All doors and barriers must be hung so as to open outwards, and close against the walls, the larger doors being hung in two folds. The fastenings on the doors used by the public should be such as to allow them to open the doors from the inside with ease. Locks are bad, as keys are seldom forthcoming when most required. The danger attendant upon the ordinary barrel-bolt was terribly illustrated in the case of the Sunderland disaster. It is apt to slip and catch in the floor, fixing the doors. A fastening is wanted that will enable those inside to get out, while it will at the same time present an effectual barrier to those outside. This has been provided by an invention known as "Arnott's patent bolt," in which an ordinary spring square bolt has the lower portion knuckle-hinged. Pressure on the inside will cause this portion of the bolt to leave the socket, and become parallel with the floor, thus allowing the door to swing both ways. Pressure from the outside will only tighten the bolt. What are now known as "emergency" doors are too often found locked, and worse than useless.

If the public were acquainted with the means of getting out of a theatre there is no doubt they would feel safer when visiting these places of amusement. A great number enter with the idea that they could never find their way out if they wanted; this is not to be wondered at, considering what some of these entrances are, and that the entrances are not always the exits, and the exits not always used nightly. Everything should be done to inspire the audience with the idea that they could save themselves without hurting others in case of accident. To do this they should be able to find their way easily about the house. Several ideas to attain this suggest themselves — placing ample notices on walls and doors, such as "Exit;" "This way out;" printing the plan of each section of the house separately on the programmes; placing large plans of the house in conspicuous positions; but above all, simplicity and uniformity in the plan at the first onset. Place the exits where they will be easily seen, and make both sides of the house as nearly alike as possible. Notices should be painted on lavatory, saloon-doors, etc., to distinguish them from exit doors. All notices should be painted in luminous paint. Never should such notices as "In case of need," "Exit in case of fire," "In case of panic," "Emergency," "Alarm exit," be seen; they only suggest danger to the people, and everything should be done to intimate safety and avoid panic among the nervous visitors to theatres.

All seats should be numbered, and the house licensed to hold that number, and no more admitted under penality of heavy fines to manager and visitor alike, then the gangways would be left unobstructed; but until they are both equally fined the passages will be blocked by people standing or seated on loose chairs. All seats should be fastened to the floor, and made to tip up to allow more room between each row for exit.

As far as the contents of the auditorium are concerned, it may be presumed that it is impossible to do without carpets, curtains and stuffing to the seats, otherwise there need be nothing inflammable in the furniture.

The floors should be laid with blocks of hard wood, over the fire-resisting floors, for comfort.

As many bodies which are incombustible under normal conditions become inflammable at a high temperature, every means should be taken to keep a theatre cool, adding to the health, comfort, and safety of all. When heat is much concentrated it makes substances highly inflammable, which might at a low temperature be simply combustible; it is therefore necessary, to prevent fire, to provide proper ventilation in a theatre. How often is this done?

The stage should be well ventilated, and at the same time there must be no draught to cause the scenery to wave about. Metallic shafts, with gas-jets burning in them, fixed in several places above the gridiron, would draw off the vitiated and heated atmosphere and smoke in case of fire; but should a fire break out the upward draught would increase it to a very serious extent; but if the gas-jets were turned out, and the proscenium curtain lowered the draught would be greatly lessened.

Fresh air should be admitted to the auditorium as near the floor level as possible, being previously warmed. The number of inlet-shafts should have some relation to the numbers occupying the seats, and the manner in which the vitiated air is drawn out of the building. Sun-burners play an important part in extracting the foul air, but, in addition, every gas-burner should have over it a funnel-shaped flue, up which the products of combustion might pass. It must be borne in mind that perfect ventilation is imperceptible; but to acquire such ventilation has been found a hard task, therefore theatres have been left to take care of themselves, and in but few cases the slightest provision taken to render them little better than death-traps. Whether the mode applied be what is known as the vacuum or natural system, or the plenum or mechanical, seems of little moment, provided fresh air is continually admitted throughout the whole house. The number of deaths occasioned through breathing the foul, poisonous and heated air of our theatres is far in excess of those caused by fire and panic. It would be as well if some of the numerous authorities which govern places of entertainment in this country were to turn their attention to this fact; but I fear that the familiar adage may only too truly be said of theatre regulation, that "too many cooks spoil the broth." Large sums of money have been expended in providing means to avert dangers that *may* occur some day, while the fact that thousands nightly breathe the poison that will bring disease and untimely death with it, even to the strong, is totally ignored.

Lightning-conductors should be fixed at various points outside the building.

Materials for Prevention of Fire. — The accepted idea of what is fire-proof is a very mistaken one. Materials that are incombustible are not therefore fire-proof; take iron and stone, both accepted legally as fire-proof, and both among the first substances that will succumb to the influence of heat and sudden change of temperature. To give an idea how totally mistaken some are as to the fire-resisting qualities of materials, I have known lead suggested as a substance to be used to render floors fire-proof. Lead, of all materials, is the most dangerous and the most dreaded by the fireman.

The walls must be solid and very thick, well bonded into each other, of good sound bricks; bond timbers should not be admitted, but hoop-iron bond should be used. Every opening should have an arch turned over it, the use of lintels, either of stone or wood, being discarded. The walls should be corbelled out to receive the floors.

The floors, where possible, should be supported on brick arches abutting against brickwork, but on no account against iron. When the floors are constructed of iron and concrete, the iron should be completely embedded in the concrete, and the concrete should have the aggregate of calcined material, such as broken bricks, clinkers, or broken pottery. The circles should either be constructed of iron and concrete, or of timber in large bulk, and of the hardest description, such as elm or oak, which should be thoroughly protected from the action of fire by thick coatings of plaster; gypsum or plaster-of-Paris is well adapted for this purpose.

Where iron columns are used, they should be protected by a

thickness of fire-resisting plaster or cement, held to the columns with a good key. Strong posts of the harder woods would suffer less from the changes of temperature than iron, but their thickness would destroy a good deal of the sighting.

The ordinary thin iron doors are of no use to resist fire. If iron doors were placed on both faces of the walls, the space between might be filled up with some wet materials to keep them cool; but it would be a very difficult task to do this to every door in a theatre. Thick oak doors would resist fire for a long time. Wooden doors, lined with sheet-iron or zinc, would be more effective than the thin iron doors so often met with; none of these, however, would be *fire-proof*, although *fire-resisting* to a certain extent. A perfect fire-resisting door could be made on the same system as safe doors, having an inner case of iron packed with sawdust and alum, surrounded by a strong well-bound and well-hung outer case. These would be heavy and expensive, and as all fire-resisting doors must be hung to close automatically, they would be dangerous; but they should be fitted to divide the greatest risks, such as the workshop section from the stage, the stage from the auditorium.

Steps and landings should be made solid, of approved artificial stone, fire-clay, or concrete, whose aggregate has already been burnt. Stone should be avoided, as, in the words of Captain Shaw — a man whose opinion on such subjects is the best in the world — it yields to fire more rapidly than any other material, is the most dangerous of all materials, as at sudden changes of temperature it cracks, leaving a passage for smoke.

That unprotected iron is unsafe, owing to the risk of fracture and the loss of strength attendant upon great heat, is a fact well known, and, as it is sometimes applied, it is a source of great danger, assisting in the destruction of the building, as its contraction or expansion will thrust out or pull down the walls, and even when covered with cement, it will suffer in great heat. Wood is only a dangerous material when used in thin slices. "It will withstand a powerful dead heat upon its sides for an indefinite period without igniting, unless transverse sections of the fibre, such as a knot, presents itself to the action of fire." If used in large bulk of the harder kinds, and protected with plaster, it is infinitely safer than naked iron.

The use of plaster as a fire-protecting agent I would strongly advocate; it is light, and resists fire for an indefinite period.

It would perhaps be as well to enumerate some of the many causes from which fires in theatres have originated and become fatal, before considering the last part of our subject, namely, the extinction of fires.

Bad arrangement and planning of the various sections, and not making each an independent fire-risk, and not providing separate accommodation for each department or trade.

Danger from contiguous houses, and from people living in and about the theatre.

Bad judgment in the choice of materials, and bad or faulty construction.

Foul or imperfect flues.

Darkness and dirt, and keeping rubbish, shavings, etc., on the premises.

Smoking in the theatre proper.

Overheating through lack of proper ventilation.

Unprotected gas-lights, and escape of gas from imperfect fittings.

Upsetting oil-lamps.

Using matches or other naked lights.

Imperfect system of electric lighting.

Accumulation of heat round the sun-burner, and not cleaning same.

Carelessness in the manipulation of the stage during a performance.

The use of firearms, fireworks, and colored-fires.

The want of a properly-organized fire watch, defective fire appliances, and lack of water.

Carelessness among workmen, such as carpenters and plumbers.

Lightning, concentrated rays of the sun by means of lens, spontaneous combustion, and incendiarism.

Extinction of Fire. — When a building has been constructed that will in every way retard the spread of fire and panic, it should be considered how, should the fire, in spite of all the precautions, occur, it could be most effectually coped with.

A theatre, from the nature of its business and contents, cannot be *fire-proof*, although fire-resisting; but there is no reason why fires should not be localized and burn themselves out in the department in which they originate. Every means, therefore, should be taken to extinguish fire. Water is the element to overcome fire; it is cheap, and can be obtained in large quantities, and if there is some at hand when a fire first breaks out, a jug-full judiciously used would prevent the loss of much life and property.

As regards fire-appliances, there should be an unsparing supply of fire-buckets, always full of water, in all parts and sections of the building. More good can be done with these, if used in time, than any elaborate appliance that may come into use when the fire has got a hold. These buckets should be made conspicuous, labelled "fire-buckets," painted red, and never allowed out of their place. Hand-pumps, with and without pails, should be distributed about the building, with a few chemical engines. Hydrants should be mounted on the rising main on every floor, in every section, and every forty feet apart, having the hose "married" and ready for action. All proper tools and implements should be near at hand, wet sponges, wet blankets, hatchets, axes, etc., being distributed about the stage and other parts. There should be a cock on each hydrant to fill buckets from. Hydrants should also be placed outside the building and on the roof.

All fire appliances in these buildings should be periodically tested by the authorities; for the lack of this they are too often, in an emergency, found to be useless. The pattern of the appliances should be similar to that of the brigade of the town in which the theatre is situated, so that the theatre and town appliances may be used indiscriminately.

Ladders should be fixed from the roof to within twenty feet of the ground, where external aid can easily reach them. Iron balconies should be provided to windows.

It seems almost needless to say that there should be a sufficient supply of water, at a pressure strong enough to reach the highest part of the building. In towers formed at a height above the roof, there should be large water-tanks as a secondary supply, supposing the main failed at any time, but too much reliance must not be placed on tank hydrants. Experience has taught us that the tanks are too often empty, or only partly full, owing to the want of a constant supply from the water companies.

So much has been said upon the desirability of employing brigade firemen, well versed in their business, in lieu of the, in more senses than one, "theatrical fireman," that I need not repeat the arguments in favor of the brigade men. Two trained firemen should be in charge of the house from an hour before the performance till daylight, and two others should have charge during the day, all four being present when the house is open. The stage should never be left during the performance, and at the same time it would inspire the audience with confidence to see firemen walking about the auditorium. By the day-watch the appliances should be cleaned and kept in repair, everything being tested every day at a fixed hour, say 6 P. M., just before the audience is admitted.

It should be the duty of the firemen to keep everything in working order, and they should be required to do nothing else. Imagine a stage without a responsible fireman, if, in the full swing of a pantomime, a small fire occurred. It is easy to conceive the confusion there would be among the numerous young and nervous people employed on the stage. The noise behind, even supposing the curtain to be down, would cause fear and panic among the audience, and a stampede might be the result. But if steady, experienced men, always ready for action, are employed, and the buckets and appliances are always in their places and in order, with plenty of water at hand, there need be no fear of fires on the stage. Yet there are many theatres in which the water-supply is insufficient, the appliances imperfect, and no organized fire-watch in existence.

To extinguish fires on the stage, a suggestion has been made that a series of perforated pipes be fixed to the under side of the gridiron, or to the gas battens, governed by a series of stop-cocks on the stage. By this means the scenery that had not already ignited might be moistened and the spread of fire stopped, but a great destruction of property would ensue. Far better get at the heart of the fire with a hand-pump or bucket of water.

Telegraphic communications should be held with the nearest fire-station. Too much reliance should not be placed on emergency fire-alarms. People are apt to become careless when they put their confidence in these appliances; they are also liable to act when no danger exists, especially in this class of buildings where the temperature at times is so high; and, on the other hand, when most needed, they may be out of order through disuse.

All check-takers and attendants should wear uniform, to be conspicuous, so that they may be better able to manage the people in an emergency. They should attend fire-drills, and be able to help the firemen when needed. For the same reasons it is well to have a policeman or two about the building, to extinguish fire, provide good and sound appliances, plenty of water, and a good watch.

Theatres are luxuries, and to enter some of them one pays dearly, both as regards money and the risk of losing one's life. If we pay so highly, surely we should be better protected while there. But the system seems to be to work the house as cheaply as possible, and to pack as many into it as it will hold, at as high a price as they will pay.

After every consideration is given to the disposition and construction of the building, and it has been passed by the authorities, the architect, under whose supervision the house has been built, hands it over to the manager for the rest of its existence, except in rare cases where the architect receives a fixed remuneration for periodical visits,—which should be the case everywhere. As a rule, the manager is a man of refinement and education, who will do everything in his power to protect the public and make the house popular; but for all that, there should be a further continuous inspection supervising the management, as is being advocated by Mr. Dixon-Hartland, in his bill now before the House of Commons. A staff of inspectors, knowing the architectural arrangement and the business peculiar to theatres, should be appointed, with power to visit the houses at all odd times, before, after, during the performance, in the day, and even in the middle of the night, unbeknown to the management. Reports as to the condition in which they find the house, and the way in which it is being worked, should then be made to the *one* recognized authority which should take the place of the many that now exist.

In theatres which at present hold certificates from the Metropolitan Board of Works as being structurally safe, fresh dangers may in a year or two arise, through alterations being made, perhaps trivial

in themselves, but to which some risk is attached. There are other matters requiring supervision besides structural defects, *i. e.*, ventilation, water-supply, and the general management of the whole establishment. Until these inspectors are appointed, the public cannot be protected as they ought to be; on the other hand it would be useless to make managers suffer from more official inspection, unless the men can be found to fill the posts who are qualified through previous experience in the *modus operandi* of theatre management and construction.

Once more I would strongly urge that the best safeguards against fire are good planning and construction, perfect ventilation, light, and scrupulous cleanliness; that the best means to extinguish fire are a good fire-watch and plenty of water; and that on no account should "emergency" appliances be relied on in a theatre.

THE ILLUSTRATIONS.

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EPURATION OF SEWAGE.

AT an adjourned meeting of the Suffolk (Mass.) District Medical Society, held May 21, Dr. Henry J. Barnes read a paper on the above subject. He said:—

If the theories advanced in opposition to the employment of irrigation and agriculture for the epuration of sewage had not been used in Europe and finally overcome by actual experience, one would hardly feel like continuing to advocate this system for Massachusetts. My enthusiasm, however, does not carry me so far as to suggest even a possibility of the abandonment of Gaston's system of intercepting sewage, notwithstanding the probability of its polluting the lower harbor, and producing an unsanitary condition similar to that of the upper harbor, and an annoyance to the people living on the south shore. Before this condition is reached, it may fairly be anticipated that irrigation and agriculture will have proved here, as in Europe, an economical and practical method of epuration. The sewer can then be extended to the main land and discharge on the soil. "It will not be possible, however, to connect any adjacent territory to Boston with this system without constructing an additional tunnel under Dorchester Bay." This is the language of one of Boston's officials before a committee of the Legislature a few weeks since. Filtration has in numerous instances in Europe accomplished complete classification of sewage, and yet the analyses show the effluent water as containing from one-half to six-sevenths of the original amount of polluting matter. Col. Waring's system of filtration of the Women's Prison accomplishes all that is possible, and yet the analyses show the result to be far from satisfactory. Pasteur and Shloesing, with others, sign a report to the Parisian Government, in which the system of epuration by soil is stated to be the only one yet demonstrated to be a success. The discharge should be intermittent, and with methodical rotation, and the doses should be determined by analyses of the effluent water. At Dantzic is encountered a mean winter temperature about that of our own. Irrigation is continued throughout the year, with quite as much success in epuration in winter as in summer, and at all times without offence.

The "winter basins" at Breslau are not a part of the system advocated, as they involve the stagnation of sewage. "The rosy coloring" of the Gennevilliers farms was not my own painting, but the translation of a report by a commission appointed by the City Government of Paris, who, it seems to me, ought to be accorded the credit of knowing the facts, particularly as the report was unanimously signed. These gentlemen say "the increase in valuation and population at Gennevilliers is due to farmers coming from other parts of France to share in the general prosperity." Durand-Claye says "the population of Gennevilliers has increased thirty-four per cent in five years, by the arrival of numerous cultivators." M. Joly says of the Gennevilliers farms: "The question, scientific and practical, is absolutely solved," and Dr. Loiseau, at the Geneva Congress in 1882 said: "The benefits derived from these farms are indisputable from every point of view." I was amazed at the statement that no person knew the cost of the Gennevilliers farms, as I have in my library an official document of Paris pretending to give every item of expense from the first experiment at Clichy in 1867 and 1868, down to 1882, including lawsuits and large indemnities paid for an unfortunate experiment.

In regard to the city of Pullman making arrangements to pump the sewage into the lake, I have the following letter from the superintendent of the farm:—

RIVERDALE, COOK COUNTY, ILL., May 9, 1884.

Dear Sir,—If any such arrangements as you speak of in yours of 6th inst. are being made, I have no knowledge of the fact. The sewage is thoroughly purified by filtration, creating neither offensive odor nor nuisance of any kind. The farm last year paid over six per cent profit on the money invested ($80,000), and we hope this year to do even better. Consequently there exists no necessity for any such change as you speak of.

Very respectfully, E. T. MARTIN, Superintendent.

HENRY J. BARNES, M. D., Boston, Mass.

It should be mentioned here that downward intermittent filtration is a valuable auxiliary to sewage farming. I. Bailey Denton has written considerable upon this branch of the subject. I regret not knowing the history of the Pullman farm, as I should like to pay a tribute to the pioneer of this system in America.

The unprofitable results of sewage-farming have been dwelt upon by most of the opponents of the system, forgetting that it is a question of sanitation and not of making money, and if raising vegetables contributes in any degree to lessening expenses, it takes precedence in a financial point of view of all others, as they make no return to the original outlay except the almost universal offences they create. It has been a long and costly struggle to demonstrate the fact that sewage can be epurated by agriculture and irrigation. Every conceivable danger has been predicted, and many are the unfortunate and disastrous experiments which can be cited swelling the cost above the possibility of many of the farms earning interest on the plant. To obtain an act of Parliament authorizing the establishment of a sewage-farm often requires the expenditure of $10,000 in litigations and land-damages. Another large amount is needed, for land is very dear in England. The heavy clay soil requires a large expenditure for drainage. But, notwithstanding these obstacles, the number of farms has rapidly increased, until now there are at least two hundred. The royal commission recommended the enactment of a general law authorizing farms of this character.

One of the commissions appointed by the Parisian Government declared the sewage-farms at Gennevilliers profitable, and use it as one of the arguments in support of their recommendation to the city to purchase of the State lands in the forest of St. Germain. The owner of the farm at Leamington (which, by the way, has not been levelled), as well as the superintendent of the farm, claims a good profit after paying the city $2,250 per year for delivering 1,000,000 gallons each day at the highest point of the farm. Mr. Aird could not have lost a large amount of money in his contract to take the sewage of Dantzic, for some years later he made a similar contract with the city of Breslau. But it ought not to be required of the friends of this system to show profit until at least one system is devised capable of competition with this in producing satisfactory epuration.

The enormous dilution of sewage in this country was raised as an objection. By analyses, the amount of organic matter in the sewage of American and European cities varies but a trifle. Boston consumes more water *per capita* than Paris, but the latter city dilutes her sewage equal to that of our own, by a lavish use of water in washing the streets each morning, and the estimate of three barrels of water to the discharge of one individual here does not include the organic matter constantly discharged from sink-drains or the street washings.

Durand-Claye, the celebrated French engineer, to whom the world owes a debt of gratitude for demonstrating the possibility of epuration by this method says: "It is desirable and necessary there should be a great dilution by water in order to insure rapid transit." The soil does not clog where systematic irrigation is practised. The thin skin of impervious deposit, when dried, shrinks, cracks and breaks up, the organic matter decays, and the soil is more pervious than where irrigation is not employed. Reservoirs of deposit are used to eliminate the coarse particles, as their decay on the surface would cause an offensive odor.

As to the impossibility of suitable soil of sufficient area in Massachusetts for the general employment of this system, the success which has attended the efforts of the English in finding it in their thickly-populated island is an answer. Our forests could be utilized with little expense, and, next to Italian rye-grass, the trees would prove the best absorbers of filth. A few acres of willows at Winsor take care of the sewage of twelve thousand people. I recall but one other objection: the comparatively large rainfall here, from forty to fifty inches per year. At Gennevilliers, three hundred and twelve inches of water are sent on the land each year, and this without making it damp or marshy, since the establishment of sub-soil drainage, and I know of two farms in my native town in Worcester County where irrigation with brook water has been practised with advantage. Our average rain-fall is a little larger than that of Great Britain, where it is from forty to forty-five inches per annum; but England does not experience the protracted droughts so common in this country. The average humidity there must range much nearer the dew-point.

To-day I only ask that this system may be tried on a limited scale in Massachusetts by some one having faith in its success, that we may not make the mistake of London, Brighton, Torquay and Dantzic, by building a metropolitan sewer from Natick, to discharge in deep water; for the success of this system here might ultimately necessitate reversing the current of the sewage of the metropolitan district. A large proportion of our rural population have gardens attached to their homes. I would discourage the use of cesspools, and recommend the use of these lands for disposing of sink-water. I am informed that Dr. Jewett, of Northboro, has for many years employed this system, and I have practised it myself for ten years, with complete satisfaction. Victor Hugo, in "*Les Misérables*," describing the sewage of Paris more than twenty years ago, makes a vivid picture

of our system at the present time. He writes as follows: "The earth impoverished by the sea. Paris throws $25,000,000 a year into the sea. And this without metaphor. How, and in what manner? Day and night. With what object? Without any object. With what thought? Without thinking. For what reason? For nothing. By means of what organ? By means of its intestine. What is its intestine? Its sewer. . . . Science, after long experiment, now knows that the most fertilizing and the most effective of manures is that of man. The Chinese, we must say to our shame, knew it before us. No Chinese peasant, Eckeberg tells us, goes to the city without carrying back, at the two ends of his bamboos, two buckets full of what we call filth. Thanks to human fertilization, the earth in China is still as young as in the days of Abraham. Chinese wheat yields a hundred and twenty fold. There is no guano comparable in fertility to the detritus of the capital. A great city is the most powerful of stercoraries. To employ the city to enrich the plains would be a sure success. If our gold is filth, on the other hand our filth is gold. What is done with this filth? Gold! It is swept into the abyss. We fit our convoys of ships at great expense to gather up at the south pole the droppings of petrels and penguins, and the incalculable elements of wealth which we have under our own hands we send to the sea. All the human and animal manure which the world loses, restored to the land instead of being thrown into the water, would suffice to nourish the world. These heaps of garbage at the corners of the stone blocks, these tumbrils of mire jolting the streets at night, these horrid scavengers' carts, these fetid streams of subterranean slime which the pavements hide from you, do you know what all this is? It is the flowering meadow; it is the green grass; it is marjoram, and thyme and sage; it is game; it is cattle; it is the satisfied low of huge oxen at evening; it is perfumed hay; it is golden corn; it is bread on your table; it is warm blood in your veins; it is health, it is joy, it is life. . . . Statistics show that France alone makes a liquidation of a hundred millions every year into the Atlantic Ocean from the mouths of her rivers. . . . The cleverness of man is such that he prefers to throw this hundred millions into the gutter. It is the very substance of the people, which is carried away — here drop by drop, there in floods — by the wretched vomiting of our sewers into the rivers, and the gigantic collection of our rivers into the ocean. Each hiccough of our cloaca costs us 1,000 f. From this come two results: the land impoverished and the water infected. Hunger rising from the furrow, and disease rising from the river. . . . . A system of elementary drainage, as simple as the lungs of a man, and which is already in full operation in several villages in England, would suffice to bring into our cities the pure water of the fields, and send back into our fields the rich water of the cities. And this easy see-saw, the simplest in the world, would retain in our possession the hundred millions thrown away. The present system does harm in endeavoring to do good. The intention is good; the result is bad."

THE JAVA ERUPTION.

THE inquiry instituted in consequence of a Government resolution of October 4, 1883, into the nature, the extent and the consequences of the volcanic eruptions of Krakatoa, has led to various remarkable results, of which a short account is given here. A detailed report is in course of preparation, but will not appear for some months, as the making of numerous illustrative maps and plates will take much time. The inquiry did not extend solely to the islands of the Straits of Sunda, but also to the coast countries of the Lampong districts, Bantam and Batavia, which were partly or entirely destroyed. About the causes of eruptions there is usually not much to be said, yet in this case something has been ascertained. Krakatoa, mainly, lies with a few other volcanoes on a rent or fissure in the crust of the earth which runs across the Straits of Sunda, and of which I indicated the probable existence for the first time three years ago. Along such a fissure little shiftings of the earth's crust are possible, by which a pressure is exercised upon the molten substances below the crust. It is also possible that along such a rent — however tightly closed by the neighboring stone-layers — the water may more easily than elsewhere flow to the regions under the earth. If this water comes in contact with the molten substance, steam at high temperature and high pressure is formed, and this steam may be considered as the chief motor of most, if not all, volcanic eruptions.

Many circumstances, therefore, combine to make eruptions take place in preference near fissures, provided water (either rain or sea water) can penetrate in sufficient quantity. Now it happens that during the last ten years a great many earthquakes took place along this fissure. The most violent earthquake took place September 1, 1880; the upper part of the tower was rent, and had to be broken off afterward. These earthquakes were probably the result of subterranean subsidences, and I think I may assume that through these subsidences modifications took place along the fissure through which the sea-water could ooze in greater quantity than before. Within the last three years the pressure of the steam formed became sufficiently strong to force the lava, out of the much deeper-lying lava strata, upwards through the crater of Krakatoa, and the eruption took place when, at last, the violence of the steam was enabled to force its way through the lava to the crater and the surface. The steam carried with it a quantity of lava, which was mostly shot as fine dust out of the crater. The porous nature of the ejected substances — pumice-stone was almost the only substance formed — is doubtless to be ascribed to the steam, which was blown with great force through the lava.

The sounds of the explosions in May were heard in a north-west direction at Moeara Doea in Palembang, and at Bintoehan, in the division of Kauer in Benkoelen, respectively 230 and 270 kilometres from Krakatoa; the transmission of the sound on August 27 surpasses, however, all which is known of the kind. The explosions were heard in Ceylon, in Burmah, at Manilla, at Doreh in the Geelvink Bay (New Guinea), and at Perth on the west coast of Australia, besides all the places which lie closer to Krakatoa than the above mentioned. If a circle is drawn from Krakatoa with a radius of 30 degrees, 1,800 geographical miles, or 3,333 kilometres, the circle will go exactly over the farthest points where the sound was heard. The farthest distance between the points east and west where the sound was heard is, therefore, 60 degrees (the diameter of the circle) or one-sixth of the whole circumference of the earth. The surface of this circle, or rather of the spherical segment comprises more than one-fifteenth the surface of the earth. In historic times no eruption is known of which the sound was transmitted over such an enormous area. At the eruption of Tombora in Sumbawa, in 1815, the radius of the circle within which the sound was heard was but half the size, namely, 15 degrees, the surface being, therefore, 3.93 times smaller.

Besides these sound vibrations, very long air waves were formed during the explosions, which did not manifest themselves by any sound, but had nevertheless an important effect. The most rapid of these vibrations communicated themselves to the buildings and walls of rooms, so that objects which hung on the walls or from the ceiling were set in motion. Thus at Batavia and at Buitenzorg, a distance of 150 kilometres from Krakatoa, the doors and windows began to rattle, clocks stood still, ornaments on cabinets fell down, and hanging lamps were thrown out of their fastenings, and fell shattered to the ground with their chimneys and globes.

But not only at this distance was the air vibration perceptible. At Batoe-Radja in Palembang (250 kilometres from Krakatoa) rents appeared in the pradjosrit's barracks at three o'clock in the night; even at Palembang, 350 kilometres from Krakatoa, several Government buildings had to be immediately vacated as a crash was feared; and even in the Alkmaar country in Pasoeroean, 830 kilometers from Krakatoa, the walls were rent in the house of the administrator and the machinist. All this was caused by air vibrations, not by earthquakes, for it is a remarkable fact that these have nowhere been observed with certainty in this eruption.

The eruptions which took place at first above the sea probably became submarine about 10 o'clock on August 27. Before that time only more or less damp ashes were ejected, after that also a large quantity of mud or mire, being volcanic sand mixed with sea-water. The giving way of the northern part of the mountain must have preceded these submarine eruptions, as appeared from the time at which the large tide-wave, which probably originated through this subsidence, overflowed the Vlakken Hoek. This catastrophe caused a great change in the group of islands of Krakatoa. To the north-west of Krakatoa lies Verlaten Island, to the northeast Long Island, and west of the latter lies the Poolsche Hoedje. This small island has disappeared, and two others still exist, and are even larger than before, through the ejected substances which have settled on and around the island; but the greatest change has been undergone by Krakatoa itself. The whole northern part with the craters Perboewatan and Danan, and half of the peak have sunk in the depths. There only remains the southern part of the peak, which has been cut in two from the very top, and forms on the north side a magnificent precipitous cliff more than 800 metres high. Through the downfall, therefore, a volcano has been formed which is probably unique in the world. A colored drawing of this remarkable rock will be added to the large report.

The size of Krakatoa was formerly 33½ square kilometres; of that 23 square kilometres have subsided, and 10½ square kilometres remain extant. But on the south and southwest side the island has been increased by a large ring of volcanic products, so that the size of New Krakatoa is now, according to our survey, 15½ square kilometres. The size of Long Island was formerly 2.9 and is now 3.2 square kilometres. Verlatan Island has become much larger; it was formerly 3.7 and is now 11.8 square kilometres in size. Of the Poolsche Hoedje nothing remains.

In the place where the fallen part of Krakatoa once stood there is now everywhere deep sea, generally 200, in some places even more than 300 metres deep. It is remarkable that in the midst of this deep sea a rock has remained which rises about five metres above its surface. Close to this rock, which is certainly not larger than 10 metres square, the sea is more than 200 metres deep. It is like a gigantic club which Krakatoa lifts defiantly out of the sea.

The ascent of the mountain from behind, on the pumice-stone elevations, is difficult, but possible; the innumerable crevices, into which one must constantly descend, make the climbing up in the

great heat and the total want of shade very fatiguing. The ascent may be made from the northwest, close along the rupture till about twenty metres from the top, which, according to our measurements, lies 831 metres above the sea; the surroundings of the top are rent and constantly crumbling away.

That the ash particles, as a matter of fact, were carried very far in the upper air-currents, has already appeared from snow which fell in Spain and in the Netherlands, in which the same components were found as in the ashes of Krakatoa; and that the particles must, moreover, have been projected very high at the last eruption may be concluded from the report that, on May 20, during one of the first eruptions, the steam-cloud—according to the measurements taken on board the German man-of-war *Elizabeth*, which left Anjer that morning at 9 o'clock — must have reached a height of at least 11,000 metres. During the much more violent explosions of August 26 and 27, the height, if the above report may be relied on, may very well have reached 15 to 20 kilometres.

One more very remarkable phenomenon during the eruption was the formation of powerful sea waves, which flowed over the low-lying districts of the Straits of Sunda, and destroying a number of kampoengs and more than 35,000 lives.

There is much uncertainty about the time at which these waves originated, and this is not surprising. The number of Europeans who witnessed the catastrophe on the coast places in the Sunda Straits and on board ship was but small; besides most of them were in a state of great alarm, so that observations with a timepiece were exceptional. Most of the estimates of time were no more than a rough calculation which, especially after the darkness set in, were not very trustworthy. This explains what came under my notice, that a time of computation of the same event in the same place by two different people showed a discrepancy of an hour and a half.

Besides, a remarkable fact must be taken into account, namely, that the largest wave, the only one which spread great distances along the north coast of Java and to the southwest, and which surpassed all other waves by far in height, was seen almost nowhere; at Tjiringin alone this wave was seen to approach before the darkness began, and this was about ten o'clock on the morning of the 27th. Anjer was already destroyed at 6 A. M., and then abandoned. At Telok Betong, and in the lighthouses on the Vlakken Hoek, and at Java's First Point the wave was not seen because it was pitch dark. Even in the lighthouse, 40 metres above the sea, on Java's First Point, nothing was seen of the wave, and the destruction of the coast country was only discovered the next morning when it became light.

As the great darkness at Bantam set in soon after the great detonation of 10 hours and 5 minutes—the same explosion which gave rise to the great air-wave—and as the wave had only time, before the darkness set in, to reach the neighboring Tjiringin, which lies 47 kilometres from Krakatoa, this tide-wave cannot have arisen much before 9 hours 50 minutes or 9 hours 55 minutes. At the Vlakken Hoek, 103 kilometres from Krakatoa, it appeared at about 10 hours 30 minutes, which agrees with our time computation, if it be taken into account that the velocity of the waves towards the Vlakken Hoek must have been greater on account of the greater depth of the sea than towards Tjiringin.

It is very probable that shortly before 10 o'clock a subsidence of the hollow crater walls of one or both of the active craters took place, that through this the water gained access in large quantities, and that then half of the peak, which had been previously undermined and fractured by the eruptions, also disappeared in the depths. The cause of the great wave motion must no doubt be sought for in the subsidence of the peak. Of the northern part of the island, after the many eruptions, not much more than a hollow shell can have remained, the subsidence of which could not have caused waves of great importance; nor could the rush of the water produce great waves, but rather a suction toward Krakatoa, and this may be the cause of the water on the coast first retreating in various places before the great flood advanced.

The peak, itself, however, was still massive, and I have calculated that the part which fell off this mountain alone, without Danan and Perboewatan, possessed a volume of at least one cubic kilometre. If this cubic kilometre be suddenly plunged into the sea, the same quantity of water must be displaced, which must give rise to a circular wave round Krakatoa.

After these terrible events Krakatoa slowly calmed down, not, however, without having still violently roared in the evening and night of August 27 to 28. The detonations were scarcely less strong at Buitenzorg from 10 to 1 o'clock than in the morning. But after the 28th nothing more was heard of the mountain. — *R. D. M. Verbeek, in Nature.*

Hygienic Sewer Arrangement. — In view of the proximity of gas-mains to sewers, the plan has recently been devised of inserting what is termed a hygienic gas-furnace in the man-holes. The gas is introduced into a little chamber, where it is mixed with a due proportion of air, and supplies some Bunsen burners; immediately above the gas are some fire-clay plates, which soon become heated, while above them are iron divisions. The heat naturally draws the air up from the sewer below; it thus passes through the Bunsen burners backward and forward over the fire-clay plates and iron divisons, until at last it finds its exit in the ventilation chamber or man-hole, and hence through the grate into the street. The furnace not only causes a strong current of air from the sewer, but, as it is capable of being heated at from 600° to 700° F., it should destroy all the germ-life that travels with the sewer-gas. — *New York Tribune.*

MORELIA.

MORELIA, the historic capital of Michoacan, Mexico, is a clean, bright city, with a clear, tonic air exhilarating to breathe, and blessed with a climate where one seems unconscious of either heat or cold. It is one of those places with which most visitors fall in love at first sight. It covers a gentle elevation in the midst of a rich valley, the ground falling away on all sides from the cathedral. It is the seat of a comfortable old civilization, to which life is like one long siesta, or at least, a day-dream. The shriek of the locomotive has hardly yet awakened it, although it is rubbing its eyes. The first families are mostly owners of the great haciendas which cover the surrounding country. They live in luxurious ease on the income from their lands, and the occupation of the rest of the population of 25,000 or 30,000 is principally to supply the wants of the leisurely classes. It is, however, the centre of distribution for the abundant agricultural products of the State — sugar and coffee from the hot lands, wheat and maize from the upland valleys — and lines of primitive carts, wholly of wood and with wheels of solid blocks so irregularly hewn and far from circular that they hobble over the ground in clattering jerks, pass through the streets all day. I had never before seen these carts in Central Mexico, though they are common in Chihuahua and even New Mexico.

The cathedral is a grand old building, situated differently from most Mexican cathedrals, for, instead of facing the central plaza, its front is on the main street, and there is a plaza on either side. One's attention is concentrated upon the great twin towers which dominate the town from every point with impressive dignity. In their presence one forgets the elaborately carved façade and the customary dome, which they dwarf into comparative insignificance. Embodying the true architectural principle of increasing the richness of decoration with the height, their bases, as high as the roof of the cathedral's body, are of the severest plainness possible. Then follow three successive tiers, increasing in adornment until the highest and smallest, which suffers a relapse towards plainness which might be marring were it not that proportion is well preserved. The first of the three upper sections is square, and the upper two are octagonal. The beauty of the carved work is that it has a rich strength which gives the details due prominence, instead of being weakened by elaborate profusion, destroying the value of the masses. The large clock-faces are surrounded by the flame-like rays familiar in the decorative effects of Willlam Blake, and in those of Elihu Vedder. The belfry openings have projecting balconies of stone-work of a delicately ærial lightness. There is a large family of bells in the towers, and their harmonious voices frequently ring out over the town in glad accord. Among them there is a giant whose deep mellow tone seems to be the solemn utterance of sacred peace. A feature which would delight our architects is the fine ornamental iron-work of Mexican manufacture in the six gateways to the cathedral yard or atrium.

The two plazas flanking the cathedral are occupied by beautiful gardens blazing with brilliant bloom, whose perfume fills the air. The larger of the two is the Plaza de los Martires, Place of the Martyrs, in commemoration of the shooting there of a band of revolutionary patriots. Morelia is preëminently a city of patriotic associations. Morelos was born there, and a tablet marks the house. When Mexican independence was gained, the name of Morelia took the place of the city's original designation, echoed from Spain, Valladolid, the home of its founder, Don Antonio de Mendoza. The unfortunate Emperor, Iturbide, the liberator of Mexico, was also born in Morelia, and the house is likewise designated by a tablet. Iturbides are still leading people in Morelia, and to a manly, handsome youth of the name our party is indebted for thoughtful courtesy. The patriot Matamoros was shot in the Plaza de los Martires, on February 3, 1814, and a tablet on one of the pillars of the arcade on the west side marks the spot. Hidalgo, the father of his country, was at one time a priest in Morelia, and Morelos was under him, a novice, I believe. Opposite the Plaza de los Martires stands the State Palace, in which is the public Library with 12,000 volumes, occupying a fine large room, where at the tables studious young men may be seen absorbed in reading. Morelia has advanced schools, hospitals, a theatre, and other public institutions which do, credit to its position as a State capital.

One of the most beautiful features of the city is the Alameda, which is approached by a shady avenue, the Calzada de Guadalupe, a driveway and promenade, the part devoted to the latter being paved with broad flagstones between a continuous row of stone benches on each side. A stately aqueduct, with Roman-like arches, runs parallel to the avenue, and I recognized here one of the illustrations by Mary Hallock Foote, who wrote a delightful article about Morelia for the *Century* two or three years ago. The park, or Paseo de San Pedro, has a fascinating air of neglect about it, well befitting the dreamy character of the place. The driveways are bordered by tangled hedges, where sweet-peas bloom in variegated abundance, and rectangular footways penetrate beneath the dense shade of the ash trees with the quaint primness of old-time European gardens. One would hardly be surprised to learn that far within the wood there was an enchanted castle, within whose moss-grown walls there lay a sleeping

beauty awaiting her coming prince. And the fair state of Michoacan is a sleeping beauty, while American enterprise is the daring young prince who is advancing into her magic realm to awaken her from the dream of a century's slumber. — *Sylvester Baxter in the Boston Herald.*

"AS TO MILL CONSTRUCTION."

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your well deserved commendation of the efforts of an individual in the furtherance of fire-resisting construction you have hardly given sufficient credit to the efforts of many architects and builders in the same direction. The construction known as a "mill floor" is the outcome of a necessity prompted by the mutual insurance system; and is simply a revival of an old form of open-timber work common enough several hundred years ago. Plastering on wire lathing was used here in the Boston Theatre, by Mr. Cabot, nearly thirty years ago. In the year 1834 Mr. Wm. Washburn built a house, still standing in Boston, in which he plastered the floors, and plastered the chimney breasts directly on the brick-work. Not many years since this house took fire and the flames were confined to the room in which they originated, thus saving the whole building from destruction. Mr. Washburn has, whenever permitted, continued to employ the same safeguards. Probably every conscientious architect has endeavored to persuade his clients to increase the safeguards against fire, so far as he could do so without making a martyr of himself. Sometime ago the writer advised a client to introduce reasonable fire precautions in a business block; but his employer took advice from real-estate experts who told him that the additional outlay would not increase his rents nor lessen his insurance, and the precautions were omitted. And here lies the root of the evil; it has been cheaper to insure liberally than to build well. The efforts of the architect have been neutralized by those of the underwriter. The former can be the "guardian of the public safety" only so far as his employer will allow him. Few of the complicated structures required of the architect to-day can be modelled on the dry-goods-box shape of a mill, with its acres of unbroken lofts, flat roofs, and external staircases. To meet the wants of a luxurious domestic life with such simple and bold construction, necessitates great expense. Even the mechanic and laboring man of the period prefers a dwarfed and pinched travesty of a palace to a comfortable laborer's cottage; and skins the frame of his house to indulge in a little fresco. The only serious opposition to reforms in the building-act, that has been developed in the last three years, has come from those who wish to build floor-bearing party-walls only eight inches thick.

No one man or class of men can inaugurate an era of substantial construction. It is easy enough to find fault with a profession and its work. The true reformer in this line is the man who will spend some money in experiments in which the failures shall be counted as so much contributed for the public good. J. A. F.

STONE-CARVING.

CLEVELAND, O., May 19, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I wish to study the first principles of stone-carving with a view of becoming a practical architectural stone-carver. Will you please inform me (through the columns of your paper or by mail) of any reliable works on the subject which you can recommend my studying in connection with practical work? Also is there any English or American journal published in the interest of this trade?

Yours respectfully, W. W. S.

[WE do not know of any book or periodical devoted to practical stone-carving, and doubt if there is any. Much the best way to learn that profession is to serve a long apprenticeship under a first-rate master, and then travel abroad for improvement. — EDS. AMERICAN ARCHITECT.]

COMPETITIONS.

DES MOINES, IO., May 22, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Enclosed please find a circular which the Association here has prepared for the purpose of suggesting improvements in the American *systems* of conducting architectural competitions.

It may be taken as expressing the opinion of this Association upon your open-letter of April 5th. E. H. TAYLOR, *Secretary.*

A CIRCULAR ON ARCHITECTURAL COMPETITION.

As at present carried on in the United States, architectural competitions demand the attention of the Post-Office Department in its efforts to suppress the various lottery systems throughout the country.

The only just system of conducting competitions, which is rapidly extending from France and Belgium to all civilized countries is based upon advancing human welfare. To illustrate: A city of 20,000 is in need of a city-hall. This is a subject of interest not to this one city alone, not to merely 20,000 people (much less a little handful of architects), but every city of that grade is concerned in some improvement being made in this class of building.

It is made of first importance, therefore, that *advance* be made. Rewards in money are offered, fully adequate to repay any architect whose study shall prove of universal value. The local building is made secondary. The practice is even being introduced of a second, close competition, to finally solve the design to be executed — the first competition, for advance, being open to all the architects of the world. Where but one competition is undertaken it is frequently the third in rank that is awarded execution.

All designs of worth, but not producing any real advance, can justly claim no pay. They are fully rewarded by ranking such studies in the order of merit.

One-half of the number of judges are named by the competitors themselves, while the other half represents the local authorities, but always includes professional talent of the highest grade, as the local Engineer of Construction, and in France the Architect of the Department.

The value of such a system may be understood when it is known that it is producing, at the present moment, a progress so rapid, a work cannot be executed ere it is again surpassed by competitive design.

At the national yearly exhibits designs of international importance are awarded medals, and extend their influence even to America.

The Architectural Association of Des Moines asks your thoughtful consideration of this subject, for it demands prompt and concerted action. Respectfully, E. H. TAYLOR, *Secretary.*

[WE are pleased that the youngest architectural association in the country is thus early in its career bestirring itself in the matter of competitions. But we must be allowed to say that it is a waste of energy and resources to send out such circulars as the above, which only embodies — rather blindly — the suggestion that there ought to be a preliminary and a final competition, but does not suggest how such a desirable reform can be carried out. It is too much to expect that the impatient American public will consent to abandon the present manner in which it forces the profession to enter into competition in favor of one which will, of course, secure more creditable architectural results, but which will equally, of course, entail at least double the delay, a thing which seemingly the public abhors more than anything else in all that relates to building. The suggestions in our "open-letter" of April 5 might, if carried into effect, make it possible to bring about this further reform, and it would please us if the officials of the Des Moines Association and of other architectural bodies throughout the country would endeavor to obtain some official action on our suggestions. — EDS. AMERICAN ARCHITECT.]

PUBLISHING FLOOR-PLANS.

RICHMOND, VA., May 20, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Pardon me for making a suggestion to the profession through your paper.

I notice of late in many of your illustrations the absence of floor-plan accompanying the published designs. It is most desirable that each design should be attended with at least one floor-plan, as, in perspective drawings particularly, it is impossible to distinguish the good or bad features in a design without an insight into the interior arrangement of the building. I have no doubt that many a happy thought by the architect, and wrought out with care in your illustrations has failed to be appreciated or even understood at all by the omission of an accompanying plan. I believe your paper has exerted a very happy influence in the improvement in design throughout the country, and every architect should feel interested in its success.

Most respectfully, M. J. DIMMOCK.

[As we are somewhat weary of urging architects to send plans with their perspectives or elevations we are very glad Mr. Dimmock has been moved to make a complaint. — EDS. AMERICAN ARCHITECT.]

THE EFFLORESCENCE ON BRICKWORK.

ITHACA, N. Y., May 20, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — The white efflorescence on bricks made in this vicinity is *sulphate of soda.* The clay evidently contains some compound of soda which, in the process of burning, is converted into sulphate by sulphur existing in the *coal-dust*, which is now-a-days generally mixed with the clay. The remedy suggests itself: Omit the *coal-dust.* This the manufacturers will probably not do, as they claim that the use of it insures easy, thorough and uniform burning of the brick. Very truly yours, CHARLES BABCOCK.

NOTES AND CLIPPINGS.

A PNEUMATIC PIPE-LINE. — An application was made to the commissioners of the Illinois and Michigan Canal, May 8, by a Chicago lawyer, for the right of way along the canal to LaSalle for a pneumatic tube. He proposes to sink a tube in the ground, five feet from the surface, and run it from Chicago to LaSalle, 100 miles. It is to be used for shipping wheat, bundles and other portable stuff. The commissioners decided to let the attorney put down the tube provided he would pay the usual toll charged on the canal. — *Philadelphia Press.*

DR. SCHLIEMANN'S LATEST DISCOVERIES. — The London *Athenæum* publishes the following extract from a letter from Dr. Schliemann, dated Tiryns, April 11, 1884: "Three cheers to Pallas Athena! In fact I have succeeded here in a wonderful way, having brought to light an immense palace with innumerable columns, which occupies the entire upper acropolis of Tiryns, and of which the floor and walls are well preserved. . . . Of paramount interest are the wall-paintings, which my architect and collaborator, Dr. Dorpfeld, is now copying with the same colors. Of the very highest interest are also the vase-paintings with the most primitive representations of men and animals. The plan of this wonderful prehistoric palace can be made with great accuracy, and it will excite universal amazement, for nothing like this has ever turned up. . . . The capital found is one of the most ancient Doric order ever discovered."

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.]

298,723. Fire-Escape. — Samuel Beltz, Wilmington, Del.

298,724. Hinge.—Amos S. Blake, Waterbury, Conn.

298,725. Fire-Escape.— Joseph Henry Bowley, Marengo, Ill.

298,727. Shingle-Sawing Machine. — Gordon Earl, Pierson, Mich.

298,750. Hydraulic Cock or Filtering Faucet. — Albert Hallowell, Lowell, Mass.

298,755. Planing-Machine.—Levi Houston, Montgomery, Pa.

298,757. Fire-proof Fabric. — Henry W. Johns, New York, N. Y.

298,759. Cant-Hook or Dog. — Amos Kennard, Clearfield, Pa.

298,786. Auger. — Henry L. Shaler, Deep River, Conn.

298,787-788. Pneumatic Door-Check. — John A. Sherman, Boston, Mass.

298,790. Portable Building. — Joseph Sanford Simmons and Robert Marion Simmons, Belton, S. C.

298,791. Builders' Scaffolding. — Daniel W. Spooner, Minneapolis, Minn.

298,804. Adjustable Support for Water-Closet Basins. — Henry Cory Weeden, Boston, Mass.

298,805. Flushing-Apparatus for Closets and Urinals. — Henry C. Weeden, Boston, Mass.

298,834. Draughtsman's Adjustable Curve Ruler. — Frank Winthrop Davenport, Providence, R. I.

298,839. Latch. — George Fowler, Philmont, N. Y.

298,841. Trap for Sinks, etc. — Henry Friedrich, East Port Chester, Conn.

298,850. Tile-Machine. — Francis M., Maxwell G., Milo J., and Marcus L. Harris, Covington, Ind.

298,860. Blind-Slat Operator. — William H. Keeran, Auburn, Ind.

298,861. Lock-Strike. — Jacob William Kohn, Newark, N. J.

298,888. Border-Light for Theatres.—John T. Preddey, Carson, Nev.

298,905. Brick-Machine. — Wm. Stewart Smith, Dayton, O.

298,914. Stay-Roller for Sliding-Doors. — Le Grand Terry, Horseheads, N. Y.

298,921. Decorative Tile. — Savillion Van Campen, Jersey City, N. J.

298,933. Skid-Elevator.—Sylvester Barcus, Etna, Ohio.

298,941. Paint. — Louis Brown, New York, N. Y.

298,964. Door-Securer. — Charles Franke and August Peters, Hoboken, N. J.

298,970. Eaves-Trough Hanger. — Henry John Hoepfner, Athens, O.

298,989. Door-Check. — John J. Lamb, Waterloo, Iowa.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report thirty-six permits have been granted, the more important of which are the following: —

Wm. Carback, 2 two-st'y brick buildings, w s Chapel St., s of Eager St.

W. I. Phillips, 8 three-st'y brick buildings, commencing s w cor. Fulton and Mulberry Sts.

J. H. Vonderhorst, 5 two-st'y brick buildings, e s Madeira Alley, s of Baltimore St.

G. H. Fisher, 2 two-st'y brick buildings, e s Point Lane, between Harford Ave. and Eden St.

John Small, 2 two-st'y brick buildings, e s Elbow Lane, between Greene and Warner Sts.

Wm. Colton, 2 three-st'y brick buildings, n s Lafayette Ave., e of Gilmor St., and 4 two-st'y brick buildings (square) in their rear.

C. A. Pindell, 4 two-st'y brick buildings, w s Vincent Alley, s of Lafayette Ave.

Henry Richer, three-st'y brick building, n e cor. Charles and Little Hughes Sts.

Boston.

Church. — The First Spiritual Temple, now building at the cor. of Exeter and Newbury Sts., is from the plans of Messrs. Hartwell & Richardson, architects, of Boston. It covers ground measuring 82′ x 106′, is built of granite and brown stone, in the Romanesque style of architecture, and its estimated cost, $140,000; Norcross Bros., builders.

Building Permits. — *Brick.* — *Baldwin St.*, near Northampton St., Ward 18, for Heirs of Eliza Cushing, family-hotel, 63′ 8″ x 79′ 8″, five-st'y mansard; Vinal & Dodge, builders.

Shawmut Ave., No. 748, cor. Ruggles St., Ward 19, for David H. McKay, skating-rink, 103′ and 112′ x 272′, one-st'y arched; David H. McKay, builder.

Tremont St., Nos. 1307-1311, Ward 19, for Wm. Gaston, tenement and store, 57′ x 62′ 6″, four-st'y flat; John Hegan, builder.

Fairfield St., cor. Marlborough St., Ward 11, for John T. Morse, Jr., dwell., 47′ x 67′, three-st'y flat; S. H. L. Pierce, builder.

Columbus Ave., cor. Northampton St., Ward 18, for Society Adult Israel, church, 63′ 8″ x 80′ 3″, two-st'y pitch; J. H. Kelley, builder.

Maple St., cor. Cheney St., Ward 21, for Geo. L. Adams, dwell., 33′ x 40′ and 44′, two-st'y pitch; ell, 11 6″ x 28′; Seth Westerly, builder.

Wellington St., No. 25, Ward 18, for Samuel Stubbs, family-hotel, 48′ x 102′, four-st'y flat; Samuel Stubbs, builder.

Brookline Ave., rear, near Depot St., Ward 22, for B. & A. R. R. Corp., car-house, 16′ x 20′, one-st'y pitch; B. & A. R. R. Corporation, builders.

Beacon St., No. 293, Ward 11, for Edward Gray, dwell., 24′ x 68′ 8″, five-st'y flat; Alonzo Folsom, builder.

Washington St., cor. Worcester St., Ward 18, for Geo. A. Gibson, dwell. and store, 26′ x 53′, four-st'y flat: James E. Potter, builder.

Washington St., Nos. 1671 *and* 1673, Ward 18, for Roland H. Allen, dwell. and store, 24′ x 46′, four-st'y flat; Jas. E. Potter, builder.

Worcester St., Nos. 5-11, Ward 18, for Geo. A. Gibson, 3 dwells. and stores, 24′ x 42′, four-st'y flat; Jas. E. Potter, builder.

Tennyson St., Ward 11, for Christian Sechel, dwell., 15′ x 35′, four-st'y flat; Adam Hahn, builder.

Newbury St., Nos. 250-266, Ward 11, for Alden Avery, 4 dwells., 18′ 11′ x 62′, three-st'y mansard; Alden Avery, builder.

Gloucester St., Nos. 42-46, for Silas W. Merrill, 3 dwells., 22′ 6″ x 42′, three-st'y mansard; Silas W. Merrill, builder.

West Broadway, Nos. 173-177, Ward 13, for A. A. Heyl, family-hotel and stores, 40′ x 60′, four-st'y flat; A. C. Barstow, builder.

Wood. — Auburn St., No. 8, Ward 19, for W. J. McCormick, dwell., 15′ and 32′ x 43′, three-st'y flat; Benj. Rockwell, builder.

Washington St., near Harvard St., Ward 24, for John McDonald, mechanical-building, one-st'y pitch, 16′ x 25′; John McDonald, builder.

Unnamed St., cor. Gilbert St., Ward 23, for Joseph Wilson, dwell., 24′ x 50′, three-st'y hip; Joseph Hammerle, builder.

Granite St., near Richards St., Ward 10, for Standard Sugar Refinery, carriage-house, 22′ x 22′, one-st'y flat; W. H. Moses, builder.

King St., near Dorchester Ave., Ward 24, for F. M. & A. G. Frost, two-st'y pitch building, 24′ x 29′ 6″; ell, 17′ x 18′ 6″; Chas. L. Welden, builder.

Hyde Park Ave., Ward 23, Mrs. A. N. Patterson, dwell., 25′ and 30′ x 30′; ell, 12′ x 15′, two-st'y pitch; Wm. W. Patterson, builder.

Whitney St., No. 30, Ward 22, for Kate Manning, dwell., 17′ and 27′ x 61′, three-st'y hip; Frederick McKenzie, builder.

Lexington St., No. 239, Ward 1, for Henry Ewell., dwell., 21′ x 45′, two-st'y mansard; Ezra Heustis, builder.

West First St., No. 394, Ward 14, for Isabella Jarvis, storage, 30′ x 35′, one-st'y flat; Richardson & Hatch, builders.

Dorr St., Ward 21, for Edwin Daniels, stable 23′ x 30′, one-st'y pitch; John W. Elkins, builder.

Bunker Hill St., cor. Chelsea St., Ward 3, for John Richardson, dwell. and store, 24′ x 38′ and 44′, three-st'y flat; John B. Wilson, builder.

Saratoga St., No. 589, for Thomas Pounded, dwell., 21′ x 26′, two-st'y flat; Thomas Pounded, builder.

Monroe St., Nos. 67 *and* 69, Ward 21, for J. C. & E. A. Loud, 2 dwells., 17′ x 18, and 22′ x 34′, two-st'y pitch; Chas. E. Currier, builder.

Warren St., Nos. 19 *and* 21, Ward 21, for Francis A. Brooks, mercantile, 43′ x 53′, three-st'y flat; Warren Hayford, builder.

Poplar St., near South St., Ward 25, for John Pierce, dwell. and store, 9′ x 11′ and 20′ x 28′, two-st'y pitch; Wood & Weatherbee, builders.

East Fourth St., No. 789, Ward 14, for Henry Hussey, 2 dwells., 21′ 5″ x 25′ 2″ and 16′ 5″ x 28′ 7″, three-st'y pitch; Wm. T. Eaton, builder.

Dennis St., No. 77, Ward 20, for C. L. Creber, dwell., 24′ 6″ x 30′, two-st'y pitch; F. C. Creber, builder.

Sheridan Court, cor. Tufts St., Ward 3, for City of Boston, storage, 30′ x 50′; one-st'y flat.

Tremont St., cor. Huntington Ave., Ward 22, 6 dwells., 18′ 11″ x 28′ 4″, three-st'y flat, for Albert Geiger; A. D. Gould, builder.

Summer St., No. 32, Ward 3, for Charles R. Gassett, dwell., 21′ and 32′ x 42′, three-st'y flat; E. W. Archer, builder.

Dorchester Ave., near Dorchester St., Ward 15, 2 dwells. and stores, 19′ 10″ x 36′ 9″, three-st'y flat; John W. Wigglesworth, builder.

Adams St., near Butler St., Ward 24, for Jas. H. McGrath, dwell., 17′ and 30′ x 30′, two-st'y pitch; F. M. Severance, builder.

A ams St., opposite Robinson St., Ward 24, for Charles Sheridan, dwell. 19′ x 14′ 6″ and 25′ x 37′, two-st'y pitch; James Bacon, builder.

Alban St., rear, near Ashmont St., Ward 24, for S. E. W. Smith, stable, 25′ x 31′ 6″, one-st'y pitch; A. H. Price, builder.

Nixon Ave., near Clement St., Ward 24, for Sarah Snow, dwell., 23′ and 28′ x 30′; ells, 20′ x 20′; two-st'y pitch; F. M. Severance, builder.

Roxbury Ave., near Eaglewood Ave., Ward 25, for Frank F. Morton, dwell., 26′ 6″ and 30′ x 33′ 6″, two-st'y pitch; Morton & Chesley, builders.

Cambridge St., cor. Mansfield St., Ward 25, for Silas C. Hammond, dwell., 22′ and 25′ x 34′; two-st'y pitch.

Washington St., cor. Keyes St., Ward 23, for Lawrence Follam, dwell. and store, 22′ 6″ x 36′, three-st'y flat.

Eaglewood Ave., near Beacon St., Ward 25, for Austin B. French, dwell., 37′ x 44′ and 69′, three-st'y pitch; S. H. & L. Pierce, builder.

Brooklyn.

Building Permits.—*Spencer St.*, w s, 150′ n Willoughby Ave., three-st'y frame tenement, tin roof; cost, $4,000; owner, James Hanahan, Walworth St.; builders, A. Rutan and Myron C. Rush.

Pacific St., s s, 99′ 10″ w Troy Ave., and *Pacific St.*, n s, 175′ w Troy Ave., 12 two-st'y frame dwells., tin roofs; cost, each, $2,500; owner, etc., George R. Waldron, 1906 Atlantic Ave.

On Bulkhead, foot of North Twelfth St., 600′ from First St., two-st'y brick building for manufacturing purposes, gravel and felt roof; cost, $10,000; owner, Pratt M'f'g Co., on premises; architect, R. G. Ewer; builder, not selected.

Decatur St., s s, 100′ e Stuyvesant Ave., 6 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner, Henry Cornell, 133 East One Hundred and Nineteenth St., New York; architect, W. Baker.

Marcy Ave. n w cor. Monroe St., three-st'y brick store and dwell., also brick stable, tin roof; cost, $7,500; owner, William Richter, 610 Marcy Ave.; architect, A. Hill; builder, T. W. Swimm.

Nevins St., n w cor. Warren St., 2 four-st'y brick tenements, tin roofs; cost, each, $4,500; owner, Jas. McGarry, 491 Warren St.

Union St., s e cor. Fifth Ave., four-st'y brown-stone store and tenement, tin roof, wooden cornice; cost, $8,000; owner and builder, E. L. Donnellon, President St., near Henry St.; architect, R. Dixon.

Bridge St., n e cor. Tillary St., 2 four-st'y brick stores and tenements, gravel roofs; cost, $22,000; owner, Geo. Wilson, 77 Willoughby Ave.; architect, M. J. Morrill; builders, P. J. Carlin and T. D. Norris.

Eckford St., No. 154, e s, 200′ n Nassau Ave., three-st'y frame tenement, felt, cement and gravel roof; cost, $4,200; owner, R. Shepard, 154 Eckford St.; architect, F. Weber; builders, Gaitly and Smith and Post & Walker.

Leonard St., No. 732, e s, about 300′ s Greenpoint Ave., three-st'y frame tenement, felt, cement and gravel roof; cost, $4,000; owner, William Tracy, 732 Leonard St.; architects and builders, Post & Walker.

Willoughby Ave., s s, 120′ e Nostrand Ave., 4 three-st'y brown-stone dwells., tin roofs; cost, $4,800 each; owner, etc., Daniel B. Norris, 359 Clifton Pl.

Bainbridge St., n s, 357′ w Reid Ave., two-st'y brick dwell., tin roof, wooden cornice, cost, $3,500; owner, Kate Acor; architect, John Patten; builders, Lewis Acor and John Patten.

Washington Ave., w s, 129′ s De Kalb Ave., five-st'y brick extension to the Graham Home, tin roof, wooden cornice; cost, $16,000; owner, the Brooklyn Society for the Relief of Respectable Indigent Females, Washington Ave.; architects, Wm. Field & Son; builders, Thomas B. Rutan and John Lee.

Fourteenth St., No. 239, n s, 97′ 10″ w Fifth Ave., three-st'y brick double flat, tin roof; cost, $9,000; owner, S. Moffett, 237 Fourteenth St.; architect, Geo. W. Bush.

Grand St., n s, 15′ w Second St., three-st'y brick storehouse, tin roof; cost, $6,000; owner, Thomas Kiley, 59 and 61 Broadway; architect, E. F. Gaylor; builders, Matthew Smith and R. B. Ferguson.

Rochester Ave., n e cor. Atlantic Ave., 5 two-st'y and basement frame dwells., tin roofs; cost, each, $2,000; owners, Frederick and John Dhuy, 184 Chauncey St.; builder, John Dhuy.

Thames St., No. 27, two-st'y frame dwell., tin roof; cost, $3,000; owner, Wm. Grassman, on premises; architect, Frank Hahnberg; builder, W. Hellmann.

South Fifth St., s s, 240′ w Tenth St., 4 three-st'y brick tenements, tin roofs; cost, each, $3,424; owner and carpenter, Wm. Kohlmeier, South First St., near Ninth St.; architect, A. Herbert; mason, M. Smith.

Sands St., s e cor. Jay St., four-st'y brick storehouse, tin roof; cost, $22,000; owners, Alsgood, Rash & Co., Fulton St.; architect, C. F. Eisenach; builders, Thos. Donlon and Long & Barnes.

Seventeenth St., n s, 280′ w Tenth Ave., two-st'y brick dwell., tin roof; cost, $5,000; owner, Ellen A. Mathews, 322 Fourteenth St.; builder, J. P. Goodwin.

Steuben St., No. 29, e s, 275′ n Park Ave., four-st'y brick tenement, tin roof; cost, $5,000; owner and architect, J. F. Carey, 418 Lafayette Ave.; builders, Long & Barnes.

Hall St., e s, 75′ s Myrtle Ave., three-st'y brick dwell., tin roof; cost, $3,500; owner, Thos. McCarty, 190 High St.; architect, J. D. Reynolds; builders, J. Lambert and Thomas Hanlon & Son.

Third Ave., s e cor. Third St., 2 four-st'y colored brick engine-house and factory, tin roofs; cost, total, about $60,000; owners, Somers Bros., Front St., cor. Pearl St.; architect, D. M. Somers.

Broadway, No. 741, e s, 25′ s Locust St., four-st'y frame store and tenement, tin roof; cost, $7,000; owner, John H. Dewes, 853 Willougby Ave.; architect, Th. Engelhardt; builders, John Auer and Michael Metzen.

Chicago.

Building Permits. — I. Schroeder, three-st'y store and flat, 173 Milwaukee Ave.; cost, $6,000; architect, H. Kley.

G. Goodwin, 2 three-st'y stores and dwells., 999 and 1001 West Madison St.; cost, $16,000; architect, Wm. Strippelman; builders, Wilkie & Holman.

E. Debos, two-st'y dwell.; cost, $2,800; builder, Wm. Prehler.

E. Larson, three-st'y flats, 252 West Erie St.; cost, $3,500.

F. Berry, three-st'y dwell., 203 Lincoln Ave.; cost, $4,000.

M. Zais, two-st'y flats, 23 Lane Pl.; cost, $5,000; architect, R. F. Boos; builders, H. Pauley & Co.

F. Farley, 2 two-st'y flats, 265 and 267 Bissell St.; cost, $7,000; architect, A. F. Bass.

H. F. Brand, two-st'y dwell., 1133 Washington Boulevard; cost, $4,000.

J. Buechel, two-st'y store and dwell., 756 West Madison St.; cost, $8,500.

Case Estate, three-st'y stores and flats, 43 to 47 South Halsted St.; cost, $21,000; architect, J. N. Tilton; builder, J. Woollacott.

F. G. Logan, two-st'y dwell., 2919 Prairie Ave.; cost, $10,000; architects, Wheelock & Clay; builder, W. L. Hoffman.

Victor Walters, three-st'y dwell., 71 Laflin St.; cost, $7,000; architect, J. M. Van Osdel; builders, Rogers & Koch.

W. H. Bobson, three-st'y dwell., 656 Fulton St.; cost, $7,000; builders, Rogers & Koch.

J. Willems, three-st'y flats, 559 Lasalle Ave.; cost, $10,000; architect, T. Karls; builder, C. Hellmann.

F. Charvat, two-st'y dwell., 595 Laflin St.; cost, $3,100; architect, J. Vitner; builder, F. Mashek.

Jansen & Hansen, 2 three-st'y stores and flats, 174 and 176 Indiana St.; cost, $12,000; architect, C. O. Hansen; builders, T. Tobiasen & Co.