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CONTENTS

IT has been decided to hold the Annual Convention of the American Institute of Architects for 1892 in Chicago, at the time of the opening festivities of the Columbian Exhibition. The date of these is not yet definitely fixed, except that it is determined that they will occur some time in October, so that the exact day of the meeting of the Convention will have to be appointed later. Independent of the interest of the opening ceremonies of the Exhibition, which will attract visitors from all parts of the country, the Convention of the Institute will this year have important matters to consider, and there should be a full attendance.

ONE of the best provisions in the new building law which has just come into force in New York, is that requiring that the first floor in all tenement-houses shall be of fireproof construction, and that the staircase from the first story to the basement shall not be under the main staircase, and shall be enclosed in brick walls, with an iron or tin-covered door at the foot. Among the speculating builders, this part of the law has excited considerable disgust, as it adds three or four hundred dollars to the cost of an ordinary tenement-house, but the public generally seems to approve it, and it is certain to be of great use. Before long, we shall hope to see its operation extended to all buildings, for whatever purpose, erected within the fire limits. In France, and still more in Germany, no one thinks of building a house without a fireproof first floor; and even the farm-houses in the country districts have, as a matter of course, their basements isolated from the rest of the house by a brick vaulted floor. If this is thought an indispensable precaution against fire in the rural districts of Continental Europe, where the cellars are occupied only by coal-bins and heaps of vegetables, it must be a hundred-fold more necessary in our city tenements, where the basement is always a receptacle for spare furniture and rubbish of all sorts, even if it does not accommodate a steam-boiler; and experience shows that nearly all our destructive tenement-house, hotel and dwelling-house fires begin in the basement, and spread thence to the upper part of the structure. In a French or German house, every particle of inflammable material in the cellar might be burned, without disturbing the tranquillity of the occupants of the rooms above, and it is quite time that we should adopt a similar system. It is quite appropriate that New York, which has a larger tenement-house population than any other city, should lead the way, but the others should not be long in following her example.

MR. DAVID JARDINE, one of the best known of the older generation of New York architects, died a few days ago. Mr. Jardine was born in or near a small town in Scotland, where his father was an architect and builder. He learned as much of his profession as his father could teach him, and, when twenty years old, came to New York, where he soon afterward opened an office, in partnership with Mr. Edward Thompson. Later, the partnership with Mr. Thompson was dissolved, and Mr. Jardine took his brother John into the business. The firm of D. & J. Jardine soon attained a high reputation for careful attention to business, and was entrusted with many important commissions, and, although the members made little pretension to artistic eminence, some of their work shows careful, and even elegant design. Mr. Jardine was a staunch Presbyterian, and, naturally enough, was well known in the denomination, for which he built several churches, but he designed also Baptist and Methodist churches, and one or two synagogues, besides denominational buildings of other kinds.

DR. JOHN S. BILLINGS, and Colonel George E. Waring, Jr., have been making an examination of the drain-pipes and plumbing of the Capitol, at Washington, and find them, as might have been expected, in a very defective condition. The largest drain in the building is about ninety years old, and many others, even in the comparatively modern wings, are at least forty years old. As the Capitol has been remodelled, plumbing has been added, and water-pipes changed, but the main drains have not been much disturbed, and natural decay has probably nearly made an end of some of them, while their design — one brick drain, under the Supreme Court-room, being two feet in diameter — would now be considered highly objectionable. Many of the iron soil-pipes are built into the walls, and have probably rusted away by this time, allowing the liquids that flow through them to soak into the masonry. The two experts advise the renewal of all the plumbing and drainage work, leaving only the supply-pipes, and estimate the cost at less than seventy thousand dollars. This seems to the New York *Tribune* a moderate sum, but plumbers and architects will wonder how so much money can be spent on the work proposed. There are, in all, not quite three hundred and fifty plumbing fixtures in the building, consisting mostly of wash-basins, water-closets and urinals, which are, as a rule, collected in groups. It is not likely that the arrangement of these, with regard to the rooms, will be materially altered, and, as the supply-pipes are to be left untouched, it would seem as if a hundred dollars for each fixture ought to be ample for the work, including all the necessary cutting of floors, and decoration of soil-pipes, in case Colonel Waring should think best to remove these conduits from their concealment in the walls, and make them objects of beauty in the rooms. However, the experts on the spot ought to know more than we do about the conditions, and if it is necessary to spend seventy thousand dollars on the work, the public will make no objection to furnishing the money.

MR. FRANKLIN W. SMITH, whose devoted and unselfish efforts toward the establishment of a great National Museum at Washington are familiar to our readers, appears as the hero of quite a pretty romance, which is disclosed in a petition which he has just presented to Congress. It seems that, during the war, Mr. Smith was a member of a firm of contractors for naval supplies, which furnished large quantities of goods to the Government. In the course of his business, he discovered many tricks by which the Government had been defrauded in the purchase of such supplies, and, through correspondence with the Secretary of the Navy, and the Naval Committee of the House of Representatives, and personal conferences with members of Congress, he was instrumental in securing a change in the law relating to the making of contracts for such supplies, by which fraud was, in great measure, prevented. The dishonest contractors and officials, however,

soon succeeded in evading the modified law, and renewed frauds were perpetrated. These Mr. Smith again exposed in a pamphlet addressed to the Secretary of the Navy, and a committee of the Senate was appointed to make investigations, which resulted in the substantiation of Mr. Smith's statements, and recommendations for meeting the new frauds which he described. This step brought on Mr. Smith the enmity of certain powerful officials, and, a few days later, he was arrested, without a warrant, or judicial proceeding of any kind, by a file of soldiers; his warehouse, office and house were seized and searched, and his papers taken away. Two months later, for the first time, a charge of defrauding the Government was presented against him, and he was tried by a court-martial, which found him guilty and sentenced him. The finding and sentence came before President Lincoln, as Commander-in-Chief, for review, and were overruled and annulled by him, in a characteristic endorsement, in which he said that the facts found by the court, that, in a contract involving more than a million dollars, the amount of the alleged fraudulent gain was only a few hundreds, satisfied him that no fraud had been attempted. "That they [the contractors] did not in such a case strike for greater gains proves that they did not, with guilty or fraudulent intent, strike at all." The President ordered Mr. Smith's immediate discharge, but his business was ruined, and his health had suffered so that he was incapacitated for mental labor for several years. According to the quotations which Mr. Smith makes in his petition from the newspapers of the day, and from the report of an investigating committee of the Boston Board of Trade, the general opinion seems to have been that he was the victim of the malice of Government officials. For some reason, the story appears to have been lately revived, and Mr. Smith, partly, we suppose, to set himself right before the public, has taken the occasion to present his petition, reviewing the circumstances, and asking for an appropriation of two hundred thousand dollars, which, as he says, is less than half the actual money loss which he suffered on account of them, adding interest to the present time. He does not ask for this appropriation for himself, but requests simply that it shall be held by the Treasurer of the United States, to be paid over, when his beloved project shall have been, in the judgment of the President, firmly established, as his gift to the institution.

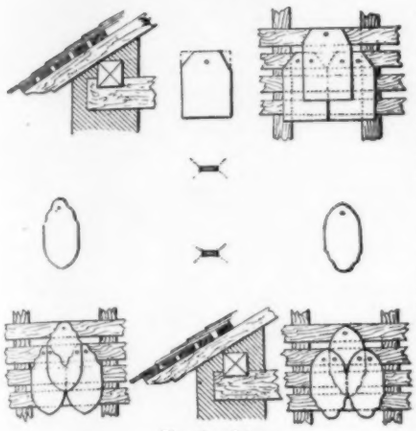
THE order restraining the Women's Memorial Fund Association from erecting a statue of Mary Hamilton Schuyler at Chicago, which was granted by a court in New York, and an appeal taken from the decision, has been heard on appeal by Justices Van Brunt and Barrett, of the New York Supreme Court, and affirmed, Justice Van Brunt, in his opinion, stating the ground of the decision in one of the clearest and neatest sentences that we have ever met with in a court record. It will be remembered that the Association claimed that the memory of a person deceased belonged to the public, and that Mrs. Schuyler's nephew, who applied to the courts for the restraining order, could have no standing in court, inasmuch as he was not, and would not be, injured in person, good name or estate by the erection of a monument to his aunt. Judge Van Brunt, however, disposed of both these theories in a few words, saying: "The memory of the deceased belongs to the surviving relatives and friends, and such relatives have a right to see that that which would not have been permitted in respect to the deceased when living shall not be done with impunity when the subject has become incapable of protecting himself." It would be possible, we suppose, to appeal the matter again, but it is hardly likely that the Association will persist in its plan, and it may be taken as settled that statues cannot be lawfully erected in this country to the memory of any one whose relatives choose to make objection.

ALTHOUGH we see the justice of the decision, and would not wish to have it reversed or modified, we cannot help regarding the appeal of Mr. Schuyler to the courts to prevent the admirers of his aunt from carrying out a harmless scheme for expressing their esteem as a piece of supercilious arrogance which we hope will never be imitated in the future. That any American is so genteel as to be removed from the necessity of receiving evidences of affection, however clumsily devised, with anything but courtesy and forbearance, is a notion unfit to be tolerated in this Republic. Let any one endeavor to imagine Abraham Lincoln rushing about from court to court, trying to get injunctions against an association of Digger Indians, or plantation negroes, who, as he heard, were raising money to pay for a statue of him, because he was afraid they would not have the statue handsome enough, and he will perceive the difference between real greatness and the unfeeling haughtiness which meets intended favors, if they do not happen to come in a form agreeable to its fastidious taste, with a repulse.

A TEMPEST in a teapot has been raging, according to the Boston papers, among the people interested in the new public library building, which, it will be remembered, is the work of Messrs. McKim, Mead and White. Operations on the building have been nearly at a standstill for some time, owing to the failure of appropriations, but, a few days ago, it was determined to go on with the inscriptions intended for certain tablets on the front. The wish of the Trustees was to fill the tablets with names of distinguished authors, musicians and artists, but the unfortunate idea occurred to them to select six hundred names, and send the whole collection to the architects, to be arranged in such manner as might impart the most artistic appearance to the tablets. Architects will readily imagine what the busy professional men did with the names. According to the most probable account, they turned the list over to a draughtsman, recently graduated from college, who might be supposed to have some judgment in such matters, to make a suitable arrangement. Instead of this, however, it occurred to the youth to arrange his first list in such a way that the initial letters of the names spelt the words "McKim, Mead, White." If the silly joke had been carried out with more care, it might not have attracted attention; but the facetious youth began his tablet with the names, "Moses, Cicero, Kalidasa, Isocrates, Milton." The people of Boston are tolerably well accustomed to jumbles of literature and theology, but to see Moses, Isocrates and Cicero lumped together in a tablet in front of their most important building, carefully drawn in red chalk, in preparation for cutting, startled even them; and their astonishment was not allayed by discovering, on the tablet below, the names of "Wren, Herrick, Irving, Titian, Erasmus." The most indifferent lover of art and literature must feel some qualms at such a ridiculous hodge-podge as this last group, and when the penetrating intellect of a reporter had "analyzed" the inscriptions, and his penny newspaper had held up to the righteous indignation of the public the "cheap advertising acrostic" which, as it informed its readers, had been "put on the tablets by direction of the architects," there was a very general expression of disapproval of the joke. It is hardly necessary to say that the names were speedily erased, by direction of the Trustees, but it will be many days before one or two of the Boston papers, when they have vacant space to fill, will tire of reiterating their comments on the sin to which the architects of the Library were led by their anxiety to bring their names before the public.

THE designs for the new English coinage have been accepted, subject to some slight alterations. It will be remembered that, about the same time that, according to the Director of the Mint, an unsuccessful attempt was made to find an American sculptor capable of designing a coin, the British Treasury made a similar attempt, and either through the greater capacity of English sculptors, or the less fastidious taste of the Treasury authorities, it was found expedient to select two sculptors, Mr. Thomas Brock and Mr. Edward J. Poynter, who were each commissioned to make complete sets of designs. One of the conditions was that a head of Queen Victoria should appear on all the coins; and Mr. Brock's model of the portrait has been selected as the most satisfactory, and will be used for the obverse of all the coins. Two of the reverses designed by Mr. Brock have also been accepted, but for all other reverses Mr. Poynter's design will be used. We are not informed what the designs for the reverses represent, except in the case of one of Mr. Brock's, which shows the combat between Saint George and the dragon. At the risk of exhibiting a dense ignorance of the first principles of coinage design, we must say that it seems to us that a lively little group of that sort would be more interesting — we had almost said more artistic — than the effigy of an eagle, apparently inspired from a stuffed skin nailed on a barn-door, surrounded with five-pointed stars, which is held up to us as the acme of American low-relief sculpture; and we shall look anxiously for the arrival of some specimen pieces on this side of the Atlantic.

ROOFING.[1] — II.



Figs. 1 and 2.

LET us now pass to the second division of our subject — slate roofing. Slate is a schistose rock of such structure that it splits readily into thin, even laminæ. As it is very light, it possesses in certain cases a considerable advantage over other roofing materials, and this often settles the question of its use where it can be obtained cheaply. But there is another important consideration affecting the choice of material, namely, the pitch of the roof. In the Paris basin, for example, it is impossible for climatic reasons to use slate unless the slant is at least 30 degrees. If this minimum be lowered there is danger that the dampness will gradually reach the inside of the joint and penetrate imperceptibly into the construction itself.

The slate used at Paris comes chiefly from the quarries of Angers and Renazé, and, in smaller quantities, from the Ardennes. Slate possesses a great many advantages for roofing purposes: it can be adapted with the greatest ease to all sorts of framework, wood or iron, no matter how peculiar or elaborate, no matter what the shape; it is very solid, owing to the thickness, which is ordinarily three, five or even nearly six millimetres; and the roofs of our ancient monuments bear witness to its durability. It moreover exhibits in turn the severe aspect, so well suited to the new Sorbonne, and the attractiveness demanded for such structures as the Hôtel de Ville; all this is wanting, in part at least, in other roofing materials. It is not affected by changes of temperature; it never freezes, which accounts for its great durability. It is a poor conductor of heat, and the rain falling on it does not produce the disagreeable noise occasioned by it on a zinc roof. Lastly, it can be laid with extreme facility, and in most cases special craftsmen are not required for the work; masons are amply qualified to do it. If to all these considerations cheapness of material and transportation be added, clearly this kind of roofing has an advantage over all others.

In order to carry out our original plan we will now take up a series of constructional details, showing the proper mode of adjusting and fastening the slates, according to different systems. In the first place the following general rule may be laid down: The distance from batten to batten of the roof must be equal to the uncovered portion of the slate. All the requisite elements can then be secured, this exposed part being a third of the entire slate.

The battens may be of poplar or northern fir; they are not nailed to the rafters until the most exact measurements have been made to ascertain whether the framework as a whole is definitively regulated. It is necessary, as far as possible, to avoid joining the battens, as the air should be allowed free circulation; this is an indispensable condition if the roof is to be properly preserved. Each slate rests on three battens (Figs. 1, 2); its upper edge is flush with that of the first batten, while the lower edge extends a little below the third; it is usually made fast at the top by two copper nails. There is no difficulty in shaping the slate to suit requirements; all depends on the ornamental effect to be obtained. On a private dwelling, for example, where every decorative element is to be brought into play, rounded and scalloped slates are used (Fig. 2). The mode of laying them is the same as in the other case, only the work must be entrusted to skilled hands.

Angers slates, the mode of adjusting which we have just described, have the following dimensions: Height, 21 to 32 centimetres; breadth, 10 to 22 centimetres; thickness varying from 3 to 5 millimetres. English slates (Fig. 3) differ from these in their greater mean thickness, and the uncovered portion is not determined in the same way, but by the pitch. They are also secured in place by means of copper nails, instead of galvanized-iron.

It should likewise be remarked with reference to slate roofs in general that as the slates cannot all be of exactly the same thickness, they should be sorted at the outset; the thickest should be placed at the lower edge, the medium ones toward the centre of the slope, and the lightest at the ridge. For the sake of economy the system may be disposed as indicated in Figure 4. The rafters are 0.40 metres apart, and the battens 0.122 metres; the slates are fastened with metallic hooks — either galvanized-iron or copper.

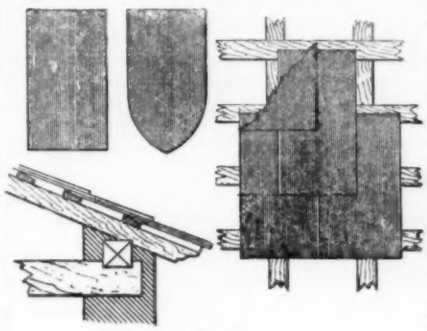


Fig. 3.

Slate can, as we all know, be readily adjusted to a metallic framework. As an example, the roof of the new Sorbonne may be cited, in which the slates rest on iron strips and are kept in place by copper hooks. The ordinary means of attachment are familiar to every one; they are the copper or galvanized-iron nail (Fig. 5) employed for the Angers slates, or, if economy calls for it, a hook of the same metal.

Other quite different methods were exhibited at the Paris Exposition. Among them was the Célier system: this is a hook so constructed as to admit of the removal of the slate in making repairs, without the aid of any tool whatever. According to the inventor, it insures cheapness and perfect security. A word should also be said of the method adopted by the maison Grosjean. Here under-joints of zinc, galvanized-iron or copper are introduced (Fig. 6), designed to hook and hold the slates. The main advantage of this system lies in the increase of the exposed surface, which is equal to four-fifths of the entire slate instead of a third as originally. A much greater part of the slate is consequently utilized, and, if firmness and tightness are not thus sacrificed, the method certainly merits a trial: experience alone can determine its real worth. The under-joints are of two kinds, one expressly for the first course, the other for the remaining courses; the latter are the shorter. Seven under-joints are required for every square metre of roofing; the price is 25 francs per hundred. They admit of a great variety in decoration.

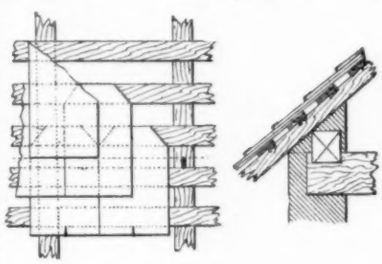


Fig. 4.

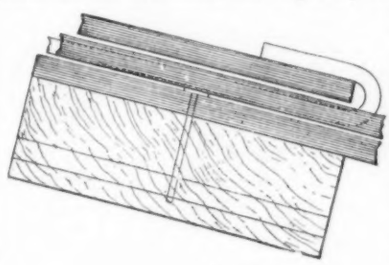


Fig. 5.

The third division of our subject includes all metallic materials: zinc, plain and corrugated sheet-iron, cast-iron, tin, lead and copper.

Zinc first made its appearance in Europe in the twelfth century. It was brought from China and India, and for this reason was long known as India tin. It is only since the middle of the seventeenth century that the preparation of it in European countries has reached sufficient importance to be deserving of notice. It is found in a native state in different

[1] From the French of A. Rospide, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 859, page 161.

conditions: as calamine or carbonate of zinc, often contaminated with silica; or as blende (sulphide of zinc), this being by far the most important, as it yields sometimes as high as sixty per cent of utilizable metal. These ores are found in rich deposits in England, in Upper Silesia and in Belgium, between Liège and Aix-la-Chapelle. They also occur, though much less abundantly, in France, in the departments of Lot and Gard.

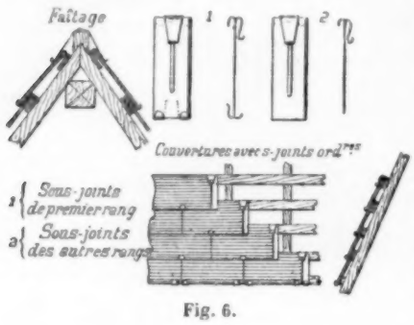


Fig. 6.

The following is, briefly, the method employed for removing the gangue: the ore is first converted into oxide of zinc, so that it can be more easily separated mechanically. It is then mixed with the same volume of fine, dry pit-coal, and subjected to a high temperature. The oxide of zinc is reduced, and the metal distills at the same time that the carbon is released.

Zinc has a slightly bluish-white tint, and is of a crystalline texture. It is brittle at an ordinary temperature, but becomes ductile and malleable between 100° and 130°; it can then be rolled out in very thin sheets for manufacturing purposes. It is unalterable in oxygen and dry air, but, brought in contact with damp air, it takes on an impervious coating of hydrocarbonate of oxide of zinc, which preserves the rest of the metal from any ulterior change. This is the reason that it is so extensively used for roofing. The advantages which it offers for this purpose, where exterior decoration is not called for, are such as to recommend its use wherever the question of economy has to be considered. It is solid, light and durable; moreover, a steep pitch is not necessary, 10 centimetres to the metre sufficing for an ordinary roof, and for a flat roof it can easily be reduced to zero. Slate, on the contrary, requires at least 30 centimetres, and tiling 45; when the surface to be covered is taken into account, it is readily seen that there is a great economy in the use of zinc. According to the Société de la Vieille-Montagne, for a building 12.50 metres long by 6.80 metres deep, masonry, framework and roofing included, with zinc No. 14, the official market rate of rolled zinc being 65 francs a hundred kilos, prices would be as follows:

Zinc	1,444 fr.	82 or 16 fr.	40	per square metre.
Slate	1,972	90 " 23	24	" " "
Tiles	2,902	80 " 31	80	" " "

The prices for a shed of 63 metres long by 18 wide, with iron frame, would be:

Zinc	18,592 fr.	53 or 16 fr.	40	per square metre.
Tiles	29,765	48 " 26	25	" " "

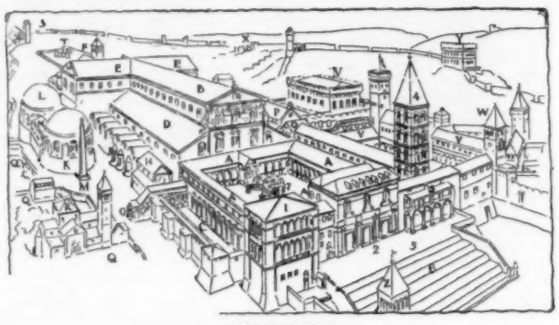
Zinc is lighter than lead. If the tenacity of lead be represented by 2, that of zinc is 10. Its density is 7.19, while that of lead is 11.35.

There has been a tendency for some time toward replacing lead ornamentations, which are so heavy and costly, with stamped zinc. This movement is the more deserving of notice here, because the results show that almost as rich and elegant decoration can be produced with the zinc.

[To be continued.]

Lengthening a Stand-pipe. — Owing to the steady growth of Mt. Vernon, N. Y., the charming little place that was recently made into a city, it became necessary, in order to obtain greater pressure for elevated points, to enlarge the stand-pipe. The old affair was originally 100 feet high, 20 feet in diameter and weighed about 75 tons. It was built of five-foot plates, double riveted vertical seams, and had a capacity of about 235,000 gallons. To increase the pressure the stand-pipe was raised 25 feet with hand-jacks and blocked up temporarily. The extension of 25 feet was made of tank iron, 12 1-2 feet of 5-8-inch and 12 1-2 feet of 9-16-inch iron, having a tensile strain of 50,000 pounds per square inch of section. The present height of the stand-pipe is 125 feet; diameter, 20 feet, with capacity of about 300,000 gallons. The stand-pipe was raised in thirteen days. The placing of the extension and connecting force main took nearly thirty days. The cost of the entire work was about $5,000. Isaac A. Blair & Co., of Boston, did the raising, and the ironwork was done by the Cunningham Iron Works of South Boston. — *Fire and Water.*

ST. PETER'S AND ITS BUILDERS.[1] — I.



REFERENCES.

A. The Quadriporticus.
B. Nave of the Basilica.
C. Space where Paul III erected the Chapel of the Archconfraternity of S.S. Sacrament.
D. Aisles of the Basilica.
E. Transept of the Basilica, or "Transverse Nave."
F. The Lady Chapel erected by Probus and Proba.
G. Entrance used by the Popes when they resided at the Lateran.
H. Chapel called the Secretarium.
J. Place where Sextus IV built the Canon's Chapel.
K. Church of "Sta. Maria de Febribus." Afterwards used as the Sacristy of St. Peter's.
L. Church of St. Petronilla.
M. The Vatican Obelisk, called "La Giulia."
N. Chapel and Tomb of St. John Chrisostom.
O. Chapel and Tomb of St. Gregory the Great.
P. The "Jerusalem Church."
Q. Campo Santo.
R. St. Salvator de Ossibus.
S. Monastery of St. Stephen.
T. Ancient Chapel and Cemetery, called "Fons Petri."
V. Ancient buildings of the Vatican.
W. "Orologium," or clock-tower of the Vatican.
X. Porta Pertusa.
Y. The Belvedere.
Z. Church of St. Gregory in Platea.

1. "Church of St. Apollinaris," or Hospilium for Pilgrims.
2. Entrance Gateway, or Propylæum.
3. Loggia from which the Popes gave Benediction.
4. "Turris Cymbalaria" (Bell-tower).
5. Platform in front of Basilica.
6. The Five Flights of Marble Steps.
7. The Pine-cone from the Mausoleum of Hadrian.
8. The Cantharus, or Fountain.

Key Sketch to View of Ancient Basilica of St. Peter, Rome.

THE Church of St. Peter is called the Vatican Basilica, though it is not a basilica, because it was so once; that is, it occupies the site and contains the foundation of the greatest early Christian basilica. At the place where the Vatican hill slopes southeasterly to the bend of the Tiber, where the lowland was crossed by the ancient Via Triumphalis, lay the gardens and circus of Nero, the scene of the earliest and most wanton persecution of the Christians; and here, tradition says, at the end of the first century, St. Anacletus, fourth bishop of Rome, consecrated by St. Peter's own hands, built a modest oratory over the tomb where the apostle had been laid after his martyrdom on the neighboring Janiculan Hill. Two centuries later, we are told, Constantine, passing the spot as he entered Rome in triumph after his great victory over Maxentius, in the first campaign that was fought under the banner of the cross, vowed to himself that he would build a church in honor of St. Peter. This church, built in 324–30, lasted nearly twelve centuries — the most venerated church in Christendom, and in course of time the most sumptuous. It gradually usurped the importance which originally belonged to the Pope's own church, the basilica of St. John Lateran — which, also founded under Constantine, is even now called the mother and head of churches — and when in the fourteenth century the popes, returning from their exile in Avignon, transferred themselves from the palace of the Lateran to that of the Vatican, St. Peter's became the Pope's chapel.

The chronicles of the Roman Church are full of accounts of its splendors and its vicissitudes, its burnings, its plunderings and restorations. Fortunately, before Constantine's building was pulled down to make room for the present church careful plans were made of it, so that we know what it was; and representations of it may be seen in the Stanze of the Vatican in Raphael's paintings of the "Coronation of Charlemagne, which took place in it — and of the Incendio del Borgo. It was a great five-aisled basilica with projecting transepts, nearly four hundred feet long and two hundred and seventy in extreme width. It fronted the east, as did the earliest Christian churches, and as the present church does; its western apse covered the tomb of St. Peter. An imposing flight of forty steps and a broad platform, stretching all across the front, served the popes as a reception place for the potentates who on great occasions came to visit the church, and somewhere in front, as now, was a balcony from which they delivered their blessings to an assembled multitude. The plain façade was the entrance not of the church but of an atrium,

[1] While this article has been waiting its turn there has appeared in *The Builder*, an excellent and detailed account of Old St. Peter's, by Mr. W. H. Brewer, to which we commend readers, who are willing to go into the subject more minutely than we have done here, and from which we have borrowed a general view of the old buildings. This may be depended on for general truth, though more or less of the details is naturally conjectural.

open and lined on all four sides with arcades, enclosing in the centre a bronze fountain for the due purification of worshippers. The arcaded galleries were decorated with painted walls, and the side next the church, serving as a narthex, contained many tombs and mosaic decorations, while on the opposite wall was put later the famous mosaic by Giotto called the "Navicella," which represented Peter walking on the sea, and now, much altered by restorations, is replaced in the present narthex. The main façade, rising high over the atrium, and crowned by a low gable, was covered with splendid mosaics which stretched in bands across the front. There were as now five doors, three in the nave and two in the aisles. The nave itself was enormous, more than seventy feet wide, or almost as wide as the present nave which follows its lines, a hundred feet high, and nearly three hundred long. It and the aisles were separated by four rows each of twenty-eight marble columns, plundered, as were most of Constantine's building decorations, from older structures.

Its unique characteristic was that while the columns that lined the nave carried a horizontal entablature, those that divided the aisles carried arches. This is one of the evidences that although by this time builders had succeeded in detaching the arch from the entablature, and setting it directly on the capital of the column, they still considered the entablature to be the more monumental crowning of the column and relegated the arch to an inferior place. The same feeling appears in Sta. Maria in Trastevere, built only about fifteen years later, in which the entablature is used, but the frieze of flat arches that take the weight of the wall off the architrave, undoubtedly once hidden, has been revealed by the falling-off of the plaster.

It is singular that this should be done a quarter of a century after the building of Diocletian's palace at Spalato, in which, as Mr. Freeman has insisted, the greatest step had been taken in the development of Romanesque architecture by the emancipation of the arch from its subservience to the entablature, but we may remember that by this time Rome had become the home of conservatism, that not only armies and emperors, but all the impulses of progress were supplied by the provinces, that the determining argument for the substitution of the arch in a time of mechanical decadence was likely to be its ease of construction and cheapness, and that Spalato, where it first claimed supremacy and respect, was within the range of that Greek influence which was two centuries later to transform architecture in the splendid buildings of Justinian and Theodoric, and which would tempt Constantine away, almost as soon as he was securely possessed of the old Rome, to found a new Rome on the shore of the Bosphorus.

Whatever we may assume to have been the origin of the form of the early Christian churches, whether we take it to have come from the conversion of civic basilicas to ecclesiastical uses, of which no evidence has been found, or conclude that as soon as large churches became necessary the basilican form showed itself to be better adapted to the Christian worship than any other form of building then known, we must believe that Constantine's first church fixed the type for centuries to come of those in Rome, except for burial churches, for which, also through his example, another form was adopted, and for some time to come elsewhere. The nave and aisles, the transept not as broad as the nave, the great triumphal arch, opening from the nave into the transept, the western apse, transferred to the east when later the orientation was reversed and the churches were entered from the west, the crypt under the apse containing the body of the patron saint, the long arcades, the clerestory, the narthex, the atrium, all were there.

It does not appear that any of these parts were here used for the first time, or perhaps that there was any other novelty in the new basilica than its size, its completeness, and its splendor. Most of its characteristics as a church were probably common in the East, where in the great cities the Christian Church was prosperous and its places of worship conspicuous while Rome was still, from an ecclesiastical point of view, an oppressed provincial town. The great basilica built a few years before in Tyre by Bishop Paulinus, was apparently like it, so far as we can understand Eusebius's glowing description, except perhaps for the transept, which is hardly found in the eastern basilicas, and the crypt, or as it was called, the *confession*, which was also a Latin feature, and the double aisles. It probably had a coffered and gilded ceiling under its timbered roof, like that which Eusebius mentions in his description of the later basilica which Constantine built over the Holy Sepulchre, and it was, at first or afterwards, profusely decorated with rich mosaics, both within and without.

Perhaps it was the decadence of Latin art which, already begun, was continued and accelerated during the dreary centuries that followed Constantine's reign, that prevented further development in the form of the Roman churches until veneration for those of Constantine had hardened into conservatism. Perhaps as the Church of Rome grew stronger, and after a century and a half succeeded to the authority of the western empire, it clung loyally to the form of its first houses of worship, the witnesses of its elevation. Perhaps the absence of Teutonic blood and of Teutonic rulers like Theodoric and the Lombard kings conspired with the aversion to change which belongs to ecclesiastical government. At all events, the progress of church architecture in the early Middle Ages passed Rome by. The great inventions of the Romanesque period, the cruciform plan, the lengthened choir, the compound bay, the vaulted nave, are not found there. The type of Constantine's basilicas, St. Peter's, St. John Lateran, was continued with little alteration except in scale from the fourth to the twelfth century, in a series of churches which still remain, though more or less altered. In several of them, as well as in Sta. Maria in Trastevere just mentioned, even in Sta. Prassede so late as the end of the fifth century, and in others which many authorities date later still, we again find a reversion to the entablature in place of the usual arcades of the nave.

So this church stood till the middle of the sixteenth century, a monument to the conservatism of Rome, revered, adorned, wasted, patched, plundered and restored, but substantially unchanged, except for the clustering about it of many parasitical buildings, that at once disfigured it and served as props for its later decrepitude. It must have been well built, for its situation was insecure. It stood on the alluvial shore of the Tiber, on absorbent ground penetrated by the rising and falling river water. This unstable substratum was a sore trial to the architects of the modern St. Peter's, whose efforts to make their buildings secure were again and again baffled by it. It is not practical nor very important to unravel the structural history of the building. We do not know when the flat ceiling of the outer aisles was replaced by a barrel-vault, nor when the ceilings of Constantine were stripped from the roof-trusses. We know that two towers were added to the front, not of the basilica, but of the atrium, one a bell-tower by Adrian I in 772. Two round chapels, connecting with each other and with the south transept, were the mausoleum of Honorius, afterwards the oratory of St. Petronilla, and the chapel of St. Andrew. South of the atrium was a small cruciform church with two apses north and south, called the Church of the Saviour, and devoted to the use and the burial of pilgrims, and all about the basilica itself clung a thick growth of smaller building, partly identifiable and partly not, which appear on the published plan. As for the legendary furnishings with which the church was resplendent, the wonder of pilgrims and historians in the Middle Ages, they have left no trace. The spoils of the Jewish Temple, transferred from the Temple of Peace, and the accumulated riches of more than a century, were carried off to Carthage by the Vandals, under Genseric, in the middle of the fifth century; the silver doors of Honorius, weighing nearly a thousand pounds, were the spoil of the Saracens in the middle of the ninth. It is almost incredible that, of the later splendors of the church, the accumulation of the secure ages of the Pontificate up to the sixteenth century, nothing should have survived its removal; but this seems to be the case. Whether the cause was the eagerness of Julius II to raise money for his pet scheme of rebuilding, or the disdain of the artists of his day for the art of the barbarians, as they called their predecessors, or what else, we do not know; but the magnificent canopy of the confessional, the silver candlesticks and altar rails, the golden plates that lined the confessional and its silver pavement, the bronze tomb with which Constantine had provided St. Peter, and the golden cross that surmounted it, the silver-gilt ciborium, a ton in weight — all these seem to have utterly disappeared. Only two or three relics of especial sacredness and no money-value have been preserved: St. Peter's statue and his chair, only one or two works of art which were recent enough to secure the interest of the artists of the Renaissance, the Navicella and the bronze doors of Filarete and Simon the Florentine.

W. P. P. L.

(To be continued.)

THE AMERICAN CATHEDRAL.

SS. Peter and Paul, Chicago, Ill.

THE oldest cathedral of the Episcopal Church in this country is the Cathedral of St. Peter and St. Paul in Chicago, Ill., erected in 1861. When the proposal to build it was made to his Convention in 1852, by Bishop Whitehouse, his views were regarded by many Episcopalians throughout the country, as most extreme and impracticable, "What did a Protestant Church want with a cathedral, anyhow?" they asked, "And suppose that one were needed, how are we ever to build one here, when the cost will run up to millions and millions of dollars?"

The two objections made then to the cathedral are the two which are urged to-day: What is the need of it? and How can it be built?

There would be very little need of it in the Episcopal Church in this country if it were thought of as mainly a place for spectacular religious functions. The genius of this church is opposed to a very elaborate ritual in worship. There has been in the past a decided leaning to simplicity, and simplicity has its strong advocates to-day, who oppose any approach to what is usually called "Ritualism." Nevertheless, the æsthetic tastes of the American people and their sound common-sense are lifting them up above the old Puritan prejudices of the past, and there is a disposition to make religious

services more dignified and impressive. This point is abundantly shown in the architecture of many of our newer churches. They are not mere meeting-houses for preaching purposes, but stately temples whose very materials, and outlines and adornments become teachers, through the eye, of the grand verities of the Christian Faith.

But whatever may be the advance in the æsthetics of worship, it is hardly probable that the American Church will ever need cathedrals for spectacular displays. They must subserve more useful

Cathedral, Davenport, Ia.

Trinity Cathedral, Omaha, Nebraska.

purposes. Whenever men understand how practically beneficial they may become, some objections immediately fade away.

Perhaps the briefest statement of their uses is this: Every diocese should have a church for its bishop in which he can meet his conventions, ordain ministers, hold conferences and reach the people. Such a church is the cathedral.

Apart from the many occasions when it would be used for diocesan purposes, it would be in daily use as a free church for the people, and would be the centre of special services for reaching the masses. Think then of the American cathedral as the people's church in the see city of the diocese, under the direct charge of the bishop, assisted by a staff of clerical and lay helpers. The people's church with dignified and impressive services, with a pulpit from which the best speakers shall speak, with multiplied agencies for benevolence, and with open doors for all who will enjoy its benefits — that is the American cathedral.

The growing enthusiasm of American churchmen, which is doing so much to popularize the Episcopal Church to-day, will take hold of the cathedral scheme before long and make a cathedral necessary in every diocese. It will not be "What do we want with it?" but "How can we do without it?"

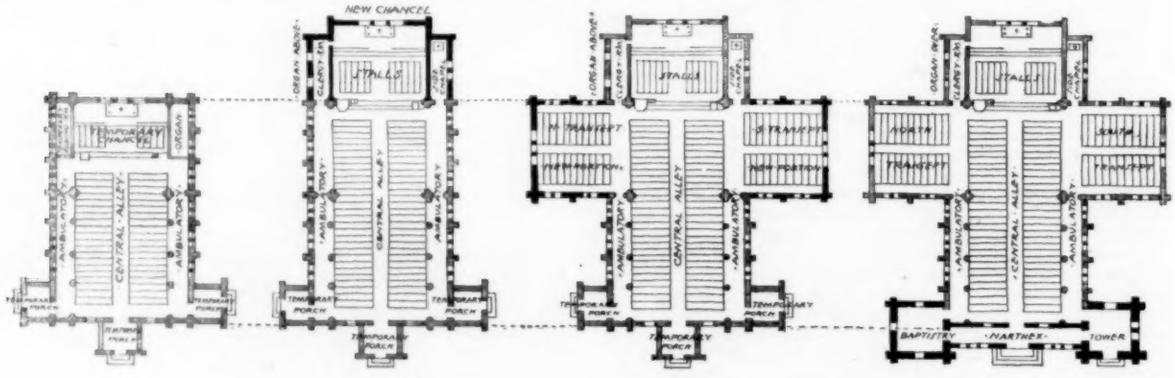
The second objection seems to be almost as serious as the first appeared. If we think of those noble edifices which we have seen abroad and recall their great size, their wondrous architecture and their rich adornments, we may well think the day is far distant when the cathedral is possible here except in a few large centres of population. But we must disabuse our minds entirely of the impression that a cathedral must necessarily be large and imposing and costly. It may be a log structure. It may be, as was Bishop Lay's cathedral, a simple frame building costing only a few thousand dollars. Size, grandeur, and costliness do not make a cathedral.

Most of the foreign cathedrals, however, are stately edifices, the chief glory of the places in which they stand. If the people here have the means to construct the American cathedral as large, as noble and as richly adorned as those which have stood so long in England and on the Continent of Europe, let them do so, but the cathedral, itself is possible, and the cathedral system, or the essential parts of it, can be worked out upon a more humble scale. It must be remembered, however, that very few of the foreign cathedrals were finished by the generation that began them. Some of them were hundreds of years in process, some are unfinished even now.

One of our American traits is our impatience. We want to see things hurried through. It would be well for us if more of our public buildings were built by degrees and paid for as the work went on. There are often no good reasons why the congregation of an ordinary parish should be in such a hurry to complete its new building. Much more substantial and suitable churches could be built if the architects were permitted to arrange the work to be built by sections, a nave now, a chancel later on; a temporary porch now, to be succeeded by a stone tower after a while; common windows at first, then richly stained glass; rough benches until carved and solid pews can be paid for — so, on and on until a stately edifice rises where, under our present way of hurrying, we get a finished but very cheap and flimsy thing.

The cathedral can grow. Its largest outlay at first would be for the nave. Chancel, transepts, tower, porches, chapter-house, crypt, side chapels, adornments by carving and color, and a hundred other additions can all come later. It is not difficult to think of a cathedral growing up in one of our American cities in some such way as this. First of all a rectangular nave — say 60 by 100 feet — arranged somehow as below:

Here would be seating-space for about 500 persons, and a temporary chancel cut off from the upper end of the nave. Such a building would serve its purposes for quite a time. Later on, as the cathedral movement flourished and money could be secured, the next step would probably be to add the chancel. The rear wall of the nave is removed and the chancel added.



The third step would be taken when there came still greater demand for room. The transepts would be built, so that the ground-plan will look about like the third plan.

And finally, at the end of years, perhaps a long period, when the building is finished, with all its parts added, the completed structure would be as shown by the fourth plan.

Nothing can better illustrate the flexibility of the cathedral system and at the same time show how the American Church is reaching out to make use of it than to give some views of cathedrals already erected or in progess in this country, of which there are sixteen: Chicago, Davenport, Omaha, Salt Lake City, Portland (Me.), Springfield (Ill.), Denver, Garden City (L. I.), St. Louis, Fond du Lac, Topeka, Atlanta, Buffalo, Easton (Md.), Albany and New York.

The one in Chicago was originally a parish church, a small stone

building with a wooden chancel. It was bought when the parish was hopelessly in debt, and was made the bishop's church. Subsequently 39 feet were added to its length and the transepts were built. Its interior has been handsomely adorned. Connected with the building is a clergy and choir house. An endowment of $100,000, mostly in land within the city limits, awaits the future development of the cathedral system here.

A much nobler structure is the Davenport Cathedral, Iowa. It was begun in 1867 and consecrated in 1873. Its extreme length is 142 feet, extreme breadth 60 feet, and its height to peak of gable is 56 feet. It is built of gray native limestone faced with a yellow limestone. The columns supporting the roof are of iron. Only the lower stages of the tower are built; the spire awaits its completion. The cost of the building was over $75,000.

St. John's Cathedral, Denver, Colorado.

Trinity Cathedral, Omaha, Nebraska, was begun in 1880 by Bishop Clarkson, and consecrated by him in 1883. It cost over $100,000. It is built of blue limestone, and has nave, aisles, transepts, and apsidal chancel. It measures 116 feet by 46 feet, and seats 700 people. Its interior is very beautiful.

There is nothing particularly striking in the architecture of St. Mark's Cathedral, Salt Lake City, Utah, nor in that of St. Paul's, Springfield, Ill., nor yet in that of St. Luke's, Portland, Me. They are about like ordinary parish churches, the latter, however, being exceedingly graceful in its proportions.

St. John's Cathedral, Denver, Colorado, does present some very interesting features. It was deliberately decided by the authorities to avoid the Gothic style and to adopt the Romanesque, also, "to build an interior"; that is, to build of bricks now and at some later period to finish the exterior with stone. The present walls are really the brick lining of the future stone edifice. The dimensions are 140 by 100 feet, and the seating accommodation is for 1,200 persons. The nave is 33 feet wide, and the highest point of ceiling inside is 57 feet. The chancel is 26 by 60 feet. The cost of the structure thus far has been over $150.000.

The most elaborate of all those yet completed is the Cathedral of the Incarnation, at Garden City, Long Island. It is a memorial of Mr. A. T. Stewart, and has been constructed without regard to expense. It is a Gothic structure, highly decorated, and seats about 800 persons. It has been so often described that no details are needed here.

One of the most interesting of the attempts to build by degrees is the Cathedral of All Saints, Albany, New York. Looking at the completed drawings, we have before us an exceedingly graceful Gothic building of stone, with corner towers and central dome; but, looking at the building as far as it has gone at this writing, we see curiously incomplete walls and roof and the foundations for future work. It is the purpose of the authorities to go ahead as they are able. They have built what they could for present use. They add a window or complete a section when the means are provided. But, even in its incomplete condition, it has a most cheerful, inviting and convenient interior. When finished, it will be one of the noblest buildings in the land. The nave is 150 feet, and the choir 90 feet. The whole length of the building, when completed, will be 270 feet. All the foundations for all the parts are laid, and the superstructures upon them will go on when means are supplied. There are 153 stalls for the clergy, 50 for the choir, 1,500 seats for the congregation, with space for increase by chairs, etc., to 2,300, so that the total would be 2,500.

Cathedral of the Incarnation, Garden City, Long Island.

By far the most important movement thus far to build an American cathedral is that in New York City. It has awakened a vast amount of attention. The preliminary study of plans has been entered into with eager interest. This work has been quite educational in its influence thus far, and has done much to answer the questions proposed by the average layman: "What is a cathedral, and what do you want with it?"

The decision reached by the New York committee shows that they had in mind a structure that would provide for the dignified rendering of religious services when large congregations were present, and also for less elaborate services participated in by the handful of people early in the morning. The grand chancel, with its great altar and generous choir space, its broad ambulatories and its noble seating-space beneath the dome, give all that could be asked for great occasions, when the thousands of worshippers are drawn together. But equally well are the handful of people and the one minister provided for at the quiet services in the early morning in one of the side chapels.

They also had in mind provision for seating the main portion of the congregation where they could hear and see. It would have been a blunder to provide simply for seeing, the people must hear, and so they have arranged this great seating-space under the dome.

It is not the purpose of this article to enter into the merits of the plan adopted judged from an æsthetic standpoint, or to discuss the question of whether some other style might not have been richer in symbolism. The great point is that the building is likely to answer the purposes for which an American cathedral is needed, viz: as a place for religious worship according to the Ritual of the Episcopal Church, whether the congregations be large or small; as a place for the delivery of sermons and lectures, where large numbers of persons can easily hear the same speaker — and finally as a place so noble in its proportions, so rich in its adornments, that it will inspire holy thoughts and awaken reverential feelings.

A very important adjunct to the cathedral is the chapter-house or guild-hall. But it cannot be treated in this article.

If the writer were asked by architects for some suggestions as to the smaller cathedrals which are likely to be in demand within the next few years in the different dioceses of the Episcopal Church in this country he would sum them up thus:

1. Inasmuch as the Cathedral is intended to stand a long while it should be well placed. It must not be put down in a poor location, or in such a select neighborhood that the people cannot reach it.

It should be as accessible from all parts of the city as is the theatre or the leading hotel or the music-room. It draws its congregations from all directions, and does not depend, as does the parish church, upon those living in a given locality within prescribed bounds. It is far better to pay a good round price for just the right lot than to accept land as a gift if it be out of the way.

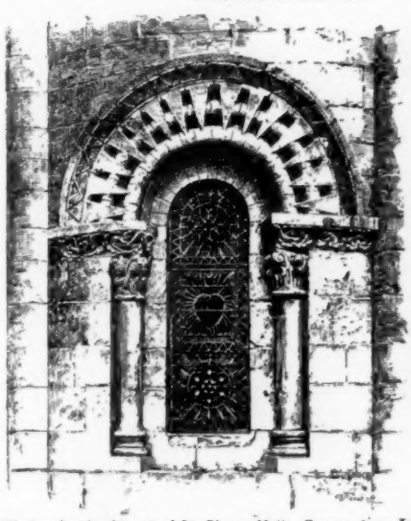
2. The cathedral should be of good size, larger than the usual parish church, and so arranged that in addition to the average congregation a few hundred extra seats can be brought in when emergencies arise. Thus it is probably best to use the aisles as ambulatories in which chairs can be put when there is a crowd.

3. The plans for a complete building should be matured before any part of it is begun, and then only such portions should be built as the people are able to pay for. It would be most absurd to encourage people to run into debt for a cathedral. They must pay as they go.

4. No matter how complete the cathedral may be for purposes of worship and preaching — adequate provision for the social needs of the congregation and their benevolent work must be made. This involves the chapter-house or the guild-hall or parish-house, some detached building where singers may be trained, societies meet, and hospitality be extended.

GEO. W. SHINN.

SEWAGE DISPOSAL OF ISOLATED DWELLINGS AND INSTITUTIONS.[1]



Window for the Church of St. Pierre, Melle, France, from *La Semaine des Constructeurs.*

AT the Rathdown Union, Loughlinstown, County Dublin, great difficulties had been experienced for many years in the attempts to dispose of the workhouse sewage. The pail system had been adopted some time ago instead of water-closets, in order to reduce the quantity of sewage as far as practicable. The laundry water was conducted into a closed tank, from which it was pumped into a cart and carried up by horse-labor to the land at the back of the building; it was here thrown into a large manure heap, where the closet pails were also emptied, and

[1] Extracts from a paper by Mr. W. K. Parry, read April 6, 1892, before the Institute of Civil Engineers of Ireland.

this heap was always very offensive in the summer. But the rest of the slop-water had still to be disposed of, and this is just as foul and offensive as water-closet sewage. It was conducted formerly through a large stone drain into an open pond, between the river and the road, outside the walls of the workhouse. The liquid collected in this pond and percolated through the adjoining gravel pits, gradually making its way into the river. In reality the pond was nothing better than an open cesspool, which in warm weather emitted an intolerable stench. Frequent complaints were made by residents in the neighborhood and persons who had occasion to make use of the road. No public sewer existed near the workhouse into which the sewage could be conducted. The building is situated near the foot of the ground belonging to the union, which rises sharply behind it to the railway, so that any system of sewage disposal by gravitation over the land was impracticable. Several attempts were made to obtain the necessary consent for the construction of a main outfall sewer to the sea, but all these efforts were strenuously opposed by the owners of property and the commissioners of the adjoining township. Eventually the guardians decided to consult Mr. Charles P. Cotton, Chief Engineer to the Local Government Board, and Mr. Cotton recommended that the sewage should be conducted into a closed tank, and then pumped to the high land at the rear of the institution, and distributed over the surface. The guardians adopted his suggestion, and Mr. Parry was engaged to design and superintend the necessary works. In this connection it may be mentioned that the water-supply to the workhouse was obtained from a main by meter, and cost about $500 per year. To save a portion of this heavy annual expenditure the guardians considered that it would be wise to make provision for storing and utilizing the roof-water of the buildings. What is known as the "separate" system of drainage was, therefore, adopted, and two large rain-water tanks were constructed in the airing-yards at the back of the institution. These tanks are thirty-eight feet square and six feet deep, and each tank contains 52,500 gallons. The total superficial area of the roofs is 3,850 square yards, so that one inch of rainfall represents about 18,000 gallons of water. It should be mentioned that all the surface-water from the yards is taken into the sewage-drains, as it was considered that the risk of pollution would be too great to take it with safety into the rain-water tanks. A gravel filter is constructed at the side of each tank, by which the water is filtered on its way to the tank. The water is pumped by a steam-pump into storage tanks at suitable levels, and is used in the laundry and kitchen. A reduction in the consumption of city water has been effected by the storage of the rain-water which amounts to a saving of about $250 per annum.

The sewage-drains are all laid, in accordance with modern practice, on concrete with water-tight joints, in straight lines, with man-holes at each change in direction. All the sewage, with the exception of that from the hospital, is conducted into two underground tanks, each fifteen feet long, ten feet wide, six feet deep, and containing 5,525 gallons. The object of duplicating the sewage-receiving tanks is to enable one section to be cleaned out while the other is in use. Overflow pipes are taken from both sections and conducted to the under-drain from the irrigation-ground. It was not thought prudent to take the hospital sewage into the tanks already described. It is, therefore, conducted into an independent tank in order that it may be disinfected when necessary, so as to prevent the spread of infectious disease. Before the sewage enters the receiving-tank it is passed through strainers, so that the coarser particles and the suspended matter and other elements which are likely to choke the pumps are removed. These strainers are cleaned by the man in charge of the works. The dry-weather flow of sewage is 30,000 gallons per week. It is pumped from the receiving-tank four times a week by a pair of small direct-acting steam-pumps fixed in one of the back yards of the main building, and delivered into the distributing-tank. This distributing-tank is built of concrete plastered in cement and situated above ground at the summit level of the land near the railway. It is also made with a division wall to facilitate cleaning.

When the sewage has been pumped and one section of the distributing-tank is filled, a sluice is opened and the sewage is conducted, by a closed pipe carried in an embankment between the plots devoted to irrigation, to a central sluice-chamber fitted with two sluices by which the liquid can be conducted to either side. The distributing-pipes run right and left from the centre chamber and terminate at a pair of distributing-chambers, each fitted with four sluices and situated at the intersection of four of the plots devoted to irrigation. By opening any one of the eight sluices in the distributing-chambers the liquid can be discharged into any one of the eight plots prepared to receive it. Each of these plots was accurately leveled, and at a depth of about four feet beneath the surface a herring-bone system of agricultural drains was laid, discharging into a central main under-drain connected with an outfall drain. These under-drains are all provided with man-hole chambers to facilitate inspection and cleansing, and a sluice is also fixed on the outfall drains near the distributing-tank. By closing the sluice all the under-drains can be filled and flushed out, and this prevents them getting choked up. The main outfall under-drain is carried down the hill past the hospital, receiving on its way the rain-water from the hospital buildings and also from the lodge buildings. The overflows from the sewage-receiving tanks are also conducted into this main drain. It is carried along inside the workhouse grounds in the front of the buildings for some distance, and it then crosses the road and delivers into the gravel pits near the river. This arrangement insures that all the foul liquid shall be filtered through about four feet of land before being discharged, and the effluent is found to be bright, clear, and free from smell. By subdividing the land into eight plots, and adopting the system of intermittent downward filtration, each of the plots receives its dose in succession, and then enjoys a long interval of rest, so that there is no fear of the land becoming sewage sick.

Part of the irrigation-ground has been planted with osiers, which feed greatly upon the sewage, and flourish under the treatment. Italian rye-grass has also been grown. During 1891, between eight and nine tons of prime hay were saved, which realized about $200, and a sum of $15.25 was received for willows grown on the osier beds. In practice it is found that the quantity of land devoted to irrigation, which is about three acres, is in excess of the requirements, so that so far from the disposal of sewage being any longer a difficulty, the only matter of regret with the master of the workhouse is that there is not sewage enough for the successful cultivation of the land set apart for the purpose. It is probable that in the future the quantity of sewage will be largely increased if water-closets are substituted for the present pails, and it was with a view to this that a large area of land was laid out for irrigation. The works have now been in operation for some years and have given great satisfaction, so that not only has a glaring breach of the Public Health Act been successfully cured, but the sewage and the rain-water of the institution have been fully utilized. The fertilizing value of the former, and the saving of city water by the storage of roof-water, have combined to yield a substantial pecuniary return more than sufficient to pay working expenses. The annual consumption of coal for pumping is twenty tons, and the cost in 1891 was $110. The attendant who has charge of the works has also other duties to perform; the estimated annual proportion of his wages chargeable to the sewage account is $200. The total cost of the works was $15,100.

The second building referred to is Carton, Maynooth, County Kildare, the seat of the Duke of Leinster. The sewage of this extensive establishment formerly discharged into the lake near the house, and as the outfall was close to the carriage-drive, a very filthy and unsightly collection of sludge and rank coarse weeds was formed, which created a great eyesore, and one of the objects of the new system was to get rid of this accumulation. The main outfall drain of the establishment was originally a large stone culvert, about four feet high by two feet six inches wide, and the house drains were either built of brickwork or imperfectly constructed with pipes. A complete new system of water-tight drains was laid down, those outside the building being of fire clay, and the portions under the mansion of heavy cast-iron, with leaded joints. All the drains were properly trapped, intercepted, and ventilated. The original main outfall drain was utilized as a subway for the new pipe, which is laid beneath it and covered over with concrete.

A subsoil drain was also formed beneath the pipe, so that there are really three distinct systems in the culvert. The surface-water in the yards passes down over the concrete bottom above the sewage-drain and with the subsoil drainage is still conducted into the lake. The outfall sewage-drain delivers with a cast-iron bend into an intercepting-tank, plastered inside in Portland cement. A galvanized-iron wire bucket is suspended under the nozzle of the quadrant metal bend, and all the sewage flows through the bucket before it passes into the chamber. All the larger suspended matter which will not pass through the wire meshes is retained in the bucket, which is lifted every day, and the contents are mixed with dry earth and removed. The chamber when full contains 380 gallons, and is provided with one of Rogers-Field's automatic flushing siphons. The outfall drain from the chamber is carried across the stream by an iron pipe, and skirts along the foot of the rising ground until it reaches the land devoted to irrigation. This site is admirably adapted to its purpose. It occupies a secluded position near the lake. It is comparatively level and consists of a porous, loamy soil, the surface being about three feet above the level of the water. The distributing-pipe is of earthenware and runs right and left from the central distributing-chamber; it is fitted with eight sluices, from any one of which the sewage can be discharged. Iron gutters or carriers have been constructed which can be moved about from place to place, and in this way the liquid can be conducted to all parts of the irrigation-ground. The land is materially benefited by the irrigation with sewage; no nuisance whatever has been created, and no practical difficulty has occurred in the working.

The objects in storing the sewage in a tank and discharging it at intervals by a siphon are threefold. In the first place, the available fall from this tank into the irrigation-ground is not sufficient to secure a good velocity of discharge unless this method is adopted. Secondly, by discharging the sewage in a volume it can be readily conducted, owing to its greater volume, to any part of the land under treatment, whereas if it were allowed to dribble out through the sluices it would never reach the more distant parts of the irrigation-ground. Thirdly, the land enjoys an interval of rest between each successive discharge. It must be understood that no cesspool is required in this system. The sewage-tank above described is in no sense of the word a cesspool; it does not permanently retain the sewage, but discharges itself two or three times a day. In order to secure an abundant supply of water for the mansion a turbine was

erected at the waterfall at the end of the lake, and the spring-water found near the lake is pumped up to a concrete tank situated at the top of the tower hill not far from the house. This tank is at a sufficient altitude to command the mansion, and fire-mains are taken from it and laid all around the building. An abundant supply of water is, therefore, always at hand for all domestic purposes. A pressure-gauge is fixed in the steward's office, so that he can always tell the quantity of water in the tank, and give orders to turn on the turbine when necessary. By attaching the fire-hose to the hydrants the sewers are periodically flushed out with clean water, and in this way they are maintained in a most perfect state of efficiency. No difficulties whatever have been experienced since the works were completed in March, 1890; and the cost, exclusive of the internal plumbing was $10,745.

At a house at Celbridge, Kildare, the sewage formerly discharged into a leaking cesspool and overflowed into a ditch. It is now conducted into a distributing-tank. In this case the solids are deposited by causing the liquid to pass under and over a series of divisions in the tank. In this way the suspended matter is thrown to the bottom, and the liquid when it reaches the last section is discharged by one of Adams's automatic flushing siphons into the outfall drain. This drain is carried for a distance of 240 feet through one of the fields near the house. The first pair of cross drains must be filled with sewage before either of the others come into operation. When the liquid rises to a certain level in the stand-pipe it overflows and passes down by gravitation to the second cross-drain, which is similarly arranged, and thence to the third. The object of this arrangement is to secure a complete distribution of the liquid over the land, which is of a somewhat retentive character. As long as the land round the first cross-drain is able to take the liquid it continues to do so; should it become overtaxed, relief is obtained by the overflow, and the second cross-drain comes into operation. This method of distribution has been found to work very well, and it is only under exceptional circumstances that the sewage ever reaches the third cross-drain. In this instance the levels did not admit of the sewage being distributed over the surface of the land, and even the cross-drains are at a greater depth beneath the surface than the author could have wished, but it was impossible to get them up any higher without pumping. Even if the levels had permitted it, it would have been manifestly injudicious to arrange for surface-irrigation in such a conspicuous position close to the dwelling. A liquid-manure pump is connected with the distributing-tank, so that the liquid can be pumped out of it and used for garden purposes. One advantage of this arrangement is that the distributing-tank does not need daily attention, as it will collect the solids for some months before it is necessary to clean it out; but where circumstances admit it the author strongly advocates the arrangement similar to that at Carton, previously described, as the distributing-tank at Celbridge, if neglected for too long a period, will not only become offensive, but the cleaning of it will be attended with considerable amount of smell, and will have to be performed at night time. It was made a condition in this case that some system should be devised which would be practically automatic, and this is the nearest approach to it that the writer could devise.

The fourth case is that of a suburban residence at Terenure, Dublin County. All the sewage of the establishment, and also that of a neighboring house, formerly discharged into an open ditch at the foot of the sloping ground upon which both houses were erected. This ditch was separated from the river by a stretch of level, sandy soil, about 200 feet wide. The sewage lay in the ditch and caused an intolerable stench in hot weather, and, of course, any attempt to continue the drain to the river would have been checked by the sanitary authorities. Sub-surface irrigation was, therefore decided upon. A new system of water-tight drains was laid down, discharging into an intercepting-chamber, designed so as to retain the solids, and fitted with one of Adams's automatic flushing siphons. The special clean-water feed-pipe, which is the characteristic feature of this siphon, was supplied by an independent waste-pipe from a lavatory basin in the house, which was made to deliver into the feed-pipe. From the outlet of the intercepting chamber the outfall drain is carried down to the low-lying land already mentioned. It is then conducted into a number of sub-surface distributing drains. As soon as the intercepting chamber fills with sewage, the entire liquid contents automatically discharge themselves and pass down into the under-drains and from thence to the soil. Between each successive discharge the land enjoys an interval of rest, during which thorough aeration takes place, and the soil is rendered fit to receive another discharge of liquid. The solids which are caught in the intercepting-chamber are occasionally removed by hand. The situation of this house rendered it particularly well adapted for this method of sewage disposal, owing to its elevated position and the possession of a tract of low-lying porous soil, in a secluded position near the river, where the sub-surface irrigation beds have been laid out.

The next instance is similar in many respects to the one already described. The sewage of the establishment of a country gentleman near Oldcastle, County Meath, was formerly conducted through an old stone drain into an open dike near the river, but separated from it by a tract of comparatively level pasture land. When the writer first inspected this house, very little of the sewage made its way into the ditch, as the large stone drain was choked close to the house, and the greater part of the sewage was percolating into a well under the scullery, from which water was daily pumped for household-purposes. Under the new system the sewage is conducted into a large intercepting-chamber situated near the old dike, and fitted with an automatic siphon. The low-lying pasture land is laid out with sub-surface drains, which are constructed with a very slight fall, and each line of drain follows the fall of the ground, so that the average depth beneath the surface is about twelve inches. The effect of the sub-surface irrigation is very well shown. The track of each line of drain is clearly marked upon the surface of the pasture-land by a bright green line of luxuriant grass, nourished, no doubt, by the liquid sewage which is supplied to its roots. Instead of a foul and stinking dike, in which a putrid, seething, and fermenting body of sewage formerly collected, there is now nothing to be seen but a field of pasture-land, and there is no indication either to the sense of sight or of smell that the land in question is literally the sewage farm of the establishment. The land steward, who at first viewed the engineering operations with scepticism and suspicion, has been completely converted, and admits that the sewage problem has been satisfactorily solved.

The last work dealt with is somewhat dissimilar to the preceding ones. The owner of a house at Foxrock, near Dublin, was threatened with proceedings by the sanitary authorities for allowing the overflow from a cesspool to pass into an open ditch beside the road and thus create a nuisance. No ground was available over which the sewage could be conducted by gravitation, nor could the land between the house and the road be utilized for sewage treatment. A concrete tank was, therefore, formed close to the house, into which the sewage was conducted, while a separate system of clean-water drains was laid down to carry off the roof-water, which is still allowed to flow into the ditch already mentioned. The sewage is lifted by means of a hot-air pumping-engine to a height of twenty feet, measured from the bottom of the tank to the distributing-chamber formed in some meadow land at a high level at the back of the house. Here a system of subsoil distributing-pipes has been laid down about twelve inches beneath the surface, and so designed that the liquid flows equally over the entire area under treatment. The solids are deposited in the receiving-tank, and are occasionally removed by hand, and the liquid is partly utilized for subsoil irrigation in the manner just indicated, and can also be pumped into a small tank in the garden and used for manuring the vines and strawberry beds. The engine is managed by the gardener.

The system has been in operation for twelve months, and the total quantity of fuel consumed in that time for the engine has been two tons of coke at $5.50 a ton, equal to $11 per annum for pumping. The sewage receiving-tank is pumped out every second day, and the quantity pumped is 470 gallons. The pump is fitted with a special ball-valve to make it suitable. The engine consists of a cylinder closed at one end by a steel pot, and at the other end by a piston; the steel pot is fixed within the stove, whilst the cylinder is surrounded by a water-jacket. The engine is fitted with a speed governor which may be adjusted by hand, and it is kept at work by the alternate heating and cooling of the air within the cylinder, the air being caused to travel backward and forward by a loose-fitting piston within, which is worked by the engine from the outside by means of a piston-rod passing through the front or driving piston. The air being used over and over again there is thus no exhaust, and there are no valves to wear out or stick fast. The furnace will burn almost any fuel, and the attention required is very simple. The writer trusts that the foregoing examples will afford sufficient evidence to show that the sewage disposal of isolated buildings presents no insuperable difficulties provided the owners are willing to go to the expense of a complete system of works. — *Engineering News.*

HOW THEATRES SHOULD BE CONSTRUCTED.

AT a recent meeting of the Franklin Institute, Philadelphia, C. J. Hexamer read a paper on the subject of "The construction and interior arrangement of buildings designed to be used as theatres," which he illustrated with diagrams and pictures of some of the local theatre buildings. He said:

Ten years ago I read a communication before the Institute "On the prevention of fires in theatres," which was general, applying to the theatres of our country. I have been called upon by your committee on meetings to say a few words on the same subject to-night, but more specifically in regard to local conditions. My remarks ten years ago seemed of sufficient importance to secure the appointment of a special committee, with myself as chairman, to investigate and suggest better features in our American theatres. Although not as much good as we had anticipated resulted from our labors, we at least had the satisfaction of knowing that many of our suggestions were adopted in the rating schedules of underwriters; some, which had been described as impractical by stage-carpenters, have been introduced and are now in daily use in a number of places of amusement.

Allow me to rapidly make a few suggestions which are no longer novel, recapitulating much that I have said on

former occasions, before proceeding to what is new and of local importance. A theatre should consist of four separate and distinct buildings, like the Park Theatre, separated by substantial brick walls rising above the roofs, all communications to be cut off by the best known fire-resisting means. First, there should be a fireproof auditorium, like a fireproof office-building; second, a stage building; third, a fireproof building for dressing-rooms, etc., and fourth, a fireproof storage-room for scenery, properties, etc., with fireproof doors. The proscenium-wall should rise well above the roofs of all the buildings, with an iron girder covered by a good non-conductor, relieved by an arch. The wall should be cut to the stage floor, as in the Academy of Music, and the curtain should be of pure asbestos, with an interior network of strong, woven, pliable wire to give it tensile strength, and sliding in iron grooves on both sides of the stage, securely bolted into the masonry of the proscenium-wall.

All the four buildings should be provided with large, separate exits to the open air. Every part of the auditorium should have separate exits, and never should the exit of one part be allowed to discharge into that of another. All corridors should increase in width from the theatre to the open air. All extra exits (fire corridors) should be marked as such in large, bold letters; should be lighted by oil lamps (not petroleum products, sperm or lard oil is recommended), and should be unbarred from the opening of the theatre until it is closed. Before the close of every performance they should be opened, so that the extra exits may become known to the public. All doors should open outwards (which is still neglected in many concert-club halls). Long rows of seats should not be permitted. Rows should be cut by aisles at short intervals. Movable seats should not be allowed. Seats should be tightly screwed to the floor. Fixed chairs with a spring attachment, which throws back the seats when not occupied, are strongly recommended.

No scenery, properties, materials or impediments of any description should be allowed to remain in the corridors. The fireproof drop-curtain should be kept down at all times except during rehearsals and performances, after which it should be immediately let down, and not raised until a few minutes before the beginning of the next performance. The lowering apparatus should be so arranged that the curtain will be lowered automatically in case of fire. Doors in fire-walls should have stone sills, tin-lined on both sides, constructed according to the underwriters' specifications, without springs or latches, so they can readily be opened. Incandescent electric lights should be used throughout, and all others should be prohibited on a stage. The system of lighting the stage should be separated from that of lighting the auditorium; each should have a distinct circuit. The system should be installed under the direction of the electric-light inspector of the Fire Underwriters Association, and an ordinance should prohibit the use of lights until so approved and the certificate of approval has been issued. Where electricity is generated in the theatre the boilers, engine and dynamo should not be located in the stage building, and lights in stairways should receive their currents from outside independent sources. A large reservoir, the bottom at least ten feet above the highest sprinkler, holding at least 5,000 gallons, should be introduced, always full of water, connecting with the stand-pipes and not allowed to freeze.

Every theatre should be supplied with a sufficient number of fire-hydrants, with hose and nozzles attached ready for instant use and not removable, connected with the tank. The stage and workshops should be fully equipped with an approved system of automatic-sprinklers, connected with two supplies, an approved pump and tank, both of which should be located outside of the stage building. A sufficient number of fire-buckets (used in case of fire only), kept always filled, should be distributed conspicuously over the premises. Every theatre should be connected with the nearest fire-station by electric alarms in the office and on the stage, the latter to be further thoroughly equipped with automatic alarms. Steam or hot water should be exclusively employed for heating. A large smoke-flue should be provided above the stage. Automatic devices are recommended. That the public itself may have control in this matter, a complaint book should be laid open to the public in every theatre, where any individual may enter faults of construction or arrangement which he has noticed. This book should not be the property of the proprietor of the theatre, but should belong to the "theatre-inspector," the fire-marshal and building-inspectors. The workshops and paint-loft should be outside of the stage building.

We all know by experience that any matter which devolves on a number of persons, especially when their time is fully occupied by other duties, is done badly, or not at all. As the old adage has it, "Everybody's business is nobody's business"; therefore, in order to keep control of the various theatres, a theatre-inspector should be appointed, who should have full power to enter a theatre at any moment, and whose duty it should be to see that these or other suggestions, made law by ordinance of councils or an act of the legislature, are faithfully carried out, test fire-appliances, and once a month make a report on each theatre. These reports are to be kept on file, and can be used as evidence against managers, or against the inspector, should he become derelict in his duties.

The only way in which theatres can be made safe is to place them fronting broad streets not less than sixty feet wide, with wide open spaces on both sides not less than twenty feet — thirty would be better in width. Then fire-escapes, which are what the name implies, can be erected, not arrangements the descent of which tests the skill of an acrobat in broad daylight. I believe we have a right to require of our legislators that they prohibit the erection of additional fire-traps. But what shall we do with our present theatres? Force the owners to make them safe as possible by ordinances or acts of legislature, and let the city condemn the requisite adjoining properties, buy them, tear them down, and place breathing-spaces on sides which are now without outlets. — *Fire and Water.*

THE PROVINCE LANDS AT PROVINCETOWN.

THE most important feature of the matter is the fact that, besides the territory thus used and dwelt upon, there remains an area entirely unoccupied, which is estimated at about 4,000 acres, or six square miles. This region embraces and constitutes the extreme end of Cape Cod. About half of the tract is fairly well wooded, being covered by a thick growth of "hard pine" (*Pinus rigida*), oak, maple and other trees, with a dense undergrowth of shrubs and vines. This wooded portion lies nearest the village of Provincetown, and probably contains about two thousand acres. The part nearest the shore, constituting the point of the Cape, appears to be of nearly equal area. It is a region of moving sand, which is blown by the wind into great billows, or irregular ridges, which are every year rolled farther and farther inland toward the village, swallowing and burying the forest as they advance.

I saw maple trees more than twenty feet in height which are entirely covered as they stand, except a few sprouts from the highest branches, by which the tree is struggling to raise its lungs above the suffocating sand. It is a painful spectacle to a lover of trees. The whole of this area of two thousand acres of unstable sand was covered by a pine forest when white men first came to the Cape. This desert is not natural, but was directly created by human agency. The trees were cut away, and much of the space — perhaps all of it — burned over, thus destroying the soil and the mat of vegetable fibres which held it in place. All the conditions which maintained the stability of the surface being destroyed, the sand of the shore began to move inland before the wind; and it has continued to advance with increasing depth, volume, and velocity until now. The stumps of pine trees are still visible where the wind blows the sand away down to the original surface.

Much money has been expended in efforts to stay the progress of this ruinous and resistless tide of sand, but nothing has been accomplished except to demonstrate the futility of the methods employed. The planting of beach grass has been the means chiefly or wholly relied upon to bind the shifting and flowing surface; but it is almost entirely ineffective, owing to the depth and mobility of the sand and the great force of the wind. A ridge or plateau of sand, from ten to twenty feet in depth and several acres in extent, is sometimes removed in a few hours.

I think the whole of this desert area might be reclaimed and rendered stable and productive, and the wooded region defended from further injury; but no effort for these ends can be successful unless the means used are adapted to the essential conditions and requirements of the problem. These have been entirely disregarded hitherto. The work of restoration must, of necessity, begin at the edge of the water, at the place where the wind which moves the sand first exerts its force.

A temporary barrier, or wind-break, extending a considerable distance along the shore, would be required. A hedge or wall, formed of several rows of closely planted cedar saplings, or something of a similar character, would afford the protection needed; and under the shelter of this hedge could be planted such cuttings and young trees as are thought best adapted to growth in such conditions, some species of willow and of poplar, the pitch pine and other suitable trees. One species of poplar grows rapidly, and becomes very large along the streets of Provincetown, where it is absurdly called the "Silver Oak."

The hedge of cedar saplings would not be planted to grow, but it would last a long while, would catch most of the sand that might be raised by the wind between the hedge and the sea, and would afford shelter for the growth of the cuttings and young trees planted at its foot on the landward side.

Only a narrow strip could be thus defended at first, and, therefore, only a narrow strip could be planted at once with any possibility of success. The planting of a broad area at the beginning of

[1] Extract from an appendix to the first annual report of the Trustees of Public (Massachusetts) Reservations.

the undertaking would be entirely unscientific and impracticable. After the young trees of the first narrow strip of plantation along the shore have begun to grow, another narrow belt, on the landward side of the first, can be planted; but the requisite shelter for later strips or belts of planting can be supplied only by the growth of the first belt. The essential requirements for the enterprise would be a small beginning, careful attention to details, unremitting watchfulness and fostering of the young plants, and the extension of the plantations by successive narrow belts. After a beginning is successfully made, short lateral spurs could probably be extended from the base line of the planting at frequent intervals and at various angles. Much time would be indispensable, and great patience and faithful industry.

This State reservation is under the care of a State agent who is appointed by the Governor and Council. He is by law empowered to give permits for the cutting of timber and of sods on State lands. The sods are not of grass, but of the roots of the bushes and shrubs growing on the land; and, when these sods are removed, all the soil is taken up with them, down to the inert sand, which is then blown away by the wind, thus adding to the area of desert. The sods are much desired and much used by the people of the village for "bulkheads," terraces, banks, walls, and many similar constructions. It is almost the only building material available for the people of the village without cost, but it does not belong to them. It is the property of the State, and ought to be protected from spoliation. The removal of the soil is robbery of the most fatal kind.

The State agent appears to be extremely honest and conscientious in wishing to avoid expense to the State in the administration of his office. He grants very few permits. The fee for each permit is one dollar. All fees are turned over to the public treasury, and the agent is allowed three dollars a day for time actually employed in the duties of his office. He told me that, to save expense to the State, he seldom visits the reservation. I think that, as a matter of fact, he gives it no considerable attention, and scarcely ever sees much of its area. As a consequence, people do not take the trouble to apply for permits to cut wood or sods, but take what they want without permission. The reserve is despoiled of both wood and sods without scruple. Many of the Portuguese laborers in the town obtain fuel for domestic uses from the State lands, carrying home the wood on their backs after the regular labor of the day is over; but the native Yankees also contribute their full share to the spoliation.

The proximity of thousands of acres of wooded land, without apparent ownership or efficient supervision, is a perpetual provocation and inducement to theft; and it would have a similar effect anywhere. I have repeatedly observed about the same state of things on Indian reservations in Dakota and Idaho, and on the public domain in the Coast-range region. While this Massachusetts reservation remains unguarded and uncared for, it must continue to exert a demoralizing influence upon the adjacent community.

I think the law relating to the administration of the reserve should be so changed that no cutting of timber for use outside of the limits of the reservation shall be authorized or permitted, and the removal of sods and soil should be entirely prohibited.

The town officers of Provincetown, and other leading citizens, would be glad to see an efficient supervision of the Province Lands established and maintained by the State. There is much talk of various schemes of real-estate men for the use and improvement of this State property as a means of attracting summer visitors and revenue to the village; but the first thing for the people of the State to consider is the need of proper care for the property of the Commonwealth, and the adoption of an efficient system of treatment for the reclamation of the desert area and the preservation of the extensive wooded region which still remains unburied.

So far as can now be understood or foreseen, the advancing sand will in time, if it is left alone, bury the remaining woodland and destroy the village and harbor.

THE NUMIDIAN POMPEII.

UNTIL I went to Algeria last winter, I had no idea of the number and importance of the remains of Roman civilization still existing in North Africa. For instance, I had read of Thamugas as "a city of Numidia, near the Aures Mountains," but had never heard of the interesting discoveries lately made there under the direction of the French Ministry of Education, in consequence of which the title of the "Numidian Pompeii" is not unjustly claimed for this remote border settlement of the Empire of Trajan.

I visited the place on March 7, perhaps a short account of what I then saw may interest your readers. Algeria is now traversed by excellent roads in every direction. We left the railway — to Biskra from Constantine — at Batna Station, and about twenty-two miles from thence noticed a number of short white pillars standing out against the dark side of a not very high hill, with somewhat the effect of a cemetery. An inscription on what looked like a milestone by the wayside intimated that here was an "historical monument, the Roman city of Thamugas," so we turned off by a rough lane across the desolate pasture-land, descended into the deep bed of a brook, which we forded, and, climbing out on the other side, presently found ourselves surrounded by a multitude of hewn stones scattered among the rank herbage. Some massive foundations and pavements, on which rested large Corinthian capitals, denoted the position of one of the city gates; and, farther on, we came to the row of pillars already mentioned. Here was the "street called Straight," the principal thoroughfare, wonderfully well preserved, considering that twelve hundred years have elapsed since it was deserted by its inhabitants.

This African Pompeii was not overwhelmed by a volcano, but gradually desolated by war, and at last burned by the barbarians of the Aures, to restrain whose inroads it was originally founded. Quantities of charred timber were discovered among the rubbish which covered it; but when this was removed, the great stones of the ancient pavement appeared, neatly jointed together, and showing by the tracks of wheels what busy traffic had once passed over it. There was a little ridge raised in the middle, difficult to explain — no marks of horses' hoofs, and none of the stepping-stones at corners so remarkable at Pompeii. A colonnade of monoliths bordered this street on each side. Their bases, raised on steps, are entire, but the tops are all broken off, though some are still twenty feet high. Behind the pillars were low shops, like those in the bazaars of Tunis, lined with marble slabs, and roofed over with earthenware jars made for the purpose, without bottoms, and turned to fit a vault. Many are lying where they fell. The street runs east and west; we turned to the right, or west, to visit the principal monument of the city. This is a triumphal arch, erected by the Decurions of the colony in honor of Trajan, who is called its founder. The principal arch crosses the street, and there are smaller openings at each side for foot-passengers. It is strange to see such beautiful architecture in this wild and lonely region where there are now no dwellings but the tents of Arab herdsmen. However, we have examples of Gothic architecture in England, among the Yorkshire valleys, equal to anything in our grandest cathedrals.

It was the solitary situation of Thamugas that saved it from the fate of Carthage, which served as a quarry to build Tunis and Cairwan. The Corinthian pillars and capitals of Trajan's arch are of singular elegance, and the varied color of the marbles of different kinds, softened by the exposure of centuries to African suns and showers, adds greatly to its charm. Nothing of the kind that I have seen in Rome itself has given me more pleasure. A statue of white marble has been replaced in one of the niches above. There are several tolerably perfect figures remaining at Thamugas, where, in their ancient drapery costume, they seem to represent the vanished population of this *splendidissima civitas*, as it was termed. Antique statues have always more effect among their original surroundings than in modern museums. Near the arch is the *macellum*, or market, a square surrounded by an arcade on columns. The pillars are all fallen, but the stone tables remain in the shops between them.

On a hill behind, surrounded by a sort of cloister (some of the pillars are still erect) is the Temple of Jupiter, the only one in the city. It had been damaged by an earthquake in the reign of Valens and Valentinian, when the magistrates repaired it. But it must have been finally overthrown by another shock, as the enormous fluted drums of its columns, and their elaborately carved Corinthian capitals of great size, lie as they fell. It, one would imagine, might be easily restored. One of the four city churches stood a little below this noble temple. They were all small and of inferior architecture. It is only at Carthage that traces remain of a great basilica like those of Rome. Returning through the Arch of Triumph, we notice a marble fountain, its edges chipped by the frequent dipping into it of bronze and earthenware pitchers. There is no water in the place now, but the Romans had a neighboring stream conducted to it, and when the hills, now so bare, were covered with forests, the two rivulets not far off were better filled than now.

The main street has been cleared to near the east end of the little city, where we can study how the chief civil buildings of a Roman town were arranged. A handsome portico, already referred to, led to the right, into the Forum, a small square, with a pulpit for orators at one side; off this were the Basilica and the Senate House, adorned with curious twisted columns, ending in little darts. The theatre was behind; its seats, excavated in the hillside, are quite perfect, and all the arrangements of the stage, though the pillars of the *scena* have been broken off. The magistrates' chairs, the mosaic pavements, are all in their places, and I could even read a sportive inscription, traced on the floor of the Forum with some sharp instrument: "To hunt, to bathe, to play, to laugh; this is to live." A lazy fellow had added, "to rest"; and another wag, "the life of a duck." As the "h" in *hoc* is omitted, there is a precedent here for the English custom of dropping the aspirant. — *London Spectator Correspondence.*

DISCOVERY OF STONE IDOLS IN NEW MEXICO. — In excavating some ancient Aztec ruins near Chaco Cañon, Governor Prince has unearthed twenty stone idols of a different type from any before discovered. They are circular in shape, forming discs varying from six to fifteen inches in diameter, the upper half containing a deeply carved face, and the lower half rudimentary arms in relief. The idols are believed to be at least 600 years old. — *New York Evening Post.*

COMPARATIVE MUNICIPAL BUILDING LAWS.—IX.

[*Note:*—In these tables bracketed letters invariably refer to preceding passages in the same column.]

Fire Walls.

Boston:—*a. Every Party-Wall* shall be built through and at least 12″ above and distant from roof boarding at every part of roof.

b. Shall be entirely covered with metal securely fastened.

c. Shall be corbelled to the outer edge of projections, or a gutter stone of suitable dimensions and properly balanced may be inserted in place of corbelling.

d. When walls extend 36″ above adjoining roof parapet wall may be omitted.

Baltimore:—*Brick or Stone Buildings*, shall have party or side walls of brick or stone, at least 9″ thick extending from foundations to top of and through roof and be covered with slate or metal, so constructed as to completely intercept all outside and inside woodwork between houses. (Except cornices and store fronts.)

Brooklyn:—Side or Party Walls shall be built at least 6″ above roofing and covered with a coping of stone or metal.

Party or Division Walls roofed with mansards shall be carried at least 3″ above the roof boards and coped with stone or iron or other fireproof material.

Planking or sheathing of roof shall in no case extend over party or side walls.

Charleston:—Partition wall between tenement buildings shall be of brick or stone, not less than 12″ thick, project 14″ above roof and be coped with stone.

Chicago:—*e. Business Buildings over two stories high, with flat roofs*, shall have rear and side walls 2′ above roof, Division and Party Walls 3′ above roof. All such walls not less than 12″ thick with incombustible copings. *With Mansard or steep roofs*, Division and Party Walls to extend not less than 16″ above roofs with incombustible copings.

f. All other buildings with flat roofs, all walls except front walls to extend 16″ above roof with incombustible coping.

g. Not less than 8″ thick.

h. With double pitched roofs to have division and side walls carried up and finished in like manner.

i. Except for flat roofs, walls at eaves shall be carried full thickness flush with upper edge of rafters and the sheathing boards bedded in mortar.

j. Any building not more than three stories high, may have rear wall terminate flush with upper surface of roof, provided the gutter at eaves is of metal or of wood enveloped with metal, with such metal extending across wall covering it and properly secured to roof boards.

Cincinnati:—

Cleveland:—

Denver:—Party-Walls shall be built through, and in dwellings at least 18″ and in other buildings at least 36″ above and distant from roof, be covered with brick laid in cement or by a coping of stone, terra-cotta or metal.

Dwellings in blocks shall have intercepting brick walls not less than 8″ thick topped out as for Party-Walls.

Detroit:—Division-Walls in blocks, shall be constructed of brick, stone or iron, extending from extreme front to back, and at least 30″ above roof.

District of Columbia:—Party-Walls to be built through roof, covering at least 6″ "above the flat of the roof of the highest building of which such build-" ing forms a part for the full extent of the flat and shall be covered by brick "laid on slate, or by a coping of stone or metal, so as effectually to prevent the "connection of the roofing of any two buildings."

Mansard roofs may be constructed without additional thickness of walls and topped out with 9″ walls.

Kansas City:—Party-Walls shall be built through and at least 18″ above roof boarding and where wall projections occur at the ends of mansard roofs, shall be entirely with metal or stone coping securely fastened. (*e*).

Louisville:—(*j*).

Memphis:—Parapet walls must extend above roofs at least 3′ and be at least 13″ thick. The last four courses in good Portland cement mortar and covered 1″ thick with same. Or a coping of stone or terra-cotta may be used to extend at least 1″ over each side of wall and have joists well filled with Portland cement.

Milwaukee:—(*e*). But for "rear and side," read "side."

Front walls may terminate flush with upper surface of roof sheathing, if such front wall have cornice constructed of incombustible material. (*f*); (*h*); (*i*); (*j*).

Minneapolis:—*k. Flat, hip or pitch roof.* Party-Wall shall be carried to a height of not less than 2′ above roof covering at every part of roof.

l. Other kinds of roof. Unless the roof is constructed throughout of fireproof material, the Party-Wall shall be carried to a height not less than 2½′ above the flat or upper slope of roof, and shall extend through the lower slope at least 18″ from and parallel to roof covering.

m. All kinds of roof. Party-Wall shall be corbelled at least 12″ and (*c*).

Nashville:—Side or Party-Walls over 15′ high shall be built up not less than 24″ at lowest point above roof and have coping of stone or metal.

Brick or stone buildings in blocks, with mansard roofs. Fire wall shall extend through roof in front and rear not less than 2′.

Newark:—All walls shall be carried up to planking of roof, to planking of pediments and gables and to the height of cornices where higher than roof.

In all buildings except Dwellings. Party-Walls shall be carried 12″ above roof and have coping of stone or iron.

Mansard roofs not built with fireproof materials. Side or Party Wall shall extend through lower slope at least 6″ beyond and parallel with roof; at least 12″ above upper slope or flat of roof and have coping of stone or iron.

New Orleans:—

New York:—All walls over 15′ high shall be coped with stone or well burnt terra-cotta, except where such walls are finished with cornices or gutters.

Parapet walls shall be carried 2′ above roof except where the building is isolated or is 2′ or more, higher or lower than adjoining building and then the walls shall be carried not less than 1′ above.

Omaha:—Party or Division Walls shall be built through and at least 16″ above and distant from roof boarding at every part of roof; shall be properly coped with metal or other good material; shall project at least 12″ distant from roof boarding in mansard stories.

Philadelphia:—*n*. Party or Division Walls shall extend at least 10″ above the line of roof and be covered by stone or metal, so as effectually to disconnect the roofing or wooden cornice of any two buildings.

o. This does not apply to blocks of not more than two houses having a side-yard to each house, provided they are covered with incombustible material.

Pittsburgh:—(*n*).

Separate shops or tenements in same block shall be separated by such parapet walls.

Providence:—Party-Walls shall be coped with non-combustible material securely fastened or with wood covered by metal. (*k*).

Other kinds of roofs. Unless the roof is constructed of fireproof material throughout, the Party-Wall shall be carried to a height not less than 2′ above flat or upper slope of roof and shall extend through lower slope at least 18″ distant from and parallel with roof covering. (*m*) and (*c*).

St. Louis:—Contiguous houses shall have Division-Wall built entirely of incombustible material carried through roof and topped out at least 1′ above roof.

Walls usually carried above roof, over 15′ high, shall extend at least 24″ above the roof, be coped with stone or iron, or good hand bricks, the last five courses well laid in hydraulic cement mortar.

Party-Walls shall extend 2½′ above roof covering, not less than 9″ thick, coped with stone or iron securely fastened, or hard brick in cement mortar wall pointed.

Flat, hip or pitch roof. Party-Wall shall be carried 2½′ above roof covering at every part of roof.

Other kinds of roofs, on other than Dwellings (*l*); (*m*) and (*c*).

San Francisco:—*Stone or Brick Buildings*, shall have side walls or Party-Walls of brick or stone and those walls and all partition walls shall extend from the foundation and through the roof and shall be so constructed as to completely separate interior and exterior wood work of adjoining buildings.

All walls of buildings 15′ or more high, partition walls carried up, or Division-Walls carrying mansards, shall extend at least 4′ above roof.

Wilmington:—*A continuous line of buildings roofed on a level* shall have not more than two buildings between two fire-walls. The fire-wall shall rise not less than 12″ above roof, not less than 4″ outside cornice, and be built of fireproof material properly secured to building.

Division-Walls shall be carried 9″ thick solid to bottom side of roof boards.

Stone Faced Walls.

Boston:—*a.* Walls may be made with a facing of stone or other approved material.

b. Facing to be tied securely by metal clamps to a backing not less than 8″ of hard brick laid in mortar.

c. The thickness of facing and backing together shall not be less than that required for brick wall of same height.

Baltimore:—

Brooklyn:—*d.* In all walls faced with thin ashlar anchored to the backing, or in which the ashlar has not either alternate headers and stretchers in each course, or alternate heading and stretching courses.

e. The backing shall be of hard burnt brick not less than 12″ thick.

f. Laid in lime or cement mortar, and such 12″ backing course shall not be built higher than height prescribed for 12″ walls.

g. All heading courses shall be of good, hard, perfect brick.

h. The backing in all walls, of whatever material composed, shall be of such thickness as to make the wall independent of facing, and not less than 12″ thick.

i. Each stone used for facing, except where alternate headers and stretchers shall be strongly anchored with iron anchors set at least 1″ into stone.

Charleston:—

Chicago:—*j.* Cut-stone facings shall be backed with brickwork of thickness required where there is no stone facing.

k. Except that if the stone is in great measure self-supporting, or where ashlar is properly bonded into brickwork, the backing may be 4″ less in thickness.

Cincinnati:—*l.* In all buildings over three stories high faced with stone, the backing shall be of thickness specified for walls without facings, except when the stone facing is laid in alternate courses of different thicknesses bonding into backing at least 4″ every 2″ in height, the backing may be 4″ less in thickness.

Cut-stone work must be properly clamped and anchored together and to the backing.

Cleveland:—(*l*).

Denver:—(*a*); (*b*); (*c*).

m. In all walls faced with thin ashlar anchored to the backing, and in which the ashlar has not either alternate heading and stretching courses, the backing shall not be of less thickness than is required for a brick wall, and shall be laid in cement or brown lime-mortar. The backing in all walls of whatever material composed shall make such thickness of wall, independent of facing, at least 8″ thick.

Detroit:—

Ditsrict of Columbia:—*n.* External walls faced with stone shall have a backing of hard brick-work laid in cement-mortar.

o. Stone facing shall be securely tied to backing by suitable iron clamps.

p. Thin ashlar facing shall not be counted in determining the thickness of wall.

Kansas City:—(*a*); (*b*); (*c*).

Louisville:—(*j*), unless the cut-stone facing is self-supporting and anchored to brickwork, in which case the backing may be 4″ less in thickness.

Memphis:—(*j*).

g. The stone ashlar shall be anchored to the backing.

Minneapolis:—Exterior walls faced with stone to have (*b*), (*c*), (*d*). The backing shall not be less than 12″ thick.

Each ashlar stone securely tied to backing by one or more suitable metal anchors.

The backing of all walls, of whatever material composed, shall be of such thickness as to make all walls, the facing of which is less than 4″ thick, the thickness required, independent of facing.

Nashville:—Exterior walls faced with stone (*b*), (mortar to be old), (*c*); (*d*).

Each stone securely tied to the backing by one or more suitable metal anchors let into stone at least 1″, and into the backing at least 8″.

Newark:—All walls that are faced with ashlar or with front brick shall not be less than 12″ thick. All such ashlar or brick facing securely tied to backing with anchors to each course of stone, or with headers to each sixth course of front brick.

New Orleans:—

New York:—(*q*), and the backing, independent of ashlar, shall have thickness required by law. (Sect. 466 and Sect. 477.)

All stone used for the facing of any wall (except where built with alternate headers and stretchers), and known as ashlar, shall be not less than 4″ thick, and strongly anchored with iron anchors to each stone.

Omaha:—(*j*); (*k*).

The backing of all stone ashlar shall be laid with cement mortar.

Philadelphia:—

Pittsburgh:—

Providence:—Exterior walls faced with stone shall have (*b*); (*c*); (*d*); (*e*); (*g*).

Each ashlar securely tied to backing by one or more suitable metal anchors.

St. Louis:—Exterior walls faced with stone shall have a backing of not less than 9″ of hard brickwork laid in cement mortar. (*c*).

Stone facing securely tied to brick backing by iron clamps.

San Francisco:—(*d*). The backing of brick shall not be less than 8″ thick, laid in cement mortar, and not built to greater height than prescribed for 8″ walls. (*g*); (*i*).

Wilmington:—

Wall between Timber Ends.

Boston:—*a.* Roof and floor timbers entering opposite sides of party-wall shall have 4″ solid brick-work between ends of beams.

Baltimore:—*b.* Party and side walls shall completely intercept all inside or outside woodwork between houses.

Brooklyn:—*c.* Timbers entering opposite sides of masonry walls shall have ends separated a distance of at least 4″, except that in 8″ walls the butts of beams shall be cut to on a splay of 2½″ in their width.

Charleston:—

Chicago:—(*a*); also when such timbers enter division walls.

Cincinnati:—*d.* Timbers in party-walls shall be separated from each other by not less than 4½″ of solid masonry.

Cleveland:—(*d*).

Denver:—*e.* Floor timbers entering opposite sides of party-walls shall have at least 4″ bearings therein, and be separated by at least 4″ of solid brick-work,

f. Or other approved fire-stop.

Detroit:—(*a*); also where such timbers enter division walls.

District of Columbia:—(*e*).

Kansas City:—(*a*).

Louisville:—

Memphis:—*Stone, brick or iron buildings.* Timbers entering opposite sides of party-walls shall be separated by at least 8″ of solid mason-work.

Milwaukee:—(*a*); also those entering division walls.

Minneapolis:—Roof and floor timbers entering opposite sides of wall shall have at least 4″ solid brick-work between ends of timbers.

Nashville:—(*a*), with mortar well grouted or slashed in between ends of timbers and brickwork.

Newark:—

New Orleans:—

New York:—*Stone, brick or iron buildings.*

g. Timbers entering opposite sides of party-walls shall have ends separated by at least 4″ of solid mason-work.

Omaha:—(*a*); also where such timbers enter division walls.

Philadelphia:—*h.* Ends of all joists of adjoining buildings shall be separated by an interposed brick and grouted with mortar.

Pittsburgh:—(*h*).

Providence:—(*a*).

St. Louis:—

San Francisco:—(*g*).

Wilmington:—*In division walls*, the joist ends shall be not less than 1″ from the centre of wall; joists, beams or rafters from two buildings shall not butt or touch, and the space between the ends shall be entirely filled with good mortar or with slate, so as to prevent the passage of fire.

OLD-TIME PROCESSIONS AND PAGENTRIES.

In the old days, when the people of England and of other European countries had less done to amuse them than now, and, consequently, had to do more to amuse themselves, there used to be between the great festival of Whitsuntide and the Midsummer Day, which all who have ever been children and readers of fairy-tales remember with affection, certain other days of feast and merriment, less notable, perhaps, but still worthy of note. The chief of these was the day of Corpus Christi, sacred in the Church to the doctrine of transubstantiation. The day fell, and, of course, still falls on the Thursday after Trinity Sunday, which, in the present year, will be Thursday of this week. Trinity is the Sunday after Whitsunday; that is, the eighth after Easter, or, in other words, to-day.

This day had some peculiar customs of its own, and, perhaps, never any more curious than one which prevailed in the latter part of the seventeenth century at a place called Newnton, in North Wiltshire. King Athelstan once gave to this town a common and a house for the hayward, and the little ceremony of Trinity Sunday was in commemoration of this gift. It may be well to explain that the hayward was the man employed to keep a watchful eye over the animals pastured on the common.

On Trinity Sunday the parishoners used to go to the hayward's house and knock on the door three times, in honor of the Trinity. When they had been admitted prayers were read, and then a garland of flowers was brought forward by a young girl of the parish, who wore it on her neck. Then a fortunate young man of some other parish kissed the girl three times, in honor of the Trinity, whereupon she put the garland on his neck and kissed him three times. He then put the garland back on the girl's neck and kissed her three times more. Finally, he took it from her again and gave her, at least, a penny. It must have been felt that this was merely a nominal price for the youth to pay, for the old account says that he often gave more, and sometimes as much as 2*s.* 6*d.* The purchasing power of money was, indeed, large in those days.

Corpus Christi was a day of processions. The host was borne through the streets in state for the reverent admiration of the populace, and it was followed by representations of such saints as could be most picturesquely presented. There were St. Ursula and her eleven thousand virgins, or as many of them as there were people at hand to play the parts, and this company must have been in itself a most attractive part of the procession. St. George, always such a popular favorite, pursued the dragon; St. Christopher carried the infant Christ on his shoulder, as when he bore Him across the swollen and rushing stream and won his title to saintship. St. Sebastian, with his body stuck full of arrows, was there, and so was St. Catherine, with her wheel, and many more. In many places where there were not such elaborate processions as these people went about the streets and strewed sweet herbs before the doors. The custom of processions at Corpus Christi still survives to some extent, and in some of the Roman Catholic churches of this city the services for the Sunday after Corpus Christi, commonly spoken of as the Sunday within the octave, include processions more pretentious than the usual ones. These will, of course, occur one week from to-day.

Miracle plays, which in England as in other countries, were common on various church festivals, were especially so on Corpus Christi. In an article published in these columns a week ago an account was given of the Chester plays, which were performed a few days earlier, at Whitsuntide. Some part of what was said of those plays would apply to all. The plays second in importance to those of Chester, or perhaps even equal to them, were those of Coventry, which were given on Corpus Christi. Like the Chester plays, they covered the whole of the Bible history, but they contained more from the apocryphal books and the legends of the Church than the exhibitions at Chester. The editor of Hone's "*Every Day Book*" thinks that this was because the monks who made them, a considerable time after the Chester plays were written, tried to offset the labors of Wycliffe in translating the Bible and spreading the knowledge of it among the people by introducing foreign elements and confusing the popular understanding of it. But on a sober and impartial view this explanation seems far-fetched and unnecessary. The two sets of plays were probably different simply because they were made by different men and at different times. It pleased the authors of the one to confine themselves to the Scripture narrative, while the authors of the other chose to use all the material that they had at their own discretion.

The Coventry plays were acted by the Gray Friars. The theatres were on wheels, that they might be moved about to various parts of the town, and they were probably much like the pageants used at Chester. The performances drew people to see them from far and near, and sometimes people of consequence, for in 1483 King Richard III came to witness them, and in 1492, 400 years ago next Thursday, King Henry VII and his Queen were present. Miracle plays were also done on this day at Newcastle-upon-Tyne, and here they were acted by trade guilds, as at Chester. But they seem to have been single plays, performed by single guilds, instead of a great series as at Chester. They never had any importance approaching that of the Chester or Coventry plays.

The tradesmen of Shrewsbury, instead of acting Scriptural plays, had a great show on the second Monday after Trinity Sunday. In a place at the south of the town, called Kingsland, they had buildings erected, one for each guild, called harbors or arbors, fitted with tables for eating and drinking, and some of them decidedly fine in architecture and decoration. The guilds marched thither in procession and spent the day in feasting. In the procession each guild had its distinguishing pageant. That of the shearmen represented King Edward VI or Bishop Blaise, that of the shoemakers their patron saints, Crispin and Crispinianus, that of the tailors Queen Elizabeth and Adam and Eve, who were conceived to be the first who followed the tailor's trade. The butchers had a "Knight of the Cleaver," the barber-surgeons and weavers displayed St. Catherine with a spinning-wheel, though the wheel appropriate to St. Catherine is one intended for torture; the bricklayers, carpenters and joiners chose to be represented by King Henry VIII, the hatters and cabinet-makers had an Indian chief for their emblem, and the bakers had the goddess Ceres or Venus. A stag and a party of hunters represented the skinners and glovers, while Vulcan, dressed in armor, stood for the smiths, and a horse for the saddlers. In some of these cases the emblems have obvious connection with the trades for which they stand, and in some they seem altogether arbitrary.

Chambers's "*Book of Days*," published in 1866, from which the account of the Shrewsbury show is condensed, speaks of it as still going on in a degenerate way, and describes the show as it appeared in 1860. Kingsland was then becoming a favorite place for fashionable homes, and the utter decay of the show was already predicted, though a few of the old arbors were still standing. Various attempts to revive the old glories of the show have been made, but without success. When the spirit of an institution is departed it is hard to keep its form from corruption.—*N. Y. Tribune for June* 12.

MORE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE CENTURY CLUB, THE RACQUET CLUB, MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS: AND ACADEMY OF MEDICINE, MR. R. H. ROBERTSON, ARCHITECT, WEST 43D ST., NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR FOR 1891, MR. ALBERT KAHN, DETROIT, MICH.

[Issued with the International and Imperial Editions only.]

ITALIAN DOORWAYS (TWO SHEETS) SKETCHED BY MR. W. T. PARTRIDGE, ROTCH TRAVELLING-SCHOLAR, BOSTON, MASS.

[Issued with the International and Imperial Editions only.]

HOTEL AT PASADENA, N. J. MR. EDWARD CHESTRE SMITH, ARCHITECT.

THE hotel is to be located at Pasadena, a new resort just below Lakewood, N. J., and will be 315 feet frontage, with two wings forming a hollow square, in which a small opera house may, in the future, be built, entered through the wing shown in drawing. In this space also there is the unique feature of the hotel, a separate building for the whole domestic department, in all its branches, and in connection therewith a fireproof tower, containing all engines, boilers for heating and lighting, dynamos, etc., and having a tank at the top ninety feet high, to furnish complete fire-service through the hotel, all of which is dominated by this tank, except the two fireproof upper stories of main tower which are above this line. Contracts not yet let, so cost is not definitely determined.

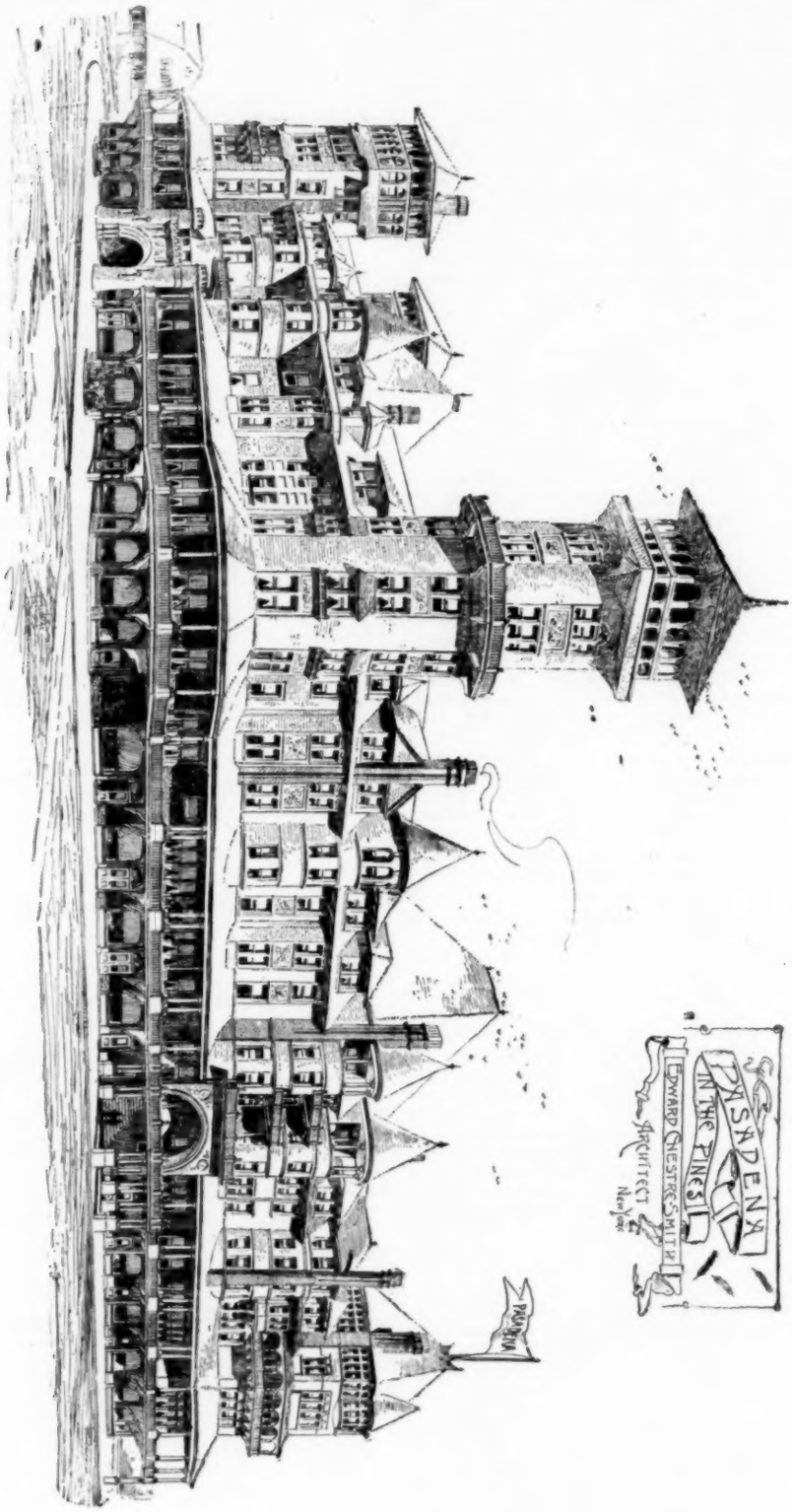
UNITED BANK BUILDING, PORTLAND, OREGON. MR. I. HODGSON, ARCHITECT, PORTLAND, OREGON.

PACIFIC MUTUAL INSURANCE COMPANY'S BUILDING, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

HOUSE OF DR. H. M. HOBART, CHICAGO, ILL. MESSRS. J. M. VAN OSDEL & CO., ARCHITECTS, CHICAGO, ILL.

CHURCH NEAR NEW WESTMINSTER, B. C. MESSRS. TRIPP & MILLS, ARCHITECTS, VANCOUVER, B. C.

BUILDING AT THE CORNER OF MICHIGAN AND MILWAUKEE STREETS, MILWAUKEE, WIS. MESSRS. ANDREWS, JAQUES & RANTOUL, ARCHITECTS, BOSTON, MASS.


PASADENA
IN THE PINES
EDWARD CHESTER SMITH
ARCHITECT
New York

[**Additional Illustrations in the International Edition.**]

SOUTH TRANSEPT DOORWAYS, ST. MARTIN'S CATHEDRAL, YPRES, BELGIUM.

[Gelatine Print.]

THIS building dates from 1221–54 and the portion here shown is held to be its finest exterior feature.

THE RATHHAUS, WIESBADEN, GERMANY.

[Gelatine Print.]

A WELL AT COURTRAI, BELGIUM.

[Copper-plate Etching.]

INN AT FORTINGALL, PERTHSHIRE. W. DUNN & R. WATSON, ARCHITECTS.

CHURCHCROFT, PUTTENHAM, NEAR GUILDFORD. HALSEY RICARDO, ARCHITECT.

TURKISH BATHS, CORK.

THE baths have been recently built, and are giving satisfaction in every particular. The heating is effected by a system of hot air introduced at one end of the hot rooms, and drawn off by suitable flues at the other end, thereby securing the most perfect ventilation. The rooms are lined all around with glazed brick and terra-cotta, supplied by Mr. J. C. Edwards, of Ruabon. The coved ceilings are formed in plastering attached to punched iron plates instead of wood laths, and backed with silicate cotton to keep in the heat. All the water engineering and laundry work was carried out by Messrs. Bradford, of Manchester, the general contractors being Messrs. E. & P. O'Flynn, Cork. Mr. Arthur Hill, B. E., F. R. I. B. A., of Cork, is the architect.

THE ROMAN FORUM.

THE Forum Romanum at present can hardly be said to correspond with Prout's drawing. The remains of the great structures are, of course, unchanged; but between them there is no such rough and irregular piece of ground as he represents. It is now made apparent that in the palmy days of Rome the Comitium and Forum displayed as little of the earth's surface as Trafalgar Square. There are many advantages in the new arrangements, for it becomes plain that the public places of Rome were overcrowded with buildings and memorials. But one effect is that painters no longer select the Forum as a subject. There are few public galleries in Europe which are without *A Scene in Rome*, which is in most cases a representation of the Forum. The contrast between the earth that was covered with weeds and the stately structures, the absence of all association between the washerwoman who utilized the place and "the breed of noble bloods" that ruled the world from the Forum, gave a pathos to the spot which few landscapists were able to resist. Prout's stay in Rome was limited, but he also could not refrain from trying in his own way to record the appearance of a spot which was not without its influence on the history of his country. There were still enough degradations to be seen, but a few years earlier the Forum was in a worse condition. The middle opening of the triumphal gate of Septimius Severus was, for instance, filled up to the crown, and was used as a pottery, and the Tabularium as a prison.

It would take a volume to describe the controversies which have arisen since Prout's time over the identification of some of the ruins which he has delineated. We have no means of knowing the theories that were held by his guide, but the following translation of a description which appeared about the time Prout was in Rome may enable us to understand under what titles the buildings were introduced to his notice:

The Forum, the illustrious spot in the universe, became the ignoble Campo Vaccino; antiquarians had restored its noble name without changing its destiny. The lowing of oxen was heard where the magnificent language of the Roman orator once resounded, and for all but simplicity of manners one might say, as in the time of Evander: —

Passimque armenta videbant
Romanoque foro, et lautis mugire carinis.

The rostra were in the centre till Cæsar had them removed to the corner near the velabrum. The excavations of the Forum begun by the French administration, which cleared the principal monuments, have been since resumed and carried on with intelligence and activity, and while other capitals are increasing by new edifices and buildings, Rome is enlarged and embellished by the discovery of its antique ruins. The monuments in the Forum were crowded and confused, not having the clear open space considered indispensable before modern monuments. Descending towards the Forum, we pass under the vast substructions of the tabularium, the only considerable building prior to the emperors now remaining, the sole State edifice of Ancient Rome, and one of its most majestic monuments, the archives in which the senatus consulta and other public acts were kept on tables of bronze, the brazen diplomas of the grandeur of the imperial people. The stern arches of the tabularium, of travertino and peperino, seem in analogy with the harsh government and policy of republican Rome: —

Nec ferrea jura
Insanumque Forum, aut populi tabularia vidit.

The Temple of Fortune, for a long time supposed the Temple of Concord, according to a learned German antiquary, is the *Juliana* basilica. It is composed of fragments of divers epochs, some of the best days of art, but the plan belongs to the decline.

The same antiquarian, whose authority does not appear infallible, sees the wreck of a Temple of Saturn in three elegant columns of the Temple of Jupiter Tonans, erected by Augustus after his preservation from lightning, which fell one night near his litter in the Spanish war. The Temple of Concord, in which Cicero assembled the Senate during Catiline's conspiracy, was burnt under Vitellius, rebuilt under Vespasian, and burnt again in the Middle Ages. It is now a shapeless ruin, of no interest but for its associations.

The majestic but heavy arch of Septimius Severus announces the epoch of decline. It was erected, as the inscription states, by the Roman Senate and people to Septimius Severus and his sons Caracalla and Geta, in memory of the victory over the Parthians, Arabians, and the inhabitants of Adiabena. Geta's name was effaced after his death by his barbarous brother, a fact opposed to the hypocritical apotheosis which he decreed him.

The name of Phocas has also been obliterated from his column by his successor, Heraclius. This column to a tyrant has but little interest near the noble theatre of Roman liberty. In style, it appears long prior to Phocas, and must be of the epoch of the Antonini. The exarch Samaragdus probably took it from some edifice to consecrate it to his master.

The three superb Corinthian columns, said to belong to the Temple of Jupiter Stator, most certainly never formed part of that edifice. In 1828 and even in 1830, it was the opinion of antiquaries that they belonged to a Græcostasis, a building for the reception of ambassadors from the great Republics and other allied nations, where they attended the deliberation of the Forum or awaited an audience of the Senate — a vast diplomatic tribune, thus named from the Greek ambassadors sent by Pyrrhus, the first ever received at Rome. The old building had perished, but it was magnificently rebuilt by Antoninus Pius on the same spot of the former pretended Græcostasis.

The ancient Curia Hostilia, where the Senate assembled, erected by the third King of Rome, whose name it took, was rebuilt by Augustus, who gave it the surname of *Julia*, in honor of Cæsar. These wrecks consist of three well-built walls, in the middle of the south side of the Forum. Between the Curia and Comitium stood the famous fig-tree called *ficus ruminalis*, under which, according to a pious and patriotic tradition, Romulus and Remus were suckled by the wolf, and thus named from the word *Ruma* (teat), a sacred symbol of the empire and eternity of Rome.

On beholding the pavement of the Via Sacra, recently discovered, I can fancy we see Horace advancing, as he was wont, plunged in his trifling reveries: —

Ibam forte via Sacra, sicut meus est mos,
Nescio quid meditans nugarum, et totus in illis.

And our thoughts dwell with pleasure on that charming scene of Roman manner, without any trace of Greek imitation, so generally prevalent in Latin poetry and philosophy.

The Temple of Antonius and Faustina, erected by the Senate, shows the magnificence and arrangements of antique temples. The ornaments on the frieze and of its six columns of cipollino, the largest known of that brilliant marble, are esteemed as classic models of taste. The elegant Temple of Romulus and Remus is still remarkable for its bronze door, still retaining the fastening, a curious monument of ancient lock-work. The three majestic arcades, said to belong to the Temple of Peace, the subject of hot disputes among antiquarians, are more probably part of the basilica erected by Constantine after his victory over Maxentius. The Temple of Venus and Rome was planned by Adrian, a Cæsar architect, still more jealous of his architect Apollodorus, whom he put to death, than of the Emperor Trajan.

The Arch of Titus was erected after his death by the Senate and the people. The two principal basso-relieves are the best Roman works known; one represents Titus on a triumphal car conducted by an allegorical figure of Rome; the other, the captive Jewish soldiers, the table, the seven-branched golden candlestick, and other spoils from the Temple of Jerusalem. When we remember that the city was utterly destroyed by Titus, he seems little worthy his surname, "the delight of mankind," which he would never have obtained in a really civilized age. It is most remarkable that the least injured of the monuments of ancient Rome, viz, the Coliseum and the Arch of Titus, should be connected with the early history of Christianity.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

GLASS BUILDING-BLOCKS.

HARTFORD, CONN., June 6, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please inform us where we can get information, prices, etc., of the glass building-blocks mentioned in your editorial of current issue on page 142, and oblige,

Yours truly, CURTIS & JOHNSON, *Architects.*

[ADDRESS H. Mayer & Cie., Kommandantenstrasse 36, Berlin, S, asking for prices, etc., of the "Falconnier" Glass Building-stones. The circular

sent us says that they are patented in the United States, but we have not yet heard of any American representative of the manufacturers. — Eds. American Architect.]

LOG HOUSES.

Albany, N. Y., June 8, 1892.

To the Editors of the American Architect: —

Dear Sirs, — Could you give me any information as to the methods used in building the log club-houses or "Camps" which are becoming so popular in the Adirondacks now. I have looked through the advertisements of books in the *American Architect*, but fail to find any mention of books or catalogues on the subject. If you can refer me to any book or could give me any information on the subject, you would greatly oblige me.

Yours very truly, Frederic Van Wormer.

NOTES AND CLIPPINGS

The Measurement of High Temperatures. — At a recent meeting of the Institution of Civil Engineers, a paper was read on "The Measurement of High Temperatures," by Professor W. C. Robert-Austen, C. B., F. R. S. The author pointed out that there were many operations incidental to the work of the engineer involving the use of high temperatures which should be accurately measured, because a difference of 20 deg. at a "bright red" heat might be of vital importance to the success of an operation. The object of the paper was to show that such measurements could be readily and accurately effected. It appeared that little was known as to the methods of measuring high temperatures until the time of Wedgewood (1781), and that a period of renewed activity in the line of investigation began with the work of the late Sir W. Siemens in 1861. The author did not attempt to give the history of pyrometric methods, but from all the various appliances which had been devised, a few modern ones were selected, the use of which was justified by experiment. These depended on the measurement of heat (*a*) by the aid of electricity, or (*b*) by optical methods. Siemens, and more recently Callendar, has shown that very trustworthy results might be obtained by employing the increased resistance of a platinum wire, due to heating it, as a measure of the temperature to which the wire was raised. On the other hand, Professor H. Le Chatelier had perfected the use of thermo-junctions, the electrical equilibrium of which was distributed by heat, and the measurement of the difference of potential thereby produced, afforded a means of ascertaining the temperature to which the junction was subjected. The author then described at length his method of rendering the indications of the Le Chatelier thermo-junction self-recording, and he proceeded to show what degree of confidence might be placed in the measurement of high temperatures, incidentally comparing the testimony afforded by an air thermometer and by a thermo-junction as to the temperatures of highly heated bodies. The meeting points of gold (1,045 deg. C.) and of palladium (1,500 deg. C.) were measured by the aid of a thermo-junction, a spot of light from a galvanometer with which the thermo-junction was connected, traversing a scale thirty feet long. Electric pyrometers, were, however, in the author's opinion, too costly, and were not sufficiently simple for daily use in works, and it was fortunate, therefore, that a less complicated instrument of sufficient accuracy had also been furnished by Le Chatelier, who had thereby increased the debt due to him by the scientific and industrial world. His new optical pyrometer, based upon the photometer of Cornu, was described at length, and a series of measurements of high temperatures made by its aid in the furnaces of the Royal Mint and in various metallurgical works in this country and on the Continent were given. The author then dealt with the question of pyrometry from the point of view of the special needs of the engineer, and the paper concluded with an appeal to practical men to do all in their power to foster scientific investigation. — *Invention.*

Local Transportation in London. — The public transportation of passengers in London is carried on by omnibuses, tramways, steamboats, railways and cabs. Omnibuses are owned by twenty-three companies, the two principal ones being the London General Omnibus Company (limited) and the London Road-Car Company (limited). These omnibuses are drawn by horses, and are usually arranged to seat twenty-six passengers, fourteen outside and twelve inside. There are about 2,100 of these vehicles in use. The two large companies mentioned carry about 70,000,000 passengers a year, each omnibus earning from $75 to $80 a week. There are ten tramway companies, eight using horses for the motive power, one using stored electricity and one being a cable line. There are about 950 cars in use on these lines. One company, the Victoria Steamboat Association (limited) having entire control of the business, runs steamboats for the traffic up and down the Thames River. Of railways, there are three underground, two using steam for motive power and one electricity, and seventeen surface railroads running out of London which carry passengers by very frequent trains to and from the suburbs, which extend in all directions some fifteen miles from Charing Cross. Cabs, of which there are about 7,500 two-wheeled vehicles, or hansoms, and about 4,000 of what are known as four-wheelers. These are much used in the central part of London. — *J. C. New, U. S. Consul-General.*

Durability of Wood. — The problem has puzzled many why two pieces of wood, sawed from the same section of a tree, should possess very varied characteristics when used in different positions. For example, a gate-post will be found to decay much faster if the butt end of the tree is uppermost than would be the case if the top was placed in this position. The reason is that the moisture of the atmosphere will permeate the pores of the wood much more rapidly the way the tree grew than it would in the opposite direction. Microscopical examination proves that the pores invite the ascent of moisture, while they repel its descent. Take the familiar case of a wooden bucket. Many may have noticed that some of the staves appear to be entirely saturated, while others are apparently quite dry. This arises from the same cause; the dry staves are in the position in which the tree grew, while the saturated ones are reversed. — *Timber Trades Journal.*

American Arid Lands. — The extent of arid lands within the boundaries of the United States is greater than is generally supposed. According to a recent report of a Committee of the House of Representatives the arid regions, including the semi-arid plains, embrace 1,340,000 square miles, of which about one-fourth lies in the great plains region east of the Rocky Mountains; another fourth in the Rocky Mountain belt, not more than one-third of which is arable; three-eighths in the great basin and plains region between the Rocky Mountains and the Sierra Nevada, about one-half of which is arable; while the remaining one-eighth, lying in the ranges of the Sierras, is in the main rocky and incapable of cultivation. — *Engineering.*

BOOKS AND PAPERS

The phenomenal abundance of money in nearly all financial circles induces predictions of speculative activity later in the season, which, it is predicted, will manifest itself in an expansion of land values, of new industrial enterprises, of increased railroad building, and in the inauguration of a multitude of new enterprises which usually are pushed when money is plenty and low. These anticipations may possibly be realized, but there is a drawback; namely, that consumptive demand, for some reason or other, is lagging, and the producing interests have as much as they can do to prevent overproduction. There is something wrong in the commercial world, and nowhere is there any intelligent explanation of the cause or remedy. The facts in the commercial world can be very briefly summarized: there is moderate activity, low rates for money, which is easily obtainable in ordinary channels, but difficult to obtain outside. The exports of gold for the past week were $1,650,000; exports for two weeks, $3,000,000. Wheat exports were one-third larger than for same week last year. The textile manufacturers are quite busy, and a rapid distribution of goods is in progress, and will probably continue. Railroad earnings show increased traffic. The increase in the volume of business this year so far foots up nearly thirteen million dollars over same time last year, or six per cent. The production of iron has fallen off slightly, and a further decline is probable, owing to low prices, sharp competition and a generally lagging demand. Stock-brokers generally look for an improving demand and higher prices in stocks after the first of July. Several good reasons could be assigned for these probabilities: prices have been unusually low for six months, in fact, for the entire year; many causes have prevented a reaction, and it is possible that other causes may arise to prevent a general improvement, but far beneath the surface there are influences at work that must in time show themselves in an expansion of railroad traffic, building activity, improvement in the iron trade and, in fact, in a general expansion of trade and consequent improvement in prices. Returns from Far Western markets are quite encouraging, and show that while there are discouraging influences at work farther East, there is much to encourage in the West. A part of this activity is due to increased output of gold and silver mines. A large amount of capital is being invested in the Rocky Mountain region. Whatever improvement in railroad-building is done is likely to be done there. Lumber is in very active demand in this locality, and a good many circumstances point to a very rapid growth of business in the States and Territories in the Rocky Mountain region. Evidence of activity in that locality is the demand for small machinery and equipments; in fact, the improvement extends over the entire region west of the Mississippi, although more marked in the region referred to. Electrical and mechanical engineers are authority for this statement, and the manufacturers of equipments of all kinds have received within the past two months a larger amount of business from this region than for the preceding six months. In fact, from all indications that can be relied upon, it looks as though an unusual and decided activity in mining, in industries, in agricultural and in irrigation enterprises was about setting in.

In the Southern States there is less to encourage, but while the distribution of cotton is less than last year, at this date, the condition of the cotton growers is improving; a great many are holding cotton for better prices, but in this they are probably wrong. Quite recently a stimulus has been given to the establishment of new enterprises with small capital in those States. The lists of announcements of new works is increasing. Pig iron manufacturers are selling all the iron made. The distribution of lumber is also satisfactory, and a good many new mills have been begun this season. The booming of towns has been discontinued, and industries in the South are now in a great many instances on a better basis than last year. Reports from Savings Banks in New England and Middle States show an increase in deposits without the corresponding demand for funds. Reports from Building and Loan Associations both East and West show a moderate accumulation of funds over last year due to a slight decrease in demand. Statements from Banking authorities seem to indicate the probability of a heavier demand for funds with the early opening of Fall trade. The abundance of money should be understood to be confined to the ordinary channels of borrowing. The smaller industries have felt a slight improvement in demand on small orders; the characteristic of the market just now is small orders for early delivery. This applies to all the industries of which any reliable reports can be received. There is talk of speculative movements in certain lines of railway securities, but it is probably erroneous, as conditions are against artificial values. Foreign investors in American securities are loath to make rash or indiscriminate purchases of American bonds, but there is a growing confidence on the other side which will, no doubt, be felt within the next few months, and exhibited in a larger demand for good securities. The month of June has not developed the volume of business that was predicted very confidently during the Spring, neither have building operations come up to expectations. Production is very carefully guarded, and the industries are under good control. The danger of large stocks is being avoided. The coal trade is in excellent shape in all sections of the country. Slight reductions continue to be made in railway traffic for the higher classes, but not on the finer classes ranging from 1 to 3.

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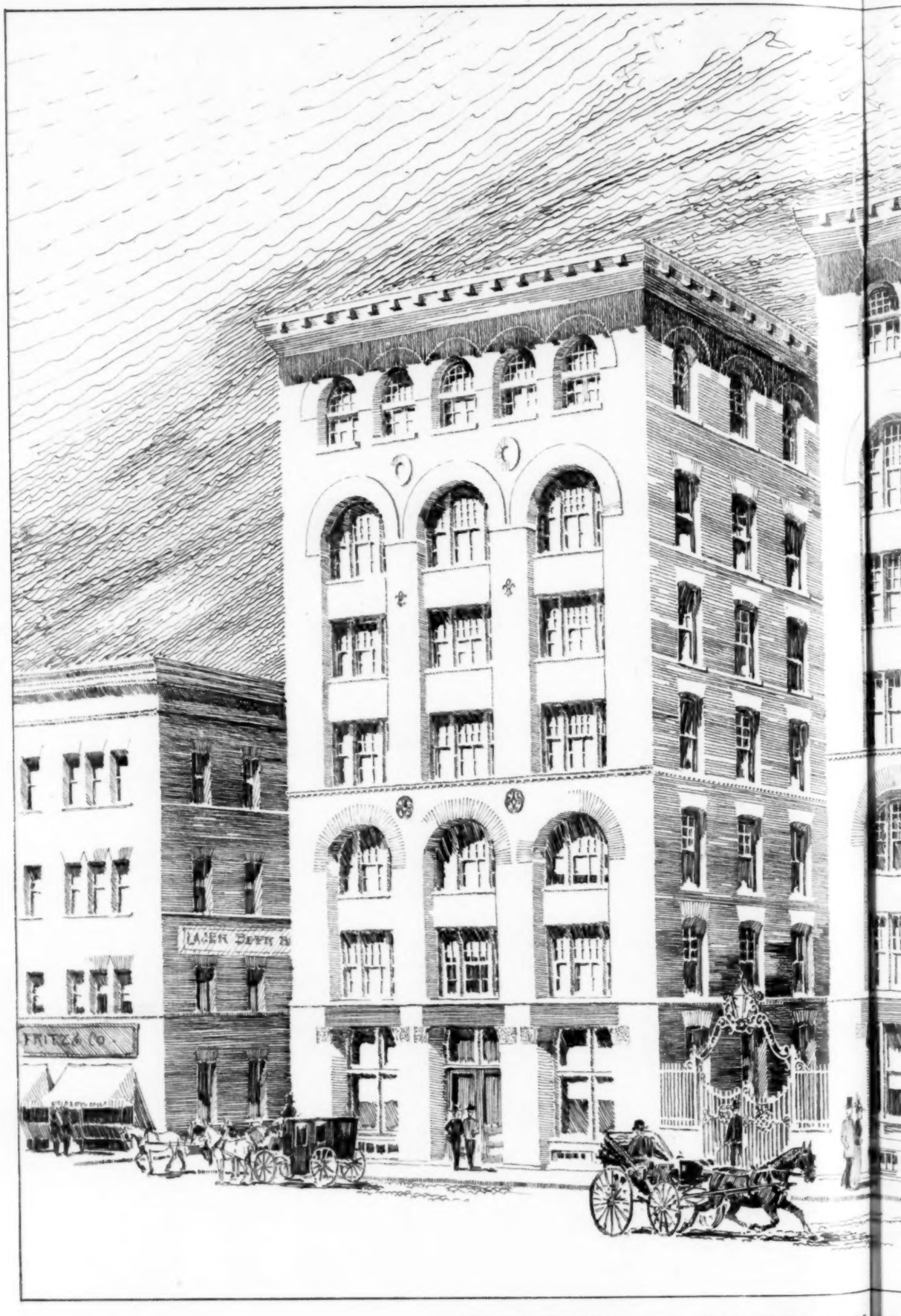

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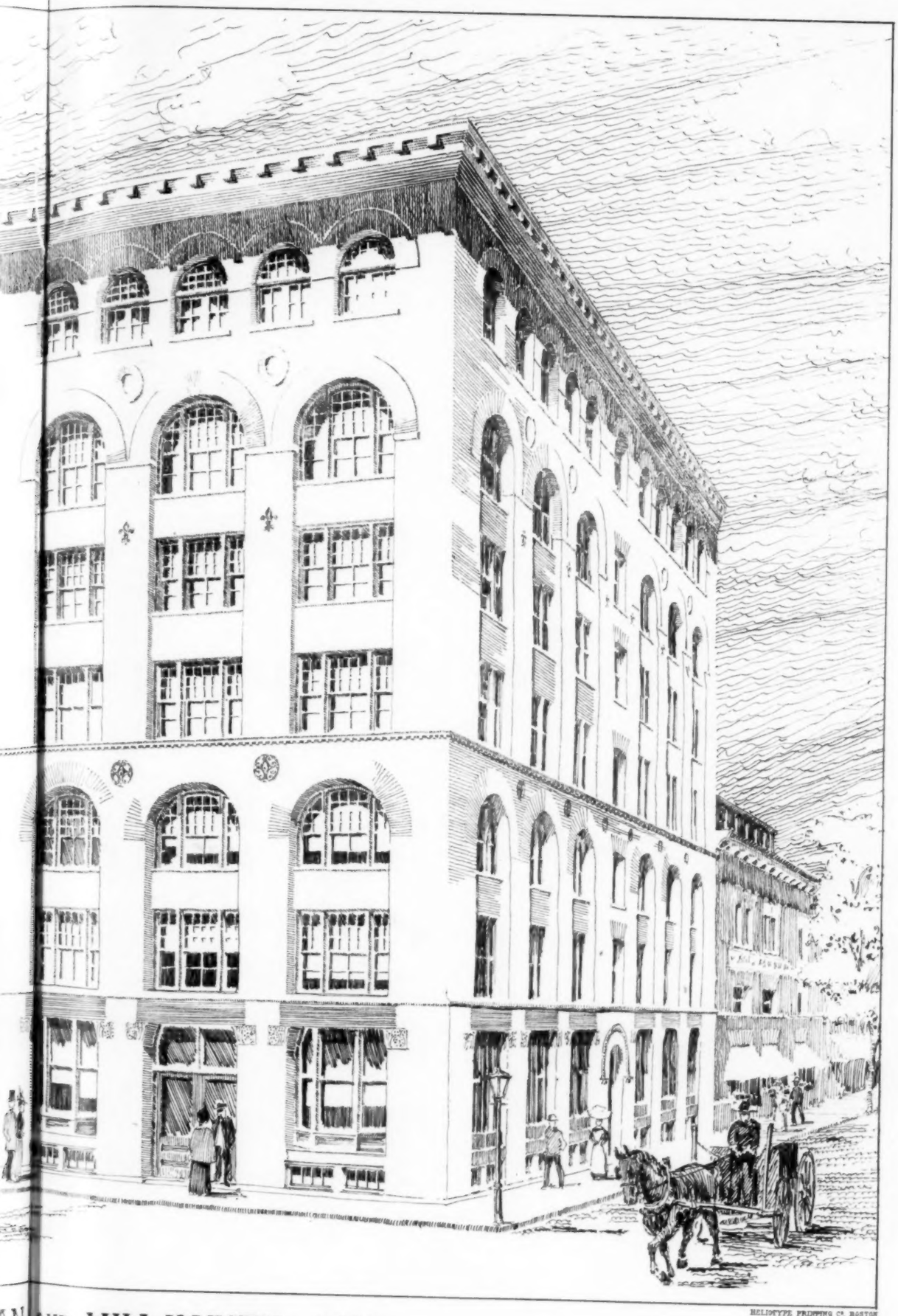

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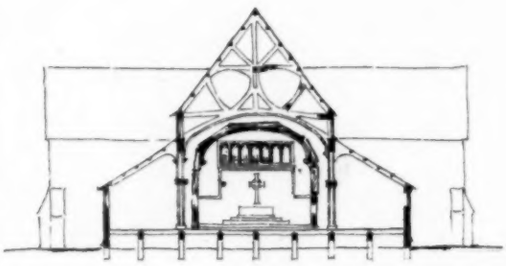

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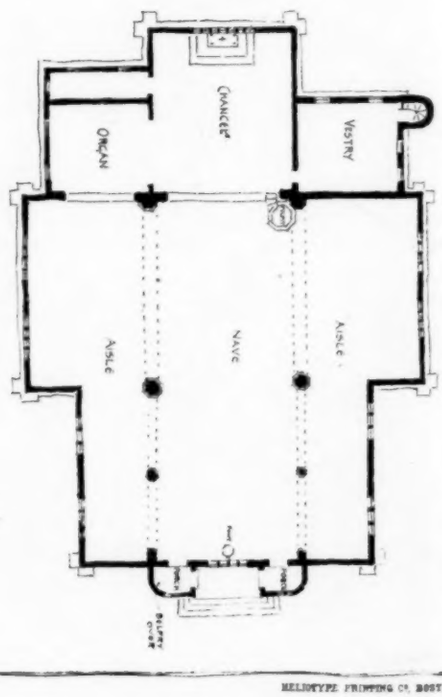

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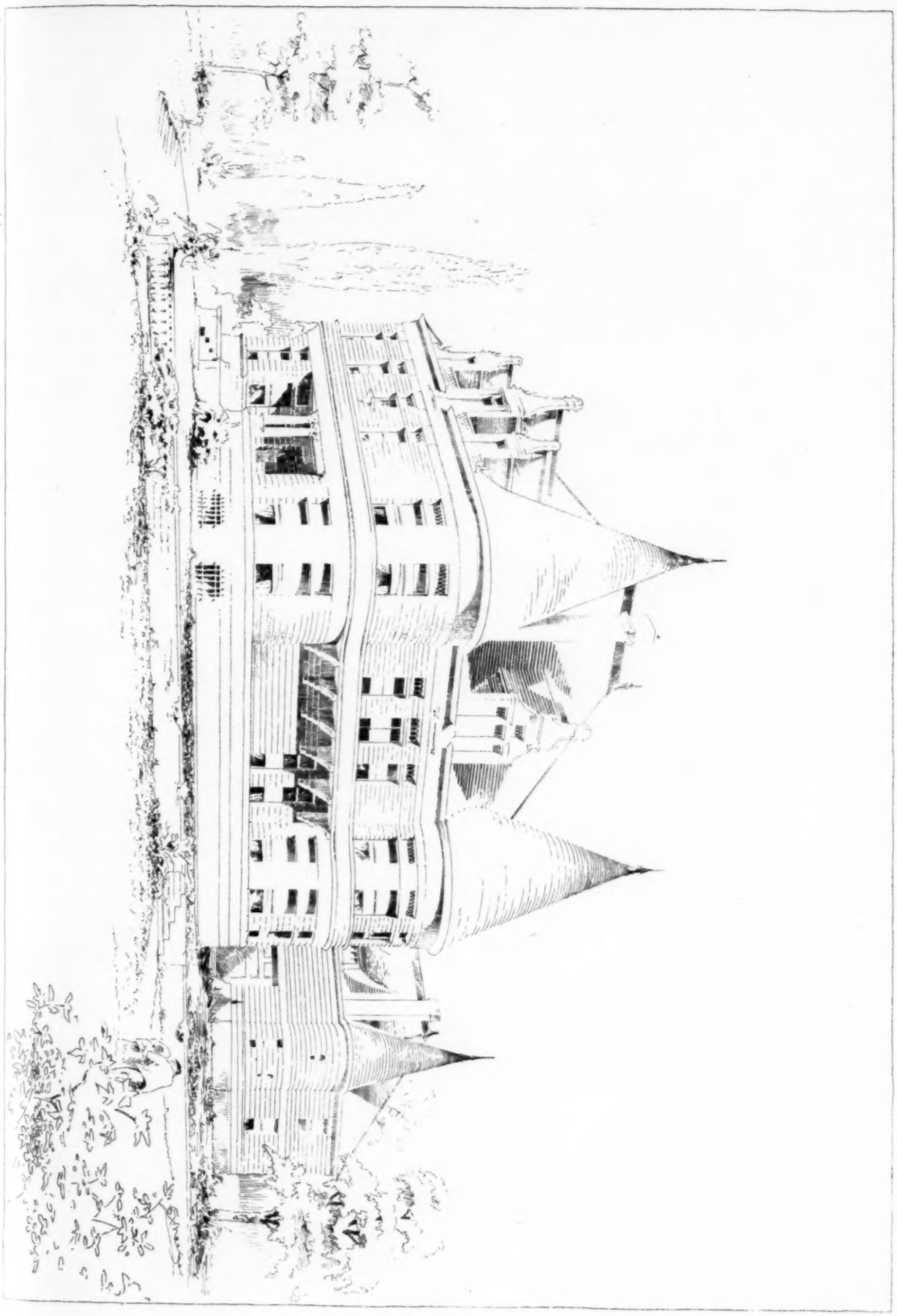

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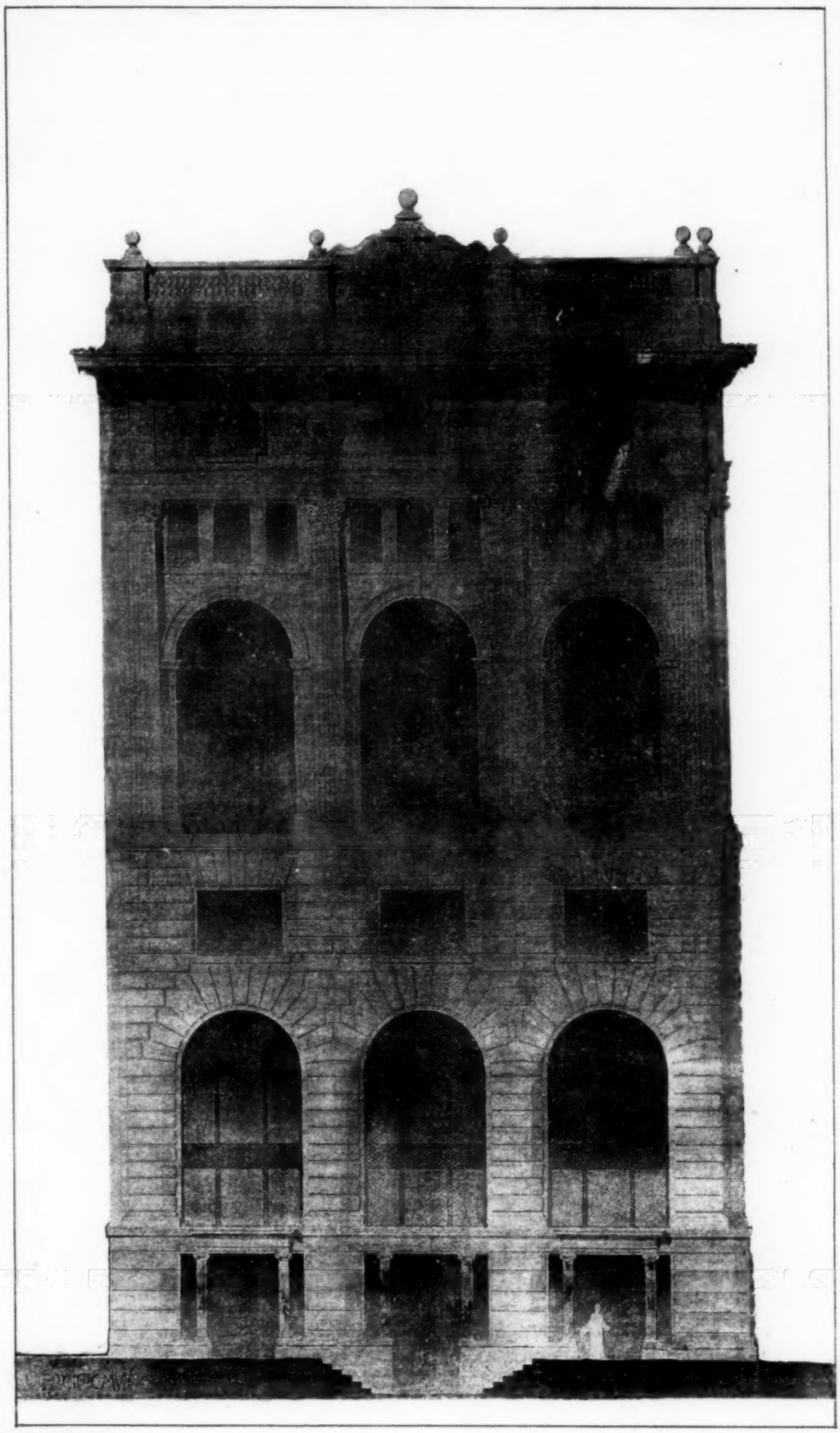

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