PRICE 15 CENTS.

AUGUST 31, 1895.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XLIX. * REGULAR EDITION * NO. 1027.

ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

211 TREMONT ST.

BOSTON, MASS.

CONTENTS.

ILLUSTRATIONS.

Additional Illustrations in the International Edition.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLIX. No. 1027.

Entered at the Post-Office at Boston as second-class matter.

AUGUST 31, 1895.

CONTENTS

THE investigation into the causes of the fall of the Ireland Building, in New York, seems to have been very thorough. As in another recent case, the coroner summoned a jury, composed mostly of architects and builders, and the testimony was taken with great intelligence and thoroughness. Briefly, the structure was originally intended to be seven stories high, but was made a story higher after the lower portion was built; the foundations and walls, which had been approved by the Building Department, were not increased in strength when the decision was made to put on an additional story; and, as it appears, the concrete foundations, which, according to the specification, seem to have been of reasonably sufficient thickness, were, without the consent or knowledge of the architect, made much thinner than the specification required. For example, the concrete footing under the central columns, which seem to have carried a very heavy load, was, according to the architect's testimony, required by the specification to be eighteen inches thick, and nine and one-half feet square. On this rested a granite block, six feet square, and one foot thick, and on this, again, a cast-iron plate, thirty-two inches square, and three and one-half inches thick. The soil seems to have been sand, so fine and soft that the architect directed planks on edge to be laid under the concrete. Under such circumstances, most architects would have wished to increase, rather than diminish, the depth of the concrete footing; but the contractor appears to have reduced it, making its thickness only twelve inches, instead of the eighteen inches specified. Moreover, there is some reason to suppose that an old well, or cesspool, loosely filled with rubbish, existed under a part of the footing of the column whose failure seems to have brought about the crash. The indications are that the footing of this column broke across, and the thin granite stone above it seems, on the failure of its support, to have broken also, allowing the plate and column to sink. According to some accounts, this failure, instead of taking place suddenly, seems to have occurred some time before the final collapse; for it is said that the middle portion of the upper floor of the building, which, of course, was originally laid level, was ten inches lower than the sides a day or two before the structure fell. We all know how enormously the sinking of an interior support increases the strain upon it, by throwing toward it the weights, which, so long as the floors remain level, are equally shared between it and other supports; and it is not surprising that such a movement, once begun, should soon culminate in the total disorganization of the structure. The contractor for the plastering had carelessly allowed a great weight of material to accumulate in the upper stories, and the composition roof seems to have been enormously overloaded with gravel, possibly to level up the sunken places for the owner's and inspector's eyes. In a newly built warehouse of proper strength, the piling of bags of plaster on the upper floor, or of gravel on the roof, while it might cause deflection of the beams, would have no injurious effect on the foundation; but, in this case, the foundation seems to have failed first, the overloading only hastening the fall, by which sixteen men lost their lives. The testimony of the architect showed that he was paid only six hundred dollars for his work on the building, including general supervision; that two superintendents were employed, after the foundation-work was begun, by the owner, and paid by him; that, although he visited the work about twice a week, he did not particularly inspect the trenches before the concrete was put into them; and that the change in thickness of the footings was made without his knowledge or consent. He had seen some of the concrete put in, but had not measured it, and did not imagine that the contract had been violated, not supposing, as he said, "that Mr. Parker would lay insecure foundations." On the testimony furnished, the coroner's jury found the architect, the contractor, and three other persons guilty of manslaughter.

SO far as the architect is concerned, the testimony does not appear to show any serious fault. With good concrete, on tolerably good bottom, particularly with planks underneath, a footing made as specified ought not to break under any load, and the effect of overloading would be simply to force it, as a whole, deeper into the ground. Such a movement as this would take place very slowly, if at all, and, as a footing of those dimensions, if unbroken, would support safely, over pretty soft ground, a far greater load than would be brought upon it, with girders and beams of ordinary spans, by eight floors and a roof of a new and unoccupied building, it seems clear that the accident was not due to the faulty plan or design of the foundation of this column. It seems, however, equally clear that it was directly due to the reduction of the thickness of the concrete footing from eighteen to twelve inches. As the resistance to breaking of a slab of concrete is roughly proportional to the square of the depth, it is plain that the reduction of the thickness brought down the strength in the proportion of 324 to 144; or, in other words, reduced its transverse resistance to considerably less than one-half of what it would have been if the specification had been followed. Even this, however, might have sufficed, the factor-of-safety in foundation-work being generally large, had it not been for the new element introduced by the reduction of thickness, in changing the proportion of depth and spread in the portion of the footing extending beyond the granite leveller. As originally designed, the concrete footing extended on all sides twenty-one inches beyond the granite block above it, with a depth of eighteen inches. It is usually assumed that, to be sure that a concrete footing will not break at the edges, owing to the combined effect of the pressing of the middle portion downward by the load, and the reaction of the earth around the margin, the projection of the concrete beyond the course above it should not exceed the depth of the concrete itself. This rule would give a projection of eighteen inches for the concrete footing in question, instead of twenty-one; but a greater projection than the strict forty-five degrees is often given, and a projection of twenty-one inches, with a depth of eighteen, could not be regarded as unwarranted by good practice. A projection of twenty-one inches, with a depth of twelve, is, however, a very different thing, and we think that most architects would expect such a footing, on compressible soil, to fail as soon as a heavy load came upon it. Certainly no architect would trust ordinary concrete under such a profile without filling the concrete with steel beams, to give the necessary resistance; and the failure of the footing, reduced to these dimensions, was only natural.

SUPPOSING our view of the cause of the catastrophe to be correct, the next question relating to the architect would be whether he could reasonably be held responsible for the consequences of the change in the thickness of the footings. That the change was made without his consent or

knowledge is attested by his positive and repeated statements under oath; and his straightforward and intelligent testimony in other respects indicates that he is to be believed in this point; while his knowledge of theoretical construction, as shown in his statements, and in the design of the footings, as described, seems far too good to have permitted him to assent knowingly to a change which would fatally modify a proportion of projection to height which had evidently been studied with much care. If, then, he did not order, or permit the change, does the fact that he did not discover it render him jointly criminal with the contractor who made it? We can hardly think so. Every architect knows that it is by no means easy to measure the depth of concrete put into a trench. When the concrete is put in by sections, the depth of each section can be measured when the side of it is uncovered for laying the next; but where all is put in at once, the only way is to make marks on the sides of the trench, at the proper height above the bottom; or, as is sometimes done, to set stakes of known height in the trench, before filling in the concrete around them. It is not often that an architect can be on the spot at the time for applying these tests, even if it is his duty to do so, which, in the light of recent decisions, is very doubtful; and in the present case, where the architect had furnished clear, sufficient and precise plans and specifications, and the execution of the work had been committed to a contractor whom he had reason to believe faithful and reliable, it is difficult to see in what way he failed to fulfil his duty.

THE heroic death of Thomas Hovenden will consecrate the fame of an artist who had already won a secure position among the leaders of American art. It is hardly necessary to recall the many pictures of simple sentiment by which he has for many years held public interest in this country, but every one does not know that Mr. Hovenden was by birth an Irishman, having been born near Cork, in 1840. He studied in the art school at Cork, which, though not pretentious, has still a good reputation for the thoroughness of its teaching, and came to this country at the age of twenty-three. On his arrival, he entered himself as a pupil at the National Academy of Design in New York and studied and worked there until his removal to Baltimore. In 1874, always anxious for improvement, although he had already a reputation which most American artists would find sufficient, he went to Paris, and studied six years under Cabanel. Returning in 1880, he was elected a member of the National Academy, and his pictures have since that time constantly increased his reputation here and abroad. Although settled in Philadelphia, and a prominent member of the artistic colony of that city, he belonged, perhaps more than any other American painter, to the whole country, and his death, caused by his unavailing attempt to save a child from being run over by a freight train, will be generally mourned.

THE *Engineering Record*, speaking of the practice of placing main traps, with fresh-air inlet, on all house-drains connecting with a sewer, which, as it says, is "pretty generally considered necessary by American sanitary engineers," quotes an interesting report made to the Local Board of Hornsey, one of the suburban districts of London, by Mr. T. de Courcy Meade, the Engineer of the Board, who was desired to investigate the subject, and give an opinion on the advisability of making the use of main traps compulsory. Almost everywhere in England such traps are required on house-drains, but the Hornsey Board had been unfortunate, apparently, in its choice of the sort of trap to be required, for those first put in had given so much trouble by clogging with grease that there was a question whether they might not be dispensed with altogether.

MR. MEADE began his report by showing how traps could be arranged, and were in other places so arranged, as not to clog with grease; and he gave a long series of abstracts of communications from local engineers, or of the results of his own investigations, indicating the practice in respect to traps of the town authorities of a large number of places. From the surveyor of a single town, Southgate, he received a letter, saying, "I may surprise you by stating I am strongly against the use of an intercepting trap between the house-drain and sewer, except in cases where the drains are laid under a building." What difference this surveyor could find, in regard to the necessity for an intercepting trap, between house-drains laid through a house vertically or horizontally is not very clear, but he seems to be quite alone in his view of the matter; for the twenty-nine other towns investigated without exception required or urged the use of intercepting traps. Of course, the object of leaving out the trap is to utilize the house pipes to ventilate the sewer; but no less than fourteen of the town surveyors applied to for information replied that they regarded the ventilation of sewers through house-drains as "objectionable," "dangerous," "fraught with the utmost risk," or "exceedingly dangerous." Mr. Meade himself, speaking of the common notion of engineers who have not made sanitary matters a study that the air in the house-drains is as bad as that in the sewers, and that there is, therefore, no danger in having the sewer air circulate through them, said, very frankly, that he had once himself accepted that view, but that his investigations into the actual conditions had shown him that it was erroneous. In house-drains, properly constructed, sewage remains but a few moments, the constant flushing removing matters to the sewer before they have time to decompose, while the current of air from the "foot-vent" to the roof is so rapid as to keep the air in the drains constantly and greatly diluted. In the town sewers, on the other hand, while the flow is rapid for eight hours of the day, it is reduced for the remaining sixteen to a mere dribble, quite insufficient for flushing, or washing off the slime deposited on the sewer walls. During this period, therefore, decomposition proceeds rapidly, producing vast quantities of a gas different from that found in house-drains. Moreover, as the flow of air in sewers, even under favorable conditions, is far more feeble than in house-drains, the connecting of the latter with the sewers admits to them a stream of comparatively undiluted gases, of a more offensive and dangerous sort than any that would, under ordinary circumstances, be found in them.

WE may add, on our own account, that the sewer vapors are liable at any moment to be loaded with a cloud of diphtheria or scarlet-fever germs, poured into the sewers from the drain of an infected house, and that these germs pass thence into the untrapped house-drains, from which they may, and do, issue abundantly through defective joints, or through the traps of fixtures which have been for a time unused, ready to carry out their mission of pain and death. To our mind, this is the principal reason for requiring main traps on house-drains connected with sewers, and it is a very sufficient one. Not one householder in five hundred knows that if he leaves his house unoccupied for two or three weeks, while he and his family are enjoying a vacation in the country, his bath and wash-basin traps are likely to dry out, admitting to his rooms a copious stream of whatever gases may be in the house-drain. If the drains are cut off from the sewer by a trap, nothing can get into them from the outside, and the vapors from an unused house-drain, aerated and dried for two weeks by the regular current through it, would not be very bad, and, at least, would contain no diphtheria germs, unless there had been diphtheria in the house before leaving it; but, with an open sewer connection, the current through a dry trap is more than likely to contain specimens of all the zymotic ferments produced in the whole city, which will accumulate to welcome him and his children on their return. It is much to be desired that every case of diphtheria, or scarlet fever or measles, should be followed by an examination, not only of the house-drain, but of all the drainage conditions. It is our impression that many cases of scarlet fever, and some of diphtheria, would be found to occur among children who have just returned from a summer vacation to a city house with unguarded sewer connection. It would not be very difficult to make such an inquiry in the few towns in this county where house-traps are not used, and the result would be of incalculable value in fixing future municipal practice in sanitary matters. As a collateral matter, the subject of the effect on the health of children of being obliged to live, or pass daily, near the open sewer manholes which it is at present the delight of city engineers to scatter broadcast through the streets, might also be inquired into with great advantage; and some of our young engineers or students might do the world a service, and perhaps save many precious lives, by a candid and thorough examination of these questions.

A SYLLABUS OF EARLY CHRISTIAN, ROMANESQUE AND GOTHIC ARCHITECTURE.[1] — II.

HISTORICAL INTRODUCTION.

THE time of general dissolution when the Roman empire had gone to pieces.

THE NEW NATIONS.

Beginning of the migration of the Teutonic tribes, 375 A. D. The Westgoths in Italy, 400–415; in Spain, 507–711. The Franks and the Burgundians in Gaul. Angles and Saxons enter Britain.

The Merovingian Kingdom, 486–751. Kingdom of the Ostrogoths in Italy, 493–555. Byzantine Conquest, 535. Kingdom of the Longobards, 568–774.

The greatest victory won over these nations is their acceptance of the Christian faith, Arianism. Many of the Teutonic nations were Arians and therefore in conflict with the Papal See.

The Roman Church. — It appears probable that the transfer of the seat of government of the Roman Empire from Rome to Constantinople, and the subsequent period of wars, conquest and anarchy, afforded a fitting opportunity for the Bishop of Rome to become head of the Christian church, which would not have occurred under a strong government.

The firmest upholders of Catholicism were the Franks. The Merovingians are important only in so far as they united different kingdoms under one sceptre and compelled conversion by the sword.

The missions extend the Roman type of church-building (basilical) as well as the faith.

The star of the Papal See rises with the Carolingians, who consider themselves defenders of the Catholic faith against the heathens, as well as the Arian Longobards and the Schismatic Greeks.

CHARLEMAGNE, 768–814.

His reign the beginning, in art, of the Romanesque period. Impulses toward a renascence of culture after the long period of barbarism and war are found in his administration of government and in his interest in art and literature. He tried to create something similar to the past among his free Germanic nations. To accustom his warriors to an ordered and domestic life by his own example and an extensive legislation; to protect attempts of higher civilization for the sake of the growth of it in his newly-founded empire; to draw art and learning nearer to his person and re-create in his surroundings the old splendor of the imperial court at Rome, are natural features of his policy.

The historical position of the Germanic nations is rendered different from that of any previous by the desire to create a Christian world-monarchy as strong and solid in its composition as the deceased Roman, but based upon the recognized liberty of the individual and the mutual agreement as to the extent of duty and privilege. They have to grope their way to the realization of the new ideals.

An important event is the division of the Carolingian empire into separate kingdoms [Treaty at Verdun, 843], each of which soon develop national peculiarities.

At the same time the existence of provincial (and tribal) differences marks the style of each region and in spite of common characteristics gives the Romanesque architecture its surprising richness and variety of form.

Romanesque architecture rests in its main characteristics upon the ideas brought forth in the Early Christian basilica as they probably existed throughout the empire before the invasion. The style may be said to be derived from Rome, but in its development far from the vicinity of Rome and even of Italy, with new materials at first roughly treated, it led to a very different mode of construction and decoration.

The two forms of Early Christian architecture — *the concentric building and the basilica* — are continued: the basilica as the church proper; the concentric structure especially utilized as memorial edifice, mortuary chapel and baptistery [Italy]. The principles of both, however, are in course of time blended, mainly by the introduction of vaulting, and result in a new structure that is an advance upon the previous ones.

The study of Romanesque style chiefly consists in considering the changes which the basilical plan undergoes under the influence of the spirit of the new nations. The technical demands, the demands of the climate and the lack of experience inflict much labor and slow progress upon the builders.

TYPICAL TRAITS OF ROMANESQUE ARCHITECTURE.

It is difficult to give a general review of the Romanesque style, because it, more than any other style — in spite of the common faith and liturgical demands — is dependent upon and marked by national and provincial preferences. There are a few traits, however, that serve to form the general type, though this, to be completed, must be studied in its different aspects in each separate land.

This type consists, to begin with, in a less spacious, less lofty structure than the Early Christian basilica. The *wooden churches* that were probably erected at first passed away except in a few cases, and buildings of more or less *rough masonry* superseded them, having heavy walls, narrow openings, square piers or clumsy columns and wooden ceiling or coarse vaulting. To these buildings towers were added.

In time this coarse type is changed into one much more refined and dignified. The methods of building become more secure and the sense for the beautification of the object more acute. The building then rises to an impressive height, the old division into three aisles is mostly maintained, the side-aisles being always proportionally narrower than the nave or middle aisle. For the division of space a system is adopted by which the building internally, as well as externally, receives the appearance of symmetry and proportion that is of much æsthetic effect.

In *Germany* the Romanesque period lasts from the Franco-Carolingian age till the end of the thirteenth century.

In *France*, till the twelfth century.

These are the countries that mainly influence the others.

In *England* Romanesque architecture is introduced by the Normans and continues even till the thirteenth century.

To *Spain* it was communicated through the provinces of Southern France.

In *Scandinavia* Germany is predominant.

In *Italy* it is in use from the eleventh to the thirteenth century. Italy is to some extent influenced by the neighboring countries.

Because of the marked difference between the buildings of Romanesque style according to the period or the province where they originate, it is a matter of recent arrangement for the sake of a general survey to divide the whole number of structures into two main groups,

ACCORDING TO GROUND-PLAN:

1. *Buildings of the cruciform plan*, which comprise the greater multitude of monuments typical for the time, and
2. *Buildings of the concentric plan*, a small but distinguished group.

OR, ACCORDING TO ELEVATION:

A. Buildings of the basilical type, which also comprise the greater mass of monuments and

B. Buildings of the non-basilical type, that form a smaller, very select group of edifices.

THE EVOLUTION OF CONSTRUCTION.

Material. — Wood, stone, concrete, brick.

By far the greater number of mediæval edifices are erected of stone. The walls are built up of courses of masonry with pebble or mortar filling, or of brick with stone facing; the vaults are of more or less irregular stone in mortar bedding.

Ground Plan. — Prototype is the plan inherited from the Early Christian basilica. The first and main change the latter undergoes

[1] Continued from No. 1023, page 52.

in the Romanesque style is the development of the Signum Tau form into the so-called *Latin cross*. The Latin cross probably originated as early as the Franco-Carolingian period.

Its immediate cause was the increase of the ministering clergy in large churches (hence the demand for more space) and the extension of the crypt from a mere cavity into an oratory.

These reasons led to:

a. The establishment of a real choir by adding an extra space in front of the apse.

b. The elevation of the choir above the level of the nave.

Further changes were:

1. The general adoption of the transept as an organic part of the edifice.

2. With a view towards better regulation of space, the square that was formed at the intersection of the nave with the transept was settled upon as the norm to be repeated in all parts of the plan, in the nave, the arms of the transept — the space in front of the apse being whole squares; the aisles, half squares, etc. With the freedom and irregularity characteristic of Romanesque style, this ideal, however, is not generally adhered to until vaulting becomes permanent.

The cruciform plan may be considered as approaching the concentric type in structures that have *double choirs* or *double transepts* — an exaggeration of the cross caused by the dedication of the same edifice to more than one patron-saint and a corresponding increase of altars.

Of importance for the later development of the style is especially to be noted the enrichment of the plan of the simple apse by extension of the aisles beyond the transept so as to form *subsidiary choirs*. *The continuation* of the subsidiary choirs entirely around the apse is a further elaboration of the scheme. It is seen as early as in the plan of St. Gall (830) and appears in the east-choir of St. Michael at Hildesheim.

The same plan (but derived from another source) appears at St. Remi at Rheims (eleventh century) with the difference, however, that a *row of columns* takes the place of the wall between the apse and the aisle and with the *addition of semicircular niches or chapels attached* to the aisle. It becomes a motif of much consequence in the vaulted structures of Central France and is represented in Germany by the choir of

St. Godehard at Hildesheim.

Irregularities such as (1) extreme elongation and square ending of choir, and (2) absence or displacement of transept (western transept) and other minor changes, are mostly of strictly provincial character or belong to the style adopted by certain religious orders.

The atrium of the Early Christian edifices disappears. Instead of this, a small *vestibule* of the width of the nave with towers to flank it precedes the nave and forms the entrance of the façade or west end of the church.

As indicated, the position of the *towers* is altered. Instead of the separate structure of Early Christian architecture the tower is drawn into close contact with the building. The originally circular shape made the adjustment of the tower very difficult and unsightly. A powerful square belfry was raised, instead, over the vestibule, or two less massive structures were made to flank the entrance. Small towers such as used for staircases were transformed into polygonal shape and adjusted to the transept or choir.

Elevation. — As a matter of general interest it may be said that in elevation the predominant structure, the basilica, is characterized by three or more aisles and by the superior height of the middle aisle which admits light to this room independently of what it may acquire through the side-aisles. Other structures that have only one aisle or aisles of equal or almost equal height are for this reason not considered basilicas.

The building, however, whether it be a basilica or not, is characterized by more or less articulation of the constructive membering. In the horizontally ceiled basilica, the walls have no special weight to bear and remain of moderate thickness and plain appearance, while those that support vaulting display in time a marked character, with all parts prepared and moulded for their enterprise. Thus in the interior a succession of members strengthens the resistance of the wall and leads the pressure from above down to its main opponent, the floor, while on the outside the unsightly pilaster-strip is replaced by a solid buttress assisted in its work by the sloping roof of the aisles.

These general hints, however, have to be carried out in detail, in order to be understood.

While in the ground-plan the general *disposition of space* is the prominent feature, in the elevation the *kind of roofing* employed is of special importance. The nature and form of supports have to be in accordance with and depend upon the weight and construction of the ceiling. As a general thing it may be stated that the *changes and alterations* begin in the ground-plan until a system has been formed for the upper parts of the structure also, which *reacts* upon the ground-plan and causes it to conform to the principle of general safety and consistency. In Romanesque architecture it is peculiar that vaulting is anticipated in the substructure long before it is actually brought about.

THE EVOLUTION OF MEMBERMENT.

The earlier structures wherein the traditions of the Early Christian style are still maintained are, of course, the less perfect ones.

In the interior *the wooden ceiling* is strangely *neutral and preliminary* in its appearance. It is a remnant from the time of haste and poor facilities which characterizes much of Early Christian architecture. The wooden beam above is strangely out of keeping with the masonry beneath. The prevailing *horizontalism* of most churches of early Romanesque design depends upon their relation to the Early Christian style. The *vertical* memberment is of much later date. The beginning was made mainly for the sake of appearance. It consists at first, merely of a strip of vertical moulding connecting the supports below with the horizontal line above. Later on, bands of masonry or semicircular shafts rise to the edge of the ceiling and divide the wall-space into regular fields wherein windows and arcades are grouped symmetrically, in contradistinction to the previous co-ördination.

The idea of grouping is first brought forward by the *alternation of supports* settled upon as an improvement of æsthetic kind. A slender member is placed between two more massive ones, a large arch extends from the heavier member including the weaker one and two arches of second order. The pleasant effect of this rhythmical exchange is increased when — as happens — the movement below is repeated, but in smaller proportions, by the arcades that open between the upper and lower story. This is a method that proves of much consequence during the whole mediæval period.

In this connection the important function of the *pilaster strip* ought not to be overlooked. In Roman architecture the mural band performs constructive as well as decorative service, and the succeeding ages did not forget to take advantage of this most useful quality. On the exterior the heavy band of masonry indicates the divisions of the interior system. It steadies the clerestory walls against the weight of the comparatively light roofing; it connects the upper story with the lower, externally as well as internally, and it increases the resisting power of the side-aisles against the pressure of the nave; it lines the apertures and strengthens the corners and, in connection with arcades, it furnishes almost the only decoration there is. Even after vaulting is introduced the pilaster-strip remains in power, partly as an actor, partly as a mediator and performs the function at once modest and important of pointing the way for the flying and standing buttress whose faint predecessor it is.

M. Wergeland.

[To be continued.]

THEATRES.[1] — XIX.

GARRICK THEATRE.

Plan of Garrick Theatre.

MR. JOHN HARE, the popular London actor, is the owner of the Garrick Theatre, Charing Cross, and as he is about to visit America, I have had lent me for the purposes of this article by the architect of the building, Mr. Walter Emden, the plans, sections and drawings in order to lay them before the readers of the *American Architect* at a time when they are most likely to be interested in Mr. Hare's theatre.

Although not a large building, the Garrick is probably more luxuriously fitted up than any other theatre in London. Every detail which could add to the comfort of the visitors was considered by Mr. Hare and his architect at the time of the erection of the building. It is a notable fact that the desire to do everything for the comfort of his audience extended at the time not only to all the occupants of the half-guinea stalls, but also to the frequenters of the pit and gallery. Not content with furnishing the theatre with the ordinary armchair usually to be found in the stalls, Mr. Hare, the manager, had chairs specially designed and made for

Fig. 1. Stall Seat.

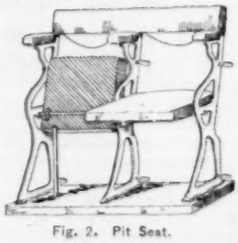


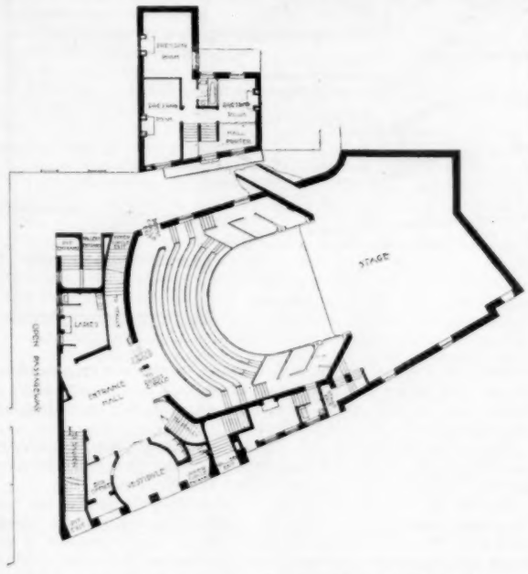
Fig. 2. Pit Seat.

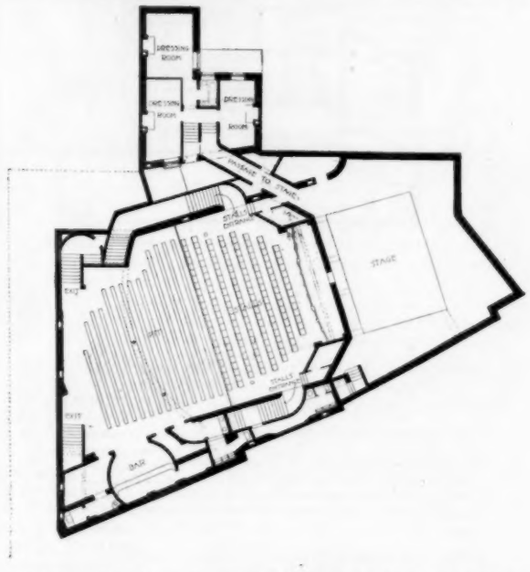
the various parts of the house. Figure 1 is a sketch of the stall seat; it will be seen that underneath the seat a board is placed to form a receptacle for the hat and coat of the person seated in the

[1] Continued from No. 1025, page 68.

row behind; an upright board is also fixed under the seat to prevent the person in front kicking against the hat, etc., of the one behind.

Figure 2 is a sketch of the pit seat. This is provided with a cord at the back for hanging coats and a place at the side for holding umbrellas, sticks, etc. I give these illustrations merely as examples of the way the whole of this house has been fitted up in effort to create comfort for the audience. Nowhere have I seen dressing-rooms fitted with such comfort and, indeed, luxury; while these rooms contain all that is necessary for an actor or actress to have in a dressing-room, they have none of the unsightly and untidy appearance common to the general run of rooms used for this purpose. The lavatory basin, the wardrobe hangings, cupboards, dressing-tables and other accessories for the dressing-rooms are all specially made and enclosed with mahogany fittings. The majority of the floors are covered with

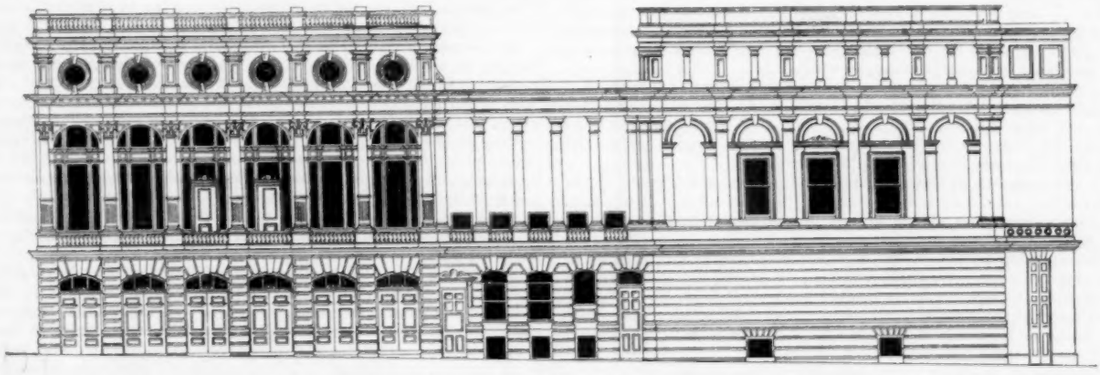




Turkey or other costly rugs, and the furniture itself consists of good examples after Chippendale, Sheraton, or other well-known designers.

Speaking now of the general structure and its arrangements: it will be seen from the ground-plan how irregular is the shape of the land upon which the theatre stands. There is one frontage towards Charing Cross Road which really consists of the side of the vestibule, the auditorium and the stage. The house is a small one, and its approaches are in proportion to its size. The outer vestibule is three parts of a circle, and affords the means of entrance to the dress or reserved portions of the house.

From the vestibule a large entrance-hall opens; this is situated at the back of the dress-circle: from this it will be seen that the dress-



circle is on the street-level, and that the pit and stalls are formed below the level of the ground by excavation. The stalls are entered on both sides by staircases which start from the entrance-hall already described.

The auditorium of the house has been isolated by forming an open passageway at the back and the side; by this means exits are obtained into the passageway on the opposite side of the building to the entrances in Charing Cross Road. Other advantages have been taken into consideration in the formation of this passageway, the occupants of the pit and gallery having their separate entrances to the theatre at the end of the passage farthest from the street.

Here people can stand and await admission sheltered from rain by a glass awning some distance away from the traffic and danger of the streets and from carriages and cabs "putting down" at the main entrances. The pit and gallery extra exits are both placed in Charing Cross Road. The dressing-room block is a distinct and separate building, having but one connection with the theatre by a sub-way at the stage-level which is closed by an iron door. By shutting this door the artists are placed out of the reach of all danger from fire, which may arise from the stage, and are left in perfect safety with a separate entrance into the open air from the dressing-room block. In addition to the dressing-room, on each floor a bath-room and a lavatory are provided for every three dressing-rooms.

The area level, which is below the ground, is divided into pit and stalls, and as this is a house most frequented by wealthier citizens, in the fashionable world of London, as much and sometimes more of the space is allotted to the stalls, as to the pit. Indeed, at the height of the season the pit becomes smaller and smaller, while the number of rows in the stalls increase.

As to the construction of the theatre, Mr. Emden, the architect, has carried out the system he has adopted in so many other of his buildings, of making the structure entirely fireproof in all its parts.

All the tiers are built in iron and concrete; all the floors, passages, landings, corridors and staircases are of fireproof material, and all the walls and partitions of solid brickwork. The roof, also, is of iron, concrete and asphalt.

Especial facilities are given for removal of scenery to and from this theatre through a high door at the right-hand end of the façade next to Charing Cross Road. No accumulation of scenery is allowed to be kept in the theatre. The plays produced are, as a rule, of a class that run for several months, and no stock scenery is therefore required, so the two or three scenes, usually of a most heavy and luxurious character, needed for the play are alone kept on the premises. This, of course, reduces the risk of fire considerably.

The house is lighted everywhere by electric-light, gas and oil being also used. The chief lighting power on the stage is electric-light which is even employed in lieu of the more dangerous lime-light usually found in theatres. In fact, lately, there has been a tendency in London to abolish the use of the lime-light and substitute the electric search-light in its place. Special impetus has been given to the movement, through the action of the London County

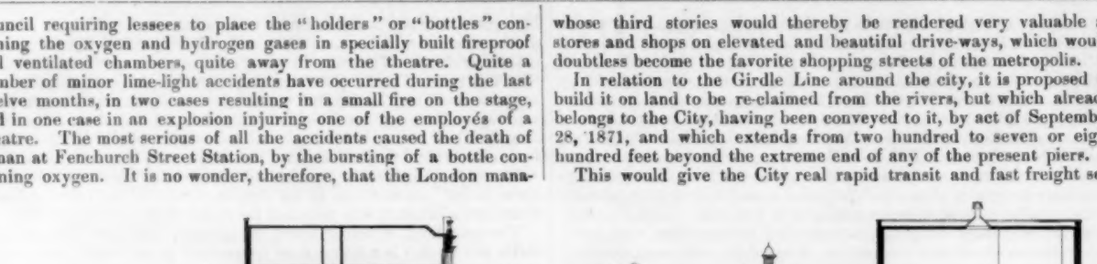
Council requiring lessees to place the "holders" or "bottles" containing the oxygen and hydrogen gases in specially built fireproof and ventilated chambers, quite away from the theatre. Quite a number of minor lime-light accidents have occurred during the last twelve months, in two cases resulting in a small fire on the stage, and in one case in an explosion injuring one of the employés of a theatre. The most serious of all the accidents caused the death of a man at Fenchurch Street Station, by the bursting of a bottle containing oxygen. It is no wonder, therefore, that the London managers have adopted the safer system of the electric search-light, and Mr. Hare was one of the first to set this example.

The following are the leading dimensions of the building:

From curtain to centre back wall of pit	74 feet.
" " " " " " stage	38 "
Width between main walls of auditorium	50 "
Average width between main walls of stage	55 "
Width of proscenium opening	30 "
Distance from curtain-line to dress-circle front	33 "
" " " " upper circle "	35 "
" " " " gallery "	36 "
Height from pit floor to ceiling (at top of cornice)	40 "
" " stage to top of roof	56 "
Depth of stage cellar	20 "

E. A. E. Woodrow.

[To be continued.]



A PROPOSED SYSTEM OF RAPID TRANSIT FOR NEW YORK CITY.

THIS system devised by Mr. A. H. Thorp, a New York architect, proposes to supply Rapid Transit by six lines of tracks — two for express, two for way-trains, and two for freight — around the entire City of New York, along the water-fronts, and connecting in the upper part of the island with the New York Central & Hudson River, the New York & New Haven, and other railway lines. It also proposes a central longitudinal line of four tracks — two for express, and two for way-trains,— and transverse connecting lines of two tracks for way-trains, all these latter on existing streets, or on streets to be cut through, or widened.

It proposes to construct these lines on structures of masonry and iron, close up to the adjoining buildings on one side and open to the air and light on the other: at a height of about thirteen feet above the street-level, allowing all cross streets to pass under, and utilizing the street beneath for heavy traffic.

It also proposes an elevated boulevard or carriage drive-way above the railway lines, with a solid road-bed of concrete and asphaltum, on iron construction at a height of about twenty-eight feet above the street-level.

The abutting buildings, which on the longitudinal and transverse lines would either be altered or re-built to participate in the advantages of these new conditions, would have their floors on the street-level reserved for wholesale, or packing and delivery of goods, while the floors on a level with the elevated drive-way would be devoted to shops for retail business, etc.

The system proposes to arrange approaches to the drive-way at appropriate distances, by means of inclined roadways for carriages, and at the stations by flights of steps from the streets.

The central longitudinal four-track line would take up about forty-five feet in width and might occupy one side of the proposed new Elm Street, for example. The connecting cross lines (of two tracks) would not take up over twenty-five feet in width, and might be built in any of the cross streets.

It is argued that these lines would not depreciate the total value of property in the streets through which they would pass, as the depreciation in value of buildings facing the Rapid Transit galleries on the opposite side of the street, would be more than counterbalanced by the increased value of buildings abutting on the lines, whose third stories would thereby be rendered very valuable as stores and shops on elevated and beautiful drive-ways, which would doubtless become the favorite shopping streets of the metropolis.

In relation to the Girdle Line around the city, it is proposed to build it on land to be re-claimed from the rivers, but which already belongs to the City, having been conveyed to it, by act of September 28, 1871, and which extends from two hundred to seven or eight hundred feet beyond the extreme end of any of the present piers.

This would give the City real rapid transit and fast freight service by six lines of tracks, with a grade everywhere on a dead level, around the entire city; and would also add to the city along the whole line of the route two other entirely new and invaluable avenues of traffic and circulation.

It is proposed, first, to build a new system of piers, extending on an average about 100 feet farther out into the river than the present piers — but still remaining far within the city-limits.

By laying them out at an angle of about fifty degrees to the line of the shore, as shown by the illustrations, and making the piers all with two stories or floors, instead of one, a larger amount of dock-room and a greater number of square feet of floor-space on piers would be obtained, and yet bring the shore-end line of the new piers and docks 210 feet farther out toward the rivers — thus actually creating a strip between the outer line of the present river-front streets and the shore-line of the new piers of 210 feet.

The new piers *might*, of course, be built straight out into the rivers, as prolongations of the present piers 210 feet, but the building of two-story piers and carrying them out at an angle of about fifty degrees it is asserted would be a great advantage, in the facilities offered for landing passengers and freight on different levels, and for all vessels in approaching or leaving their piers, independently of the room saved.

It is proposed that the City reserve the first 100 feet inland of this strip of 210 feet, which may be filled in and sold as sites for new buildings, which would thus face at the rear on the old river-front streets and on the other side toward the rivers, on the new drive-way, and rising above it any number of stories desired.

These new buildings would probably be devoted in their lower stories to wholesale business, packing and freight, being easily accessible to the rapid freight lines, and in the parts on the level with the drive-way and rising above it to the best order of retail shops, and to hotels, apartment-houses, and dwellings. Thes facing as they would on a superb elevated boulevard, overlooking the rivers and shipping at a height of about 28 feet, would be withdrawn from the bustle and confusion of the traffic beneath and yet within easy access of the Rapid Transit.

A continuous covered arcade might also be arranged along the fronts of these buildings on a level with the drive-way, similar to that of the Rue de Rivoli in Paris.

The Girdle Line Viaduct, carrying the six railway lines at its first story and the drive-way at its second, would be about 70 feet wide and would be constructed on the site of the present wharves, and could be supported on piers of iron and concrete carried down to solid bottom at intervals of about 40 feet and spanned by truss-work, carrying on masonry and iron construction the superstructure; and at the different levels the street road-way — the railway tracks and the upper driveway.

The railway gallery would be entirely open on one side to the rivers, and on both sides at every cross street, though roofed-in overhead by the driveway and protected from the snow.

The entire deck of the road-bed would be covered with iron buckle-plates filled-in with gravel, in which would be bedded the rails and rail-carriers — a construction which has proved almost noiseless in Berlin on the Metropolitan Elevated Railway. Ample space could be reserved in this gallery for gas-pipes, electric-wires, pneumatic-tubes, etc.

The space underneath the railway gallery would be available as

a covered and protected street, 70 feet wide, and augmented by the open street extending in width from the outer line of the viaduct to the wharf line, would make an avenue for heavy traffic 110 feet wide all around the city.

The great problem of getting around the Battery without taking away from, or obstructing the Battery Park, would be solved by carrying the viaduct, minus the private building sites, out beyond the present shore-line, reserving the ground-level for an extension of the present park — allowing framed views of the Bay through the colonnade and under the arches of the viaduct.

A great central station, or terminus, might well be built without obstructing navigation in the shallow water off the Castle Garden.

Such an improvement to the entire water-front of the city would render practicable and desirable the filling-in of the shallow water to the west of Riverside Park from 72d Street up, where the line of city-limits extends some seven or eight hundred feet out into the river, so as to form a broad plateau which could be used as an extension of the Park, and where a perfectly level speed-way could be constructed, three or four miles long.

The advantages of such a system as this, especially as regards the Girdle Road, would be manifold, as for example:

First. — The absence of necessity of great expenditures of money for buying up of private property.

Second. — The absolute absence of engineering difficulties.

Third. — The absence of necessity for obstructing or destroying the present highways of the City, or of disturbing pipes or sewers.

Fourth. — The grade of the road.

Fifth. — The improving of the piers and the extending of them farther out into somewhat deeper water, etc.

A liberal estimate of the cost of filling-in the 100 feet for building sites, is about $250,000 per mile, and of re-building the piers about $1,000,000 per mile, which would be $1,250,000 per mile.

The land acquired by the City would be about 400,000 sq. ft. per mile, which at the low figure of $10.00 per sq. ft., would be $4,000,000 per mile.

The franchise for the building of the railway lines would be an income to the City; and it is reasonable to suppose that if the City finds itself in possession of land sufficient for the laying out of two valuable avenues of traffic and circulation through its most crowded districts, it will not hesitate to avail itself of the advantages.

THE BREAD-AND-BUTTER SIDE OF ARCHITECTURE.

EVERY year earnest, enthusiastic young men are graduated from the Department of Architecture who are looking forward to winning a position in their chosen profession. They are graduated in several senses of the word, alligned, divided into degrees, and with the freezing and the boiling points clearly defined, having aims and purposes which are real to themselves if to no one else, and are ready for the hard experiences and the keen, relentless polish which contact with the unsympathetic business world will give them and which is so necessary for their final career. And not only from this University, but from other architectural schools throughout the country, as well as from numerous architects' offices, young men by the hundred are annually turned loose on the current of business affairs. Some are full of enthusiasm, others are earnestly practical, some are poetic by nature, and some are ready to take their places as wheel-horses in the hard tug of professional life; but all have one common purpose and one very decided aim, and that is to make money — to make it artistically, with proper regard for the æsthetic proprieties if they can, but to make money somehow. Disguise it as we may, impute as much earnest enthusiasm as we please to our motives, the fact remains that the man who expects to become an architect must have an opportunity to earn money, and the bread-and-butter side of architecture is one to which young men look forward with a great deal of apprehension. Their schooling may make them feel confident of their powers in solving æsthetic and practical problems, they may know that they have in them the germs of talent and may feel assured beyond any doubt that they are fitted to win a place in the world, but very few can calmly contemplate the possibility of being unable to even get the opportunity to show what they are worth. The painter or the sculptor who desires to make a mark for himself can quietly go to work in his studio, can elaborate a fine art production without the help of any one save himself, suddenly exposing it to the critical view of fellow-artists, and spring, Minerva-like, full fledged upon the artistic world. An architect, however, no matter what his degree of talent or capability may be, must first of all have opportunity to show his worth. He can not create the opportunity, for drawings do not constitute architecture, and until he has found some one confiding enough to take chances and entrust an important building to a young man of untried capabilities, he is unable to demonstrate that he can win even his bread, much less his butter. I know of no profession which is more ennobling, if pursued rightly, which will lead to a higher degree of culture, or is more truly self-contained, holding within itself the opportunities for study and recreation, for practical industry and enthusiastic enjoyment, than architecture. And, also, there is scarcely a profession in which the rich prizes are harder to acquire or demand such a combination of talent. Every man looks forward to winning these rich prizes. Few really get them. It is worth a young man's while sometimes to sit down quietly and look at architecture from a purely mercenary view, trying to see how he can get the great opportunities and in what way his work will command the highest pecuniary rewards. This science of getting work is something which is not taught in schools. There is as yet no Department of Applied Money-making, and while each young man generally has to work out his own lines and cannot depend very largely upon the experience of others, there certainly are some general possibilities which have been made manifest as the result of experience as aids to a young man in accomplishing the very important factor of bread-winning.

The young architect, when released from school, first enters the large army of draughtsmen and undergoes the ordeal of continuous office drudgery. This is a very thorough sifting process by which the survival of the fittest is aptly illustrated, for of the thousands of young men who are toiling in architect's offices, a small percentage only reach the dignity of architect. But in the course of time, the young man whose staying powers are sufficiently strong finds some confiding friend or relative who entrusts to him the erection of some building, usually a small dwelling, rarely an important public building. Then he hires a sign-painter and blossoms out as an architect. He finds the first year hard, the second year exceedingly hard, and it is only after at least two years and sometimes more, that he feels sufficiently established in his profession to be sure of remaining in it through seasons of mild depression. Then comes the real experience in getting work. To the superficial observer, the most potent factor in helping an architect to his opportunities is rich and numerous relatives. When viewed in the light of the success of some architects, a second important element seems to be "bluff," pure and simple; the ability of imposing one's self on would-be clients, the faculty of making people think you are a good fellow and understand your business. A third help, which is often advised for young men, is the cultivation of social relations, bringing one's self into prominence before one's fellow-beings in social intercourse. And the fourth way is by persistent advertising, either in the way of published drawings or notices in the papers through kindness of friends. Now, architecture would indeed be a mercenary profession and worthy of little real honor if individual advancement depended upon such unworthy factors as these. There is no questioning the advantage of all of these as adjuncts. Each has its proper place, each contributes to the architect's personal advancement as well as to his pecuniary advantage, and has its proper function in self-development and professional growth. But architecture is more than these, and the man who is really to receive the rich prizes must have something more to recommend him than relatives, must possess more intrinsic qualities than bluff, and must have a stronger hold upon the community than can be acquired by social intercourse. He who means to rise to the top of the profession must, first and last, continually, at all times, follow the advice that was given the young man who asked a celebrated speaker as to what were the secrets of success, and was told that the first was preparation, the second was preparation, and the third was preparation. The man who depends upon extraneous or adventitious helps will sooner or later find that he is left in the race, and that the rich chances are not going to him but to the man who is thoroughly prepared, the man who is able to handle a large problem because he knows how, not because he has friends. There are plenty of opportunities everywhere, and when a young man is really ready for them he will not fail for lack of the chance. Therefore, in architecture as in every other department of industry, the first bread-winning requisite is thorough preparation.

Now let us consider what preparation means, and, understand, we are speaking now in a purely mercenary spirit and are viewing architecture simply as a means of winning bread and butter. And let us also be understood that many are called, but few are chosen, and that the personal equation always counts for a great deal in an artistic pursuit. By mere volition a man may not necessarily become an architect. There is an essential spark which is found to enter into the composition of every successful architect, and achievement is pretty fairly measured by the extent to which that spark is nurtured and tended until it develops into a flame which can fire men's souls. So that preparation means more than mathematics or the handling of a jack-plane, and simply as a matter of dollars and cents, the architect who would be successful must be, first and always, an artist. If he is not, if his preparation impels him to in any measure disregard his art, he may have irreproachable business methods, he may be the best constructor in the world, and may be able to hire all the artists in christendom to lend him ideas wherewith to clothe his dry bones, but sooner or later the public will find him out, will measure him for his just worth, and when the great opportunities arise they will be given to men who are able to do their work themselves. This is not sentiment: it is fact. Witness Violet-le-Duc, who was everything but an artist in his profession, and who, notwithstanding his brilliant success as a writer and a draughtsman, was not able to earn his living as an architect, and never had the creation of a single important building entrusted to him. Witness, on the other hand, the World's Fair last summer. The architects, who were especially honored and given the largest commissions were not the men who had the largest social connections or the greatest amount of personal magnetism, nor were they the most successful constructors, but were a selection of the best artists that this country has produced. There is no more common mistake made by young men entering architecture than to suppose that real artistic ability, as

such, does not count in a purely mercenary way, that it does not pay first and foremostly to be an artist in one's profession.

But while art is the first necessity of architectural bread-winning, there are other qualities which are very essential. The architect who expects large commissions must also have good business habits, be able to keep up the odds and ends of the tiresome minutiæ which are so inseparable from all building relations of any magnitude, must be able to keep the financial side of architecture in proper order, and be able to handle and direct his employés, whether actually in his office or indirectly employed around a building. And then, last in economic necessity, the successful architect must have a thorough scientific education. There is seldom a lack of this on the part of graduates from schools. Its absence is a very common failing with the so-called self-made men who have graduated from architects' offices. A hand-book and tables of beams and columns are not sufficient to teach construction, and a young architect who is to seriously compete for the great prizes must know how to scientifically construct his buildings.

Then beyond these three, which are really indispensable, there comes a fourth element, sometimes and in some emergencies quite as necessary, which is always displayed in a very marked degree by the successful architect, and that is common-sense; that indefinite quality which is so hard to define and yet which is so thoroughly appreciated by every one, whether applied to pure art, to dry business methods or to practical construction. The faculty to do things as they ought to be done, to design in a reasonable, appreciative manner, to carry on business in a logical, systematic way, to construct sensibly and without waste, all these are involved in common-sense as applied to architecture, besides which there is the common-sense which should be developed in intercourse with clients and with men, the common-sense which makes a man feel the importance of giving his client what he wants, rather than only what he thinks he wants.

Therefore, still considering architecture in a purely mercenary way, it pays to do the best work. It pays to be thoroughly prepared and equipped. Honesty is the best policy in every respect as a financial investment, and he who wins the most money in the profession and plans the most important buildings is not he to whom most has been forgiven, is not the man whose sins against good taste are pardoned because he is a good fellow, or whose badly-constructed buildings are condoned because of his relatives' influence, but is he who best serves the community. That this is fact and not theory, is becoming more apparent every year. The community is not composed entirely of fools. The general average of intelligence is quite equal to that of the average architect, and though bluff and influence may seem to count sometimes, in the long run the public will find out the difference, and with very few exceptions, looking over this country, it can be seen that the great buildings, the great opportunities, have fallen to the architects who are the best prepared in their profession.

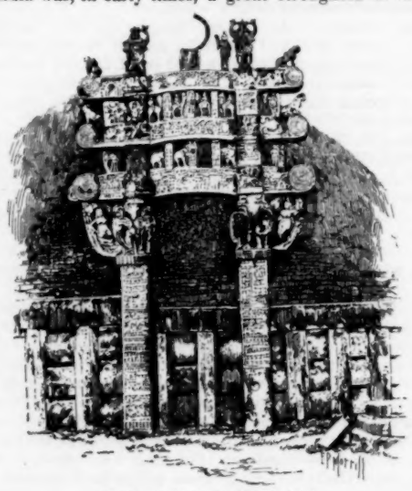
It is not always easy, however, for the young man just out of college, or just entering architectural business life, to know how to begin his post-graduate preparation. He may have his own ideals and it may take some time to have them adjusted and straightened to the necessities of business and of practical art. Let it be remembered in this connection that the line of progress in art or science is always along the line of least resistance. If we find in dealing with the world that our way is hard, that we are not received as we think we ought to be, it behooves us to look very carefully to see if we are right ourselves, and in most cases I will venture to assume that the trouble has been on our side rather than with the world. We need the world a great deal more than the world needs us, and it is no use for us to try to impose our ideas upon others unless those ideas are right. Don't give up ideals. Don't surrender any part of one's individuality, but be sure that the ideals are real and earnest and that our individuality is not a selfish one. Be ready to give the world what it wants, not necessarily what it thinks it wants, but strive in dealing with other men to find what are their real wants, and to fit art, science and business to those necessities. Business success is not incompatible with high ideals, but is often in a direct pecuniary sense an immediate result of them.

But all natures are not alike. Some men seem to be particularly adapted for artistic pursuits, others for business, and others again are of scientific bent, but if a man has to choose between the three sides of professional life, it is financially better for him to devote himself to art first, because that cannot be hired; his second choice might be the business side, but if circumstances or personal limitations are such that one element must be neglected, the architect's bread and butter will suffer least in the long run by entrusting to subordinates the scientific side of his profession. There are, however, natures which can not fully develop any one of these lines, and there are others who are absolutely unable to take care of more than one. All men can not be ideal, neither can all be successful, I mean in a financial sense Is, therefore, the pure artist to starve, and the scientist to stagnate, while business tact rakes in the shekels? Most assuredly, if the artist or the scientist sits down and bemoans his sad fate, and does not try to infuse common-sense into his art or practical business into his science. Fortune always was a lazy goddess, and the architect who would win her greatest rewards must be wide-awake, keenly alive to all the possibilities of his profession, and must try with all the powers within him to be not only an artist, not only a good business man, but a good all-around architect.

The question naturally suggests itself, after all the labor and hard work of preparation, the years of preliminary toil when the architect has no career behind him and everything is in the future, Are the prizes, after all, worth the effort? No, most decidedly, if any one enters the profession with the idea of acquiring a fortune: most assuredly not, if a man considers architecture simply as a means of satisfying his personal wants. Yes, emphatically, if the architect is the artist he might be. There are thousands of half-way, poorly equipped and very poorly remunerated architects in this country. On the other hand, there are hundreds of bright, smart men, who have good opportunities, are able to show every year what they are worth, can gratify reasonably their æsthetic tastes, and are possessed of comfortable incomes. These are the men who are to be successful architects in a pecuniary sense. They are generally also the ones who win the broader success and who at the end of their careers have the satisfaction of looking back on a life well done, a race well run, and a task accomplished in a manner which has brought its own reward. — *C. H. Blackall, in the Technograph.*

THE SANCHI TOPE.

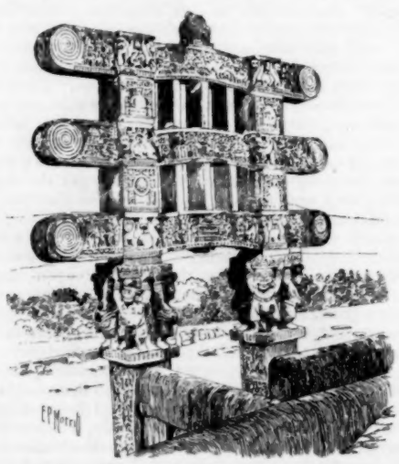
THE famous Sanchi Tope, in Bhopal, British India, is perhaps the most ancient and interesting of the Buddhist relics in the East. The word "tope" signifies a compact collection, whether of buildings or trees. In this case, it is used in relation to a mound. Central India was, in early times, a great stronghold of Buddhism.



The North Gate with Tope behind.

So substantial were all the temples and monuments erected by the adherents of that religion, that despite all the vicissitudes through which they have passed, the changing dynasties and antagonistic faiths of the rulers of the country, their remains are still abundant, and, to a large extent, in good preservation.

The town of Bhilsa, in the native State of Bhopal, gives its name

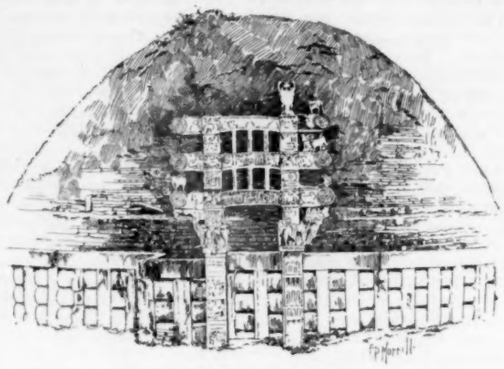


The South Gate.

to the surrounding topes, which thickly cover a district seventeen miles from east to west and six miles from north to south. These topes comprise about sixty-five individual sets, of which ten are in the neighborhood of Sanchi. Fergusson, in his well-known work

on "*Tree and Serpent Worship*," describes this series as "the most extensive, and, taking it altogether, the most interesting group of topes in India."

Sanchi is five miles south of Bhilsa. There was no city or town of that name; but there were large monastic establishments in the district, which gave wealth and prosperity to the surrounding neighborhood. The remains of embankments thrown across the valleys — the country around Sanchi being undulating — are thought to prove that the old-time Buddhist monks of this region were practical engineers, as well as agriculturists.



The Great Tope and East Gate.

Sanchi is referred to by the Chinese pilgrim as the great kingdom of "Sha-Chi." The great Tope of Sanchi, of which we give illustrations, occupies a commanding site on a hill. It consists of a basement, 121 feet in diameter and 14 feet high. On the top of this is a path, 5½ feet wide, within which the dome rises to a height of 39 feet. On the summit of the dome, there was formerly a level platform 34 feet across, surrounded by a circular railing of stones. Within this again was a square "Ter," consisting of 16 square pillars, 11 feet 6 inches each way, on which rested the golden umbrella, which always crowned these monuments. The superstructure has disappeared, but the shape of the massive mound remains unaltered.

The West Gate and Railwork.

Urn on Ground near the Tope.

Encircling the mound to a height of 7 feet from the ground, and 9½ feet from the base, is a remarkable railwork of stones dovetailed into upright pillars. There are 100 of these in all. Each was the gift of a different individual, as shown by the inscriptions on them. The whole is in a perfect condition of preservation.

Temple adjacent to the Tope.

Four gateways, on the north, south, east and west of the tope give access to the passage round the mound, inside the stone railwork. These gateways are covered with elaborately sculptured decorations, representing scenes in the life of Buddha, the Great Renunciation,

Upright Pillars: Remains of Temple.

Double-storied Temple adjacent to the Tope. Figure of Buddha inside.

and details of the Buddhist worship and ritual as they existed in the time of the renowned As-oka.

Of these gates, that on the north is the most perfect. It has an opening 7 feet wide between the two pillars. The height from

the ground to the top of the central ornament is 33½ feet. The architecture of these gateways is exceedingly fine.

A study of the various incidents depicted on them is very interesting. Most of the figures are those of Hindoos and their dress is much the same as that worn at the present day. The worship of the tree and of the serpent is constantly represented in the sculpture. Eating, drinking and love-making are also given much prominence.

There is nothing in the inscriptions which gives any satisfactory clew to the period in which the gateways were erected. But it is pretty generally accepted that they were added to the original structure during the Christian Era, probably at the close of the first century, A. D. The Sanchi Tope itself is considered to have been raised some three or four hundred years before Christ.

There are two or three other topes on the hill, but they are small and have no sculptures or special points to attract notice. In the immediate vicinity of the great Tope are the remains of two or three temples, one of which, of two stories, contains a large stone image of Buddha. There are also to be found numerous relics scattered about the ground, amongst which is an immense urn.

J. B. Braddon.

Simla, India, June 3, 1895.

The Illustrations

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

The Fugger and the Schnekin Chapels at Augsburg.

[Issued with the International and Imperial Editions only.]

THE fine old city of Augsburg contains three chapels erected during the Middle Ages by the great and wealthy family of the Fuggers. The first "Fugger Chapel" forms a church for the great almshouse called "The Fuggerei"; the second is attached to the nave of the beautiful Church of SS. Afra and Ulrich; and the third is situated at the west end of the nave of the Church of St. Anne. The last-mentioned is the one which we illustrate.

The Church of St. Anne was built between the years 1472 and 1510, but was very much modernized when it was made over to the Lutherans after the treaty of Munster. One very singular alteration appears to have been made at this time; the high altar was removed from the east end, and a new one set up in the Fugger Chapel at the west end, forming that portion of the church into a quasi-chancel.

The walls of St. Anne's Church are covered externally and internally with plaster, and with the exception of the vaultings of the nave and aisles, no old work is now to be seen.

The Fugger Chapel was undoubtedly, before the alterations to which we have alluded, separated from the nave of the church by a screen, probably of metal; its floor is still raised two steps higher than the rest of the church. In the west wall of the chapel are four arched marble recesses, which are not in a line with each other, but form a very slight angle. These recesses are filled-in with richly-carved monumental reliefs of a very uncommon character, at any rate for Germany. They are in low-relief, and are executed in fine statuary marble. The two outer compositions represent the armorial bearings of the Fugger family, borne up by figures in Eastern costumes (a Persian and an Indian), in a building crowned by domed vaulting, the whole represented in perspective and filled-in with trophies, wreaths, allegorical figures, etc., in the Italian style of the earlier part of the sixteenth century. The two inner recesses are occupied by reliefs representing sarcophagi with recumbent figures resting upon them, and sacred subjects filling-in the upper portions of the arcades. One of these represents the Resurrection, but the other has been very much mutilated, and is not quite intelligible. Above these four recesses is a balustrade of marble, forming a gallery in which is a fine old organ with painted wings, with a little choir-organ in front, which also has painted wings. This organ is adorned with a good deal of excellent carving, and in the "shades" of the centre compartment are two angels bearing a tablet inscribed with the date 1512. The whole of this work — recesses, screen and organ — was built at the expense of three brothers of the Fugger family, and would appear to date between the years 1505[1] and 1512, which makes it very interesting, as it is probably the earliest example of pure Renaissance design in Germany, no indication of Gothic influence being anywhere visible. There is a tradition that the organ was "designed by Holbein," and that the wings of the small choir-organ were painted by that master.

As, however, there were three Hans Holbeins, all Augsburg men, the probability is that, if any of them had anything to do with this organ, it was the *second*, not the third, who is so well known in England by his magnificent portraits; in fact, he could not have designed this work, which is dated 1512, as he was only fourteen years of age at the time.

The very fine paintings upon the shutters of the great organ are by Hans Burgkmair, one of the most celebrated of the Augsburg school of painters of the earlier part of the sixteenth century.

The sculptured reliefs in the recesses of the screen are said to be the work of "Candido," or de Witte (the former being simply an Italianization of the German "Witte"). Be this as it may, there can be no doubt whatever that these carvings are either by an Italian, or a German who had studied in Italy. A most curious proof of this is furnished by the fact that, in the perspectives introduced into the side panels, iron ties are represented at the springing of the vaultings. Now, no German or Frenchman would ever have done this, unless, as was the case with "Candido," he had received his art-training in Italy. We are unfortunately unable to find out for certain who it was that really executed these fine works, nor are we sure whether the "Candido," referred to is the same man who executed some works at the old palace in Munich and at Landshut. There is a good deal of very interesting Early Renaissance work in Augsburg which is of a very different character to that generally found in Germany, and it looks as though it were the work of Italians, or possibly of Germans who had been brought up in Italy. Now it is known that "Candido," studied in Italy, but his works at Munich, and in Castle Transnichts, at Landshut, singularly enough, are less Italian in character than the Fugger monuments at Augsburg, and it has struck me that it is probable that just as there were three Holbeins and two Burgkmairs in Augsburg, there may have been two Candidos — if a Candido was really the sculptor of the work in the Fugger Chapel.

Now we come to the singular fact that five years later than the Fugger Chapel another great and wealthy family in Augsburg, the Schnekins, were erecting at the church of SS. Afra and Ulrich, in the same city, a monumental chapel of the most opposite character — that is to say, a building in quite pure Gothic style, without any admixture of Renaissance — so that here we have two wealthy families, one employing an architect to erect a purely Italian chapel, and another patronizing an architect who was working in the pure Gothic style, just as we find things going on at the present day. The altar of the Schnekin Chapel is dated 1517, and the chapel is over the sacristy, on the north side of the choir of the church of SS. Afra and Ulrich. By rights we ought to specify that it is the "Catholic parish church of SS. Afra and Ulrich," because there is a Protestant parish church of the same dedication, which leads to considerable confusion in describing the churches, and even the indefatigable Kugler, in his "Kunstgeschichte," indexes this very church incorrectly, naming it as *two distinct churches*, one dedicated to St. Afra and the other to St. Ulrich. There *are* certainly two churches, but both are dedicated to SS. Afra and Ulrich, and the only possible way of distinguishing them is to state to which religion the one in question belongs.[2] The (Catholic) parish church of SS. Afra and Ulrich is a very noble example of a third pointed tower church of grand dimensions, 318 feet long, 94 feet wide (over nave and aisles), and 100 feet to the crown of the vaulting. The nave was commenced in 1476, by an architect named Hans Luitpold, but the choir was not begun until the year 1500, under the celebrated architect and sculptor, Burkost Engleberger, who also designed the aisles and pulpit of Ulm Cathedral. No doubt Engleberger's work included the Schnekin Chapel, which must have been very little later than the choir, but was completed earlier than the latter, which was not entirely finished until the close of the sixteenth century. The Schnekin Chapel, however, was certainly finished in 1517, as the beautiful altar bears that date. The reredos is a very fine work, carved in pine-wood, gilt and painted. The triptych is rather singular in arrangement, as the doors have very long hinges, so that the extreme outside statues and canopies are seen whether the doors are open or closed; in the former case, they show between the hinges, and in the latter outside the doors. There is another feature which we have met with elsewhere, and that is the glazing of the little window-like piercings behind the figures and under the canopies. The saints represented are as follows, commencing at the top: 1. St. John the Baptist, to whom the chapel is dedicated; 2. St. John baptising our Lord; 3, 4, 5 and 6. Angels bearing emblems of the Passion; 7 (in centre). Madonna and Child; 8. St. Catherine; 9. St. Afra; 10. St. Ulrich; 11. St. Anthony; 12. St. Ulrich; 13. St. Rock; 14. St. Boniface. The pictures on the wings or doors represent the Annunciation, the Presentation, the Nativity and the Judgment of Solomon; but these have unfortunately been so abominably retouched, some seventy or eighty years back, as to be ruined. The altar itself is perfectly plain, with a moulded "mensa" and an arched perforation in the centre. The work is attributed, and, I think, correctly, to Tilman Riemenschneider, of Wurzburg, as there are more than one singularity of treatment in common between this and Riemenschneider's altar at Rothenburg, in addition to which, the figures, allowing for difference of material, greatly resemble those on the columns of the Marienkapelle, at Wurzburg, the tomb of St. Henry at Bamberg, and the monument of Bishop Scherenberg (illustrated in the *Builder* a few years back) in the Cathedral at Wurzburg.

The entire absence of any kind of Classical ornament from the details of this altar is very singular when we consider its date, 1517, and the fact that the Fugger Chapel, which was certainly completed five years earlier, is quite as purely Renaissance and free from Gothic detail. These examples of two distinct styles of architecture

[1] This is an "obit date," so probably the work is rather later.

[2] Baedeker speaks of a "Protestant and a Catholic Church, both dedicated to St. Ulrich," which is also incorrect.

being carried on at the same time, serve to show that the present architectural practice can derive some countenance from that of the Middle Ages; and very likely if we knew all, we should find that architects' patrons in the Middle Ages did not differ very much from those of the present day, and were just as full of whims and fancies. *H. W. Brewer, in the Builder.*

ORGAN CASE, ST. SAVIOR'S CHURCH, SOUTHWALK.

[Issued with the International and Imperial Editions only.]

THE proper position for the organ in this church, after the rebuilding of the nave, was for a considerable time a matter of animated discussion.

Many suggestions were made, and models were even erected, but it was ultimately agreed that there was no place for it within the church which was not open to grave objections, either acoustic or architectural. No alternative remained but the erection of an organ-chamber — in many ways an unsatisfactory expedient, but in this case inevitable.

The only place for it was the angle between the east wall of the south transept and the south choir-aisle on part of the site of the chapel of St. Mary Magdalen, which was pulled down in the early part of the present century. Two arches in the choir-aisle and one in the transept, formerly opening into this chapel, have been cleared out without interference with any ancient work, and it is in front of the latter that the case shown in the drawing will be erected.

The organist's console will be immediately behind the choir-stalls on the south side.

The organ is being built by Messrs. T. C. Lewis & Co., and, together with the organ-chamber, is the gift of Mrs. Courage of Queen's Gate, as a memorial to her husband.

The drawing was exhibited in the Royal Academy and is here copied from the *Builder*.

SOUTH TOWER OF THE CATHEDRAL OF TOURS.

[Issued with the International and Imperial Editions only.]

THIS plate is copied from *L'Architecture*.

UNIVERSITY AND TERRITORIAL LIBRARY, STRASBURG, GERMANY. PROF. S. NECKELMANN, ARCHITECT, STUTTGART, GERMANY.

[Issued with the International and Imperial Editions only.]

THIS plate is copied from *Architektonische Rundschau*.

OFFICE-BUILDING, 60 STATE STREET, BOSTON, MASS. MESSRS. CABOT, EVERETT & MEAD, ARCHITECTS, BOSTON, MASS.

RAPID TRANSIT (GIRDLE LINE) SYSTEM FOR NEW YORK CITY, DEVISED BY MR. ALFRED H. THORP, ARCHITECT, NEW YORK, N. Y.

FOR description, see article elsewhere in this issue.

[Additional Illustrations in the International Edition.]

SUFFOLK NATIONAL BANK BUILDING, 60 STATE STREET, BOSTON, MASS. MR. EDWARD C. CABOT, ARCHITECT, BOSTON, MASS.

[Gelatine Print.]

TEN years ago, this building might have been taken as typical of the architecture of the banking quarter on State Street, and as it is one of the latest to give place to the modern high office-building, it seems worth while at this time to make a record of a type of building and phase of architecture which have lived their day.

PAINTED PANELS FOR A DINING-ROOM, BY THE LATE M. MAZEROLLE.

NORTHEASTERN STATION HOTEL, NEWCASTLE, ENG. MR. WILLIAM BELL, ARCHITECT.

THE NEW HOUSE OF THE BERLIN CLUB, BERLIN, PRUSSIA.

IN connection with our series dealing with American club-houses, a study of this new German club-house should prove interesting. The plate is copied from the *Deutsche Bauzeitung*.

THE DRAWING-ROOM: HALL OF THE GROCERS' COMPANY, LONDON, ENG. MR. H. C. BOYES, ARCHITECT.

THE chimney-pieces are executed in alabaster and marble. The frieze was modelled by Mr. G. Seale. The plate is copied from the *Building News*.

OLD HOUSES AT BRUGES, BELGIUM.

THIS illustration is copied from *L'Emulation*.

COTTAGES IN THE BLACK FOREST.

THIS plate is copied from the *Zeitschrift für Bauwesen*.

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.*]

THE RIMINGTON COLOR ORGAN.

35 ALBANY ST., LONDON, N. W., August 5, 1895.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — From your account of Mr. Rimington's color organ, I fancy you think that the instrument plays the music as well as the colors. This is not so. The organ is played as a dumb-piano might be, while some one else plays a piano, or at times we had the orchestra.

I believe the idea is, that supposing any one were so skilful in the colors as to be able to follow it as a very clever musician may a full score — the pleasure would be the same *as hearing music*. But how many musicians really get the same pleasure from the score as from the sounds?

The effect of colors was charming, but monotonous; the combination to me (being a musician) most distracting. I hold that if one gets pleasure from music while some lovely sunset is playing before one's eyes, one need not really observe the sky much — and *vice versa*. Can one take in two things at once? Opera? Yes. But, as a fact, do you not observe scenery, action and so on, slightly, if you attend to the music intellectually? Could you tell next day the color of a gown, if you were wrapped up in the music? It is really one harmonious whole. Whereas Mr. Rimington's effects change so rapidly and dodge about so — in a slow note the color remains, but a trill is most confusing — that to me it was most distracting. If you want to try the effect, put your hand on your gas or lamp screw and turn it suddenly up and down. At last it made my head ache so, I ran away! I think, perhaps, you may like these personal notes upon a very interesting subject. S. BEALE.

ASH-CONCRETE FILLING.

NEW YORK, N. Y., August 22, 1895.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In a recent article in speaking of fireproof material and of the experiments about to be made by a joint committee from several societies in this city, Mr. Alex. Rice McKim calls attention to the ash-concrete filling of floors. He says, "In my opinion there is too much of this used altogether. By filling up the space between the tile and (wood) flooring, as is usually done, air is excluded, and the sleepers and under-flooring decay more rapidly than otherwise; moisture from this mass of concrete penetrates the tile arch and stains the plaster; and the dead weight of the floor is materially increased.

"The beams, of course, should be entirely encased by concrete and tile, so as to protect them as far as possible from fire; but wooden floors can be carried to better advantage entirely by the sleepers, which need be but 4″ deep and can be notched if necessary, and with as little material in between the beams as possible."

I think many of the architects who have looked into this subject will agree with Mr. McKim in the above.

Yours truly, ARCHITECT.

EXHIBITIONS

BOSTON, MASS. — *Summer Loan Exhibition; Gobelin Tapestries; Japanese Paintings; Line Engravings, Mezzotints, and Etchings by Rembrandt:* at the Museum of Fine Arts.

NEW YORK, N. Y. — *Twenty-eighth Semi-annual Exhibition:* at the Metropolitan Museum of Art.

Summer Charities Loan Exhibition: at the American Art Association Galleries.

NOTES AND CLIPPINGS

SALT-WATER SUPPLY IN SAN FRANCISCO. — The recent disastrous fire in San Francisco, when $1,000,000 worth of property was destroyed, shows the lack of a proper system of fire-protection. The water-pressure was altogether too low. With a view to remedying this evil, which is recognized by the authorities, the Olympic Salt Water Company of San Francisco, has for some months past been laying its mains, and intends to bid for the patronage of the city. The Company proposes to offer the city free of cost all the salt water needed for sprinkling purposes in the section where their mains are laid and their

hydrants set. Fighting fire with salt water is not an experiment, but has been successfully used in England for years. It has been proved beyond question that salt water is best adapted for fire purposes, and there are several reasons why this is so. First, the density of the water does not allow it to evaporate so readily, thus allowing it a longer period to get in its destroying power. Again, salt water weighs sixty-four pounds to the cubic foot, as against sixty-two pounds for fresh water. The difference, of course, is found in the salt. It is claimed that one service of salt water is equal to three in fresh. Returns from seventeen English cities where salt water is used for sprinkling purposes show that the streets have gradually become macadamized. The mortality has also decreased from twenty to thirty per cent. The Olympic Company has a reservoir with an elevation of 320 feet above the city. The reservoir is on Point Lobos Avenue, near Josephine Street and has a capacity of 4,500,000 gallons. — *Fire and Water.*

The Highest Trees in the World. — In the Victorian State Forest, on the slopes of the mountains dividing Gipps Land from the rest of the Australian colony of Victoria, grow the highest trees in the world, the noble gum trees of the genus eucalyptus. These trees range from 350 feet to 500 feet in height. One of the huge trees that had fallen was found, by actual measurement with a tape, to be 438 feet from the roots to where the trunk had been broken off by the fall, and at that point the tree was 3 feet in diameter. A cedar tree recently felled near Acosta, Wash., measured 467 feet in height and 70 feet in circumference. Dr. James gives some interesting particulars of these gum trees. The eucalyptus globulus grew 40 feet high in four years, in Florida, with the stem a foot in diameter. Trees of the same species in Guatemala grew 120 feet in twelve years, and had a stem diameter of 9 feet. Other species also attain enormous sizes — eucalyptus diversicolor is know to grow 400 feet high, and trees have been measured 300 feet long without a branch. Boards 12 feet wide can frequently be obtained. In 1860 a monster petrified tree was found in Baker County, Oregon. It was just 666 feet long, and at its butt was quite 60 feet in diameter. Amber-like beads of petrified gum adhered to the sides of the trunk for a distance of 100 feet or more. — *London Tit-Bits.*

An Economy of Power. — A Chicago engineer, Prof. John P. Barrett, has originated a plan for combining the electric-lighting and water-supply systems of that city so as to gain a great economy of power. The electric-light plants require the use of dynamos for lighting purposes during those hours when there is the least demand for water. At night the great manufacturing plants are shut down and make but slight demands on the water-mains. In summer the demand for water is almost doubled, and during the same months less is required of a dynamo for lighting purposes. In the heated season it is not necessary to turn on the current for street-lighting until after all lawns are sprinkled and the 10,000 steam plants of Chicago have ceased drawing water from the mains. In the winter months there is not so much trouble with the water-supply, and less is required to make up the deficit of pressure. Prof. Barrett proposes to connect the great dynamos in the four electric-light plants belonging to the city with electric-motors, which will furnish power to such minor pumping-stations as the water-department may decide to establish. For the operation of the smaller pumping or re-inforcement stations he proposes two plans: The first is to operate with the pump directly on the mains with what may be termed a "run-around." The pump would then create a suction from the direction of the main pumping-station and exert a force in the other and opposite direction. The second plan is to erect a water-tower, pump the water through the pipes from the direction of the tunnel, and force it into the tower. The dynamos could be connected with a float in the tower which would operate a governor or regulator, by means of which the height of the water would regulate the speed and capacity of the pump. In this way the system would be automatic and self-regulating. — *N. Y. Evening Post.*

A Big Church to be moved Bodily. — If the building-mover who signs the contract to move Immanuel Baptist Church, Michigan Avenue, near Twenty-third Street, successfully performs the work he will have done one of the most remarkable feats of building-moving ever known. The contract calls for the moving of the church in its entirety fifty feet south and nine feet east, and it is an undertaking well covered with risks. Immanuel Church is built of stone, has a self-supporting roof, and to the eye of a builder has the appearance of a big nutshell. There is a sixty-five-foot steeple on the top of this church. With all the risky features in connection with the project, there are two contractors willing to do the job and their bids on the work are now under consideration. When the idea of moving the massive hollow structure with its towering spire was first broached, it was laughed at by many, but the people who wanted the church moved knew what they were talking about. These were the proprietors of a hotel, whose interest it was to have the edifice a little farther south, because it darkened all of the best rooms in the hostelry — those of the south exposure. The hotel company buys the fifty feet of property south of the church property from B. F. Jacob for $30,000, and deeds it to the Immanuel Church. It pays the expense of moving the church, its re-construction and re-decorating. It is estimated that this part of the job will cost $65,000. The trustees of the church, in exchange for the property bought from Jacobs, relinquish to the hotel company the open fifty feet created by the removal of the church. The removal does not cost the church a cent. — *Chicago Tribune.*

Lowering the St. Lawrence River Level. — The Canadian Government is worried over the effect of the Chicago drainage-canal upon the level of the St. Lawrence River, whose present low water, it is feared, will be rendered still lower by the opening of the canal. It is pointed out by the Dominion authorities that in 1881 they deepened the rapids below Ogdensburg from ten to sixteen feet, which added from six to eight per cent of water to the free channel. There was feared that the level of Lake Ontario would be considerably lowered, and finally the matter was investigated by General Comstock and Colonel McFarland, of the United States Army Engineer Department. The conclusion was that the effects would extend to no great distance, and that the level of Lake Ontario would not be impaired. Similar cases are presented by the Lime Kiln crossing of the Detroit River and at the St. Clair flats. It was shown that the level was not affected in 1881, and that the water-level at Niagara Falls will be lowered from two and one-half to five inches — probably not more than four inches. If there is four inches of difference at Niagara, there will, therefore, be still less change at the St. Lawrence rapids. In fact, the actual variations from change of wind and barometer are greater. A strong south-west wind will cause the level of Lake Michigan to vary as much as eighteen inches within twenty minutes. The Chicago canal will connect the lakes with the Illinois River, and so with the Mississippi and the Gulf of Mexico. — *Fire and Water.*

The Clay Industry. — For the first time in its history, the extent of the clay-working industry will be thoroughly given in the forthcoming report of the Geological Survey. Information gathered by the survey officials from representatives of over 14,000 firms and individuals employed in the business leads them to place value of over $65,000,000 upon the clay products of the United States for 1894. The census compilation made the value of the product in 1890, $67,000,000. Fifty-three per cent of the product in 1894 was in bricks, over six billions being accounted for. There were enough of them to make a walk over eleven feet wide all around the globe. Ohio stands at the head of the States in clay manufacture, its product being valued at $10,668,000, or over 16 per cent of that of the whole country. Illinois comes next with 13 per cent, Pennsylvania 11 per cent, New York 8 per cent, New Jersey 6 per cent, Indiana 5 per cent, Missouri and Iowa 4 per cent, Massachusetts and Michigan 3½ per cent, Maryland, Wisconsin and Minnesota 2 per cent. The largest deposits of asphalt known are found in California, Utah, Oklahoma, Texas and Montana. That from Utah, the reports say, is the purest in the world, the total production in 1894 being valued at $353,000. Soapstone is found in all the Atlantic States, the principal deposits being in New York and North Carolina. The product for 1894 was valued at $401,000, an increase of about sixty per cent over 1893. — *Boston Transcript.*

Wind Velocities and Pressures. — Mr. E. F. Miller, in the *Proceedings* of the Engineers' Club of Philadelphia for April, gives a table of wind velocities observed by the United States Weather Bureau at Philadelphia. For calculating the pressure per square foot the equation used was: $P = 0.004\ V^2$. The table is as follows:

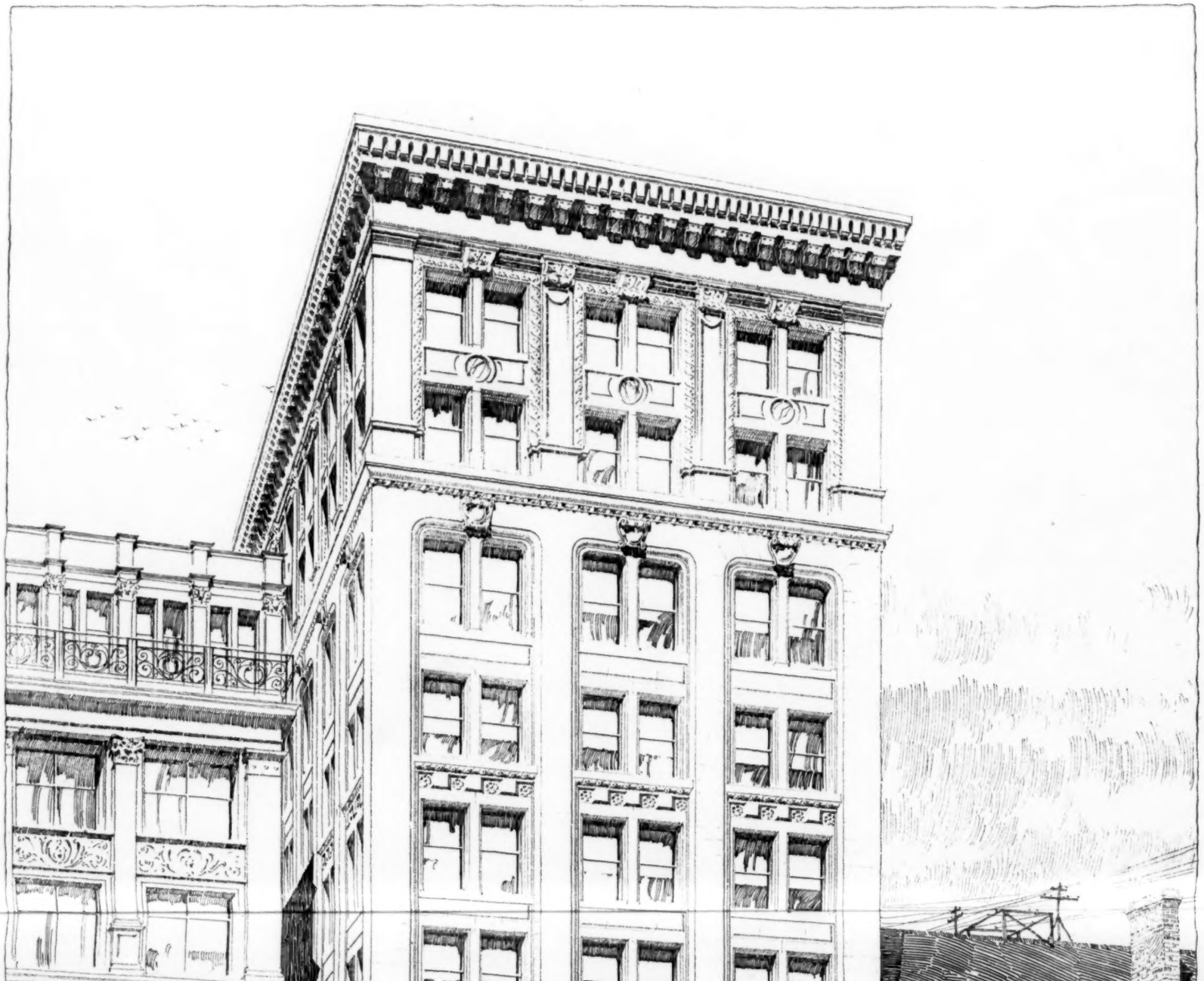
Highest velocity in the month of	Occurred in the years of	Velocity recorded by anemometer M. P. H.	Corrected velocity M. P. H.	Corresponding pressure per square foot.
January	1878 & 1885	52	42.2	7.13 lbs.
February	1876, '80, '86	48	39.3	6.18 "
March	1888	60	48	9.22 "
April	1879	50	40.8	6.67 "
May	1889	60	48	9.22 "
June	1889	46	37.8	5.72 "
July	1876	40	33.3	4.44 "
August	1893	55	44.4	7.89 "
September	1889	54	43.7	7.64 "
October	1876	75	58.7	13.74 "
November	1873	66	52.3	10.94 "
December	1876	63	50.2	10.08 "

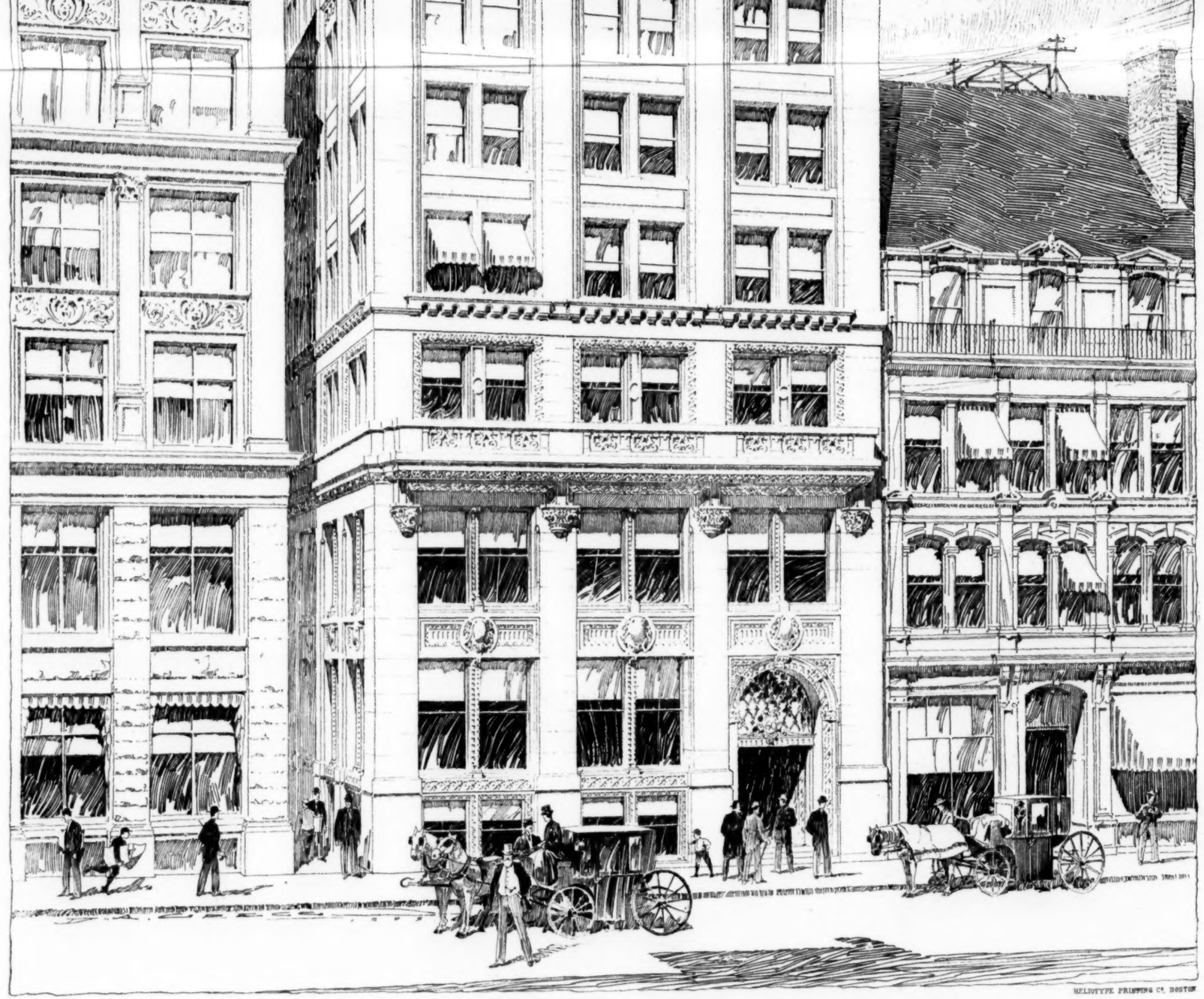
Sacred Sewage. — For many years past a resident near Hampton Court has been complaining of the discharge of sewage from two drains into a small stream which passes his garden and enters the Thames just above the intake of one of the water companies. So long ago as 1888 the Conservators of the Thames called upon the sanitary authority in whose district the drains are, to prevent the pollution of the river. But, from that day to this, nothing has been done, owing to the fact that the chief offender is the Crown, and against the Crown no proceedings can be taken. The bigger of the two drains comes, it seems, from the Royal Mews. Its exalted source does not, however, make the sewage any the less offensive and poisonous; and I would humbly suggest that the privilege of creating a nuisance and polluting the water-supply of the metropolis might be voluntarily surrendered without any serious loss to the dignity and authority of the Crown. — *London Truth.*

The Plan of the Greek House. — The work carried out by M. Homolle adjacent to Delos has very much enlarged our knowledge of the domestic life of the Greeks, beside yielding many fine art objects. The *Athenaeum* says that the town in proximity with the harbor has the same interest as Pompeii possesses. We can now understand what was the plan of a Greek house, something we only knew theoretically by studying Vitruvius. The ground near to the harbor shows what must have been commercial warehouses and private dwellings. They have more than such decorations as of wall paintings and mosaic floors, and contain works of sculpture. This work at Delos promises great results, and there is the possibility of finding some masterpieces of Greek sculpture.

Molasses as a Paving Material. — E. Furke, the head chemist of a sugar refinery at Chino, Cal., has invented a queer pavement. It is made mostly of molasses, the kind used having been a refuse product hitherto believed to be utterly worthless. It is simply mixed with a certain kind of sand to about the consistency of asphalt, and laid like an asphalt pavement. The composition dries quickly, and becomes permanently hard. The heat of the sun, instead of softening it, makes the pavement harder and drier. A block of the composition successfully withstood repeated blows of a machine hammer, and showed no signs of bending or cracking. — *N. Y. Tribune.*

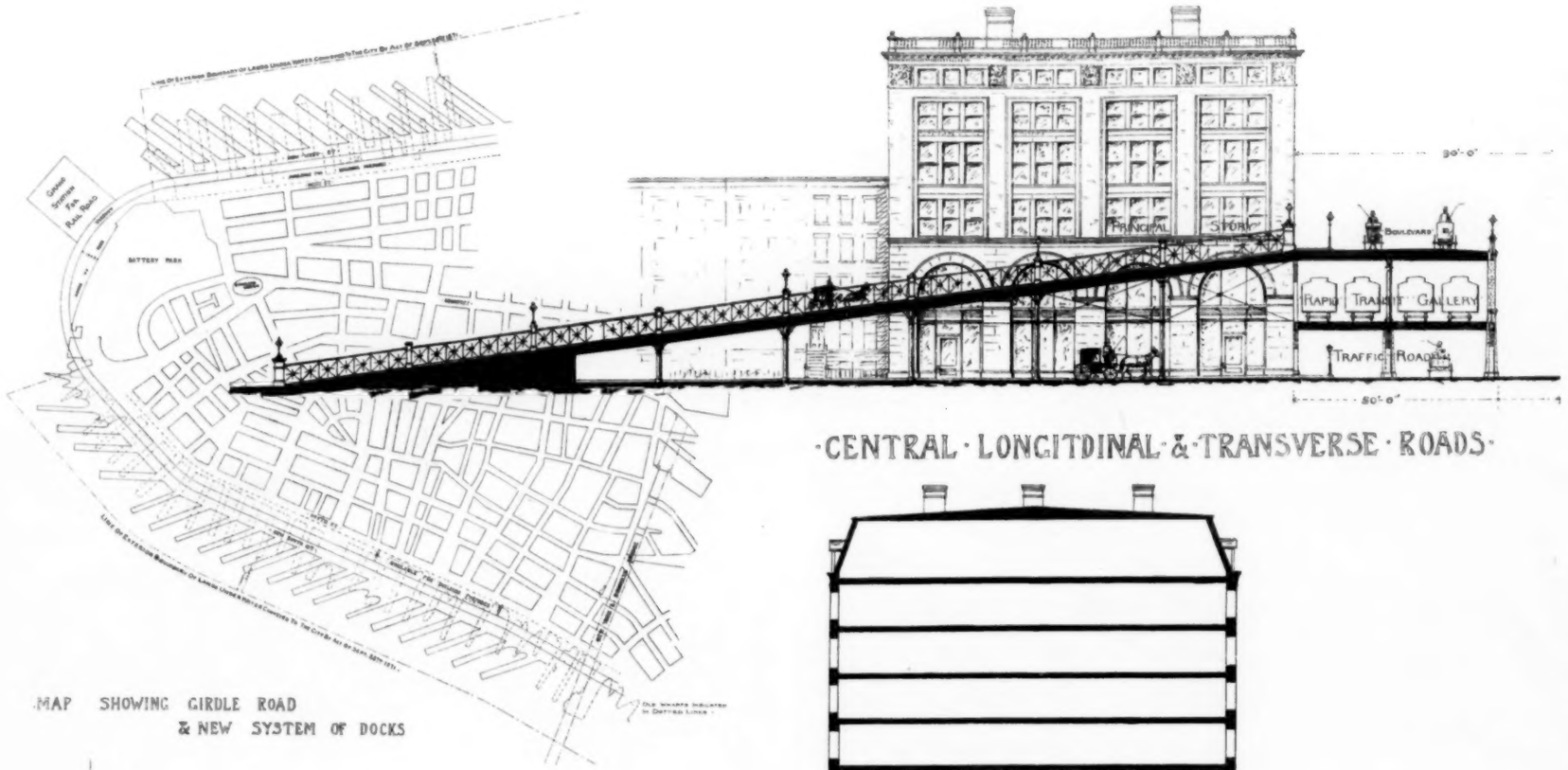
S. J. Parkhill & Co., Printers, Boston, U. S. A.





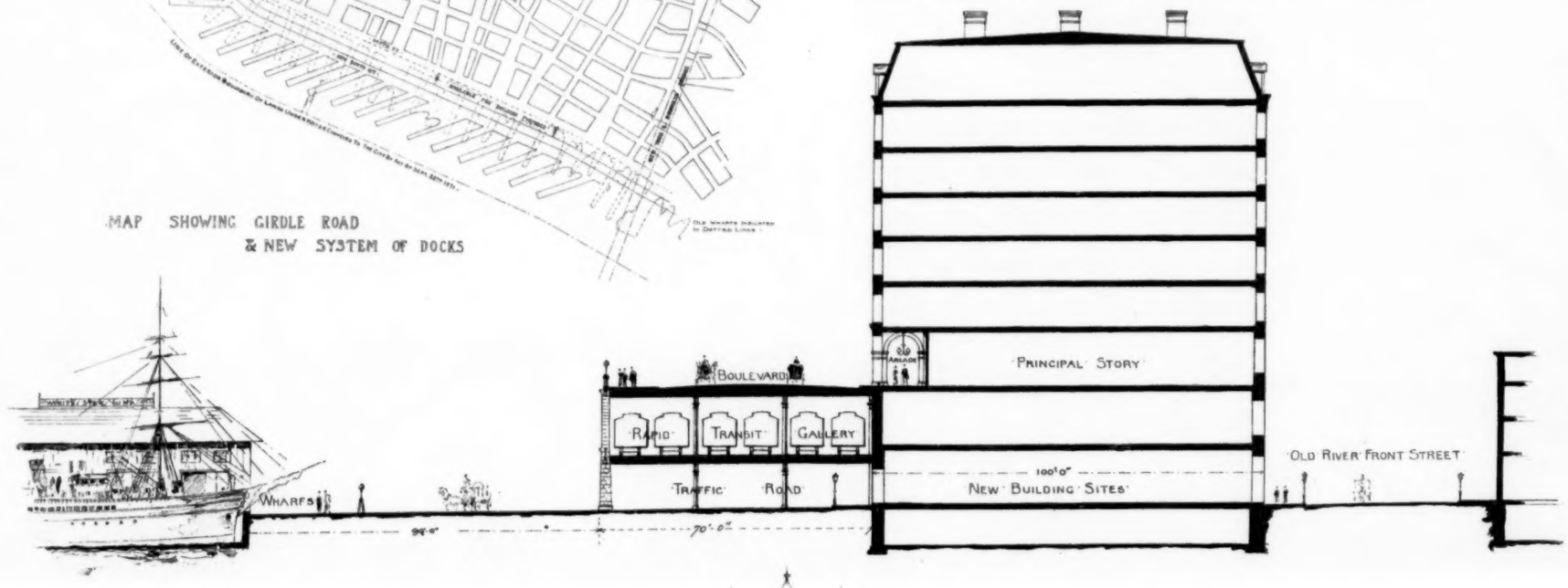
NEW OFFICE BUILDING, 60 STATE STREET, BOSTON, MASS.

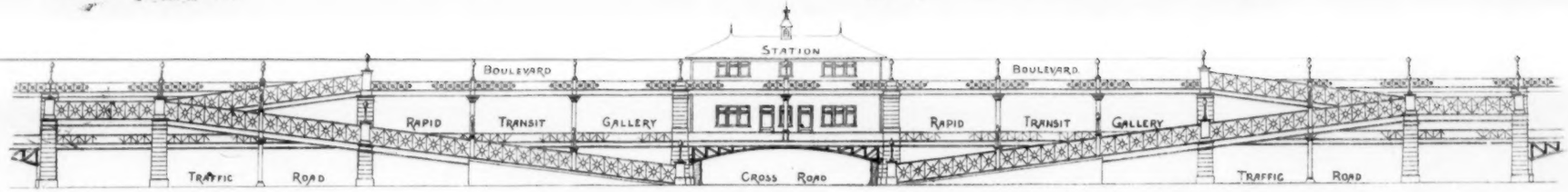
CABOT, EVERETT & MEAD, Architects.



MAP SHOWING GIRDLE ROAD
& NEW SYSTEM OF DOCKS

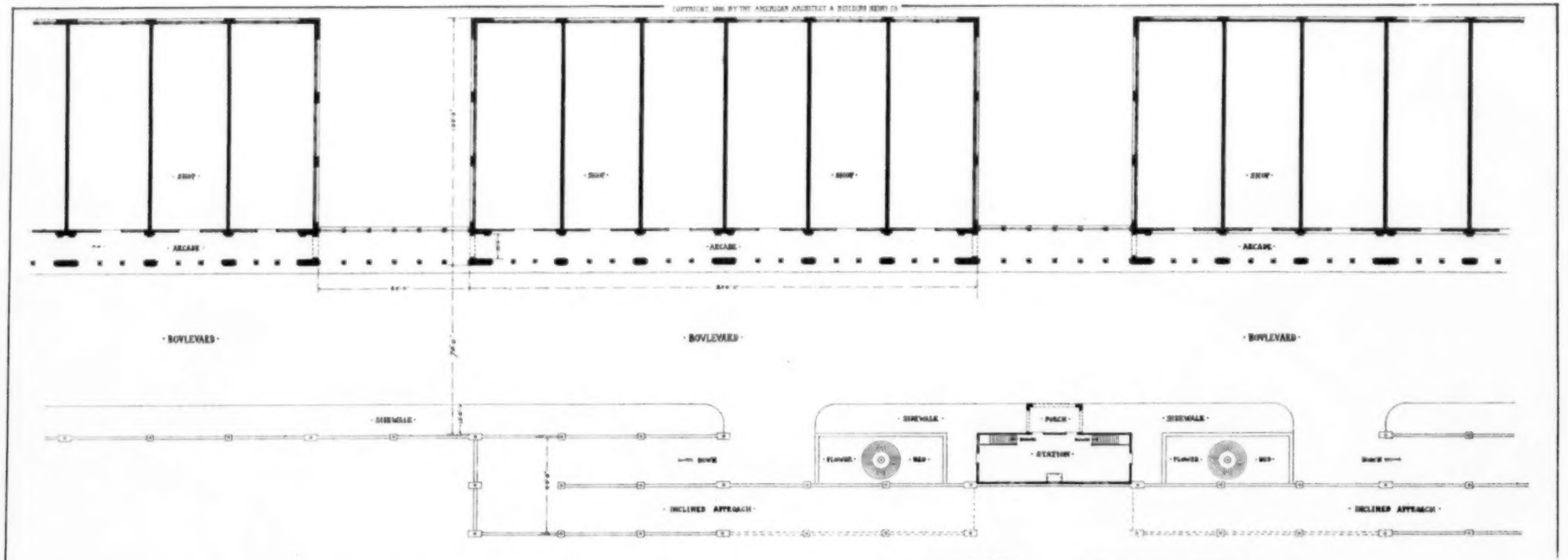
CENTRAL · LONGITDINAL · & · TRANSVERSE · ROADS ·



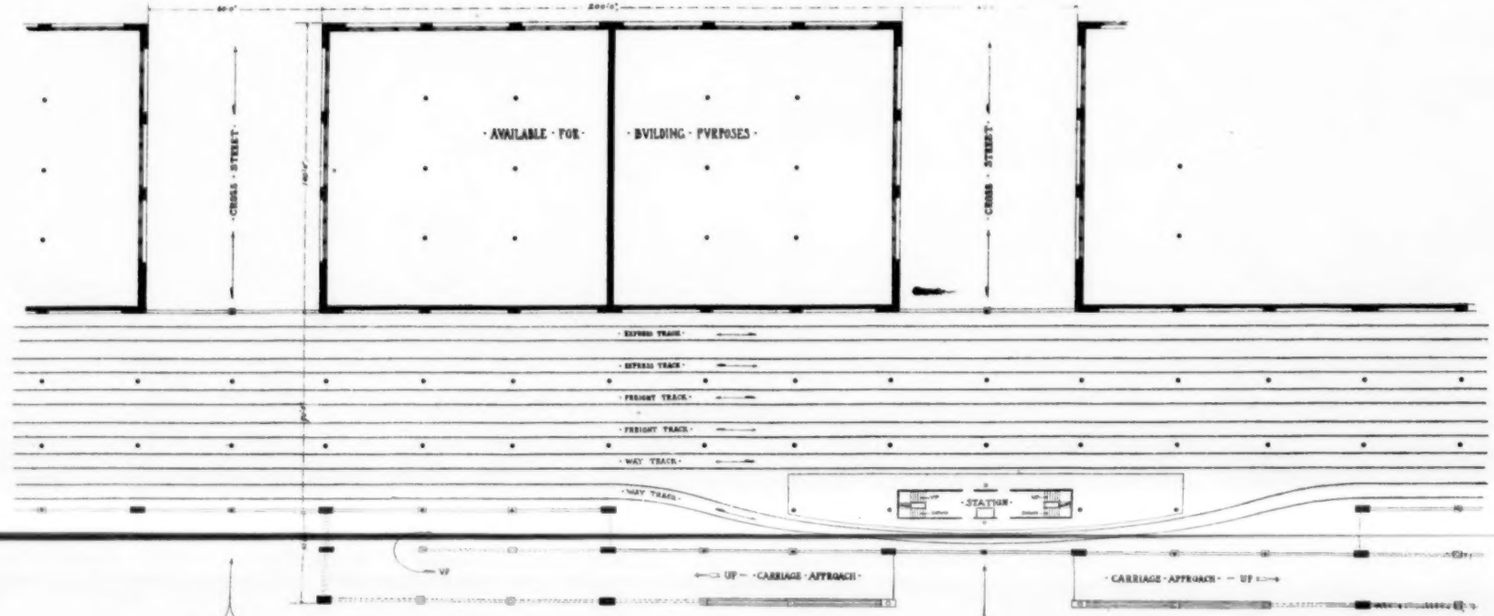


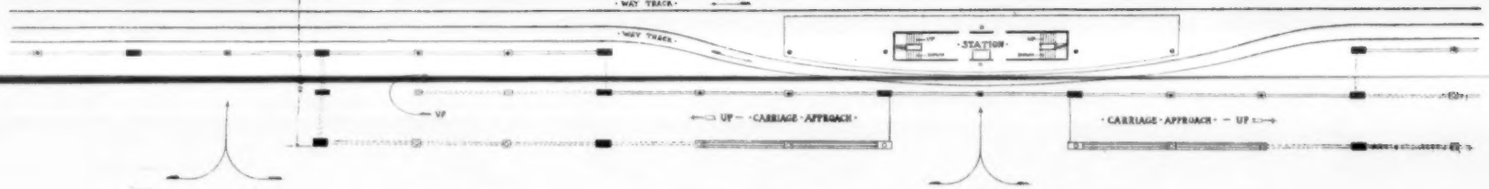
· CIRDLE · ROAD · · ELEVATION · FROM · RIVER · · SHOWING · CARRIAGE · APPROACHES ·

· VIEW OF GIRDLE ROAD FROM THE RIVER FRONT ·



CIRCLE ROAD. PLAN OF ELEVATED BOULEVARD.





GIRDLE ROAD PLAN OF RAPID TRANSIT GALLERY SHOWING STATION & PLATFORM

GIRDLE ROAD PLAN AT STREET LEVEL

HELIOTYPE PRINTING CO. BOSTON