THE AMERICAN ARCHITECT

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The New Terminal Station, Birmingham, Ala.

THOUGH much has recently been written regarding the material changes which have taken place in the Southern States during the last one or two decades, it remains for the traveler, who perhaps has been accustomed to think of the South as a section devoted almost entirely to the cultivation of cotton, rice, tobacco and sugar, and who sees on every hand the great manufacturing plants in which are fabricated not only the materials raised on the plantations and the minerals taken from recently developed mines, but materials brought from all other sections of the country, to fully realize that the South is even now abreast of the East and West in commercial activity and development.

Foremost in this great development have been the railroads, which, in addition to the building of thousands of miles of new lines, have, in many instances, been compelled to practically rebuild the old and poorly constructed short lines, which were tied together in the formation of the present great systems.

In a short time villages have changed into towns and towns into cities, so that not the least problem confronting the railroads has been that of providing for the convenient and adequate handling of their increased passenger service at transfer points and terminals.

The efforts which they have made to solve this one of their many problems is evidenced by the passenger stations at Columbia, Charleston, Savannah, Jacksonville, New Orleans, Mobile, Meridian, Atlanta, Chattanooga, and Birmingham, all constructed within the past few years.

The Birmingham Terminal Station, which was opened to the public on April 6, is the most extensive of the stations so far built in the South. It is used jointly by the Southern, Seaboard, Central of Georgia, Alabama Great Southern, Frisco System and Illinois Central.

The problems presented in planning this station were, briefly, the provision for ten through tracks and a station building for the accommodation of white and colored passengers, baggage, express and mail. The depth of the building site was limited to 180 feet between the western track and Twenty-sixth Street and the width to 785 feet, from Fourth to Sixth Avenue.

The closing of Fifth Avenue by the tracks and the building made it necessary to make a subway of it fifty-six feet in width, with head room of 17 feet, under the building and tracks. Fifth Avenue was widened from Twenty-fifth to Twenty-sixth Streets and the subway constructed from Twenty-fifth to Twenty-seventh Street, leaving a double driveway on grade from Twenty-fifth to a plaza over the subway at Twenty-sixth Street. Two stairways connect the plaza and subway.

The building faces the plaza and Twenty-sixth Street, with its axis on the center of Fifth Avenue. The waiting rooms are located in the center, the baggage and mail rooms in the south wing and express rooms in the north wing. A passenger "midway," 40x271 feet, is located between the tracks and the central part of the station building, and trucking platforms twenty feet wide are located between the tracks and the baggage and express wings of the building, with cross-overs for trucks connecting the platforms at the north and south ends of the train shed. A wide stairway connects the midway with the Fifth Avenue subway.

The train shed, constructed of reinforced concrete, is

VIEW LOOKING SOUTH BIRMINGHAM TERMINAL

780 feet long, covering two platforms and four tracks, and 630 feet long, covering three platforms and six tracks. The total width is 210 feet over five platforms 19 feet 6 inches each in width, and two single and eight pairs of tracks.

To avoid the "cutting" of trains and the crossing of tracks by the passengers a passenger subway twenty-eight feet in width, with nine feet clearance, is constructed under the train shed, with two stairways to each platform, and entrance and exit stairways with gateways on the midway. The passenger subway has an exit stairway to the Fifth Avenue subway. The roof of the midway is of reinforced concrete with skylights.

The train shed is a series of connected "umbrella sheds." The sheds over the platforms are low, clearing the tops of the coaches only a few inches, while the sheds over the tracks have a clearance of twenty-one feet above the rail, and overlap the platform sheds, thus affording protection from weather and giving ventilation and light without the use of skylights. Longitudinally the sheds are a series of arches supported on beams resting on columns and cantilevers, spaced twenty-foot centers on platforms; in cross section the roofs slope towards the center of each section, collecting rain water over centers of columns, in which are embedded downspouts with connections to drains under platforms.

The well-known type of train shed constructed of steel and wood has long been looked upon as most objectionable, not only on account of the difficulty of constructing it in proportion to the station building, but on account of the accumulation of smoke and gases and the excessive cost of maintenance. The shed at Birmingham, after designs by Mr. Walter H. Harrison, civil engineer, gives promise of a satisfactory solution of this problem in station building.

In the center of the station building is located the general waiting room with smoking room, barber shop, ladies' waiting room, news and refreshment stands, telegraph and telephone booths, ticket office and information bureau adjoining.

In front of the main waiting room and facing the plaza is an arcade twenty feet in width, with vaulted ceiling of tile, from which may be entered direct the smoking room and ladies' waiting room. This arcade is entered under cover of a marquise of iron and glass.

To avoid congestion due to the waiting room being used as a passageway, two covered concourses, thirty feet in width, on the north and south of the main waiting room, connect the midway with the plaza. The refreshment stand, news stand, telephone and telegraph booths and information bureau are located on the east side of the main waiting room, so as to be accessible from the midway. To the left of the north concourse, as you enter, are located the lunch room, dining room, service rooms, kitchen, etc. The lunch room, designed and thoroughly equipped for quick service, is reached from both the concourse and midway, the dining room being located in the front as far as possible from the noise of

trains. Serving rooms are provided between the lunch room, dining room and kitchen, and connecting with the latter is a large store room and refrigerating department. On the right of the concourse is the station master's office.

To the right as you enter the south concourse is located the waiting room for colored people, with the smoking room, woman's retiring room, toilet rooms and lunch counter adjoining. The ticket office is located between the south concourse and the main waiting room, so as to be accessible to both white and colored passengers. The checking space of the baggage room opens both into the south concourse and midway, so as to be equally accessible to both races.

The necessity for separate accommodations for the two races, which is now required by statutes in most of the Southern States, creates a problem not met with in the planning of stations in other sections of the country. The accommodations for the colored race are required to be equal in every respect to those for the white people, and the economy of operation requires that they be so located as to be accessible to the ticket office, baggage rooms, etc., and prompt service rendered without material increase in the operating force of these departments.

The toilet rooms throughout the building have floors of marble tiles and marble wainscoting and partitions eight feet high. The fixtures are heavy and substantial. All connections are located in spaces behind wainscot; these working spaces and the toilet rooms are ventilated by exhaust vans operating in vent ducts.

Barber shop and baths adjoin the smoking room and men's toilet. A maid's room with bath connects with the ladies' waiting room and toilet.

DETAIL OF MAIN PASSENGER ENTRANCE BIRMINGHAM TERMINAL

DETAIL OF NORTH TOWER BIRMINGHAM TERMINAL

In the mezzanines, reached by stairways from the north and south concourses, are the rooms for train and Pullman conductors.

The train dispatcher's room is located north of the lunch room, with entrance from the train shed, and adjoining are the rooms for storage of train conductors' boxes and for storage of ice used in icing passenger coaches.

The north wing is devoted to the accommodations for two express companies. These express rooms are provided with large doorways opening onto the wagonways on Twenty-sixth Street and Fourth Avenue.

The south wing is devoted to the accommodation of the baggage, train mail and United States mail. The baggage and mail rooms are provided with large doorways opening onto the wagonways on Twenty-sixth Street and Sixth Avenue.

In order to make the structure as nearly fireproof as possible, and to reduce the cost of maintenance to a minimum, no combustible materials, or materials requiring paint were used except for the window frames, doors and furniture, which are of wood. The subways are of reinforced concrete construction. The roofs of the north and south wings are of reinforced concrete. The roofs over the dining room, lunch room and colored waiting room are of steel covered with terra-cotta roofing tile. The ceiling of the main waiting room is constructed of four barrel vaults intersecting with a central dome 64 feet in diameter, which, together with the outer dome, are all of terra-cotta tile of the Gaustavino construction, covered with terra-cotta roofing tiles. Cornices and flashing are of copper, and all skylights are of copper glazed with wired glass. The floors throughout are of concrete construction; those throughout the waiting rooms,

INTERIOR MAIN WAITING ROOM BIRMINGHAM TERMINAL

etc., being finished in marble tile and those in the express rooms, baggage room, mail rooms, etc., being finished in asphalt mastic.

The general waiting room has a floor area of about 7,600 sq. ft. The walls are finished to the height of 16 ft. in gray Tennessee marble. The barrel vaults and dome are of semi-glazed tile and terra-cotta in polychrome. The walls are finished in a soft shade of gray with the panels and mouldings brought out in shades of ivory, buff and greens, which colors are used in the vaults, dome and central skylight of ornamental glass. The skylight frame, clerestory window frames and lighting fixtures are finished in verde-antique. The furniture throughout the building is of dark oak; the settees and chairs in the ladies' waiting room and smoking room being upholstered in green leather. The settees are all protected from washing of floors by marble bases. The other waiting rooms, dining-room, and lunch room have floors and wainscot of gray mable with the walls finished in greens and terra-cottas.

ARCADE BIRMINGHAM TERMINAL

The exterior of the building is of mottled brick, shading from light buff to terra-cotta. The roof tiles are of a medium shade of terra-cotta. Base, sills, belt courses, sill courses, coping and ornaments are of gray sandstone and terra-cotta. Window frames and marquise are finished in green bronze. The central dome rises to a height of 100 ft., and the two towers, designed to accentuate the concourses, are 130 ft. high.

On the southeast corner of Twenty-sixth Street and Sixth Avenue is located the power house, constructed entirely of reinforced concrete. The power plant consists of two 200-horsepower Sterling water tube boilers and three Russell engines direct connected with Western electric generators of three-wire type; two units of 125 kilowatts and one unit of 50 kilowatts. This plant furnishes heat for the building by means of an Evans-Almirall hot-water system, and direct steam for heating cars standing in the train shed. The station building, train sheds, yards and approaches are all lighted from this plant.

All departments of the station are connected by telephone.

All switches throughout the yards are controlled by an interlocking system operated from towers of reinforced concrete located north and south of the train shed.

P. THORNTON MARYE.

New York's proposed new Building Code, the subject of much bitter controversy, is now under consideration by the Board of Aldermen and will probably be passed in some form before this issue is off the press.

RECENT LEGAL DECISIONS

LIABILITY ON CONTRACTOR'S BOND.

Where a building contractor enters into a contract to furnish all labor and material necessary for the construction of a building and his surety executes a bond conditioned to save the owner harmless from any pecuniary loss resulting from a breach of any of the terms of the contract, and the contractor unjustifiably abandons the work after entering upon it, the surety is liable for mechanics' liens filed against the property for labor and materials.

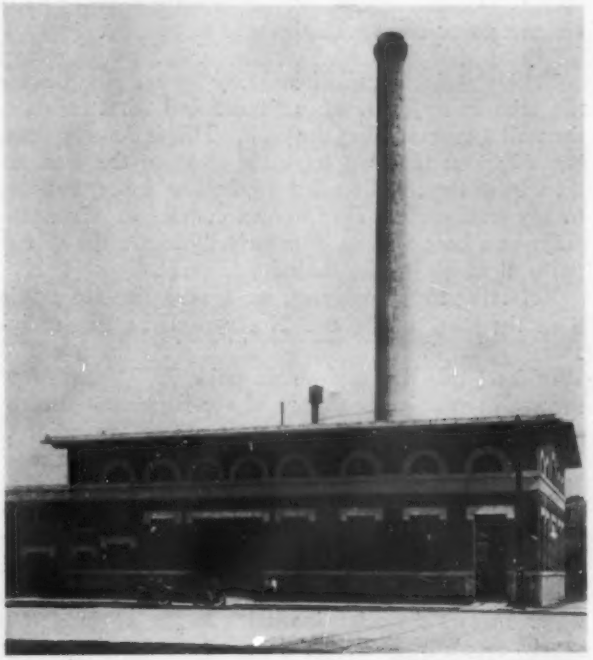
Stoddard v. Hibbler (Supreme Court of Michigan) 120 North Western Reporter, 787.

If a contractor who has a right under his contract with a sub-contractor to discharge the sub-contractor's debts for labor and material out of the instalments due to the sub-contractor or to withhold payment of such instalments until receipts are produced, pays the sub-contractor without requiring payment for labor and material furnished to the sub-contractor, the surety or the sub-contractor's bond is discharged from liability thereunder.

Pauly Jail Building & Manufacturing Co. v. Collins (Supreme Court of Wisconsin) 120 North Western Reporter, 225.

Where a building contractor's bond contained a provision that the owner should retain the last payment due the contractor until the completion of the work and notification to the surety and the whole contract price was paid to the contractor before the commencement of the work, the surety was discharged from liability.

Leiendecker v. Aetna Indemnity Co. (Supreme Court of Washington) 101 Pac., 219.

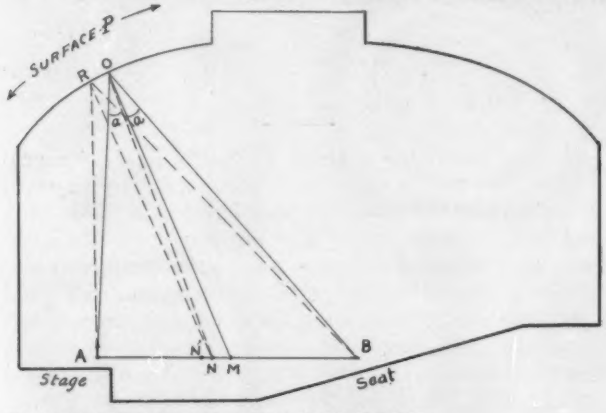


THE POWER HOUSE BIRMINGHAM TERMINAL

METHOD OF CORRECTING FAULTY ACOUSTIC PROPERTIES OF PUBLIC HALLS *

By the Paris Correspondent of the Scientific American

M. Gustave Lyon, who is at the head of the well-known Pleyel piano manufacturing firm of Paris, has devised a method for remedying the faulty acoustic properties of public halls. One of the largest and at the same time the worst public halls in the city is that of the Trocadero, which seats 5,000 persons. By his method he succeeded in correcting the surfaces to such an extent that about ninety per cent. of the disturbances are suppressed. He divides the stage into a number of ruled squares each about 5 feet square. Standing on one of them he makes a loud sound by clapping two pieces of wood together. Auditors are placed in various seats, and when one of them hears the first sound and then a second one or echo reflected by the walls, he raises a large numbered cardboard from which his number is noted. From each point of the stage in turn we thus make a note of the seat numbers.



HOW THE REFLECTING SPOT ON A WALL IS FOUND

Taking a given case where stage square No. 8 causes the echo in seat No. 25, we must find what points on the wall surfaces reflect the echo. This is done by drawing a line on the plan from the stage to the seat, and then from the middle point of the line a perpendicular to any wall surface *P* of known curvature. From this point as a base we can geometrically locate the spot on the wall which throws the echo to seat 25.

Referring to the diagram, we draw a line from point 8 on the stage to the seat No. 25, on the longitudinal cross-section of the building, which gives the line *A B*. We bisect this line and obtain point *M*. From *M* we draw a perpendicular to any of the large wall surfaces such as the surface *P*, and thus obtain the point *O*. We draw the lines *A O*, *O B* which form the angle *A O B*, and then bisect this angle by the line *O N*. This line intersects the line *A B* at the point *N*. From *N* we draw another perpendicular to the reflecting surface at the point *R* and draw the lines *A R*, *R B*, when it is found for practical purposes that the point *R* is the one which throws the echo, inasmuch as the angle *A R N* nearly equals *N R B*. A closer approximation can be

LYONS SMALL APPARATUS FOR ASCERTAINING THE POSITION OF ACOUSTIC REFLECTING POINTS

made by repeating the same operation, bisecting the angle *A R B* and finding thus a third point *N'* on the line *A B*, etc. Many of the points fall where they could produce no echo for a given surface, while others are too near to give an echo. An interval of one-tenth second is needed for the ear to perceive the echo after the direct sound, and as sound travels at about 1,000 feet per second, the sound must travel at least 100 feet in order to be heard one-tenth second afterward. Otherwise the direct and reflected sounds will be confounded with each other. Thus the wall point must be one-half of 100 or 50 feet off in order to give an echo, and all points under this value can be discarded.

After plotting on the elevation and plan views of the hall the points which give the reflections as we have just seen and finding the faulty surfaces, it is desired to check up these results by an experimental method, and for this purpose M. Lyon devised a novel acoustic apparatus. It consists of a long metal tube which serves the purpose of a speaking trumpet, and the tube is connected by a rubber hose with a box about two feet cube in which an audible signal can be produced. Such a sound is sent from the tube and is projected along one general direction. For giving the adjustment and measuring the angles of the tube there is used a graduated dial around which a pointer travels mounted on the

(Concluded on page 20)

LYONS LARGE APPARATUS EMPLOYED IN CORRECTING THE ACOUSTICS OF THE "TROCADERO"

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CONTENTS

UNDOUBTEDLY the wonderful development of the world's resources, the improvement in means of communication, in transportation, and in methods and machinery generally, which taken together make up much of the progress of the century, is due in considerable degree to the knowledge, resourcefulness and untiring energy of the engineer. But granting to the engineer his full measure of credit, it appears probable that during the process of development the architect in his more restricted, or at least less diversified field, has been confronted with problems comparable in their complexity with those by the successful solution of which the engineer has added so much to the world's wealth, the peoples' convenience, and quite incidentally, his own fame and fortune. The problem of transportation, for example, while primarily, perhaps, belonging to the province of the engineer, presents to the architect for consideration one of its most difficult features, and upon his successful handling of it depends to a very considerable extent the success of the entire undertaking. We refer to the terminal structure required to accommodate the immense passenger traffic of a great railway system.

WHILE the engineers are tunneling through mountains and under rivers, and are spanning chasm and gorge with their cobweb-like trestles and bridges, the architect is puzzling over the less spectacular task of meeting the exacting utilitarian requirements of plan, without entirely abandoning all thought of architectural forms or treatment. Prominent among these requirements are very obviously, a plan by means of which the modern ideas of convenience, safety and rapidity in handling the constantly changing and often conflicting crowds of people, may be realized. And to these normal requirements of a railway terminal in the north is added by law to those erected in the southern states that of providing separate waiting rooms and conveniences for the colored race. This requirement of approximate duplication of principal rooms practically precludes the possibility of adopting some form of what might almost be considered the natural interior arrangement, including rooms of large area with lofty ceilings or domes, and adds greatly to the general complexity of the problem.

REGARDING the architectural style which might with propriety be adopted by the designer of a great railway terminal or station, there appear to be wide differences of opinion. As far as these differences have found expression, they range from the somewhat nebulous design suggested by an enthusiast which would "exude speed from every pore of the structure," to the concrete expressions, to be found in various parts of the country, of men who have actually had stations to build. Perhaps there will eventually be evolved some type or style of building peculiarly fitted to the purpose, as satisfying in a greater degree than any other both the utilitarian and æsthetic requirements, but where climatic and other conditions vary so greatly as in America—even this seems doubtful. The problem viewed broadly is one that will in all probability increase in importance, and if a practically new or independent solution is required in each instance, those already before us appear none the less interesting.

THE influence of material on design is a subject which undoubtedly deserves more thought and consideration at the hands of the designer than it apparently receives in a great many offices that are far from obscure. Of course it is generally recognized that the great architectural styles that form the basis of the major part of our present day designing were developed largly in accordance with and as the result of the properties of the available building materials of the time, but the fact is continually being lost sight of to the very great detriment of modern architecture. As a result the attention is constantly being drawn, for example, to buildings possessing every indication of having been intended for execution in stone, constructed of brick, even to the columns and steps. A little inquiry will often disclose the fact that the designer was entirely cognizant of, but apparently oblivious to, the conditions which would unquestionably settle the matter of materials of construction. Obviously the matter could be carried to extremes, as when a designer varies the form and detail of his structure to accommodate his materials, till it becomes crude and ill-shapen, no longer fulfilling the requirements of good architecture. But almost any principle requires some liberality of application, and while we are not ignorant of the timber origin of the Grecian Orders, and realize the meaninglessness of some of the detail when executed in stone, it does not appear advisable to attempt to correct classical architecture, even in this respect, nor to take extreme liberties with any style. Tradition plays so important a part in the art that except we are the possessors of undeniable genius we would do well to consider carefully any variation from what is generally regarded as good precedent in either the adaptation of material to style or vice versa.

METHOD OF CORRECTING FAULTY ACOUSTICS

(*Continued from page* 18)

tube shaft. The whole device is mounted on a circular base. This can be turned around on a pivot after the manner of a surveying instrument.

As we know the position of any of the noted points on the wall on the vertical and horizontal plans of the building, it is an easy manner to calculate the position for setting the angles of the "acoustic theodolite" so as to direct the tube to this particular point. Finding thus from the drawings the angles needed, for the point number 32, for instance, we direct the tube to this point by the two graduated scales, and then find whether this is actually the point which gave the echo at say seat number 25, from the square number 8 of the stage. We have only to make the acoustic signal in the box which is mounted on the stage at the proper square, and the hearer finds whether the echo is noted at this seat. By

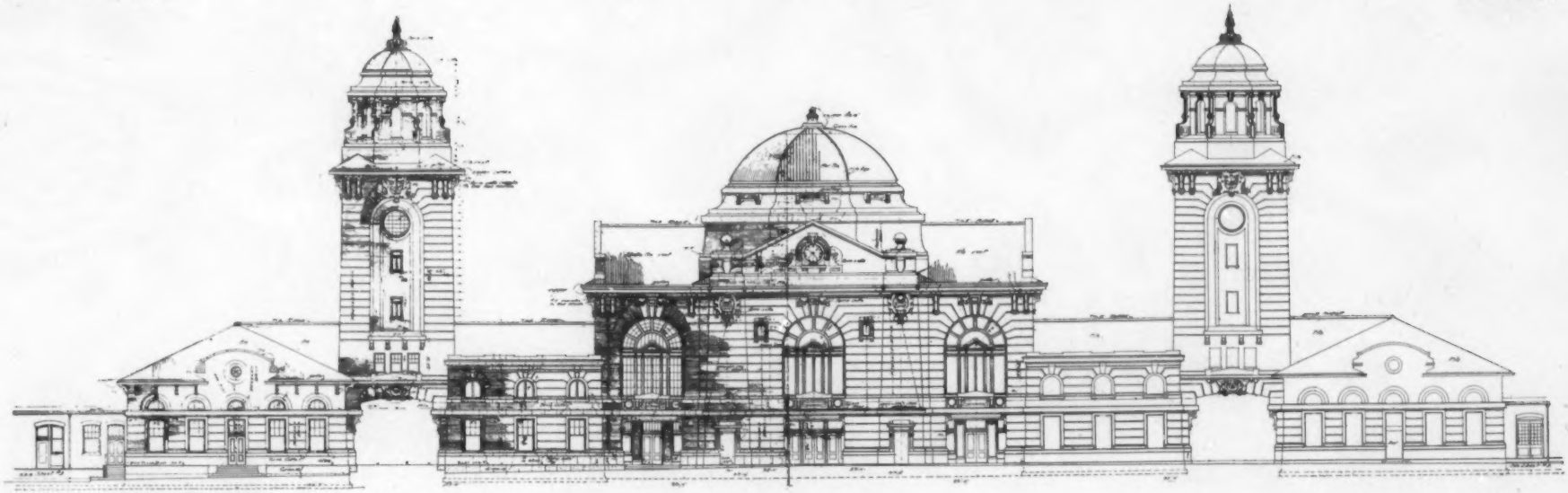
A CLOTH SCREEN WITH A SOUND-REFLECTING MIRROR BEHIND IT

carrying out a series of observations in this way we are able to find the exact points, and in consequence the wall surfaces which need to be corrected.

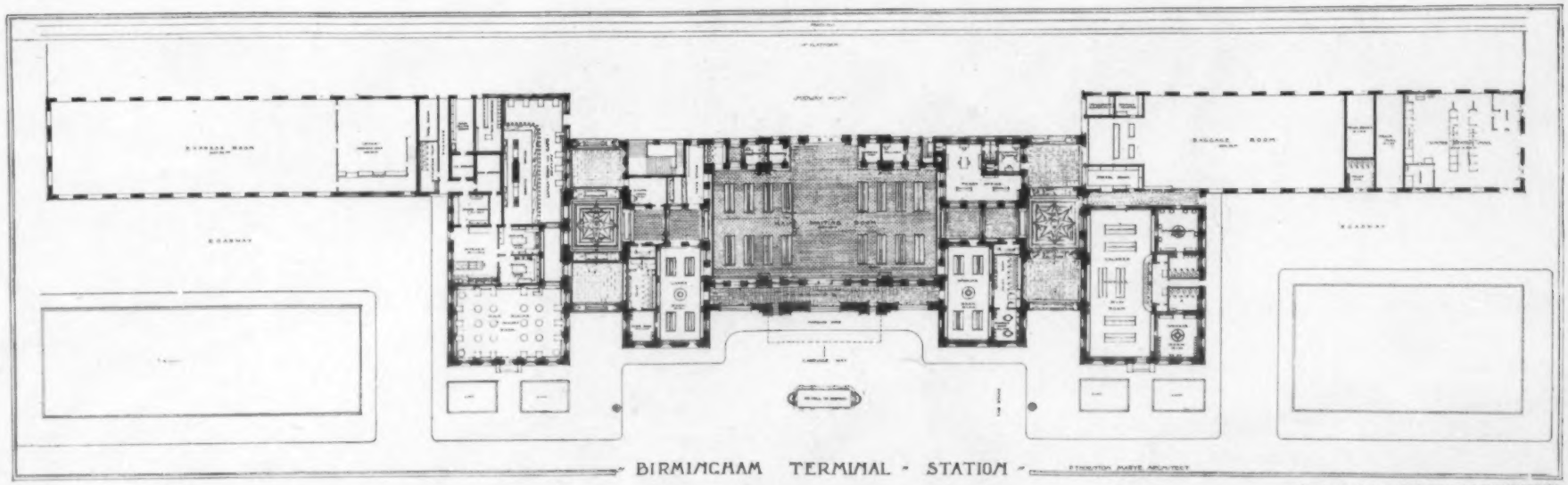
M. Lyon devised another instrument of a larger size which is intended to demonstrate his method in a more striking manner. A small cabin is used which is sound-proof, and made so as just to cover one of the squares of the stage. On the sides are openings through which can be inserted two acoustic tubes of large size, as will be noticed. The operator is stationed inside the box. The sound is produced between the two ends of the tubes so that it is given out from each tube. Above the cabin is a support which carries a graduated beam. This holds the tubes at a given angle by wires with which the tubes are hung from the ends of the beam. Previous to this we have already located the points by the "acoustic theodolite" and noted the place of each one by referring to certain details of the ornamentation of the walls. Accordingly we are able to direct one of the present tubes, the rear one, to the same point by means of crosswires placed at each end of the tube by sighting from the inside of the cabin. In the same way the front tube is directed to the seat in question. Were the front tube to be used alone, the hearer in the seat could perceive only the principal sound given by the operator, but when the rear tube is used he hears first the principal sound and then the reflected sound. Should the front tube be stopped off, he will hear only the reflected sound. Placing an auditor in the President's box, for instance, we find that the concave part of the wall lying over the organ is the principal cause of the echoes in the hall, and we can explore this region and the other walls so as to make this evident. According to the data which he thus obtained, M. Lyon was able to demonstrate very clearly that 90 per cent. of the echoes of the Trocadero hall were produced by this concave surface, and that if it were properly corrected the hall would have its acoustic properties radically changed. This was, in fact, the case.

It was thought advisable to cover the wall with cloth or similar covering so as to deaden the echo. In order to find out how to do this, M. Lyon made experiments with a large circular reflecting mirror. The reflector is made of stucco, which gives a very smooth surface. It has about 200 feet radius. In the middle is mounted a sighting tube for directing the reflector. At the proper distance in front of the mirror is a closed cabin having a small front window of two feet square, and by making a sound by striking on a suspended steel bar with an electric tapper with the bar placed well back of the window, we send out the sound on a general straight line. It falls on the mirror, being reflected from it to a point lying close to the cabin. There are three hearers placed at this point. When the operator makes the signal in the cabin it is perceived by the hearers directly, and afterward there comes a second sound reflected from the mirror, this being also a strong sound. What is desired is to suspend some kind of screen before the reflector (representing the wall), so as to shut off the sound. Various screens were tried, and one which is seen here is made of crossed strips of cloth. This cut down 50 per cent. of the echo, but strange to say, a full cloth covering scarcely cut down the echo at all. On the other hand, it was found that a double cloth with a few inches space between the two, would almost completely suppress the reflected sound. We no doubt have interference phenomena which are not as yet very clear, but the practical effect is certain.

Accordingly, such a double cloth covering was placed over the concave surface of the Trocadero wall above the organ, this being simply hung between two flat pieces of wood strip, leaving a space of a few inches between the two cloths. A fabric of the nature of Canton flannel is found to be best. A very small expense is needed for this work, and in the present case it did not exceed 5,000. At the same time the result is striking, and the acoustic properties of the Trocadero are vastly improved, as 90 per cent. of the echoes have disappeared. M. Lyon, who had carried out all work at his own expense, was congratulated for his results by the Secretary of Beaux-Arts, and other officials, who were present at the tests.

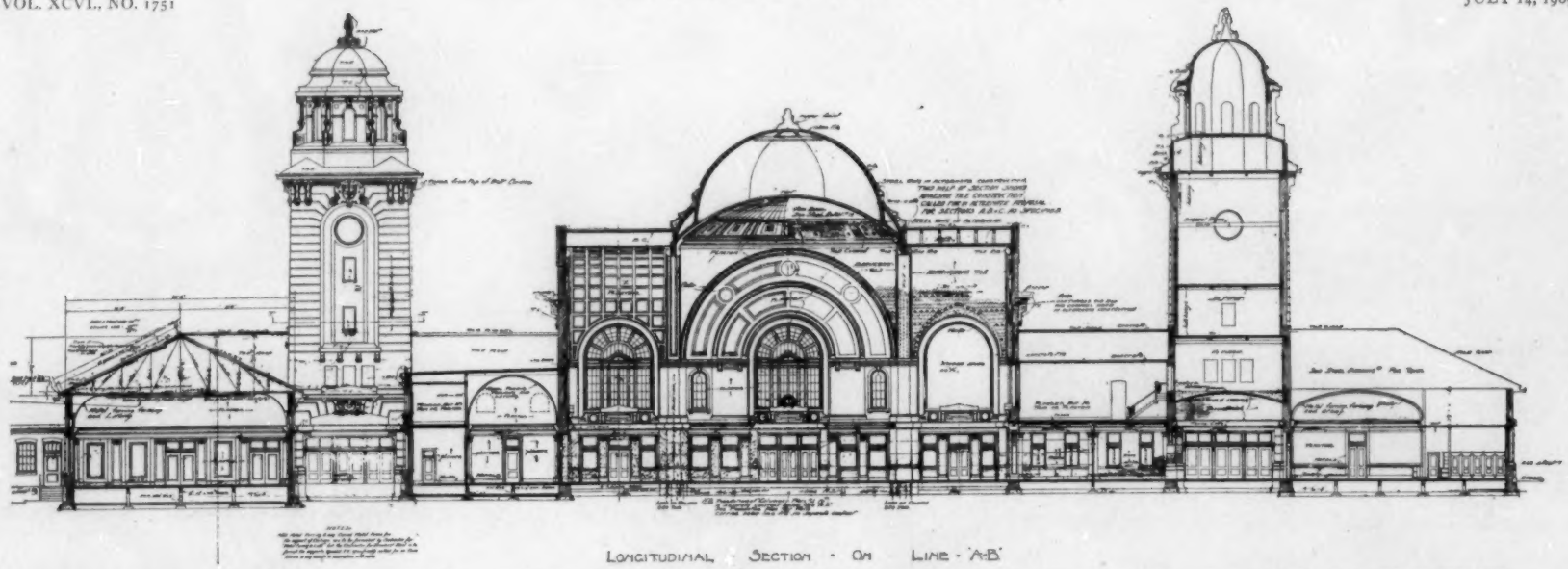


TWENTY-SIXTH STREET ELEVATION.

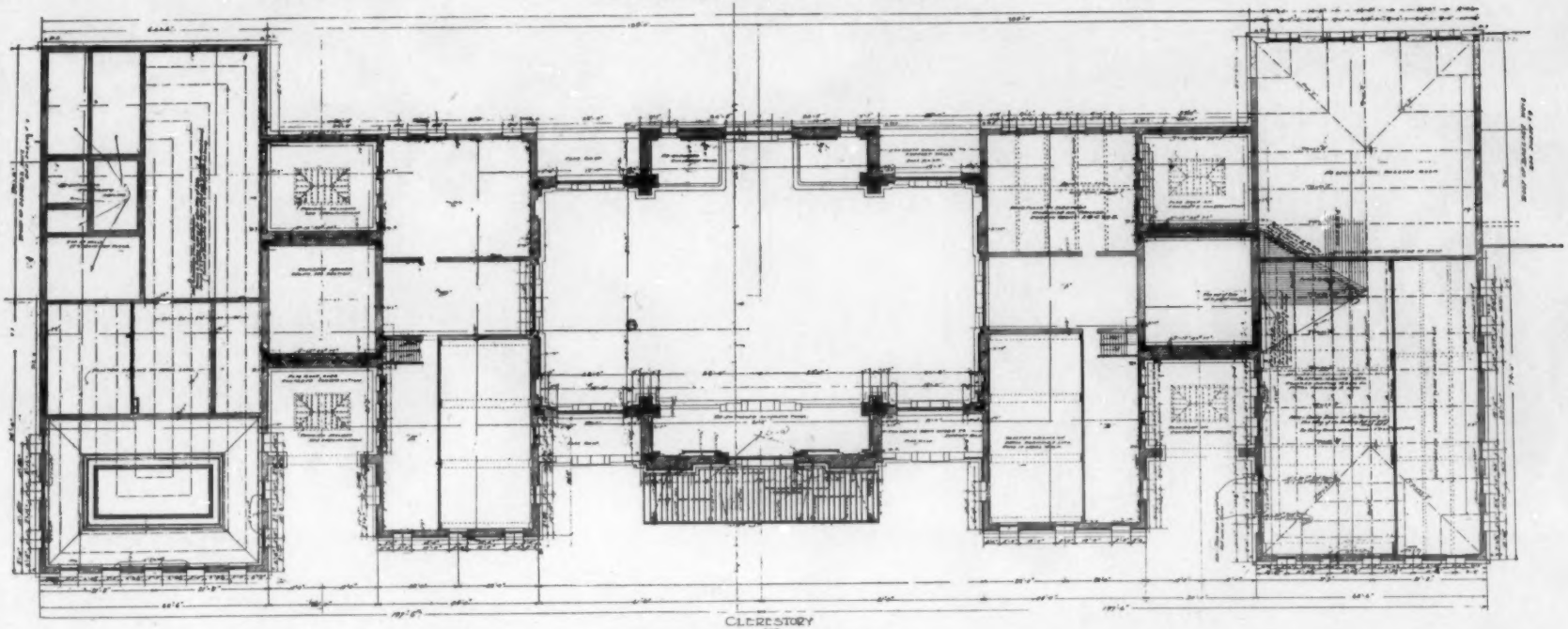


THE BIRMINGHAM TERMINAL STATION
BIRMINGHAM, ALA.

MR. P. THORNTON MARYE
ARCHITECT



LONGITUDINAL SECTION ON LINE 'A-B'



CLERESTORY AND MEZZANINE FLOOR PLAN

THE BIRMINGHAM TERMINAL STATION
BIRMINGHAM, ALA.

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ARCHITECT

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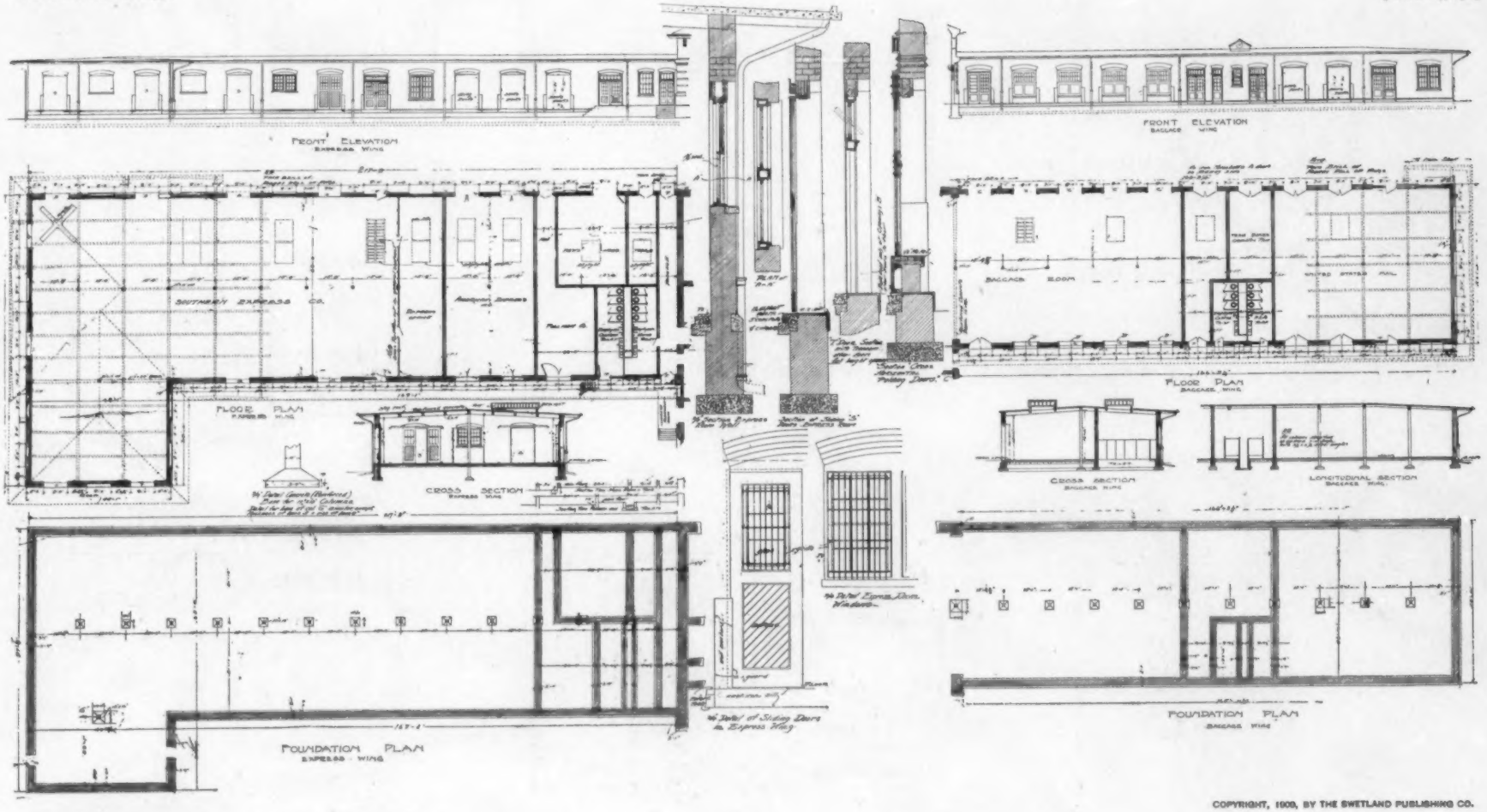

THE BIRMINGHAM TERMINAL STATION
BIRMINGHAM, ALA.

MR. P. THORNTON MARYE
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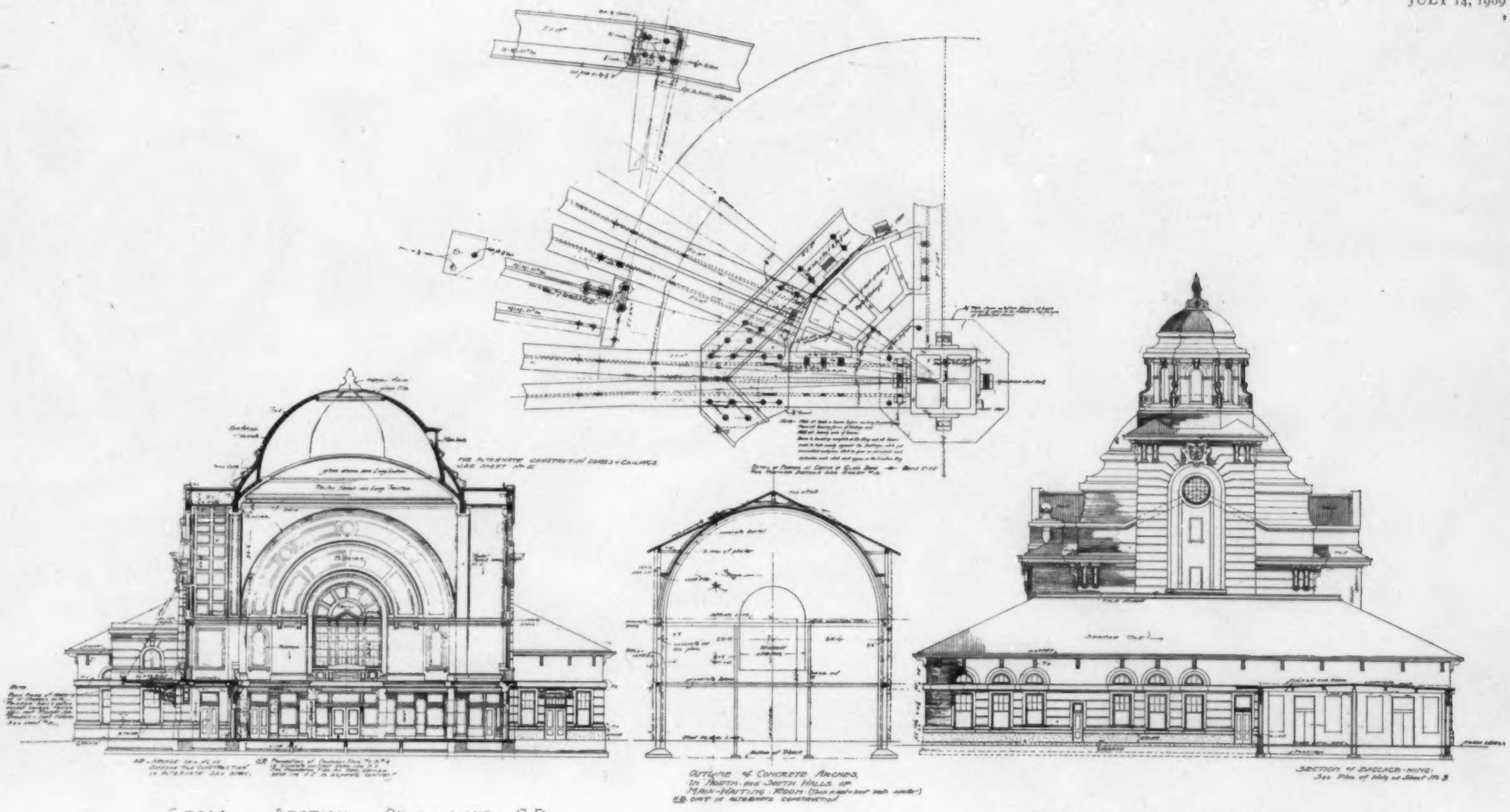

CROSS SECTION ON LINE C-D

SOUTH SIDE ELEVATION

(OTHER SIDE ELEVATION SIMILAR)

THE BIRMINGHAM TERMINAL STATION
BIRMINGHAM, ALA.

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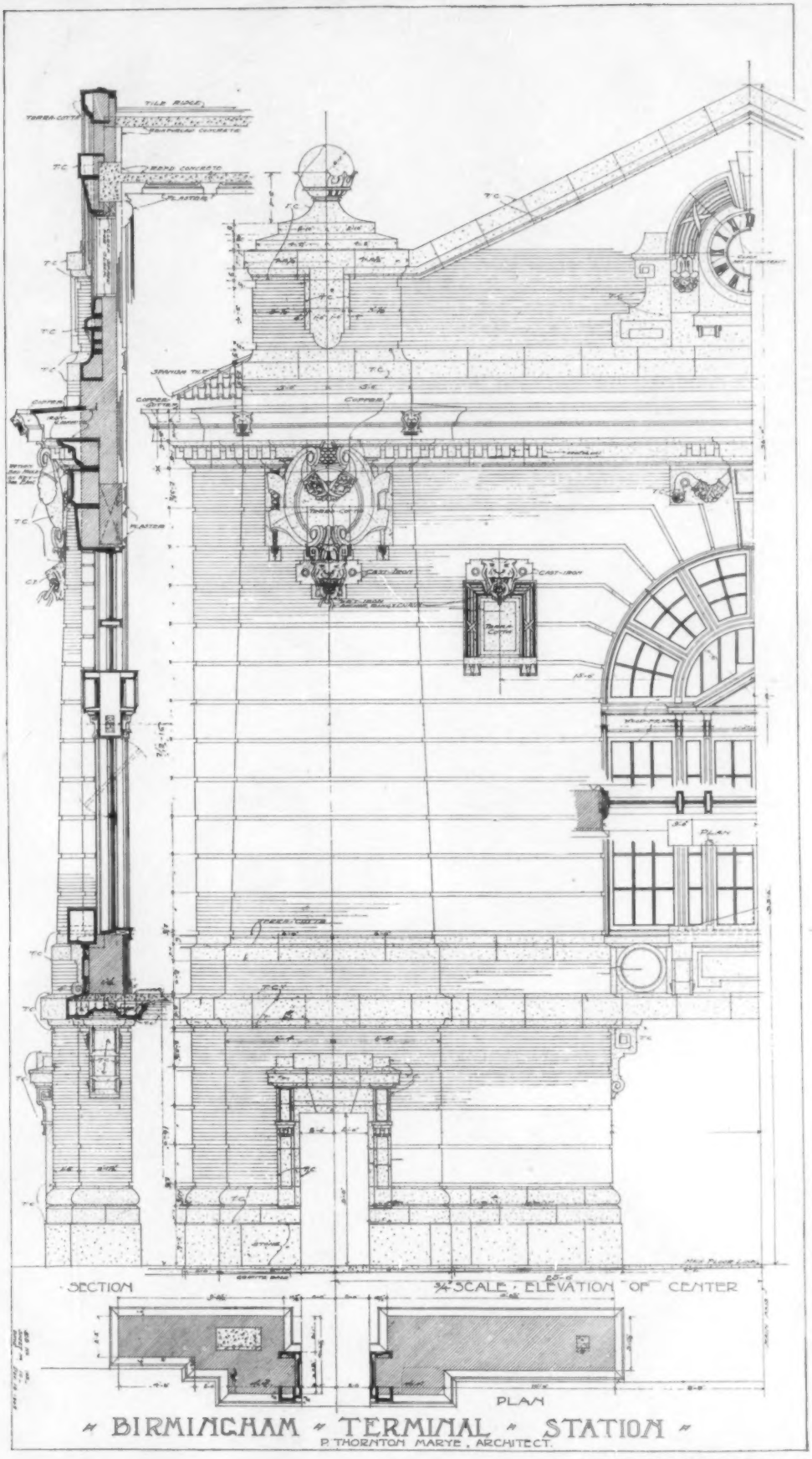

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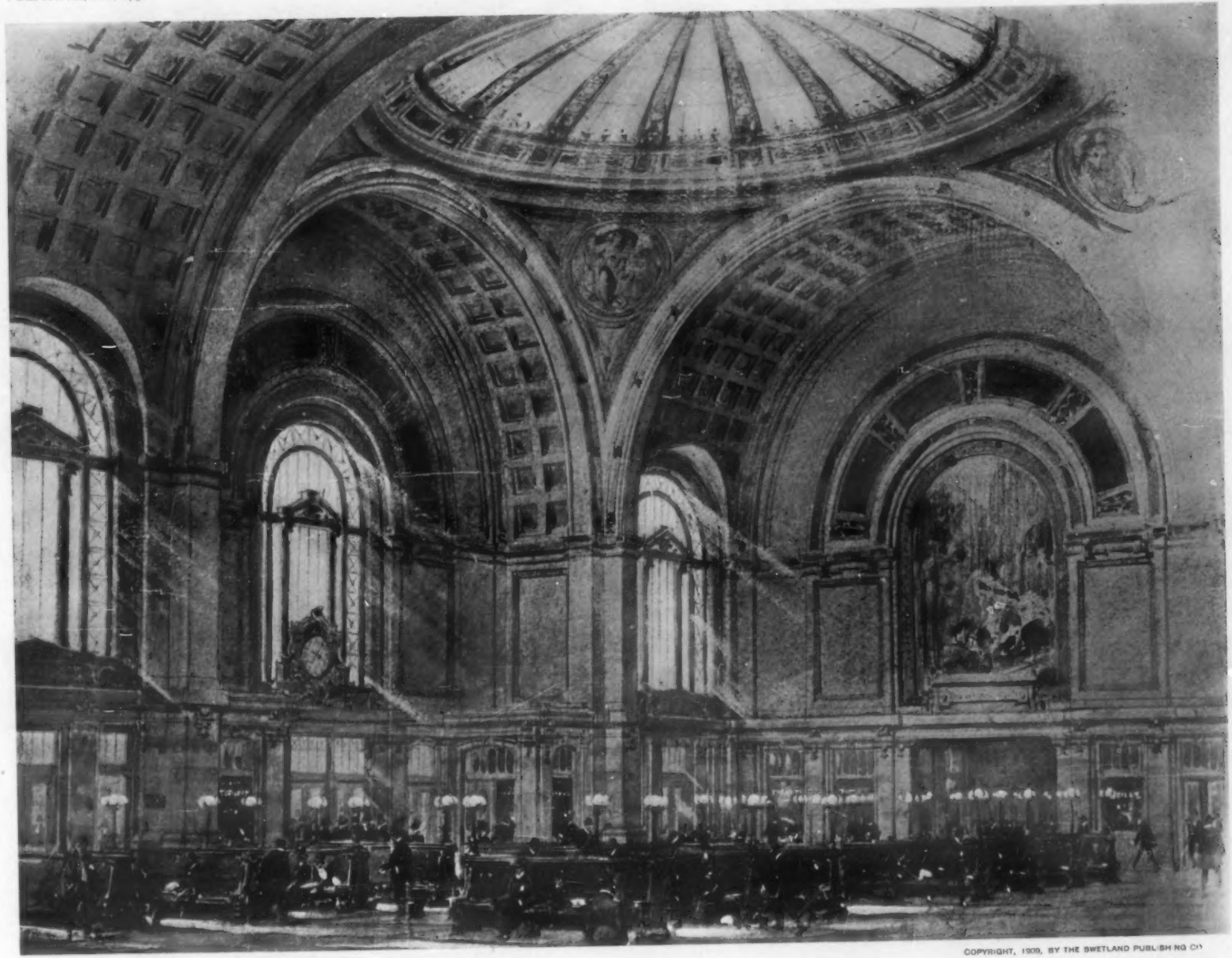

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