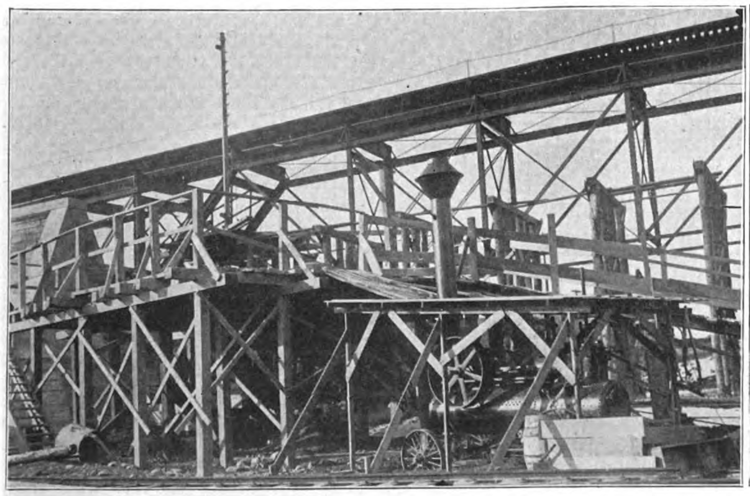


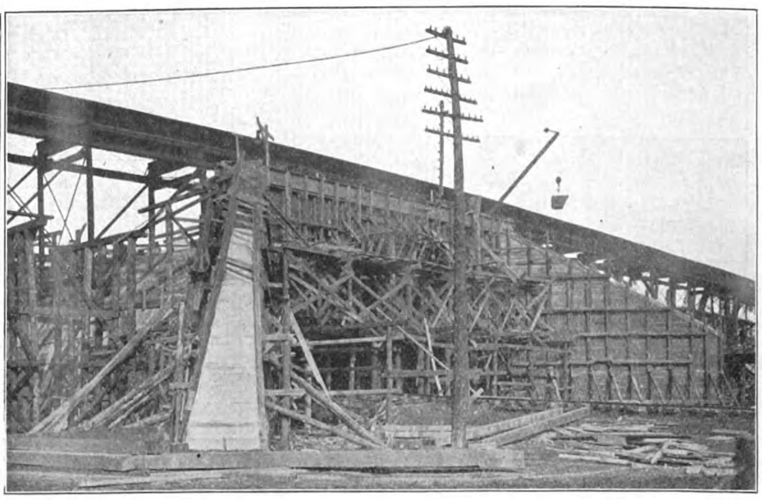


FIG. 1—CONCRETE MIXING PLANT FOR 60-FT. ARCH BRIDGE AT CAIRO, ILL.

FIG. 2—FORMS FOR THE 60-FT. CONCRETE ARCH BRIDGE AT CAIRO.

But before the officer could move the senator opened the stage door, stepped inside, then leaned out, touched the sheriff's arm and whispered:

"Tell the landlord he'll find the spoons in the coffee-pot."—Boston Post.

Some Concrete-Arch Bridge Construction on the Illinois Central R. R.

In connection with the work of building second track on the Illinois Central R. R., south of Cairo, Ill., during the past year some interesting concrete arch bridge work has been done. The long approach to the famous bridge over the Ohio river at Cairo is to be filled in, making an embankment at some points about 55 ft. high. Over Sycamore street, in Cairo, a concrete arch bridge of 60-ft. span has been built. It is semi-circular, with bench walls 4 ft. 9 ins. high. The arch ring is 2 ft. 8 ins. thick and the barrel of the arch is 94 ft. long. At one end the wings stand at an angle of 45 degs., and at the other end they are straight with the barrel.

This arch was built on pile foundations, and, as it comes under the deck trusses of the approach to the long bridge, it had, by reason of insufficient clearance, to be built around some of the members of these trusses, which were boxed in, so as to be removable after the arch was finished.

The centering of the arch was supported on piles (Figs. 2 and 3) capped longitudinally with the barrel of the arch. On these caps heavy timbers were placed transversely, and the centering ribs were supported upon these timbers. Other details of the centering appear with sufficient clearness in the illustration.

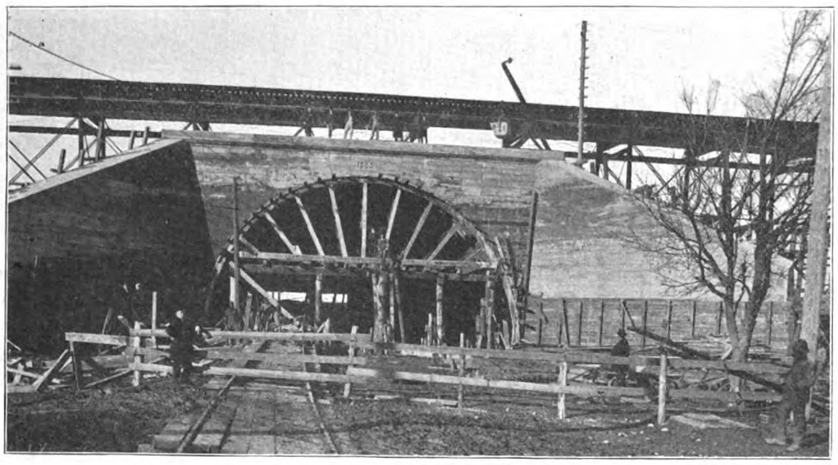


FIG. 3—CENTERING FOR THE 60-FT. CONCRETE ARCH BRIDGE AT CAIRO.

The concrete for this work consisted of a 1:4; 8 mixture of cement, sand and broken stone for the foundations, a 1:2½:6 mixture for the bench walls and a 1:2:5 mixture for the barrel or arch ring. Broken stone for the concrete was delivered in Rodger ballast cars and dumped through the bridge floor at the right of the mixing plant, as seen in Fig. 1. The sand was unloaded from gondola cars on a low-level track near the stone pile, and the cement was unloaded from the same track near the mixer.

The material was mixed in a No. 2 Smith mixer belted to a portable steam engine. The stone and sand were moved to the mixer in wheeled scrapers, being hauled up a plank incline onto the mixing platform and dumped into the chute, in which there was a measuring device delivering into the mixer. Water was delivered to the mixer in pipes from the city mains.

The concrete for the bench walls was dumped from the mixer into iron cars of one cubic yard capacity, and these were run to position and dumped into the forms. The material for the arch next above the springing line was first dumped into the cars, and then the car bodies, which were separable from the wheels, were picked up by a derrick and transferred to trucks on a high-level track, on which they were run over the work and the material dumped into the forms. The material for the top part of the barrel was placed by means of buckets handled by the derrick.

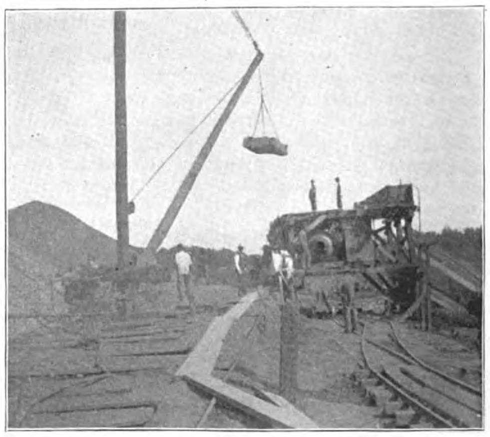


FIG. 8—CONCRETE MIXING PLANT FOR 60-FT. ARCH BRIDGE NEAR BRIGHTON.

The work was carried on in the following order: Each bench wall was finished and then, at the next stage, the work was carried up to the haunches; from this point the barrel was divided into rings of such length (longitudinally with the barrel) as could be finished in one day. Usually this length was about 8 or 9 ft., containing 100 to 110 cubic yards of material.

Figure 4 shows quite clearly the manner in which the barrel was built around the lower chord, posts and diagonals of the bridge trusses. Figure 5 shows other interesting features in this same connection. The bridge trusses were supported upon cylindrical piers, and two of these came under the arch, as seen in the picture. The illustration also shows part of the lower chord, the lower end of one of the diagonals and the lower part of one of the posts of each truss projecting through the arch.

Figure 6 shows the completed structure. It contains 6100 cu. yds. of concrete. The temporary wooden trestle at the left is the structure which will be used by the traffic while the bridge is being

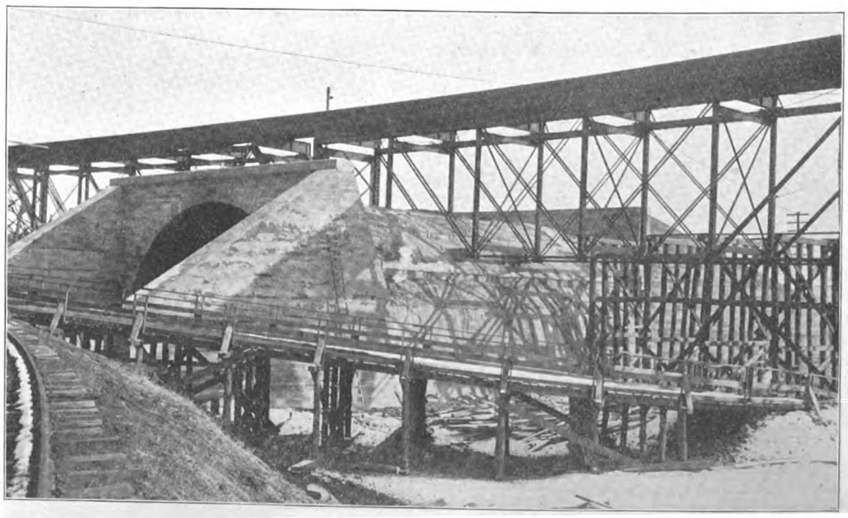


FIG. 9—TRESTLE FOR RUNNING CONCRETE TO PLACE. FIG. 4—VIEW SHOWING HOW BARREL OF 60 FT. ARCH WAS BUILT AROUND MEMBERS OF TRUSS BRIDGE.

Fig. 5—View Showing Cylindrical Pier and Bridge Truss Members Under and Extending Through 60-Ft. Concrete Arch.

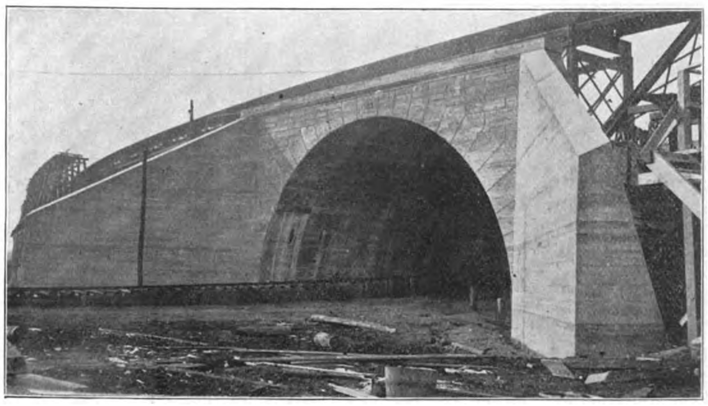


Fig. 6—60 Ft. Concrete Arch Bridge at Cairo, Structure Completed.

removed to make way for the top part of the embankment filling.

On the Tennessee division there are a number of new concrete arch structures of considerable interest. Near Brighton, Tenn., there is one arch of 75 ft. clear span and another of 60 ft. span, with a number of structures of smaller span. The 75-ft. arch is shown in Fig. 7. It is three-centered and is built around some of the piles of the trestle on the old alignment, the new structure being a little off the center of the old location. The ring of this arch is 3 ft. thick.

In building this arch the mixed concrete was handled with a derrick and boxes. The method of handling the materials and the charging of the mixer was similar to work presently described for the 60-ft. arch. In the work on this division a No. 1 Smith mixer was used, and on one of the days a record of 150 cu. yds. of concrete, mixed and deposited in 10 hours, was made.

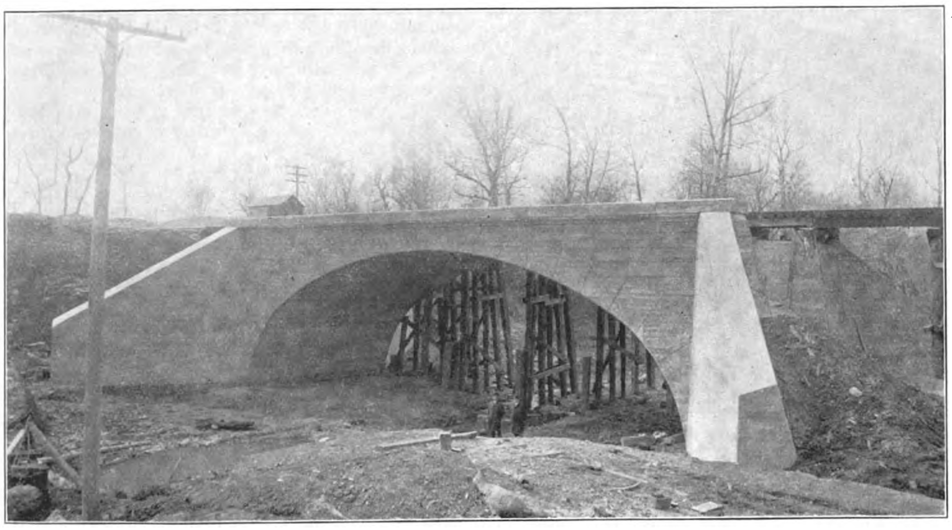


Fig. 7—Concrete Arch Bridge of 75 Ft. Span, Near Brighton, Tenn.

The 60-ft. arch, shown in Fig. 11, is semi-circular. The concrete mixing plant consisted of a Smith mixer, over which a platform was built, with a chute leading to the mixer and closed by a trap. A derrick was set to reach the sand and stone piles and feed the mixer with a box, as shown in Fig. 8. As a means of measuring the material this box was divided into two compartments, one for the stone and the other for the sand, and at each trip of the box toward the mixer the necessary amount of cement, in the bags, was piled on top of the sand and stone. The materials carried in each box-load were therefore in the right proportions for the mixture. The box was dumped through a hinged end door, by tilting it up over the chute.

The material from the mixer was dumped into cars on a track running underneath, as seen in the picture. The water for the mixing plant was pumped from a creek into a wooden tank, which is shown on the platform. In this case the mixer was run by a Fairbanks-Morse gasoline engine. The derrick was operated by a bull wheel and cable worked by an engine not seen in the view. The steel tip cars, furnished by the Contractors' Supply Co., Chicago, were run on a track on a light trestle over each bench wall and over the arch ring. Part of the arrangement is shown in Fig. 9. Part of the centering for this arch (Fig. 10) was afterward used in the 60-ft. span of the Cairo arch, above described.

This and the Cairo work was done by the Bates & Rodgers Construction Co., of Chicago, to whom we are indebted for photographs and descriptive data. This firm built all the concrete masonry in connection with the second-track work on the Tennessee division between Fulton, Ky., and Memphis, Tenn., extending from the Big Hatchie, north of Covington, to Woodstock, Tenn. As examples of some of the smaller structures built on this work, Fig. 12 shows an arch culvert of 16-ft. span, near Brighton, Tenn., and Fig. 13 a 20-ft. segmental arch near Covington, Tenn. This last structure was reinforced with corrugated bars.

Block Signaling on Single Track.

On a double-track road the object of block signals is primarily to preserve the required space interval between trains moving in the same direction, or, to put it in plain English, obeying the signal indications will prevent rear collisions.

The function of block signals on a single-track road is to prevent collisions front and rear, and for this purpose the signals have not only to remain at danger behind a moving train in a block, but they have to show beforehand that a train is approaching.

The Cincinnati, New Orleans & Texas Pacific is a carefully operated singe-track road which is protected by automatic block signals, and is perhaps the best example of its kind to be found in the country. Distant signals are being introduced on this line, but at present to consider the simplest form of these signals may be the more satisfactory way for the reader.

The signals for south-bound trains are placed at the right, and those for north-bound trains on the other side of the track. The beginning of a block is indicated by a small post placed about 150 feet from the signal, the object of which will be apparent later on. When we speak of the signals for a south-bound train we mean the signals which the engineer of a south-bound train would look for in order to be informed of the condition of the block ahead. On a single- track road, however, the north-bound signals are also operated by a south-bound train in the vicinity, but they are then for the information of any possible north-bound engineer.

The operation of the system is, briefly: A train moving south enters block C and the following signal indications give visual indication of the fact. The entrance to block C is marked by a post called the "signal station," which is 150 feet from the home signal for that block. The engineer, as he approaches block C, observes that the signal is "clear," if the track ahead is unoccupied, when he

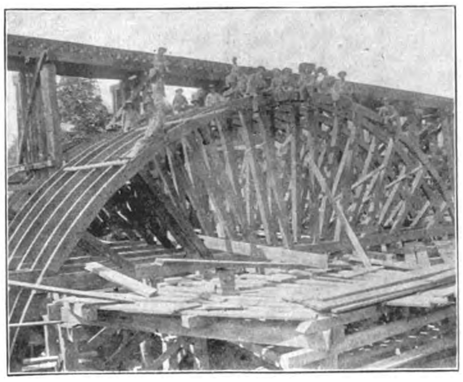


Fig. 10—Centering for 60-Ft. Concrete Arch Bridge Near Brighton.

reaches the small post or signal station, the signal just ahead of him goes to "danger" as he passes on. The object of this, as explained by the officers of the C., N. O. & T. P., is to give the engineer the opportunity to actually witness the movement of the semaphore blade, and so feel satisfied that the apparatus is in efficient working order, and also to give him that feeling of security which comes from the knowledge that the signal immediately behind his train is protecting it by showing the "danger"

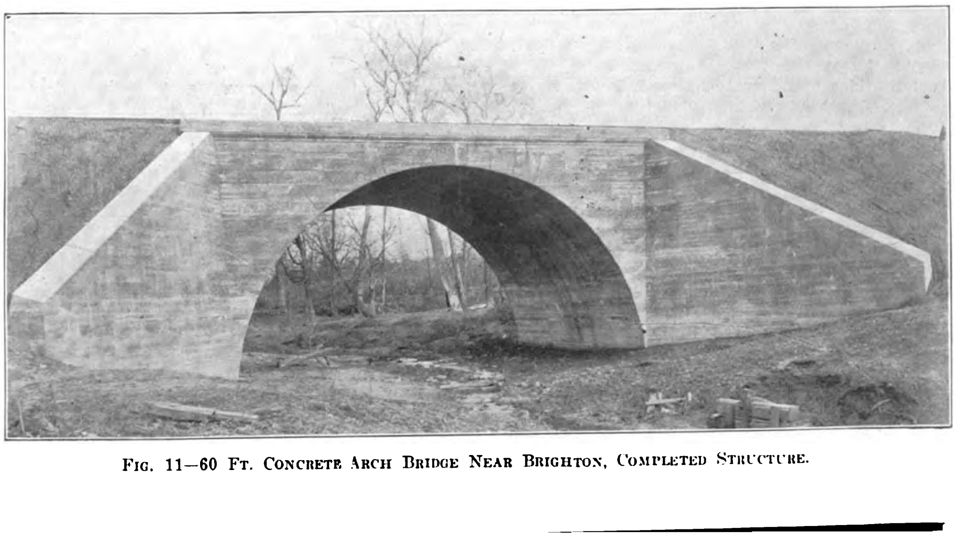


Fig. 11—60 Ft. Concrete Arch Bridge Near Brighton, Completed Structure.

FIG. 12—16-FT. CONCRETE ARCH CULVERT.

FIG. 13—20-FT. SEGMENTAL CONCRETE ARCH CULVERT.

indication. At the same time the home signal at B is lowered, showing that the train has passed out of block B. These indications are given by what we may call the "south-bound" signals, but the entrance of this train into block C operated two signals on the "north-bound" side. It first raised the semaphore blade at E and lowered the "north-bound" one at C, which latter had already performed its duty.

The train, therefore, on entering block C protected itself from a following train and at the same time caused a stop signal to be instantly displayed two blocks ahead, which being a "north-bound" signal, would be looked for by an engineer of a north-bound train, if one was then on the line. This protection from "coming events" on a single track line is most important, because it pre-empts the line ahead for two blocks and says to all and sundry who are moving in an opposite direction, "Your written orders may be right or wrong, but a south-bound train is now in block C." The same kind of information is also given to the engineer of the train in block C concerning the one moving against him.

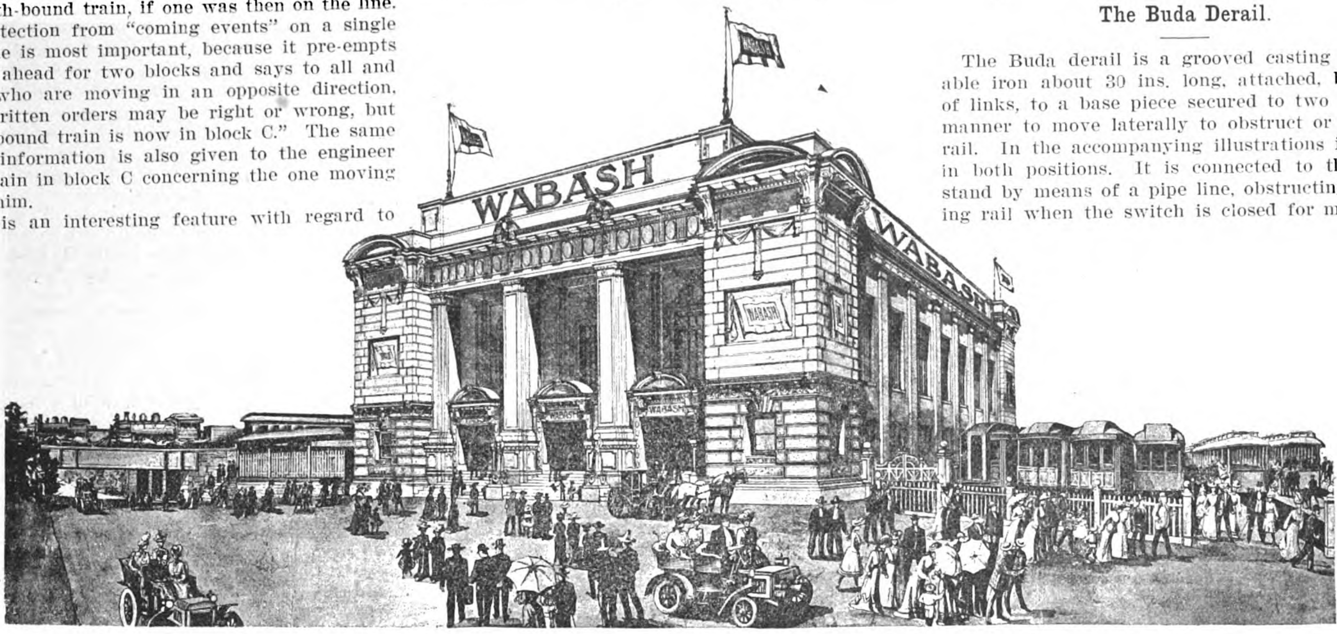
There is an interesting feature with regard to the operation of this system, and it is a fact that no sooner has a train put up the danger indication ahead of it than by its own onward motion it tends to reduce the distance ahead at which it is protected. If on entering block C it is at once protected at E, the distance of the train from E constantly diminishes until at a certain point, governed by circumstances, the moving train throws up another signal ahead and so maintains an advance guard all the time. The varying distance ahead at which a train is protected, owing to its own motion, is arranged so that, taking track and grade conditions into consideration, the minimum distance will at all times be adequate. "Forewarned is forearmed," and a mistake in or a misunderstanding of train orders would at once become apparent to the engineers of the opposing trains when they were on the road and practically beyond the reach of direct human aid, in that short but blessed interval of time before it is just too late.—Train Dispatchers' Bulletin.

The Wabash Station at the World's Fair.

We have already published plans and descriptive information in detail of the World's Fair terminal of the Wabash R. R., at St. Louis, explaining all of the arrangements for handling the very large traffic which is anticipated. The principal article was published in the Railway and Engineering Review of Jan. 23. We now supplement this with the plans and general data of the station building located, as previously shown, immediately south of the main tracks and fronting on the plaza at the main entrance to the fair grounds.

The building will be of staff construction, in harmony with the general appearance of the fair buildings. The accompanying general view of the building shows to good advantage some of the prominent features of the terminal. At the left is seen the main line and the subway under the main tracks in De Baliviere avenue. At the right of the station are the tracks for the so-called "shuttle" trains, which are to run between the Union station and the main entrance to the fair grounds. The exit from the platforms at these tracks is immediately in front of, and only 200 ft. distant from, the main entrance to the World's Fair grounds.

We are indebted to Mr. Theo. C. Link, the architect, for plan drawings of the station. This will have a main waiting room 100 ft. square, with an



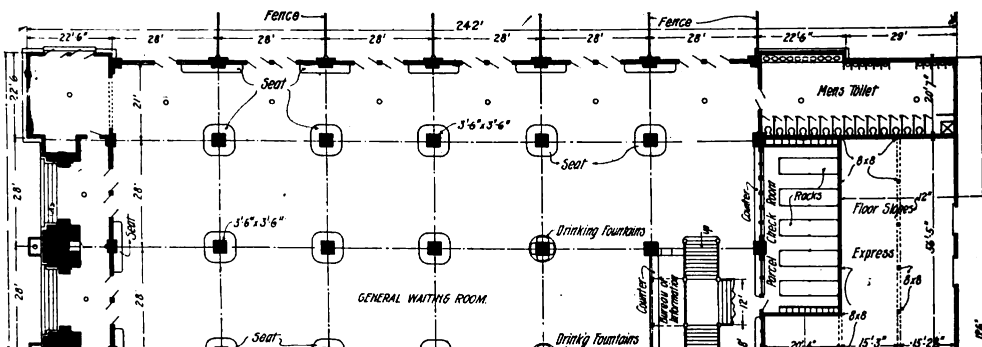
WABASH TERMINAL PASSENGER STATION AT THE WORLD'S FAIR, ST. LOUIS.

information bureau in the center, and all the usual toilet rooms, ticket offices, parcel room and a baggage room, where baggage will be received for passengers going to the near-by hotels; also an express office. On the north side of the station and adjoining the main waiting room will be located four classification compartments, which is intended to be a unique feature. At a certain hour there will be scheduled a west-bound through or excur-

four classification compartments, which is intend-trance to one of these compartments indicating the track from which the train will depart, and passengers holding tickets for that train will be admitted to that compartment, and any passengers intending to take other trains will not be permitted to enter. When the train is announced the gate from that compartment will be opened and passengers will proceed to the platform, and thence to their train. In this way crowding will be avoided, and passengers will not be allowed to have admission to any train except the one they are to take and for which they hold tickets.

The Buda Derail.

The Buda derail is a grooved casting of malleable iron about 30 ins. long, attached, by means of links, to a base piece secured to two ties, in a manner to move laterally to obstruct or clear the rail. In the accompanying illustrations it is seen in both positions. It is connected to the switch stand by means of a pipe line, obstructing the siding rail when the switch is closed for main track and leaving that rail clear for traffic when the switch is opened for the siding. In this case it is connected to one of the low semaphore switch stands, which are standard on the Chicago & Alton Ry., and used extensively on a number of other roads. These stands also are furnished by the same company as the makers of the derail, the Buda Foundry & Manufacturing Co., of Harvey, Ill., and Chicago. The derail may, however, be



FIRST FLOOR PLAN OF WABASH TERMINAL PASSENGER STATION AT ST. LOUIS WORLD'S FAIR.