Engineer, specified the live load for bridges as given in *Fig. 1 on page 654.*

Two engines, each with one forward axle, four driver axles and four tender axles, covering together a wheel base of 108 ft. 6 in., followed by a uniform load. The weights were taken from actual Baltimore & Ohio locomotives which served as a type for those of the Erie. As far as I have learned this was the origin of the method of specifying live loads which has now for a long time been in predominant use, and has come to be generally adopted. A present standard live load is given in Fig. 2 on the opposite page.

The placing of the heavier and lighter concentrations in this diagram of 1899 agrees practically with the one of 1878, and the ratio of increase is almost uniform throughout. May not this general arrangement be taken as definitely accepted and likely to continue? If it does not absolutely give the actual live load does it not give it is nearly as it can practically be specified for the class of bridges to which it is applied?

It may be said in passing that axle concentrations of some cars now in use exceed these specified for engine drivers comparatively recently, as for instance Pennsylvania RR. ore cars of 110,000 lbs. capacity and 37,000 lbs. weight, giving axle concentrations of 36,750 lbs.

The proposed alternative is to adopt a uniform live load with a single heavier concentration placed at the head of or anywhere in the train. No one such arrangement will agree in results with a given engine diagram for varying lengths of spans; a table of equivalent concentrations for different span lengths must be used if the engine diagram is adopted as the basis. Having the proper concentration the computing of stresses is simple. On this reason alone there is, however, very insufficient cause for adopting the method. By means of the familiar shear and moment table, comparatively easily obtained for any given engine diagram, stresses are readily calculated. Whichever way it is done, this is generally the smaller part of the work of designing.

It may be taken for granted that purchasers will continue to specify by actual loads, as nearly as these can practically be given, rather than by the deduced method of uniform load and single concentration, which must always be comparatively meaningless to them.

New Scherzer Lift Bridges Over the Chicago River.

Two new rolling lift bridges are now building over the Chicago River at a point which has heretofore been one of the worst obstructed places on that river. This is at the crossing of the tracks of the Chicago Terminal Railroad leading to the Grand Central Station, and at the crossing of Taylor St. The location is shown by the accompanying plat, Fig. 1, which gives in dotted lines the outline of the ends of the protection piers of the former swing bridges, while the position of the new rolling lift bridges are shown in full lines. The improvement made at this point in clearing the channel for the passage of vessels is so evident that no comment is necessary, excepting that the work can scarcely be considered complete until the center pier bridge at Twelfth St. has been replaced.

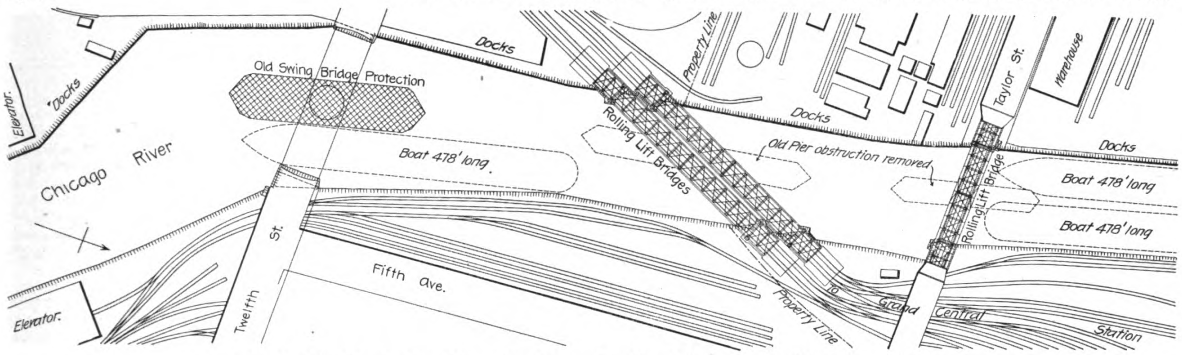

Fig. 1.—Plat Showing Pier Obstructions Removed by New Scherzer Rolling Lift Bridges, Chicago.

These bridges are being rebuilt by the Sanitary District in order that the necessary amount of water for the Drainage Channel may be obtained, the required flow being 300,000 cu. ft. of water per minute. The old bridges formed such an obstruction that it was necessary either to construct an extensive bypass system under some very valuable railroad and warehouse property or build lift bridges. It was estimated that the latter plan would effect a saving of about $95,000. At the Twelfth St. bridge there was thought to be sufficient opening for the present requirements of the Sanitary District.

Fig. 2 shows a general plan of the rolling lift bridge now building at the Chicago Terminal crossing. The design is for two double-track bridges, side by side, to be operated jointly or singly as desired. However, only one of the double-track spans will be built at present; the second bridge will not be built until required. The bridge is designed as a through truss cantilever and crosses the channel at the very acute angle of 36 degrees 30 minutes, which necessitates a span of 275 ft. center to center of end bearings in order to give a clear waterway for navigation of 120 ft., the minimum channel allowed by the Government for the Chicago River. Cooper's specifications for railroad bridges, 1896 edition, controlled the design as far as applicable. The loading was taken as 10,000 lbs. per lineal foot of bridge, with a concentrated load of 50,000 lbs. at any point on each track. The bridge will be operated by electric motors, and although provision is made for an operator on each side of the river, yet the machinery and electrical equipment will be so arranged that both leaves may be operated from one side of the channel. The superstructure will be counterbalanced so as to be at rest when opened at an angle of about 40 degrees. This is to assist the machinery in opening and closing the bridge and prevent a possibility of the bridge falling shut by accident and disabling the structure. The substructure for all four tracks is now being put in and consists of Portland cement concrete and Bedford stone which rests upon piles driven to rock and cut off 5 ft. below the bottom of the channel. The superstructure will be furnished by the Pennsylvania Steel Company.

The new Taylor St. highway rolling lift bridge has a span of 148 ft. 7 in., center to center of bearings, the two leaves meeting at the center. The roadway, center to center of trusses, is 20 ft. wide, with a 5-ft. sidewalk on each side. It is designed to carry the heaviest highway and electric street car traffic in accordance with Cooper's specifications for highway bridges. Although this bridge will have the appearance of an arch, it is designed to act as a cantilever, the live load stresses being carried by means of anchorages at the rear of the supporting piers. It will be operated similarly to the railroad bridge just described. A sufficient clearance is allowed for the passage of tugs without opening the bridge. The superstructure of this bridge is being furnished by the Chicago Bridge & Iron Company.

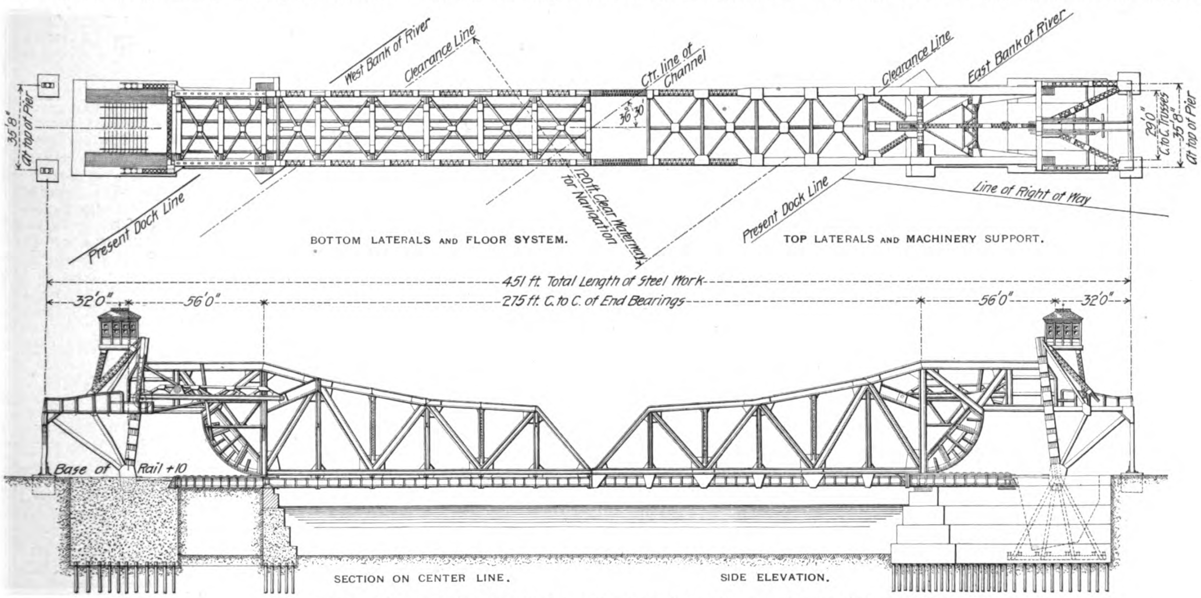

Fig. 2.—Scherzer Rolling Lift Bridge at Crossing of the Chicago Terminal Railroad.

The designs for both bridges were made and the erection will be superintended by the Scherzer Rolling Lift Bridge Company, Chicago.

Steel Foundations for Steam Railroad Track.

By Gustav Lindenthal, C. E.

(Continued from page 641.)

V.

A comparative estimate of cost of a first class track with wooden ties, as per standards of Penn-