To further facilitate erection of the troughs, the stiffeners are omitted from the inner side of the longitudinal girder. The end connection angles of the troughs, which are field riveted to the web of the girders, are placed high enough so that the tie bolt diaphragms near the ends of the troughs will not interfere with the driving of the field rivets at the ends of the troughs in which the tie bolt diaphragms occur.

The troughs are drained through 1 in. gas pipes fitted into holes in their bottoms and projecting slightly below the trough to form a drip. This projection of the drain pipes must not extend below the line of low steel determined by the rivet heads on the under side of the extreme cover plate of the bottom of the floor beam. The upper ends of the drain pipes are threaded into washers to hold them in place. The lower part of the troughs is filled with asphalt mastic, the surface sloping toward the drain pipes and flashed over the washers at the upper ends of the pipes. A layer of broken stone covered with gravel is spread over the mastic for a protection.

sections. There is no interference from the girder in driving the rivets on the outside of the truss, but these rivets, up to the level of the tops of the girders, should be driven at the same time that the riveting on the opposite side of the truss is done.

In the development of this type of shallow floor for double track bridges, the first efforts were directed toward obtaining an open floor design, with stringers beneath the track, transmitting the load directly to the floor beam. The excessive bending moment in the floor beam, resulting from this arrangement, made it impracticable to design a floor beam that would come within the required limits of depth of floor.

Following this, a trough floor type was designed, differing from the one shown on Fig. 1 in that it had no longitudinal girders to carry the troughs. Instead, the troughs were extended to the trusses and connected to the bottom chord in the same manner that the floor beam in Fig. 1 is connected to the chord at the panel point. The bottom chord was designed to act as a girder, to carry the panel loads to

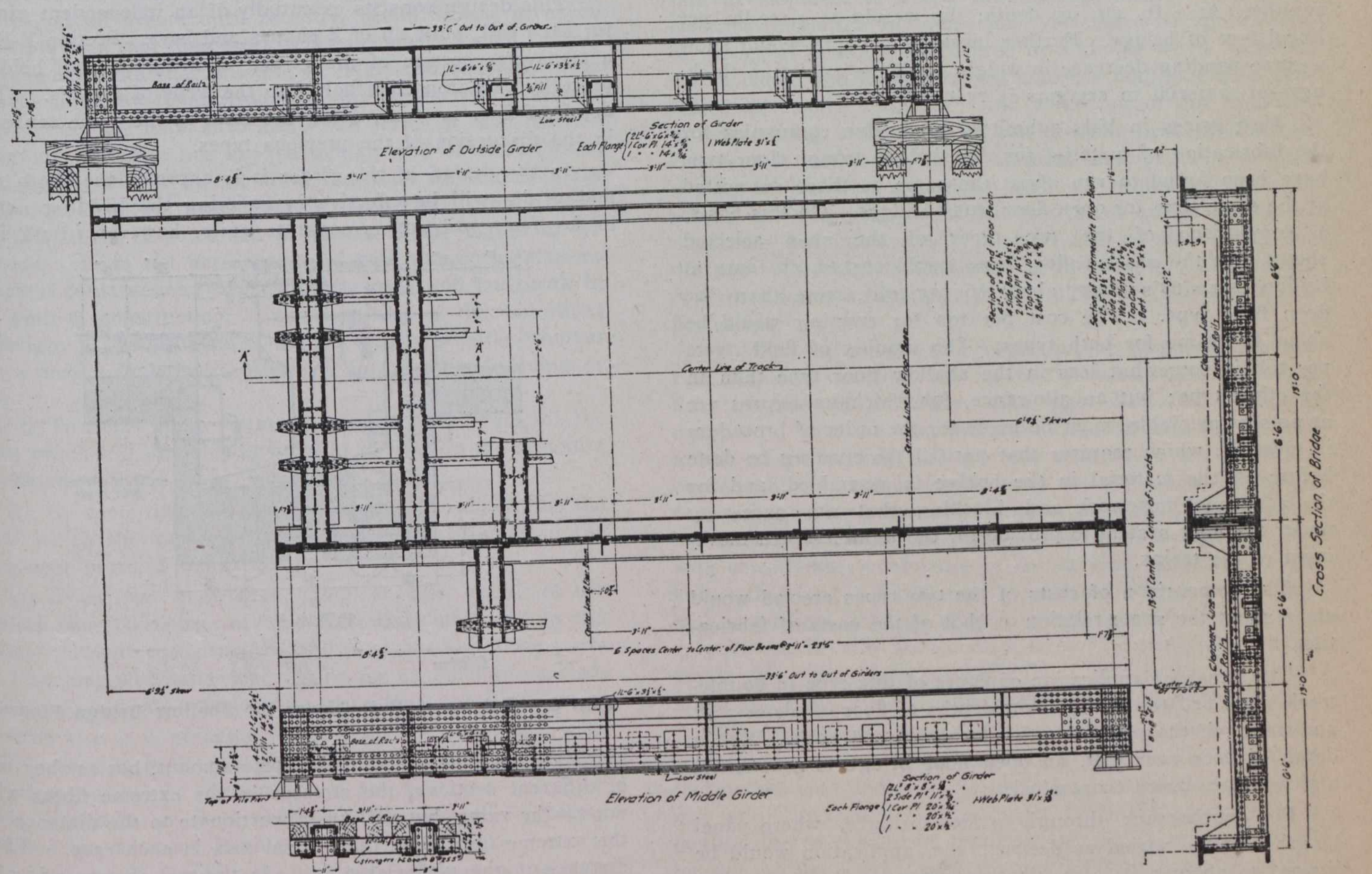

Fig. 2.—General Details of Shallow Open Bridge Floor.

The deflection of this floor under a maximum load is considerably greater than that of floors designed for depths determined by economical sections. Under maximum load the theoretical deflection at the centre of the floor beam is 0.65 in. The erection of truss bridges of the open trough floor type requires a special order of work in riveting, owing to the longitudinal girders being located so close to the trusses. After the girders have been placed in position, no riveting can be done on the inside of the lower chord opposite the girder. On this account all riveting in the trusses below the level of the tops of the girders must be done before the girders go into place, which means that all lower chord splices, floor beam connections to trusses, and web member connections to gusset plates, up to the level of the tops of the girders, must be riveted before placing girders and trough

the panel points. This design brought the depth of floor within the required limits, but made the troughs excessively heavy. The bottom chord was necessarily made deep and heavy, since it had to act as a beam for the floor troughs at the same time that it was doing duty as a tension member in the truss.

The next step was the introduction of the longitudinal girder. This was placed as close to the track as the clearance diagram would permit, to reduce as far as possible the bending moment, and thereby the sections, of the floor troughs. The introduction of the longitudinal girder changed the bottom chord from a combined beam and tension member to a simple tension member, and eliminated from it the objectionable secondary stresses produced by the vertical loads applied at the trough connections.