

necessary at Kansas City, men being constantly needed to tend the draw, and collect tolls, this danger is reduced to almost nothing.

The trusses of the five fixed spans measure respectively 130, 198, 248, 198, and 176 feet, the difference between these distances and the lengths of spans, given in the preceding chapters, being the allowance made for pedestals, wall-plates, and clearance room. The two shortest of these have straight parallel chords, the depth of truss being 22 feet; the same depth is retained at the ends of the larger spans, but in them the upper chord is arched so as to increase the central depth to one-eighth of the length, the inclination of the braces being kept nearly constant by varying the lengths of the panels. The upper chord of the 130 foot span is formed of three pieces, packed in the usual manner; in the other spans the chord is of five parts, and supplemented at the centre by a sub-chord of two parts. The lower chords are of wrought-iron upset links with pin connections, made under the Linville and Piper patent. The end posts and braces bear upon a cast-iron pedestal, which rests on a wall-plate likewise of cast-iron, carefully fitted to the masonry, and well bedded with mortar; at one end of each span a set of rollers is placed between the pedestal and the wall-plate. In place of the ordinary square ends the braces are cut with two end faces, which make an obtuse angle with one another, and the angle blocks are cast to correspond; this device makes it impossible for a brace to slip upon its bearing. The ties are of square iron, with a welded loop at the lower end, passing around the chord pin, and a screw cut on the upper end, which is previously upset, so as to leave an equivalent area after the cutting of the screw. In the 130 foot span both the main and counter braces are single, the counters bearing upon cast-iron brackets placed on the sides of the main braces; the main and counter ties are in pairs running along the sides of the braces. In the other spans the main braces are in pairs, and the counters, which are single, pass between them. In the 176 foot span both sets of ties are in pairs, the main ties passing outside of the main braces, and the counter ties between the main and counter braces. The arrangement of ties is the same in the central panels of the 198 and 248 foot spans, but in the panels near the ends there are four main ties, two passing outside the main braces, and two between them and the counter. In all the spans the counter ties are carried