

timber longitudinals 6 in. deep, the one in the centre bearing upon the cross girder through a 3 in. packing, and the outside ones resting on the bottom flange of the main girder, and on the inner side of the cast-iron fascia plate, which forms the ornamental plinth to the hand-railing, as before mentioned. The footways are close timbered with 3 in. planking. The cross girders are 34 ft. 6 in. long and 15 in. deep; they are simply web plates with angle-iron upper and lower members, and occasional stiffening plates. Figs. 3, 6, and 7 show these girders. The former of these figures is a transverse section of the roadway, and represents the shape of the paving blocks as well as the close planking to which they are spiked; while Fig. 7 shows the construction of the 5 ft. 9 in. platform, with the longitudinal bearers and packing pieces over the cross girders.

The main girders are 4 ft. in depth, and the same rise in the centre, with a solid web, and a maximum section of 42 square inches. They may be regarded as continuous girders, supported at three intermediate points 50 ft. apart, and resting at the abutments on curved bed-plates, as shown in Fig. 22. The ends of these girders abut against cast-iron skewbacks, bolted into the masonry (Figs. 21 and 22), and are enclosed in pilasters which abut against the towers, forming a finish to the girders. The bridge is suspended by a system of straight chains, and an auxiliary catenary passing over the saddles in the towers to the moorings in the abutments. This latter only does duty in supporting the four sets of main links, so that they are always kept in absolutely straight lines, and thus rendered rigid. Fig. 5 shows in detail the method of attaching the shorter chains to the longitudinal girders. The web is pierced in the centre for the passage of a 6 in. diameter pin, and is stiffened by a $\frac{1}{2}$ in. plate on each side, strengthened at the edges with angle irons. Wrought-iron distance pieces are also rivetted to each side of the web, to transmit the strains of the chains to the web. The pin before mentioned passes through the web and distance pieces, projecting sufficiently on each side to receive the ends of the chains,

which are kept apart by washers 1 in. thick. The links are prevented from sliding off the pin by cast-iron caps (section Fig. 5), which are fastened to it by 1 in. screws tapped into the centre. In the middle of the bridge, where the longer diagonal chains meet, the detail is very similar, the only difference being that the two sets of chains are coupled together on each side of the girder by a short horizontal link which turns freely upon a centre pin.

The various connexions between the catenary and main supporting links are given in Figs. 15, 16, 17, 18. Where the former is at a higher level than the latter, a light rod couples the two together, keeping the diagonal in place, and at such points where the curved chain falls below the straight a vertical strut supports the latter. The joints of the catenary are so arranged that they may be always exactly above or below those in the straight chains, so that the length of the links in the former varies throughout, while in the latter it remains the same. The arrangement of these struts and ties will be understood from Figs. 16 and 18.

The land chains have a strength equal to the united strengths of both sets of bridge chains. The first joint from the towers, shown in Figs. 19 and 20, is an adjustable one, and is placed there to regulate the curve of the catenary which ends at this place, and is merged into the mooring chains which pass through the back of the abutments to cast-iron anchor plates beneath, which are shown in Figs. 12, 13, and 14. The strain upon the mooring chains amounts to 6 tons per inch, or 432 tons total load; this is divided over an anchorage area of 28 square feet, giving a pressure of $15\frac{1}{2}$ tons per square foot on the abutment. At the towers the chains pass over a double saddle (Figs. 8, 9, and 10), resting on ten rollers, 4 in. diameter and 3 ft. 6 in. long.

Before shipment from this country, the bridge was erected at Messrs. McClellan's works, and tested with a load equivalent to four times its own weight, *i. e.*, equal to double the greatest strain which could be brought upon the chains.