GENERAL DESCRIPTION

Of a single-track iron Railway Bridge, with a centre-opening of 500 feet and two side-openings of 300 feet each in the clear, at low water mark.

(See Plate 1.)

The three openings of this bridge are spanned by two parallel continuous parabolic trusses, 1184 feet in length, at a distance of 14 feet apart in the clear; the floor-beams for support of the track resting upon the lower chords. This superstructure is firmly fixed upon one of the two middle piers, while it rests upon roller-plates on all the other piers. This arrangement, therefore, admits of free contraction and expansion, caused by changes of temperature. It will be noticed that the towers which support the cables on the middle piers, form integral parts of the movable structure, and consequently will change their position in unison with the other parts of the work, when affected by contraction or expansion. The cables together with the arches form one united system, all moving together uniformly when thus influenced.

The Railway track is supported at intervals of 5 feet, from c—c, by rolled iron beams of 12 inches depth and 21 feet 5 inches in length. The rails rest upon wooden stringers 12 x 12, which are strengthened in depth by timber bridgings, 6 x 12, fitted in between the iron beams. A longitudinal iron beam of 9 inches depth underneath the bridge, suspended by bolts to the wooden stringer, adds further to the depth of bearing, which is wanted to distribute the concentrated weight of the Locomotive drivers, and thus diminish their jarring action. Every second crossbeam is suspended to the cable by means of suspenders, but each of the beams is also firmly riveted to the lower chords by 16 rivets of 1 in. diameter. This union forms the only connecting link between the arches and the cables.

There are trusses on each side of the track, and each is double throughout from end to end, leaving an open space 24 inches in width between the posts. In the centre of this space the cable is freely suspended in a vertical plane, parallel to the trusses; the suspenders run down in the same plane; so, also, do the wire rope-stays, which pass over the towers below the cables. Where the stays cross the suspenders, they are united with them by wire wrappings, for the purpose of preserving their straight lines, and to prevent oscillations.

The principal features which give supporting strength as well as stiffness to the trusses, are the arches. The cables which co-operate with the arches, are designed for strength alone, without adding much to stiffness. An additional source of strength as well as stiffness is obtained by the wire rope-stays, six on each tower; these are also very efficient in preserving the equilibrium between the spans under the action of variable loads, and also in relieving the arches at the haunches, where assistance is most needed.

At the extreme ends of the Trusses, 4 light, double, wire rope-stays are added to give additional strength and stiffness to those points.

At the first glance this plan may appear a complicated arrangement, defeating its own end by the want of internal harmony among its different parts. But no view could be more mistaken. In place of exhibiting a want of harmony, this system will be found in its practical working so co-operative and mutually supporting in its various parts, that nothing will be left to desire. No system is possible which, under the action of passing and variable loads, will be affected