RAILWAY BRIDGE OVER THE DANUBE, NEAR VIENNA.

PLATE LXXV.

ON Plate LXXV. are illustrations of a bridge erected over the Danube, near Vienna, for the company of the Austrian States Railway.

It consists of five spans of 262 ft. across the Danube, and of four spans of 112 ft. across that portion of the river which is dry at low water, and according to the original plans it was to terminate on that side by a wooden viaduct. It is carried at both ends by abutments of masonry and concrete resting upon timber piles at a depth of 32 ft. below ordinary high-water level.

The large spans are carried by cast-iron caissons, 15 ft. 6 in. in diameter at the bottom, reduced to 12 ft. 6 in. at the top, and carried down to a depth of about 63 ft. below high-water level, the underside of the iron superstructure being about 15 ft. above that level. The caissons are 70 ft. long, made in lengths of about 8 ft. 3 in., except the two lowest rings; the several rings are made in six segments of 1½ in. metal in the body, bolted together through flanges faced in the joints. The caissons are filled in with concrete, and are surmounted with ornamental stone cappings upon which the girders rest. The smaller spans are carried also by cast-iron caissons 8 ft. in diameter, and 64 ft. long, cast in complete rings of 8 ft. in depth, surmounted also with stone cappings similar to those on the large caissons.

It had been originally decided by the engineers of the company to sink the caissons by means of the compressed air system, but this plan was abandoned and the foundations, the contract for which was let to M. Castor, of Paris, were made with temporary caissons. The pneumatic apparatus is, however, shown in the engravings.

The large spans consist of two continuous main girders constructed on the lattice system, 20 ft. 6 in. apart from centre to centre, and 25 ft. deep over all, this being 1/3 of the span. Their top and bottom members, which are of a section very generally employed by Continental engineers, consist of dwarf webs 2 ft. 7 in. deep, made of two plates of an aggregate thickness of 1½ in., rivetted together, and of flanges made of plates of the same thickness as those of the dwarf webs, 2 ft. 7 in. wide, and varying in number from six (irrespective of cover-plate), at the points of greatest fatigue, which, in the case of continuous girders occur over the piers, to three in the centre of the spans, and to two at the points of contrary flexure, being those of least fatigue, and situated at distances of one-fourth the span from the piers, except in the end spans, where there is only one point of contrary flexure, situated at a distance from the first pier of approximately one-fifth the span. It follows from this, that the girders over the end spans require to be somewhat stronger than over the intervening spans, as will be pointed out with more precision hereafter; and we have no doubt that the engineers of this work, who are thoroughly alive to these theoretical niceties, have paid proper attention to this requirement.

The flanges are connected with the dwarf webs by means of 6 in. angle irons ½ in. thick, the whole being rivetted together by means of 1 in. rivets.

The lattice bars consist of vertical struts placed at distances of 12 ft. 6 in. apart, and of diagonal ties crossing each other in each bay; the struts consist of two pairs of angle irons rivetted together back to back with a stiffening plate between them, and the ties consist of flat bars, both struts and ties being rivetted in pairs to the dwarf webs on the inside and the outside of the girders. The lattice bars, of course, increase gradually in strength from the centre of the girders to the piers and abutments, but in our illustrations we have shown a section (Fig. 7) of the largest sections only.

The main girders are connected both at top and bottom by cross girders 2 ft. 7 in. deep, placed also at distances of 12 ft. 6 in. apart, and by diagonal brances connecting opposite ends of alternate cross girders. The upper cross girders, whose duties are merely to steady the main girders laterally, are of a very light construction, but the bottom cross girders which have to carry the roadway are solid plate girders. The rails are carried by full-webbed longitudinal bearers about 16 in. deep, rivetted in between the cross girders with their top flanges level with those of the latter, and each set of bearers between two consecutive cross girders is connected by a light strutting girder for the sake of lateral stiffness.

The platform or roadway covering of the bridge consists of 2½ in. planking carried by pieces of scantling 4 in. x 3 in. in section on the outside of the rails. In the 6 ft. 6 in. space the roadway planking is level with the top of the rails, but between the lines of rails it is laid 3 in. lower.