horizontal arches transfer the thrust from the face of the abutment to the wing walls, as shown. These latter have a thickness of 7 ft. 2 in. at the base, gradually decreasing as the pressure of the retained earth diminishes, to 2 ft. 7½ in. at formation level, and they are tied together with four bolts 2½ in. diameter. Externally the abutments present a symmetrical though not highly ornamental appearance; they are of brickwork, with stone mouldings, and parapets.

There are four main ribs placed 4 ft. 11 in. and 5 ft. apart, so that the centres of the ribs coincide with the position of the line of permanent way.

The general construction of the main ribs is shown in Fig. 10, and in cross section, Fig. 1, as well as in details, Figs. 2, 3, and 7. They are 4 ft. in depth in the centre, increasing to 4 ft. 9 in. at springings, with top and bottom flanges 1 ft. 13½ in. wide, and 2 in. thick, which is also the thickness of the web. Nine segments each 22½ ft. long, with the intrados curved to a radius of 250 ft., complete the rib. The construction of the end segment is shown in Figs. 2 and 3, where it will be seen to terminate with a rounded heel, curved with a radius of 2 ft. 5½ in., and strengthened transversely and longitudinally with ribs and feathers. This rounded end fits into a curved shoe (Figs. 2, 3), which is held down to the abutment by seven bolts 2 in. in diameter and 6 ft. long. The shoe is 3 ft. in breadth, corresponding to that of the main rib (which is widened out as shown in the plan), and 6 ft. long over its bedplate, the thickness of metal averaging 2½ in. Both the shoe and the heel of the main rib were cast as nearly a true fit as could be obtained, and afterwards the surfaces were faced, and ground on the other side, so that extreme accuracy of contact was obtained. It is found, however, that the girders do not turn at all upon these joints, but rise and fall in the centre with the variations of temperature.

Horizontal wrought-iron girders 2 ft. deep, and of section shown in Fig. 16, Plate III, rest on the top of the spandril-filling, bearing at one end, on the abutments, 22 ft. above the springing, and dying away on the main ribs, at a point 18 ft. from the centre of the bridge. The upper flanges, however, are continued until they meet the corresponding girders on the other side. These girders are of ordinary construction, the flanges having a constant cross sectional area throughout of 84 square inches. The thickness of web is 1½ in., and the top and bottom angle irons are 2½ in. × 3 in. × ¾ in.

Stiffeners of the construction shown are placed 8 ft. apart, at the joints of the web plate, which are made good with 2½ in. covers, 1 ft. wide by 1 ft. 4 in. deep. Intermediate T-iron stiffeners are also placed at intervals of 8 ft. The cover plates of the bottom flange are placed on the inside of the girder, so that the web has to be notched, and the angle irons cranked, to accommodate the extra thickness. This is done to preserve a perfectly flush surface on the under side, and all rivets have countersunk heads for the same purpose.

The spaces between the under sides of the horizontal girders and the main ribs are filled in with cast-iron standards, as shown in Fig. 10, and in details, Figs. 7 and 15. The standards are placed 4 ft. apart, from centre to centre; they have a cruciform section, and vary in size from 12 in. × 6 in. × 1¼ in. thick, to 9 in. × 6 in. × 1¼ in. thick. In each case they are cast in 4 ft. lengths, the joints being made with bolts 1¼ in. diameter midway between the standards, as shown in detail, Fig. 7. On the lower side they are secured to the main arched rib by bolts 1 in. diameter, placed 12 in. apart, and at top they are fastened to the horizontal wrought-iron girder by ¾ in. bolts, 8 in. apart, which alternate with the rivets in the bottom flange of the girder. Horizontal struts of the construction shown in Figs. 5 and 6 are placed between the main ribs, and bolted thereto. The distance between them varies from 16 ft. 6 in. to 8 ft. 4 in., the space being governed by the length of the spandril standard. These struts are formed from two channel-iron rolled beams, 4½ in. deep, ¾ in. thick, and 1½ in. wide across the top and bottom flanges, placed back to back, and riveted together, except at the ends, where they are opened out sufficiently to admit one web of the spandril standard, while the ends are turned back to bear against the other web, to which they are fastened by two bolts 1¼ in. diameter. Fig. 1 shows the system of vertical cross-bracing between the main ribs, adopted for this bridge. It consists of a series of cast-iron struts of the section shown, the top and bottom horizontal members being circular, and 4 in. in diameter, and hollow to admit of the passage of a bolt 1½ in. in diameter, which secures them to the main ribs. There are two sets of struts to each segment, or eighteen altogether in the whole length. At the top and bottom of these struts tie rods, 1½ in. in diameter, extend diagonally from rib to rib, forming a through system of horizontal bracing throughout the bridge. The spandril standards are tied together vertically by diagonal bracing rods 2 in. wide by 1¼ in. thick, and horizontally by bars of the same scantling, which do not cross each other, but are turned round at a distance a little short of the centre of each bay, and are bolted together by 1½ in. bolts passing through iron distance pieces, which are suspended from the platform overhead (see Figs. 13, 14). The wrought-iron girders underneath the roadway are also similarly braced, horizontally and vertically, in each case with tie rods 2½ in. by ¾ in., while struts formed of two T-iron 1½ in. by ¾ in. by ¾ in. are bolted horizontally to the bottom flange of the girders, as well as to the top of the spandril filling, as shown in Fig. 15.

It is to this complete system of bracing throughout