

The spaces which separate the retort houses are spanned by bridges that form the continuation of the viaducts. The design and construction of these are shown in Fig. 20 on the preceding page. The span of each bridge is 47 ft. 9 in., and the height, from the ground level to the underside of the girders, is 21 ft. 10 in., the depth of the girder is 5 ft. 4½ in., and the distance between girders, from centre to centre, is 13 ft. The bottom flange of the girder is formed of a plate 14 in. wide and ½ in. thick, and two angle irons, 2½ in. by 2½ in. by ½ in., spaced apart, in order to admit a channel iron ring, 3½ in. by 2½ in. by ⅝ in., between them. The top flange of the girder is of similar construction, but the upper plate is curved. The ends over the bearings upon the walls of the retort houses have a solid web ⅝ in. thick, stiffened by angle irons, the inner ones being 3 in. by 3 in. by ⅜ in., and those at the end 2½ in. by 2½ in. by ⅜ in., these latter being attached to a back plate 14 in. by ⅜ in. The rest of the girder is divided into nine panels, each filled with a hooped channel

iron of the dimensions given above, and braced by diagonal rods, 4 in. wide by ⅝ in. thick, connected together in the centre by an ornamental casting and distance pieces, as shown in Fig. 20.

The spaces between the outside of the rings, and the top and bottom flanges of the girders, are filled in with ornamental ironwork, as shown. Transverse joists, 8 in. deep, 4 in. wide by ¾ in. thick in both the top and bottom flanges, and ⅝ in. thick in the web, are placed from girder to girder at intervals of 5 ft. 3½ in., rivetted to the bottom flanges of the longitudinal girders, and also to a T-iron web, which is attached to the inside of the main girder between the underside of the top flange and the top of the joists, as shown. Upon them are laid the longitudinal sleepers, 9 in. by 8 in., for carrying the rails, and the spaces between them and the girders are close planked with 3 in. planking. Between the longitudinal sleepers occasional transoms are placed, and a central plank is laid upon the bridge as in the rest of the viaduct.

SPECIAL MAINS.

PLATE XI.

FIGS. 1 to 5 on Plate XI. illustrate one of those examples of special construction, in which the 4 ft. main has been necessarily contracted in passing over the North London Railway at the Poplar station, East India-road, there not being sufficient depth to lay down pipes of the ordinary section beneath the road, and preserve, at the same time, the requisite headway above the rail level. Figs. 1 and 2 show a general elevation and plan of the main crossing, where the span of the railway is 25 ft., but where for a distance of 57 ft. a special construction was necessary. It will be seen that the ordinary 48 in. main terminates on each side of the railway, and 16 ft. from the face of the retaining walls, and that to the flanges of this terminal length of the ordinary section a reverse curved pipe, 7 ft. 6 in. long and 4 ft. diameter, is attached; to this follows a taper casting, 6 ft. in length, as shown in the plan and section, and between the faces of these special castings, a distance of 30 ft., is placed a wrought-iron tube, made of ½ in. plates throughout, and fastened with ¾ in. rivets pitched 2 in. apart; the joints being made good, in the usual way, with tape and red lead.

In Figs. 3, 4, and 5 on Plate XI., and Fig. 6 on the present page, are shown the tapered castings by which the curved 48 in. pipe is connected to the wrought-iron boxes already mentioned. Fig. 4 is a vertical section of one of the special castings, and Fig. 5 a half-plan, from which it will be seen that each is made of two parts, bolted together on the vertical axis of the

main. The thickness of the metal is 1¼ in., and the sides, top, and bottom, are stiffened by flanges of the same strength, and the two halves of the castings are fastened together by 1½ in. bolts spaced at intervals of 9 in., bolts of the same size and pitch being used for fastening the tapered length to the curved length of

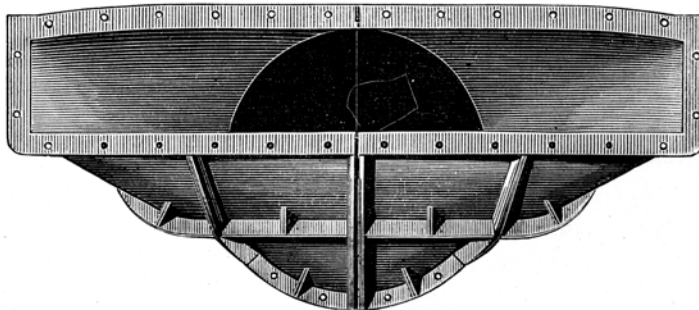


FIG. 6.

main, and to the wrought-iron boxes. Fig. 6 is an end elevation of one special casting, showing the manner in which the form at the end adjoining the wrought-iron tubes is converted into the circular shape, where it is bolted to the curved main. Fig. 3 is a cross section of the wrought-iron tube, which crosses the railway, and it will be seen that it is divided longitudinally down the centre by a web of the same dimensions as those on the outside. The plates for the side and centre webs are in lengths of 6 ft., and are 18 in. deep. They are placed 5 ft. apart, so that the total width of the tube is 10 ft. The plates forming the top and bottom are 10 ft. 6 in. long and 3 ft. wide, and being disposed transversely,