formed a box of plate iron containing a counterweight composed of masonry, which completely balances the longer overhanging portion of the girder. In order to strengthen the bridge over the piers, and to furnish convenient attachments for the machinery on which each part turns, the two girders forming each half, are at those points united by a cylinder or drum of plate iron, 29 ft. 6 in. in diameter. The manner in which these cylinders are constructed, and the form of their connexion with the girders, will be seen from the detailed views of one of them given in Plate LI. The same figures also show the arrangement of the turntables on which each half of the bridge rests. It will be seen that the lower edge or curb of the cylinder above mentioned is connected to a series of massive castings, which form a circular table resting upon a number of conical cast-iron rollers. There are fifty of these rollers, each 1 ft. 11½ in. long, and having a mean diameter of 1 ft. 7½ in.; their spindles revolve in bearings formed in a pair of concentric rings, so that the rollers are kept at a constant distance from each other. The rings carrying the bearings of the roller spindles are connected by radial angle irons with a boss embracing the centre pin of the turntable, this pin being 11½ in. in diameter for the main part of its length, and being securely keyed into a casting forming one of a set fixed on the top of the pier. The axes of the rollers are inclined, as shown on Plate LI., so that their upper surfaces, on which the bridge rests, are level, the whole of the inclination necessary for accommodating the conicality of the rollers being given to the lower bed.

On the top of the pier are securely fixed a set of castings forming the lower bed on which the rollers run, this circular bed being connected by radial arms, with a boss 3 ft. 1 in. forming the socket for the centre pin already mentioned. The form and arrangement of these castings will be seen from the section, Plate LI. Both the upper and lower beds between which the rollers are placed were turned up with the greatest care.

The machinery for moving each part of the bridge is also shown on Plate LI. Around the castings composing the lower bed, upon which the rollers run, there is fixed a circular rack, so as to form, as it were, a large spur wheel, fixed down to the top of the pier. Into this wheel there runs a pair of pinions, 1 ft. 9¾ in. in diameter over all, and 9¼ in. wide on the face; these pinions being each fixed upon a vertical shaft revolving in a long socket formed on the upper or movable ring of the turntable, which is secured to the bridge. That part of each shaft on which the pinion is placed is 5¼ in. in diameter, whilst the part within the socket is 7¼ in., and this size is continued for a short distance above the socket, where the shaft is fitted with a spur wheel, 6 ft. 8 in. in diameter. The weight of each shaft and its appurtenances rests upon an adjustable set screw at the lower end, and a similar set screw is arranged so as to bear upon the upper end, as shown on Plate LI.

The spur wheels, which we have just mentioned as being fixed on the vertical shafts, are each 7½ in. wide on the face, and have bosses 11 in. deep. Into each of them there goes a pinion placed upon a shaft, extending upwards to the roadway of the bridge, and furnished at its upper end with a socket for capstan bars. The diameter of each of these shafts is 4 in. where the pinion is placed on it, and 3½ in. for the remainder of its length. It is steadied by bearings carried by brackets fixed to the inside of the wrought-iron cylinder, as shown by the half longitudinal section on the right-hand side of Plate LI. The capstan heads at the top of these long vertical shafts are each fitted with four bars about 6 ft. 6 in. long, and they are arranged so that when they are not in use for turning the bridge, they can be folded down below the line of the roadway, as shown in the upper figure. In calm weather, two men acting on the capstans of each half of the bridge can open or shut it, but the two capstans with which each half is furnished of course afford the opportunity of employing a far larger number of men if necessary.

Each half or wing of the bridge is so balanced by its counterpoise, that its centre of gravity rests directly over the centre of rotation. To restrain within certain limits the amount by which the centre of gravity can be displaced under the influence of variable loads, there is connected with the abutment end of each short span, by means of levers, an arrangement of anchorages which is capable of opposing to the upward or downward movements of the ends of the girders a force of 154,000 lb. The unequal distribution of the movable load upon the two wings of the bridge, might in some cases cause a difference in the level of their ends where they meet in the centre of the main span, and to counteract this the following arrangement is adopted: At the end of one of the wings are placed horizontally a pair of strong bolts of a conical form, which, when the bridge is shut can be thrust outwards, so that they are made to enter to a depth of 12 in. or 16 in. into sockets correspondingly placed upon the end of the other half of the bridge.

In order to facilitate the examination or repair of any portion of the turntables upon which the bridge rests, there is placed on each pier, under each half of the bridge, four hydraulic presses. These presses are each capable of exerting a lifting force of 440,000 lb., and the water is supplied simultaneously to each of the four presses forming one group by means of pumps placed in the centre of the tower, and worked by hand in a