and to the proper cone for rolling in the circle in which they are placed; and the upper and under tracks, between which they are to roll, to be made true and even, and inclined to correspond accurately with the coning of the wheels. The wheels and both tracks to be made of the best white cast iron or steel. The construction of the turn-table must be such that the pivot may be made to carry 200 tons of the weight of the bridge, or relieved entirely as occasion may require, and the pivot must be of suitable materials, dimensions, and construction for the purpose. The turn-table must also be so constructed that any part thereof that is liable to be broken or worn out by ordinary use of the bridge, may be repaired or replaced without interrupting the use of the swing bridge, and shall be furnished with lever turning gear, so that in case the engine should be disabled the swing bridge may be operated with facility by hand.

13. The ends of the swing bridge to be furnished withcams or other effective device worked from the engine-room, by which a firm and steady bearing upon the resting piers may be given when the draw is closed, and the ends instantly freed when it is about to be opened.

14. A sufficient number of long bars of the iron to be used in the construction of said bridge shall be selected indiscriminately by the engineer of said party of the second part, and tested to ascertain that permanent set will not take place with less than 25,000 lb. per square inch tension. From the bars so previously tested for permanent set, a sufficient number shall be cut of the proper length to fit into the testing machine, and allow of a space of 10 in. in length, which shall be turned parallel and of a diameter of .7854 of an inch. These shall be capable of supporting from 55,000 to 60,000 lb. per square inch before breaking, measured upon the original area of the bar, and shall diminish at least 20 per cent., or 15,000 lb. per square inch in area, and elongate at least 10 per cent. before breaking. Flat bars, 2 in. wide and 1¼ in. thick, and round bars 1¾ in. in diameter, shall bend cold to a right angle without any signs of fracture.

15. All the links of the lower chords and all of the diagonal tension bars of the main girders, shall, before being put into the bridge, be tested to a strain of 20,000 lb. per square inch of section, and shall, while under tension, be struck with a hammer, and if any show permanent set or show signs of imperfection, they shall be rejected.

16. All abutting joists shall be planed or turned. All pin-holes in wrought iron shall be drilled. No bar of wrought iron having an error in length, between the pin-holes, of over 1/24th of an inch, or in the diameter of pin-hole of over 1/324th of an inch, shall be allowed in the bridge.

17. The 185 ft. spans will be built to a camber of 1¼ in., and shall return to the original camber without re-adjustment after being tested. The 70 ft. spans will be built to a camber of ½ in., and shall return to the original camber without re-adjustment, after being tested.

18. All the ironwork shall, as soon as possible after being cleaned, be painted with one coat of oxide of iron paint and oil. All machinery out of work shall be covered with one coat of white lead and tallow; all before leaving the place of manufacture thereof.

19. Immediately after the erection of the bridge, the ironwork shall be thoroughly cleaned and be painted with two coats of white lead and oil, tinted as the engineer of said party of second part shall direct.

20. The side walks to be floored with longitudinal joists of pine, 3 in. thick and 12 in. deep, not more than 2 ft. apart between centres; and 2-inch pine plank, well nailed to the joists. Said side walks to be supported by additions to the cross beams of the railway floor, and each side walk to have at the outer edge a strong and handsome iron railing firmly secured to the non-supporting beams.

It will be noticed from the specification that the floor system is stronger than is usually adopted for American bridges, but this is a step in the right direction. To provide for expansion one end of each girder was fixed to the pier, while the other end was carried upon rollers formed of lengths of 1½ in. cold rolled shafting mounted in wrought-iron frames.

The engine, and boiler, and all the machinery required to actuate the draw span is situated within the turntable, and is out of sight. The draw span can be opened and closed very quickly, and on one trial the time which elapsed from the time of setting the cams in motion to free the ends until they were again in place, and the bridge locked to receive trains, the span having in the mean time been swung open 90 deg. passed a steamboat, and closed again, was only 2 minutes 15 seconds.

The outside wheels mentioned in the specification really merely steady the draw, and support it so as to give a good and steady bearing for the passing of trains. When being swung the weight is carried by the centre. The whole weight of the draw span and lines is about 350 tons; but before steam power was applied it was found that two men could move it easily. The ends of the draw span are fitted with an efficient arrangement of locking cams.

The system of construction mentioned in the sixteenth paragraph of the specification is always strictly adhered to at the Phoenixville Bridge Works, and we are informed that the bridges built there always return to their original camber, without readjustment, after testing.