nected by radial struts so that they can be erected and centred accurately in the shop, and when later put in position will occupy the same relative position.

In this design the live ring is connected to the centre pivot by radial rods, which are connected on the outside of the wheels by a flexible ring and on the inside by an angle. With this construction the centre ring around the pivot does not start to turn as soon as the wheels, but drags, and the rods through the rollers are thrown out of radial lines, so that the rollers do not run concentric with the top and bottom treads.

This is the reason for a large percentage of the broken wheels of old swing spans, and it also increases the power required for turning.

With reference to the drum wheels and spider, Tenderer No. 3 states: "It approaches very nearly that of the great swing span over the Thames River at New London, Conn., which it follows very closely in general design." This bridge was built more than twenty-four years ago, and, although the span is nearly 500 feet, the construction is light.

The specifications of Sir William Arrol say: "All radial bars and the roller frame of the live ring shall be formed of rigid members with suitable tangential bars to maintain the relative motion of the parts of the frame."

One of the Past Presidents of the American Society of Civil Engineers, in a paper on "Movable Bridges," presented before the Society on April 3rd, 1907, describing this type of construction, says: "The live ring arrangement for separating and holding the rollers which was formerly popular, consisting of adjustable radial rods, one end of each rod carrying a roller, the other end being connected to a ring devolving round the centre pivot, is, to say the least, an unmechanical contrivance. Good practice requires a more substantial construction. The rollers should run between two concentric circular girders firmly connected to each other; this ring should be connected to the revolving part of the pivot by rigid struts."

The design of the end shoes does not meet the requirements of good, modern practice, which requires supports for the ends of a swing span of solid, substantial construction similar to the end shoes of a fixed span. In this design the bearing pressure of the roller on the cast steel base is excessive and the base is too shallow to distribute the reaction over its full area.

It is stated that the 7/8-inch cup at the centre of the casting is for lock and centring device when closing. Tenderer No. 3 says: "These shoes are likewise of simple but massive construction. Cast steel bearing plates having an inclined approach and a hollow provided for the seat of the 16-inch solid steel roller bearing supporting the draw-arm. These rollers are to have a 9-inch pin and bearing at each end. This roller bearing is designed to form an automatic locking device and centreing device in addition to the rail lock for the bridge when it is closed, the roller, by gravity, rolling into the cup or seat provided."

In order to have the roller and the base casting centre the bridge when closing, the ends of the span must be lowered by lowering the ends of the centre eyebars through a percentage of their travel before the span has been turned to its final position. If the lowering has been excessive the momentum of the span will not be sufficient to carry the ends up the inclined path on the base casting, while if the ends have not been sufficiently lowered the momentum will carry the span past the 7/8-inch drop provided for the centreing. The momentum of the span must be sufficient to lift the ends up an inclined plane until a point 8 inches from the centre is reached and to carry the span on a horizontal plane for a distance of about 4 inches, but it must not be so much as to carry the ends 4 inches past the centre, or the device fails to act. As the deflections of the two trusses are different and vary with the temperature, the chances of successful operation are very small.

Suddenly dropping the ends of the bridge 7/8 of an inch will produce a hammer action on the cast steel base and a racking strain all through the structure.

Summarizing, we would say that the pressure on the foundation for the pivot pier is much higher in the 3rd design than in the other designs submitted.

The piles for the north approach foundations are loaded more than twice as high in the 3rd as in the other designs.

Maximum unit stress in the chord members of the trusses are 32 per cent. higher in the 3rd and 25 per cent. higher in the 1st design than in the 2nd.

The 1st and 2nd designs follow the lines of accepted good practice in modern swing bridge construction. The 3rd design is a distinct departure, and the largest structure operated in a similar manner, of which we can find any record is a double-track swing bridge, 228 ft. long, at Hammond, Indiana. In this structure the ends of the bridge are raised by means of double toggles in place of the single toggles.

The recommendation of the consulting engineers, however, was at variance with that of the British Columbia Manufacturers' Association, the Board of Trade, and other public organizations.

Despite the fact that the Provincial Government is exceedingly desirous that the company proceed without delay in the construction of the bridge in order to have the structure completed by the time the Pacific Great Eastern Railway connects North Vancouver with Fort George, little progress can be announced. The directors of the company appealed to the Government in the matter of awarding a tender. The Government, however, expressed itself as indisposed to take the responsibility of making an award and referred the question back to the Board of Directors. Numerous alterations to tenders were permitted, all three undergoing various changes. Then the Board decided to place the whole question before a disinterested engineer, fully capable of recommending the best award. Mr. Ralph Modjeski, of Chicago, was accordingly retained on July 10th, 1914. His report is expected in a few weeks, whereupon an award will probably be made.

INTERNATIONAL IRRIGATION CONGRESS.

There will be no postponement of the session of the International Irrigation Congress, which is scheduled for October 5th to 9th. On account of the war and the fact that European countries would not be in a position to participate in the Congress, some question arose as to the advisability of holding a session this year. It has, however, been decided to go ahead as previously planned confining the work to the United States and Canada. The Dominion and provincial governments which are really most interested in the success of the gathering, have concluded that it will be better to proceed than to postpone.

In the fear that the United States government may make the coal product contraband of war, all the Rochester and Pittsburg coal company mines in Indiana county have received word to start all mines full time, give all miners employment, and get out all the coal possible. The Canadian railroads have placed big orders and want the coal shipped to Canada at once.