

QUEBEC BRIDGE CENTRAL SPAN.

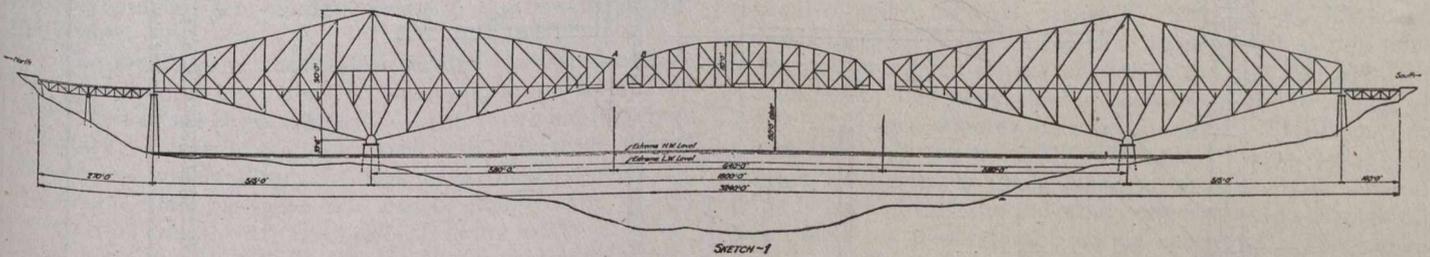
(Continued from page 210.)

down-stream ends of the scows, two at each end, and one tug on the up-stream end of each set of three scows to assist in moving the span endwise and generally for purposes of manipulation, so that there will be eight tugs in all—five on the down-stream side to hold the span against the current and three on the up-stream side for use as may be required.

It is the intention to check the span several times on the way up to the bridge to determine that it is under perfect control, and to stop it definitely some 200 or 300 feet below the bridge. Light lines will then be run from engines on the suspended span to the mooring frames which are now suspended from the ends of the cantilevers, and the span will be gradually pulled into position against a moderate pull of the tugs working down-stream. As the span nears its position, additional heavy lines will be carried from the mooring frames to the end of the span, these lines being crossed and arranged in such a way that the span may be hauled to an exact position vertically

Dealing with one corner only, all four corners being alike, there is placed across the end of the cantilever arm vertically over the point of intersection a heavy cross girder from the ends of which is suspended another cross girder, marked B, known as the fixed girder and placed at about the floor level of the cantilever arm. On top of this girder B are placed heavy hydraulic jacks with a working stroke of about two feet, and resting on these jacks and operated by them is the third or movable girder C. The hoisting chain before referred to is composed of long flat links bored for pins at regular distances of 6 feet. These links pass between the webs and cross-webs of the box girders B and C. In the cross-webs is a series of three holes two feet apart, one of which holes will be opposite the holes in the hoisting links. The operation of hoisting is as follows:—

Assuming that the hydraulic jacks are lowered and the movable girder C in its lowest position, the hoisting chain would be fastened to this girder by means of a pin, V, passing through the cross-webs of the girder and the chain. The hydraulic jacks are then pumped up about two feet until a pin hole in the hoisting link comes opposite



under that it will occupy when in place on the bridge.

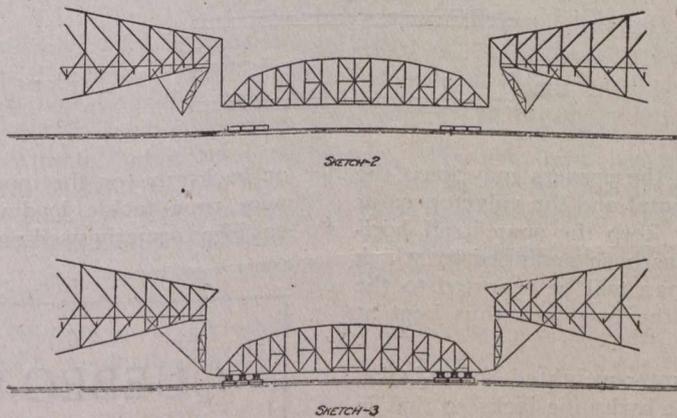
After the span is securely moored in this position, the hoisting chains, made of a series of bar links, by which it is to be raised up will be dropped into position and attached to the span. After the links are secured to the span they will be pulled up by hydraulic power and the span thus lifted to its final position. The eye-bars from which the span is to be finally suspended will be joined about the middle of their length by pins which will be driven when the span is in place. The upper links of these eye-bars are now hanging from the ends of the cantilevers and the lower links are fixed in their final position at the ends of the centre span.

Sketch No. 1 shows the bridge in outline with the centre span in its final position after the above described operations but without the floor system completed or without the redundant member later to be put in for the sake of appearances between the points A and B.

Sketch No. 2 shows the centre span when partly hoisted with the mooring lines released and the mooring frames partly hauled up out of the way.

Sketch No. 3 shows the span moored in position but without the hoisting chains attached to it. These will be hanging down from the lifting girders but are omitted on the sketch to avoid confusion of lines.

Sketch No. 4 illustrates the arrangement for hoisting the span into place.



a pair of pin holes in the webs of the fixed girder B, when a pin, W, will be inserted in these holes. The jacks will be slacked back so that the weight will rest on the pin W and the pin V may be withdrawn, permitting the movable girder C to be returned to its original position, 2 feet lower. When in this position another pin hole in girder C will be opposite a pin hole in the hoisting links, the pin V will be inserted therein, and the jacks pumped up until the load

is relieved from the pin W, which will then be withdrawn and the girder C raised another two feet. In this way the operation will be repeated, raising the span two feet at each movement of the jacks until it is in its final position.

The following data may be of interest to engineers:—

There are two jacks to a corner, 8 in all. The load to be lifted is estimated to be 5,540 tons. The rams of the jacks are 22 inches in diameter and the working pressure 4,000 lbs. The jacks have been tested in position by anchoring the girders B and C together to a pressure of 5,000 lbs. or 25 per cent. overload. The hydraulic pumps operating the jacks, two at each end of the span, are operated by compressed air piped from power houses on shore. There is a separated control valve for each jack at each corner and control valves for each pair of jacks at each end. Multiplying tell-tales are arranged