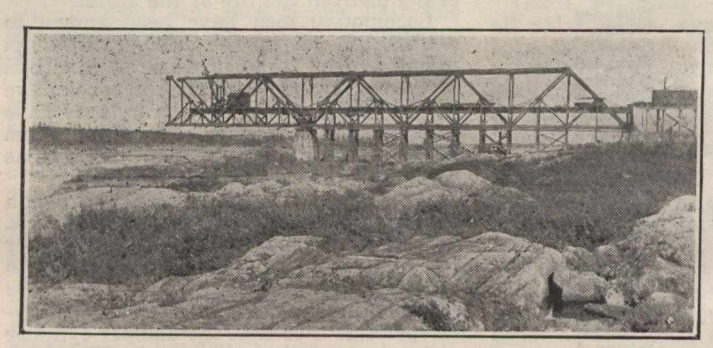
The Erection of Kettle Rapids Bridge, Hudson Bay Railway.

The Kettle Rapids Bridge, on the Hudson Bay Ry., crosses the Nelson River about 332 miles north of Pas, Man. The Nelson River, at this point, forms a deep, narrow gorge, through which flow swift rapids, directly in the way of the site chosen for the crossing. The banks on both sides consist of solid rock for a considerable distance back of the shores, and were a determining factor in selecting the continuous girder type of truss adopted. The design consists of a single track through truss structure, 1,000 ft. long, continuous over 4 supports. These piers are built on small islets of rock, between and in place economically, formed one of the chief considerations. The following erection programme was adopted:—

The south arm, between piers 1 and 2 was erected on wooden staging, with an ordinary derrick car, the only unusual features being that L0 was erected 10 in. lower than its normal elevation in order to allow for deflection in cantilevering. The truss, as a whole, was also erected on the permanent pier member rollers, about 5 ins. closer to the shore than its normal position. The main joints were then completely riveted, and the derrick car erected the balance of the south half



Kettle Rapids Bridge. The completed structure.

which and the adjacent shores the stream is shallow, with a slow current. The channel span is 400 ft. long, c. to c. of pier members, and the two flanking arms 300 ft. each. The trusses are the Warren type, having 50 ft. main panels, subdivided to form two 25 ft. stringer panels. They are 50 ft. deep, c. to c. of chords, and are spaced 24 ft. apart. All truss joints are riveted throughout. The floor system is the ordinary open floor type, having wooden ties carried on two lines of built up stringers, which frame into the webs of the floor beams. The simplicity of the design greatly facilitated the fabrication and erection and has many commendable points.

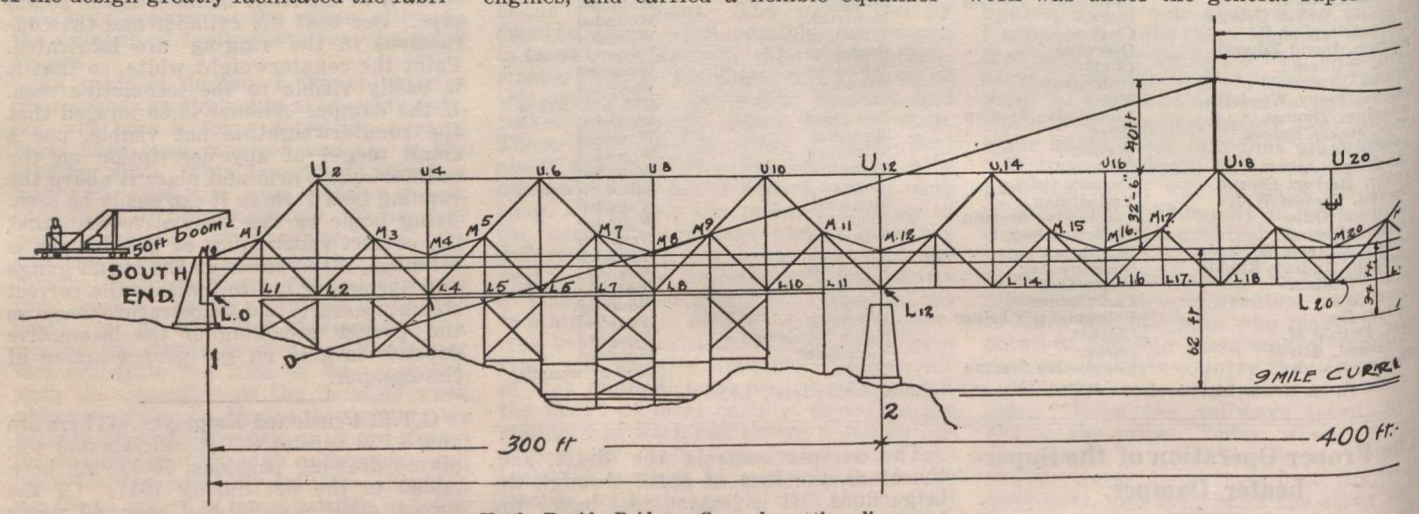
The method of erecting the bridge is of special interest, as it was out of the question to use staging of any kind for the channel span; the channel being of great depth, with a current of 9 miles an hour. Furthermore, the remoteness of the site, being at the end of a long construction line leading from Pas, precluded the possibility of bringing material for the north end in from that side, and the problem of getting this half of the structure across, of the crossing, as a cantilever, from L-12 to L-20. The riveting followed the erection very closely, so as to take care of the erection stresses.

A cableway tower was then erected on the north shore, materials for it being hauled by team over the ice some distance from the crossing. A short cableway bent was also erected on the completed truss at U-18, and a double cableway made of two 2¼ in. diameter cables was erected on these towers and securely anchored at both ends. These two cableways were operated by two double drum hoisting engines, and carried a flexible equalizer designed for lifting fifteen tons. The materials for the north end were then taken out on cars to the extreme end of the cantilever truss on the south side, and materials transferred by means of this cableway to the north side.

The staging for the north anchor arm was erected first and on this a light double boom traveller assembled. The steel work was then transferred and placed with this traveller, starting at L-12, and erecting the lower half of the anchor truss, backing up with the traveller until L-0 was reached. The traveller was then jacked up, so as to bring the trucks level with the top chord of the span, and the balance of the steel for the north anchor arm completed, going forward from U-2 to U-12. After riveting this anchor arm, the cantilever portion of the truss between panels 12 and 20 was easily completed, with the traveller running out on the top chord.

The whole of the south half of the bridge was then jacked forward on the permanent pier member rollers, and a coupling made at L-20. After this joint was riveted, jacks were applied at the two extreme ends of the bridge, points L-0 north and south ends. These ends were raised until the joint at U-20 was closed, after which the four corners were raised simultaneously until a load of 118½ tons was registered on each of the 4 jacks, which fixed the distribution of the dead load stresses throughout the entire structure.

Work on the piers was started in 1916 by the general contractors for the whole line from Pas to Port Nelson, but owing to floods, but little work was done until February and March, 1917. The entire work was under the general supervision



Kettle Rapids Bridge. General erection diagram.

of W. A. Bowden, M.Can.Soc.C.E., Chief Engineer, Railways and Canals Department, Ottawa. The bridge was designed by W. Chase Thomson, M.Can.Soc.C.E., Montreal. The superstructure was fabricated and erected by Canadian Bridge Co., Ltd., Walkerville, Ont.

Quebec & Saguenay Ry.—A press report states that construction on this railway was resumed Mar. 15, and that it is hoped to complete the section to Baie St. Paul, by the end of May.