as shown by Figs. 4 and 5. They were generally placed in pairs about 6 feet apart, and each alternate space left open for the passage of water, to be closed by gates as hereafter described. Each sill was fastened by five 1½ in bolts driven into pine plugs forced into holes drilled from 18 inches to 24 inches into the rock. The temporary rock was then removed as far as possible, to allow a free flow of the water.

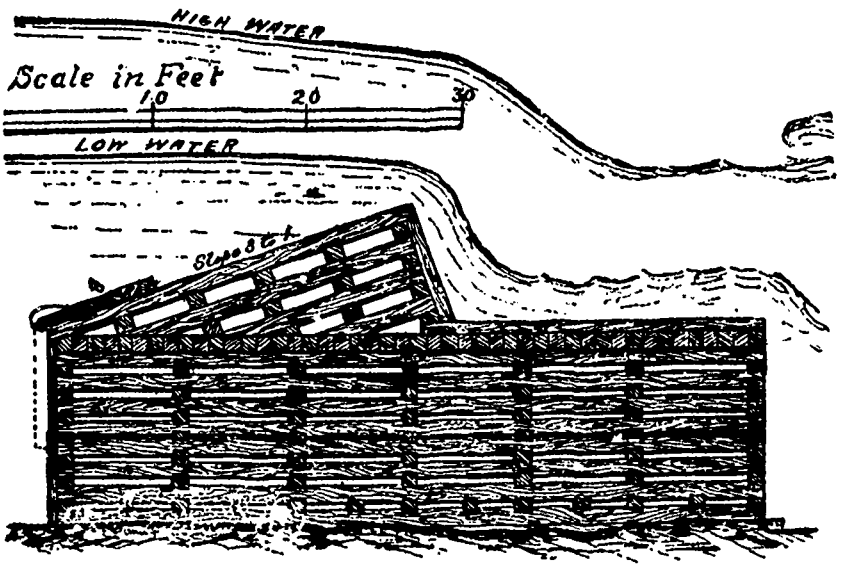

FIG. 1. CROSS SECTION IN DEEP WATER.

In the channels of which there are three, having an aggregate width of about 650 feet, cribs 46 feet, wide up and down stream were sunk. In the deepest water, where the rock was uneven, they covered the whole bottom up to about five feet of the level of the sills, and on top of that isolated cribs, 46 in. × 6 in. and of the necessary height were placed seven feet apart, as shown at C, Figs. 2 and 3. At other places similar narrow cribs were placed on the rock, as shown at D, Figs. 2 and 3. The tops of all were brought to about the same level as the before mentioned sills. The rock bottom was cleaned by divers of all bowlders, gravel, etc The cribs were built in the usual manner, of 12 in. × 12 in. timber, generally hemlock, and carefully fitted to the rock on which they stand. They were fastened to the rock by 1½ in bolts, five on each side of a crib, driven into pine plugs as mentioned for the sills. The drilling was done by long runners from their tops. The up-stream sides of the cribs were sheeted with 4 in. tamarack plank

On top of these sills and cribs there was then placed all across the river a platform from 36 to 46 feet wide, made up of sawed pine timber 12 in. × 12 in. each piece being securely bolted to its neighbor and to the sills and cribs below. It was also at intervals bolted through to the rock.

On top of the "platform" there was next built, a "flat dam of the sectional form shown by Fig. 1.. It was built of 12 in. × 12 in. sawed pine timbers, securely bolted at the crossings and to the platform, and sheeted all over with tamarack 10 in. thick and the crest covered with ½ in. boiler plate 3 ft. wide. The whole structure was carefully filled with stone—field stone, or "hard head" generally being used for this purpose.

At this stage of the works, namely, in the fall of 1881, the structure presented somewhat the appearance of a bridge with short spans. The whole river—fortunately low—flowed through the sluices, of which there were 113, and also through a bulk-head which had been left alongside of the slide with a water width of 60 feet. These openings had a total sectional area of 4,400 sq. ft., and barely allowed the river to pass, although, of course, somewhat assisted by leakage.

It now only remained to complete the dam, to close the openings. This was done in a manner that can be readily understood by reference to the cuts. Gates had been constructed with timber 10 in. thick, bolted together. They were hung on strong wooden hinges and, before being closed, laid back on the face of dam as shown at B, Figs. 1, 2 and 3. They were all closed in a sort time on the afternoon of 9th November, 1881 To do this it was simply necessary to turn them over, when the strong current through the sluices carried them into their places, as shown at A, Figs. 2 and 3, and by the dotted lines at Fig. 1. The closing was a delicate as well as dangerous operation, but was as successfully done as could be expected. No accident happened further than the displacement of two or three of the gates. The opening thus left were afterward filled up with timber and brushwood. The large opening alongside of the slide was filled up by a crib built above and floated into place.

The design contemplates the filling up with stone and gravel on up-stream side of the dam about the triangular space that would be formed by the production of the line of face of flat dam till it struck the rock. Part of that was done from the ice last winter; the balance is being put in his winter.

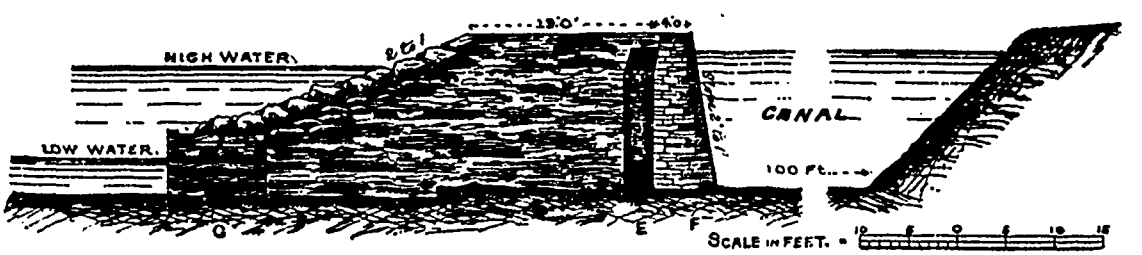

FIG. 6. SECTION THROUGH CANAL EMBANKMENT.

DETAILS OF THE OTTAWA RIVER DAM, AT CARILLON.