

tables for St. John, N.B., now available for the first time, will appear in *McMillan's Almanac*, published by Messrs. J. and A. McMillan of St. John. In all the above, due acknowledgment is made to the Tidal Survey branch of this department for the tables supplied; and some of the newspapers in the above ports may also issue the tables daily.

These tide tables give the height as well as the time of the tide; which is very important in such harbours as St. John and Quebec, where the rise is so great. The depth of water on the sill of the dry docks at Quebec and Halifax, is also given with relation to the tide, so that vessels may know the depth of water available for entrance to those docks at any high tide.

TIDE TABLES FOR 1899.

As the preparation of tide tables always requires much time, the calculation of the tide tables for Quebec, Halifax and St. John, for 1899, by Mr. E. Roberts, of the Nautical Almanac Office, London, was arranged for in May last. They should thus be ready in good time next year. On account of the present want of means, it was not possible to extend the basis of these tables by the analysis of further record obtained from the self-registering tide gauges; but they will depend for their accuracy upon the same lengths of tidal record, as the tide tables for 1898, as above mentioned.

SUMMER SEASON OF 1897.

During this season the seven principal tide gauges were visited by myself, and a number of improvements made in them. In reaching them the ordinary routes of travel were followed, as the steamers of the department were unable to furnish assistance in the matter. By these routes the furthest of the stations, in the Strait of Belle Isle, is 2,100 miles from Ottawa; and the total amount of travel in visiting the stations was over 6,000 miles, in all conveyances from ocean steamers to schooners. The time occupied was from June 17th to October 18th.

There are three of the tidal stations which are less accessible than the others, and are also without any means of communication during the winter months. These have given much anxiety in the past, as any interruption from failure of the driving clock of the recording instrument, or other cause, was often impossible to remedy for months, and thus involved a serious break in the tidal record. To place such stations in a more satisfactory position, a new form of recording instrument was devised by me, in which the driving clock is made removable, instead of being a fixed part of the instrument; and a duplicate clock is placed at the station for security. (See description in annual report of the Department of Marine for 1896, pages 70-71.) Instruments of this new type have now been manufactured by Messrs. A. Léauté & Co., of London; and this season these have been placed at two of the stations, namely, at Forteau Bay, in the Strait of Belle Isle, and at St. Paul Island. The gauge removed from St. Paul Island was taken to South-west Point, Anticosti, and left there as a duplicate instrument in case of accident; as the two were identical in scale and otherwise, and their driving clocks had already been fitted with an improved and stronger form of escapement for greater security against interruption. By the replacement of these gauges, it also became possible to send two of the old type of instrument to the makers, in Glasgow, to have them fitted with the new escapement. In this way, better security will be obtained for the other stations at which that type of instrument is still in use, as driving clocks with this improvement will be on hand to replace any that may require to be removed for cleaning or repair.

Next to this, the chief difficulty has arisen from the accumulation of gravel and debris, around the inlet which admits the water to the tide gauge. This would be avoided if there were any wharfs at the exposed stations, at which sufficient

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