

was fortunately possible to replace the instrument temporarily within three days, while it was sent away for repairs.

After extensive inquiry and careful consideration of the requirements, a form of recording instrument has been devised by myself, which obviates the uncertainty and expense connected with the use of the ordinary type of instrument. The essential point is to have a driving clock which can be readily detached from the rest of the instrument. This is secured by placing the driving clock inside of the revolving cylinder which carries the sheet of paper on which the tidal record is marked; as is done in some types of self-registering instruments of smaller size, used for meteorological purposes. In case of failure of the clock, a duplicate cylinder with clock inside can be substituted in less than two minutes, as it is released by a single screw. The defective clock can then be sent away for repair without interruption to the record. This new form of instrument is also provided with interchangeable gearing by which any one of four scales can be used; corresponding to a range in the tide of 9 feet, 18 feet, 27 feet or 36 feet. Our tides have such a variety in their range, that when an instrument requires to be changed to a new position, it has usually been first necessary to return it to the makers in Britain to have the gearing altered to another scale. There are also several minor improvements, especially in so arranging the carriage of the marking pencil, that the point of the pencil is readily accessible. This is important in making the comparisons on which the datum depends to which the observations have ultimately to be reduced. A recording instrument of this new type, manufactured by Messrs. A. L  g   & Co., Covent Garden, London, has been in use at Pictou during last summer with very satisfactory results. This type of instrument should be substituted as soon as possible for those now in use at the more isolated stations, because of its reliable character. Its cost, including the duplicate clock, is also considerably less than the Lord Kelvin instrument, as there are no patent rights upon it.

TIDE TABLES; THEIR PREPARATION AND IMPROVEMENT.

The improvement which can be made in the tide tables each year has to depend upon the balance remaining after the charges of first importance are met. Out of the small vote available for this survey, the special appliances for deep-sea anchorage, and all current meters and other marine instruments required for the survey of the currents have to be provided; as well as the salaries of assistants and of the tidal observers, and maintenance and supplies for the tidal stations. The question of expense made it necessary to choose between these and improvement of the tide tables. The tide tables for Halifax were based upon old records obtained at the Dock Yard in 1860 and 1861; and it was found that an additional record also existed for the years 1851 and 1852. The reduction of this record to extend the basis of the Halifax tables had already been postponed. Sufficient record had also been obtained from the tide gauge at St. John, N.B., to enable tide tables to be prepared which are much needed; as such tables as are now published are based upon a fixed difference from ports on the other side of the Atlantic and are far from accurate; and they give only the time of high water without reference to the height of the tide, which at St. John is of special importance. The tide tables for Quebec were based upon observations for one complete year only, and there is now record sufficient to improve their accuracy. On considering these various claims in view of the money available, it was thought best to give the preference to the preparation of tide tables for St. John and the improvement of the Halifax tables; and to postpone the improvement of the Quebec tables.

The tide tables for Quebec for 1897 are still based therefore upon observations during one complete year obtained from the tide gauge at the dry dock at L  vis, namely, from 7th November, 1893, to 15th January, 1895. These tables are nevertheless far in advance of anything heretofore published. The basis on which the Halifax tables rest has been extended to include the four years for which the record existed; namely, 1851, 1852, 1860 and 1861. The datum to which the tides are at present referred is the one used in the old observations themselves which were

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