

depth of water could be obtained to keep the inlet well off the bottom. As it is, the inlets have to be protected by crib-work; and to put these in thorough repair, it would have been necessary to take men as well as materials to these distant places, as it is not usually possible to hire labour there during the fishing season. As this expense could not be incurred this year, some minor repairs were made, and some expedients adopted which may answer in the meantime.

The heating lamps used in winter to prevent the water from freezing in the tide pipes, have sometimes given trouble by smoking, which is rather a serious matter if it should happen to occur in the night; as the recording instrument may become so clogged with the soot as to be much impeded in its working. The instrument is inclosed in a glass case for protection against this contingency and against dampness; but this oily soot is very penetrating. A better grade of coal oil has been used to avoid this trouble; and this season more thorough arrangements were made for the ventilation of the deep tide wells inclosing the tide pipes, in which the heating lamps have to burn.

At these isolated stations, meridian instruments, named dipeleidoscopes, are used to obtain the time for the observations. These were inspected and adjusted, by comparisons with the chronometer of a man-of-war, kindly furnished by the navigating officer, or by telegraphic exchange of time with an observatory provided with a transit instrument, as the case might be.

In the sight gauges, on which the datum plane of the observations depends, the connecting line between the tide float and the graduated staff must be of some material which will neither stretch nor rust; and it should also be very light, as it has to be balanced by a counterweight. Copper wire is too soft; and brass wire or chain becomes brittle after a time, apparently because of sulphurous fumes from the heating lamps. This connection has now been made by aluminium chain, which promises to prove satisfactory. It is important that the connection should be permanent and unaltered in length, as the re-determination of the length gives rise to much trouble and possibly also to uncertainty in the result. Several improvements in detail were also made this season at the different stations, and some fittings renewed.

At several of the stations careful levels were again taken this season with a surveying instrument, to check the elevation of the low water datum plane, to which the tidal observations are referred. The result of these, and of the levels previously taken for the better determination of low water datum planes, are given below.

As the vote for this survey for the current fiscal year has been reduced to one-fourth of its former amount, it was not possible to continue the tidal observations this season for the determination of tidal differences in any further region. The saving effected by discontinuing this branch of the work has amounted to nine hundred dollars. This was the cost of equipping the seven temporary stations of last season with recording instruments, and of obtaining short records for comparison at five other points, including travelling expenses and salaries paid to local observers during three to six months; but without counting the salary of the assistant in charge of the work. Observations of this character are much required in the Lower St. Lawrence, the Bay of Fundy, and along the Atlantic coast of Cape Breton Island and Nova Scotia. The time of the tide in these regions, with reference to the principal stations, would thus be known; which would not only be of direct importance locally, but would also be of service to navigation, by helping to bring the time at which the strong tidal currents turn, into relation with the rise and fall of the tide itself.

LEVELS AND DATUM PLANES.

On the charts of rivers and harbours, as on all other charts, the soundings show the depth of the water below the level of the water surface at low water at ordinary spring tides, which is known as the Low Water datum. The determination of this datum can only be made by means of tidal observations; and on the correct