may be observed as often as practicable, and especially when unusual displays of *aurora borealis* take place.

In all cases the *time*, which forms an essential part of the record, should be carefully noted.

Not long before starting on a sledge-journey from a winter station, and soon after returning, the observations with the loaded dipping needles for relative intensity should be repeated, in order to have a trustworthy comparison for the observations which have been made on the journey.

FORCE OF GRAVITY.

As the long winter affords ample leisure, pendulum experiments may be made to determine the force of gravity, in comparison with that at Washington, where observations have been made with the Hayes pendulum lent to the expedition. The record of the Washington observations, a copy of which is furnished, will serve as a guide in making the observations. Special care should be taken while they are in progress to determine the rate of the chronometer with great precision, by observations of numerous stars with the astronomical transit instrument, the pointing of which on a fixed mark should be frequently verified.

OCEAN PHYSICS.

Depths.—Soundings should be taken frequently, when in moderate depths, at least sufficiently often to give some indication of the general depth of the strait or sound in which the vessel is afloat at the time. If an open sea be reached, it should be considered of the greatest importance to get some measure of its depth, and since no bulky sounding apparatus can be carried across the ice barrier, the boat party should be provided with 1,000 fathoms of small twine, marked in lengths of 10 fathoms. Stones, taken on board when the boat is launched, may serve as weights.

Bottom should be brought up whenever practicable, and specimens preserved. Circumstances of time and opportunity must determine whether a *dredge* can be used, or merely a *specimen-cup*.

Temperature of the sea should be observed with the "Miller protected bulb thermometer" made by Casella, near the surface, about two fathoms below the surface, and near the bottom. When time permits, observations at an intermediate