

REPORT OF THE SUPERINTENDENT

OF THE

U. S. COAST AND GEODETIC SURVEY

SHOWING

THE PROGRESS OF THE WORK

DURING THE

FISCAL YEAR ENDING WITH

JUNE, 1881.



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P 252

want of an observer the usual declination and intensity observations in June had to be deferred this year; besides, the observatory was needed for the above-stated purposes, and the dip-circle belonging to it had to be given up to the Point Barrow party. This instrument, it is expected, will soon be replaced by a new one.

Permanent trial base at Fort Myer.—With a view of having a permanent test line for preliminary practice of parties taking the field for base measurement, as well as to secure an established line of known value for testing measuring bars at any time, a permanent "trial base" one kilometer in length has been laid down in the vicinity of Fort Myer, Va. The ends of this line are securely marked, and the marks are at a depth sufficient to be beyond the effect of climatic and hygrometric influences. As the frequent use of this line requires the ready means of transferring this underground mark to the surface, suggestions as to the best method of accomplishing the purpose were invited, and the plan suggested by Assistant O. H. Tittman was adopted. (See Appendix 13.)

Pendulum observations.—The pendulum experiments conducted during the year by Assistant Charles S. Peirce have, in great part, related to the effect upon the oscillation period of the walls of the receiver (or vessel within which the pendulum swings). It has hitherto been assumed that this effect is very small, and upon this assumption its value has been calculated by an approximate hydro-dynamical theory. Experiment has, however, unexpectedly shown that the effect, although naturally not large, is far from being very small. The mathematical theory is thus shown to be very imperfect, and it has become necessary to determine, experimentally, the effect above referred to. The alteration of the value of this effect involves alteration in other constants, and has important indirect results. Certain anomalous determinations of gravity are thus explained, and former experiments made by the Coast and Geodetic Survey are found to be even more accurate than had been supposed.

A new pattern of the reversible pendulum has been invented, having its surface as nearly as convenient in the form of an elongated ellipsoid. Three of these instruments have been constructed, two having a distance of one meter between the knife-edges and the third a distance of one yard. It is proposed to swing one of the meter pendulums at a temperature near 32° F. at the same time that the yard pendulum is swung at 60° F., in order to determine anew the relation between the yard and the meter. The other meter pendulum has been sent to Lady Franklin Bay, under the charge of Lieut. A. W. Greely, U. S. A., after having been oscillated at the Coast and Geodetic Survey Office by Mr. Israel, of Lieutenant Greeley's party. The oscillations were made under the personal direction of Assistant Peirce.

Observations to determine the force of gravity have been made at Washington and Baltimore. A new series of experiments has also been made to test the plan of oscillating pendulums on rollers. The result has been unequivocally unfavorable. Investigations upon the flexure of the pendulum support and upon the plan of swinging two pendulums upon the same stand have been continued. (See Appendix No. 14.) A memoir by Assistant Peirce upon the deduction of the ellipticity of the earth from pendulum experiments will be found in Appendix No. 15.

The measures of deviations of light by diffraction plates, forming a part of the work upon the spectrum meter alluded to in former reports, have been continued by Assistant Peirce, who has also made special experiments to determine the influence of the movement of the solar system upon the deviation. The results of these experiments and measures will be a matter of future publication.

Hypsometry.—The work assigned in July to Mr. H. F. Walling was the compilation of a map of that part of the Appalachian chain of mountains extending from the northern part of Maryland to the northern parts of Georgia and Alabama, many of the summits of the mountains between these limits having been occupied in the primary triangulation of the Coast and Geodetic Survey.

After obtaining all available data from this office and from outside sources, Mr. Walling took the field on October 1, in order to complete the collection of necessary information to make such triangulation as might be required to connect the existing maps and plans in his possession with the trigonometrical points of the survey, and to make barometrical and other observations over the region covered, for the purpose of representing its hypsometry.

The area over which work has been carried during the fiscal year comprises that portion of

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