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P

356

UNITED STATES COAST AND GEODETIC SURVEY.

FOR PARTY EXPENSES—Continued.

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| For continuing explorations in the waters of Alaska and making hydrographic surveys in the same, and for the establishment of astronomical, longitude, and magnetic stations between Sitka and the southern end of the Territory | \$12,000 |
| For continuing the researches in physical hydrography relating to harbors and bars, including computations and plotting | 4,000 |
| For examination into reported dangers on the eastern, Gulf, and Pacific coasts | 1,500 |
| To continue magnetic observations on the Atlantic and Gulf slopes | 1,000 |
| For continuing magnetic observations on the Pacific coast at the Los Angeles Magnetic Observatory | 1,200 |
| For continuing magnetic observations at various temporary stations on the Pacific slope | 1,000 |
| For running an exact line of levels from Boston or Salem, Mass., to Mount Monadnock, Mount Washington, Mount Independence, and Lake Champlain | 2,000 |
| For continuing the exact line of levels from Cairo westward | 2,000 |
| For continuing tide observations on the Pacific coast, viz: at Kodiak, in Alaska, and at Sancelito, near San Francisco, in California | 2,500 |
| To continue tidal observations on the Atlantic coast at Pulpit Harbor, Maine, and at Sandy Hook, New Jersey | 2,100 |
| To continue gravity experiments, at a cost not exceeding \$500 per station, except for special investigations and experiments authorized by the Superintendent at one or more stations | 2,500 |
| For furnishing points to State surveys, to be applied, as far as practicable, in States where points have not been furnished | 10,000 |
| For determinations of geographical positions, longitude parties | 5,000 |
| For continuing the transcontinental geodetic work on the line between the Atlantic and Pacific oceans | 30,000 |
| To continue the compilation of the Coast Pilot, and to make special hydrographic examinations for the same | 2,500 |
| For traveling expenses of officers and men of the Navy on duty, and for any special surveys that may be required by the Light-House Board or other proper authority, and contingent expenses thereto | 5,000 |
| For objects not hereinbefore named that may be deemed urgent | 4,000 |
| And ten per centum of the foregoing amounts shall be available interchangeably for expenditure on the objects named. | |
| In all for party expenses | \$244,000 |

REPAIRS AND MAINTENANCE OF VESSELS:

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| For repairs and maintenance of the complement of vessels used in the Coast and Geodetic Survey | 25,000 |
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PAY OF FIELD OFFICERS:

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| For pay of Superintendent, \$6,000 per annum | 6,000 |
| For pay of two Assistants, at \$4,000 per annum | 8,000 |
| For pay of one Assistant, at \$3,600 per annum | 3,600 |
| For pay of one Assistant, at \$3,200 per annum | 3,200 |
| For pay of two Assistants, at \$3,000 per annum | 6,000 |
| For pay of two Assistants, at \$2,800 per annum | 5,600 |
| For pay of four Assistants, at \$2,400 per annum | 9,600 |
| For pay of three Assistants, at \$2,300 per annum | 6,900 |
| For pay of six Assistants, at \$2,200 per annum | 13,200 |
| For pay of six Assistants, at \$2,000 per annum | 12,000 |
| For pay of ten Assistants, at \$1,800 per annum | 18,000 |
| For pay of nine Assistants, at \$1,500 per annum | 13,500 |
| For pay of three Subassistants, at \$1,400 per annum | 4,200 |

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Lieutenant Hanus reports statistics as follows:

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| Miles run in sounding | 1,755 |
| Angles measured | 20,545 |
| Number of soundings | 90,086 |

In November Lieutenant Hanus received instructions to fit the Endeavor for work on the coast of South Carolina. A report of this service will appear under the heading of Section V.

In June, 1886, he took up the hydrography in New York Bay and vicinity from the limits of the season of 1885, and by the end of the fiscal year had carried the work over Sandy Hook Bay and part of Raritan Bay. For that month the statistics reported are as follows:

| | |
|-----------------------------|-------|
| Miles run in sounding | 169 |
| Angles measured | 1,543 |
| Number of soundings | 7,849 |

Determinations of gravity and pendulum experiments.—The plan for carrying on gravitation work during the fiscal year 1885-1886 was outlined in instructions received by Assistant Charles S. Peirce in July, 1885. He was directed to make a reconnaissance for an east and west line of stations along or in the vicinity of the forty-third parallel of north latitude as far west as the Mississippi River, examining certain specified localities with reference to their facilities for gravitation stations, and then occupying such stations, three or four in number, as should best fulfill the conditions required.

After careful examinations the stations finally selected were Ann Arbor, Mich., Madison, Wis., and Ithaca, N. Y. At these stations, and at the Smithsonian Institution, Washington, the invariable reversible pendulums Peirce No. 2 (a meter in length) and No. 3 (a yard in length) were remeasured and were oscillated. The rule was to oscillate each pendulum eight times in each position on each stand.

Two new pendulum stands had been constructed of improved design, so that two pendulums could be oscillated simultaneously on two supports. Each swinging consisted of five thousand oscillations with heavy end up and fifteen thousand with heavy end down, except that one-fourth of the swingings in the latter position were of double length. There were thus about six hundred thousand oscillations with heavy end down and one hundred and sixty thousand with heavy end up at each station.

At Ithaca one of the stands was set up in a cold room, so that the average temperature was about 0° Centigrade, while that of the other was about 15° Centigrade.

The three Kater invariable pendulums used by Colonel Herschel, and later by Assistant Edwin Smith, were, at the request of Professor Stokes, the president of the Royal Society, oscillated in Hoboken preparatory to being returned.

Special experiments were made in Ithaca on the variation of the absolute personal equation in observations of pendulum transits with the amplitude of the vibration. These experiments were fully reduced.

The reductions of the observations at Ann Arbor and Ithaca were carried toward completion, and those of observations made at Madison and Washington were begun. A reduction was also begun of observations made at Key West in a former year.

At Washington, Ann Arbor, and Madison time signals were kindly supplied by the Directors of the Observatories of those cities. At Ithaca and Hoboken time was observed by Mr. Peirce.

Continuation of the primary triangulation in the eastern part of the State of Pennsylvania.—Prof. Mansfield Merriman, Acting Assistant, under instructions dated June 22, 1885, began immediately the erection of signals and preparations for the occupation of stations for the extension of the primary triangulation in the eastern part of the State of Pennsylvania. The plan of his work involved the occupation of a number of stations to the east and west of a line between Allentown, Lehigh County, and Wilkes Barre, Luzerne County.

Knob Station, near Mauch Chunk, Carbon County, was first occupied. Signals were erected at two stations and heliotropers posted at five. Horizontal angles were measured between these stations and directions to eight secondary points were observed. The work at Knob was finished July 18, and two days later Professor Merriman began the occupation of station Bear's Head,

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