
REPORT OF THE LIGHT-HOUSE BOARD.

REPORT

OF

THE UNITED STATES LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT,
OFFICE OF THE LIGHT-HOUSE BOARD,
Washington, September 1, 1875.

Hon B. H. BRISTOW,
Secretary of the Treasury:

SIR: Since the date of our last annual report it has been the endeavor of the board, as in past years, to administer the affairs of the Light-House Establishment with the greatest economy, consistent with a proper regard to the efficiency of a branch of the Government service so extensive and of such vast importance to the commerce, not only of our own country, but of the civilized world.

Besides the usual attention to the details of work by the officers of each district, many of the districts have been visited at various times during the year by members of the board itself, who have examined with care into the condition of the various aids to navigation, thus making felt the direct influence and supervision of the board.

The aids to navigation which are in place, and completed, are in good, serviceable condition, meeting the wants of mariners, and, in most cases, work is progressing satisfactorily with those for which appropriations have been made, though in some instances delay has been occasioned by the difficulty of obtaining titles to suitable sites.

The detailed statements contained in the body of this report under the heads of the fourteen geographical districts into which the Light-House Establishment is divided, embrace the work which has been done since the last annual report, the constructions now in progress, those for which appropriations have been made, and those for which appropriations are recommended to Congress.

During the year the board has, under the personal direction of its chairman, assisted from time to time by other members of the board, made an extensive and careful series of experiments with regard to the merits of the mineral-oils of this country for purposes of light-house illumination. In order to obtain a great variety of oils, the board on November 24, 1874, advertised in various newspapers, published in different parts of the United States, inviting manufacturers and dealers to furnish it with specimens of domestic mineral-oil for test as to their fitness for light-house purposes, and as soon as a sufficient quantity had been received, the investigation was begun, and has been continued, with results which lead to the belief that there can be had in this country an oil of suitable quality for light-house use, and perhaps at a considerable reduction in expense. For the purpose of comparing our mineral-oils with those now coming into use abroad, the Trinity House authorities have been requested to send to the board a specimen of that used in lights under their control, the arrival of which is soon expected,

when further experiments will be made. While with its present knowledge of the qualities of these oils the board proposes to put them into use at light-stations on the main-land, it would hesitate to endanger valuable property, and the lives of its employés, by placing them on board of light-ships, in structures standing in the water, or at other points from which the keepers could not escape in case of accident.

It was soon apparent that the use of mineral-oil would necessitate a change of lamps, and attention is now directed to the perfection of one which will produce the best results from this illuminant. It is thought that the lamps now used with lard-oil can be converted at no great expense, and successfully used with mineral-oil. Our experiments have shown that this oil can be more readily used in the smaller lamps, and it is proposed, as soon as suitable ones can be prepared, to put it into use at such stations of the fifth and sixth order as may be thought expedient, when, if it be found satisfactory, an attempt will be made to substitute it for lard-oil in lamps of the higher orders.

The board has also, through its appropriate committee, conducted an elaborate and extensive series of experiments with regard to sound, as applied to signals for warning the mariner of his approach to danger in thick or foggy weather, when other guides are of little use. Even at this stage of our experiments its success has been most gratifying, and by pursuing these inquiries the board hopes to arrive at results not only valuable to science, but of practical importance in enabling it better to contend with one of the worst elements of danger which the mariner has to meet on our extended and dangerous coast.

The limits of this report will not permit a detailed statement of the many interesting experiments which have been made and are now in progress, both with mineral-oil and with regard to sound-signals, even if at the date at which it closes the series had been concluded. It is, however, the intention of the board to publish an appendix to this report, prepared by the chairman of its committee on experiments, which will give full information of the work done and conclusions reached.

By act of Congress approved June 23, 1874, the jurisdiction of the Light-House Board was extended over the Mississippi, Missouri, and Ohio Rivers, "for the establishment of such beacon-lights, day-beacons, and buoys as may be necessary for the use of vessels navigating those streams." The rivers were divided into two districts; officers were assigned to them, and steps were immediately taken for obtaining all possible information with regard to their waters, the nature of their obstructions, the necessity for suitable aids to navigation, and the kind and number of the aids required for the protection of commerce.

Examinations were made by the officers of the districts and by a special committee of the board designated for that purpose; the officers and pilots of the various steamboat-lines running upon the rivers were consulted, and no pains were spared to obtain information upon all points bearing on this novel and extensive field of labor which had so suddenly been assigned to the board.

A great diversity of opinion was found among the river-men, many believing that no great benefit to commerce would be derived from an attempt to light and buoy the rivers, while others were sanguine as to the result.

In the course of the examination it was soon evident that structures of a permanent and expensive character would be entirely out of place, owing to the frequent shiftings of the channels, which necessitate a corresponding change in the location of the lights; and it was also apparent that owing to the short distances at which the lights must be seen, rarely

more than four miles, and usually not more than half that distance, powerful and costly lens-apparatus would not be required. Steps were then taken to secure a substantial and inexpensive lens-lantern of sufficient power to show distinctly at the distances required upon those waters, and one that could be depended upon in all weather. This could of course only be reached by experiment, and as it was desirable to at least test the value of the system determined upon, before the close of navigation, a limited number of the best lanterns obtainable for the purpose were purchased at small expense, and on December 4, 1874, the first lights under the national jurisdiction, for the aid of navigation on the western rivers, were established upon the Jefferson Barracks dike, and at Twin Hollows, Mo. On the following day another light was placed at Perry's Towhead, and after a few days' delay, to determine by actual service the adaptability of the lanterns for the purpose, others were located at such points as personal observation and information received from pilots showed to be necessary between St. Louis, Mo., and Cairo, Ill. Immediately afterward, on December 21, 1874, the first light was placed on the Ohio River, and a few others were established on the same river before the close of navigation for the winter.

Early in January, 1875, navigation was closed by the ice between Cairo and St. Louis; and although only a month had passed since the first lanterns were placed, steamboat-owners, pilots, and masters united in bearing testimony to the great value of the lights; and the success of the system was assured.

The stage of water had been most favorable for a practical test, and there remained no doubt of the efficiency and value of a completely organized system.

During the time the rivers remained closed by ice the lamps were not lighted, and no expense was incurred for their care. This time was occupied with experiments upon lanterns of various kinds, several being constructed expressly for our use, the object being to obtain, at moderate cost, a portable lantern, readily handled, which would show a steady bright light during the severest storms. Modifications and adaptations were made as found necessary, and the lantern now in use was finally selected, and the experience of the past season has proved it to be well adapted to secure the results desired. All the lanterns on these rivers are supplied with mineral-oil. As soon as navigation opened in the spring the work of examining the channels and placing lights in these two river-districts was begun again, and it has been vigorously prosecuted, until we have now in position on the Mississippi, Missouri, and Ohio Rivers 280 fixed and floating lights, together with a limited number of buoys. An additional number both of lights and of buoys will be required, and the appropriation for their maintenance must necessarily be increased.

In this connection it may be well to state that there are upon these rivers 1,100 steamboats; with a tonnage of 258,000 tons; 832 licensed barges of 179,000 tons; coal barges and other craft of 750,000 tons, making a total tonnage upon these rivers of nearly 1,200,000 tons. The total value of cargoes-carried is estimated in round numbers at \$400,000,000 per annum, and the coal sent to market by the Ohio River alone amounts to 4,000,000 tons yearly.

The necessity for lights on these waters is now unquestioned, the navigation being of the most intricate character. The "crossings" are very numerous, and at some of these, technically termed "blind crossings," where the banks show no diversity of outline, and where the channel is very narrow, the best pilots are frequently delayed and cannot always

avoid disaster. At many points previous to the establishment of the lights the passage was never attempted on a dark night, but by means of the aids now in place the passages have been rendered practicable at all times. The hidden obstructions are numberless, in many places leaving barely room for the passage of large and heavily laden steamers. No better evidence of the intricate and dangerous nature of the navigation of these rivers need be adduced than the fact that there are hundreds of consecutive miles of river where the wrecks average more than one to a mile. No difficulty has been found in securing men to care for and attend the lights. They are selected from the people living on and owning property along the river, and they have been found, with few exceptions, to be trustworthy and alive to the demands of the service for which they are secured at small compensation. The fixed lights used are substantially-made lens-lanterns, which are suspended from an arm projecting from a post at an elevation of from 8 to 10 feet from the ground. They are of most value during the season of low water, though they afford important aid at other times. At points where the channel is made very narrow by permanent obstructions, and the passage is dangerous, buoys have been placed as day-marks, to which floating lights are attached at night. This lighting of the western rivers being an enterprise of great magnitude, and also differing widely in its details from any work hitherto undertaken by the board, has received our most careful attention; and in our attempts to establish an efficient and inexpensive system we believe that we have been successful. In doing this the board has availed itself not only of the knowledge and experience of its members and officers, but of all information it could gain from persons familiar with the rivers and interested in the subject. Numerous testimonials have been received from officers and managers of different steam-boat-lines, from boards of trade, and other commercial organizations, and from various persons interested in the navigation of these waters, bearing emphatic testimony to the value of the system and its great benefit to commerce. Experience will doubtless show changes and improvements to be necessary, and the board will make them from time to time as their need is developed.

By act approved March 3, 1873, an appropriation of \$50,000 was made for a light-ship for general service, and by act approved June 23, 1874, the same sum was appropriated for a light-ship for Winter Quarter Shal, coast of Virginia. Both the vessels are now nearly completed. They are stronger, larger, and more seaworthy than any ever before built by the board, and each has a powerful steam fog-signal. As soon as these vessels are completed they will be placed upon stations where the need of such aids has long been felt. Measures have been taken to sell light-ship No. 18, she having been surveyed and found unworthy of repair. Several of the light-ships now in service are much decayed and need extensive repairs, which will be made as rapidly as circumstances will permit, but it is thought that two of them will be found, on examination, so far decayed as to be past renovation, and an appropriation for at least one new light-ship is earnestly recommended.

Several of the steam-tenders belonging to the establishment are old, inefficient, and worn out; vessels purchased from private parties to meet emergencies, low in the water, of little power, and unfit for the rough work of supplying stations, towing light-ships in all weathers, and caring for the buoyage of the districts. They are in constant need of repair, and are a never-ending bill of expense to the establishment, costing more than efficient vessels built for the purpose, while able to do but a portion of the work required. A proper regard both for economy

and efficiency would dictate that these tenders be sold and their places supplied by vessels built for light-house work. The board has estimated for two new tenders for the Atlantic coast, to replace those unfit for service, and also for an additional tender for the Pacific coast, where the establishment now has but one for the entire service, from the Mexican frontier to British Columbia. It is simply impossible for one tender to do the work required on a line of such extent, being about 1,500 miles, and this necessitates the frequent chartering; at high rates, of private vessels, for transporting material and supplies, and meeting emergencies, which often causes expensive and vexatious delays in carrying on necessary work.

The board, in preparing its general estimates for the support of the existing and authorized aids to navigation, has, with the exception of the estimates for the salaries of light-keepers, and for the maintenance of lights on the Mississippi, Missouri, and Ohio Rivers, made no increase upon the amounts asked for last year. It has made as close a calculation of expenses, based upon probable prices and quantities, as is possible so far in advance of the time when the appropriations will become available for use. For repairs and incidental expenses of light-houses, the board has estimated that \$350,000 will be required. This amount is the same as that asked for last year, and which experience has shown to be necessary.

For expense of fog-signals, \$50,000 will be required. This amount was appropriated last year.

For the salaries of light-keepers the estimate is \$594,600, an increase of \$9,600 over that for last year. This is owing to the additional number of keepers required by the erection of new light-houses. There are in actual employment, and required for new lights already appropriated for 991 light-keepers; the average pay authorized by law is \$600 per annum for each keeper. This does not include the light-keepers upon the western rivers—280 in number.

For supplies of light-houses the estimate is \$400,000, the same that was asked for last year.

For the expenses of light-ships the estimate is \$240,000, the same as last year. This amount, it is thought, will be sufficient, although the number of light-ships on stations has been increased by two, that on the wreck of the steamer Scotland, entrance to New York Harbor, and that on Winter Quarter Shoal, off the coast of Virginia.

For expenses of buoyage the estimate is \$350,000, an amount which it is hoped will be sufficient, notwithstanding the greater number of buoys yearly required as aids to navigation.

For maintenance of lights on the western rivers the estimate is \$150,000, an increase of \$25,000 upon the amount asked for last year. This estimate is thought quite small in view of the number of lights now placed and yet to be placed on these waters; and it may be found necessary, in paying the salaries of the keepers of these lights, to use money from the general appropriation for salaries of light-keepers.

The board cannot too strongly urge the appropriation for the light at American Shoal, Florida Reefs. Upon the establishment of this light-house, together with the one now building on Fowey Rocks, but one more will be needed to complete a system of lights for this dangerous coast, which was commenced in the early days of the board, and which will render the navigation in this vicinity comparatively safe. The board has not submitted estimates for all the lights that, in its opinion, are necessary to render navigation safe, but having in view the necessity for economy in the expenditures of the Government, has made the

estimates for special works smaller than for many years before. All those works that, in the opinion of the board, can be delayed for a time without manifest detriment to the service, though they will have to be built at no distant day, have been left out, in order that the aggregate of the estimates may be placed at the lowest practicable figure.

The board has to lament the loss, by death, of one of its officers, Commander W. N. Allen, United States Navy, inspector of the first light-house district, who died at Portland, Me., on February 18, 1875. The death of this officer has deprived the Light-House Establishment and the country, of the services of one who was universally recognized as a man of ability, who was conscientious and energetic in the discharge of his duties.

It is thought that the time has now come when it is proper to supply light-houses, particularly those at isolated points, with a limited quantity of reading-matter. By so doing, keepers will be made happier and more contented with their lot, and less desirous of absenting themselves from their posts. If the Government will provide for the keeping of books at light-stations as other light-house property is kept, and also provide a small number of books as a nucleus, it is believed the quantity will be swelled at individual stations, from private sources, to respectable dimensions. Libraries are supplied to the light-houses of England and France, and it is said that they exert the happiest influence upon the *personnel* of the service. Our establishment should do as much. The board has therefore inserted in its estimate for supplies the words "books for light-stations," and if they are allowed to remain and the board is thus authorized, it will supply to the more prominent and more isolated stations a few books during the year, if it finds that it can do so without trenching upon the funds needed to purchase the usual articles of supply.

CONDITION AND OPERATIONS OF THE LIGHT-HOUSE ESTABLISHMENT DURING THE FISCAL YEAR 1874-'75.

Light-houses, light-ships, fog-signals, day-beacons, and buoys belonging to the United States Light-House Establishment on the 1st July, 1875.

ATLANTIC COAST, INCLUDING FLORIDA REEFS.

Light-houses	343
Light-houses finished and lighted during the year ending July 1, 1875	6
Light-ships in position	22
Fog-signals operated by steam or hot-air engines.....	21
Day or unlighted beacons.....	317
Buoys in position.....	2,473

COAST OF THE GULF OF MEXICO.

Light-houses	52
Light-houses finished and lighted during the year ending July 1, 1875	1
Light-ships in position	1
Fog-signals operated by steam or hot-air engines	3
Day or unlighted beacons.....	8
Buoys in position.....	76

PACIFIC COAST.

Light-houses	32
Light-houses finished and lighted during the year ending July 1, 1875	4
Light-ships in position	0
Fog-signals operated by steam or hot air-engines.....	12
Day or unlighted beacons	31
Buoys in position.....	86

LIGHT-HOUSE BOARD.

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NORTHERN AND NORTHWESTERN LAKES.

Light-houses	195
Light-houses finished and lighted during the year ending July 1, 1875.....	6
Light-ships in position.....	0
Fog-signals operated by steam or hot-air engines.....	9
Day or unlighted beacons	2
Buoys in position.....	245

WESTERN RIVERS.

Lights established on the western rivers.....	280
Buoys placed in the western rivers.....	21

TOTAL AIDS TO NAVIGATION FOR THE ENTIRE ESTABLISHMENT. -

Light-houses	622
Light-houses finished and lighted during the year ending July 1, 1875.....	17
Light-ships in position.....	23
Fog-signals operated by steam or hot-air engines.....	45
Day or unlighted beacons	358
Buoys in position.....	2,880
Lights established on the western rivers.....	280
Buoys placed in the western rivers.....	21

List of light-houses finished and lighted between July 1, 1874, and July 1, 1875.

Name of station.	Locality.	When lighted.
Indian Island.....	On the southerly point of Indian Island, east side of entrance to Rockport Harbor, Maine.	January 15, 1875.
Block Island (southeasterly)	On southeast end of Block Island	February 1, 1875.
Hudson City.....	On south end of Middle Ground Mud Flat, west of Hudson City.	November 1, 1874.
Hatteras Inlet.....	On the shoal known as Oliver's Reef, on the north side of the entrance to Hatteras Inlet from Pamlico Sound.	October 1, 1874.
Dutch Gap Canal:		
Upper light	At upper end of Dutch Gap Canal, James River, Va.	June 10, 1875.
Lower light	At lower end of Dutch Gap Canal, James River, Va.	June 10, 1875.
Timbalier	West side of Grand Pass, entrance to Timbalier Bay, in 7 feet water, on north side, near east end of Timbalier Island, La.	January 5, 1875.
Twin River Point.....	On Twin River Point, about 5 miles north of Twin River, west shore of Lake Michigan, Wis.	November 18, 1874.
Poverty Island.....	On the south end of Poverty Island, entrance to Green Bay, Lake Michigan.	September 1, 1874.
Big Sable	At Big Sable Point, on the south shore of Lake Superior, between White Fish Point and Grand Island.	August 19, 1874.
Portage Lake Ship Canal..	At the entrance to Portage Lake Ship Canal, south shore of Lake Superior, on west side of cut.	November 20, 1874.
Outer Island.....	On the most northerly point of Outer Island, (Apostle group.)	October 20, 1874.
Rock Harbor	On the west side of the entrance to Rock Harbor, Isle Royale, about 12 miles from the eastern extremity of the island.	August 15, 1874.

REPORT ON THE FINANCES.

List of light-houses finished and lighted between July 1, 1874, and July 1, 1875—Continued.

Name of station.	Locality.	When lighted.
Point Fermin	On west side of entrance to San Pedro Bay, Cal.	December 15, 1874.
Point Hueneme	On the main-land, at the eastern entrance to the Santa Barbara Channel.	December 15, 1874.
Piedras Blancas	On the point northwest of the entrance to San Simeon Bay, Cal.	February 1, 1875.
Point Adams	On low ridge, nearly opposite outer black buoy, in south channel entering the Columbia River, Oregon side.	February 15, 1875.
(Mouth of Columbia River.)		
Western rivers	There have been established on the Mississippi, Missouri, and Ohio Rivers, at the various points named in that part of this report devoted to the 14th and 15th light-house districts, two hundred and eighty lights, between December 4, 1874, and the present time, and twenty-one buoys have been placed in position.	Between December 4, 1874, and June 30, 1875.

List of lights of the different orders exhibited by the light-house establishment, corrected up to July 1, 1875.

	First order.	Second order.	Third order.	Three and one-half order.	Fourth order.	Fifth order.	Sixth order.	Reflector.	Ship-lanterns.	Lens-lanterns.	Total.
Atlantic and Gulf coasts	33	24	32	3	116	84	88	30	8	.....	418
Pacific coast	11	1	4	.....	13	3	.....	.....	.....	.....	32
Lake coasts .....	.....	2	19	8	58	33	72	.....	3	.....	195
Western rivers .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	280	280
Total	44	27	55	11	187	120	160	30	11	280	925

List of light-houses discontinued between July 1, 1874, and July 1, 1875.

Name of station.	Locality.	When discontinued.
Savannah River. Obstructions light.	On a pile on obstructions, starboard side of channel, opposite northwest end of Elba Island.	October 15, 1874.
North Cut beacon, Milwaukee..	On the north pier, at the harbor of Milwaukee, Wis.	January 31, 1875.
Yaquina	On the north point of the entrance to Yaquina Bay, Oregon.	October 1, 1874.

Operations and condition of the light-house establishment during the year.

FIRST DISTRICT.

The first district extends from the northeastern boundary of the United States (Maine) to and including Hampton Harbor, N. H., and includes all aids to navigation on the coasts of Maine and New Hampshire.

Inspector.—Commander W. N. Allen, United States Navy, until his

death, February 18, 1875; Commander Henry F. Picking, United States Navy, present inspector.

Engineer.—Lieut. Col. James C. Duane, Corps of Engineers, Brevet Brigadier-General United States Army.

In this district there are :

Light-houses.....	52
Light-ships.....	0
Fog-signals operated by steam or hot-air engines.....	8
Day or unlighted beacons.....	68
Buoys actually in position.....	381
Spare buoys, for relief and supply losses.....	251
Tender (steamer) Myrtle, for construction and repairs, also used in second district, and tender Iris, (inspector's tender).....	2
Tender (steam-launch) Marie, for construction and repairs.....	1
Tender, (sail), schooner Wave, for repairs, also used in second district.....	1

The following numbers which precede the names of stations correspond to those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

4. *Avery's Rock, Machias Bay, Maine.*—An appropriation of \$15,000 was made by act approved June 23, 1874, for building a light-house and fog-signal at this point. Measures were taken last year for the acquisition of the site, and, after some delay, a title and cession of jurisdiction were obtained. Work was commenced on the tower and dwelling early in the present year; but, owing to the roughness of the sea around this rock, some delay occurred in landing material. Considerable difficulty was experienced in preparing the rock, which is very uneven, to receive the foundation. The work, however, is now nearly completed, and the station will be ready for lighting in the course of the present season. A 1,200-pound bell, to be used as a fog-signal, has been placed at this station.

8. *Narraguagus, on the west side of the entrance to Narraguagus Bay, Maine.*—The dwelling at this station having become uninhabitable, a cottage for the keeper has been commenced, and will be finished in the course of the present fall.

9. *Petit Menan, on Petit Menan Island, Maine.*—An appropriation of \$5,000 was made by act approved March 3, 1875, for repairs and additions to the tower and keeper's dwelling at this place. Arrangements are now being made for the prosecution of the work. In order to obtain an additional supply of fresh water for the steam fog-signal at this station, water-sheds and tanks have been erected.

13. *Egg Rock, Frenchman's Bay, Maine.*—An appropriation of \$15,000 was made by act approved June 23, 1874, for building a light-house and fog-signal at this place. After considerable delay in obtaining a title to the site, and cession of jurisdiction, measures were taken for the erection of the buildings. The situation of the rock is very similar to that of Avery's Rock, and the difficulty experienced in landing material much the same. The work was commenced in June. The iron-work is now completed and ready to be set in place. Nearly all the material has been landed, the foundation is laid, and the brick-work nearly finished. The station will probably be ready for lighting November 1. A fog-bell, similar to that placed at Avery's Rock, will be placed at this station.

14.—*Baker's Island, off Mount Desert Island, and south of entrance to Frenchman's Bay, Maine.*—The roof of the keeper's dwelling has been reshingled, and other general repairs have been made about the station.

23. *Eagle Island Point, near the head of Isle au Haut Bay, Maine.*—A frame boat-house has been erected. Owing to the dilapidated condition of the southern end of the keeper's dwelling the battens were removed, and replaced with new weather-boarding, and the dwelling painted. An extra cistern was also supplied.

27. *Whitehead, entrance to west side of Muscle Ridge Channel, Penobscot Bay, Maine.*—Repairs of a general character have been made at this station, and a duplicate fog-signal established.

30. *Indian Island, entrance to Rockport Harbor, Maine.*—An appropriation of \$9,000 was made by act approved June 23, 1874, for re-establishing the light-house at Indian Island, Rockport Harbor, Maine. Upon an examination of the premises it was decided to renew the wood-work of the old one-and-a-half-story brick dwelling, repair the walls and foundation, increase the accommodations by a frame addition 16 feet square, and erect a brick light-house tower, the light having formerly been exhibited from a lantern on the roof of the dwelling. This work was taken in hand soon after the appropriation was made, and on the 15th of January, 1875, it was completed, and the light exhibited.

32. *Grindel's Point, north side of entrance to Gilkey's Harbor, Maine.*—The light-house at this place was a one-and-a-half-story brick dwelling with a lantern on top, and was in such condition that it was deemed advisable to rebuild instead of attempting to repair it. A one-and-a-half-story frame building for a keeper's dwelling, and a square brick-tower for the light, were therefore erected; the walls of the old house taken down to near the surface of the ground, and the roof lowered. The building thus changed will be used as a covered way between the dwelling and the tower, and for the storage of provisions, fuel, oil, and supplies of various kinds.

37, 38. *Monhegan, on Monhegan Island, Maine.*—An appropriation of \$5,000 was made by act approved June 23, 1874, for a keeper's dwelling at this light-station. A one-and-a-half-story frame dwelling has been erected, and the covered way between the light-house tower and the dwelling rebuilt. The assistant's dwelling has been raised one foot, as well as partially renewed, and the brick underpinning topped out. The battens on the walls of the old house have been removed, and replaced with new weather-boarding. A frame building for the reception of a duplicate fog-signal has also been erected. The fog-signal at this station is not well located, it being impossible at the time the signal was established to secure a better site. It should be of a better class, and located on an adjoining hill. An appropriation of \$10,000 is asked for this purpose.

42. *Hendrick's Head, on east side of mouth of Sheepscoot River, Maine.*—The light-house at this place is a one-story rubble-stone dwelling, with a lantern on the roof, and was erected in 1829. It is now in such an advanced state of dilapidation and decay that it has become uninhabitable, and new buildings are being erected, to be paid for from the general appropriation for repairs of light-houses.

44. *Seguin, on Seguin Island, off the mouth of Kennebec River, Maine.*—An appropriation of \$4,000 was made by act approved March 3, 1875, for repairs and additions to the tower and keeper's dwelling at this station. The work will be commenced as soon as practicable.

46, 47. *Cape Elizabeth, entrance to Portland Harbor, Maine.*—An appropriation of \$30,000 was made by act approved March 3, 1873, for rebuilding the western tower at this station. With the amount of this appropriation both the west and east towers have been rebuilt of cast iron, lined with brick, and the old rubble-stone towers taken down. A

second-class siren which had been constructed for purposes of experiment, after the experiments were completed, was established at this station, the work being paid for from the general appropriation for fog-signals. A duplicate should be erected at an early day, and the whistle sent to some other less important station. An appropriation of \$5,000 is therefore asked for this purpose.

49. *Portland Breakwater, on the breakwater in Portland Harbor, Maine.*—An appropriation of \$6,000 was made by act approved June 23, 1874, for a light-house at this place. This light was established in 1855, and has been exhibited since that time from a temporary wooden building, which became decayed and unfit for further service. A cast-iron tower lined with brick has been erected on the end of the pier, from which the light is now exhibited, and the old structure has been removed.

Cape Neddick, (York Nubble,) near York Harbor, Maine.—An appropriation of \$15,000 was asked in the last annual report for a light-house on (York Nubble) Cape Neddick. The recommendation of last year is respectfully repeated.

55. *Isle of Shoals, off Portsmouth, New Hampshire.*—The old building in which the keepers now live at this station is so much decayed and in such a dilapidated condition that it is scarcely habitable. An appropriation of \$6,000 is respectfully asked, to build a new dwelling for the keeper and his assistant.

Boat-landings at exposed outside stations.—In order to effect a landing with a loaded boat at many of the light and fog-signal stations on the exposed coasts of Maine, New Hampshire, and Massachusetts, it has been found necessary to construct boat-landings or inclined planes of timber, extending from below low-water mark to a boat-house situated above the reach of the waves. These landings consist of timbers bolted and strapped to the rocks, and are expensive, as the work can only be executed during calm weather and at very low tides. They are also subject to rapid decay from their situation, and to destruction from the force of the waves and ice. They are, however, absolutely necessary to the landing of fuel and supplies for the maintenance of the lights and fog-signals, and as many of them now need renewing, an appropriation of \$10,000 is asked for building boat-landings at exposed stations on the coasts of Maine, New Hampshire, and Massachusetts.

REPAIRS.

At each of the following-named stations repairs and renovations more or less extensive have been made during the year:

1. *Saint Croix*, on Dochet's Island, Saint Croix River, Maine.
2. *West Quoddy Head*, western entrance to Passamaquoddy Bay, Maine.
3. *Little River*, entrance to Little River Harbor, Maine.
5. *Libby Island*, Machias Bay, Maine.
6. *Moose Peak*, on Moose Peak Head, Maine.
7. *Nash's Island*, off the mouth of Pleasant River, Maine.
10. *Prospect Harbor*, on Prospect Harbor Point, Glasborough, Maine.
11. *Winter Harbor*, entrance to Winter Harbor, Maine.
12. *Mount Desert*, on Mount Desert Rock, Maine.
15. *Bear Island*, entrance to Southwest Harbor, Mount Desert, Maine.
16. *Bass Harbor Head*, entrance to Bass Harbor, Maine.
- 17, 18. *Burnt Coat*, entrance to Burnt Coat Harbor, Maine.

19. *Eggemoggin*, east entrance to Eggemoggin Reach, Maine.
20. *Saddle back Ledge*, Isle au Haute, Maine.
21. *Heron's Neck*, entrance to Carver's Harbor, Maine.
22. *Deer Island Thoroughfare*, west entrance to Deer Island Thoroughfare, Maine.
24. *Pumpkin Island*, west entrance to Eggemoggin Reach, Maine.
- 25, 26. *Matinicus Rock*, entrance to Penobscot Bay, Maine.
28. *Owl's Head*, entrance to Rockland Harbor, Maine.
29. *Brown's Head*, west entrance to Fox Island Thoroughfare, Maine.
31. *Negro Island*, entrance to Camden Harbor, Maine.
33. *Dice's Head*, entrance to Castine Harbor, Maine.
34. *Fort Point*, entrance to Penobscot River, Maine.
35. *Tenant's Harbor*, entrance to Tenant's Harbor, Maine.
36. *Marshall's Point*, entrance to Herring Gut Harbor, Maine.
39. *Franklin Island*, entrance to George's River, Maine.
40. *Pemaquid Point*, entrance to John's Bay, Maine.
41. *Burnt Island*, entrance to Townsend's Harbor, Maine.
43. *Pond Island*, entrance to Kennebec River, Maine.
45. *Halfway Rock*, in Casco Bay, Maine.
48. *Portland Head*, entrance to Portland Harbor, Maine.
50. *Wood Island*, entrance to Saco River, Maine.
51. *Goat Island*, entrance to Cape Porpoise Harbor, Maine.
52. *Boon Island*, off York Harbor, Maine.
53. *Whale's Back*, entrance to Portsmouth Harbor, New Hampshire.
54. *Portsmouth Harbor*, entrance to Portsmouth Harbor, New Hampshire.

LIGHT-SHIPS.

There are no light-ships in the first district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

- West Quoddy Head*. Ten-inch steam-whistle.
- Petit Menan*. Ten-inch steam-whistle.
- Matinicus Rock*. Twelve-inch steam-whistle. It is proposed to establish a duplicate at this station.
- White Head*. Ten-inch steam-whistle.
- Monhegan, Manana Island*, six-inch steam-whistle. A duplicate is to be established at this station.
- Sequin*. Ten-inch steam-whistle. A second-class siren has been erected at this station during the past season.
- Cape Elizabeth*. Ten-inch steam-whistle. A second-class steam-siren has also been placed at this station during the past season as a duplicate for use in case of accident.
- Portland Head*. Second-class Daboll trumpet with a duplicate engine. These fog-signals are in good condition.

DAY OR UNLIGHTED BEACONS.

Under the appropriation for "day-beacons in Maine and Massachusetts," approved March 3, 1873-'74, the following day-beacons have been added to the list presented in the last annual report:

- Stone's Island Ledge*.—Machias Bay, Maine.
- Jordan's Delight Ledge*.—Narraguagus Bay, Maine.
- Drunkard's Ledge*.—Penobscot Bay, Maine.

Black Jack Rock.—Entrance to Kennebec River, Maine.

Stone's Rock.—Off York Harbor, Maine.

At the above-named places, holes have been drilled in the rock, and iron spindles with distinguishing marks have been procured, and will be set when suitable opportunity offers.

South Breaker.—Off White Head, west entrance to Penobscot Bay, Maine. A hole was commenced in this rock last season, but, owing to the rough weather and heavy seas, the work had to be abandoned.

Iron spindles with proper day-marks have been established at the following places during the past season :

Fessenden's Ledge.—Moose à bec Reach, Maine.

Trafton's Island Ledge.—Narraguagus Bay, Maine.

Clark's Rock.—Prospect Harbor, Maine.

Grindstone Ledge.—Winter Harbor, Maine.

South Bunker's Ledge.—Southwest entrance to Southwest Harbor, Mount Desert, Maine.

Harbor Island Ledge.—Entrance to Burnt Coat Harbor, Maine.

Pumpkin Island Ledge.—West entrance to Eggemoggin Reach, Maine.

Serag Island Ledge.—Merchant's Row, Penobscot Bay, Maine.

Colby's Ledge.—Merchant's Row, Penobscot Bay, Maine.

Inner Ledge.—Isle au Haute Harbor, Maine.

Goose Rock.—East end of Fox Island Thoroughfare, Maine.

Iron Point Ledge.—Fox Island Thoroughfare, Maine.

West Mark Island Point.—Penobscot Bay, Maine.

Hypocrite Ledge.—Off Townsend Harbor, Maine.

The top of the spindles of the above-named day-beacons are 32 feet above the rocks, which are out of water at about half tide. A number of spindles will be required during the ensuing year to replace those destroyed by ice, and to take the place of buoys at points where they can be set to advantage. An appropriation of \$10,000 is therefore asked for establishing day-beacons on the coasts of Maine, New Hampshire, and Massachusetts.

BUOYAGE.

The buoyage of this district is in as good order as the means at the disposal of the inspector will permit. New buoys have been placed to mark the following dangers, viz :

Black Rock, Swett's Point Reef, Fort Point Rock, and Bettie Allen's Point.—Spar-buoys to mark the approach to York River and Harbor, Maine.

Hog Island Ledge.—Spar-buoy, Casco Bay, Maine.

Point of Little Island.—Spar-buoy to mark the approach to Sheepscot River, Maine.

James and Willie Ledge, North Point of Hurricane Island, and Middle Rock.—Spar-buoys to mark the approach to Hurricane Island, Maine.

Hooper's Island.—Spar-buoy to mark the approach to Herring Gut Harbor, Penobscot Bay, Maine.

Tupper's Ledge.—To mark the approach to Blue Hill Bay, Maine.

Myrtle Ledge.—Spar-buoy to mark the approach to Somes' Sound, Maine.

Abijah's Ledge, and Guptill's Ledge.—Spar-buoys to mark the channel into Winker and Mosquito Harbors, Maine.

Eaton's Ledge.—Spar-buoy to mark the approach to Sullivan Harbor, Maine.

Juniper's Ledge, and Middle Ledge.—Spar-buoys to mark the Seguin Passage, Maine.

Little River.—Spar-buoy to mark the entrance to Little River Harbor, Maine.

Spar-buoys used during the year to supply losses, 88; chains used, 418 fathoms; shackles used, 228; moorings used, 97.

TENDERS.

The steam-tenders Myrtle and Iris are in good condition. It is found impossible with the Iris, which alone is used for purposes of supply and inspection and for the buoyage of the district, to keep the great number of buoys on the exposed coast of Maine in as good order as is desirable, but every effort is made, and no assistance will be asked this year.

The schooner Wave is old and in poor condition, but as she is only used for carrying material for construction and can wait for proper weather, she is still useful.

DEPOTS.

As stated in the last annual report, it became necessary to remove the buoy-depot from its temporary location on the land belonging to the War Department at House Island, near Fort Scammel, Portland Harbor, Maine. A site was secured at Little Hog Island, in the same harbor, and a wharf 120 feet long by 90 feet wide built, with a bridge, 74 feet long and 20 feet wide, connecting it with the shore. Upon this wharf a buoy-house 70 feet by 30 has been built. Also a coal-house, 85 feet by 30; and a rail-track laid for the convenient handling of buoys and sinkers. A cottage for the custodian and a large tank set up for supplying fresh water to the premises and to the light-house steamers has been erected.

SECOND DISTRICT.

The second light-house district extends from Hampton Harbor, New Hampshire, to include Gooseberry Point, entrance to Buzzard Bay, and embraces all the aids to navigation on the coast of Massachusetts.

Inspector.—Commander George H. Perkins, United States Navy.

Engineer.—Lieut. Col. James C. Duane, Corps of Engineers, brevet brigadier-general, United States Army.

In this district there are—

Light-houses.....	61
Light-ships.....	9
Fog-signals operated by steam or hot-air engines.....	4
Day or unlighted beacons.....	51
Buoys actually in position.....	511
Spare buoys for relief and to repair losses.....	217
Tenders (steam) Verbena and Daisy, inspector's tenders.....	2

The following numbers, which precede the names of stations, correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

56, 57. *Newburyport Harbor, on Plum Island, entrance to Merrimac River, Massachusetts.*—On account of the wearing away of the site by the abra-

sion of the sea and river, the front-light has been moved to the eastward 340 feet. The seaward side of this building has been painted black, that it may be distinguished in day-time when in range with the white rear tower. The main or rear light has been moved in the same direction 455 feet, making the distance at present between the two towers 336 feet. The keeper's dwelling and outbuildings have also been placed 100 feet south of the main light-tower. No change has been made in the bearings or sailing directions.

64, 65. *Cape Ann, on Thatcher's Island, off Cape Ann, Massachusetts.*—In the attic of the principal keeper's house four rooms have been finished, to be used as sleeping-apartments. At this station there are five keepers living in two houses. As all the keepers have families, and as the station is an isolated one, having two towers with first-order lights, it is desirable that additional quarters should be provided. An appropriation of \$6,000 for additional quarters is therefore recommended. Material for rebuilding the boat-slip has been landed, and the work has already been commenced. One of the fog-signal houses has been moved 30 feet to the southward, reduced in height 6 feet, a stone foundation and cement floors laid. A duplicate fog-signal has been placed here, the expense of which has been paid from the general appropriation for fog-signals.

75. *Minot's Ledge, entrance to Boston Bay, Massachusetts.*—The interior of this tower has been repainted. The roof of the assistant keeper's dwelling at Gulf Island has been reshingled, new saddle-boards put on, and other repairs of a general nature made.

81. *Duxbury Pier, entrance to Plymouth Harbor, Massachusetts.*—The iron ladder for landing at this light-house, having been badly damaged by the ice last winter, has been repaired, and an additional quantity of riprap placed around the base of the tower.

82. *Race Point, on the northwesterly point of Cape Cod, Massachusetts.*—The tower at this station was originally built of rubble-stone, laid in common lime mortar. The lime disappeared, and the tower became so leaky that it was necessary to cover it with shingles. The shingles are now rotten, as are also the wooden stairs inside, and the tower is so dilapidated that it is necessary to rebuild it. Extensive repairs are also required on the keeper's dwelling. An appropriation of \$8,000 is recommended for rebuilding the house and tower.

84. *Long Point, on Long Point, entrance to Provincetown Harbor, Massachusetts.*—An appropriation of \$13,000 was made by act approved June 23, 1874, for rebuilding the dwelling and tower and erecting a fog-signal at this station. A one-and-a-half story frame dwelling and a brick light-tower, square in plan, have been erected during the past season, and the old buildings removed. A fog-bell tower has been erected near the north side of the light-house, and a bell, weighing about twelve hundred pounds, with a striking-machine, has been placed on it and put in operation.

89, 90, 91. *Nauset Beach, on east side of Cape Cod, Massachusetts.*—An appropriation of \$5,000 was made by an act approved March 3, 1875, for repairs and additions to the tower and keeper's dwelling at this station. Plans have been prepared, and the work will be taken in hand at an early day.

East Chop, Martha's Vineyard, Massachusetts.—An appropriation of \$5,000 was made by act approved March 3, 1875, for establishing a light at this place, and negotiations have been entered into for the purpose of securing a site.

114. *Nobsque Point, near Wood's Hole Harbor, Massachusetts.*—Repairs

of a temporary nature were made on the buildings at this place last fall, but the station is now in a dilapidated condition, and should be rebuilt. A fog-bell tower has been erected, and a bell with striking-machinery placed on it and put in operation.

REPAIRS.

At each of the following-named light-stations repairs and renovations, more or less extensive, have been made during the year:

- 58-59. *Upper Harbor Beacons*, Newburyport Harbor, Massachusetts.
- 60-61. *Ipswich*, entrance to Ipswich Harbor, Massachusetts.
62. *Anisquam*, entrance to Anisquam Harbor, Massachusetts.
63. *Straitsmouth*, on Straitsmouth Island, Cape Ann, Massachusetts.
66. *Eastern Point*, entrance to Gloucester Harbor, Massachusetts.
67. *Ten-Pound Island*, Gloucester Harbor, Massachusetts.
- 68-69. *Baker's Island*, entrance to Salem Harbor, Massachusetts.
70. *Hospital Point*, Beverly Harbor, Massachusetts.
71. *Fort Pickering*, Salem Harbor, Massachusetts.
72. *Derby's Wharf*, Salem Harbor, Massachusetts.
73. *Marblehead*, entrance to Marblehead Harbor, Massachusetts.
74. *Egg Rock*, off Nahant, Massachusetts.
76. *Boston Light*, entrance to Boston Harbor, Massachusetts.
77. *The Narrows*, Boston Harbor, Massachusetts.
78. *Long Island Head*, Boston Harbor, Massachusetts.
- 79-80. *Plymouth*, entrance to Plymouth Harbor, Massachusetts.
83. *Wood End*, on Cape Cod, Massachusetts.
85. *Mayo's Beach*, head of Wellfleet Bay, Massachusetts.
86. *Billingsgate Island*, entrance to Wellfleet Bay, Massachusetts.
87. *Sandy Neck*, entrance to Barnstable Harbor, Massachusetts.
88. *Cape Cod*, Highlands of Truro, on Cape Cod, Massachusetts.
- 92-93. *Chatham*, on Cape Cod, Massachusetts.
95. *Monomoy Point*, southern extremity of Cape Cod, Massachusetts.
98. *Nantucket*, Great Point, on the northeast point of Nantucket Island, Massachusetts.
99. *Sankaty Head*, on the east side of Nantucket Island, Massachusetts.
101. *Gay Head*, west entrance to Vineyard Sound, Massachusetts.
102. *Brant Point*, entrance to Nantucket Harbor, Massachusetts.
103. *Nantucket Range*, Nantucket Harbor, Massachusetts.
- 104-105. *Nantucket Cliff Beacons*, on the beach northwest of Nantucket Harbor, Massachusetts.
106. *Bass River*, entrance to Bass River, Massachusetts.
107. *Bishop and Clerks*, in Vineyard Sound, Massachusetts.
108. *Hyannis*, Hyannis Harbor, Massachusetts.
110. *Cape Poge*, on the northeast point of Martha's Vineyard, Massachusetts.
112. *Edgartown*, entrance to Edgartown Harbor, Massachusetts.
113. *Holmes's Hole*, entrance to Holmes's Hole Harbor, Massachusetts.
115. *Tarpaulin Cove*, entrance to Tarpaulin Cove, Massachusetts.
118. *Cuttyhunk*, entrance to Buzzard's Bay, Massachusetts.
119. *Dumpling Rock*, in Buzzard's Bay, Massachusetts.
120. *Clark's Point*, entrance to New Bedford Harbor, Massachusetts.
121. *Palmer's Island*, New Bedford Harbor, Massachusetts.
122. *Ned's Point*, entrance to Mattapoisett Harbor, Massachusetts.
123. *Bird Island*, entrance to Sippican Harbor, Massachusetts.
124. *Wing's Neck*, entrance to Sandwich Harbor, Massachusetts.

LIGHT-SHIPS.

The cold weather during the past winter has been unequaled for many years, causing serious damage to the floating aids to navigation on this part of the coast.

All the light-ships in the district, with the exception of South Shoal, were swept from their stations during the movements of the large ice-floes, and carried about by the tides at will, at times being threatened with entire destruction. Fortunately, none were lost, although all were more or less injured, losing copper anchors, chains, &c.

96. *Nantucket New South Shoals No. 1, 21 miles south-southeast from the Island of Nantucket, Massachusetts.*—This light-ship was the only one in the district which was not carried from her station by the ice. She was taken into New Bedford about the middle of June for repairs, and light-ship No. 9 was placed upon the station temporarily. The estimated cost of repairs required, including a new boat and 30 fathoms of chain, is \$3,450.

90. *Pollock Rip, No. 2, off Chatham, Massachusetts.*—This ship was swept from her station by the ice during the past winter, and requires slight repair. She is one of the most important on our coast, as she marks the narrow channel connecting Vineyard and Nantucket Sounds with the open ocean to the eastward, and through which passes all the immense coasting trade of that section of the country. It is proposed at an early day to replace the present ship by light-ship No. 40, an entirely new and larger vessel, having on board a powerful steam fog-signal, which will supply a much-felt want.

92. *Shovelful, No. 3, on Shovelful Shoal, off Chatham, Massachusetts.*—This vessel was carried from her station by the ice, on February 14, and was taken over a shoal with but four feet of water upon it, dragging her moorings after her. The copper was stripped from her bottom, but otherwise the damage was slight.

93. *Handkerchief, No. 4, on Handkerchief Shoal, in Nantucket Sound, Massachusetts.*—This vessel was swept from her station by the movement of the ice, and, being in danger of going upon the shoals, which would probably have resulted in her loss, her master slipped her moorings and went to sea. She was off her station for twelve days before it was found practicable to replace her. She lost her anchor and ninety fathoms of chain-cable, and it cost \$1,000 for the services of a steamer to replace her upon her station.

105. *Cross Rip, No. 5, off Cross Rip Shoal, Nantucket Sound, Massachusetts.*—This vessel was also dragged from her station by the ice, but sustained no serious damage.

107. *Succonessett, No. 6, between Succonessett and Eldridge Shoals, Nantucket Sound, Massachusetts.*—This vessel lost an anchor and chain, and was carried from her position by the movement of the ice. She sustained some damage, but none of great importance.

112. *Vineyard Sound, No. 7, off Sow and Pigs Rocks, western entrance to Vineyard Sound, Massachusetts.*—This vessel, which was dragged from her station by the large moving fields of ice, sustained no considerable damage. It is proposed to place upon this station, which marks the western entrance to Vineyard Sound, light-ship No. 39, soon to be completed, which has a powerful fog signal on board.

113. *Hen and Chickens, No. 8, western side of entrance to Buzzard's Bay, Massachusetts.*—This vessel was also moved by the ice, but she was promptly returned to her station, having sustained but slight damage.

All the light-ships in this district are being put in complete order as

rapidly as the means at the disposal of the inspector will permit; and, as much of the work is done by the crews of the light-ships and tender, it will be done at small expense.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Cape Ann.—Twelve-inch steam-whistle.

Boston light.—First-class Daboll trumpet.

Race Point.—Twelve-inch steam-whistle.

Cape Cod.—First-class Daboll trumpet.

DAY OR UNLIGHTED BEACONS.

South Pier, Newburyport Harbor, Massachusetts.—Wooden crib filled with stones.

North Pier, Newburyport Harbor, Massachusetts.—Wooden crib filled with stones.

Black Rocks, Newburyport Harbor, Massachusetts.—Stone pier, with wooden pyramid at top.

Point Neck Rocks, entrance to Essex Harbor, Massachusetts.—Iron spindle, with ball at top.

Lane's Point, Annisquam Harbor, Massachusetts.—Square wooden beacon.

Lobster Rock, Annisquam Harbor, Massachusetts.—Square granite beacon.

Dry Salvages, off Cape Ann, Massachusetts.—Wooden tripod.

Londoner, off Thatcher's Island, Massachusetts.—Iron spindle, with cage at top.

Five Pound Island Beacon, Gloucester Harbor, Massachusetts.—Granite base, with iron spindle, and ball at top.

Harbor Rock Beacon, Gloucester Harbor, Massachusetts.—Iron spindle, with ball, and cage at top.

Black Rock, Gloucester Harbor, Massachusetts.—Iron spindle, with cage at top.

Lobster Rock, Beverly Harbor, Massachusetts.—Stone, with wooden spindle.

Ram's Horn Beacon, entrance to Beverly Harbor, Massachusetts.—Square granite, wooden mast, cage at top.

Monument Bar, entrance to Beverly Harbor, Massachusetts.—Square granite, wooden mast, cage at top.

Abbott's Monument, entrance to Salem Harbor, Massachusetts.—Square granite, wooden spindle, cask at top.

Little Haste, entrance to Salem Harbor, Massachusetts.—Wooden mast, cask at top.

Halfway Rock, off Marblehead, Massachusetts.—Granite beacon, broken down.

Bowditch Beacon, entrance to Salem Harbor, Massachusetts.—Granite triangular pyramid, wooden spindle, and cage at top.

Hardy's Rock, entrance to Salem Harbor, Massachusetts.—Wooden spindle, with two triangles at top.

Great Aqua Vitæ, entrance to Salem Harbor, Massachusetts.—Granite, wooden spindle, and cage at top.

Little Aqua Vitæ, entrance to Salem Harbor, Massachusetts.—Granite, wooden spindle, and cage at top.

Marblehead Rock, entrance to Marblehead Harbor, Massachusetts.—Granite cone, wooden spindle.

Cat Island, entrance to Salem Harbor, Massachusetts.—Wooden spindle with cask at top.

Half-tide Rock, entrance to Swampscot Harbor, Massachusetts.—Iron spindle, cask at top.

Pig Rocks, Boston Bay, Massachusetts.—Granite pyramid, with wooden spindle and cage at top.

Sunken Island Boston, Bay, Massachusetts.—Granite base, with wooden spindle, and cage at top.

Bird Island, Boston Bay, Massachusetts.—Iron spindle, cage at top.

Deer Island Point, Boston Bay, Massachusetts.—Square granite pyramid.

Great Fawn Bar, Boston Bay, Massachusetts.—Square granite base and granite cone, with iron spindle, and cage at top.

Nix's Mate, Boston Harbor, Massachusetts.—Square granite base, with octagonal wooden pyramid on top.

Spit Beacon, Boston Bay, Massachusetts.—Square granite pyramid.

False Spit, Boston Bay, Massachusetts.—Granite base, with iron spindle, and cage at top.

Point Alderton, Boston Bay, Massachusetts.—Square granite pyramid, with cone at top.

Harding's Ledge, Boston Bay, Massachusetts.—Iron spindle, with wheel at top.

South Beacon, entrance to Scituate Harbor, Massachusetts.—Iron spindle, with two lozenges.

North Beacon, entrance to Scituate Harbor, Massachusetts.—Iron spindle, with two rounds.

Hogshead Beacon, Plymouth Harbor, Massachusetts.—Iron spindle, with arm, cask, and cage at top.

Breakwater Beacon, Plymouth Harbor, Massachusetts.—Square granite base, with wooden spindle, and cage at top.

Duxbury Pier, Plymouth Harbor, Massachusetts.—Square granite base, with granite post on top.

Egg Island Rock, entrance to Wellfleet Harbor, Massachusetts.—Wooden spindle, with cask at top.

Billingsgate Shoal, entrance to Wellfleet Bay, Massachusetts.—Owing to the washing away of the island, the rebuilding of the beacon has been abandoned, and a buoy substituted.

Breakwater, entrance to Bass River, Massachusetts.—Unfinished.

Sunken Pier, entrance to Bass River, Massachusetts.—Wooden spindle, with cask at top.

Breakwater, entrance to Hyannis Harbor, Massachusetts.—Wooden spindle, four arms, and cask at top. stands on east end of breakwater.

Great Rock, west of Point Gammon, Vineyard Sound, Massachusetts.—Iron spindle, cage at top.

Collier's Ledge, Centreville Harbor, Vineyard Sound, Massachusetts.—Granite base, black spindle, ball and vane.

Lone Rock, entrance to Wood's Hole, Massachusetts.—Iron spindle, cage at top.

Spindle Rock, entrance to Edgartown Harbor, Massachusetts.—Iron spindle, with a cask at top, surmounted by spindle and vane.

Cormorant Rocks, entrance to Mattapoisett Harbor, Buzzard's Bay, Massachusetts.—Iron spindle, with cage at top.

Range Beacon, entrance Fair Haven Harbor, Massachusetts.—A triangular pyramid of iron.

Egg Island, entrance New Bedford Harbor, Massachusetts.—A granite cone, with an iron spindle and vane at the top.

Old Cock, north side of entrance to Buzzard's Bay, Massachusetts.—Iron spindle, cage at top.

Under the appropriation for "day-beacons in Maine and Massachusetts, 1873-'74," operations have been carried on during the past year at the following-named places:

Monument Bar Beacon, on south side of entrance to Beverly Harbor, Massachusetts.—The granite-crib day-beacon at this place has been rebuilt, and filled in with stone nearly to the top. It is pyramidal in form, 17 feet high, 12 feet square at the base, and 3 feet at the top, and is surmounted by a mast and cage, painted black.

Little Haste Beacon, on south side of entrance to Salem Harbor, Massachusetts.—A wooden mast, 35 feet high by 8 inches diameter, has been erected in place of one recently carried away, and painted black.

Great Aqua Vitæ Beacon, Salem Harbor entrance, Massachusetts.—A wooden mast, 22 feet high and 7 inches diameter, with a cage at the top 3 feet high and 26 inches square, has been erected in place of one recently carried away. All painted black.

Little Aqua Vitæ Beacon, Salem Harbor entrance, Massachusetts.—A wooden mast, 25 feet high and 7½ inches diameter, with two prongs at top, and all painted red, has been erected in place of one recently carried away.

Bird Island Beacon, Boston Harbor, Massachusetts.—A 7-inch hole, 19 inches deep, has been made in the center stone, and the latter banded with iron; the iron spindle raised and reset; a wooden cage, 4 feet diameter by 8 feet high, made and placed at the top of the spindle, the iron braces repaired, and the cage, spindle, and braces repainted red.

False Spit Beacon, Boston Harbor, Massachusetts.—A 7-inch hole, 20 inches deep, has been made in the center stone, and the latter banded with iron, the iron spindle raised and reset, a wooden cage made, 4 feet diameter by 8 feet high, and placed at the top of the spindle, a new brace made, and the iron-work, spindle, and cage repainted red.

Collier's Ledge, Centreville Harbor, Vineyard Sound, Massachusetts.—The day-beacon at this place has been rebuilt. It is conical in form, 12 feet diameter at the base, 5 feet at the top, and 18 feet in height, with a wooden staff at the top, surmounted by an open-work ball and vane.

BUOYS.

The buoyage of this district is now in excellent condition. During the past winter most of the buoys were swept from their positions by the ice, and 62, with their appendages, were lost. The others were promptly returned to their stations, and the places of the missing ones supplied by spare buoys on hand for that purpose.

TENDERS.

The steam-tenders *Daisy* and *Verbena* have had constant employment, much of it of the roughest kind, and now both of them require extensive repairs. The *Daisy* is too small to do the work efficiently; and if caught at sea in bad weather, as she is liable at any time to be, is not safe. She should be sold, and her place supplied by a larger and more efficient vessel.

DEPOTS.

The buoys and material at Gulf Island have mostly been removed to Lovell's Island, where we now have excellent facilities for the hand-

ling and storage of buoys, chains, anchors, fuel, and stores of all kinds.

The depot at Wood's Hole for the southern part of the district is in good condition. During the present season the Light-House Board, desiring to do all in its power for the advancement of science, has tendered to the United States Commissioner of Fish and Fisheries the use of the portion of the depots grounds and buildings not at present required for light-house work for the purpose of carrying on his investigations, which offer has been accepted, and the investigations at that place are now going on, but without expense to the Light-House Establishment.

THIRD DISTRICT.

The third district extends from Gooseberry Point, Massachusetts, to include Squam Inlet, New Jersey, and embraces all the aids to navigation on the sea and sound coasts of Rhode Island, Connecticut, and New York, Narragansett and New York Bays, Providence and Hudson Rivers, Whitehall Narrows, and Lake Champlain.

Inspector.—Commodore Stephen D. Trenchard, United States Navy.

Engineer.—Col. I. C. Woodruff, Corps of Engineers, brevet-brigadier general, United States Army.

In this district there are—

Light-houses.....	119
Light-ships.....	9
Day or unlighted beacons.....	39
Fog-signals operated by steam or hot-air engines.....	9
Buoys actually in position.....	427
Buoys for relief and to supply losses.....	615
Steam-tenders for supply and for inspection, Putnam and Cactus.....	2
Steam-tender for engineer purposes, Mistletoe.....	1
Supply-steamer for supplying the light-houses of the Atlantic and Gulf coasts, Fern.....	1

The numbers preceding the names of stations correspond with the "Light-house List of the Atlantic, Gulf, and Pacific Coasts and the Northern and Northwestern Lakes of the United States," issued January 1, 1875.

LIGHT-HOUSES.

126. *Beaver Tail, entrance to Narragansett Bay, Rhode Island.*—During the year all the plate-glass of the lantern was reset, and the two caloric engines of the fog-signal thoroughly overhauled. The mouth-piece of the fog-signal trumpet was broken during the latter part of the year, and a new one was fitted. The station is now in good order. The fog-signal was in operation during the year 623 hours.

130. *Dutch Island, Narragansett Bay, Rhode Island.*—Repairs of a general nature are required at this station, which it is estimated will cost \$1,500. These will be made as soon as practicable.

— *Castle Hill fog-signal, entrance to Newport Harbor, Rhode Island.*—An appropriation of \$10,000 was made by act approved March 3, 1875, for the erection of a fog-signal at this place. An examination of the site was made by direction of the board, but the purchase has not been consummated, as the owners of the property where it is proposed to erect the signal have, within the past year, erected spacious mansions for summer residences, and are opposed to the erection of a signal on their land, which must, of necessity, be at their very doors, and in their opinion would depreciate the value of their property. It seems quite probable that no proper site can be procured in this locality, except by condemnation, under the laws of the State of Rhode Island, and even in

this case the valuation of the land would undoubtedly be far beyond the sum appropriated for the fog signal, and thus the object of the appropriation would be defeated. No other site in the vicinity can be occupied to the same advantage, otherwise the board would ask that the act making the appropriation for this work be modified so as to allow the selection of a different site. There are no positions on either side of Castle Hill, seaward or landward, suitable for such a fog signal, and a selection could only be made of positions on the opposite shore, which would not answer the purpose. A fog-signal is very much needed at this point, but it is not probable that a site can be secured for any reasonable sum.

132. *Muscle-Beck Shoals, Narragansett Bay, Rhode Island.*—This station was seriously damaged by the ice during the past winter, and the rebuilding of the beacon becomes a necessity. The stone pier was moved some four feet by the force of the ice. The light and fog-signal have been continued since the damage, but require frequent adjustment to keep the apparatus in running order. The cost of rebuilding the beacon and protecting its base with rip-rap is \$6,000, for which an appropriation is recommended.

136. *Conimicut entrance to Providence River, Rhode Island.*—Early in March last a heavy field of floating ice moving down the Providence River, struck the pier and completely demolished the keeper's dwelling. There were present at the time the keeper and his son, both of whom narrowly escaped with their lives. The keeper lost all his furniture, valued at about \$319. It is recommended that an appropriation be made to re-imburse him to this amount. The destruction of the keeper's dwelling on the pier necessitated the re-occupation of the old house at Nayat Point and the employment of an assistant keeper to insure a proper attendance to the light which is on the opposite side of the channel. The Nayat dwelling was enlarged and considerable repairs made to give accommodation to the keepers. The Conimicut light-station was originally a day-beacon, but was changed so that a light might be shown and a fog-bell sounded. The tower resisted the shock of the ice, but much of the protection-stone at its base was carried away. The pier not having sufficient superincumbent weight, was entirely destroyed. Temporary repairs to the station were made, and stone for protecting the base of the tower is now being placed, but the rebuilding of the pier of greater dimensions and greater stability is necessary. A proper pier and stone-dwelling thereupon it is estimated will cost \$30,000, which amount it is respectfully recommended shall be appropriated for that purpose.

137. *Bullock's Point, Providence River, Rhode Island.*—This station, originally built as a day-beacon, is about to be rebuilt on a larger scale, under an appropriation approved June 23, 1874. Plans and specifications have been approved and contracts entered into for enlarging the pier; and for the materials for the new dwelling-house, &c., and the work of getting out stone is already commenced.

140. *Fuller's Rock, and—*

141. *Sassafras Point, Providence River, Rhode Island.*—The purchase of a site for the erection of a dwelling for the keeper of these lights has not been made. The land in the vicinity is being much improved for business purposes, and there is a disinclination on the part of the owners to sell land for a keeper's dwelling, as they fear that the remainder will be depreciated in value. The appropriation of \$5,000, made by act approved June 23, 1874, is still available.

142. *Point Judith, Rhode Island.*—During the year the boiler of the

fog-signal has been duplicated, making the whole of the fog-signal apparatus now in duplicate. The repairs, besides the work required in housing and setting up the new boiler, have been quite extensive, including the patching, retubing, and putting in good condition the old boiler. The number of hours' duration of fog during which the signal was sounded is 776½.

144. *Block Island, (southeasterly,) Rhode Island.*—This station was completed and the light first exhibited from the tower on February 1, 1875. There remains to be completed at the station some protection to the reservoir, to secure an adequate supply of water for the use of the fog-signal, and the fencing of the grounds. For this the funds of the special appropriation made by act approved June 23, 1874, are ample. The signal is in duplicate in all parts except the boiler. A duplicate boiler will be added as soon as practicable. The number of hours of fog during which the signal has been sounded is 801.

— *Block Island Breakwater, Rhode Island.*—The temporary range-lights on the breakwater at this island, maintained by the Engineer Department of the Army during the construction of the breakwater, have become a necessity to navigation, and their maintenance should be transferred to the Light-House Establishment. New and permanent frames for exhibiting the lights should be built, and an estimate therefor is submitted of \$900.

146. *Montauk Point, Long Island, New York.*—Some essential parts of the flashing apparatus at this station have been renewed. The lantern has been entirely reglazed, and the station painted. The fog-signal has been cleaned and repaired, and the station put in good order. The fog-signal was in operation 748 hours during the year.

147. *Stonington Harbor, Connecticut.*—General repairs have been made to this station during the year, under special appropriation therefor, made by act approved June 23, 1874.

151. *New London Harbor, Connecticut.*—This station has undergone general repairs during the latter part of the year, and the buildings have been painted throughout. The fog-signal engines have been fitted with some new parts. The number of hours during which the signal was in operation during the year was 553.

153. *Race Rock, Long Island Sound, New York.*—The operations during the year have consisted in completing the concrete foundation for the pier, and the laying of the cut-stone courses of the pier and landing-wharf has been commenced. The contractor has not pushed this work during the year with the energy which its importance demands.

154. *Little Gull Island, Long Island Sound.*—A portion of the special appropriation made June 23, 1874, has been applied toward completing the landing. The past severe winter damaged the concrete decking of the pier, causing great loss of rain-fall from the cisterns, and apprehensions were felt lest there should be a deficiency of water for the use of the fog-signals at the station. The damage will be repaired at an early day. The number of hours during which the fog-signal was in operation was 651.

159. *Saybrook, mouth of Connecticut River, Connecticut.*—A striking apparatus for the fog-bell at this station has been put up during the year, and the bell hung in a better position. This station has undergone general repairs, and is now in good condition.

165. *Falkner's Island, Long Island Sound, Connecticut.*—The recommendations made in the last annual report for a powerful fog-signal and for the protection of the bank, which is washing away by the abrasion of the sea, is renewed. On February 7th the steamer E. A. Wood-

ward, of Norwalk, from Providence for New York, ran aground on the reef north of the island. The fog-bell is wholly inadequate for the wants of navigation, and a steam-signal of the most approved pattern should be established. The estimated cost of protecting the site and establishing a steam fog-signal is \$7,500, for which an appropriation is recommended.

168. *Southwest Ledge, entrance to New Haven Harbor, Connecticut.*—The operations under the contracts for building a light-house at this station have been confined to the completion of the foundation-tube, filled with concrete, and the commencement of the manufacture of the iron superstructure, which, it is feared, will be completed too late to be erected this season.

171. *Middle Ground, Stratford Shoals, Long Island Sound, New York.*—The contract for the concrete foundation and stone pier was made too late in the last season to justify commencement of the work at that time. During the winter large accumulations of gravel were made within the riprap ring. The removal of this gravel became a necessity under the plan proposed for the foundation and pier, and for the stability of the structure. This caused delay in the commencement of the contractor's operations, who had collected material for concrete, and had received a quantity of the heavy pier stone from eastern quarries. It is expected that the laying of the concrete will be completed by the end of July, and the commencement of the courses of cut-stone work of the pier will be made in August. Much of the first course of the pier has already been brought to the site, with the view of an early beginning, and large quantities of the other courses of cut-stone have been shipped from the quarries, and are now stored at convenient distances from the work.

173. *Bridgeport, entrance to Bridgeport Harbor, Connecticut.*—The work of coping the granite breakwater, which protects this light-station, by heavy blocks of stone has been completed during the year by contract, made under the appropriation of Congress therefor.

178. *Lloyd's Harbor, north shore of Long Island, New York.*—The protection of the site of this light-house from the abrasion of the sea by an enrockment of large stones has been completed during the year, and general repairs made at the station.

— *Cold Spring Harbor, north shore of Long Island, New York.*—An appropriation of \$20,000 was made by act approved March 3, 1875, for building a light-house or range-lights. The purchase of land for sites of the range-lights proposed for marking the channel has not been made, because of objections by one of the owners of the land. In case the purchase be made, the lights cannot be erected during the present year, as cession of jurisdiction cannot be secured from the State of New York until some time subsequent to January next.

182. *Stepping-Stones, Long Island Sound, New York.*—The operations at this station have been limited to the completion of the riprap foundation. A contract for the concrete foundation, granite pier, dwelling, and tower has been made, and the material for the work is being prepared. The sheltered position of the site will admit of the continuance of operations until late in the season, and it is thought that the contractor will fulfill his engagement to complete the work within the time required, namely, one year from the time of actual commencement.

183. *Throgg's Neck, Long Island Sound, New York.*—This station was in a dilapidated condition, and should have been rebuilt, as recommended, last year. In the absence of an appropriation for that purpose, how-

ever, repairs have been made during the present year, and are now in progress to put the building in a condition fit for habitation.

190-191. *Highlands of Navesink, New Jersey.*—The repairs and fencing authorized under the appropriation of June 23, 1874, have been completed, and the station is in good order, with the exception of the road-way to the landing.

193. *East Beacon, Sandy Hook, New Jersey.*—The brush jetties for protecting the beach and station from the encroachments of the sea have fulfilled in a great measure the purpose intended. It is found that a more secure method of fortifying the ends is necessary by means of a few piles. A siren of improved pattern was purchased during the year and put up at this station. The number of hours during which the signal was in operation was 531.

194. *West Beacon, Sandy Hook, New Jersey.*—The rebuilding of the crib-work protection at this station and its extension, for which there is an appropriation of \$6,000, will be commenced as soon as a working party now at Sandy Hook, East Beacon, shall have finished work there.

204. *Robbin's Reef, New York Harbor, New York.*—New and improved parts have been fitted to the fog-bell striking-machine, and general repairs and improvements have been made, for the greater comfort of the keeper, as well as the efficiency of the station. The board is now making experiments in the use of mineral oil at this station.

210. *Stony Point, Hudson River, New York.*—The fog-bell frame at this station is being changed, preparatory to erecting a striking machine in place of the old apparatus at the station, which was inefficient. The materials have all been ordered, and the changes will be made during the month of August.

213. *Rondout, Hudson River, New York.*—The dike on the north side of the entrance to Rondout Creek needs a light to prevent collision of passing vessels. During the construction of the dike it was lighted by the Engineer Department of the Army. Its maintenance should now devolve upon the Light-House Establishment. If the dike itself is substantial enough for the base of a frame support, it will cost but a small amount, estimated at \$1,600. If the light be built on a separate foundation of piles, behind the dike, which is preferable on account of security from passing vessels, the cost will not be less than \$3,200. An appropriation of the latter amount is asked to establish this light.

215. *Hudson City, Hudson River, New York.*—The structure has been completed during the year, and the light was first exhibited on November 1, 1874.

487. *Split Rock, Lake Champlain, New York.*—This station was in a dilapidated condition, and unfit for habitation. Some repairs have been made, but this is only a temporary expedient. There should be a new dwelling-house, the estimated cost of which is \$6,000.

489, 490. *Burlington Beacons, Burlington Breakwater, Vermont.*—The dwelling-house for the keeper of these beacons has been completed. The two beacons have been moved to the extremities of the breakwater.

491. *Colchester Reef, Lake Champlain, Vermont.*—The enrockment for the protection of the foundation of this station has been completed during the present summer.

REPAIRS, ETC.

At each of the following stations in the third district, repairs, more or less extensive, have been made during the year:

126. *Beaver Tail, Rhode Island.*

128. *Newport*, Rhode Island.
129. *Rose Island*, Rhode Island.
130. *Dutch Island*, Rhode Island.
131. *Poplar Point*, Rhode Island.
132. *Muscle Bed Shoal*, Rhode Island.
133. *Prudence Island*, Rhode Island.
134. *Bristol Ferry*, Rhode Island.
135. *Warwick*, Rhode Island.
136. *Conimicut*, Rhode Island.
- *Nyatt Point*, Rhode Island.
137. *Bullock's Point*, Rhode Island.
139. *Pumham Rock*, Rhode Island.
142. *Point Judith*, Rhode Island.
143. *Block Island*, Rhode Island.
146. *Montauk Point*, New York.
147. *Stonington*, Connecticut.
149. *Morgan's Point*, Connecticut.
150. *North Dumpling*, Connecticut.
151. *New London*, Connecticut.
154. *Little Gull Island*, Connecticut.
156. *Plum Island*, Connecticut.
158. *Cedar Island*, New York.
159. *Saybrook*, Connecticut.
161. *Brockway's Reach*, Connecticut.
164. *Horton's Point*, New York.
165. *Faulkner's Island*, Connecticut.
166. *New Haven Harbor*, Connecticut.
167. *New Haven Long Wharf*, Connecticut.
169. *Stratford Point*, Connecticut.
172. *Old Field Point*, New York.
174. *Black Rock*, Connecticut.
175. *Penfield Reef*, Connecticut.
176. *Norwalk Island*, Connecticut.
177. *Eaton's Neck*, New York.
178. *Lloyd's Harbor*, New York.
179. *Great Captain's Island*, Connecticut.
180. *Execution Rocks*, New York.
181. *Sand's Point*, New York.
183. *Throgg's Neck*, New York.
184. *North Brother Island*, New York.
186. *Great West Bay*, New York.
187. *Fire Island*, New York.
- 190, 191. *Highlands of Navesink*, New Jersey.
192. *Sandy Hook*, New Jersey.
193. *Sandy Hook, East Beacon*, New Jersey.
195. *Conover Beacon*, New Jersey.
196. *Chapel Hill*, New Jersey.
197. *Point Comfort*, New Jersey.
198. *Waackaack*, New Jersey.
199. *Elm Tree*, New York.
200. *New Dorp*, New York.
201. *Princess Bay*, New York.
202. *Fort La Fayette*, New York.
203. *Fort Tompkins*, New York.
204. *Robbins' Reef*, New York.
205. *Fort Columbus*, New York.

- 206. *Bergen Point*, New Jersey.
- 208. *Passaic*, New Jersey.
- 210. *Stony Point*, New York.
- 214. *Saugerties*, New York.
- 216. *Four-Mile Point*, New York.
- 217. *Coxsackie*, New York.
- 218. *Stuyvesant*, New York.
- 220. *New Baltimore Dyke*, New York.
- 222. *Coeyman's Bar*, New York.
- 223. *Roha Hook*, New York.
- 225. *Nine Mile Tree*, New York.
- 226. *Cow Island*, New York.
- 229. *Cross Over*, New York.
- 230. *Cuyler's Dyke*, New York.
- 486. *Barber's Point*, New York.
- 487. *Split Rock*, New York.
- 488. *Juniper Island*, New York.
- 491. *Colchester Reef*, New York.
- 496. *Point aux Roches*, New York.
- 498. *Windmill Point*, New York.
- . *Light-House Depot*, New York.

LIGHT-SHIPS.

125. *Brenton's Reef*, No. 11, off *Brenton's Reef*, entrance to *Newport Harbor, Rhode Island*.—Since the last report this vessel has received new casing for pumps, cast-iron whelps for windlass, and sundry other small matters. She is in need of extensive repairs, and will soon be taken off her station for that purpose. The estimated cost is about \$18,000. During the past winter she held her ground against masses of floating ice without a parallel in many years.

148. *Eel Grass Shoal*, No. 25, off *Mystic, Connecticut*, in *Fisher's Island Sound*.—This vessel has had no repairs since the date of last report. She is unsound, and too small for the service. The cost of necessary repairs is estimated at \$6,000.

152. *Bartlett's Reef*, No. 13, off *New London, Connecticut*, in *Long Island Sound*.—This vessel was carried from her station by the ice and was towed into *New London*. Her metal sheathing was repaired, sundry minor defects remedied, and the vessel was then returned to duty after an absence of twelve days. Some of her timbers are unsound, but she is in a sufficiently good condition for another year's service.

163. *Cornfield Point*, No. 12, *Long Island Sound*, off the mouth of the *Connecticut River*.—This vessel has been thoroughly repaired, at a cost of \$16,438.33. She has been furnished with two mushroom-anchors and one hundred and eighty-five fathoms of chain. She was, during the winter, carried from her station by ice; and the cost of repairing her sheathing amounted to \$731.25. Total expenditure upon this vessel during the year, \$19,523.72.

170. *Stratford Shoal*, No. 15, on *Middle Ground*, off *Stratford Point, Long Island Sound*.—This vessel was carried from her station by ice on February 9, and went ashore near *Orient, Long Island*. She was hauled off by the tenders *Cactus* and *Mistletoe*, and was towed to *New London*, where it was found that she had sustained no serious damage. Her metal, boats, berth-deck, and pump-boxes were repaired, at a cost of \$301.91. The vessel, however, is much decayed, and to put her in good condition will cost \$15,000.

188. *Sandy Hook Light-Ship, No. 16, off entrance to New York Bay, six miles from Sandy Hook and Highlands of Navesink Lights.*—This vessel during the past year received a new deck; her top sides were recalked, and she was otherwise overhauled, at a cost of \$1,723.29. She is now in good condition, and, as heretofore, is creditably kept. Total expenditure upon this vessel, \$3,072.52.

Light-vessel No. 17.—This vessel, when on station temporarily at Stratford Shoal, was damaged by ice. She was repaired at a cost of \$1,609.51. She is now doing duty on Brenton's Reef, and is in a sound condition. The total cost of her repairs during the year was \$3,826.76.

Light-vessel No. 20.—This vessel is now at the light-house depot, Staten Island. Considerable repairs are needed, the estimate for which is \$2,500.

189. *Wreck of the "Scotland," Light-vessel No. 23, off Sandy Hook.*—This vessel was authorized by act of Congress, approved June 23, 1874, and an appropriation of \$40,000 was made for that purpose. As the vessel was much needed upon the station, and a considerable time must necessarily elapse before one could be built, an old vessel which had been used for a relief was placed there, and the light exhibited for the first time on the evening of September 10, 1874, giving great satisfaction to the coasting-vessels trading to and from New York. The old vessel now upon the station is in need of slight repairs, which it is estimated will cost \$2,500.

New light-vessel, No. 39.—This vessel, built under contract with David Carll, of City Island, N. Y., was successfully launched on June 5th. She is now at New London, receiving on board her boilers and the machinery for a fog-signal. She will, when completed, be placed upon Sow and Pigs Reef, western entrance to Vineyard Sound.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

126. *Beaver Tail, Rhode Island.*—A first-class Daboll trumpet, operated by 24-inch Ericsson hot-air engine, duplicated.

142. *Point Judith, Rhode Island.*—First-class steam-siren, duplicated.

144. *Block Island light-station, southeasterly.*—First-class steam-siren in duplicate.

146. *Montauk Point, New York.*—First-class Daboll trumpet, operated by 24-inch Ericsson hot-air engines, in duplicate.

151. *New London, Connecticut.*—Second-class Daboll trumpet, operated by 18-inch Ericsson calorific engines, in duplicate.

154. *Little Gull Island, New York.*—Second-class steam-siren, in duplicate.

177. *Eaton's Neck, New York.*—Second-class steam siren, in duplicate.

180. *Execution Rocks, New York.*—Third-class Daboll trumpet, operated by 18-inch Ericsson hot-air engine, in duplicate.

193. *Sandy Hook, (East Beacon,) New Jersey, entrance to New York Bay.*—First-class steam-siren, in duplicate.

—, *New light-ship, No. 39.*—The experiment of operating a steam fog-signal on board a light-ship will be tried in this vessel. The machinery for the purpose will be two boilers, a whistle-boiler, and an evaporating-boiler of locomotive tubular form, distillers, circulating and feed pumps, and horizontal non-condensing steam-engine operating a whistle twelve inches in diameter. It is proposed to place her, when completed, which will be late in the autumn, at the western entrance

Vineyard Sound, to mark Sow and Pigs Rocks, where a fog-signal is much needed.

Duration of fog, characteristics of signal, and expenditure of stores at the fog-signal stations in the third district for the year ending June 30, 1875.

Name and number of station.	Duration of fog, hours.	Coal, pounds.	Wood, cubic feet.	Average pressure, steam or hot-air.	Average consumption of coal.	Characteristics.	
						Duration of blast.	Length of interval.
				Lbs.	Lbs.	Seconds.	Seconds.
126. Beaver Tail	622½	14, 482	92	10	23½	6	10 & 50
142. Point Judith	776½	78, 520	21½	55	101. 12	6	40
144. Block Island	801	94, 080	33	55	117. 5	6	20
146. Montank Point	748	22, 186	27½	8	29½	12	50
154. Little Gull Island	651	67, 255	8	50	103½	5	40
151. New London	553½	9, 876	60½	8	17 4.5	6	14
177. Eaton's Neck	487½	70, 540	51½	60	144½	9	30
180. Execution Rocks	368½	5, 798	182	8	16 1.5	7	15
193. Sandy Hook	531	61, 841	365	65	116 2.5	6	40

DAY OR UNLIGHTED BEACONS.

2. *South Point of Rose Island, Narragansett Bay, Rhode Island.*—This beacon, consisting of a granite structure and iron spindle and cage, was carried away by the ice during the past winter. As a temporary mark, an iron spindle and cage have been erected at the site.

It is estimated that it will cost, to rebuild the granite structure and surmounting spindle and cage, \$4,000. An appropriation is recommended.

— *"Rhode's Folly," Pawcatuck Bay, Rhode Island.*—A day-beacon should be established at this place. The estimate of cost, \$2,500.

14. *West or Wicopesset Rock, entrance to Fisher's Island Sound by Lord's Channel, northwest of East or Catumb Reef, two-thirds of a mile.*—This spindle was carried away during the winter, and has been replaced by another spindle and cage-work.

24. *Sand's Spit, Sag Harbor, New York.*—This beacon has been entirely destroyed by ice during the past winter.

Measures have been taken for temporarily marking the spit by placing a large granite block on the riprap foundation of the old beacon, and placing in the block an iron spindle and cage-work. The cost of rebuilding the beacon on a granite pier and protecting the same by a proper encroachment is estimated at \$3,500, for which an appropriation is asked.

37. *Success Rock, near Sand's Point.*—This day-mark has been destroyed during the year by the ice. The spindle has been overthrown, splitting the rock where it was pierced by the spindle.

A party has been engaged for some time in drilling a new hole in the rock, and it is expected the spindle will be replaced some time during the month of August.

BUOYAGE.

During the past winter, navigation was much interrupted by the ice, which in extraordinary quantities filled the bays, harbors, and water-routes of travel. Perhaps in no preceding year were more buoys displaced than during the protracted cold weather of the past winter. But the constant employment of the steam-tenders resulted in the recovery of

the greater number. The value of buoys and attachments lost was about \$9,000. In the majority of cases the buoys were found to have parted their chains or mooring-loops, proving them to have been well moored, and that their displacement was the result of the resistless force of the moving fields of ice, sweeping down upon them with the full force of the tide. During the year there have been purchased, to supply losses, 270 iron buoys and their appendages, at a cost of \$59,996.21, the cost of buoy service in this district alone being \$69,884. There is now on hand a sufficient stock of buoys to supply all ordinary losses.

TENDERS.

The tenders in this district are in fair condition, and are sufficient to properly perform the work required.

DEPOTS.

Light-House Depot, Staten Island, New York.—The general work of repairs and grading of the grounds has been continued during the year. A duplicate engine for the use of the lamp-shop has been put up during the year, and an additional building for its housing. The roadway outside the northern wall became so bad as to seriously impede travel for the teams, &c., having business with the depot. Repairs were therefore made to some extent. Additional facilities and improvements have been made in the testing-room of the lamp-shop for experiments. Repairs of the wharves, where urgently needed, have been made. At present the barrels of oil, when received, are placed on skids in the yard. This exposure causes loss of oil. The enlargements recommended would increase the room for storage, which is inadequate. Many articles of second hand, or condemned, or bulky nature, which are now put in store with the supplies, embarrassing the work going on there, might be stored in the oil-shed if enlarged as recommended. The water continues to come through the roof of the oil-vault during rainy weather, and particularly when the frost leaves the ground in the spring. One of the storage-tanks has been repaired during the year. They are now all in good order.

In consequence of the improvements made upon the land adjoining the depot on the south, and the consequent changes to be made in the grading of portions of the depot-grounds, referred to in the last annual report, the recommendation then made for an appropriation of \$10,000 is herein renewed.

The estimate for commencing the enlargement of the basin and for renovating the wharves, &c., and for a brick addition to the oil-shed, viz, \$50,000, is also renewed.

New London depot.—It is recommended that the passage-way from Bank street to the water lot, purchased by the Light-House Establishment, at New London, Connecticut, and which is the right of way secured to the United States in connection with that purchase, be walled along the east side. The passage-way should also be properly paved. The estimated cost of these improvements is \$3,000.

This depot, in view of its central position, and of the facilities it affords, is invaluable in its service to the district, and its enlargement is a matter of necessity; for frequently there are assembled there the three tenders, relief light-ship, and two or three other vessels; besides this, the number of fog-signals is constantly increasing, and a depot for fuel required by them is here almost indispensable.

LIGHT-HOUSE BOARD.

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Lens-apparatus, &c., received at and delivered from light-house depot, Staten Island; also number of cases in which the lenses were received and delivered from July 1, 1874, to June 30, 1875.

	First order.	Second order.	Third order.	Three and one-half order.	Fourth order.	Fifth order.	Sixth order.	Steamer lenses.	Canal and other lenses.	Lamps.	Totals.
Received	1	1	...	...	6	2	1	...	3	1	15
Delivered	2	2	1	...	9	3	4	...	7	1	29
Total	3	3	1	...	15	5	5	...	10	2	44
Cases received	26	21	...	...	30	4	4	...	34	3	122
Cases delivered	32	61	17	...	64	9	11	...	13	3	210
Total cases	58	82	17	...	94	13	15	...	47	6	332

List of boxes, barrels, bundles, packages, cans, kegs, &c., exclusive of lenses, received at and shipped from light-house depot, Staten Island, from July 1, 1874, to June 30, 1875.

	Boxes.	Barrels.	Packages.	Bundles.	Cans and kegs.	Total.
Received	2, 416	4, 518	6, 424	737	235	14, 330
Delivered	2, 241	4, 055	7, 071	180	207	13, 754
	4, 657	8, 573	13, 495	917	442	28, 084

List of articles manufactured and repaired in lamp-shop at light house depot, Staten Island, from July 1, 1874, to June 30, 1875.

	Lenses.	Lamps.	Lamp-burners.	Miscellaneous articles.	Total.
Manufactured	2	168	130	1, 118	1, 418
Repaired	22	23	7	117	179
Total	24	191	137	1, 235	1, 597

FOURTH DISTRICT.

The fourth light-house district extends from Squam Inlet, New Jersey, to and including Metomkin Inlet, Virginia. It includes the sea-coast of New Jersey below the highlands of Navesink, the bay coasts of

New Jersey and Delaware, the sea-coasts of Delaware and Maryland, and part of the sea-coast of Virginia.

Inspector.—Commander George B. White, United States Navy.

Engineer.—Lieut. Col. W. F. Reynolds, Corps of Engineers, brevet brigadier-general, United States Army.

In this district there are :

Light-houses.....	20
Light-ships.....	4
Fog-signals operated by steam or hot-air engines.....	0
Day or unlighted beacons.....	0
Buoys actually in position.....	113
Spare buoys for relief and to supply losses.....	142
Tenders (steam) for inspection, Violet.....	1
Tenders (steam) for construction and repairs, Rose.....	1

The numbers preceding the names of stations correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

231. *Barnegat, sea-coast of New Jersey*.—During the very cold weather of last winter, the mechanical lamps which had been in use at this station for many years became unserviceable, and their place was supplied by new lamps of the Funck pattern. Electric bells for calling the relief-keeper have also been placed in position.

232. *Tucker's Beach, entrance to Little Egg Harbor, New Jersey*.—The tower at this station has been cement-washed, and the lantern painted. A boat and buoy house is now being built. The dwelling is a one-story brick building, outside dimensions 35 by 20 feet, and contains but two rooms besides the attic. The accommodations for the keepers are entirely inadequate, and a new one should be built. An appropriation of \$8,000 is asked for this purpose.

233. *Absecum, sea-coast of New Jersey*.—The semi-monthly measurements of the beach have been continued. No important changes have occurred. Electric bells for calling relief or assistance have been placed in the tower, and add greatly to the efficiency of the station. The front site has been raised to the city grade, and new curbing put down along the sidewalk.

234. *Hereford Inlet, northend of Five-mile Beach, coast of New Jersey*.—On August 9, 1874, John March, the keeper of this station, was drowned by the capsizing of his boat, on returning from the main-land to his station. Repairs only of a general nature have been made during the past year.

237. *Cape Henlopen, entrance to Delaware Bay, Delaware*.—This tower has been repainted, new pumps for the cistern supplied, and workmen are now engaged in making repairs to the keeper's dwelling, and tower. The lantern is of the old style, and obscures a large quantity of light. It is the only one of this kind in the district. The light being a very important one, a lantern of the most modern construction should be supplied. An appropriation of \$8,000 is asked for that purpose.

238. *Cape Henlopen Beacon, Cape Henlopen, Delaware*.—Complaint having been made of the want of brilliancy of this light, a double-wick burner was placed in the apparatus with satisfactory results. The repairs authorized by act approved March 3, 1875, for this station, are now being made. An appropriation of \$12,000 was made by the same act for establishing a steam fog-signal here, which work is now in progress. It is proposed to place duplicate sirens at this station.

240. *Mispillion Creek, Delaware Bay, Delaware*.—At the date of the last annual report designs were in preparation for additions to the pr

ent structure under an appropriation made by act approved June 23, 1874. This work has been completed. The keeper's dwelling has been entirely remodeled, four good rooms having been added, and a good brick cistern built. This site is subject to overflow by the tide, and can only be protected by a properly-constructed dike, which would cost about \$4,000.

— *Joe Flogger Shoal, Delaware Bay, Delaware.*—The channel between Joe Flogger Shoal and Miah Maul Shoal is about $1\frac{1}{2}$ miles broad, through which careful navigation is required at night, and a light on the lower end of the former would enable vessels to go through safely. There is a small bank, with 14 feet of water on it, southeast by compass, and distant about one mile from Joe Flogger Shoal, which can be removed for much less than it would cost to properly mark it. About seven miles above the lower end of Joe Flogger Shoal and on the opposite side of the channel is Cross Ledge Shoal, on which is now being constructed a light-house to take the place of the light-ship. It is suggested that when the light is established at Cross Ledge, authority be given the Light-House Board to place the light-ship near the lower end of Joe Flogger Shoal.

241. *Brandywine Shoal, Delaware Bay.*—The fog-bell-striking machinery has been repaired and adjusted, and additional motive-weight supplied. This structure stands in the middle of Delaware Bay, and has to resist the action of large fields of moving ice. It is an iron screw-pile structure, surrounded by additional piles, which serve as ice-breakers. It was built in 1849. The original number of fender-piles was 30, made of wrought iron, 5 inches in diameter, and screwed about 10 feet into the shoal, braced and tied together above water. In 1857 an outer row, consisting of 38 piles, was added, and a substantial wooden platform built over the entire space occupied by them. Since 1857, the structure has remained in substantially the same condition, without important repairs until the season of 1874, when the wooden platform was renewed. During the past winter, which was one of the most severe ever known, the down-stream pile of the ice-fender was broken off by the ice at flood-tide. The structure having stood eight years without the outer row of piles, it is not thought that the loss of one of them endangers its stability to such an extent as to cause apprehension for its safety. Iron piles, as a rule, are not suitable where they are subjected to the force of large masses of moving ice. In the case of this light-house, the fender-piles being only 5 inches in diameter, have necessarily become considerably weakened by rust. Ultimately the structure will doubtless require further additional protection, either by a renewal of the iron piles, or by a riprap of loose stone thrown in around them.

242. *Maurice River, New Jersey.*—This station has been supplied with new lamps and a new oil-house has been erected. A water-tank and pump have been supplied, a small store-house and boat-house built, and supplied with blocks and rigging for hoisting the boat.

This work was done under the appropriation made by act approved March 3, 1875, for general repairs at this station.

243. *Egg Island, Delaware Bay, New Jersey.*—This station is in need of slight repairs. The site is washing away, so that ordinary high tide comes within a few feet of the building. It should be protected with stone, or additional land purchased, the cost of which, together with repairs required, would be \$1,500, and an appropriation therefor is asked.

245. *Cross Ledge, Delaware Bay, New Jersey.*—Contract for the erection of the foundation-pier of this structure was entered into on the 8th of September, 1874, after having duly advertised for bids. Work was

promptly commenced, and the contractor succeeded in getting in as much riprap and small stone as the estimate called for before the work was stopped by the ice. On resuming work in the spring, it was found that the sand around the site had been to a large extent washed away, and a very material settling of the riprap had taken place. This was anticipated, but the extent of it could not be foreseen. The only remedy was to go on putting in stone until stability was secured. This has been done, and the laying of cut stone has progressed to the completion of the second course. It is believed that the pier will be completed in time to place a temporary structure containing a light upon it this fall. The total amount of riprap and small stone placed in it up to this time is 175,856 cubic feet. The original estimate for this work was \$125,000, (see Report of Light-House Board for 1872,) of which amount but \$75,000 has been appropriated. It is expected that this amount will be sufficient to complete the pier. The superstructure will then have to be built. To do this and give additional protection to the site will require an appropriation of \$25,000, which is recommended. This is \$25,000 less than the original estimate.

246. *Mahon's River, Delaware Bay, Delaware.*—The site of this station having been almost entirely washed away, a new one was purchased, and the erection of a new structure was commenced under the appropriation made by act approved June 23, 1874. Work is now progressing satisfactorily, and the structure will be completed before the end of the season. The new site, while quite as good for the purpose of navigation, is much more accessible, and comparatively free from the action of the water.

247. *Ship John Shoal, Delaware Bay, New Jersey.*—Considerable delay in the commencement of this structure was caused by the difficulty of procuring title to the site and cession of jurisdiction by the State to the United States. These difficulties having been overcome, the erection of the light house was commenced during the latter part of August, and the iron caisson was sunk on the 28th of October, 1874. The caisson was filled with concrete, and a temporary structure placed upon it, from which a light was exhibited for the first time on the evening of the 29th of November of that year. The quantity of riprap placed around this structure was largely in excess of what was estimated as necessary. The past winter was one of great severity, and the structure was probably subjected to as severe a test as it will ever be again. This it passed through unharmed. The keepers, however, became alarmed for their personal safety, and abandoned their posts on the 18th of January, 1875. Owing to the quantity of ice in the Delaware, it was impossible to reach the work again until the 13th of March, when it was found unharmed, and the light was re-exhibited. This structure is a simple cast-iron cylinder, 24 feet in diameter, filled with concrete, and resting on the top of piles cut to a level of 22 feet below ordinary high-tide. It is kept in place by its own weight and the riprap of loose stone placed around it. The keepers report that the vibration of the structure when struck by the ice was so great that they considered it unsafe. An additional quantity of riprap will be required, and a contract has been entered into for placing 2,000 tons additional, during the present season. The original estimate for this work was \$125,000, of which \$75,000 has been appropriated. It is proposed to place on top of it, as now finished, a keeper's dwelling and a lantern, both of cast iron. The floor of the dwelling will be about 15 feet above high-tide. To complete the structure will require an additional appropriation of \$25,000, which is \$25,000 less than the original estimate.

248. *Cohansey, Delaware Bay, New Jersey.*—As stated in the last annual report, the buildings at this station are in a dilapidated state, and should be rebuilt.

Liston's Tree ranges, Delaware Bay, Delaware.—By act approved March 3, 1875, an appropriation of \$55,000 was made for two sets of range-lights at or near Liston's Tree, Delaware Bay. As the proper location for these ranges could only be determined by a careful survey, the Superintendent of the Coast Survey was requested to make it. As soon as it is completed steps will be taken to procure sites and erect the light-houses at as early a day as practicable.

250. *Reedy Island, Delaware Bay, Delaware.*—The characteristic of this light was changed during the past year from fixed red to fixed white, varied by red flashes; a fixed white light being shown for sixty seconds, followed by five red flashes at intervals of twelve seconds. By act approved March 3, 1875, the appropriation made by previous act of Congress for rebuilding the keeper's dwelling at this station is made applicable to the construction of Liston's Tree ranges, and provides that when the Liston's Tree ranges are established, the light at Reedy Island shall be discontinued.

252. *Bulkhead Shoal ranges, Delaware Bay.*—At the date of the last annual report a survey had been made, and the location of the range-lights fixed; the necessary steps to secure title and cession of jurisdiction had been commenced. It was found, however, impossible to purchase the sites selected for these ranges at reasonable rates. Proceedings were therefore commenced in the superior court of Newcastle County, Delaware, to have the land condemned under the State laws, but the awards of the jury, in the several cases, were considered by the board as exorbitant, being largely in excess of the prices at which they had previously been offered by their owners, and were rejected, and orders were given to examine into the practicability of locating the lights at other points. It was ascertained that one of the ranges could be placed on the New Jersey shore, and negotiations were commenced for the purchase of sites. The ranges will now be located, one on the Delaware side, and the other on the New Jersey side of the river. Plans have been prepared, and as soon as the titles to the sites are secured, and cession of jurisdiction obtained, work will be prosecuted without delay. An appropriation of \$8,000 for a light-house on or near the south end of Pea Patch Island was made by act approved March 3, 1873. The building of the Bulkhead ranges will render this light unnecessary. It is therefore suggested that the appropriation for Pea Patch Island be made available for expenditure on the Bulkhead ranges if necessary.

254. *Fort Mifflin, Delaware River, Pennsylvania.*—Additional riprap stone has been placed around this structure to replace that carried away by the ice during the past winter. The fourth-order lens taken from Reedy Island has been put in good order and placed at this station, and a Funck lamp supplied, the sixth-order lens formerly in use having been removed and sent to the depot at Staten Island. Additional riprap will be required at this station during the present year.

Schuylkill ranges, Schuylkill River, Pennsylvania.—An appropriation of \$15,000 for range-lights at the mouth of the Schuylkill River was made by act of Congress approved March 3, 1875. Surveys to determine the proper location have been made. Designs for the structures have been prepared and approved, and their erection is now in progress. They will be finished during the present season. The sites for structures fall on the reservation of League Island naval station, and authority has been obtained from the Secretary of the Navy for their occupation.

Cherry Island Flats, Delaware River.—There is a bad shoal at this point, with a narrow channel on either side. It should be marked by a light or lights, the exact positions of which can only be determined by a survey. It is recommended that an appropriation of \$50,000 be made for a light or lights to guide past this shoal.

REPAIRS.

At each of the following-named light stations repairs and renovations more or less extensive have been made since the last annual report:

- No. 231. *Barnegat*, Barnegat Inlet, New Jersey.
- No. 232. *Tucker's Beach*, Little Egg Harbor Inlet, New Jersey.
- No. 233. *Absecum*, Absecum Inlet, New Jersey.
- No. 236. *Cape May*, entrance to Delaware Bay, New Jersey.
- No. 237. *Cape Henlopen*, entrance to Delaware Bay, Delaware.
- No. 238. *Cape Henlopen beacon*, entrance to Delaware Bay, Delaware.
- No. 239. *Delaware Breakwater*, entrance to Delaware Bay, Delaware.
- No. 240. *Mispillion Creek*, entrance to Mispillion Creek, Delaware Bay.
- No. 241. *Brandywine Shoal*, Delaware Bay.
- No. 242. *Maurice River*, entrance to Maurice River, New Jersey.
- No. 243. *Egg Island*, Delaware Bay, New Jersey.
- No. 248. *Cohansey*, entrance to Cohansey Creek, New Jersey.
- No. 249. *Bombay Hook*, Delaware Bay, Delaware.
- No. 250. *Reedy Island*, Delaware Bay, Delaware.
- No. 253. *Christiana*, entrance to Christiana River, Delaware.
- No. 254. *Fort Mifflin*, Delaware River, Pennsylvania.
- No. 555. *Fenwick's Island*, coast of Delaware, Delaware.
- No. 257. *Assateague*, coast of Virginia, Virginia.

LIGHT-SHIPS.

235. *Five Fathom Bank light-ship No. 37, on Five Fathom Bank, off the capes of Delaware.*—In July, 1874, this vessel was brought in for repairs, her place being temporarily supplied by light-ship No. 18, and she was thoroughly overhauled, caulked from her copper up, including decks, a new mast put in, and an extra strip of copper put on. She was hauled out, copper repaired where necessary, and placed in good condition in every respect, at a cost of \$2,143.03.

244. *Upper Middle or Cross Ledge light-ship No. 19, Delaware Bay.*—Last August it was found that the mainmast of this vessel was very much decayed in the partners, and No. 18 was placed upon the station in her place. She was then brought to the depot and a new mast put in. Some repairs were made to her copper, and she resumed her station early in October. On January 14, 1875, she was driven from her station by heavy ice, and took refuge behind Delaware Breakwater. Notwithstanding the great importance of this vessel, she was unable to resume her station until March 26, having been off her station more than two months. On February 11 the ice in the breakwater broke up and dragged a large fleet of vessels at anchor there to sea, and among them the Cross Ledge light-ship. She was carried about five miles to sea, when she was taken in tow by one of the Reading Coal and Iron Company's steamers, and brought in. On the 25th of March, the lower part of the bay became clear of ice, and the master promptly left the breakwater, under sail, and reached his station before the steamer sent to tow him arrived. This vessel is in need of extensive repairs.

It is expected that a light will be shown from the light-house now being built at Cross Ledge this season, when the services of this vessel will no longer be required at this place.

256. *Winter Quarter Shoal light ship No. 24, off the coast of Virginia.*—This ship was placed in position November 15th, 1874, and has been of great advantage to the coasting-trade. She is moored in 11 fathoms of water, and in one of the most exposed positions on the Atlantic coast.

Light-ship No. 18.—Last summer this vessel was placed on the Five Fathom Bank Station while No. 37 was brought in and thoroughly overhauled. Later in the season, she relieved the Cross Ledge light-ship while some necessary repairs were made upon her. A thorough examination of this vessel has recently been made and she has been found unworthy of repair. Steps have been taken to sell her at auction and turn the proceeds into the Treasury.

Light-vessel No. 40 has been built at Wilmington, Delaware, under a contract with the Jackson & Sharp Company, made September 25, 1874, for \$39,200. She was launched April 20, 1875, and received from the contractors May 26, 1875. The boilers for steam fog-signal will be built and put in by Messrs. Hilles & Jones, of Wilmington, Delaware, under a contract dated March 3d, 1875, for \$5,850. The vessel will be completed and ready to go upon her station by the middle of August.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are no fog-signals operated by steam or hot-air engines in this district. That at Cape Henlopen, for which an appropriation has been made, is not yet completed.

BUOYAGE.

The following changes have been made in the buoyage of the district, viz:

A third-class black spar-buoy was placed at the mouth of the Schuylkill River to mark the turning-point for vessels bound up the river. Two third-class spars, one red and one black, were placed on either edge of Cherry Island Flats Shoal to mark the two channels. One second-class spar wreck-buoy was placed on the wreck of the schooner sunk in the main ship-channel near Dan Baker Shoal. One second-class can-buoy, painted green, with word "Wreck" upon it, was placed on the wreck of bark Cienfuegos, about two miles outside of Cape Henlopen, and directly in the track of southern-bound steamers.

The Ship John Shoal buoy has been removed, the establishment of a light at this point rendering its longer continuance there unnecessary.

Last winter was very severe on the spar-buoys in Delaware Bay and River. Nearly all of them were so badly cut as to render them unfit for further use. Two first-class and two second-class iron buoys were carried to sea by the ice from the shoals off the capes of Delaware; but all save one second-class buoy were recovered and replaced by the tender Violet.

TENDERS.

The steam-tender Violet has been actively engaged during the past year. She is entirely too small for work on this exposed coast—taking supplies to light-vessels, towing them into position, attending outside buoys, transporting supplies to inlets and attending to buoys in them,

or for purposes of inspection, which require her to go outside the capes of the Delaware. One of the light-ships is sixty miles from the capes, and the other eighteen, and there are five important buoyed inlets, besides fourteen sea-buoys, other than the entrance-buoys, which require constant attention and involve working outside. Should she be caught out by a heavy gale, it would be a matter of doubt if she could make a harbor, and the lives of her officers and men would be imperiled. Much valuable time is lost in waiting until the weather makes it safe for her to proceed with her work. It is recommended that a tender be built for this district, and an appropriation of \$50,000 for this purpose is respectfully asked.

DEPOTS.

A place at which buoys can be cleaned, repaired, and painted is required at some point near Cohansey light-station. A suitable piece of ground can be purchased near the light-house for a small sum, and it is recommended that an appropriation of \$1,000 be made for this purpose.

Chincoteague Inlet, Virginia.—A buoy-shed at this place to protect the buoys used in the inlet is very necessary, and an appropriation of \$1,000 to purchase a site and build a shed is recommended.

FIFTH DISTRICT.

The fifth light-house district extends from Metomkin Inlet, Virginia, to include New River, North Carolina, and embraces part of the sea-coast of Virginia and North Carolina, Chesapeake Bay, sounds of North Carolina, and the James and Potomac Rivers.

Inspector.—Commander F. H. Baker, United States Navy, until June 10, 1875; Commander E. C. Merriman, United States Navy, present inspector.

Engineer.—Major Franklin Harwood, Corps of Engineers, brevet lieutenant-colonel, United States Army.

In this district there are—

Light-houses	73
Light-ships	0
Fog-signals operated by steam or hot-air engines	0
Day or unlighted beacons	78
Buoys actually in position	668
Spare buoys for relief and supply losses	878
Tenders (steam) Heliotrope (buoy-tender) and Tulip, (for construction and repairs)	2
Tenders (sail) Maggie, (buoy-tender,) Pharos, and Spray, (for construction and repairs)	3

The numbers preceding the names of the stations correspond with the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

260. *Cape Henry, on the south side of the main entrance to Chesapeake Bay, Virginia.*—As stated in the last annual report, the tower at this station is one of the oldest on the coast of the United States, and a new one should be built at the earliest day practicable. The keepers' dwelling is dilapidated and at too great a distance from the tower to insure proper

attendance. It is a frame building, and now more than thirty years old. It is too small for the number of keepers at the station, and affords poor protection from the weather in winter. An appropriation of \$75,000 for commencing a new tower and keepers' dwelling is recommended.

269. *Jordan's Point, James River, Virginia.*—By act approved March 3, 1875, an appropriation of \$2,000 was made for protecting the site and establishing a fog-bell. The exposed shore has been thoroughly protected by a dry-laid stone wall, 6 feet in thickness at the bottom, and backed with dry earth, adding slightly to the area of the grounds. A bell-tower has been built and a bell, struck by machinery, established. It is proposed to place a new lantern on the top of the present dwelling.

— *Dutch Gap Canal, James River, Virginia.*—At the date of the last annual report work on these beacons had been temporarily suspended. In October work was resumed, and the station was ready for lighting in January, 1875. The structures consist of two frame beacons, each 27 feet high from base to focal plane, situated at the entrance of the canal on the port hand, ascending the river. The frame dwelling was built at the top of the hill, between the two beacons, and within easy distance of each. The buildings are of a substantial character. The lights of this station not being required to be of great brilliancy, it was determined to try small lanterns, burning mineral oil. These lights were first exhibited on June 10, and are found satisfactory.

270. *Cherrystone, entrance to Cherrystone Inlet, Virginia.*—The only work done at this station during the season has been repairs of a minor nature, and none are necessary except the establishment of a fog-bell rung by machinery. The present bell is rung by hand. It is proposed to do this work and pay for it from the general appropriation for fog-signals.

— *Too's Marshes, south side of the entrance to York River, Virginia.*—The work of establishing this light-station, under the appropriation approved June 23, 1874, was commenced May 24. The structure is now nearly completed, and will be lighted on the 15th of August. It is a screw-pile light-house, square in plan, the keeper's dwelling being surmounted by a lantern which contains the lens.

— *Solomon's Lump, in Kedge's Strait, between Tangier Sound and Chesapeake Bay, Virginia.*—A site having been selected for the light-house to be built on Solomon's Lump, to take the place of the one at Fog Point, and plans having been prepared, the work was begun on the 21st of June, and is now in progress. The structure will be a screw-pile light-house, on five wrought-iron piles, square in plan, with a lantern surmounting the keeper's dwelling. It is expected that the light will be exhibited during the present season.

288. *Thomas's Point Shoal, mouth of South River, Chesapeake Bay, Maryland.*—An additional appropriation of \$15,000 having been made by act approved March 3, 1875, for this light-house, the location of which is one of great exposure, the plans were prepared, and proposals for furnishing the iron-work were invited by public advertisement. This work is now progressing well, and it is expected that the structure will be finished during the present season. It is to be an iron-pile light-house, the foundation piles of which are to be of wrought iron, ten inches in diameter. The superstructure will be of wood, and serve as a keeper's dwelling. It will be surmounted by a lantern of the fourth order. When this light-house is finished, the light on Thomas's Point will be discontinued.

290. *Sandy Point, west side of Chesapeake Bay, Maryland.*—The light at this station, situated on the main land, is too far from the channel to be

efficient. The shoals make out from the point a distance of about one mile, and vessels drawing more than ten feet of water cannot approach within that distance of the light-house. The fog-bell at this station can seldom be heard on account of its distance from the channel. This light-house marks a turning-point. A change in the location to the outer edge of the shoal and the establishment of an efficient fog-signal is recommended, and an appropriation of \$30,000 is asked for that purpose. A structure somewhat similar to that being built at Thomas's Point, it is believed, will answer the purpose.

291. *Love Point, mouth of Chester River, Maryland.*—After due advertisement for bids, contract was made with the lowest bidder for furnishing the riprap protection to this light-house, under the appropriation made by act approved June 23, 1874. Since this riprap has been placed, the light-house has stood the severe test of the winter of 1874-'75 without damage or material displacement of the stone. It may now be considered secure.

292. *Craighill Channel range-beacons, mouth of Patapsco River, Maryland, upper or rear light.*—Shortly after the date of the last annual report, work on this station was resumed, and in March of the present year the structure was completed.

293. *Craighill Channel range-beacons, mouth of Patapsco River, Maryland, lower or front light.*—The iron tubular foundation described in the last annual report was surmounted by a temporary structure until October of last season, when, the iron superstructure having been completed, it was placed in position. About 675 cubic yards additional of riprap was placed around the structure. The heavy ice of the past winter did no damage to this station, though the locality is one of great exposure.

295. *Fort Carroll, on Fort Carroll, Patapsco River, Maryland.*—The skeleton frame structure surmounting the keeper's dwelling on the parade of the fort having become so decayed as to endanger the safety of the keeper and his family, a new beacon was erected on the southwest salient, over the second tier of casemates. The lens and fog bell machine were removed into the new structure, and the light exhibited from it on the 5th of May, 1875. The change having been made, the old structure was removed, the roof of the keeper's house repaired, and the station put in thorough order.

— *Mathias Point, Virginia, or Port Tobacco Flats, Maryland, Potomac River.*—Under the orders of the board, the district officers made a careful examination of the Potomac River in this vicinity, with a view to determining the best location for this light-house. The board, after a careful consideration of their report, decided to locate the light-house on Port Tobacco Flats, and erect the day-beacon on the shoal off Mathias Point. The plans having been prepared, proposals for manufacturing the iron-work were called for by public advertisement, and awarded to the lowest bidder. The iron-work is now in process of construction, but will not be finished in time to erect the light-house at the site during the present season. This will be undertaken early in the spring.

311. *Currituck Beach, sea-coast of North Carolina.*—A full account of the foundation for this important structure is given in the last annual report, since which time the work has been prosecuted without intermission. The piles being driven for the foundation, they were inclosed by a coffer-dam, and the material inside excavated to a depth of about seven feet. The bottom around the piles was then well rammed with stone paving set edgewise, and the space between the heads of the piles filled in

with concrete. The work on the superstructure was then commenced, and has been in progress since that time. The tower is nearly finished, and it is expected that the light will be exhibited about December 1. The material for this structure has been delivered at the pier near Church's Island, in Currituck Sound, and thence towed in scows of light draught a distance of about ten miles to the light-house wharf. The establishment of this light completes the chain from the mouth of Chesapeake Bay to Cape Harter, and supplies a want long felt by commerce.

315. *Hatteras Inlet, Pamlico Sound, North Carolina.*—The material for this light-house and a working force for its erection were shipped to the station early in July, 1874, and the erection of the structure immediately commenced. The work was finished in September and the light exhibited October 1, 1874. The light-house consists of a frame dwelling, square in plan, resting on a foundation of five solid wrought-iron piles, eight inches in diameter, which are screwed vertically into the shoal to a distance of about ten feet, the keeper's dwelling being surmounted by a lantern of the fourth order.

321. *Neuse River, entrance to Neuse River, North Carolina.*—The roof of this structure, which is a screw-pile light-house, was removed during the past season, a new one put on, and the station left in good order.

324. *Roanoke Marshes, on the east side of the narrow channel connecting Pamlico and Croatan Sounds, North Carolina.*—An appropriation of \$15,000 was made by act approved March 3, 1875, for rebuilding the light-house at this station. It was found upon examination that the soil upon which this light-house stands is very soft to a great depth, so that it may become necessary to select a new site in the vicinity. The iron-work for the structure is now in hand, but owing to the difficulties of the site it is estimated that it will require \$5,000 additional to complete the structure, and it is recommended that an appropriation for this amount be made.

REPAIRS.

At each of the following-named stations there have been repairs and renovations more or less extensive during the year :

- 262. *Old Point Comfort*, entrance to Hampton Roads, Virginia.
- 263. *Craney Island*, near the mouth of Elizabeth River, Virginia.
- 264. *Lambert's Point*, Elizabeth River, Virginia.
- 266. *White Shoal*, James River, Virginia.
- 267. *Point of Shoals*, James River, Virginia.
- 268. *Deep Water Shoals*, James River, Virginia.
- 271. *Black River*, entrance to Black River, Virginia.
- 272. *York Spit*, entrance to York River, Virginia.
- 274. *Wolf Trap*, east end of Wolf Trap Shoal, Chesapeake Bay, Virginia.
- 275. *Stingray Point*, mouth of Rappahannock River, Virginia.
- 276. *Windmill Point*, mouth of Rappahannock River, Virginia.
- 277. *Watts Island*, east side of Tangier Sound, Virginia.
- 278. *James Island*, entrance to Little Annamesssex River, Maryland.
- 299. *Somer's Cove*, north side of Little Annamesssex River, Maryland.
- 280. *Smith's Point*, mouth of Potomac River, Virginia.
- 283. *Point Lookout*, entrance to Potomac River, Maryland.
- 284. *Hooper's Straits*, abreast of entrance to Hoga River, Maryland.
- 285. *Cove Point*, north of entrance to Patuxent River, Maryland.
- 286. *Sharp's Island*, off north end of Sharp's Island, Maryland.
- 287. *Choptank River*, opposite entrance to Choptank and Treadhaven Rivers, Maryland.

289. *Greenbury Point*, entrance to Severn River, Maryland.
 296, 297. *Hawkins Point*, upper and lower lights, south side of Patapsco River, Maryland.
 298. *Leading Point*, south side of Patapsco River, Maryland.
 300. *Pool's Island*, off mouth of Gunpowder River, Maryland.
 301. *Turkey Point*, at the head of Chesapeake Bay, Maryland.
 302. *Fishing Battery*, entrance to Susquehanna River, Maryland.
 303. *Havre de Grace*, south bank of Susquehanna River, Maryland.
 304. *Piney Point*, east side of Potomac River, Maryland.
 305. *Blackstone's Island*, north side of Potomac River, Maryland.
 306. *Lower Cedar Point*, west side of Potomac River, Virginia.
 307. *Upper Cedar Point*, opposite mouth of Tobacco River, Maryland.
 308. *Fort Washington*, on wharf at Fort Washington, Maryland.
 309. *Jones's Point*, west bank of Potomac River, Virginia.
 310. *Bowler's Rock*, Rappahannock River, Virginia.
 312. *Body's Island*, on Body's Island, coast of North Carolina.
 313. *Cape Hatteras*, coast of North Carolina.
 316. *Ocracoke*, entrance to Ocracoke Inlet, North Carolina.
 317. *Southwest Point Royal Shoal*, on the southwest point of Royal Shoal, North Carolina.
 318. *Northwest Point Royal Shoal*, on the northwest point of Royal Shoal, North Carolina.
 319. *Harbor Island*, between Pamlico and Core Sounds, North Carolina.
 320. *Brant Island Shoal*, southern part of Pamlico Sound, North Carolina.
 322. *Pamlico Point*, entrance to Pamlico River, North Carolina.
 323. *Long Shoal*, on the east point of Long Shoal, Pamlico Sound, North Carolina.
 328. *Roanoke River*, near the mouth of Roanoke River, North Carolina.
 329. *Cape Lookout*, near the extremity of Cape Lookout, North Carolina.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR.

There are no fog-signals operated by steam or hot-air engines in this district.

DAY OR UNLIGHTED BEACONS.

The number and positions of the day or unlighted beacons in the fifth district remain the same as in the last annual report. Under the appropriation made by act approved March 3, 1873, sites have been selected for three day-beacons in the Potomac River.

The plans have been prepared, and the material is now ready to be put in place. It is not expected, however, to commence work at the sites until spring. The structures are to be of iron, one of them being a cast-iron tube filled with concrete; the others are to be made of solid wrought-iron piles, braced and tied together, and surmounted by a cage.

BUOYS.

Much trouble is caused from the Maryland line northward by schooners and other vessels making fast to the buoys and dragging them from

their positions, particularly in and about the Craighill and Brewerton channels and the approaches to Baltimore, there being no law in the State of Maryland, as in most of the seaboard States, making such conduct an offense to be punished by the courts.

The buoyage of the district is very extensive, and with the inferior vessels at the disposal of the inspector it is difficult to maintain it in proper condition. An efficient vessel for buoy service is much needed.

TENDERS.

The two steam-tenders *Heliotrope* and *Tulip* employed in this district are old vessels purchased some years ago to supply a pressing need. They are of small size and little power, low in the water, and unseaworthy in rough weather. They are as expensive to maintain as suitable vessels would be, while constant delay is caused by their unfitness for the work they are expected to perform. The recommendation contained in the last annual report, that an appropriation of \$50,000 be made to build a tender for this district, is respectfully renewed.

DEPOTS.

Lazaretto Point, Patapsco River, Maryland.—At this depot a number of buoys, sinkers, &c., are kept for use as reliefs, and to supply losses in the channels leading to Baltimore and the upper part of the Chesapeake and tributaries. The recommendation in the following extract from the last annual report is renewed :

“The wharf at this depot is in need of considerable repairs, which should be made without unnecessary delay. It is too small for the purpose, and should be extended so that a supply of coal can be kept there. The depot is much in need of a blacksmith-shop, which should be separate from the store-house, and in which small forging could be executed. The estimated cost of repairs to the wharf, and building a blacksmith-shop, is \$4,000, for which an appropriation is asked.”

Portsmouth, Elizabeth River, Virginia.—At this depot are kept the principal supply of spare buoys and appurtenances, coal for the use of steam-tenders and for light-house stations; also supplies to meet cases of emergency. Most of the spare buoys used in the district are made here. This depot is in good condition.

Washington, Pamlico River, North Carolina.—The wharf requires filling in and grading between the wharf-logs and the lot, and several fender-piles in front to make it secure and prevent the tenders from over-riding it during freshets. Belaying-posts are also required to be placed on the wharf.

This work is being done from time to time without expense by the crew of the tender *Maggie*.

SIXTH DISTRICT.

The sixth district extends from New River Inlet, North Carolina, to and including Cape Canaveral light-house, Florida, and embraces part of the coast of North Carolina, the coasts of South Carolina and Georgia, and part of the coast of Florida.

Inspector.—Commander Charles S. Norton, United States Navy, to December 31, 1874; Captain A. E. K. Benham, United States Navy, present inspector.

Engineer.—Major Franklin Harwood, Corps of Engineers, brevet

lieutenant-colonel, United States Army, to February 11, 1875; Captain W. A. Jones, Corps of Engineers, United States Army, present engineer.

In this district there are—

Light-houses.....	34
Light-ships.....	5
Fog-signals operated by steam or hot-air engines.....	0
Day or unlighted beacons.....	48
Buoys actually in position.....	237
Spare buoys for relief and to supply losses.....	25
Tender (steam) Alanthus, buoy-tender.....	1
Tender (sail) Mignonette, used for constructions and repairs.....	1
Steam-launch Crocus.....	1

The numbers preceding the names of the stations correspond with those given in the list of light-houses, lighted beacons, and floating lights of the Atlantic, Gulf, and Pacific coasts of the United States, published January 1, 1875.

LIGHT-HOUSES.

332, 333. *Oak Island Range beacons, entrance to Cape Fear River, North Carolina.*—An appropriation of \$4,000 was made by the act approved June 23, 1874, for building two new frame beacons to take the place of the present ones, and to secure a better range. A survey of the locality shows that the range can be moved to the eastward and give better water through the western or Oak Island channel; also that the rear light can be located in a position that will, with another light placed on Battery Island, serve the purpose of a range through the channel now being dredged on the westerly side of Cape Fear River, between Horse-shoe Shoals and Marsh Island. The Bald Head channel has now 11½ feet of water at ordinarily low tide, with a prospect of that depth being maintained, and even increased by further dredging operations, while Oak Island Channel is reported as shoaling. Steamers now use the latter but little, but it is considered important to maintain the Oak Island range for the present, as sailing-vessels use the channel to find shelter between the bar and the rip off Fort Caswell. The board has ordered the work to be suspended until it is determined whether the changes in the channels now taking place are of a permanent nature.

335. *Cape Romain, on Raccoon Key, seacoast of South Carolina.*—At the date of the last annual report, the deflection of this tower from the perpendicular, owing to the unequal settlement, was 27¼ inches. Measurements have been carefully taken at short intervals since, to determine whether any further settlement has taken place. Within the past year no increase is perceptible, and the machinery of the lens has been running with perfect accuracy. Artesian-well borings on the four sides of the tower, at a distance of 50 feet from the foundation, have been made in order to test the character of the soil, which was found to consist of alternate strata of sand, mud, clay, and shells. At a depth of 52 feet a solid bed of sand was reached.

336. *Bull's Bay, north end of Bull's Island, South Carolina.*—This station has received extensive repairs. The roof of the building has been stripped off, defective rafters replaced, and then resingled. The cistern has been repaired, and the building and the station put in good order.

338. *Morris Island, (main light,) on south end of Morris Island, South Carolina.*—At the date of the last annual report, seventy-nine of the

foundation-piles had been driven. Owing to the unhealthiness of the climate at this station the work had to be suspended during the remainder of the summer. Operations were resumed in November, and the piling completed. The piles were then cut off, three feet below the level of the water, and capped with 12 by 12 inch timbers, forming the grillage. The space between the timbers, and for three feet below them, was filled in with concrete, which was extended two feet outside of the outer row of piles. The base of the tower below the surface of the ground is composed of concrete, 8 feet thick, reduced by offset courses to a surface base of 36 feet in diameter. This has been completed, and is now ready for the brick superstructure. The metal-work of the tower, with the exception of a small portion lost by the sinking of a lighter, has been received at the station and stored ready for use. The missing portions are being duplicated by the contractor. Arrangements have been made for delivering the brick for the tower, and the work will be resumed in the autumn. It is expected to complete the tower during the spring of 1876.

— *Fort Ripley, Charleston Harbor, South Carolina.*—Some two years ago a day-beacon of large dimensions was established on this shoal, which lies between the South and the Folly Island, Channels, Charleston Harbor. The light on Castle Pinckney serves the purpose of guiding through the Folly Island Channel only, which is by no means as good as the other, and but little used. The two are separated by a middle ground, on which during the war a small fort was built. This fort has disappeared excepting the foundation, which is visible only at low water. A light-house at this point would serve to mark both channels, and enable the board to discontinue the light on Castle Pinckney. The estimated cost of a structure on screw-piles is \$15,000, and an appropriation is asked for this purpose. The light at Castle Pinckney to be discontinued when the one on Fort Ripley is completed.

344. *Castle Pinckney, Charleston Harbor, South Carolina.*—An appropriation of \$2,000 was made by act approved March 3, 1875, for rebuilding this beacon, which was damaged in a hurricane the year previous. Should the appropriation recommended for Fort Ripley be made, this light can be discontinued and the appropriation revert to the Treasury.

346. *Hunting Island, on the north end of Hunting Island, South Carolina.*—The work at this station, which at the date of the last annual report was suspended on account of the unhealthiness of the climate, was resumed again during the month of November, and prosecuted until the completion of the tower, early in June. The light was exhibited for the first time on July 1, 1875. A fresh-water pond in the vicinity of the tower, which is supposed to have been the main cause of the unhealthiness of the station, has been drained for a distance of 2,000 feet. The ditches, however, will require plank revetment or drain-pipes along that portion cut through sand-hills. The ditch empties out on the beach through a flood-gate built into a timber-crib filled with stone, which forms the nucleus of a breakwater proposed to be built to protect the site. The seeds of the *Eucalyptus globulus* tree, said to neutralize the effects of malaria, have been planted on the margin of the pond, and in the vicinity of the site, as an experiment. An appropriation of \$10,000 was made at the last session of Congress for building the keeper's dwelling and protecting the site. This work will be taken in hand during the present season. No further appropriation is asked.

348, 349. *Dawyuskie Island range-beacons, on the northeast point of Dawyuskie Island, South Carolina.*—A boat-landing and boat-house

have been built at this station, from the general appropriation for repairs.

350. *Tybee, (main light,) on Tybee Island, entrance to Savannah River, Georgia.*—This tower, the dangerous condition of which has been described in a former report, has recently exhibited further signs of instability. The tower has lately been carefully examined, and the measurements taken show that no departure from verticality has taken place. The cracks, however, have increased in number and extent, one of them being open $\frac{1}{2}$ inch on the inside, and several others from $\frac{3}{16}$ to $\frac{1}{2}$ inch, while on the outside the jambs and arches of all the windows are cracked, that of the third landing being $\frac{3}{8}$ inch, and the others being from $\frac{1}{8}$ to $\frac{3}{16}$ inch, opened. The cracks have been caulked in places, to show any further movement. This tower, which is one of the oldest on the coast of the United States, having been built in 1793, should be rebuilt, with the least practicable delay, and an appropriation of \$50,000 is asked to commence the work.

352. *Tybee Knoll, Tybee Knoll Shoal, entrance to Savannah River, Georgia.*—As stated in the last annual report, work on this structure was suspended, owing to the fact that a channel was being dredged in this vicinity, under the direction of the War Department, which would render the light-house in its proposed position useless. Examinations have since been made with a view to the establishment of range-lights to guide through the dredged channel. The board, however, is not prepared to submit an estimate for this work, but request that the appropriation made for Tybee Knoll be made available for range-lights.

355. *Oyster Beds beacon, Savannah River, Georgia.*—During the severe gale of September, 1874, the boat-landing at this station was entirely destroyed, and the tower damaged by the *débris* of the wharf being dashed against it, tearing out portions of the masonry, and causing the tower to crack from top to bottom. The landing has been rebuilt, and the brick-work repaired; and it is proposed to place a talus of rip-rap around the base as an additional protection. The cost of these repairs was paid from the general appropriation for repairs of light-houses.

358. *Sapelo beacon, Sapelo Island, Georgia.*—This beacon, a skeleton frame structure, is old and infected with dry-rot. It is not practicable to repair it properly. Its condition is such that it is in danger of falling, and the recommendation made in the last annual report, that \$2,500 be appropriated to rebuild it, is repeated.

361. *Saint Simon's, on the south end of Saint Simon's Island, entrance to Saint Simon's Sound, Georgia.*—The ponds in the vicinity of this station, which have made it so unhealthy as to be almost uninhabitable, have been effectually drained. The seeds of the *Eucalyptus globulus* tree have been planted at the station, and an acre of land fenced in for a garden for the keepers, which is now under cultivation. These improvements were paid for from the appropriation for repairs.

366. *Amelia Island, front beacon, south range, on Amelia Island, Florida.*—This beacon is old and decayed, and is in danger of being destroyed by an ordinary gale of wind. It has recently been braced up to keep it from falling.

369. *Saint Augustine, north end of Anastasia Island, Florida.*—At the date of the last annual report this tower was nearly completed. The light was first exhibited October 15, 1874. During the ensuing month a flock of wild ducks flew against the lantern, breaking three panes of glass and slightly damaging the lens-apparatus. A wire screen has since been placed around the lantern. An appropriation of \$20,000 was made by the act approved June 23, 1874, for building

jetties to protect the site, and for the erection of a keeper's dwelling. A breakwater has been built, and the walls of the dwelling have been raised. The building has been roofed in, verandas built, and floor laid. The work is now progressing and will soon be completed.

370. *Cape Canaveral, on the northeast pitch of Cape Canaveral, Florida.*—The keeper's dwelling at this station is an old frame structure, fitted up for the use of the principal keeper when the tower was first built. It was supposed that the rooms in the tower could be used by the assistants. This has been found impracticable, owing to the excessive heat of the climate, the tower being a cast-iron shell, merely lined with brick. The assistants have, therefore, been living in sheds fitted up by themselves. It is recommended that a permanent dwelling for three keepers be built at this station, and an appropriation of \$15,000 is recommended. It may be added that the great cost of building a keeper's dwelling at this station is owing to its inaccessibility.

REPAIRS.

At each of the following-named stations repairs and renovations, more or less extensive, have been made during the year:

- 332, 333. *Oak Island range-lights*, on Oak Island, North Carolina.
- 335. *Cape Romain*, on Raccoon Key, sea-coast of South Carolina.
- 339, 340. *Morris Island range-lights*, on Morris Island, South Carolina.
- 343. *Fort Sumter*, on Fort Sumter, Charleston Harbor, South Carolina.
- 344. *Castle Pinckney*, on Castle Pinckney, Charleston Harbor, South Carolina.
- 350, 351. *Tybee beacon*, mouth of Savannah River, Georgia.
- 365. *Amelia Island main light*, on Amelia Island, Florida.
- 366. *Amelia Island beacon*, on Amelia Island, Florida.
- 367. *Saint John's River*, at mouth of Saint John's River, Florida.

LIGHT-SHIPS.

331. *Frying-Pan Shoal light-ship, No. 29, off Frying-Pan Shoal, mouth of Cape Fear River, North Carolina.*—This vessel, having been repaired, was placed on her present station June 21, 1875, relieving light-ship No. 34. She is now in good condition for three years' service.

337. *Rattlesnake Shoal light-ship, No. 38, off Charleston, South Carolina.*—This vessel is undergoing repairs at Charleston, and will resume her station as soon as they are completed. Light-ship No. 34, recently upon Frying-Pan Shoals, is now on this station temporarily.

347. *Martin's Industry light-ship, No. 32, off Port Royal, South Carolina.*—This vessel was placed on her present station March 18, 1875, relieving light-ship No. 29. Prior to being sent there she was repaired and put in good condition.

353. *Tybee Knoll light-ship, No. 21, on Tybee Knoll, Savannah River, Georgia.*—This vessel was placed on her station September 6, 1872. Her hull is quite rotten, but it is hoped, with slight repairs, it will last until range-lights are established to guide through the new channel which is being dredged through Tybee Knoll.

Light-ship No. 34.—This vessel is now, as stated, on Rattlesnake Shoal. She will require extensive repairs when she is relieved by No. 38.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are none in this district.

DAY OR UNLIGHTED BEACONS.

The following is a list of day or unlighted beacons in the sixth district:

Bald Head, mouth of Cape Fear River, North Carolina.—An old tower. The light was discontinued on the establishment of Frying-Pan Shoals light-ship.

Price's Creek, Cape Fear River, North Carolina.—Light discontinued during the rebellion.

Orton's Point, Cape Fear River, North Carolina.—Light discontinued during the rebellion.

Fort Point, Georgetown, South Carolina.—Light discontinued during the rebellion.

Cape Romaine, South Carolina.—Old tower, near present light-house.

Fort Ripley, Charleston Harbor, South Carolina.—Iron screw-pile, with cage, inclosed with a wood pyramid with cage placed on the old site of the fort.

Battery light, White Point Garden, Charleston, South Carolina.—Iron spindle. Light discontinued during the rebellion.

Oyster Rocks, Savannah River, Georgia, near Cockspur Island. Two iron pile-beacons.

Savannah River day-marks.—Two wooden beacons on Long Island, two on Jones' Island, two on Elba Island, and one on Main Island, opposite Elba Island. Total, 7.

An appropriation of \$2,500 was made by act approved March 3, 1873, for day-beacons in Savannah River, Georgia. This appropriation was used to rebuild the beacons, making them 40 feet high, with a pyramidal inclosure of 10 feet, at a height of 25 feet from the ground, and cage on top.

The *Oyster Rocks beacons* have also been thoroughly examined, and painted, and two additional beacons prepared to mark the dredged channel through the obstructions as soon as the engineer in charge of the harbor-improvements reports the channel clear.

Savannah City, Georgia.—Iron spindle. Light discontinued during the rebellion.

Saint John's River, Florida.—Old tower at the south entrance, to Saint John's River, Florida.

Twenty-five wooden piles planted along the Saint John's River, between its mouth and Jacksonville, in good condition. Thirty-two groups, and four single-pile-beacons are being driven between Jacksonville and Pilatka, but are not yet completed, and are not included in the number of day or unlighted beacons given in this report.

Cape Canaveral, Florida.—An old tower near the site of the present light-house.

Saint Augustine, Florida.—An old tower and dwelling in front of the present light-house.

Accabee Flats, Ashley River, South Carolina.—Three wooden piles.

BUOYS.

The buoyage in this district is in good condition, although, owing to the necessity for withdrawing the tender *Alanthus* from the district for a considerable time to undergo much-needed repairs, the buoys have not been examined and removed as often as usual.

TENDERS.

The steam-tender *Alanthus* is now receiving a new boiler and being

generally overhauled. Upon the completion of these repairs she will be in a condition to render efficient service for several years.

DEPOTS.

The buoys and supplies are now stored at Fort Johnson, Charleston Harbor, belonging to the War Department, but the wharf is in such a dilapidated condition that it is comparatively useless, and is a dangerous place for the tenders to lie. The wharf will have to be entirely rebuilt, and as its location is not a desirable one for a depot, it is recommended that a site be procured in the city of Charleston, and the depot established there. An appropriation of \$10,000 is respectfully recommended for that purpose.

SEVENTH DISTRICT.

The seventh light-house district extends from Cape Canaveral, on the eastern coast of Florida, to the Perdido River, on the Gulf coast, and embraces all the aids to navigation within those limits.

Inspector.—Commander H. B. Seely, United States Navy.

Engineer.—Maj. Jared A. Smith, Corps of Engineers, United States Army.

In this district there are—

Light-houses.....	17
Day or unlighted beacons.....	60
Light-ships.....	0
Fog-signals operated by steam or hot-air engines.....	0
Buoys actually in position.....	136
Spare buoys for relief and to supply losses.....	80
Tender (steam) <i>Geranium</i>	1

The numbers preceding the names of the stations correspond with those of the "List of light-houses and floating lights of the Atlantic, Gulf, and Pacific coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

371. *Jupiter Inlet, between Jupiter Inlet and Gilbert's Bar, Florida.*—The dwelling has been carefully repaired throughout. A new kitchen, 14 by 16 feet, has been built. A new walk has been constructed from the keeper's dwelling to tower; the windows in the tower have been repaired and new wooden shutters made for them. The watch-room has been newly wainscoted. All the new wood-work has been painted, and the stone and plastered work whitewashed.

372. *Cape Florida, Florida.*—Although this station is to be discontinued when the new structure at Fowey Rocks is completed, it was necessary to make some repairs to keep the dwelling habitable until abandoned. The old piazza has been rebuilt, and new wooden gutters fitted to the keeper's dwelling for supplying the cistern. All the new wood-work has been painted and the cistern thoroughly repaired.

Fowey Rocks, Florida Reef, east coast of Florida.—The examinations which have been made to test the character of the reef have been pursued under great difficulties, as the weather during the entire season has been almost continuously rough, and until a foot-hold is secured by building a platform a party cannot work there when any sea is running. The engineer labored under great disadvantage in this work in not having a steam-tender, the only one at his disposal, the *Arbutus*, being unfit for any extended use. It was with the greatest difficulty and de-

lay that a sailing-vessel could reach the spot in weather sufficiently calm to do any work. The rock composing the reef is harder than that further south and west, and it is believed will furnish a secure foundation for the kind of structure which has been decided upon. Cession of jurisdiction has been obtained from the State of Florida over a circular area containing nearly four acres, the center being at the point selected as the site of the new work. It has been ascertained that Soldier Key, a small island of coral-rock about four miles distant, belongs to the United States, and in order that suitable buildings may be erected for use in construction, its reservation for light-house purposes has been obtained. Material has been purchased for the erection of a platform on the reef, and for a wharf and buildings at Soldier Key, and both are now well under way. No work could be undertaken until cession of jurisdiction was obtained, and after application had been made for this cession the matter was so long delayed that the season was consumed before it was possible to commence operations. The designs for an iron light-house are now well advanced. It is impossible to accurately estimate the expense of this structure, owing to the liabilities to accident at so exposed a location. The site being one of the most difficult on the Atlantic coast, an additional appropriation of \$25,000 is asked, to be used if necessary.

373. *Carysfort Reef, sea-coast of Florida.*—It was intended to renew at least a portion of the lower series of iron braces, and to paint the entire structure, but the funds available for repairs being insufficient, this work was unavoidably delayed. This will be done during the ensuing year, an appropriation having been made for the repairs of iron light-houses on the Florida coast.

375. *Sombrero Key, near Coffin's Patches, and Sombrero Key, Florida Reef.*—The boat-hoisting apparatus has been repaired. The roof of the keeper's dwelling and outer surface of stair-tower have been scraped and painted, and some slight repairs have been made to the fixtures. The old iron water-tanks have been removed. The whole structure needs scraping and painting, and the lower braces need attention. As funds are now available, this will be attended to as early as possible.

— *American Shoal, Florida Keys, Florida.*—In the last annual report attention was called to the necessity for a light in the vicinity of Loo Key. American Shoal indicates more nearly the desired position, and the remarks made last year are respectfully repeated: "The navigation of this portion of the Gulf is always dangerous, particularly to vessels bound to the southward and westward, because of the strong and variable currents near the reef, causing many wrecks and much loss of property. A light on or in the vicinity of American Shoal, illuminating the now unlighted space between Sombrero and Sand Key lights, would be most useful to mariners, and is strongly recommended. An appropriation of \$100,000 is respectfully asked for commencing the work."

376. *Sand Key, Florida.*—The appropriation of \$20,000 for the construction of a new dwelling and tower nearly all remains available, the work having been unavoidably delayed. The designs for the new work require great care in order that the new parts may fit the old. They are now nearly complete. It is believed that the available funds may be sufficient, and that the work will be completed within the ensuing year.

379. *Dry Tortugas, Loggerhead Key, sea-coast of Florida.*—At the date of the last annual report the tower was in such bad condition as to render it probable that a new tower would be required, and an appropriation of \$75,000 was made, March 3, 1875, for this purpose. In order to continue the light, repairs to the old tower were essential, as the

upper portion was considered unsafe in high winds. The old part, for a distance of 8 or 9 feet below the lantern, including watch-room walls, has been entirely rebuilt, and the anchors of the lantern extended downward through the entire distance, without in any way interfering with the regular exhibition of the light. When it is remembered that the tower is about 150 feet high, the difficulty in making these repairs will be better appreciated. They were accomplished by cutting out the old masonry in narrow vertical sections, replacing each section entire before removing the next. The black portion of the tower has been painted, and the remainder whitewashed. The lens has been re-adjusted and secured in position. The walk in front of the keeper's dwelling has been cemented and the water-conductors to the cisterns repaired. The cisterns have been cleaned and repaired, and wooden shutters for the tower-windows have been made, painted, and hung. It is proposed, during the coming season, to make a careful examination with a view to determining on plans for the foundation of a new tower.

380. *Dry Tortugas Harbor, Garden Key, sea-coast of Florida.*—Although the tower and lantern at this station are in bad condition, work has been deferred until funds become available for transferring the light to a new tower on an adjacent bastion of Fort Jefferson. An appropriation of \$5,000 is now available for this purpose, and designs for the work are being made.

381. *Egmont, on Egmont Key, entrance to Tampa Bay, Florida.*—The piazzas of the keeper's dwelling and all the windows have been thoroughly repaired. All the wood-work has been painted and the ceiling of the piazza has been whitewashed. The cistern has been repaired and strengthened. New steps have been made for the entrance to the tower. The windows of the tower have been repaired, wooden shutters made, and the tower painted.

383. *Saint Mark's, entrance to Saint Mark's River, Florida.*—This station has been thoroughly repaired and put in good condition.

384. *Dog Island, Saint George's Sound, Florida.*—This station was destroyed in the hurricane of September, 1873. An appropriation of \$20,000 was made by the act of June 23, 1874, for its reconstruction, and nearly the entire amount remains available. This light can only serve a local commerce, of which, for several years, there has been little or none; and it is therefore recommended that the new work be indefinitely postponed.

386. *Cape San Blas, near south point of Cape San Blas, Florida.*—The base of the tower is very nearly at the same level as the sea, which is but little more than 150 feet distant, the shore being of shifting sand. In a violent hurricane it is feared the tower may be undermined; and it is not considered prudent to leave it unprotected. An appropriation of \$5,000 is therefore asked for protecting the site.

387. *Pensacola, entrance to Pensacola Bay, Florida.*—During the year the tower has been twice struck by lightning, which each time melted the fixtures of the call-bell and broke several large holes in the brick masonry of the covered way between the keeper's dwelling and the tower, shivering windows and doing other damage. The second stroke occurred after the first damages were repaired, and with almost duplicate results. An examination showed the lightning-rod to be defective. The repairs were again made, a new lightning-rod was made and put up, and as an extra guard a heavy ground-wire was attached to the bell-fixtures. The station is now in good order.

388. *Bar beacon, Pensacola Harbor, Florida.*—The old beacon was in such bad order, and afforded so few facilities for managing the light, that

it could not be properly exhibited. A new beacon has therefore been built, consisting of an elevated building containing ample room for the oil, lamps, and service. It is thoroughly built, of yellow pine, and painted throughout. It is somewhat higher than the old beacon, but occupies the same site.

DAY OR UNLIGHTED BEACONS.

All the iron beacons on the Florida Reefs have been thoroughly scraped and twice painted, and each has received its distinctive color.

The following is a list of them :

Beacon P, on the Fowey Rocks.

Beacon O, on Triumph Reef.

Beacon N, on Long Reef.

Beacon M, on Ajax Reef.

Beacon L, on Pacific Reef.

Beacon K, on Turtle Reef.

Beacon +, on reef in Turtle Harbor.

Beacon I, on the Elbow Reef.

Beacon H, on the Grecian Shoals.

Beacon G, on French Reef.

Beacon F, on Pickle's Reef.

Beacon E, on Conch Reef.

Beacon D, on Crocker's Reef.

Beacon No. 7, on Tennessee Reef.

Beacon C, on Coffin's Patches.

Beacon No. 6, on Looe Key, (Reef.)

Beacon B, on American Shoal.

Beacon A, on Middle Sambo Reef.

Beacon No. 5, on shoal near East Channel.

Beacon No. 4, on Eastern Dry Rocks.

Beacon No. 3, on Middle Ground.

Beacon No. 2, on Western Dry Rocks.

The beacon on Rebecca Shoal has not yet been replaced. An appropriation of \$10,000 is now available for rebuilding it and repairing the others; and it is proposed to erect at an early day a substantial structure to mark this dangerous shoal.

Sea-Horse Key beacon, Florida.—This beacon greatly needs extensive repairs, which could not be undertaken during the past year owing to lack of funds. With the exception of the foundation-piles, it should be entirely rebuilt. It is proposed to do this work, if possible, during the ensuing year, from the funds now available. The remaining beacons of the district are chiefly made of wooden piles and stakes, forming ranges and marking turning-points in intricate channels.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are no fog-signals operated by steam or hot-air engines in this district.

BUOYAGE.

The buoyage of this district is in good condition.

TENDERS.

The *Arbutus*, a small steamer used in construction and repairs, being totally unfit for service in this district, and needing extensive repairs, which, when made, would still leave her an inefficient vessel, was sold at public auction, and the proceeds thereof were deposited in the Treasury. Plans and specifications have been prepared for a new steamer, to be built under the appropriation made by act approved March 3, 1875, and it is expected that work will be commenced on her in a short time. The *Geranium*, a small steamer, used by the inspector for supplying light-stations and attending to the buoyage of the district, needs extensive repairs, which will be made during the present season.

DEPOTS.

There are three buoy and coal depots in this district, one at Key West, one at Egmont Key, and one at Pensacola. The last named is on property belonging to the War Department. Each depot is small and of little consequence.

A suitable depot for the storage of buoys, supplies, and material of all kinds is greatly needed at Key West, and an appropriation of \$15,000 for the purchase of land and the erection of the necessary buildings is respectfully asked.

EIGHTH DISTRICT.

The eighth light-house district extends from the Perdido River, Florida, to the Rio Grande, Texas, and embraces the coasts of Alabama, Mississippi, Louisiana, and Texas.

Inspector.—Commander Robert Boyd, jr., United States Navy, until December 31, 1874.

Commander C. M. Schoonmaker, United States Navy, present inspector.

Engineer.—Captain A. N. Damrell, Corps of Engineers, brevet-major, United States Army.

In this district there are :

Light-houses.....	45
Day or unlighted beacons.....	8
Light-ships.....	1
Fog-signals operated by steam or hot-air engines.....	3
Buoys actually in position.....	76
Spare buoys for relief and to supply losses.....	101
Tenders, (steam,) <i>Dandelion</i> , buoy-tender; <i>Ivy</i> , used in construction and repairs..	2
Tenders, (sail,) <i>Magnolia</i> and <i>Pharos</i> , used in construction and repairs.....	2

The numbers preceding the names of stations correspond with those of the "List of Light-houses and Floating-Lights on the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

393. *Horn Island, Mississippi Sound, Mississippi*.—A fog-bell struck by machinery, which was authorized by act of June 23, 1874, has been placed at this station.

396. *Ship Island, Mississippi Sound, Mississippi*.—The tower and keeper's dwelling at this station are in need of considerable repairs; the flooring-timbers have decayed and the lower floor of the dwelling has given way; the tower window-sash, and frames are old, leak badly,

and should be replaced by new ones. The estimated cost of this work, which it is proposed to have done during the present season, is \$1,500.

402. *West Rigolets, entrance to Lake Pontchartrain, Louisiana.*—The boat-landing at this station, built some years ago, has fallen into decay and cannot be used. It should be replaced by a new one, and a walk should be built from the landing to the light-house. A small break-water should also be constructed for the protection of the light-house, and a solid foundation made for the support of the two cisterns now at the station. An appropriation of \$2,000 is respectfully recommended for this purpose.

403. *Point aux Herbes, Lake Pontchartrain, Louisiana.*—Considerable delay was experienced in procuring title to the necessary land for the site of this light-house. This having been accomplished, the work was commenced during the month of February, 1875, and prosecuted until May 15, when it was found necessary to withdraw the working-party because of the non-arrival of the iron-work. After an absence of eleven days, occupied in making repairs at the light-stations in the immediate vicinity, the party returned to the station, and work was resumed. The structure is now nearly completed, and the light will be ready for exhibition on the evening of August 1, 1875.

407. *Tchefuncti River, Lake Pontchartrain, Louisiana.*—An appropriation of \$3,500 having been made available by act of March 3, 1875, for the construction of a breakwater for the protection of this light-house, plans have been prepared, and the work will be undertaken and completed at an early day.

410. *Pass à l'Outre, Mississippi River, Louisiana.*—A new wharf and walk for landing coal for the supply of the steam fog-signal, and supplies for the light-house have been built, and the repairs to the buildings very nearly completed, an appropriation for that purpose having been made by act approved March 3, 1875.

411. *South Pass, Mississippi River, Louisiana.*—A working-party was sent to this station in May, when a new kitchen was erected, the dwelling painted, and some slight repairs made. The old landing at this station, being entirely decayed and liable to fall into the river at any moment, should be rebuilt. It is recommended that a new wharf and a walk 200 feet long to the light-house, be constructed, and the shingling of the roof of the dwelling and the sides of the tower be renewed throughout. An appropriation of \$4,000 is respectfully recommended for the purpose of building a new wharf and walk, and making the necessary repairs, to put the station in a proper state of efficiency.

412. *Head of the Passes, Mississippi River, Louisiana.*—A fog-bell struck by machinery has been placed in a suitable tower at this station, the work having been authorized by act of June 23, 1874. The dwelling-house, tower, and kitchen have been painted throughout and some slight repairs made. An appropriation of \$3,500 having been made available by act of March 3, 1875, for building a breakwater for the protection of this light-house, plans have been prepared and the work will be taken in hand at an early day.

414. *Barrataria Bay, Louisiana.*—A petition has been received from the owners and masters of the various vessels frequenting the waters of this bay, asking that the light at this station, which at present only illuminates 270 degrees, be so changed as to light the entire horizon. This change will be made to take effect on July 31, 1875.

415. *Timbalier, entrance to Timbalier Bay, Louisiana.*—An appropriation of \$15,000 having been made by act of June 23, 1874, for completing this light, a working-party was dispatched to the station in July,

1874, and operations were resumed, the light-house was completely finished in January, 1875, and lighted for the first time on the evening of the 26th of that month. The structure is a screw-pile iron tower, having the keeper's dwelling in the lower part, and an inclosed stairway from the dwelling to the lantern. The focal plane is 111 feet above the sea-level. The lens apparatus is of the second order, showing a fixed white light varied by red flashes.

416. *Ship Shoal, Gulf of Mexico, off coast of Louisiana.*—Arrangements having been made for the delivery of a quantity of granite blocks for the protection of this light, three cargoes were delivered at Fort Pickens, Fla., and will soon be removed to the site and placed in position.

417. *Southwest Reef, entrance to Atchafalaya Bay, Louisiana.*—The improvements mentioned in the last annual report, consisting of the establishment of a first-class steam fog-signal, and the raising of the tower from its foundation, have been completed. The light-house was detached from its foundation, the tower was raised ten feet, and four cast-iron columns inserted and bolted to the top of the four foundation-piles; the tower was then lowered into its place and bolted to the columns; the whole rigidly secured by a system of diagonal bracing. The fog-signal building rests on a foundation of four cast-iron hollow screw-piles, and is connected with the light-house by means of a covered passage-way. The signal was put in operation on March 31, 1875.

418. *Trinity Shoal, Gulf of Mexico, off the coast of Louisiana.*—Since the destruction of the working-platform mentioned in the last annual report, no further work has been undertaken. The iron-work of the structure has been stored in a rough shed at Southwest Pass light-house. The board has under consideration the matter of resuming work at this point.

419. *Calcasieu, entrance to river and lake Calcasieu, Louisiana.*—Several attempts have been made to purchase the land required at this point for light-house purposes, but have failed, as the owners asked an exorbitant price. Information has been received that the channel across the bar has changed in such a manner as to render the establishment of a light on the east side of the river, as heretofore contemplated, of but little use. It is proposed to have an examination made of the locality for the purpose of determining the correctness of this report.

431. *Brazos Island, entrance to Brazos Santiago, Texas.*—In September, 1874, this station was visited by a hurricane of unusual violence, during which the old wooden tower was completely swept away and everything at the station destroyed. This accident, unfortunately, was attended with the loss of the keeper's wife, who was undoubtedly killed when the tower fell. A frame structure has been erected near the site of the former light, and a small beacon-light temporarily exhibited. An appropriation of \$25,000 is now available for the construction of a new light-house for this station. As soon as the proper site has been selected plans will be prepared and the work commenced.

REPAIRS.

At each of the following stations in the eighth district repairs more or less extensive have been made during the past year:

390. *Mobile Point, Mobile Bay, Alabama.*

389. *Sand Island, entrance to Mobile Bay, Alabama.*

392. *Mobile Harbor, Mobile Bay, Alabama.*

400. *Merrill's Shell-bank, Mississippi Sound, Mississippi.*

402. *West Rigolets, entrance to Lake Pontchartrain, Louisiana.*

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404. *Port Pontchartrain*, Lake Ponchartrain, Louisiana.

412. *Head of the Passes*, Mississippi River, Louisiana.

411. *South Pass*, Mississippi River, Louisiana.

LIGHT-SHIPS.

421. *Galveston light-ship*, inside of *Galveston Bar*, Texas.—She is a small vessel, and is now needing repairs, which will be made at an early day.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Pass à l'Outre, mouth of *Mississippi River*, Louisiana.—A 12-inch steam-whistle, in good condition.

Southwest Pass, mouth of *Mississippi River*, Louisiana.—A 12-inch steam-whistle, in good condition. Repairs have been made to the machinery and buildings connected therewith at each of the above stations.

Atchafalaya, entrance to *Atchafalaya Bay*, Louisiana.—A 12-inch steam-whistle; building erected and engine put in operation during the past year.

DAY OR UNLIGHTED BEACONS.

Range Beacon, *Pass à l'Outre*, *Mississippi River*.—Iron-pile beacon.

Stake Island, *Southwest Pass*, *Mississippi River*.—Iron-pile beacon.

Atchafalaya Bay, Louisiana.—Five iron-pile beacons, marking the channel into the bay.

North Breaker Beacon, entrance to *Galveston Bay*, Texas.—Iron-pile beacon.

BUOYS.

The buoyage of the district has been carefully cared for and is in good condition.

TENDERS.

The steam-tender *Dandelion*, employed under the inspector of the district in supplying and inspecting the stations and in caring for the buoyage, requires some repairs to hull and wood-work connected with her engines, and caulking; she will then be in good condition.

The *Ivy*, employed under the direction of the engineer of the district in transporting men and material for purposes of construction and repairs, is small, worn out, and unfitted for further service. She will be sold, and the proceeds turned into the Treasury.

DEPOTS.

Coal depot, *Mobile Point*, entrance to *Mobile Bay*.—The coal-platform at this point is in fair condition.

Southwest Pass, Louisiana.—An appropriation of \$15,000 is now available for a light-house and buoy-depot at Southwest Pass, Louisiana, but it having been reported to the board that the water in the channel upon which it is proposed to locate this depot is steadily decreasing in depth, the channel gradually filling up, work will not be commenced until investigations have been made to determine the correctness of the report.

TENTH DISTRICT.

The tenth district extends from the mouth of Saint Regis River, New York, to include Grassy Island light-house, Detroit River, Michigan, and embraces all the aids to navigation on the American shores of Lakes Erie and Ontario, and Saint Lawrence River.

Inspector.—Commander Edward E. Potter, U. S. N.

Engineer.—Lieut. Col. C. E. Blunt, Corps of Engineers, brevet colonel—U. S. A.

In this district there are—

Light-houses	59
Day or unlighted beacons	1
Light-ships	0
Fog-signals operated by steam or hot-air engines	0
Buoys actually in position	100
Spare buoys for relief to supply losses	17
Tender Haze, steam-buoy tender and supply vessel	1

The numbers preceding the names of stations correspond with the Light-house List of the Northern and Northwestern Lakes, issued January 1, 1875.

LIGHT-HOUSES.

500. *Crossover Island, Saint Lawrence River, New York*.—Both the tower and dwelling are in a dilapidated condition. The tower is constantly settling, so that it is now difficult to keep the apparatus level and in working condition. The request for an appropriation of \$14,000 to rebuild this station, which was made in last year's and preceding reports, is renewed.

501. *Sister Island, Saint Lawrence River, New York*.—The appropriation of \$700, made March 3, 1875, has been expended in constructing a retaining-wall of masonry, 67 feet in length, with earth filled in behind it to the general level, and protecting the northwest side of the dwelling and tower. The rough causeways of piles and boards on trestles, which have heretofore been the precarious mode of connection between the three islets, have been removed, and substantial dry-stone causeways, 230 feet long, substituted.

503. *Rock Island, Saint Lawrence River, New York*.—The recommendation contained in the last two annual reports is renewed.

"The tower and dwelling are in a similar condition to that of Crossover Island. A new tower is imperatively necessary. The dwelling might be repaired, but it is not considered economical in the end to do so, as it would only be postponing the building of a new one a few years, and it would probably cost less to build tower and dwelling together now." An appropriation of \$14,000 is again recommended.

509. *Oswego Pier-head, Lake Ontario, New York*.—The lantern-frame of this beacon is of wood, with sash-bars nearly 10 inches wide, which almost obscure the light as vessels pass their line. These wooden bars or posts should be removed, and iron ones substituted. This change would involve new and larger glass and some modification of the lantern, but not entire rebuilding. It is proposed to have this work done the coming season.

Thirty-Mile Point, Lake Ontario, New York.—An additional appropriation of \$5,000 for this new station was made March 3, 1875, and the construction is now going on under contract, the iron-work having been delivered by the contractors therefor. Ground was broken on April 28, 1875. Bad weather in May and June caused much delay in the progress of the work. The fence inclosing the lot, and the roadway and

bridge across Golden Hill Creek, were built in the fall of 1874. It is thought that the light can be exhibited at or soon after the opening of navigation in 1876.

523. *Dunkirk, Lake Erie, New York.*—A temporary beacon was erected and lighted on the opening of navigation in 1875, as a substitute for the permanent light during the reconstruction of the station by means of the appropriation of \$15,000 made March 3, 1875. The old tower was then taken down, and ground was broken for the new tower and dwelling on June 16, 1875. The concrete foundation has been laid and masonry has been commenced. It is expected that the permanent light can be again exhibited on the opening of navigation in 1876.

524. *Dunkirk Beacon, Lake Erie, New York.*—This beacon is old and the wood-work much decayed. It is recommended that it be rebuilt, and for this purpose an appropriation of \$5,000 is asked.

532. *Conneaut, Lake Erie, Ohio.*—An appropriation of \$4,000 was made June 23, 1874, for a new beacon on the west pier, which has been built and was lighted on the opening of navigation in 1875. An elevated walk was also built. The old beacon on the east pier has been taken down.

533. *Ashtabula, Lake Erie, Ohio.*—The new beacon proposed for the end of the west pier of entrance has not yet been commenced, as the pier extension is not completed. It is hoped, however, that the beacon can be built and lighted by the opening of navigation in 1876. The present beacon on the east pier will then be taken down.

534. *Grand River, Fairport, Lake Erie, Ohio.*—There is no necessity for this light, a good beacon on the east pier-head being ample for all wants of navigation, whether for lake, coast, or harbor purposes. It is proposed to discontinue it.

535. *Grand River, Fairport Beacon, Lake Erie, Ohio.*—An appropriation of \$4,000 was made June 23, 1874, for a new beacon on the head of the east pier of entrance to the harbor. It has been built, and was lighted at the opening of navigation in 1875.

537. *Cleveland Beacon No. 1, Lake Erie, Ohio.*—An appropriation of \$5,000 was made June 23, 1874, for a new beacon on the west pier of entrance of Cleveland Harbor. It was built during last winter, and lighted shortly after the opening of navigation in 1875. In front of and connected with the beacon a frame structure has been erected containing a fog-bell, which has also been in operation since the opening of navigation.

538. *Cleveland Beacon No. 2, Lake Erie, Ohio.*—The new beacon, with double lights, which is to be placed on the head of the east pier, in lieu of the present mast-head double lights, has not yet been erected, in consequence of the non-completion of the repairs of the pier. It has lately been commenced, however, and it is expected that it will be lighted on September 1, 1875, when the mast-head lights will be discontinued.

539. *Black River, Lake Erie, Ohio.*—It is proposed to discontinue the shore-light at this station and establish a pier-head light on the west pier. The work has been commenced, and the new light will, it is expected, be exhibited before the close of navigation in 1875.

— *Sandusky beacons, Sandusky Bay, Lake Erie, Ohio.*—The unexpended balance of the appropriation of June 23, 1874, for day-beacons in Sandusky Bay, was, by act of March 3, 1875, continued and made available for range-lights at the same place, with the addition of a further sum of \$8,000. The total amount now available is not sufficient for the necessary constructions, and therefore a further appropriation of \$7,000 is asked. With the sum now available the cribs upon which the beacons

are to be erected will be constructed as soon as the title to the sites in Sandusky Bay can be obtained from the governor of Ohio.

548. *Maumee outer-range beacon, (front,) Maumee Bay, Ohio.*—An appropriation of \$2,000 was made March 3, 1875, for the protection of the shore in front of this beacon, which had been steadily wearing away under the action of the water. A substantial construction of timber and rubble has just been completed.

— *Maumee day-beacons, Maumee Bay, Ohio.*—An appropriation of \$14,000 was made June 23, 1874, for two day-beacons. The board has taken no steps to establish these beacons, as it is believed that for such an important lake port as Toledo range-lights will be required, which will be of service by night as well as by day. An examination of the locality has been made with a view to making estimates for range-lights. It was found that two sets of range-lights will be required, the cost of which, including the necessary land and keepers' dwellings, is estimated at \$75,000. As an experiment, several clusters of piles have been driven on the lines of the channel now being dredged in Maumee Bay, and lanterns such as are used on the western rivers have been placed thereupon, the lights being maintained for the present by the dredging contractors. These temporary lights seem to give satisfaction, but the piles on which they stand will doubtless be carried away by the ice in winter. It is recommended that the appropriation of \$14,000 for day-beacons be made available for the maintenance of similar lights, in order that their utility may be further tested.

REPAIRS.

Repairs and improvements, more or less extensive, have been made at each of the following-named stations in the tenth district during the year:

499. *Ogdensburgh, Saint Lawrence River, New York.*
450. *Cross-over Island, Saint Lawrence River, New York.*
501. *Sister Islands, Saint Lawrence River, New York.*
502. *Sunken Rock, Saint Lawrence River, New York.*
503. *Rock Island, Saint Lawrence River, New York.*
506. *Horse Island, Lake Ontario, New York.*
507. *Stony Point, Lake Ontario, New York.*
508. *Oswego, Lake Ontario, New York.*
510. *Fair Haven, Lake Ontario, New York.*
511. *Big Sodus, (outer beacon,) Lake Ontario, New York.*
512. *Big Sodus, (inner beacon,) Lake Ontario, New York.*
513. *Big Sodus, Lake Ontario, New York.*
514. *Genesee, Lake Ontario, New York.*
515. *Genesee Beacon, Lake Ontario, New York.*
516. *Oak Orchard, Lake Ontario, New York.*
517. *Oleott, Lake Ontario, New York.*
518. *Fort Niagara, Lake Ontario, New York.*
519. *Horseshoe Reef, Buffalo, New York.*
520. *Buffalo Breakwater, Lake Erie, New York.*
522. *Buffalo, Lake Erie, New York.*
523. *Dunkirk, Lake Erie, New York.*
524. *Dunkirk Beacon, Lake Erie, New York.*
525. *Erie Harbor, Lake Erie, Pennsylvania.*
526. *Presque Isle beacon-ranges, Lake Erie, Pennsylvania.*
531. *Presque Isle, Lake Erie, Pennsylvania.*
532. *Conneaut, Lake Erie, Ohio.*

- 536. *Cleveland*, Lake Erie, Ohio.
- 540. *Vermillion*, Lake Erie, Ohio.
- 541. *Huron*, Lake Erie, Ohio.
- 542. *Cedar Point*, Lake Erie, Ohio.
- 543. *Cedar Point beacon*, Lake Erie, Ohio.
- 544. *Marblehead*, Lake Erie, Ohio.
- 546. *West Sister*, Lake Erie, Ohio.
- 547. *Turtle Island*, Lake Erie, Ohio.
- 548. *Maumee Outer Range*, Lake Erie, Ohio.
- 550. *Maumee Middle Range*, Lake Erie, Ohio.
- 552. *Maumee Inner Range*, Lake Erie, Ohio.
- 554. *Monroe*, Lake Erie, Michigan.
- 555. *Gibraltar*, Detroit River, Michigan.
- 557. *Mamajuda*, Detroit River, Michigan.
- 558. *Grassy Island*, Detroit River, Michigan.

LIGHT-SHIPS.

There are no light-ships in this district. An appropriation of \$20,000 was made March 3, 1875, for maintaining a light-ship off the mouth of Detroit River, Michigan.

The government of the Dominion of Canada having recently established a light-ship near this point, it is thought that the one for which an appropriation was made will not be required and that the money may be allowed to revert to the Treasury.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are no fog-signals operated by steam or hot-air engines in this district.

DAY OR UNLIGHTED BEACONS.

Dunkirk Harbor, New York, in good condition.

BUOYAGE.

The buoyage of this district is in satisfactory condition and remains substantially as at the date of the last report, the only changes having been such as were incident to defining more accurately the dredged channels in Sandusky and Maumee Bays.

TENDER.

The steam-tender *Haze* has been employed in the necessary work of the district. She is old and in poor condition. An appropriation of \$30,000 was made by act approved March 3, 1875, for repairing this vessel. It is proposed to thoroughly repair her at the close of the working season.

ELEVENTH DISTRICT.

The eleventh district embraces all aids to navigation on the northern and northwestern lakes above Grassy Island light-station, Detroit River, and includes Lakes St. Clair, Huron, Michigan, and Superior, and the straits connecting them.

Inspector.—Commander William P. McCann, United States Navy.

Engineer.—Maj. Godfrey Weitzel, Corps of Engineers, brevet major-general, United States Army, for the entire district, excepting Lake Michigan; Maj. Henry M. Robert, Corps of Engineers, for Lake Michigan until May 4, 1875.

There are in this district—

Light-houses	110
Day or unlighted beacons.....	1
Light-ships	0
Fog-signals operated by steam or hot-air engines	9
Buoys actually in position.....	145
Spare buoys for relief and to supply losses.....	60
Tender (steam) Dahlia, buoy-tender and supply-vessel.....	1
Tender (steamer) Warrington, used in construction and repairs.....	1

The numbers preceding the names of stations correspond with the "Light-house List of the Northern and Northwestern Lakes," issued January 1, 1875.

LIGHT-HOUSES.

559. *Windmill Point, entrance to Lake St. Clair, Michigan*.—Congress, at its last session, appropriated \$18,000, for rebuilding the light-house at this point. The work was begun in the latter part of May, is now well advanced, and will be completed during the season.

561. *St. Clair Flats Beacon, Lake St. Clair, Michigan*.—This beacon and the crib which surrounds it, were rebuilt, an appropriation for the purpose having been made by act approved June 23, 1874. It is now in excellent condition. The heavy masses of ice of the past winter did not disturb the crib in the least.

564. *Fort Gratiot, Lake Huron, Michigan*.—An appropriation having been made by act approved June 23, 1874, for building a keeper's dwelling at this station, the work was taken in hand, completed, and the house occupied last fall. This is the oldest and one of the most important stations in the district. It is a guide to the whole commerce of the lakes into St. Clair River. Over 33,000 vessels annually pass this station. The tower is old, and a new one will have to be constructed before long.

— *Light-house between Fort Gratiot and Point Aux Barques, Lake Huron*.—The recommendation made in several annual reports to build a coast-light to divide the long distance of 75 miles between Point Aux Barques and Fort Gratiot is renewed. This light-house would be one of the coast-lights of the general system, and is not intended to serve any local interest. As nearly all of the commerce of the lakes passes along this coast, no argument seems necessary to show the importance and necessity of this light. It is therefore recommended that an appropriation of \$40,000 be made for the purpose.

Port Austin, Saginaw Bay, Michigan.—As stated in the last annual report, difficulties were encountered in getting a clear title to the site which had at first been selected for this station. An equally good site, about 200 feet to the eastward of the first one, has been found, and there is every prospect that a clear title for this can be had. As soon as this is done, the construction of this station will be begun. It is doubtful, however, if the work can be finished during the present season.

566. *Saginaw Bay, at the head of Saginaw Bay, and at the mouth of Saginaw River, Michigan*.—An appropriation of \$23,000 was made by the act approved March 3, 1875, for the erection of range-lights to guide through the cut in the outer bar at the mouth of Saginaw River, and for the construction of a new dwelling for the keeper, and the act pro-

vided that the jurisdiction of the Light-House Board be extended so that it be lawful for the board to lease the necessary ground for the erection and maintenance of said light. Plans for the keeper's dwelling have been prepared, but no satisfactory arrangements have yet been made either for the purchase or leasing of the necessary sites for the range-lights, owing to the impossibility of concluding any reasonable bargain with the owners of land.

568. *Tawas, (Ottawa,) Saginaw Bay, Lake Huron, Michigan.*—An appropriation was made at the last session of Congress for the construction of a light-house on Ottawa Point, or for range-lights to guide into Tawas Bay, on the northwest shore of Saginaw Bay, in the State of Michigan. The board has decided to erect a light-house on the shoal to the southward of Tawas Point, in 4 feet of water. Some delay, however, will be experienced in procuring title to the site. As soon as that is done, and plans are prepared, the work will be taken in hand. As the locality is one of great exposure, an additional appropriation may be required to complete the work.

— *Thunder Bay River, Lake Huron, Michigan.*—An appropriation of \$20,000 was made by act approved June 23, 1874, for a light at the mouth of Thunder Bay River. It was found, however, upon examination that a permanent structure at this place would be inexpedient, the piers being extended from time to time as the mouth of the river advances into the lake. The board therefore decided to display a temporary light for the present. Arrangements have been made to establish a small light on a cluster of piles.

579. *McGulpin's Point, Straits of Mackinac, Michigan.*—A steam fog-signal of the most approved pattern is required for this station, the number of vessels passing through the straits and close to this light-house being very great. An appropriation of \$5,000 for the establishment of a fog-signal is asked.

582. *Skulligallee, (Isle aux Galets,) Lake Michigan.*—An appropriation of \$5,000 was made during the last session of Congress for protecting the shore of this station, which had been washing away. The work will soon be taken in hand, and it is expected that it will be completed before fall. Under the appropriation made by act approved June 23, 1874, for erecting fog-signals on the northern and northwestern lakes, the board has decided to place at this station a steam-siren, a fog-signal of the most approved kind. This work, it is also expected, will be finished during the coming fall.

593. *Père Marquette, Lake Michigan, Michigan.*—The last four annual reports have urged an appropriation of \$5,000 for a keeper's dwelling at this point. It is much needed, and the recommendation is renewed. The dredging of the channel, to a width of 200 feet, will take the old house the keeper has been living in, which is not worth moving. No residence can be had within a half-mile, and that on the opposite side of the river from the light.

596. *White River, Lake Michigan, Michigan.*—An appropriation of \$15,000 was made by act approved June 23, 1874, for building a new tower and keeper's dwelling at the mouth of White River, Michigan. Plans for the building have been approved, and steps taken to procure title to the necessary site for the structure. The title-papers are now in the hands of the Attorney-General of the United States for approval. It is believed that the buildings can be erected and the light exhibited during the present season.

601. *Grand Haven pier-head light, Lake Michigan, Michigan.*—A fog-signal house has been built directly under the light, and the boiler set

in position. A steam-siren is to be established at this station under the appropriation made by act approved June 23, 1874, for the erection of fog-signals on the northern and northwestern lakes. It is expected that the work will be completed, and the signal in operation, during the present season.

602. *Holland (Black Lake) pier-head light, Lake Michigan, Michigan.*—A new section of elevated walk, 550 feet in length, has been built at this station, and connected with the shore by 450 feet of plank walk laid on top of the cribs.

608. *Michigan City pier-head light, Lake Michigan, Indiana.*—The beacon and elevated walk have been removed from the east to the west pier, and about 800 feet of new elevated walk built.

609. *Calumet, Lake Michigan, Illinois.*—A shore-light in connection with the pier-head light at this place is not deemed necessary. It is therefore proposed to extinguish the former as soon as the beacon is built on the end of the pier, which will doubtless be done the present season.

612. *Grosse Pointe, Lake Michigan, Illinois.*—The shore in front of this light is washing away gradually, and should be protected. An appropriation of \$5,000 is needed for this purpose.

615. *Kenosha pier-head light, Lake Michigan, Wisconsin.*—This light has been moved out 320 feet to the end of the pier, and 310 feet of elevated walk has been built.

— *Racine Point, Lake Michigan, Wisconsin.*—The recommendation contained in the last five annual reports that an appropriation be made to erect a lake-coast light at this point, is renewed, and an appropriation of \$40,000 is asked. The present light at Racine, which does not answer the purpose of a lake-coast light, will then be discontinued.

618. *Milwaukee North Cut beacon, Lake Michigan, Wisconsin.*—As there was a light maintained on the end of the pier, the inner light, called the North Cut beacon, was not deemed a necessary aid to navigation. It was therefore discontinued on July 31, 1875. A first-class steam fog-signal should be established at this station, and an appropriation of \$5,000 is asked for this purpose.

625. *Twin River Point, Lake Michigan, Wisconsin.*—At the date of the last annual report the construction of this station was in progress. The buildings were completed in October last, but the illuminating apparatus did not arrive until some time afterward. The light was first exhibited on the night of December 7, 1874.

629. *Port du Mort, (Pilot Island,) entrance to Green Bay, Lake Michigan, Wisconsin.*—Arrangements have been made to erect a steam-siren at this station under the appropriation for steam fog-signals on the northern and northwestern lakes. The work is now in progress, and, it is expected, will be finished during the present season.

631. *Poverty Island, entrance to Green Bay, Lake Michigan, Wisconsin.*—The dwelling and 31 feet of the tower were completed on August 1, 1874, and a temporary light was exhibited from the roof of the dwelling. An appropriation of \$3,000 was made by act approved March 3, 1875, to complete the tower. The work has been resumed, and it is expected that the tower will be completed and a permanent light exhibited by August 1, 1875.

643. *Big Sable, Lake Superior, Michigan.*—This station was completed in August, 1874, and lighted on the 19th of that month.

— *Stannard's Rock, Lake Superior, Michigan.*—A survey of this dangerous shoal was made under the appropriation made by act of March 3, 1873. The results of the survey proved that it is entirely practicable to build a light-house on it, the water varying from 10 to 12 feet in depth

on the approaches from three sides. A light-house should be built, and a fog-signal established. The rock lies in the track of all vessels running to the north side of the western portion of Lake Superior, and is an object of great concern, especially on dark nights and during the almost interminable fogs which prevail in this vicinity during the greater part of the season of navigation. The construction of this station will greatly benefit the large, growing, and valuable commerce of the Lake Superior region. This is the proper time to begin it, as it can be built now cheaper than at any future time, as the costly apparatus and machinery used in building the light-house at Spectacle Reef is now available, and is especially adapted to works of this nature. The rock is nearly 20 miles distant from the nearest land, and 40 miles from a suitable harbor; and as it will have to be placed in from 10 to 12 feet of water, it will require a structure of the most costly and substantial character. It is estimated that the cost will not be less than \$300,000, but no accurate estimate can be given in advance, on account of the liability to accidents and delay while the work is in progress. Large as this sum is, its outlay is fully warranted by the necessities of the navigation of the lakes, and it is recommended that an appropriation of \$200,000 be made to begin the work.

— *L'Anse, Lake Superior, Michigan.*—Efforts have been made to secure a title to the site on several occasions, but thus far without success. It is recommended that the appropriation made by act approved March 3, 1873, which is still available, be so worded that the Light House Board may be authorized to erect the light-house anywhere in the near vicinity that may be determined upon.

659. *Eagle Harbor, Lake Superior, Michigan.*—An appropriation of \$8,000 was made by act approved March 3, 1875, for re-establishing range-lights at Eagle Harbor, Lake Superior. Negotiations having in view the acquisition of title to the site for the light are now pending. If there is no delay in procuring a valid title, the lights will be exhibited before the close of the present season.

661. *Portage Lake Ship-Canal, Lake Superior, Michigan.*—This station was completed and lighted on the 20th of November, 1874.

663. *Outer Island, Lake Superior, Wisconsin.*—This station was completed and lighted on October 30, 1874. A steam fog-signal has been erected, and was put in operation on November 5, 1874.

669. *Isle Royale, Lake Superior, Michigan.*—Work was begun on this station as soon as navigation opened in the spring. It will probably be completed and lighted by September 15, in this year. The light-house is located on Menagerie Island, the most easterly of the small islands forming Siskiwit Bay, south side of Isle Royale.

— *Passage Island, Lake Superior, Michigan.*—Congress, at its last session, made an appropriation of \$18,000 for establishing a light at this place, conditioned upon the building, by the government of the Dominion of Canada, of a light-house on Colchester Reef, to the eastward of the mouth of Detroit River. The board is not aware that any steps have yet been taken by the Canadian government to establish a light at that point, and therefore nothing has been done toward the erection of a light at Passage Island.

REPAIRS.

Repairs of greater or less extent have been made, or are in process of execution, at the following stations:

559. *Windmill Point, entrance to Lake St. Clair, Michigan.*

560. *St. Clair Flats, Michigan.*

- 561. *St. Clair Flats beacon*, Michigan.
- 563. *St. Clair Flats Canal*, Michigan.
- 564. *Fort Gratiot*, Lake Huron, Michigan.
- 565. *Point aux Barques*, Lake Huron, Michigan.
- 566. *Saginaw Bay*, Lake Huron, Michigan.
- 567. *Charity Island*, Saginaw Bay, Lake Huron, Michigan.
- 568. *Tawas*, on Ottawa Point, Saginaw Bay, Michigan.
- 571. *Thunder Bay Island*, Lake Huron, Michigan.
- 574. *Presque Isle*, Lake Huron, Michigan.
- 575. *Spectacle Reef*, entrance to the Straits of Mackinac, Lake Huron, Michigan.
- 576. *Detour*, river Sault Ste. Marie, Lake Huron, Michigan.
- 577. *Bois Blanc*, Straits of Mackinac, Michigan.
- 578. *Cheboygan*, near eastern entrance to the Straits of Mackinac, Michigan.
- 579. *McGulpin's Point*, Straits of Mackinac, Michigan.
- 580. *St. Helena*, Straits of Mackinac, Michigan.
- 581. *Waugoshance*, Straits of Mackinac, entrance to Lake Michigan, Michigan.
- 582. *Skelligallee*, (Ile aux Galets,) Lake Michigan, Michigan.
- 583. *Beaver Island Harbor*, Lake Michigan, Michigan.
- 584. *Beaver Island*, Lake Michigan, Michigan.
- 585. *South Fox Island*, Lake Michigan, Michigan.
- 586. *Grand Traverse*, Grand Traverse Bay, Lake Michigan, Michigan.
- 587. *Mission Point*, Grand Traverse Bay, Lake Michigan, Michigan.
- 588. *South Manitou*, Lake Michigan, Michigan.
- 589. *Point Betsey*, (Point aux Bees Seies,) east side of Lake Michigan, Michigan.
- 590. *Frankfort pier-head*, Lake Michigan, Michigan.
- 591. *Manistee*, Lake Michigan, Michigan.
- 592. *Grande Pointe au Sable*, Lake Michigan, Michigan.
- 593. *Pere Marquette*, Lake Michigan, Michigan.
- 594. *Pentwater*, Lake Michigan, Michigan.
- 595. *Petite Pointe au Sable*, Lake Michigan, Michigan.
- 597. *White River pier-head*, Lake Michigan, Michigan.
- 598. *Muskegon*, Lake Michigan, Michigan.
- 600. *Grand Haven*, Lake Michigan, Michigan.
- 602. *Holland*, (Black Lake,) Lake Michigan, Michigan.
- 603. *Kalamazoo*, on the north side of the mouth of Kalamazoo River, Lake Michigan, Michigan.
- 604. *South Haven*, Lake Michigan, Michigan.
- 605. *St. Joseph*, Lake Michigan, Michigan.
- 607. *Michigan City*, Lake Michigan, Indiana.
- 608. *Michigan City pier-head*, Lake Michigan, Indiana.
- 609. *Calumet*, Lake Michigan, Illinois.
- 611. *Chicago pier-head*, Lake Michigan, Illinois.
- 612. *Grosse Point*, Lake Michigan, Illinois.
- 613. *Waukegan*, Little Fort River, Illinois.
- 614. *Kenosha*, ou Warrenton Island, Lake Michigan, Wisconsin.
- 616. *Racine*, Lake Michigan, Wisconsin.
- 617. *Racine pier-head*, Lake Michigan, Wisconsin.
- 618. *Milwaukee pier-head*, Lake Michigan, Wisconsin.
- 619. *Milwaukee*, (north point,) Lake Michigan, Wisconsin.
- 620. *Port Washington*, Lake Michigan, Wisconsin.
- 621. *Sheboygan pier-head*, Lake Michigan, Wisconsin.

622. *Sheboygan*, Lake Michigan, Wisconsin.
 624. *Manitowoc*, Manitowoc River, Lake Michigan, Wisconsin.
 626-27. *Bailey's Harbor ranges*, Lake Michigan, Wisconsin.
 629. *Port du Mort*, Pilot Island, Green Bay, Lake Michigan, Michigan.
 630. *Pottawatomie*, Rock Island, Green Bay, Lake Michigan, Michigan.
 632. *Point Peninsula*, on the point between Little and Big Bays de Noquet, Lake Michigan, Michigan.
 633. *Escanaba*, Little Bay de Noquet, Lake Michigan, Michigan.
 634. *Eagle Bluff*, Green Bay, Lake Michigan, Wisconsin.
 636. *Green Island*, Green Bay, Lake Michigan, Wisconsin.
 638-39. *Grassy Island ranges*, Green Bay, Lake Michigan, Wisconsin.
 641. *Point Iroquois*, White Fish Bay, Lake Superior, Michigan.
 642. *White-Fish Point*, Lake Superior, Michigan.
 643. *Big Sable*, Lake Superior, Michigan.
 644. *Grand Island*, Lake Superior, Michigan.
 645. *Grand Island Harbor*, Lake Superior, Michigan.
 646-47. *Grand Island Harbor ranges*, Lake Superior, Michigan.
 648. *Marquette*, Lake Superior, Michigan.
 649. *Granite Island*, Lake Superior, Michigan.
 650. *Huron Island*, Lake Superior, Michigan.
 651. *Portage River*, Keweenaw Bay, Lake Superior, Michigan.
 652-653. *Portage River ranges*, Keweenaw Bay, Lake Superior, Michigan.
 654. *Manitou Island*, Lake Superior, Michigan.
 655. *Gull Rock*, Lake Superior, Michigan.
 656. *Copper Harbor*, Lake Superior, Michigan.
 660. *Eagle River*, Lake Superior, Michigan.
 662. *Ontonagon*, Lake Superior, Michigan.
 663. *Outer Island*, (Apostle group,) Lake Superior, Wisconsin.
 664. *Michigan Island*, Lake Superior, Wisconsin.
 665. *La Pointe*, Lake Superior, Wisconsin.
 666. *Raspberry Island*, (Apostle group,) Lake Superior, Wisconsin.
 667. *Minnesota Point*, mouth of Saint Louis River, Lake Superior, Minnesota.
 668. *Du Luth*, Lake Superior, Minnesota.
 670. *Rock Harbor*, Lake Superior, Michigan.

FOG-SIGNALS.

Since the last annual report three new fog-signals have been erected in this district, namely, at South Manitou Island, Lake Michigan, and Outer and Manitou Islands, Lake Superior. These, with the other six that existed in the district, seem to have given general satisfaction to the commerce of the lakes.

A steam-siren has been ordered at each of the three following stations, namely: *Grand Haven*, *Skulligallee*, and *Port du Mort*, all in Lake Michigan. These are all in course of erection.

BUOYS.

The buoyage of this district has been carefully attended to during the year, and it is in conformity with the printed buoy-list, and generally in good order. A complete set of new buoys for Saint Clair Flats was furnished and located in the spring, the old channel being used almost exclusively by vessels towing rafts, as difficulty is experienced in using the canal for that purpose when there is much wind or sea.

LIGHT-HOUSE DEPOT.

Detroit, Michigan.—Congress, at its last session, made an appropriation of \$10,000 to complete the work on this important depot. Work under this appropriation was begun in May. The new dock is nearly completed, and all the iron shutters and doors for the fire-proof store-house are in place.

TWELFTH DISTRICT.

CALIFORNIA.

This district embraces all aids to navigation on the Pacific coast of the United States between the Mexican frontier and the southern boundary of Oregon, and includes the coast of California.

Inspector.—Commodore James H. Spotts, United States Navy, until December 1, 1874; Commander A. T. Snell, U. S. N., present inspector.

Engineer.—Lieut. Col. R. S. Williamson, Corps of Engineers, United States Army.

In this district there are—

Light-houses and lighted beacons	21
Day or unlighted beacons	17
Light-ships	0
Fog-signals operated by steam or hot-air engines	9
Buoys actually in position	31
Spare buoys for relief and supply losses	29
Tender Shubrick; common to twelfth and thirteenth districts, used for inspector's and engineer's purposes	1

The numbers preceding the names of stations correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1875.

LIGHT-HOUSES.

433. *Point Loma, entrance to San Diego Bay, sea-coast of California.*—Some slight repairs and renovations have been made at this station during the past year; but as the keeper's dwelling is in bad condition, considerable repairs are necessary. It is also proposed to fit up two rooms in a portion of the wood-house for the better accommodation of the keepers. These repairs and changes will be made during September, as that is deemed the best time for doing the work.

434. *Point Fermin, sea-coast of California.*—The light at this station was exhibited for the first time on the evening of December 15th, 1874. It is recommended that an appropriation of \$300 be made for the purchase of additional land at this station.

435. *Point Hueneme, sea-coast of California.*—The light at this station was exhibited for the first time on the evening of December 15, 1874. Plenty of water for irrigation is had from the artesian well on the reservation. It is important that a steam fog-signal should be established here. The numerous passenger and other steamers, in going up and down the coast, pass inside Anacapa Island, and very near the coast, which here makes a considerable elbow. The land at this point is quite low, and is so for ten miles inland, so that it is difficult to see it if there is any fog. An appropriation of \$7,000 for the establishment of a first-class steam fog-signal at this place is recommended.

436. *Santa Barbara, sea-coast of California.*—Slight repairs have been

made t this station. The light-house reservation is separated from the nearest public road by land owned and occupied as an orchard by a private citizen. A road to the public highway is necessary. The owner offers to sell a piece of land sufficient for a right of way, at the rate of \$200 per acre, gold coin. This is not an exorbitant price; an appropriation of \$500 is therefore recommended.

437. *Point Conception, sea-coast of California.*—The old dwelling at this station is in a bad condition, and the best plan is to pull it down, leaving the tower by itself, and to build for the accommodation of the keepers two more cottages similar to the one built last year. This being a first-order light and having a steam fog-signal, four keepers are required. One corner of the house has settled, making a serious crack. As the tower is in the center of the house, the latter having been built around it, when the walls of the house are removed the tower will be isolated and complete in itself. An appropriation of \$12,000 is asked for the purpose of building the new dwellings. The tenure by which the Government holds 160 acres of land at this point has been a matter of correspondence during some years past. A portion of this is of no value to the Government for light house purposes, and can be abandoned without detriment to the public service. Negotiations are now in progress having in view the settlement of dispute in this regard.

438. *Piedras Blancas, sea-coast of California.*—The tower at this station was completed and the light put in operation on February 15th, 1875, the keepers being accommodated in the shanties built for use of the mechanics and laborers. Congress at its last session appropriated \$15,000 for completing the station and establishing a steam fog-signal. This amount being deemed insufficient for the purpose, no work has been done under it. It is now necessary to erect the dwelling, as the shanties will not afford the necessary shelter during the rainy season. Plans for the structures have been made and the buildings will soon be commenced. In order that the fog-signal may be efficient, it will be necessary to blast off the highest point of Piedras Blancas rock, a rock that rises in the form of a seal, some distance from the main-land. But as the highest part of it is about 100 feet high, this will be attended with considerable expense. An appropriation of \$20,000 will be required for this purpose, and in the event of the appropriation not being made, it will be better to delay establishing the signal.

— *Point Sur, sea-coast of California.*—This dangerous point, on which the steamer Ventura was lost on April 20, 1875, has been surveyed during the present season. A steam fog-signal would be of as much value here as a light. The expense of establishing either will be heavy, owing to the difficulty of securing a proper site. Both a light and fog-signal will eventually be established at this point, but the board does not ask an appropriation therefor this year.

439. *Point Pinos, sea-coast of California.*—Repairs and renovations have been made during the past year. Considerable repairs to the parapet-wall of the lantern are needed, and will be made during September.

443. *Point Montara, sea-coast of California.*—Having secured a good title to the land, the work of erecting a fog-signal structure and a keeper's dwelling was commenced in October last, and completed in February, 1875. The signal was put in operation on March 1, 1875. An abundant supply of water has been obtained from two sources—a creek running through the reservation, and from a spring near its southern border. Water from the creek is forced by a hydraulic ram to the

signal-house; where there is a reservoir holding 2,000 gallons. The station is in good order.

444. *Farallones Islands, off San Francisco, sea-coast of California.*—The recommendations made in the last annual report are repeated. The dwelling at this station is very much out of repair, and is much too small for the wants of a first-order station. It was built in 1855, out of rock quarried on the island, and is very damp. A substantial wooden structure is needed, and an appropriation of \$15,000 is respectfully asked for that purpose."

445. *Point Bonita, sea-coast of California.*—From causes stated in the last annual report it became necessary to cut down the entire point on which the fog-signal stood, about 25 feet. To do this the signal was stopped on October 1, 1874. The structures were torn down and the entire point graded off to a point 25 feet lower than the original foundation. New structures were built and the signal resumed operation on January 1, 1875, the expense of the change being paid from the general appropriation for repairs and incidental expenses of fog-signals. The signal is now upon a secure foundation. The light at Point Bonita is 306 feet above the sea. At this height the light is very frequently obscured by a light haze or fog, when at the steam fog-signal there is no fog or haze. Pilots, steamship captains, and others frequently report passing Point Bonita without seeing the light, when the extremity of the point where the fog-signal is placed and the base of the bluff on which the light stands show plainly, the fog hanging above the water at a height of about 100 feet. A good light on this point is very necessary, it being at the entrance of San Francisco Bay and harbor, and an appropriation of \$25,000 is asked for moving the present Point Bonita light-house to this point.

448. *Yerba Buena Island, San Francisco Harbor, California.*—The keeper's dwelling and tower have been completed, excepting the putting up of the lantern and illuminating apparatus. When the apparatus is received it will be immediately put in place on the tower. The lens formerly in use at Yaquina light-station, Oregon, will be used at this station, and the light can be exhibited on or about the 15th of September. Congress, at its last session, appropriated \$5,000 for establishing a steam fog-signal at this station. The work was commenced in June, and is nearly completed. The signal will be put in operation on the 1st of October. Water is provided from a spring, near the buoy-depot, which has been cleaned out, enlarged, and curbed up. A double-acting force-pump is placed at this spring, and the water forced through iron pipes to a 10,000-gallon tank at the signal. This tank is made very strong and secure, and will last, under ordinary circumstances, at least twenty years. The supply of water at the spring is abundant.

449. *East Brother Island, in the straits separating San Francisco and San Pablo Bays, California.*—Extensive repairs are necessary to secure the wharf and tram-way, which were badly damaged by a violent gale and sea last spring. These repairs will be made during September.

450. *Mare Island, Straits of Karquines, California.*—Repairs have been made at this station, consisting of a strong stone sea-wall to protect the fog-bell tower. The foundation of this tower needs strengthening; this work will be done as soon as practicable.

451. *Point Reyes, sea-coast of California.*—Congress, at its last session, appropriated \$3,000 for enlarging and repairing the water-shed at this station. This work has been done, and it is now thought that, with a rain-fall of eight inches a year, water enough for fog-signal purposes will be caught. The average rain-fall is three times that amount. Materials for

repairing and renovating the various structures at this station have been purchased and sent there.

453. *Cape Mendocino, sea-coast of California.*—Funk lamps have been furnished to this station, and some general repairs have been made. The dwelling requires extensive repairs, which will cost about \$1,200. These repairs can be made to better advantage during September and October than at any other time. During the prevalence of the strong winds of summer it is almost impossible at times for any one to go from the dwelling to the tower, so great is the force of the wind.

454. *Humboldt, sea-coast of California.*—Slight repairs have been made during the past year. Quite extensive repairs and renovations are necessary to the keeper's dwelling, and the wood-shed is to be altered so as to accommodate one assistant keeper and his family.

457. *Crescent City, sea-coast of California.*—This station is in a dilapidated condition, and should be rebuilt if the light is to be continued. The entire wood-work of the keeper's stone dwelling must be removed. The ends of many of the lower floor-timbers are entirely gone, and the floor is held up by shores. But the light itself is of little consequence. No vessel can enter Crescent City harbor at night, and no vessel bound up or down the coast can, with safety, run near enough to make the light. The rocks off Point St. George are one of the chief dangers to navigation on the coast. A first-order light should be placed there. When that is done the Crescent City station should be discontinued.

— *Point St. George, or vicinity, near Crescent City, sea-coast of California.*—The recommendations in the last annual report are repeated: "This is one of the most important points for a sea-coast light on the coast of California. The bluff point is about one hundred and thirty feet high, with level land for some distance back of it. Off the point, extending some six or seven miles, is a very dangerous reef of rocks, quite a number of which show above water, and many are awash at low tide; others have from three to four fathoms of water on them. The passage between the outlying rocks of this reef and Point St. George is quite wide, and is used by the coasting steamers and sailing-vessels. The steamer Brother Jonathan was wrecked on this reef some years ago during a fog, and many lives were lost, among them General Wright and staff, with the families of himself and several of his staff. A light-house and fog-signal should be erected here. An appropriation of \$50,000 is asked to commence the work."

ROADWAYS TO LIGHT-STATIONS.

There are several light-stations on the Pacific coast which were established on reservations belonging to the Government, but which are surrounded by private property, through which the Light-House Board has no roadway. It is recommended that an appropriation of \$5,000 be made to enable the board to purchase land necessary for roadways at stations on the Pacific coast.

REPAIRS.

At each of the following-named light-stations repairs and renovations more or less extensive have been made during the year:

433. *Point Loma.*

436. *Santa Barbara.*

437. *Point Conception.*

439. *Point Pinos.*

- 440. *Santa Cruz.*
- 441. *Año Nuevo.*
- 442. *Pigeon Point.*
- 444. *Farallones Island.*
- 446. *Fort Point.*
- 447. *Alcatraz Island.*
- 450. *Mare Island.*
- 451. *Point Reyes.*
- 452. *Point Arena.*
- 453. *Cape Mendocino.*
- 454. *Humboldt.*
- 456. *Trinidad Head.*

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT AIR ENGINES.

- Point Conception.*—A 12-inch steam-whistle.
- Año Nuevo Island.*—A 12-inch steam-whistle.
- Pigeon Point.*—A 12-inch steam-whistle.
- Point Montara.*—A 12-inch steam-whistle.
- Point Bonita.*—A first-order steam-siren.
- East Brother Island.*—A 12-inch steam-whistle.
- Point Reyes.*—A 12-inch steam-whistle.
- Point Arena.*—A 12-inch steam-whistle.
- Humboldt.*—A 12-inch steam-whistle.

DAY OR UNLIGHTED BEACONS.

During the past year pile-beacons have been erected in this district at the following places:

To mark the channel in the bay of San Francisco, toward and entrance to Redwood Creek: Pile beacons, four in number.

To mark end of shoal north of Yerba Buena Island: Pile beacon, one.

To mark Berkley Rock, bay of San Francisco: Pile beacon, one.

To mark Sonthampton shoal, bay of San Francisco: Pile beacons, two.

To mark the end of shoal between Straits of Karquines and Napa Creek: Pile beacon, one.

To mark Commission Rock off Mare Island, in Napa Creek, (since carried away:) Pile beacon, one.

To mark entrance to Petaluma Creek from San Pablo Bay: Pile beacons, four.

To mark channel toward Sacramento River through Suisun Bay: Pile beacons, three.

Anita Rock, Harbor of San Francisco, California.—This rock is a serious obstruction to navigation and should be marked by spindle. An appropriation of \$2,300 is asked for this purpose.

Commission Rock, Mare-Island Straits, California.—The day beacon to be erected on this rock will be commenced at once, and will probably be completed during the month of September 1875.

Fauntleroy Rock.—The spindle is now in place, and is much better calculated to withstand the storms than the previous one, being three

feet higher and one inch thicker for six feet in length from the lower end.

To mark end of mud flat between mouths of Suisun Creek and Montezuma Creek, Suisun Bay. Pile beacon, one.

BUOYS.

The buoyage of this district is good, except in San Diego Bay and at Humboldt Bar. The buoys in San Diego Bay are 3d class, and are too few in number. Several steamers have been ashore there, and masters are anxious that the buoys should be removed, and a proper number of pile beacons, similar to those in San Francisco Bay, be placed at such points as a careful examination of the bay shall show to be most desirable. This will be done at an early day. During the year there have been lost one 1st-class buoy and three 3d-class buoys, which with sinkers and chains lost, are estimated to have been worth \$3,800.

TENDER AND SUPPLY-VESSEL.

The Shubrick is the only light-house vessel on the Pacific coast. The coast-line is nearly fifteen hundred miles in extent, and it is simply impossible for the Shubrick to do all the work required in both twelfth and thirteenth districts.

There should be a tender for each district to enable the buoyage to be kept in good condition, and the work of the inspectors and engineers to be properly performed. An appropriation of \$100,000 for a steam-tender is asked.

DEPOTS.

There are two depots in this district, one at Yerba Buena Island, and the other at Fort Point. That at Yerba Buena is used as a buoy depot and for general supplies of light-houses. That at Fort Point has in it engineers' stores and lampists' tools.

THIRTEENTH DISTRICT.

This district embraces all aids to navigation on the Pacific coast of the United States north of the southern boundary of Oregon. It extends from the forty-first parallel of latitude to British Columbia, and includes the coasts of Oregon and of Washington Territory.

Inspector.—Commodore James H. Spotts, United States Navy, until December 26th, 1874. Lieutenant-Commander Louis Kempff, United States Navy, present inspector.

Engineer.—Major Nathaniel Michler, Corps of Engineers, brevet brigadier-general, United States Army.

There are in this district—

Light-houses	11
Day or unlighted beacons	12
Light-ships	0
Fog-signals operated by steam or hot-air engines	3
Buoys actually in position	55
Spare buoys for relief, and to supply losses	47
Tender, (steam,) Shubrick, used for inspection, supplies, and engineer's purposes, common to twelfth and thirteenth districts	1

The following numbers, which precede the names of stations, correspond with those of the light-house list of the Atlantic, Gulf, and Pacific coasts of the United States, issued January 1, 1875 :

LIGHT-HOUSES.

459. *Cape Arago, (Gregory,) sea coast of Oregon.*—Some damage was done at this station by the gale of last November. This damage was repaired. Other repairs are needed, and will be attended to at an early day. The material for the same was landed at the locality on the last day of June; in consequence of severe storms it was not possible to do so previous to that date.

460. *Cape Foulweather, (Yaquina Head,) sea-coast of Oregon.*—At this station the two sides of the keeper's dwelling most exposed to severe rain and wind storms, and which leaked badly, have been covered with rustic siding. They will now be perfectly tight. The tower has been whitewashed, and the dwelling painted. Some work has been done by the keeper on the road between the station and Yaquina Bay. Many minor details have received attention. The entire station is now in excellent order.

— *Range-lights at Saint Helen's Bar, Columbia River, Oregon.*—A set of range-lights for crossing Saint Helen's Bar are required. Their proper location is the same as those heretofore used during the operations of dredging under charge of the Engineer Department of the Army. The estimated cost is \$1,000, and an appropriation of that amount is asked for this purpose.

461. *Point Adams, south side of the entrance to the Columbia River, Oregon.*—The light-house at this station has been completed. The structure is a low, square tower, rising from the keeper's dwelling, and is built of wood. The necessary building and the cistern for a 12-inch steam fog-whistle have also been erected. The light was exhibited and the signal operated, both for the first time, on the night of the 15th of February. The grounds have been partially graded, cleared of heavy timber and brush, and a road constructed from the station to connect with one leading to the Government wharf at the military post at Fort Stevens. The only work still required is a cistern near the dwelling for the use of the keepers.

463. *Shoalwater Bay, on Toke Point, entrance to Shoalwater Bay, Washington Territory.*—The principal work at this station during the year was the construction of a fence around the dwelling for its protection against the drifting sand, and other arrangements for guarding against the undermining of the building.

464. *Cape Flattery, (Tatoosh Island,) entrance to Straits of Juan de Fuca, Washington Territory.*—New buildings for the keepers have been completed.

A new store-house has been built, and a wooden tramway constructed from the fog-signal building, and store-house to the derrick by which material is raised from the landing on the beach to the top of the high rocky bluff. The old dwelling has been repaired and is now in good condition. The new one is already occupied by the keepers, and is a convenient and substantial building. The steam fog-signal building has been widened 4 feet, and the roof changed by carrying the north hip 4 feet westwardly.

465. *Ediz Hook, Straits of Juan de Fuca, Washington Territory.*—The only work done at this locality consists in the erection of a substantial fence to inclose some few acres of ground for the benefit of the keepers, the repairing and relaying of the plank-walk between the dwelling and the boat-house, and other slight repairs.

466. *New Dungeness, Straits of Juan de Fuca, Washington Territory.*—During the extremely cold weather in January the water in the pipes leading to the boiler of the fog-whistle was frozen and the pipes burst;

the necessary repairs were made. The joints in the tower were repointed. A door was put in the upper part to prevent too great a draught of air in the lantern when that in the lantern-floor is opened. A wooden tram-way was constructed, connecting the boat-house with the dwelling and fog-signal building, and a suitable hand-car provided.

467. *Smith's or Blunt's Island, near the entrance to Puget Sound, Washington Territory.*—A small brick cistern of the capacity of 5,000 gallons has been built. The old well has been cleaned out and lined with brick, a new platform having been placed over it. Pumps and pipes have been furnished for both cistern and well. The roof of the dwelling has been painted.

468. *Admiralty Head, on Red Bluff, Whidby's Island, entrance to Puget Sound, Washington Territory.*—At this station a hitherto unoccupied space in the attic of the dwelling has been inclosed and converted into a watch-room. The repairs made consist in covering with rustic siding the two sides of the building most affected by winter storms; and other slight matters needing attention.

— *Point no Point, Puget Sound, Washington Territory.*—An appropriation of \$25,000 for building a light-house at this point, or at such other point in Puget Sound as the Light-House Board may elect, was made by act approved March 3, 1873. No work has yet been done, as the question of the proper site is still in abeyance.

REPAIRS.

Repairs more or less extensive have been made during the year at each of the following-named stations:

- 458. *Cape Blanco, Oregon.*
- 459. *Cape Arago, (Gregory,) Oregon.*
- 460. *Cape Foulweather, (Yaquina Head,) Oregon.*
- 462. *Cape Hancock, (Disappointment,) Washington Territory.*
- 463. *Toke Point, Washington Territory.*
- 464. *Cape Flattery, (Tatoosh Island,) Washington Territory.*
- 465. *Ediz Hook, Washington Territory.*
- 466. *New Dungeness, Washington Territory.*
- 467. *Smith's or Blunt's Island, Washington Territory.*
- 468. *Admiralty Head, Washington Territory.*

LIGHT-SHIPS.

There are no light-ships in this district.

FOG SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

- Cape Flattery.*—A 12-inch whistle.
- New Dungeness.*—A 12-inch whistle.
- Point Adams.*—A 12-inch whistle.
- All in good condition.

DAY OR UNLIGHTED BEACONS.

The beacons of this district are 12 in number, located as follows, viz two on Sand Island, [range-beacons,] for service in entering and leaving the Columbia river. These beacons are structures of logs bolted together in the shape of a frustum of a pyramid.

Nine of the ten remaining beacons are simply single piles, driven to mark the channel of the Columbia River between Tongue Point and Woody Island.

LIGHT-HOUSE BOARD.

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A beacon of the same kind is placed on Minor Island, in the Straits of Fuca.

These beacons have cross boards at the top, placed at right angles to each other.

BUOYS.

The general condition of the buoys and appurtenances in position in this district is good, and the buoys agree with the published list.

TENDERS.

The tender Shubrick is the only light-house vessel upon the entire Pacific coast. It is of the first importance that an additional light-house tender should be supplied as soon as possible.

The work required is constantly increasing, and under existing circumstances it is impossible to perform it properly.

DEPOT.

An appropriation of \$10,000, made by act approved March 3, 1875, for the establishment of a depot for buoys and supplies, is now available.

The work will be taken in hand without unnecessary delay.

FOURTEENTH DISTRICT.

The fourteenth light-house district extends from Pittsburgh, Pa., to New Orleans, La., and embraces all the aids to navigation on the Ohio River and that part of the Mississippi River between the mouth of the Ohio and New Orleans.

Inspector.—Commander Joseph Fyffe, United States Navy, until June 1, 1875.

Lieut. Chas. H. Rockwell, United States Navy, present inspector.

Engineer.—Maj. W. E. Merrill, Corps of Engineers, United States Army.

In this district there are—

Lights	180
Buoys actually in position	9
Tender (steam) Lily	1

The following is a list of the lights in this district, with their positions :

List of lights established in the fourteenth light-house district, from date of organization, and in operation at the close of the year ending September 30, 1875.

OHIO RIVER, PITTSBURGH, PENN., TO CINCINNATI, OHIO.

Name of light.	Date established.	Character.	Distances from Pittsburgh.
			Miles.
Bruno Island	May 19, 1875	Fixed stake-light ..	2
Horse Tail	do.	do.	6
Duff's Bar	do.	do.	8
Merriman's Bar	do.	do.	9½
Merriman's Bar	do.	do.	10
White's Ripple	May 18, 1875	do.	11
Deadman's Island	do.	do.	15
Logstown	do.	do.	18
Baden	Oct. 27, 1875	do.	20
Mallory Bar	May 18, 1875	do.	21
Laycock's Bar	do.	do.	25
Beaver Shoals	May 19, 1875	do.	26
Beaver Shoals	do.	do.	27
Raccoon Bar	May 18, 1875	do.	29
Phillisi Island	May 20, 1875	do.	35
Georgetown Island	May 17, 1875	do.	37
Line Island	do.	do.	40
Baker's Island	do.	do.	49
Black's Island	do.	do.	53
Brown's Island	do.	do.	60
Brown's Island	do.	do.	62
Captina Island	May 15, 1875	do.	106
Captina Island	May 20, 1875	do.	106½
Fish Creek	May 21, 1875	do.	109
Opossum Creek	May 15, 1875	do.	113
Petticoat Bar	do.	do.	146
Bat and Grape Islands	May 14, 1875	do.	150
Carpenter's Bar	do.	do.	166
Carpenter's Bar	do.	do.	166½
Mustapha Island	do.	do.	194½
Mustapha Island	do.	do.	195
Belleville Bar	do.	do.	198
Buffington Island	May 13, 1875	do.	212
Buffington Island	do.	do.	214
Sand Creek	do.	do.	218
Old Town Island	do.	do.	224
Goose Island	May 22, 1875	do.	226
Letart Falls	May 13, 1875	do.	229
Letart Falls	do.	do.	229½
Eight-mile Island	May 22, 1875	do.	258
Gallipolis Island	do.	do.	266
Gallipolis Island	do.	do.	266½
Raccoon Island	Jan. 6, 1875	do.	273
Raccoon Island	do.	do.	273½
Straight Ripple	do.	do.	282
Straight Ripple	do.	do.	283
Green Bottom	May 12, 1875	do.	290
Guyandotte	Jan. 6, 1875	do.	302
Twelve Pole	Jan. 7, 1875	do.	311
Twelve Pole	do.	do.	311½
Greenup	Jan. 5, 1875	do.	331
Scioto Bar	Jan. 8, 1875	do.	355
Conoconegue Bar	May 24, 1875	do.	364
Conoconegue	Jan. 5, 1875	do.	364½
Quick's Run	Jan. 4, 1875	do.	389
Brush Creek	May 24, 1875	do.	384
Manchester Island	Jan. 4, 1875	do.	391
Manchester Island	do.	do.	392
Charleston Bar	Jan. 8, 1875	do.	412
Augusta Bar	May 25, 1875	do.	423
Locust Bar	do.	do.	429
Locust Bar	do.	do.	430
Swag Bar	do.	do.	431
New Richmond	Dec. 12, 1874	do.	446
Nine Mile	May 25, 1875	do.	453
Four Mile	Dec. 12, 1874	do.	456
Four Mile	do.	do.	457
Four Mile	do.	do.	457½

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OHIO RIVER, CINCINNATI, OHIO, TO CAIRO, ILL.

Name of light.	Date established.	Character.	Distances from Cincinnati.
McCullum's Ripple.....	Jan. 31, 1875	Fixed stake-light.	<i>Miles.</i> 5
McCullum's Ripple.....	Jan. 1, 1875	do	5½
Medoc Bar.....	do	do	19
Loughery Island.....	Aug. 24, 1874	do	31
Rising Sun.....	Dec. 31, 1874	do	35
Rising Sun.....	do	do	36
Ranty Bar.....	Aug. 24, 1875	do	37
Gunpowder Creek.....	do	do	43
Gunpowder Creek.....	do	do	43
Big-Bone Creek.....	Dec. 31, 1874	do	46
Sugar-Creek Bend.....	do	do	52
Warsaw Bar.....	do	do	58½
Craig's Bar.....	do	do	71
Locust Bar.....	Aug. 24, 1875	do	78
Hoagland Bar.....	Dec. 31, 1874	do	84
Cooper's Bar.....	Aug. 23, 1875	do	92
Grassy Flats.....	Jan. 31, 1875	do	115
Louisville.....	April 1, 1875	do	132
West Louisville.....	Dec. 30, 1874	do	136½
Salt River.....	Dec. 29, 1874	do	158
Mosquito Creek.....	Aug. 21, 1875	do	160
Blue River.....	Aug. 20, 1875	do	188
Peckinpaugh Bar.....	Dec. 28, 1874	do	203
Plint Island.....	do	do	217
Plint Island.....	do	do	217½
Oil Creek.....	Aug. 20, 1875	do	219
Chenault's Reach.....	Dec. 28, 1874	do	224
Holts Bar.....	Aug. 20, 1875	do	232
Hog's Point.....	do	do	246
Troy Reach.....	Aug. 19, 1875	do	256
Anderson's Bar.....	do	do	264
Anderson's Bar.....	do	do	265
French Island.....	Dec. 26, 1875	do	292
French Island.....	Dec. 26, 1874	do	293
French Island.....	do	do	294
Scuffletown Bar.....	do	do	301
Scuffletown Bar.....	do	do	302
Three Mile Island.....	do	do	304
Evansville.....	do	do	317
Evansville.....	do	do	317½
Henderson Island.....	Dec. 25, 1875	do	327
Henderson Island.....	do	do	327½
Highland Rocks.....	Dec. 24, 1874	do	338
Highland Rocks.....	do	do	339
Shawneetown Bar.....	do	do	380
Saline Bar.....	Feb. 23, 1875	do	386
Treadwater Island.....	Dec. 24, 1874	do	396
Treadwater Island.....	do	do	397
Plinn's Bar.....	Dec. 24, 1874	do	393
Walker's Bar.....	do	do	404
Cumberland Bar.....	Dec. 23, 1874	do	441
Cottonwood Bar.....	do	do	446
Cottonwood Bar.....	do	do	446½
Cottonwood Bar.....	do	do	448
Little Chain.....	Dec. 22, 1874	do	465
Little Chain.....	do	do	471
Little Chain.....	do	do	473
Grand Chain.....	do	Floating light.	477
Grand Chain.....	do	do	478
Grand Chain.....	do	do	479
Grand Chain.....	do	do	480
Grand Chain.....	do	do	481
Foot of Grand Chain.....	Dec. 21, 1874	Fixed stake-light.	482

REPORT ON THE FINANCES.

MISSISSIPPI RIVER, CAIRO, ILL., TO NEW ORLEANS, LA.

Name of light.	Date established.	Character.	Distances from Cairo. Miles.
Saint James Bayou, Missouri	Sept. 14, 1875	Fixed stake-light	45
Head of Island No. 10	do	do	60
New Madrid Bend	do	do	69
Tennessee State Line	do	do	74
Tiptonville	do	do	84
Stewart's Landing, Missouri	do	do	89
Bass Landing, Tennessee	do	do	93
Linwood Field, Tennessee	do	do	112½
Hickman's Landing, Arkansas	Sept. 15, 1875	do	120
Buckner's Landing, Arkansas	do	do	138
Johnson's Landing, Tennessee	do	do	152
Fletcher's Landing, Arkansas	do	do	156
Plum Point, Tennessee	do	do	164
Bullerton Tow-head	do	do	165
Pacific Place, Arkansas	Sept. 16, 1875	do	216
W. R. Arthur, wreck	do	do	241
Ensley's Field	Sept. 17, 1875	do	258
Reeves' Bar	do	do	260
Harklerodis Crossing	do	do	277
De Mumbrey's Landing	do	do	293
Moon's Tow-head	do	do	296
Fox Island Tow-head	do	do	303
O. K. Landing	do	do	306
Shoo Fly Crossing, Arkansas	Sept. 18, 1875	do	312
Island Sixty	do	do	323
Grant's Pass	Sept. 19, 1875	do	333
Victoria Landing	do	do	416
Island Seventy-six	Sept. 20, 1875	do	445
Glencoe Landing	do	do	470
Homochilta Landing	Sept. 21, 1875	do	566
Oakley Landing	do	do	570
McMillen's Landing	do	do	571
Bavarian Crossing	do	do	574
Island Ninety-six	do	do	587
Barleigh's Landing	do	do	598
Omega	do	do	608
Briccount's Landing	Sept. 22, 1875	do	620
Buckridge Landing	do	do	673
Boujourant Landing	Sept. 23, 1875	do	691
Braunsburg Landing	do	do	693
General Taylor's	do	do	611
Natchez Island	do	do	757
Ashley Avenue	do	do	763
Avalance Landing	do	do	771
Green's Landing	do	do	773
Ashton Bars	Sept. 26, 1875	do	554
Eutaw Landing	Sept. 27, 1875	do	466
Head Cow Island	Sept. 28, 1875	do	264
Fort Pillow	Sept. 29, 1875	do	173
O'Donnell's Landing	do	do	149

FIFTEENTH DISTRICT.

The fifteenth light-house district extends on the Mississippi from the head of navigation to Cairo, and on the Missouri from the head of navigation to its mouth, and embraces all the aids to navigation within these limits.

Inspector.—Commander R. R. Wallace, United States Navy.

Engineer.—Maj. Charles R. Suter, Corps of Engineers, United States Army.

In this district there are :

Lights	100
Buoys actually in position	12
Tender (steam) Alice	1

The following is a list of the lights in this district with their positions :

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List of lights established in the fifteenth light-house district from date of organization, and in operation at the close of the year ending September 30, 1875.

MISSISSIPPI RIVER, SAINT PAUL, MINN., TO CAIRO, ILL.

Name of light.	Date established.	Character.	Distances from St. Paul. Miles.
Newport	Aug. 24, 1875	Fixed stake light.	.8
Pine Bend	May 11, 1875	do	7.15
Gray Cloud	do	do	4.19
Hastings	Aug. 26, 1875	do	10.29
Head Lake Pepin, 1	May 11, 1875	do	30.59
Head Lake Pepin, 2	Sept. 1, 1875	do	1.60
Maiden Rock	May 11, 1875	do	12.72
Lake City	do	do	6.78
Foot Lake Pepin	May 13, 1875	do	10.88
Wabasha, West.	Aug. 23, 1875	do	4.92
Wabasha, East	do	do	1.93
Beef Slough, Upper	Aug. 26, 1875	do	4.97
Beef Slough, Middle	do	do	1.98
Beef Slough, Lower	do	do	1.99
Betsey's Chute, West	Aug. 23, 1875	do	30.129
Betsey's Chute, East	do	do	1.130
Eastmoore	Aug. 26, 1875	do	12.142
Black River	May 13, 1875	do	25.167
Warner's Landing	do	do	39.206
Coon Slough	May 14, 1875	do	2.208
Crooked Slough	do	do	33.241
Clayton, First	Aug. 21, 1875	do	33.274
Clayton, Second	do	do	1.275
Clayton, Third	do	do	1.276
Clayton, Fourth	do	do	2.278
Glenhaven	do	do	6.284
Cassville	do	do	12.296
Fairport	Aug. 19, 1875	do	154.450
Muscatine Prairie	Aug. 29, 1875	do	20.470
Kentuck Crossing	Aug. 19, 1875	do	42.512
Burlington Bar, 1	Aug. 26, 1875	do	12.524
Burlington Bar, 2	do	do	12.524
Pontoosac	Aug. 18, 1875	do	25.549
Gregory's Crossing, 1	May 17, 1875	do	42.591
Gregory's Crossing, 2	Sept. 4, 1875	Floating light	1.592
Gregory's Crossing, 3	do	do	1.592
Gregory's Crossing, 4	May 17, 1875	Fixed stake light	1.593
Nigger Island	Sept. 6, 1875	do	4.597
Tally Island	May 7, 1875	do	4.601
Canton, East	Sept. 6, 1875	do	3.604
Canton, West	do	do	1.605
Lone Tree	May 17, 1875	do	15.620
Quincy	Sept. 6, 1875	do	10.630
South River	do	do	6.636
Whitney's	do	do	5.641
Strong's	do	do	4.645
Gilbert's	Sept. 7, 1875	do	18.663
Munday's	May 17, 1875	do	3.668
Hickory Island	Sept. 7, 1875	do	4.672
Scott's	do	do	3.673
Thomas Chute	Aug. 16, 1875	do	30.705
Stag Island, 1	Sept. 7, 1875	do	10.715
Stag Island, 2	do	do	1.716
Gilead's	April 9, 1875	do	2.718
Carroll's	May 18, 1875	do	2.720
Wilson's Landing	April 9, 1875	do	2.722
Beck's	Sept. 7, 1875	do	20.742
Fruitland	do	do	2.744
Iowa Island	Sept. 8, 1875	do	3.747
Squaw Island	do	do	2.749
Grafton, Upper	do	do	2.751
Grafton, Lower	May 21, 1875	do	2.753
Franklin	Sept. 8, 1875	do	6.759
Eagle Island	May 6, 1875	do	3.762
Piasa	April 7, 1875	do	1.763
Road's Point	Mar. 18, 1875	do	23.786
Broom Corn	Sept. 8, 1875	do	2.788
Chain Dyke	Sept. 24, 1875	do	1.789
Horsetail	Sept. 9, 1875	do	15.804
Jefferson Barracks Dyke	Dec. 4, 1874	Floating light.	1.805

REPORT ON THE FINANCES.

List of lights established in the fifteenth light-house district, &c.—Continued.

MISSISSIPPI RIVER, SAINT PAUL, MINN., TO CAIRO, ILL.—Continued.

Name of light.	Date established.	Character.	Distances from Saint Paul.
			<i>Miles.</i>
Jefferson Barracks, Lower.....	Sept. 9, 1875	Fixed stake light...	1.805
Widow Beard's.....	June 26, 1875	do.....	8.813
Lilly's.....	Dec. 10, 1874	do.....	14.827
Fish Landing.....	do.....	do.....	6.833
John Brickley's.....	Dec. 15, 1874	do.....	7.840
Fort Chartres.....	Dec. 10, 1874	do.....	2.842
Frank Brickley's.....	do.....	do.....	2.844
Glendale.....	do.....	Floating light.....	2.846
White Sand.....	do.....	Fixed stake light.....	1.847
Sainte Genevieve Island.....	Apr. 17, 1875	do.....	6.853
Sainte Genevieve Bend.....	June 25, 1875	do.....	4.857
Kaskaskia.....	Dec. 15, 1874	do.....	4.861
Fairy Island.....	do.....	do.....	3.864
Saint Mary's Crossing.....	Sep. 10, 1875	do.....	4.868
Olive Branch.....	do.....	Red, wreck.....	15.833
Ryan's Landing.....	do.....	Fixed stake light.....	4.887
Grand Chain, Upper.....	Dec. 11, 1874	do.....	49.936
Thebes, Upper.....	do.....	do.....	4.940
Thebes, Lower.....	Dec. 12, 1874	do.....	1.941
Uncle Joe's Hill.....	Mch. 12, 1875	do.....	2.943
Uncle Joe's Bank.....	Dec. 12, 1874	do.....	2.943
Paul Jones.....	do.....	do.....	1.944
Burnham Island.....	Mch. 12, 1875	do.....	3.947
Greenfield.....	Dec. 12, 1874	do.....	30.977

MISSOURI RIVER—KANSAS CITY TO MOUTH OF RIVER.

Name of light.	Date established.	Character.	Distances from Kansas City.
			<i>Miles.</i>
Sibley Chain, 1.....	Sep. 20, 1875	Fixed stake light.....	3.40
Sibley Chain, 2.....	do.....	do.....	3.43
Deering's.....	Sep. 16, 1875	do.....	230.273
Dodd's Island.....	July 30, 1875	do.....	2.275
Bates's Island.....	July 29, 1875	do.....	58.333
Howard's Bend.....	do.....	do.....	55.338

LIGHT-HOUSE BOARD.

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List of lights established in the fifteenth light-house district and discontinued, from date of organization to the close of the year ending September 30, 1875.

MISSISSIPPI RIVER, BETWEEN SAINT PAUL, MINN., AND CAIRO, ILL.

Name of light.	Date established.	Date discontinued.	Remarks.
Sonora	May 17, 1875	Sept. 1, 1875	Temporarily suspended. Navigation stopped by low water.
Wilson's Island	Mch. 18, 1875	Sept. 24, 1875	Channel changed; may be again required.
Cabaree Island	do	do	Channel changed; may be again required.
Saint Louis Chain	Dec. 17, 1874	Dec. 31, 1874	Channel changed.
Illinois Dike	Dec. 9, 1874	Dec. 13, 1874	Channel changed.
Twin Hollows, east	Dec. 4, 1874	Sept. 11, 1875	Channel changed; may be again required.
Twin Hollows, Middle	do	Jan. 15, 1875	Channel changed.
Twin Hollows, West	do	Sept. 11, 1875	Channel changed; may be again required.
Perry's Towhead	do	Dec. 9, 1874	Channel changed.
Calico Island	Dec. 10, 1874	July 20, 1875	Channel changed.
Bogy's Crossing	Dec. 20, 1874	Apl. 6, 1875	Channel changed.
Bogy's	Dec. 11, 1874	Sept. 10, 1875	Channel changed.
Allen's Landing	do	do	Channel changed.
Liberty Island	do	Sept. 15, 1875	Channel changed.
Grand Chain, Lower	Dec. 12, 1874	Apl. 15, 1875	More advantageous location at Burnham Island, establishing same range.

RECAPITULATION.

Fifteenth light-house district.	Number.
Total number of lights on the Mississippi River in operation September 30, 1875	94
Total number of lights on the Missouri River in operation September 30, 1875	6
Aggregate number of lights in operation in the fifteenth light-house district September 30, 1875	100
Total number of lights established in the fifteenth light-house district and discontinued prior to September 30, 1875	15
Aggregate number of lights established in the fifteenth light-house district from date of organization to close of the year ending September 30, 1875	115

Location of buoys in the fifteenth light-house district.

Number.	Location.
1	Obstruction near Clayton; nature unknown.
4	Keokuk Chain.
3	Rocks at Gregory's Crossing.
1	Wreck at Clarksville.
1	Dike above Jefferson Barracks.
2	Wreck at Glendale.

In submitting this report it gives the board pleasure to state that every district of the extended coast of the United States is in good working condition, and has been constantly improved during the past year, and that no effort has been omitted to bring the light-house system of this country into as perfect a state as the circumstances will admit.

Respectfully submitted.

JOSEPH HENRY,
Chairman.

J. G. WALKER,
Commander U. S. N., Naval Secretary.

PETER C. HAINS,
Major of Engineers, U. S. A., Engineer Secretary.

APPENDIX.

AN ACCOUNT OF THE INVESTIGATIONS OF THE LIGHT-HOUSE BOARD
RELATIVE TO ILLUMINATING MATERIALS; BY THE CHAIRMAN OF THE
COMMITTEE ON EXPERIMENTS.

It has been the policy of the Light-House Board since its first establishment not only to adopt the latest improvements which have been made in other countries, but also to add by original investigations to the sum of knowledge on aids to navigation. In accordance with this policy, the Board has endeavored to keep itself informed as to the progress of the light-house systems of other countries, and in the erection of new towers and the supply of new apparatus to adopt those improvements which have from actual experience been preferred; and, furthermore, the committee on experiments have devoted a portion of every year to investigations which might develop new facts tending to greater economy or efficiency in the various appliances by which the dangers of navigation are diminished.

At the commencement of the operations of the Light-House Board, in 1852, sperm-oil was generally employed; this was an excellent illuminant, but as its price continued to advance from year to year, it was thought proper to attempt the introduction of some other material. The first attempt of this kind was that of the introduction of colza-oil, which was generally used in the light-houses of Europe, and is extracted from the seed of a species of wild cabbage, known in this country as rape, and in France as colza. For this purpose a quantity of rape-seed was imported from France and distributed through the agricultural department of the Patent-Office to different parts of the country, with the hope that our farmers would be induced to attempt its cultivation.

Although the climate of the country appeared favorable to its growth, and special instructions were prepared and distributed by the Light-House Board for its culture, and the means of producing oil from it, yet the enterprise was not undertaken with any approximation to success, except in Wisconsin, where a manufactory of rape-seed oil was established by Col. C. S. Hamilton, formerly of the United States Army.

To this manufactory the Light-House Board gave special encouragement, and purchased at a liberal price all the oil that could be supplied; the quantity, however, which could be procured was but a small part of the illuminating material required for the annual consumption of the Light-House Establishment.

The price of the sperm still continuing to increase, the board employed Prof. J. H. Alexander, a chemist of Baltimore, to make a series of investigations on different oils, to ascertain a method of detecting adulterations in them, and to determine the relative economical value of different kinds of oil which might serve for use in light-houses.

In his report Mr. Alexander recommended, as a means of detecting adulterations in oil, a thermal test, which was based upon the amount of heat evolved by mixing a given quantity of the oil with sulphuric acid of a given specific gravity, and noting the rise of temperature as indicated by a standard thermometer in a unit of time. For using this method, it was proposed to ascertain by actual experiment the heat evolved by mixing pure oils with a given quantity of acid, and afterward oils adulterated with given quantities of lard or inferior oils. This ingenious suggestion was, however, never reduced to practice. The method was too refined; the difference of heat evolved was scarcely sufficient to be noted unless great precautions were taken to prevent loss by radiation and conduction, and consequently it could not be employed by ordinary inspectors. In regard to lard-oil, Mr. Alexander failed to employ the proper method of burning it, and consequently rated it very low on the scale of the economical value of light-house illuminants.

In this stage of the history of the subject we are presenting, the chairman of the committee on experiments commenced himself to investigate the qualities of different kinds of oil, and was soon led to direct his attention to the comparative value of sperm and lard oils. The experiments made by Mr. Alexander were with small lamps, and the comparison in this case, as will be shown, was much against the lard-oil.

The first experiment of the new series consisted in charging two small conical lamps of the capacity of about a half-pint, one with pure sperm and the other with lard-oil. These lamps were of single-rope wicks, each containing the same number of strands; they were lighted at the same time, and the photometrical power ascertained by the method of shadows. At first the two were nearly equal in brilliancy, but after burning about three hours the flame of the lard had declined in photometric power to about one-fifth of that of the flame of the sperm. The question then occurred as to the cause of this decline, and it was suggested that it might be due—first, to a greater specific gravity in the lard-oil, which would retard the ascent of it in the wick, after the level of the oil had been reduced by burning in the lamp; or, second, to a want of a sufficient attraction between the oil and the wick to furnish the requisite supply as the oil descended in the lamp; or, third, it might be due in part to the imperfect liquidity of the oil, which would also militate against its use in mechanical lamps.

The lard-oil was subjected to experiments in regard to each of these points

It was found, by the usual method of weighing equal quantities of the two fluids, that the specific gravity of the lard was greater than that of the sperm; and also by dipping two portions of the same wick into the two liquids, and noting the height to which each ascended in a given time, that the surface attraction of the sperm was greater than that of the lard, or, in other words, the ascensional power of sperm was much greater than that of lard at ordinary temperatures.

This method was also employed in obtaining the relative surface attraction of various other liquids; we say surface attraction instead of capillarity, because it was found in the course of these investigations that substances which had less capillarity—that is, less elevating power in a fine tube—had greater power in ascending in the meshes of a wick.

The relative fluidity of the different oils was obtained by filling in succession a pear-shaped vessel, with a narrow neck, of about the capacity of a pint, having a hole in the lowest part of the bottom of about a tenth of an inch in diameter. Such a vessel filled with any number of perfect liquids would be emptied in the same time, whatever their specific gravity.

The heavier the liquid the greater would be the power required to move it, but the motive power would be in proportion to the pressure, or, in other words, to the weight, and therefore all perfect liquids should issue from the same orifice with the same velocity. To test this proposition, eight fluid ounces of clean mercury and the same bulk of distilled water were allowed to run out of the vessel above mentioned; the time observed was the same within the nearest second. It was found, in repeating this experiment with sperm and lard, that the rapidity of the flow of the former exceeded considerably that of the latter; the ratio of time being 100 to 167.

The results thus far in these investigations were apparently against the use of lard-oil; it was observed, however, that in the experiments on the flow of the two oils, a variation in the time occurred which could be only attributed to a variation in the temperature at which the experiments were made. In relation to this point the effect of an increase of the temperature above that of the atmosphere on the flowing of the two oils was observed. By this means the important fact was elicited that as the temperature was increased, the liquidity of the lard increased in a more rapid degree than that of the sperm, and that, at the temperature of about 250°, the liquidity of the former exceeded that of the latter.

A similar series of experiments was made in regard to the rapidity of ascent of the oil in the wick, and with a similar result. At about the temperature of that before mentioned, the ascensional power of the lard was greater than that of the sperm. These results were recognized as having an important bearing on the question of the

application of lard-oil as a light-house illuminant. It only required to be burned at a high temperature, and as this could be readily obtained in the case of larger lamps, there appeared to be no difficulty in its application.

The previous trials had been with small lamps, with single solid wicks, instead of the Fresnel lamp, with hollow burners. After these preliminary experiments, two light-houses of the first order, separated only by a distance of 900 feet, at Cape Ann, Massachusetts, were selected as affording excellent facilities for trying, in actual burning, the correctness of the conclusions which had previously been arrived at. One of these light-houses was supplied with sperm and the other with lard oil, each lamp being so trimmed as to exhibit its greatest capacity. It was found by photometrical trial that the lamp supplied with lard exceeded in intensity that of the one furnished with sperm. The experiment was continued for several months, and the relative volume of the two materials carefully observed. The quantity of sperm burned during the continuance of the experiment was to that of lard as 100 is to 104.

The freezing temperature of lard-oil depends upon the temperature at which it was expelled by pressure from the animal tissues in which it was contained. It is higher, however, than the freezing temperature of sperm, on an average of from 3° to 4° , but this is a matter of no practical objection to the substitution of lard for sperm, since the heat evolved from an Argand lamp is, in cases where the draught passes through the reservoir, sufficient to keep the lard liquid even during the lowest external temperature. Indeed, the small difference in temperature in freezing of the two oils is a matter of little moment, in cases which frequently happen when the temperature of the atmosphere is below zero on the Fahrenheit scale. At such a temperature, both oils would become alike solid, unless some means were afforded for preventing the freezing.

The next step toward the introduction of lard-oil was the devising of a system by which it could be inspected, and the Board assured, before it was too late to remedy the evil, that the lard purchased was of a good quality. This was a matter of great importance, and involved no small degree of responsibility, since the contractor was entitled to his pay immediately after the acceptance of the oil, and while the quantity purchased amounted annually to nearly 100,000 gallons.

The conclusion was arrived at that it was impossible, from any single test that could be applied to small samples, to determine the quality of the oil as applicable to light-house purposes; and that in the present state of our knowledge as to its character the following tests are required to fully insure in all cases the required quality of the article:

1. Specific gravity at 60° F.
2. Liquidity at different temperatures.
3. Freedom from acids or alkalis.
4. Resistance to freezing.
5. Actual burning in fifth-order lamps for at least ten hours.
6. Photometric power after burning one hour, and again after burning ten hours.
7. The condition of the wick at the end of the burning.

These tests are of very unequal value, and several of them might be dispensed with were others reduced to an absolute standard determined by the actual experience of burning in the light-houses.

The specific gravity of impure lard and of that which has been carefully refined differ but little, and hence, unless the experiment be made by means of a delicate balance, the indications will be of comparatively little value. Still, as a given sample might contain some foreign substance which is not usually mixed with this oil, the test with the hydrometer should not be omitted.

In making this test, a cylindrical vessel containing the oil, of sufficient diameter to permit the hydrometer to float freely without hinderance from the sides, should be immersed in a vessel containing several gallons of water, which, when once reduced to 60° by the addition of ice-cold water, can, on account of the great specific heat of

water, be readily kept at that temperature by a slight addition of cold water from time to time, the whole being continually stirred. It is scarcely necessary to state that the vessel containing the oil must be so weighted at the bottom that it will stand erect in the cold bath in which the experiment is made.

Liquidity at different temperatures is a test of the same character as that of specific gravity; although the difference in degree of liquidity of different kinds of oil, such as sperm, whale, and lard, is very considerable, the difference between different samples of lard-oil is small. Still, this test, for a similar reason to that given for the specific gravity, should be applied.

The test for free acids and alkalies is easily made, and should in no case be omitted. A portion is put into beaker-glasses, with a slip of litmus-paper in one and a slip of tumeric-paper in the other, and suffered to remain immersed perhaps twenty-four hours; and at the end of that time, if one of these papers exhibits no redness and the other no brownness, the oil may be considered void of free acid and of alkali, both of which would lessen its value, the former tending to corrode the lamp and the latter interfering with its burning quality.

Resistance to freezing is an important test, but not as easily applied in the case of lard-oil as might at first be imagined. Lard-oil possesses the remarkable property of resisting the influence of a low temperature if suddenly applied, while it will freeze at a much higher temperature if the cold be continued for several hours.

For example, if a small portion of lard-oil be placed in a test-tube and submitted to a rapid diminution of temperature by being plunged in a freezing-mixture, it will remain liquid at a temperature of 19° or 20° , whereas it will congeal at a temperature of 40° if suffered to remain at that temperature for several hours.

The plan adopted for determining the freezing-point of different samples of oil at one operation consisted in making a series of small openings, or windows, closed with glass, in the side of a cylindrical wooden tub about $2\frac{1}{2}$ feet in diameter. Concentric within this tub was placed another cylindrical vessel, of smaller diameter, of zinc, filled with a freezing-mixture of salt and pounded ice. A series of small beaker-glasses, filled with the several samples of oil, were placed opposite the windows in the space between the two cylinders, each containing a thermometer which could be read through the window. The whole was then inclosed by a tightly-fitting cover, through which projected the handle of a crank by which the freezing-mixture could be stirred. The samples of the oil subjected to this cold-air bath gradually pass through the several stages of a diminution in limpidity and clearness to opacity and solidity, the time of each being noted.

The most reliable test is that of actual burning in a lamp of the fifth order, and the measurement of the photometrical power. The objection to the application of this test to the oil of every barrel is the large quantity of oil required and the amount of labor involved in the proper execution of the process. Thus, in testing 60,000 gallons contained in casks of forty gallons each, at least 500 gallons would be required. It is, therefore, evident that this test can only be applied to samples selected from a given lot, while the single barrels are proved to be of a similar character by the more simple tests.

Another method of insuring that all the casks of a given lot contain oil of the same quality, consists in taking a small equal portion from each of several casks and mingling them together; the quality of the compound being ascertained by the application of burning or the other tests.

The determination of the photometrical power is, in the present state of science, unless precaution is observed, a problem of some uncertainty. The difficulty is of two kinds, the first to find a photometer which shall give the ratio of the two lights, and, second, to find an invariable standard to which oil of the proper quality may always be referred. These difficulties, I think, can be sufficiently overcome for the practical purposes of the Light-House Board. The greater difficulty is that of obtaining a standard of reference. For this a sample of lard-oil manufactured by Mr. Alden,

of Boston, was at first employed, but this, itself, was found to be variable, and hence we were obliged to adopt some other standard. The one which has been finally adopted is English sperm candles, which burn with considerable uniformity at the rate of 120 grains per hour, or two grains per minute.

In regard to the investigation, the experiments were carried on under many difficulties. They were made at first in the engineer's office of the second light-house district in Boston, with such appliances as could be procured at the moment, with the assistance of Mr. William Goodwin, the acting light-house engineer, who took much interest in the subject and rendered efficient service.

In the erection of a new lamp-shop at the Staten Island depot, care was taken to make provision for a dark room in which the photometrical examinations could be made with more precision than had been obtained in the temporary apartments previously used. This room extends the whole length of the building, is about 80 feet long by 12 feet wide; the windows are closed by iron shutters to exclude the light; and the floor and all other parts are painted black, after being sanded to remove any glare which might exist.

In the first experiments on lard-oil the photometrical process employed was that of Rumford, which consists in ascertaining the relative intensity of two lights from their distances from a screen on which shadows of equal darkness are thrown by an intermediate body. In this case the relative intensities sought are indicated by the square of the distances in inches and parts of inches of each light from the screen on which the shadows are cast. But this method, which is used by the French manufacturers of apparatus, and is very simple in theory, does not admit of much accuracy.

The arrangement, therefore, known as Bunsen's photometer, was introduced in its stead, and this, with some peculiar modifications, leaves nothing to be desired. This arrangement consists in placing two lights at the extremity of a scale so divided into distances that the relative intensity of the two flames may be immediately read off in terms of candle-power when a small intermediate movable screen is equally illuminated on both sides. This screen is usually formed of a piece of white pasteboard of about four inches square, fixed perpendicularly at right angles to the length of the scale, in a sliding frame, by which it can be brought nearer to or farther from one of the lights. In the center of this square is a circular hole of about half an inch in diameter, which is closed by a piece of thin paper, rendered translucent by a solution of spermaceti in oil of turpentine. This forms a spot which is darker than the other parts of the white screen, and is equally dark on both surfaces when the screen is receiving an equal quantity of light from each flame; the screen is moved backward and forward until this effect is produced, and the index will then point on the graduated scale to the number of the relative power of one of the lights in terms of the other.

The screen may also be made of thin paper, the whole of which is rendered translucent except a round spot in the center, of half an inch in diameter. If a light is placed before the screen on one side, the whole of the greased part will appear dark, on account of part of the light going through the translucent portion. If, now, another light be placed on the opposite side, an equal portion will be transmitted through the pellucid part, and the two surfaces will appear of like intensity when the two lights are equal, or when from their respective distances they throw equal amounts of light on the two faces of the screen.

In order that both sides may be seen at the same moment without moving the head, on one edge of the screen two mirrors, making with each other an angle of 90° , are placed so that the screen itself will bisect the angle.

For dividing the scale into parts related to each other as the square of their distances from a center, the following formula and table will furnish the means.

Let a be the length of the scale, and x the distance from the candle end to the movable screen; then $a-x$ is the distance between the lamp end and the screen. Denote the degree of illumination on the candle and lamp sides of the screen by L and L' respectively. Let the intensity of the candle end equal one candle, while that of the

lamp is n candles. Then, since the illumination of the screen varies directly as the intensity and inversely as the square of the distance, we have the following proportion :

$$L : L' :: \frac{1}{x^2} : \frac{n}{(a-x)^2}, \text{ and when } L=L' \text{ we have } (a-x)^2 = nx^2 \text{ whence } x = \frac{a}{1+\sqrt{n}}$$

For convenience of using this formula it is best to change its form into $x = a \frac{\sqrt{n}-1}{n-1}$

The following table has been computed by calling the length of the scale 100 and assigning successive integral values to n , from 1 to 100. The column A shows the value of x for each assumed value of n :

Number of candles.	A	Number of candles.	A	Number of candles.	A	Number of candles.	A	Number of candles.	A
1	50.00	21	17.91	41	13.51	61	11.35	81	10.00
2	41.42	22	17.58	42	13.37	62	11.27	82	9.94
3	36.60	23	17.25	43	13.23	63	11.19	83	9.89
4	33.33	24	16.95	44	13.10	64	11.11	84	9.84
5	30.90	25	16.67	45	12.97	65	11.04	85	9.79
6	28.99	26	16.40	46	12.85	66	10.96	86	9.73
7	27.43	27	16.14	47	12.73	67	10.89	87	9.68
8	26.12	28	15.89	48	12.61	68	10.82	88	9.63
9	25.00	29	15.66	49	12.50	69	10.75	89	9.58
10	24.03	30	15.44	50	12.39	70	10.68	90	9.54
11	23.17	31	15.23	51	12.28	71	10.61	91	9.49
12	22.40	32	15.02	52	12.18	72	10.54	92	9.44
13	21.71	33	14.89	53	12.08	73	10.48	93	9.40
14	21.08	34	14.64	54	11.98	74	10.41	94	9.35
15	20.52	35	14.46	55	11.88	75	10.35	95	9.31
16	20.00	36	14.29	56	11.79	76	10.29	96	9.26
17	19.52	37	14.12	57	11.70	77	10.23	97	9.22
18	19.07	38	13.96	58	11.61	78	10.17	98	9.17
19	18.66	39	13.80	59	11.52	79	10.11	99	9.13
20	18.27	40	13.65	60	11.43	80	10.05	100	9.09

The standard adopted with which to compare all other lights is, as we have said, that of the London sperm candle, which, under ordinary conditions, burns 120 grains of sperm per hour.

If it burns more or less than this amount during the trial, a correction of a proportional amount is made in the results.

This standard, however, is too small for determining the power of large lamps, and for this purpose an intermediate standard is provisionally adopted. For example, in determining the power of a lamp of the first order, the power of a lamp of the fourth order is first obtained, and this is used as a comparison with the larger lamp.

In the case of the arrangement at the Staten Island depot, for photometrical measurements, three scales are employed, diverging from a center at which the lamp to be measured is temporarily placed; at the farther end of each scale is placed a sperm candle, to serve as the standard of comparison.

These scales are of different lengths, one being 100 inches in length, another 150 inches, and the third 200 inches; besides these, one of the scales is occasionally replaced by one of 700 inches in length, which is put up in sections.

As the semi-diameter of the burner of the lamp and that of the candle must be included in the length of the scale, a portion of the latter at each end is cut off. In adjusting the scales, therefore, to their places, the measurement must be taken from the middle of each scale; thus in the case of the one of 200 inches in length, the middle of it must be just 100 inches from the center of the lamp on one side, and 100 inches from the center of the candle on the other.

In making the examination, three observers simultaneously, one at each scale, take the photometric readings, and the mean of the three results is adopted as the candle-power of the light under examination.

In the examination of oil previous to purchase, as we have said before, a lamp of the fifth order is charged with the oil in question, and when in a state of equilibrium

of combustion it is subjected to the trial. For greater precision ten readings are taken on one side of the scale, and then the photometer is reversed and as many taken from the opposite side. In this way the mean of sixty readings, twenty on each scale, furnishes the data on which the character of the oil principally rests. As a means of simultaneously weighing the candles for checking the effects of their irregular burning, three balances are provided, each of which bears one of the candles in a socket supported by a metallic link, through which the scale-beam passes and is attached to the hook of the scale-pan below.

On the opposite scale-pan a series of grain weights are placed, which can be taken off without disturbing the equilibrium of the scale, by a pair of pincers; the interval of time during which a given grain weight is burned is marked by a watch. If the interval is equal to two grains for each minute, the candle is burning at its normal rate; if not, a correction is made by simple proportion, which is applied to the measurement previously obtained.

The lamps containing the oil for trial are lighted and trimmed in an adjoining apartment. They are introduced into the dark room through a window closed with a sliding shutter. In order to prevent an overflow of oil at the burner by the oscillation of the liquid in the reservoir by the agitation of transfer, each lamp is placed on a small carriage moving on a railway, which, passing through the window, enables the lamp to be placed in its position with rapidity, and without the slightest disturbance of the equilibrium of the oil.

The temperature of the room is also noted, and, as far as possible, it is kept at a heat of not far from 70°. For this purpose, during warm weather the inspection may be made at night.

For reading the divisions on the scales in the dark room, a mirror is employed to throw the light of the lamp under inspection on the graduation.

To exclude all extraneous light, the three candles and the lamp to be tested are each surrounded by a cylindrical sheet-iron screen, painted black, through which a hole a little larger than the flame allows the light to pass along the scale to the photometer. The trial-lamps are those of the fifth order. Each is allowed to burn, after it has been lighted, an hour before being submitted to the photometrical measurement. If it gives a power less than 8 candles, the oil is rejected. If it passes that test, it is then allowed to burn undisturbed without being trimmed for 8 or 9 hours longer, and if it is found at the end of that time to exhibit no diminution in the brilliancy of the light it is considered worthy of adoption, especially if after this it continues to burn 4 or 5 hours with no perceptible diminution which can be detected with the naked eye. The best lard-oil will burn sixteen hours without trimming.

Each candle before the measurement commences is suffered to burn until it has assumed a perfect and uniform rate of consumption; it should be prevented from guttering by removing a portion of the melted spermaceti which may accumulate in the cup at the top of the candle beyond the power of the feeble incipient flame to consume, by absorbing it by one end of a strand of candle-wick cautiously introduced. If any portion of the spermaceti is suffered to run down the side of the candle and drop off below, the correction for variation in burning will be worthless.

All materials for the use of the Light-house establishment are purchased by contract in accordance with published specifications as regards quality and certain conditions. The award is given to the lowest bidder, provided he can offer trustworthy surety as to his ability to fulfill the contract. Preference is, however, given when bids are equal, or nearly so, to the bidder who is a manufacturer of the oil and not a mere vendor of the article. During the inspection permission is granted to the contractor to be present at the operation, in order that he may be assured that full justice is done him in the examination. After seeing the precision with which the photometric and other processes are conducted, he is generally fully satisfied as to the results obtained, even though his oil may have been rejected.

The oil is delivered in iron-bound casks, varying from 38 to 50 gallons. These are placed, previous to inspection, under a shed and arranged in different lots, each containing oil of the same quality. From different casks samples are taken in tin canisters of a capacity of about half a gallon; each canister being marked with the number of the lot and the cask from which the oil was taken. Before the sample is drawn from the cask the oil within is thoroughly mixed by rolling the cask, or by stirring. The object of this is to obtain in the sample an average amount of solid matter which may be contained in the oil.

The purest lard-oil is that which is manufactured by submitting the solid leaf-lard to great pressure during the coldest period of winter. Oil of this quality is used for burning in small mechanical lamps; it gives a bright flame and does not incrust the wick. The Light-house lamps, however, being of a much larger size, and evolving a much greater amount of heat, can consume oil of a coarser character; and indeed, it has been found that oil containing a certain amount of solid matter, provided the latter is not too much in quantity to be consumed by the lamp, gives a higher illuminating power. On this account, before this fact was generally known in the trade, complaints were made of the Light-House Board giving the preference to oil which, in the market, would not be considered of the first quality.

The quantity of oil is estimated by weight, allowing 7.6 pounds per gallon. It is weighed in gross and afterward emptied into large tanks in an underground vault. The empty barrels are next weighed; the weight of these deducted gives the net weight of the oil.

Previous to the establishment of the general light-house depot at Staten Island, from which all the supplies are now distributed, and the lamps and other light-house appliances are prepared for immediate use, the oil was received at various ports along the coast, in accordance with terms of the contract, and was stored until wanted for use in cellars hired for the purpose.

The Board, however, after the introduction of lard-oil, constructed a spacious underground receptacle capable of containing 50,000 gallons of oil, and retaining it during the whole year at a temperature not to exceed 65° Fahrenheit.

The underground vault contains 5 tanks, each of the capacity of ten thousand gallons. On each tank is a register, consisting of a glass tube so divided as to give the contents in hundreds of gallons. The oil is delivered in three installments: The first on the 1st of May, the second on the 10th of June, and the third on the 22d of July. The vault and tanks were constructed under the direction of General Poe, while engineer secretary of the Board, who also took a lively interest in the introduction of lard-oil and in the preliminary experiments for determining its quality.

A photometer room was afterward fitted up in the Smithsonian Institution, in which a series of investigations were made in regard to the illuminating power of different oils, and in the same investigations established a series of experiments relative to their chemical employments. In these the chairman was assisted by Professor C. M. Wetherill, whose untimely loss the science of this country has been called to mourn. Among the investigations in the laboratory are the following relative to the expansions of different oils, intended to facilitate the purchase, the measurements being made at different temperatures. To obviate the necessity of the correction for temperature the oil is now purchased by weight. The following results may, however, be of value in the application of different oil to light-house purposes:

REPORT ON THE FINANCES.

Experiments upon light-house oils.

[Density and volume of oils at different temperatures.]

Temperature, C.	Sperm oil.		Whale, (unrefined.)		Lard, (refined.)		Lard, (unrefined.)		Kerosene.	
	Volume.	Density.	Volume.	Density.	Volume.	Density.	Volume.	Density.	Volume.	Density.
4°.....	1.0000	0.89256	1.0000	0.92825	1.0000	0.92488	1.0000	0.92086	1.0000	0.81199
10°.....	1.0053	0.88783	1.0049	0.92370	1.0042	0.92103	1.0000	0.92086	1.0050	0.80799
15°.....	1.0095	0.88418	1.0095	0.91952	1.0093	0.91632	1.0051	0.91614	1.0106	0.80347
20°.....	1.0134	0.88072	1.0145	0.91498	1.0124	0.91356	1.0109	0.91090	1.0152	0.79984
25°.....	1.0168	0.87778	1.0166	0.91311	1.0164	0.90992	1.0146	0.90760	1.0187	0.79709
30°.....	1.0208	0.87432	1.0200	0.90999	1.0204	0.90641	1.1169	0.90556	1.0234	0.79346
35°.....	1.0243	0.87139	1.0236	0.90688	1.0247	0.90351	1.0204	0.90247	1.0276	0.79020
40°.....	1.0286	0.86721	1.0297	0.90146	1.0278	0.89986	1.0244	0.89897	1.0321	0.78674

Temperature, C.	Water, (C. M. W.)		Water, (Kopp.)		Water, (Kopp.) at 0° C.=1 vol.				Alcohol, (Pierre), vol. at 0° C.=1 vol.	
	Volume.	Density.	Volume.	Density.	C.	Volume.	C.	Volume.	C.	Density.
4°.....	1.00000	1.00000	1.0000	1.00000	0°	1.00000	9°	1.00005	0°	1.0000
10°.....	1.00048	0.99952	1.0003	0.99975	1°	0.99995	10°	1.00012	10°	1.0107
15°.....	1.00086	0.99915	1.0008	0.99918	2°	0.99991	15°	1.00070	20°	1.0217
20°.....	1.00176	0.99824	1.0017	0.99831	3°	0.99989	20°	1.00157	30°	1.0331
25°.....	1.00303	0.99698	1.0028	0.99717	4°	0.99988	25°	1.00271	40°	1.0448
30°.....	1.00447	0.99555	1.0042	0.99579	5°	0.99988	30°	1.00406		
35°.....	1.00619	0.99384			6°	0.99990	35°	1.00570		
40°.....	1.00774	0.99232			7°	0.99994	40°	1.00753		
					8°	0.99999				

Organic analyses of light-house oils.

NO. 1.—REFINED WINTER-PRESSED LARD-OIL.

	First experiment.	Second experiment.	Mean.	By calculation.	
Carbon	76.87	76.53	76.75	C ₄₄	76.74
Hydrogen	11.58	11.63	11.61	H ₄₀	11.63
Oxygen			11.64	O ₈	11.63
Formula = C ₄₄ H ₄₀ O ₈			100.00		100.00

NO. 2.—CRUDE LARD-OIL.

Carbon	77.07	76.70	76.88	
Hydrogen	11.72	11.69	11.71	
Oxygen			11.41	
			100.00	

NO. 3.—SPERM-OIL.

				Of C ₄₀ H ₃₈ O ₄
Carbon	79.52	79.41	79.46	C ₄₃ — 79.70
Hydrogen	12.28	12.28	12.28	H ₄₀ — 12.28
Oxygen			8.26	O ₄ — 8.02
				100.00

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Experiments of mixing oils with oil of vitriol of 66° Beaumé, at 62° F.—WINTER-PRESSED LARD-OIL.

FIRST EXPERIMENT.

Of oil, 2 fluid ounces; of acid, 1 fluid ounce:

Temperature of oil before mixing.....	70° F.
Temperature of oil after slow mixing.....	130°
Difference.....	60°
At the expiration of 3 minutes, temperature.....	134°
At the expiration of 4 minutes, temperature.....	134°

SECOND EXPERIMENT.

Same quantities:

Temperature before mixing.....	70° F.
Temperature after mixing rapidly.....	169°
Difference.....	99°

THIRD EXPERIMENT.

Idem:

Temperature before mixing.....	70° F.
Temperature after mixing.....	165°
Difference.....	95°

FOURTH EXPERIMENT.—CRUDE LARD-OIL.

Temperature before mixing.....	66° F.
Temperature after mixing.....	164°
Difference.....	98°

Refrigeration of the oils.

Those experimented upon were whale, sperm, refined lard; and crude lard.

FIRST EXPERIMENT.

At 30°.2 F., they were all sirupy; in the crude lard-oil, a yellowish solid began to separate.

At 26°.6 the sperm-oil began to solidify.

At 24°.8 the refined lard began to yield a white precipitate.

At 17°.6 the whale-oil was a thick sirup, without deposit. The crude lard-oil was quite hard.° The pure lard-oil was not as hard as the crude lard-oil. The sperm-oil was not as hard as the pure lard-oil. These experiments performed in test-tubes.

SECOND EXPERIMENT.

Upon pure winter-pressed lard-oil, in a test-tube.

At 17°.6 F., begins to deposit flakes of solid matter.

At 14°. is quite thick.

At 10°.4 it is perfectly solid.

If, now, the temperature rises, a small portion of the oil remains solid until the temperature reaches 44°.6.

THIRD EXPERIMENT.

The oils were placed in large cylinders and exposed to a temperature of 24°.8 F., with the following results:

1. Crude lard-oil, much sediment.
2. Sperm-oil, ditto.
3. Pure refined lard-oil, a little sediment.
4. Winter-strained lard-oil, very little sediment.
5. Whale-oil, no sediment.

In the use of sperm-oil, it was found that the purer it could be obtained the better, and hence it was the custom to strain the oil through clean white sand previous to using it, and also the drippings. In the case of lard, however, it was found that removing all the solid matter diminished its photometric power.

All fatty oils absorb oxygen, which unites with them to form oxides of their combustible ingredients; oil, therefore, freely exposed to the air, must in time gradually diminish in its power of combustion. It should not, therefore, be open to the atmosphere when the oil is to be stored, but covered with a thin wooden plane, which floats upon the surface of the oil, and thus in a great measure excludes the air. The freezing of lard-oil does not appear to affect its quality.

Considerable difficulty was experienced in the introduction of lard-oil, on account of the objection to it on the part of the keepers; in some cases from the want of experience in using it, and in others from the interference of vendors of sperm-oil. This difficulty, however, was obviated by a resolution of the board, by which any keeper that declared his inability to burn lard-oil should be requested to resign, since it had been abundantly proved that this oil, with proper management, could be made favorably to compete with sperm. Its introduction was a matter of great importance in an economical point of view; it saved the Government \$100,000 annually for several years.

Another important step in the introduction of lard-oil was that of furnishing a lamp which would burn it with the greatest perfection. This was due to the invention of Mr. Joseph Funck, foreman of the lamp-shop. As we have said, in order to burn lard-oil it is necessary it should be kept at a high temperature, and for this purpose the heat of the draught of the lamp was passed through the center of the reservoir.

Previous to the change in the illuminating material there had been used in the Light-House Establishment three classes of lamps, viz, the mechanical lamp for the first, second, and third orders, and the moderator and fountain lamps for the fourth, fifth, and sixth orders.

In the mechanical lamp the oil was placed in a reservoir below the burner, and pumped up by means of clock-work.

This apparatus is of a complicated character, and is subject to derangement. The valves must be renewed from time to time, and the clock-work cleaned. The proper performance of these operations is beyond the skill of an ordinary keeper, and requires the frequent aid of a trained lampist.

The moderator lamp is less complicated, and was invented to obviate the difficulties just mentioned. In this the oil is elevated by the descent of a heavy piston, and forced up through a small conical hole, the flow being regulated by the conical end of a wire, which is gradually withdrawn as the weight descends, so as to give a less-obstructed flow as the hydrostatic pressure of the oil increases. From this arrangement it takes its name of moderator lamp.

This apparatus, however, is liable to irregularity on account of derangement of the supplying-apparatus, the varying friction of the packing of the piston, as well as the change in the flow of the quantity of oil, owing to its less liquidity due to a diminution in temperature.

The reservoir of the fountain-lamp consists in an air-tight vessel, usually cylindrical, from the bottom of which descends a tube, terminating at the open end in a small cup, from which the burner is directly supplied with oil on the well-known principle of the bird fountain, this vessel being filled with oil by inverting it and pouring in the liquid through the open end of the tube. It is then re-inverted and the end of the tube inserted in the small cup below the level of the oil which it contains. The oil in the reservoir in this condition is supported by the pressure of the atmosphere on the surface of the oil in the cup. When this surface is lowered by burning, the end of the tube is opened, and a bubble of air passes up and an equal bulk of oil descends, and in this way a nearly constant level of oil is maintained. I say nearly constant because

the air which goes up is of some volume and in the act of passing up produces an oscillation which, in some degree, affects the steadiness of the burning of the flame.

There is, however, a greater defect in this lamp from the oscillations in the level when the reservoir has been exhausted of a considerable portion of its charge of oil. In this case the arrangement is one similar to an air thermometer with a large bulb, and is affected by a sudden draught produced by the opening and shutting of a door or the ordinary ventilation of the lantern. This was partly remedied by bending the tube, and thereby increasing the resistance to a sudden change in the level of the oil.

The improvement of Mr. Funck consisted in substituting for these lamps one of constant level, in which the oil is placed above the burner, and the flow of oil necessary for perfect combustion is regulated by a small floating piston, placed in an enlarged portion of the supply-tube, and carrying on its upper surface a conical projection which increases or diminishes the size of the supplying orifice in accordance with the rapidity of combustion. This lamp is not only free from the objections pertaining to the other lamps, but is less expensive and better adapted to the burning of lard-oil. It affords a freer combustion, and consequently a more intense light, though at the cost of a larger amount of the burning material.

In this lamp the heated air and products of combustion pass through a cylindrical opening in the reservoir, which is placed directly above the lamp, the opening in it forming as it were a prolongation of the chimney, thus not only preventing the oil from freezing in the coldest weather, but supplying it to the burner at the temperature best adapted for perfect combustion.

In regard to the comparative character of lard and colza oil, we may be allowed to print the following letter from Colonel Hamilton, the manufacturer of the latter oil, who was present at the trial to which he alludes :

"FOND DU LAC, May 16, 1868.

"DEAR COMMODORE: I must confess my great disappointment at the result of the experiments at Staten Island. It is not really so much the failure of rape-seed oil, as the undeniable excellence of lard-oil as a burner. I fully believe that our rape-seed oil of this year is as good as any that was ever made in Europe, and I know it is far better than any we have ever before made.

"I am satisfied now, that for self-heating lamps, there is no oil that will bear comparison with lard, but I am equally satisfied that no colza oil will yield a better result than ours, under exactly the same tests. We have but one more experiment to make with colza; it is its extraction by chemical displacement. If this fails, we shall abandon the whole business. If all things are put together, I think the following statement will be allowed, to wit: Our colza oil is equal to any foreign colza. It is better than any we have heretofore made. It is better than sperm or any other burner, excepting only lard-oil.

"Our failure, then, is owing to the superior excellence of lard-oil, which, under the persistent investigation of the board, has been shown to be the best and cheapest safe illuminator available.

"The Board are entitled to great credit in producing this result. It will be remembered that but a few years since lard-oil was pronounced unsuitable for light-house purposes, but the perseverance of the Board has brought out the fact that it is much the best and cheapest oil, and that the expenses of lighting the coasts and harbors has been thereby greatly reduced. Surely the country at large should acknowledged this, and give due credit to the Board. We have endeavored to do with colza what the Board have effected with lard-oil, and we have been unsuccessful both for ourselves and the light-house interest. The undertaking has been no source of profit to us, and had the capital and time that have been devoted to colza been used in our other branch of manufacture, (linseed oil,) it would at least have re-imbursed us with a fair remunerative return. As regards the oil we have offered, we have hoped the Board would take it. I do not think we can improve upon the quality, and it is the last we shall venture

to offer to the acceptance of the board, for we shall henceforth abandon the manufacture, except for local wants.

"We are grateful to each member of the board for the interest they have always shown in our undertaking, and for their uniform kindness and courtesy. Accept, my dear Commodore, for yourself and your associates in the board, my warmest thanks for your many kind expressions of interest, and believe me, truly and gratefully, yours,

"C. S. HAMILTON.

"Com. A. A. HARWOOD,

"United States Navy, Secretary Light-House Board, Washington, D. C."

From the date of the introduction of lard-oil in 1865-'66, and '67, until the end of 1873, when the attention of the board was again directed to the study of mineral oil, continual improvements were made in the processes of the preservation and inspection, and also in the lamps and other appliances for its application, and nothing further as a light-house illuminant was required. It is therefore with regret on account of the increased price of the article, due in some degree to the reputation as a burning material given it by the board itself, that we are urged to substitute for it a less reliable but a much more economical material.

At the time lard-oil was introduced a series of experiments was made on the comparative value of the different petroleum oils used in this country. They were, however, all considered too dangerous to be intrusted to the ordinary keepers of the light-stations of our coast. Since the date, however, of these investigations improvements have been made in the manufacture of these oils, by which a much greater range has been obtained in the temperature at which they give off an explosive vapor. During the last two years, therefore, a new series of investigations has been made relative to these illuminating agents, of which we propose in the succeeding pages to give a brief account.

The crude petroleum of the Pennsylvania oil region are of a greenish or yellowish appearance, and have a specific gravity of 45° to 49° Beaumé, at a temperature of 60° Fahrenheit. Some are so volatile as to evaporate rapidly at the ordinary temperature of the air, rendering it dangerous to approach an open cask of crude petroleum with a flame; others are much less volatile, requiring a temperature of from 200° to 300° Fahrenheit to evaporize them. The volatility of the hydro-carbons is intimately connected with their specific gravity. They become heavier as the volatile ingredients are driven off by heat. The inflammability of the oils is also connected with their volatility and the specific gravity. The light volatile oils ignite, as we have said, on the approach of a burning match at ordinary temperatures, while the heavier require a higher temperature for ignition. The process of manufacturing these oils consists in separating them from each other as they occur in the crude oil of the springs by what is called fractional distillation; for this purpose the crude oil is placed in an iron still provided with a worm of the same metal submerged in a tank of water for cooling it; the still is then gradually heated; the first product that passes over is gaseous at ordinary temperatures, and can only be condensed into a liquid form by cooling the worm with ice, or by compressing the gas with an air-pump into a strong receiver. After all the vapor is given off at the temperature, say at 90°, the temperature of the liquid in the still is raised, a liquid is produced which exhales in vapor at a higher temperature and is of greater density—and so on a series of liquids are produced, each of which requires to be heated to a higher degree before taking fire on the approach of a lighted match—these more volatile vapors are heavier than atmospheric air, and when suffered to escape from the cask containing them in a separate state will flow along the surface of the floor of a room, and reaching a distant fire-place will ignite, and burning backward to the reservoir will set fire to the oil from which they emanated.

Many serious accidents have occurred in this way, by the firing of a canister containing petroleum oil which has been left open, although at a distance in some cases of from 20 to 30 feet from a lighted fire. Another source of danger from the lighted oils from which the more volatile vapors arise results from the fact that these vapors when

mixed with a certain portion of atmospheric air explode on the approach of a flame with extreme violence. When the proportions of vapor and air are equal no explosion takes place; but when they are in the ratio of 10 parts of the vapor in volume to 100 parts of air the explosion is most violent; when the quantity of air or of petroleum vapor is increased or diminished the explosion is less violent until one or other becomes excessive, when the vapor kindles without explosion, as is the case with ordinary street gas when issuing from the burner.

A notable case of the explosive quality of a mixture of petroleum vapor and air occurred in connection with the light-house service in 1864, on Lake Michigan. The keeper in one of the light-houses of this district substituted on his own responsibility an ordinary kerosene lamp of tinned iron, for the usual lard-oil lamp. This gave a good light and required no trimming during the night; it burned well for several nights; and the keeper congratulated himself on the success of what he considered a very important experiment. Unfortunately, however, on the last morning that the lamp was used, he attempted to put it out in the usual way by blowing the air from his lungs down the chimney, when an explosion took place, which scattered the oil in a burning state over the deck of the tower and also on his clothes; in his fright he ran down the stairs of the tower, and had scarcely reached the ground when a violent explosion was heard above, which blew off the whole lantern and broke the lenticular apparatus.

The explanation of these two explosions is not difficult. The burning of the oil during the night left a space void of the liquid in the reservoir of the lamp, which was filled with air and vapor which happened on this occasion to be near the explosive proportions; on blowing air down the chimney it mingled with the vapor furnishing the quantity necessary for the violent combination, and consequently the explosion occurred which broke the lamp. The second explosion was caused by the ascent of the vapor from the burning oil on the deck, and took place when the quantity exhaled amounted to a tenth part of the volume of air present. The two then suddenly rushed into combination, producing the effects that we have mentioned.

Under favorable circumstances this lamp lighted with kerosene might have burned silently for several weeks, but in accordance with the doctrine of chances, time enough being given, an explosion was inevitable. Facts of this kind in connection with the difficulty experienced in burning mineral oil in light-house lamps induced the Light-House Board to adopt lard-oil.

Various experiments have, however, been made from time to time by the Light-House Board with a view to the introduction of petroleum as an illuminating material, as soon as oil could be obtained in this country of a suitable character, lard-oil having advanced in price to such a degree as to render this change desirable in an economical point of view. In the mean time various experiments had been made in France and England for the purpose of introducing mineral-oil as a light-house illuminant, but it was not until 1873 or 1874 that the result was entirely satisfactory.

The process of manufacturing the oil has been very much improved in this country of late years, and there are now several companies which profess to produce oil entirely safe, and otherwise suitable for light-house purposes.

In view of further experiments with mineral-oil, an advertisement was inserted in the papers, in 1874, requesting manufacturers to send samples of their oils to be tested at the light-house depot at Staten Island, and in accordance with this a number of specimens were received and submitted to examination.

The first test to which the oils thus furnished were submitted was that of flashing, that is, the determination of the temperature at which the oil gives off a vapor which will flash into a flame on the approach of a small taper, or, in other words, which indicates the rise of a vapor which, mixed with atmospheric air, will tend to produce an explosion. The flashing temperature differs, however, from that at which the liquid takes fire as a whole. This will be understood if we suppose that two liquids

have been mixed together, a light and a heavy one; the flash in this case will be due to the vapor from the lighter mixture, while the burning is due to the temperature at which the compound is fired. To make this flashing test requires considerable precautions. First, the oil to be tried is gradually heated by a spirit-lamp in a water-bath, a sensitive thermometer being suspended in the oil with the bulb slightly below the surface; the heat of the water is very slowly increased by removing from time to time the spirit-lamp from under the basin of the water-bath which contains the oil, and the point of flashing is obtained by passing over the surface of the oil a small flame until the first indication of flash is observed. The flame should not be so large as to heat the surface, and is best produced by a very small jet of gas from a glass tube drawn nearly to a point and connected with the gas-pipe of the house by a tube of India-rubber, the quantity of gas being regulated by a stop-cock, so that the flame is a mere pencil of light about a quarter of an inch in length and a twentieth in diameter. The basin which contains the oil is about four inches in diameter, and is sometimes covered with a plate of thin glass, the thermometer passing through an aperture in this cover, and a larger hole being left open in the same for inserting the pencil of the flame. The basin containing the oil is sometimes left entirely open, the cover being discarded, but we do not think this as safe a method as the other. Great caution must be taken in raising the temperature very gradually, so that every part of the liquid may have the same heat and the thermometer truly indicate the temperature. If the rise of the temperature be very sudden, the thermometer will not respond, and the real flashing temperature will be higher than that which is indicated.

The next test is that of firing of the mass of the liquid, which is sometimes 10 or 12 degrees higher than that of the flashing temperature, but generally the two are very near each other.

The next test is the determination of the specific gravity. This was obtained by weighing, in a glass flask with a narrow neck, an equal quantity of distilled water and of the oil in question; the ratio of the two, reduced to water as unity, gave the specific gravity required. To facilitate the operation, a flask, containing just 1,000 grains of distilled water, was balanced by a permanent weight. The scales were tested by double weighing. The first series of weighing was made at the temperature of 74° , that of the apartment in which the experiment was conducted; but oil and other substances change their bulk, and consequently their specific gravity, with a change of temperature. It is therefore necessary, in order that results may be compared, that the experiments be all made at the same temperature, or reduced to a standard temperature. The temperature formerly adopted in England for specific gravity is 62° Fabr.; but in the case of petroleum, the temperature of 60° has been adopted in this country and England. In the first series of experiments made with the oils in question, the weighing was conducted at a temperature of 74° , as we have said, namely, that of the atmosphere at the time. A series of experiments at a lower temperature was afterward made, in order to obtain a correction by which to reduce the specific gravity first obtained to that of a temperature of 60° ; but as each oil exhibits a different rate of expansion by heat, the process became very laborious. Experiments were therefore made to determine the correctness of obtaining the specific gravity of the oils by means of a hydrometer. This was found to differ from that obtained by weighing within one per cent., and was therefore concluded to be sufficiently accurate for practical purposes.

To obtain the specific gravity of the oils by means of a hydrometer, a vessel containing, say, 10 gallons of water, of a depth of about 14 inches, is provided, into this are introduced several glass cylinders to contain the oil, and into these cylinders the hydrometers are plunged, the level of the oil being so far above the water that the under contact of the surface of the liquid with the scale may be observed. Before inserting the glass cylinders containing the oils into this water-bath, the liquid is brought, by mixing ice-water with it, to the temperature of 60° , at which temperature it may be kept for a long time, on account of the large quantity of the liquid and the great specific heat of the water. A change of temperature may be prevented by occasionally

adding a small quantity of ice-cold water, care being taken to mingle the mixture by stirring. By this process may be obtained the specific gravity at 60° of a large number of samples in a comparatively short time. In this country and England the density or relative weight of petroleum oils is generally expressed in terms of the arbitrary scale of Beaumé's, instead of that of the specific gravity. The following table gives the equivalent of the Beaumé's scale in terms of specific gravity:

Beaumé's hydrometer for liquids lighter than water.

Degrees.	Specific gravity.	Degrees.	Specific gravity.	Degrees.	Specific gravity.	Degrees.	Specific gravity.
10	1.000	23	.918	36	.849	49	.789
11	0.993	24	.913	37	.844	50	.785
12	.986	25	.907	38	.839	51	.781
13	.980	26	.901	39	.834	52	.777
14	.973	27	.896	40	.830	53	.773
15	.967	28	.890	41	.825	54	.768
16	.960	29	.885	42	.820	55	.764
17	.954	30	.880	43	.816	56	.760
18	.948	31	.874	44	.811	57	.757
19	.942	32	.869	45	.807	58	.753
20	.936	33	.864	46	.802	59	.749
21	.930	34	.859	47	.798	60	.745
22	.924	35	.854	48	.794	.....	.....

Another test to which the mineral oil was subjected was that of a reduction of temperature. For this purpose the samples were placed in an air-bath reduced to the temperature of 25°. At this temperature several of the oils exhibited a thickened condition, especially those of the higher fire-test. The apparatus used for this purpose was the same as that previously described as employed in the case of lard-oil.

The next test to which the oil was subjected was that of its liquidity. This test is of some importance in regard to lamps in which the oil is pumped up by machinery, and also as to the solid matter in the oil. It therefore gives a characteristic of the oil which with others serves to determine its degree of impurity. For this purpose the same method was employed as that described for determining the liquidity of lard-oil.

The liquidity exhibited by this process was very different in different oils.

All the experiments on the flowing of the oils were made at the temperature of the air, which was from 72° to 74°. In this case, as with lard, a marked difference was found in the time of flowing at different temperatures, and hence for comparison the experiments should be made at a standard temperature.

Another experiment was made to ascertain whether oils of higher flashing test gave off a vapor at the ordinary temperature of the atmosphere; for example, at about 70°.

For this purpose a barometer tube of about 33 inches in length, and an interior diameter of one-half of an inch, was filled with warm mercury inverted in a basin of the same metal.

The finger was then placed under the open mouth of the tube in the basin and the tube slowly inverted so as gradually to pass the vacuum through the whole length of the column, and thus to gather up any particles of air that might adhere to the side of the tube; this left a space when the inverted tube was held vertically of about three inches of the open end of the tube unfilled with mercury; this being refilled, the finger applied to the open end and the tube again replaced with the open end downward in the basin, the vacuum produced by this process was nearly as perfect as if the mercury had been boiled in the tube, or the latter filled with the metal in a vacuum.

After this, a small quantity of oil to be tested was drawn into a small glass syringe, the curved point of which being introduced beneath the open mouth of the tube under the surface of the mercury, a small quantity of the liquid was injected into the column; this rapidly rose by its levity to the top, and there a portion of it flashed into vapor, as was evident by the depression of the mercurial column.

From this experiment it is evident that kerosene, even of a high flashing temperature, does give off vapor at ordinary temperatures. It is, however, of so feeble tension that it does not appear capable of producing explosion unless considerable time be allowed for its accumulation. It might not be apparent that although vapor was given off in a vacuum, as in this case, that it would be given off under the full pressure of the atmosphere; but it has been shown by the experiments of Mr. Dalton and others, that vapors diffuse themselves in a space filled with atmospheric air with the same elasticity and quantity as in a vacuum, time only being required to produce the effect in the atmosphere.

The oils were also examined as to the remains of any free acid which they might contain, by simply immersing in each sample a slip of litmus paper, which was suffered to remain in the liquid for twenty-four hours; under this test several of the samples exhibited a redness, denoting the presence of an acid which might corrode the metal of the lamps, also indicating the want of a thorough washing of the oil by an alkaline water.

Another experiment, which was exhibited to us by one of the proprietors of the oil which has a flashing test of about 140° , consisted in lighting a lamp-wick charged with the oil and plunging it into a vessel filled with the same. The oil did not take fire, although the combustion of the wick was vigorous, and, indeed, the flame was put out when the wick was plunged beneath the surface of the oil. This experiment, which is frequently exhibited to the public, tends to give a sense of safety in the use of mineral oil which is at least in some degree fallacious.

To illustrate this the following experiments were made: First a slip of cotton cloth, about 6 inches wide and 2 feet long, was saturated with oil having a flashing test of 140° , and suspended vertically from a ring-stand; a lighted match was then applied to the middle of the length of the slip, when it instantly took fire, and burned with a fierceness which was truly appalling.

After this two pieces of cloth, one of cotton and the other of woolen, were saturated with petroleum and placed flat on two pieces of tinned iron to protect the floor. On each of these was then dropped an ordinary friction match in a state of ignition. They both broke instantly into flames, which soon entirely consumed the cloth, although but little air could obtain access to its under side, and notwithstanding the good conducting power of the tinned iron.

In a similar experiment made with the same cloth saturated with lard-oil the cloth did not take fire when a lighted match was dropped upon it.

Two cotton cloths the same size were saturated, one with lard-oil, the other with petroleum, and lighted at the same time. The petroleum cloth was consumed in one minute twenty-three seconds; the lard cloth in five minutes.

To render these experiments more strikingly applicable to cases of accident which might occur in a light-house, a piece of cotton cloth about 2 feet square, which had been used to wipe the table on which kerosene had been spilled, was crumpled up into the condition of an ordinary dish-cloth and thrown into a corner of the room. When a lighted match was dropped on this it instantly took fire and burned with a fierceness truly alarming.

These experiments are important in establishing the fact that oils which are commonly sold as entirely free from danger are not really so. They may be safe from explosions at ordinary temperatures, and in this respect are to be preferred to the lighter oils; but when spread over a large surface they burn with greater intensity, even, as we have seen, on a surface of ice. Indeed, the results are so striking it might be well to repeat them in the presence of every light-house keeper, in order to impress him with an idea of the danger which might be apprehended in spilling the oil over his clothes or in carelessly dropping his matches on cloths which had been used in cleaning the apparatus.

Among the peculiar properties of mineral oil is its great surface-attraction or power of adhering and spreading on other surfaces, as well as ascending wicks to a much greater altitude than other oils. This property is recognized by the housekeeper who

finds the exterior of the lamp covered with a film of oil shortly after it has been subjected to a thorough cleansing. It rises along the interior surface of the lamp and spreads over the outside. On account of this property it can be freely burned in lamps of which the fountain is at a considerable distance below the flame, and in which no overflow is required to produce a brilliant combustion.

A series of experiments was next made with regard to the burning qualities of mineral oils of different densities, from which it was inferred that the lighter oils in lamps of the fourth order gave a greater amount of illumination than the heavier oils, and, furthermore, that the latter charge the wick more than the former, from which it would appear that, in using mineral oil, while safety should be the prominent consideration on the one hand, in the choice of the material, regard must be had on the other to the illuminating power.

In regard to the relative photometric power of lamps of the same order charged with mineral and with lard oil, all the experiments we have yet made on this point tend to the conclusion that in smaller lamps with the more volatile oils a greater photometric power is obtained than with the same lamp when charged with lard-oil; but with the larger lamps the reverse is the case, the lard giving greater power burned in these lamps than the mineral oil.

• An unexpected difficulty arose in the course of the investigations for the introduction of mineral oils on account of the form of the flame. While a lamp with a constricted chimney, like that used in the German student-lamp, gave the greatest photometrical power, it was found that the shape of the flame did not correspond with the arrangement of the lens-apparatus, a large portion of the light being thrown upward toward the sky and another toward the earth. It was only after a series of trials with chimneys of different forms and button-deflectors, that a flame of the best shape was obtained. To compare these flames in actual use, they were placed in succession in a light-house, with a lens of the fourth order, and the photometrical power determined at different distances, from a mile to ten miles in extent, by interposing between the eye and the light a series of thin colored glasses, until the light was totally extinguished. It was found in these experiments that some of the flames that had an appearance of greater brilliancy near by failed to produce comparatively the same effect at a greater distance. Having settled upon the form of the flame to be used in lamps of the lower orders, arrangements have been made for the introduction of mineral oils into all the stations in the third district, at which lights of the fourth and smaller orders are at present in use. The substitution of mineral for lard oil, however, is a matter of no small difficulty, and requires to be made with great precaution. An entire change in all the lamps is required; the several parts of the apparatus which in the case of lard-oil lamps were united by soft-solder must now be joined with spelter.

The importance of this was evinced by an accident which happened in the photometric room in the case of a lamp of the fourth order under trial; the heat unsoldered an air-tube and let down the oil from the reservoir on the flame, which produced so fierce a combustion that it would have set fire to the building had it not been of fire-proof materials.

The gradual introduction, however, of mineral oil will be made as rapidly as experience indicates the best and safest mode of employing it. It has already been adopted in the smaller lamps for lighting the Mississippi and its principal tributaries. The substitution, however, is not on account of the superior quality of this oil in comparison with lard, since we think the latter as an illuminating material is inferior to no other at present in use, but simply on account of the comparative cost of the two materials.

The comparative cost of the two materials will be definitely ascertained after we have determined the best form of lamps to be used. Experiments thus far have been principally confined to the lower orders of lamps.

REPORT OF THE LIGHT-HOUSE BOARD.

REPORT

OF

THE UNITED STATES LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT,
OFFICE OF THE LIGHT-HOUSE BOARD,
Washington, September 1, 1876.

Hon. L. M. MORRILL,
Secretary of the Treasury :

SIR: We have the honor respectfully to submit for your information, and for that of Congress, the following report of the operations of the Light-House Establishment during the past fiscal year.

A detailed statement of the operations in each of the fourteen geographical districts into which the Light-House Establishment is divided is given under the appropriate heads. From this it will be seen that the board has efficiently maintained the aids to navigation already completed; that it has established new aids of a permanent character, pursuant to appropriations made for that purpose; that it has established others of a temporary character, as the opening of new channels, or the closing of old ones, has made it necessary, and that it has done all in its power to meet the necessities of our increasing commerce.

Since the formation of the two river districts which embrace the waters of the Mississippi, Missouri, and Ohio Rivers, the labors of the board have been considerably increased. The navigation of these rivers is of so intricate a character that steamboats were often detained for hours waiting for daylight to enable them to pass obstructions. The establishment of these lights has practically obviated this difficulty, and now boats pursue their course by night as well as by day in safety. The shifting nature of the channels rendering the establishment of permanent lights impracticable, lens-lanterns which can be readily moved from time to time, as found necessary, have been adopted. None were found in market which would show a steady light during severe storms, but after a series of experiments modifications were made, and the board now has a lantern, at very moderate cost, sufficiently powerful for river purposes and admirably adapted to the wants of the service.

During the past year the board has collected fifty small libraries, containing about forty volumes each, for use at the more isolated light-stations. It is intended that each library shall remain about six months at a place, when it will be exchanged for another. By this means the keepers will be constantly supplied with fresh and interesting reading-matter and be made more contented with the lonely life and routine duties of these distant and often inaccessible stations. The books constituting these libraries were in part contributed by private individuals, and were in part purchased from the appropriation made therefor. It is proposed to add to the number of these libraries until there shall be in circulation a reasonable supply for the establishment.

The board is displaying at the Centennial Exposition at Philadelphia specimens of the illuminating apparatus now employed, and models and drawings of light-houses of peculiar or difficult construction. Specimens of the various kinds of floating aids in actual use, including buoys of the various kinds and sizes, with their moorings, and models of light-ships lately built, are also shown. The superstructure of the light-house intended for erection at Ship John Shoal, Delaware Bay, is set up in the grounds. Fog-signals now in use, viz, the sirens, operated by steam and by hot air, and the bell, struck by machinery, are exhibited, and frequently put in operation. A detailed account of the exhibit of the board will be found in the appendix, together with a report upon the exhibits made by other nations of matters relating to their several light-house establishments.

The board had made its preparations to use mineral oil in its lights of the lower orders, and was perfecting its arrangements to introduce it into the larger lights, when it was estopped by a claim that in using the burner made in its own shops it was infringing upon a patent held by private parties. The facts, and the laws bearing upon them, are now being considered by the law-officers of the Government, and when a conclusion is reached, the board will be prepared to act vigorously in carrying out its plans.

During the past year a buoy invented by J. M. Courtenay, esq., has been brought to the notice of the board. It is of iron, and sounds a whistle by means of air compressed in the buoy by the motion of the sea. One of these buoys has been placed at the entrance to Gedney's Channel, New York Harbor, one off Fire Island, one near the Duck Rocks, coast of Maine, and one off Cape Elizabeth, coast of Maine, for trial. The reports of pilots and masters of vessels, are in their favor.

The light-ship (No. 41) for which appropriation was made by Congress is nearly completed. She has been planned and built with great care, and is fitted with every appliance to make her safe and efficient. She is to have as a fog-signal, a siren operated by an improved caloric engine, from which the best results are expected. The builder of this apparatus is so confident of its entire success that he puts it into the vessel with the understanding that, if it does not give satisfaction to the board, it will be removed free of all expense to the light-house service.

The estimated amounts that will be required for the general service of the Light-House Establishment during the coming fiscal year are as follows:

For salaries of keepers of light-houses, \$594,600, being the average allowance authorized by law of \$600 each for 991 light-keepers.

For expenses of light-ships, \$250,000, being the amount required for maintenance and repairs of the 29 light-ships now in the service.

For expenses of buoyage, \$350,000; being the amount required to keep in place and in proper order the large number of buoys now under the charge of the board, and to replace those lost and worn out during the year.

For expenses of fog-signals, \$50,000. This amount is to be used for renewing, refitting, and improving fog-signals. It is the sum usually appropriated, but it may be remarked that the number and consequent expense of these aids to navigation are constantly increasing.

For inspecting lights, \$5,000; required to pay expenses of inspection, and including rewards paid for information as to collisions.

For supplies of light-houses, \$400,000; to purchase oil, wicks, chimneys, cleaning materials, and other annual supplies, and to meet other expenses of an incidental nature.

For repairs of light-houses, \$300,000. This amount is somewhat less than the usual estimate, and is necessary to enable the board to properly conduct this part of the service.

For lighting and buoyage of the Mississippi, Missouri, and Ohio Rivers, \$150,000; the same amount appropriated for the present fiscal year.

The appropriations required for special works are comprised in the following list. These estimates are based upon the wants of the country as made known by petition and letters forwarded directly to the board, or through its local officers with their favorable recommendation, and none have been submitted which are not deemed necessary to the preservation of life and property. A number of the works formerly recommended, still considered necessary, and which will doubtless be eventually established for the safety of navigation, have not been included in this list, owing to the strong desire to reduce the amount of the estimate submitted.

	Amount.
Cape Elizabeth light-station, Maine	\$5,000 00
Isles of Shoals, New Hampshire	6,000 00
Day-beacons, Maine, New Hampshire, and Massachusetts	10,000 00
The Whale day-beacon, Rhode Island	10,000 00
Muske-bed Shoals light-station, Rhode Island	6,000 00
Conimicut light-station, Rhode Island	30,000 00
Reimbursement of H. W. Arnold	319 00
Watch Hill light-station, Rhode Island	3,500 00
Rondout Pier light-station, New York	3,200 00
Rose Island beacon, Rhode Island	4,000 00
Stratford beacon, Connecticut	1,500 00
Staten Island depot, New York	10,000 00
New London depot, Connecticut	3,000 00
Tucker's Beach light-station, New Jersey	8,000 00
Absecon light-station, New Jersey	10,000 00
Cape Henlopen light-station, Delaware	8,000 00
Egg Island light-station, New Jersey	5,000 00
Cherry Island Flats light-station, Delaware River	50,000 00
Depot for fourth district	1,000 00
Sandy Point Shoal light-station, Maryland	25,000 00
Brant Island Shoal light-station, North Carolina	10,000 00
Lazaretto depot, Maryland	1,000 00
Tybee light-station, Georgia	50,000 00
Tybee beacon-light, Georgia	4,000 00
Cockspur Island light-station, Georgia	7,000 00
Cape Canaveral light-station, Florida	12,000 00
American Shoal light-station, Florida	75,000 00
Re-imbursement of keepers of Dog Island and Saint Mark's light-stations, Florida	970 65
Cape San Blas light-station, Florida	5,000 00
Trinity Shoal light-station, Louisiana	50,000 00
Reimbursement of Francis Hamilton	207 00
Reimbursement of employes at Trinity Shoal, Louisiana	2,000 00
Dunkirk light-station, New York	5,000 00
Belle Isle light-station, Michigan	10,000 00
Port Salinae light-station, Michigan	40,000 00
Port Austin light-station, Michigan	75,000 00
Père Marquette light-station, Michigan	5,000 00
Grosse Pointe light-station, Illinois	5,000 00
Racine Point light-station, Wisconsin	40,000 00
Milwaukee Pier light-station, Wisconsin	5,000 00
Green Island light-station, Wisconsin	200 00
Stannard's Rock light-station, Michigan	100,000 00
Pier-head lights on the lakes	25,000 00
Point Conception light-station, California	12,000 00
Farallones light-station, California	12,000 00
Point Saint George light-station, California	50,000 00
Anita Rock beacon, California	2,300 00
Steam-tender for Pacific coast	100,000 00
Building for Light-House Board	100,000 00
Total amount	1,003,196 65

An estimate is submitted for building a light-house at, or in the vicinity of, American Shoal, Florida Reefs, to light the dark space between Sombrero Key and Sand Key lights. The strong and variable currents along the Florida Reef renders navigation so difficult and dangerous, that many wrecks, causing heavy losses, occur each year. The proposed light on American Shoal is one of the system adopted for the permanent and efficient lighting of this dangerous reef, and it should be erected without unnecessary delay; labor and material being unusually low, the present is a very favorable opportunity for its construction.

The need of proper accommodations in this city for the transaction of the business and the deposit of the archives of the Light-House Board has long been felt. Its offices have several times been moved from building to building, and are now so inconveniently placed in rented upper rooms, that its records are to a certain extent inaccessible, a portion being in boxes at the Treasury Department. Its laboratory is at Staten Island, N. Y., and its models, now at Philadelphia will have to be remanded to the various districts from which they were gathered. Last year it was proposed to insert in the estimates an item for the construction of such a building as would meet its wants; but, owing to the necessity of economizing in expenditures, it was omitted. The board is now of the opinion that an appropriation for this purpose should be made without unnecessary delay. Its business has vastly increased in the last twenty years; records of great value are constantly accumulating, and can be properly preserved only in a fire-proof building. It is necessary to make frequent experiments with light-house illuminants and apparatus. Such experiments, particularly those relating to illuminating materials, require a building especially adapted to the purpose. The only one now used is at Staten Island, N. Y., so far distant that the members of the board cannot give such subjects the careful study and attention which they demand. A building such as that proposed, while serving the purposes mentioned above, is also needed to accommodate the officers, employés, and records of the board, and to furnish space for storing its models, specimens of the various materials used in the service, and samples of its lamps and lenses.

During the last fiscal year but one change has been made in the membership of the Light-House Board: Rear Admiral Alexander Murray, U. S. N., has been succeeded by Commodore Geo. B. Balch, U. S. N. The other members, viz, Professor Henry, General Barnard, Colonel Poe, Captain Davis, Mr. Patterson, Commander Walker, and Major Hains, remain as at the date of the last annual report.

Aids to navigation belonging to the United States Light-House Establishment on the 1st day of July, 1876.

	Atlantic and Gulf coasts.	Pacific coast.	Lake coasts.	Western rivers.	Totals for entire coast.
First-order lights	34	11	0	.....	45
Second-order lights	25	1	2	.....	28
Third-order lights	32	4	20	.....	56
Three-and-one-half order lights	3	0	8	.....	11
Fourth-order lights	114	13	64	.....	191
Fifth-order lights	85	4	32	.....	124
Sixth-order lights	89	0	74	.....	163
Lens-lanterns	0	0	6	.....	6
Stake-lights	9	0	15	256	310
Reflector or light-ships lights	40	0	0	.....	40
Total lights	434	33	221	256	974
Steam or hot-air fog-signals	27	13	13	.....	53
Day-beacons	372	39	2	.....	413
Buoys	2,616	90	245	15	2,966
Total aids	3,449	175	481	301	4,406

List of light-houses finished and lighted between July 1, 1875, and June 30, 1876.

Name of station.	Locality.	When lighted.
Avery's Rock	On southern end of Avery's Rock, Machias Bay, Maine.	October 15, 1875.
Egg Rock	On Egg Rock, Frenchman's Bay, Maine.	November 1, 1875.
Schuylkill range, beacon (front.)	On League Island, mouth of Schuylkill River, Pennsylvania.	December 15, 1875.
Schuylkill range, beacon (rear.)		
Cross-Ledge	On lower end of Cross-Ledge Shoal, Delaware Bay, east side of channel.	December 8, 1875.
Too's Marshes	On shoal off Too's Marshes, to mark entrance to York River, Virginia.	August 15, 1875.
Solomon's Lump	In Kedge's Strait, east side of Chesapeake Bay, Maryland.	September 10, 1875.
Thomas's Point Shoal	On shoal making out from Thomas's Point, west side of Chesapeake Bay, Maryland.	November 20, 1875.
Currituck Beach	On the coast of North Carolina, about midway between Cape Henry and Bodys Island light-houses.	December 1, 1875.
Hunting Island	On the north end of Hunting Island, south side of entrance to Saint Helena Sound, South Carolina.	July 1, 1875.
Point aux Herbes	Lake Pontchartrain, Louisiana.	August 1, 1875.
Thirty-Mile Point	On the bluff called Thirty-Mile Point, Lake Ontario, about 30 miles east of the mouth of Niagara River, State of New York.	Opening of navigation, 1876.
Cleveland Beacon, No. 2	On eastern pier-head, entrance to Cleveland harbor, Ohio.	September 1, 1875.
Harbor of Refuge, (Sand Beach.)	On angle of breakwater at Sand Beach, Lake Huron, Michigan.	October 25, 1875.
Thunder Bay River	Four hundred feet from north side of entrance to Thunder Bay River, Lake Huron, Michigan.	September 20, 1875.
White River	At the mouth of White River, east shore of Lake Michigan, 12 miles north of Muskegon light.	Opening of navigation, 1876.
Marquette Breakwater	Eighty-four feet from outer end of breakwater at Marquette, Lake Superior, Michigan.	September 1, 1875.
Ontonagon, west pier light	On west pier, about 200 feet from the outer end at Ontonagon, Lake Superior, Michigan.	September 20, 1875.
Isle Royale, (Menagerie Island.)	On Isle Royale (Menagerie Island), entrance to Siskiwit Bay, Lake Superior, Michigan.	September 20, 1875.
Yerba Buena	On southeastern extremity of Yerba Buena Island, San Francisco Bay, California.	October 1, 1875.

List of alterations in existing lights made from July 1, 1875, to June 30, 1876.

Station.	Changes made.	Date of alteration.
Shovelful Shoals light-ship, off Chatham, Mass.	Light changed from white to red.....	February 1, 1876.
Delaware Breakwater, entrance to Delaware Bay.	Interval of flashes increased to one minute....	May 1, 1876.
Mahon's River, Delaware Bay	Light shifted to new structure 1,980 feet from old one.	October 20, 1875.
Jordan's Point, James River, Virginia.	Light placed on new structure a short distance from old one.	August 23, 1875.
York Spit, entrance to York River, Virginia.	Light raised from fifth to fourth order, with double-wick burner.	August 6, 1875.
Love Point, near Kent Island, Chesapeake Bay.	Light reduced from three and a half to fifth order.	November 15, 1875.
Dry Tortugas Harbor, Florida Keys.	Light removed to an adjacent bastion of Fort Jefferson.	April 5, 1876.
Barrataria Bay, Louisiana...	Arc of visibility increased so that the light can be seen around the entire horizon.	July 31, 1875.
Ashtabula, mouth of Ashtabula River, Ohio.	Light shifted from the east pier to the outer end of west pier.	Opening of navigation, 1876.
Black River, Lake Erie, Ohio.	Light shifted to the outer end of west pier....	October 1, 1875.
Maumee Inner Range, Toledo, Ohio.	Lights changed from white to red.....	Opening of navigation, 1876.
Manistee, Michigan.....	Light shifted to outer end of south pier and changed to fixed red.	October 15, 1875.
Kalamazoo, Michigan	do	Opening of navigation, 1876.
Milwaukee pier, Wisconsin..	Light raised from sixth to fourth order	March, 1876.
Poverty Island, Lake Michigan, Wisconsin.	Light shifted to permanent structure	August 10, 1875.

List of lights discontinued between July 1, 1875, and June 30, 1876.

Name of station.	Locality.	When discontinued.
Fog Point.....	On Fog Point, east side of Chesapeake Bay, Maryland.	September 10, 1875. (Superseded by Solomon's Lump light.)
Thomas's Point.....	On Thomas's Point, west side of Chesapeake Bay, Maryland.	November 20, 1875. (Superseded by Thomas's Point Shoal light.)
Brant Island Shoal.....	On southern part of Pamlico Sound, North Carolina.	May 24, 1876. (Destroyed by fire.)
Combahee Bank.....	On Combahee Shoal, Saint Helena Sound, South Carolina.	June 30, 1876.
West Shoal	} Entrance to Matagorda Bay, Texas	September 17, 1875. (Destroyed by a hurricane.)
East Shoal		

OPERATIONS AND CONDITION OF THE LIGHT-HOUSE ESTABLISHMENT DURING THE YEAR.

FIRST DISTRICT.

The first district extends from the northeastern boundary of the United States (Maine) to and including Hampton Harbor, New Hampshire, and includes all aids to navigation on the coasts of Maine and New Hampshire.

Inspector.—Commander Henry F. Picking, United States Navy.

Engineer.—Lieut. Col. James C. Duane, Corps of Engineers, Brevet Brigadier-General United States Army.

In this district there are:

Light-houses.....	55
Light-ships	0
Fog-signals operated by steam or hot-air engines	8
Day or unlighted beacons.....	71
Buoys actually in position.....	387
Spare buoys, for relief and supply losses.....	166
Tender (steamer) Myrtle, for construction and repairs, also used in second district, and tender Iris, (inspector's tender)	2
Tender, (sail,) schooner Wave, for repairs, also used in second district.....	1

The following numbers which precede the names of stations correspond to those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

3. *Little River, west side of entrance to Little River harbor, Maine.*—The foundation for a new iron tower has been completed and the erection of a tower commenced.

4. *Avery's Rock, head of Machias Bay, Maine.*—The buildings at this station were completed and the light first exhibited October 15, 1875.

5. *Libby Island, entrance to Machias Bay, Maine.*—A new lantern and deck have been made, and are ready to send to the station.

8. *Narraguagus, west of entrance to Narraguagus Bay, Maine.*—A one-and-a-half-story frame building has been erected during the past season for the better accommodation of keepers, the old dwelling being uninhabitable from age and decay. The cost of the work was defrayed from the appropriation for "repairs and incidental expenses of light-houses." A new lantern and deck were placed on the tower and a new fog-bell established.

9. *Petit Menan, on south end of Petit Menan Island, Maine.*—An appropriation of \$5,000 was made by act approved March 3, 1875, for repairs and additions to the tower and keeper's dwelling. This work, which at date of last report was commenced, has been completed. The fog-signal at this station was supplied with water from a well excavated in the rock, and as the greater part of the water in the well came from an adjacent swamp, it was impregnated with decomposed vegetable matter, and proved very injurious to the boiler. In order to procure a supply of pure water, an old stone building, 34 by 20 feet, and an addition 16 by 14 feet, formerly used as a keeper's dwelling, were roofed over and fitted with gutters and water-conductors, and two wooden tanks, each 12 feet in diameter, were placed in the cellar. The two water-sheds, 50 by 30 feet each, erected last season, are located one at each end of this building, and are fitted with water conductors and gutters leading to the cisterns in the cellar of the old house. A one-story brick engine-house, 32 by 14 feet, has been erected; it contains the duplicate fog-signal and a large wooden tank which will hold four days' supply of water. The water-sheds are 150 feet distant and the water is conveyed through pipes.

11. *Winter Harbor, west side of entrance to Winter Harbor, Maine.*—The old one-and-a-half-story frame dwelling having become decayed past repair, a new one was erected just north of the old site; it is a one-and-a-half-story frame building. The station is now in good condition.

12. *Mount Desert Rock, on Mount Desert Rock, Maine.*—The old one-and-a-half-story stone house being much out of repair, and additional accommodations necessary, a one-and-a-half-story frame dwelling has been erected south of, and near the old house. This station is now in good condition.

13. *Egg Rock, Frenchman's Bay, Maine.*—The buildings at this station which at date of last annual report were in process of construction, under the appropriation made by act approved June 23, 1874, were completed and the light exhibited for the first time on the night of the 1st of November, 1875. During a gale on the 21st of March, 1876, the sea washed over the rock, carrying away the fuel-shed and moving the bell-tower some 30 feet. The windows of the dwelling were broken in on the sea-side, and the dwelling flooded to such an extent that the oil-butts were moved from their benches.

16. *Bass Harbor Head, east side of entrance to Bass Harbor, Maine.*—A fog-bell has been established at this station during the past season, and repairs of a general nature made, placing the station in good order.

25, 26. *Matinicus Rock, off southern entrance to Penobscot Bay, Maine.*—A brick engine-house has been erected about 50 feet southwest of the southern light-tower at this station, and a duplicate fog-signal placed in it.

31. *Negro Island, entrance to Camden Harbor, Maine.*—A covered way, 50 feet long and $5\frac{1}{2}$ feet wide, of wood, connecting the tower with the dwelling, has been erected, and general repairs made.

38. *Mananas, on Mananas Island, Maine; fog-signal station.*—The keeper's dwelling has been raised 18 inches, new sills and under-floors put in, and the exterior walls clapboarded and painted. A frame engine-house, $18\frac{1}{2}$ by 25 feet, for a duplicate fog-signal, and a boat-slip, 50 feet in length, have been constructed. The fog-signal is an 8-inch steam-whistle. The site is too low and the sound is masked in some directions by neighboring hills. A better site cannot be had, on account of the difficulty of obtaining title. It is, therefore, proposed to replace the whistle with a hot-air trumpet, raising the mouth high enough to overcome the difficulty.

42. *Hendrick's Head, east side of the entrance to Sheepscot River, Maine.*—As the old dwelling, with a wooden light-tower on the roof, was found to be past repair, a one-and-a-half-story frame dwelling, 22 by 31 feet, and a brick light-tower, have been erected, the expense being paid from the general appropriation applicable.

44. *Seguin, off mouth of Kennebec River, Maine.*—A one-and-a-half-story frame building, 31 by 32 feet, for a keeper's residence and fog-signal house, has been erected, and a duplicate fog-signal placed in it. This work was authorized by act approved March 3, 1875, appropriating \$4,000 for the purpose.

46, 47. *Cape Elizabeth, southwest side of entrance to Casco Bay, Maine.*—Three new windows have been furnished for the east dwelling, a violent hail-storm having entirely demolished the glass and sash-bars of all the windows on the north side of the house. At the fog-signal station a water-tank building of brick, 12 by 12 feet, has been erected. A duplicate siren should be established at this important station, and an appropriation of \$5,000 is submitted for the purpose.

Cape Neddick, (York Nubble,) near York Harbor, Maine.—An appropriation of \$15,000 having been made, the work will be taken in hand as soon as a proper site can be purchased and cession of jurisdiction obtained. Plans are now being prepared.

55. *Isles of Shoals, off Portsmouth, New Hampshire.*—The old dwelling at this station is so much decayed that it is scarcely habitable. An appropriation of \$6,000 is respectfully submitted to build a new dwelling for the keeper and his assistant.

REPAIRS.

At each of the following named stations repairs and renovations, more or less extensive, have been made during the year.

1. *Saint Croix, on Dochet's Island, Saint Croix River, Maine.*

2. *West Quoddy Head, western entrance to Passamaquoddy Bay, Maine.*

6. *Moose Peak, on Moose Peak Head, Maine.*

10. *Prospect Harbor, on Prospect Harbor Point, Glasborough, Maine.*

15. *Bear Island*, entrance to Southwest Harbor, Mount Desert, Maine.
19. *Blue Hill Bay*, (formerly Eggemoggin,) east entrance to Eggemoggin Reach, Maine.
20. *Saddle-back Ledge*, Isle au Haute, Maine.
21. *Heron's Neck*, entrance to Carver's Harbor, Maine.
22. *Deer Island Thoroughfare*, west entrance to Deer Island Thoroughfare, Maine.
23. *Eagle Island*, east Penobscot Bay, Maine.
27. *Whitehead*, west side of entrance to Penobscot Bay, Maine.
28. *Owl's Head*, entrance to Rockland Harbor, Maine.
29. *Brown's Head*, west entrance to Fox Island Thoroughfare, Maine.
30. *Indian Island*, east side entrance to Rockport Harbor, Maine.
39. *Franklin Island*, entrance to George's River, Maine.
41. *Burnt Island*, entrance to Towusend's Harbor, Maine.
43. *Pond Island*, entrance to Kennebec River, Maine.
45. *Half-way Rock*, in Casco Bay, Maine.
49. *Portland Breakwater*, Portland Harbor, Maine.
50. *Wood Island*, entrance to Saco River, Maine.
51. *Goat Island*, entrance to Cape Porpoise Harbor, Maine.
52. *Boone Island*, off York Harbor, Maine.
53. *Whale's Back*, entrance to Portsmouth Harbor, New Hampshire.
54. *Portsmouth Harbor*, entrance to Portsmouth Harbor, New Hampshire.
55. *Isles of Shoals*, on White Island, off Portsmouth, New Hampshire.

LIGHT-SHIPS.

There are no light-ships in the first district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

West Quoddy Head.—Ten-inch steam-whistle.
Petit Menan.—Ten-inch steam-whistle.
Matinicus Rock.—Twelve-inch steam-whistle.
Whitehead.—Ten-inch steam-whistle.
Mananas Island.—Eight-inch steam-whistle.
Seguin.—Ten-inch steam-whistle.
Cape Elizabeth.—Second-class steam-siren.
Portland Head.—Second-class Daboll trumpet.
 All in good condition.

DAY OR UNLIGHTED BEACONS.

Snow's Rock, Moose Peak Reach, Maine.—The broken spindle has been replaced by a wrought iron shaft 35 feet high surmounted by a spherical iron cage 4 feet in diameter. The cage and shaft are painted black.

Ship and barges, Blue Hill Bay, Maine.—The broken spindle has been replaced with a wrought-iron shaft 12 inches diameter at the base, 4 inches at the top and 30 feet high. Color, red.

Drunkard's Ledge, Penobscot Bay, Maine.—A wrought-iron shaft 8 inches diameter at the base, 4 inches at the top and 35 feet high, surmounted by a spherical cage of iron 4 feet in diameter, has been erected at this place. Color, black.

Dodge's Point, Penobscot Bay, Maine.—The stump of the old spindle has been removed and new wrought-iron shaft 30 feet in length, 6 inches diameter at the base and 4 inches at the top, set in its place and surmounted by a cylindrical cage of iron. Color, black.

Black Jack, Kennebec River, Maine.—A spruce stick, 12 inches diameter at the base, 6½ inches at the top, and 20 feet in height, with a cask at the top, has been erected at this place; color, black.

Stone's Rock, off York Harbor, Maine.—A wrought-iron shaft 8 inches diameter at the base, 4 inches at the top, and 35 feet high, surmounted by a spherical cage of iron, 4 feet in diameter, has been erected at this place; color, black.

BUOYAGE.

New spar-buoys have been placed to mark Cow Island Ledge and Metinic Ledge, Penobscot Bay, Maine; at Ram Island Point to mark Pott's Channel, Harpswell, Maine; Isles of Shoals, near Isles of Shoals light-house; Powder Horn Ledge, and Four Foot Rock, to mark Sheepscot River, Maine.

The heavy gales of March last did great damage to the buoyage of this district, displacing many of the buoys at different points. These were all replaced as soon as possible, and no casualty resulted from their absence.

TENDERS.

The steam-tenders Myrtle and Iris are in good condition. It is found impossible with the Iris, which alone is used for purposes of supply and inspection and for the buoyage of the district, to keep the great number of buoys on the exposed coast of Maine in as good order as is desirable, but every effort is made, and no assistance will be asked this year.

The schooner Wave is old and in poor condition, but as she is only used for carrying material for construction, and can wait for proper weather, she is still useful.

DEPOTS.

The buoy depot at Little Hog Island is completed, and is of very great advantage to the service of the district.

SECOND DISTRICT.

The second light-house district extends from Hampton Harbor, New Hampshire, to include Gooseberry Point, entrance to Buzzard's Bay, and embraces all the aids to navigation on the coast of Massachusetts.

Inspector.—Commander George H. Perkins, United States Navy, until October 1, 1875; Commander George Dewey, present inspector.

Engineer.—Lieut. Col. James C. Duane, Corps of Engineers, brevet brigadier-general, United States Army.

In this district there are—

Light-houses.....	62
Light-ships.....	10
Fog-signals operated by steam or hot-air engines.....	6
Day or unlighted beacons.....	51
Buoys actually in position.....	511
Spare buoys for relief and to repair losses.....	499
Tenders, (steam) Verbena and Daisy, inspector's tenders.....	2

The following numbers, which precede the names of stations, correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

56, 57. *Newburyport Harbor, entrance to Merrimac River, Massachusetts.*—An embankment of sand and thatch has been made to protect the foun-

dition of the light-house. Other repairs of a general nature have been made and the station is in good order.

64, 65. *Cape Ann, (Thatcher's Island,) off Cape Ann, Massachusetts.*—The boat-house has been reshingled, the boat-slip repaired, and a portion of it rebuilt. The accommodations for the keepers being inadequate, a one-and-a-half-story frame dwelling has been erected near the south tower. The fog-signal machinery, water-pipes, and tanks were at the same time repaired.

75. *Minot's Ledge.*—Nothing of note has occurred within the year, with the exception of the detaching and carrying away by the sea, during one of the severe gales of last spring, of a section of the ledge itself, weighing probably about 500 pounds. The station at present is in good condition, and well cared for.

76. *Boston, north side of main entrance to Boston Harbor, Massachusetts.*—The dwelling and planking of the wharf have been repaired. A brick building 22 feet square, to contain a fog-signal machine, has been erected just east of the light-tower. The fog-signal machinery has been put in complete repair.

82. *Race Point, on the northwesterly point of Cape Cod, Massachusetts.*—The tower at this station was originally built of rubble-stone, laid in common lime mortar. The lime disappeared, and the tower leaked, so that it was necessary to cover it with shingles. The shingles as well as the wooden stairs inside rotted, and the tower became so dilapidated that it was necessary to rebuild it. During the past year it has been replaced by a new one, built of cast iron, with a lining of brick. The dwelling was also decayed and afforded insufficient accommodations for the keepers. It has been repaired and a new one-and-a-half story frame structure built. The cost of these improvements was defrayed from the general appropriation for repairs, &c., of light-houses.

89, 90, 91. *Nausett Beach, Eastham, Massachusetts.*—This station has three lights, and additional accommodations for the keepers were necessary. An appropriation of \$5,000 was made by act approved March 3, 1875, for repairs and additions to towers and keepers' dwelling. At the date of last annual report, plans had been prepared for a new dwelling, which has since been completed. All necessary repairs were made and the station put in good order.

103. *Nantucket Range Beacon, Nantucket Harbor, Massachusetts.*—The old clapboards on the exterior walls of the dwelling have been replaced with shingles, the house has been painted, and other repairs made.

113. *East Chop, east side of entrance to Holmes' Hole Harbor, Massachusetts.*—The light-house recently purchased at this place, is a small wooden tower attached to the keeper's dwelling. The illuminating apparatus consists of three reflectors, with kerosene lamps.

115. *Nobsque Point, southeast side of entrance to Wood's Hole, Massachusetts.*—A new cast-iron tower and a one-and-a-half story frame dwelling has been erected at this station, the old tower and dwelling having become utterly useless. The expense of the work was defrayed from the general appropriation for the repairs and improvement of light-houses.

REPAIRS.

At each of the following-named light-stations repairs and renovations, more or less extensive, have been made during the year:

58, 59. *Upper Harbor Beacons, Newburyport Harbor, Massachusetts.*

60, 61. *Ipswich, entrance to Ipswich Harbor, Massachusetts.*

66. *Eastern Point, entrance to Gloucester Harbor, Massachusetts.*

- 68, 69. *Baker's Island*, entrance to Salem Harbor, Massachusetts.
- 70. *Hospital Point*, Beverly Harbor, Massachusetts.
- 71. *Fort Pickering*, Salem Harbor, Massachusetts.
- 72. *Derby's Wharf*, Salem Harbor, Massachusetts.
- 73. *Marblehead*, entrance to Marblehead Harbor, Massachusetts.
- 74. *Egg Rock*, off Nahant, Massachusetts.
- 75. *Minot's Ledge*, off Cohasset, Massachusetts.
- 78. *Long Island Head*, Boston Harbor, Massachusetts.
- 79, 80. *Plymouth*, entrance to Plymouth Harbor, Massachusetts.
- 83. *Wood End*, on Cape Cod, Massachusetts.
- 84. *Long Point*, Provincetown Harbor, Massachusetts.
- 86. *Billingsgate Island*, entrance to Wellfleet Bay, Massachusetts.
- 92, 93. *Chatham*, on Cape Cod, Massachusetts.
- 98. *Nantucket*, Great Point, on the northeast point of Nantucket Island, Massachusetts.
- 101. *Gay Head*, west entrance to Vineyard Sound, Massachusetts.
- 102. *Brant Point*, entrance to Nantucket Harbor, Massachusetts.
- 106. *Bass River*, entrance to Bass River, Massachusetts.
- 107. *Bishop and Clerks*, in Vineyard Sound, Massachusetts.
- 108. *Hyannis*, Hyannis Harbor, Massachusetts.
- 110. *Cape Poge*, on the northeast point of Martha's Vineyard, Massachusetts.
- 112. *Edgartown*, entrance to Edgartown Harbor, Massachusetts.
- 114. *Holmes's Hole*, (west chop,) entrance to Holmes's Hole Harbor, Massachusetts.
- 116. *Tarpaulin Cove*, entrance to Tarpaulin Cove, Massachusetts.
- 118. *Cuttyhunk*, entrance to Buzzard's Bay, Massachusetts.
- 119. *Dumpling Rock*, in Buzzard's Bay, Massachusetts.
- 121. *Clark's Point*, entrance to New Bedford Harbor, Massachusetts.
- 123. *Ned's Point*, entrance to Mattapoissett Harbor, Massachusetts.
- 124. *Bird Island*, entrance to Sippican Harbor, Massachusetts.
- 125. *Wing's Neck*, entrance to Sandwich Harbor, Massachusetts.

LIGHT-SHIPS.

94. *Pollock Rip light ship*, No. 40.—The old Pollock Rip light-ship No. 2, was taken from the station in September last, and transferred to the fourth district, and light-ship No. 40 was placed on the station. The latter is a new and very fine vessel, provided with a steam fog-whistle. This fog-signal, though so recently put in operation, is already looked upon as an almost invaluable aid to mariners making the eastern entrance to the Sound in thick weather.

96. *Shovelful light-ship* No. 3.—This vessel was newly coppered and otherwise repaired last fall. She is at present in good condition. The color of the light shown has been changed from white to red.

97. *Handkerchief light-ship*, No. 4.—On the night of the 20th of November last, this light-ship was run into and damaged by the schooner *Eleanora Van Dusen*; the vessel was at once taken into New Bedford and thoroughly repaired at an expense of about \$1,000, of which amount \$774.53 was paid by the owners of the colliding schooner. She is now in good condition.

100. *Nantucket, South Shoals light-ship* No. 1.—This vessel was thoroughly repaired in New Bedford, at a cost of about \$4,000, and replaced on her station August 14, 1875. On the 6th of January, 1876, she parted her cable during a gale; sail was made upon her, and she arrived at Tarpaulin Cove on the 9th, following. She lost an anchor and 65 fath-

oms chain, but having sustained no further damage, was at once returned to her station. When last inspected, she was in excellent condition.

109. *Cross Rip light-ship No. 5.*—This vessel was taken into Hyannis in October last, and some necessary repairs were made. She is now in good order.

111. *Succonnessett light ship No. 6.*—This vessel has remained on her station through the year; has met with no disaster, and, though very old, is still serviceable.

117. *Vineyard Sound light-ship.*—Light-ship No. 7 was stationed on the Sow and Pig's Reef, until the night of the 30th of October, 1875, when she parted her moorings during a gale, losing a mushroom anchor and 60 fathoms chain, and arriving in New Bedford on the following day. The vessel was then put in thorough repair, and has since been used as a relief. Light-ship No. 39 assigned to and placed on this station November 16, 1875, is a new vessel. She is provided with a steam fog-whistle, which renders like assistance in thick weather to mariners entering the Sound from the westward that her sister ship on the Pollock Rip Shoal affords at the eastern entrance.

118. *Hen and Chickens light-ship No. 8.*—This vessel was taken into New Bedford in October last, and repaired at a cost of about \$900, the Relief No. 9 occupying the station. She was replaced on the 31st of the same month. The vessel parted her moorings on the 5th of April during a heavy gale, lost a mushroom anchor and 60 fathoms chain; but succeeded in holding on with a spare anchor, about a mile from the station, until the 7th. As she had sustained some damage to her windlass, she was taken into New Bedford, and repaired at an expense of about \$300, Relief No. 9 being placed on the station. This vessel is old and worn out, probably not worth the expense of repairs necessary to make her a sea-worthy vessel.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Cape Ann.—Twelve-inch whistle.

Boston.—First-class Dabol trumpet.

Race Point.—Twelve-inch steam-whistle.

Cape Cod.—First-class Dabol trumpet.

The usual repairs required have been made at the above-named stations, and the machinery kept in good order.

Pollock Rip and Vineyard Sound.—The fog-signals established on light-ships at these points have proved perfectly satisfactory.

DAY-BEACONS.

Abbott's Monument, entrance to Salem Harbor, Massachusetts.—A new staff and cage furnished.

Bowditch Ledge, Salem Harbor, Massachusetts.—Rebuilding.

Point Alderton, entrance Boston Harbor, Massachusetts.—The beacon at this place has been rebuilt from the third course above the flagging and fastened with iron dogs and bolts. The stones were relaid in cement-mortar and the interior of the structure made solid. Stones were placed around the flagging at the base. The beacon is 20 feet square at the base, 8 feet square at the top, and 40 feet in height. An iron spindle, 6 feet 4 inches high and 6 inches in diameter, stands on the top, and is surmounted by a wooden frustum of a cone 6 feet in diame-

ter at base, 2 feet in diameter at top, and 10 feet high, covered with tin and painted black.

North Beacon, Scituate Harbor, Massachusetts.—A spar with two rounds has been erected and painted red.

Duxbury Pier, Plymouth Harbor, Massachusetts.—The granite beacon at this place, which was pushed over by the ice, has been rebuilt; it is 13 feet square at the base, 11 feet square at top, and 19 feet 10 inches high. The loose stone in the vicinity were piled around the beacon nearly to high-water mark.

Lone Rock, Wood's Hole, Massachusetts.—The spindle on this rock has been replaced; it is an iron shaft 7 feet long by 4 inches diameter, with an octagonal pyramidal cage on the top, base up. The cage is 2 feet 6 inches high and 1 foot 7 inches diameter at the large end.

There are forty-four other day-beacons of masonry, masonry and iron, or iron alone, in this district, which require more or less attention every year, and many are carried away annually by the ice. It is suggested that an appropriation of \$10,000 be made to establish and replace day-beacons on the coasts of Maine, New Hampshire, and Massachusetts.

BUOYAGE.

The buoyage of this district is in its usual good condition.

TENDERS.

Verbena.—This steamer has been in constant service during the year with the exception of some two weeks, during which time she was undergoing somewhat extensive repairs in New York, her place being supplied meanwhile by the *Myrtle*.

Daisy.—The work required of this steamer among the various aids to navigation in the northern part of the district has been well done, although the *Daisy* labors under many disadvantages on account of her small size, which makes it difficult for her to handle the large nun and can buoys, and her small carrying capacity, necessitating a large number of trips in distributing fuel, material, &c., to the stations. Her boiler is worn out, and a new one will be supplied at an early date.

DEPOTS.

Lovell's Island, Boston Harbor, Massachusetts.—A one-story frame building, for the protection and storage of buoys, has been built, the wharf repaired, and the bank-retaining wall rebuilt.

Wood's Hole buoy-depot.—The wharf at this depot was repaired in September last by having the stone foundations partly relaid, piles righted up, &c., while at the same time the pier itself was extended, providing much better facilities for storage, discharging of material, &c. The foundations of the sea-wall have also been strengthened and partly relaid.

THIRD DISTRICT.

The third district extends from Gooseberry Point, Massachusetts, to include Squam Inlet, New Jersey, and embraces all the aids to navigation on the sea and sound coasts of Rhode Island, Connecticut, and New York, Narragansett and New York Bays, Providence and Hudson Rivers, Whitehall Narrows, and Lake Champlain.

Inspector.—Commodore Stephen D. Trenchard, United States Navy

until September 30, 1875; Captain A. C. Rhind, United States Navy, present inspector.

Engineer.—Col. I. C. Woodruff, Corps of Engineers, brevet brigadier-general, United States Army.

In this district there are—

Light-houses.....	121
Light-ships	9
Fog-signals operated by steam or hot-air engines.....	9
Day or unlighted beacons.....	39
Buoys actually in position.....	415
Buoys for relief and to supply losses.....	601
Steam-tenders for supply and for inspection, Putnam and Cactus.....	2
Steam-tender for engineer construction and repair, Mistletoe	1
Supply-steamer for supplying the light-houses of the Atlantic and Gulf coasts, Fern	1
Schooner Pharos, for construction and repair	1

The numbers preceding the names of stations correspond with the "Light-house Lists of the Atlantic, Gulf, and Pacific Coasts," and the "Northern and Northwestern Lakes of the United States," issued January 1, 1876.

LIGHT-HOUSES.

127. *Castle Hill fog-signal, entrance to Newport Harbor, Rhode Island.*—No progress has yet been made in securing a site for this important aid to navigation, as no satisfactory agreement can be made with the owners of land in the vicinity.

131. *Rose Island, Narragansett Bay, Rhode Island.*—This station was considerably damaged by the spring gales, necessitating very general repairs of the dwelling and tower, which have been made.

134. *Muscle bed Shoals, Narragansett Bay, Rhode Island.*—The following remarks taken from the last annual report are repeated, viz :

This station was seriously damaged by the ice during the past winter, and the rebuilding of the beacon becomes a necessity. The stone pier was moved some four feet by the force of the ice. The light and fog-signal have been continued since the damage, but require frequent adjustment to keep the apparatus in running order. The cost of rebuilding the beacon and protecting its base with riprap is \$6,000, for which an appropriation is recommended.

138. *Conimicut, entrance to Providence River, Rhode Island.*—About 500 tons of riprap-stone have been placed around the base of the light-house tower as a protection against moving ice-fields. Slight repairs have also been made to the tower. The suggestion of last year that \$30,000 be appropriated for rebuilding the pier and dwelling at this station is renewed.

139. *Bullock's Point, Providence River, Rhode Island.*—The work of enlarging the pier and erecting a dwelling and tower at this station, under the act of Congress appropriating funds therefor, was commenced in August last, when the first riprap-stone was delivered. The laying of the cut-stone work and backing of the pier was begun this spring, and has advanced to within one course of completion. The framing of the dwelling-house and tower was done by day's labor at the depot during the winter and spring, and is now ready to send to the station for erection. It is believed that the dwelling may be ready for occupation before the beginning of winter.

141. *Fuller's Rock*; 142. *Sassafras Point, Providence River, Rhode Island.*—Nothing has been done at these stations toward erecting a dwelling-house for the use of the keeper, as it has been impracticable to effect the purchase of a site.

—, *Block Island breakwater, Rhode Island.*—An appropriation of

\$900 having been made by act approved July 31, 1876, for range-lights at Block Island breakwater, the work will be undertaken as soon as a title to site can be had.

147. *Watch Hill, Rhode Island, near Stonington, Connecticut.*—During the year the iron battens of the lantern have been taken out and replaced by improved brass battens, and the lantern-glass renewed. The bank or sea-wall on the east side of the station is exposed to the force of the sea and shows signs of giving way. It is recommended that it be protected by riprap at its base and for some distance out, which would break the shock of the waves. The cost of such protection would not exceed \$3,500, and an estimate therefor is respectfully submitted.

155. *Race Rock, Long Island Sound, New York.*—At the close of the working season of 1875, the end of November, the work at this station had advanced to the completion of the second course of the pier and landing-wharf, which was the amount of work limited by the contract of February 17, 1872. Operations were resumed in the latter part of May of the present year, and, at the close of the month of June, the stones of the third course of the pier and landing-wharf were laid and partly grouted, but not doweled. Two-thirds of the concrete backing of this course was also laid.

167. *Falkner's Island, Long Island Sound, Connecticut.*—Lamps for burning mineral-oil have been placed at this station during the year. General painting and some needed repairs have been made.

170. *Southwest Ledge, entrance to New Haven Harbor, Connecticut.*—The operations at this station were not resumed until the beginning of the working season of 1876, during which, an additional section has been added to the iron tube to increase its height and place the superstructure, which will soon be ready for erection, beyond the risk of danger from the sea, ice-fields, &c. The tube has been filled with concrete and the cistern-walls commenced. It is hoped that the structure may be completed and lighted by the beginning of winter.

173. *Middle Ground, Stratford Shoals, Long Island Sound, New York.*—The operations at this station were pushed forward during the last season until the month of December, when the first course of the cut-stone pier and the concrete backing were completed, and several cargoes of riprap-stone delivered at the work in places where the former riprap had settled in consequence of the scouring out of the gravel-bed. This scour occurs at the stage of low water and during the prevalence of gales. The third course of the pier and thirty-four stones of the fourth course have been completed and put in place during this season. The dwelling and tower cannot be erected until next March, as it will be too late the present season to work to proper advantage.

175. *Bridgeport Harbor, Connecticut.*—During the severe storms of the winter and early spring, many of the large coping-stones surmounting the breakwater which surrounds this station were carried away. These have recently been recovered and secured upon the breakwater, and as an additional protection against their being again removed a considerable quantity of riprap-stone has been delivered at the deepest places along the base of the breakwater, where it serves to break the force of the waves.

181. *Cold Spring Harbor, north shore of Long Island, New York.*—Nothing has yet been accomplished in securing sites for range-lights, which the board decided to establish with the appropriation now available. The owners of the lands where the lights would be located are opposed to its occupation for the purpose indicated, believing that it must result

to their injury. The appropriation is not sufficient to erect a structure on the shoal called the Middle Ground.

185. *Stepping-Stones, Long Island Sound, New York.*—The operations at this station were continued during the last working season until the latter part of December; work was stopped for the winter in December, 1875, and resumed during the month of May of the present year. The pier-work is completed with the exception of the backing of concrete and the flagging for top of pier. It is expected that the station will be completed by the beginning of winter.

186. *Throgg's Neck, New York.*—Extensive repairs begun in the last fiscal year have been completed, and the station is now in excellent condition. The lens has been fitted with lamps for burning mineral-oil.

190. *Fire Island, south side of Long Island, New York.*—Repairs have been made to the illuminating apparatus at this station. The lantern has been sheathed anew and the tower cement-washed and recolored.

196. *East Beacon, Sandy Hook, New Jersey.*—The work upon the jet-ties for protecting the beach against the abrasion of the sea was continued through the month of October, 1875, at which time they were left in excellent condition. The expectations as to their utility have been fully realized. Some repairs required during the present season will be defrayed from existing appropriations.

197. *West Beacon, Sandy Hook, New Jersey.*—Under appropriation of March 30, 1875, a new jetty of oak logs has been built, filled with brush and stone, and extended both to the northward and to the southward. The old jetty has been repaired and strengthened and platform newly planked. A plank-walk from the west beacon to the main light has also been laid.

201. *Waackaack, Gedney's Channel range, Raritan Bay, New Jersey.*—On inspection this beacon was found to be very unsafe. The heavy sill-timber and most of the joist of the lower section were badly decayed, and repairs were therefore immediately necessary. They were commenced at once, and completed during the early part of June. The tower has been thoroughly braced by wooden truss-braces, and new sills and joist put in.

207. *Robbins' Reef, New York Harbor, New York.*—General repairs have been made at this station during the year, and a shed built for storage of oil and supplies. The lamps have been changed for burning mineral-oils.

213. *Stony Point, New York.*—The fog-bell frame or tower being much decayed has been abandoned, and the fog-bell suspended from a bracket attached to the stone tower. An improved fog-bell machine has also been placed at this station.

216. *Rondout, Hudson River, New York.*—The following remarks and recommendations contained in the last annual report are repeated, viz:

The dike on the north side of the entrance to Rondout Creek needs a light to prevent collision of passing vessels. During the construction of the dike it was lighted by the Engineer Department of the Army. Its maintenance should now devolve upon the Light-House Establishment. If the dike itself is substantial enough for the base of a frame support, it will cost but a small amount, estimated at \$1,600. If the light be built on a separate foundation of piles, behind the dike, which is preferable on account of security from passing vessels, the cost will not be less than \$3,200. An appropriation of the latter amount is asked to establish this light.

220. *Coxsackie, Hudson River, New York.*—The foundation of this light-house has been protected by several hundred tons of stone.

497. *Split Rock, Lake Champlain, New York.*—The dwelling-house at this station should be rebuilt.

499, 500. *Burlington Beacons, Vermont.*—During one of the violent gales of the spring, the south end of the breakwater was displaced for

some distance and partially overturned, causing considerable injury to the beacon on that end of the structure, and endangering its safety. Workmen were at once sent to the place, and after much difficulty, caused by the fields of ice, they succeeded in recovering the beacon and securing it on the uninjured portion of the breakwater.

REPAIRS.

At each of the following stations in the third light-house district, repairs more or less extensive have been made during the year.

128. *Beaver Tail*, Rhode Island.
129. *Lime Rock*, Rhode Island.
130. *Newport Harbor*, Rhode Island.
131. *Rose Island*, Rhode Island.
132. *Dutch Island*, Rhode Island.
133. *Poplar Point*, Rhode Island.
134. *Muscle-Bed Shoals*, Rhode Island.
135. *Prudence Island*, Rhode Island.
136. *Bristol Ferry*, Rhode Island.
137. *Warwick*, Rhode Island.
138. *Conimicut*, Rhode Island.
140. *Sabin's Point*, Rhode Island.
141. *Pumham Rock*, Rhode Island.
144. *Point Judith*, Rhode Island.
145. *Block Island*, Rhode Island.
147. *Watch Hill*, Rhode Island.
148. *Montauk Point*, New York.
149. *Stonington*, Connecticut.
151. *Morgan's Point*, Connecticut.
152. *North Dumpling*, Connecticut.
153. *New London*, Connecticut.
156. *Little Gull Island*, New York.
157. *Gardiner's Island*, New York.
158. *Plum Island*, New York.
159. *Long Beach Bar*, New York.
160. *Cedar Island*, New York.
161. *Saybrook*, Connecticut.
166. *Horton's Point*, New York.
167. *Falkner's Island*, Connecticut.
168. *New Haven Harbor*, Connecticut.
171. *Stratford Point*, Connecticut.
174. *Old Field Point*, New York.
175. *Bridgeport Harbor*, Connecticut.
176. *Black Rock*, Connecticut.
177. *Penfield Reef*, Connecticut.
178. *Norwalk Island*, Connecticut.
179. *Eaton's Neck*, New York.
180. *Lloyd's Harbor*, New York.
183. *Execution Rocks*, New York.
184. *Sand's Point*, New York.
186. *Throgg's Neck*, New York.
187. *North Brother Island*, New York.
189. *Great West Bay*, New York.
190. *Fire Island*, New York.
- 193, 194. *Highlands of Navesink*, New Jersey.
195. *Sandy Hook*, (main light.) New Jersey.

- 196. *East Beacon, Sandy Hook, New Jersey.*
- 197. *West Beacon, Sandy Hook, New Jersey.*
- 198. *Conover, New Jersey.*
- 199. *Chapel Hill, New Jersey.*
- 200. *Point Comfort, New Jersey.*
- 201. *Waackaack, New Jersey.*
- 202. *Elm Tree, New York.*
- 203. *New Dorp, New York.*
- 204. *Princess Bay, New York.*
- 206. *Fort Tompkins, New York.*
- 207. *Robbins' Reef, New York.*
- 208. *Fort Columbus, New York.*
- 209. *Bergen Point, New Jersey.*
- 211. *Passaic Light, New Jersey.*
- 212. *Elbow Beacon, New Jersey.*
- 213. *Stony Point, New York.*
- 214. *West Point, New York.*
- 216. *Rondout Point, New York.*
- 218. *Hudson City, New York.*
- 220. *Coxsackie, New York.*
- 221. *Stuyvesant, New York.*
- 222. 223. *Hudson River Beacons, New York.*
- 495. *Crown Point, Lake Champlain.*
- 496. *Barber's Point, Lake Champlain.*
- 498. *Juniper Island, Lake Champlain.*
- 499. 500. *Burlington Beacons, Lake Champlain.*
- 501. *Colchester Reef, Lake Champlain.*
- 503, 504. *Plattsburg Beacons, Lake Champlain.*
- 505. *Cumberland Head, Lake Champlain.*
- 506. *Point au Roche, Lake Champlain.*
- 508. *Windmill Point, Lake Champlain.*
- *Light-House Depot, Staten Island, New York.*
- *New London Buoy-Wharf and Coal Depot.*

LIGHT-SHIPS.

126. *Brenton's Reef light-ship No. 11, off Brenton's Reef, entrance to Newport Harbor, Rhode Island.*—Since the date of last report, this vessel has received extensive repairs, including new frame-timbers, rails, planking, sheathing, hawse-pipes, and new rigging where required, at a cost of \$21,620.76. She has received all necessary supplies, and is now in good condition.

150. *Eel Grass Shoal light-ship No. 25, off Mystic, in Fisher's Island Sound, Connecticut.*—This vessel has had no repairs during the year; she is unsound, and too small for the service. If she is to be retained for any considerable time, she will need repairs estimated at \$6,000.

154. *Bartlett's Reef light-ship No. 13, off New London, Connecticut.*—This vessel has had her decks caulked, and some slight repairs. She is much decayed, and if kept in service will soon need extensive repairs.

165. *Cornfield Point light-ship No. 12, Long Island Sound, off the mouth of the Connecticut River.*—This vessel is in good condition, having been thoroughly repaired last year.

172. *Stratford Shoal light-ship No. 15, on Middle Ground, off Stratford Point, Long Island Sound.*—Since the date of last report, no repairs of moment have been made upon this vessel. She is in poor condition,

much decayed, and if continued in service will soon require to be practically rebuilt.

191. *Sandy Hook light-ship No. 16, off entrance to New York Bay.*—This vessel is in good condition.

Light-ship No. 17.—This vessel is now at the light-house depot, New London, in good condition, and ready for service.

192. *Wreck of the Scotland light-ship No. 20, off Sandy Hook.*—This vessel is in good serviceable condition.

Light-ship No. 23.—This vessel is now at the light-house depot, Staten Island; is in fair condition, and is used for a relief-ship.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

128. *Beaver Tail, Rhode Island.*—A first-class Daboll trumpet, operated by a 24-inch Ericsson hot-air engine, in duplicate.

144. *Point Judith, Rhode Island.*—First-class steam-siren, in duplicate. The old boiler at this station has been patched and retubed during the year, and the engine-house has also undergone repairs.

146. *Block Island, Rhode Island.*—First-class steam-siren, in duplicate. During the year the work upon the reservoir for the collecting of water for fog-signal purposes has been completed. An upright boiler, of similar construction to the one at Point Judith, has been placed at this station, and the locomotive-boiler repaired and patched. Thus the fog-signal facilities are duplicated in every part. Feed-water heaters for economizing fuel and carrying the water to the boilers in a heated state have also been put up. This station is now in excellent condition.

148. *Montauk Point, New York.*—First-class Daboll trumpet, operated by 24-inch hot-air engines, in duplicate.

153. *New London, Connecticut.*—Second-class Daboll trumpet, operated by 18-inch caloric engines, in duplicate.

156. *Little Gull Island, New York.*—Second-class steam-siren, in duplicate.

179. *Eaton's Neck, New York.*—Second-class steam-siren, in duplicate.

183. *Execution Rocks, New York.*—Third-class Daboll trumpet, operated by an 18-inch hot-air engine, in duplicate.

196. *Sandy Hook, east beacon, entrance to New York Bay, New Jersey.*—First-class steam-siren, in duplicate, and in separate houses. On the 15th of June, the northernmost of the engine-houses was entirely destroyed by fire, the siren and the iron fittings being badly damaged; materials were sent to the station and a new building, of brick, commenced. The damaged machinery was taken to the depot at Staten Island, and is being repaired and put in readiness for re-erection as soon as the new building is completed, which will be at the earliest practicable moment.

DAY OR UNLIGHTED BEACONS.

2. *South Point, Rose Island, Narragansett Bay, Rhode Island.*—Temporarily marked by an iron spindle and cage. The suggestion that an appropriation of \$4,000 be made for rebuilding the granite structure, submitted in the last annual report, is renewed.

29. *Stratford, entrance to Housatonic River, Connecticut.*—A granite structure with shaft and ball. This shaft was broken and displaced; the large coping-stone in which it was driven was also wrenched out of its place and injured. To repair the beacon a new coping-block and an

iron spindle and cage will be required, which, with the necessary labor, will cost about \$1,500, for which an estimate is submitted.

37. *Success Rock, near Sand's Point, Long Island, New York.*—This spindle, destroyed during the spring of 1875, has been replaced during the year after much difficulty in drilling the hole for the reception of the iron shaft in the submerged rock.

BUOYAGE.

The buoyage of this district is in good condition, the losses of buoys and appendages being much below the average of past years. The total expense for buoy-service in the district has been \$67,755.09.

TENDERS.

The tenders in this district will need repairs during the coming year, which will be paid for from the general appropriations for the support of the Light-House Establishment.

DEPOTS.

Light-House Depot, Staten Island, New York.—The general work of the depot has been carried on as usual, and has been no less important than in former years. The force has been mostly employed in the manufacture of lamps, burners, and other fittings for illuminating-apparatus, tests of oil and burners, the packing, repairing, &c., of lenses, for storage or for shipment to different districts of the United States, and the reception and shipment of oil and supplies of all kinds. In the annual report of last year recommendation and estimates were made for regrading the grounds, renovating the wharves, enlarging the basin and the oil-shed; those recommendations are renewed.

New London Depot, New London, Connecticut.—The old wharf at this place is in a dilapidated condition for a distance of about 150 feet, and it is evident that extensive repairs will have to be made during the coming year. The suggestion contained in the last annual report for walling the passage-way from Bank street to the water, is renewed.

FOURTH DISTRICT.

The fourth light-house district extends from Squam Inlet, New Jersey, to and including Metomkin Inlet, Virginia. It includes the sea-coast of New Jersey below the Highlands of Navesink, the bay-coasts of New Jersey and Delaware, the sea-coasts of Delaware and Maryland, and part of the sea-coast of Virginia.

Inspector.—Commander George B. White, United States Navy.

Engineer.—Lieut. Col. W. F. Reynolds, Corps of Engineers, brevet brigadier-general, United States Army.

In this district there are—

Light-houses.....	32
Light-ships	4
Fog-signals operated by steam or hot-air engines.....	1
Day or unlighted beacons.....	0
Buoys actually in position.....	130
Spare buoys for relief and to supply losses.....	142
Tender (steam) for inspection, Violet.....	1
Tender (steam) for construction and repairs, Rose	1

The numbers preceding the names of stations correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

234. *Barnegat, sea-coast of New Jersey.*—The monthly measurements along the beach have been continued throughout the year. No changes of importance have occurred. The sand-hill to the northward still moves towards the buildings.

235. *Tucker's Beach, entrance to Little Egg Harbor, New Jersey.*—A boat and buoy house, founded on iron piles, and affording ample protection for the boat and all the buoys in store, has been built at this station. A good roadway has been built between the keeper's dwelling and the boat-house. The keeper's dwelling at this station is very old and dilapidated, containing only two rooms, with attic. As two keepers are required, the accommodations are inadequate. The suggestion contained in last annual report, for an appropriation of \$8,000 for building a new dwelling and repairing the station, is renewed.

236. *Absecum, sea-coast of New Jersey.*—This structure when built was some 1,300 feet from the water. The abrasion of the beach, which has been going on almost ever since, and which has been watched carefully for a number of years, assumed during the past winter and spring a very threatening aspect. The ordinary high tides reached the lot and destroyed a portion of the fence, while an occasional tide covers a large portion of the site. After an examination by the committee on engineering of the board, it was determined to try the effect of short jetties, extending only from high to low water. Seven jetties in the immediate vicinity of the light-house, and about 150 feet apart, have been built. The effect has been an accumulation of sand between them in places to the depth of fully 2 feet. As was anticipated, the end jetties have been found much the most difficult to maintain, and they will require constant watching. The experiment so far has produced the effect contemplated, and justifies the conclusion that if carried far enough the abrasion will be retarded if not entirely prevented. The construction of a long jetty, extending to deep water, will involve an expense greater than would be required to rebuild the structure in a new locality. It is proposed to continue the experiment of using short jetties, in the hope that the present action of the water will ultimately cease. An estimate of \$10,000 has been submitted for this purpose.

239. *Cape May, sea-coast of New Jersey.*—The tower and oil-rooms have been cement-washed on the inside; the iron stairway, and lantern, and and the two dwellings have been painted.

240. *Cape Henlopen, sea-coast of Delaware.*—The lantern at this station is of the old diagonal pattern. To render the light as effectual as other lights of its class, a new and improved lantern should be provided, as recommended last year, which will require an appropriation of \$8,000.

241. *Cape Henlopen beacon, sea-coast of Delaware.*—Under a special appropriation for that purpose, a new brick structure has been erected near this station, and supplied with duplicate steam-siren fog-signals, affording an important additional aid to vessels entering Delaware Bay in foggy weather. A plank walk has been built from the light-house to the fog-signal house, and electric bells provided for calling assistance in case of need.

242. *Delaware breakwater, Delaware Bay.*—A new fourth-order illuminating apparatus was sent to this station in May. The increased brilliancy of the light is of great benefit to commerce.

246. *Egg Island, Delaware Bay, New Jersey.*—Four hundred and fifty perches of banking-stone have been deposited along the edge of the marsh in front of the light-house, to protect the site from the wash of the sea. This has checked, though it has not stopped, the abrasion. Additional ground adjoining the site should be purchased, and the structure moved to it. For this purpose an appropriation of \$5,000 is recommended.

247. *Cross Ledge Shoal, Delaware Bay, New Jersey.*—The erection of the pier of foundation was completed on the 23d of November last. A temporary wooden superstructure was at once placed upon it, and a light exhibited therefrom, for the first time, on the night of December 8, at which time the light-ship was removed. The light is of the fourth order, fixed, varied by flashes; the focal plane is as high as will be required for the permanent structure. The original estimate for this structure was \$125,000, of which amount \$100,000 has been appropriated; the last appropriation being \$25,000, made by act approved July 31, 1876. This sum, it is believed, will be sufficient to complete the permanent superstructure. On examining this work in the spring, it was found that the currents had washed away a large portion of the shoal on which it rests, making the riprap foundation fall away, and producing a large crack in the wall of the pier itself. The only remedy was to prevent further action of the kind, by additional riprap. About 2,000 perches have been thrown in around the structure, and no further settling of the pier is apparent. During the present season, measures will be taken to secure more firmly the small stone, under the pier, exposed by the falling away of the riprap around it.

248. *Mahon's River, Delaware Bay, Delaware.*—The new structure at this station was completed, and the light changed from the old to the new building, on the 20th of October last. The old structure has been sold at public auction, and the proceeds turned into the Treasury. The grounds around the dwelling have been graded and raised, adding greatly to the comfort of the keeper.

249. *Ship John Shoal, Delaware Bay, New Jersey.*—Toward the close of last season a contract was made for placing additional riprap around this structure and covering it with coping. The riprap was delivered as required, but the coping was not placed according to contract, rendering it of no more value as a protection against ice than the riprap. On examining in the spring it was found that the currents produced by placing the structure had caused changes in the shoal deepening the water, especially on the west side. More riprap has been added, but, until this action ceases, additional quantities may be required from time to time. On the 5th of January last bids were opened for the metal-work of the superstructure to replace the temporary frame structure now in use, and contract made with lowest bidder; the work has been completed as agreed upon. The additional appropriation, made by act approved July 31, 1876, will, it is thought, be sufficient to erect the superstructure on its proper site and further secure the foundation.

250. *Cohansey, Delaware Bay, New Jersey.*—The earth bank inclosing the buildings has been raised one foot all around, the sluice put in good order, the platform on the front of the dwelling renewed, and other repairs made, placing the station in good condition.

252, 253, 254, and 255. *Liston's Tree Ranges, Delaware.*—At the date of last report the survey necessary to locate these ranges had not been made. It was, however, completed last season, and the points indicated for two sets of ranges. One, which marked the channel in the reach from Ship John Shoal to near Reedy Island, was located about $1\frac{1}{2}$ miles

below Port Penn. The other set, marking the reach passing Baker Shoal and Reedy Island, was located on the Delaware side above Liston's Point. The purchase of a site for the front light of this last range (which is on unreclaimed swamp, of little or no value) could not be effected, as the owner of the land demanded a price that the board considered exorbitant. It was found on further examination that this range could be placed on Finn's Point, on the New Jersey side. All the title-papers have been prepared and the titles approved by the Attorney-General. The designs for the four structures have been approved, and they are now under construction. The rear lights are to be iron structures 100 and 120 feet high, with keepers' dwellings attached. It is expected that both ranges can be lighted before winter.

256. *Reedy Island, Delaware Bay, Delaware.*—Under the law providing for the erection of Liston's Tree Range light, this light is to be discontinued when Liston's Tree Range lights are exhibited.

257, 258, 259, and 260. *Bulkhead Ranges, Deep-Water Point, New Jersey, and New Castle, Delaware.*—Owing to the difficulty of obtaining sites for these ranges, and the exorbitant value placed upon the land required, the construction has been greatly delayed. The sites have now been purchased, the titles approved by the Attorney-General, and all the structures are in progress. It is hoped they will be completed before the close of the season.

262. *Fort Mifflin, Delaware River, Pennsylvania.*—Three hundred tons of riprap stone have been deposited around the pier, upon which the building is founded, to give protection against running ice. The fence around the pier has been repaired, and the entire structure painted inside and outside.

263 and 264. *Schuylkill River Ranges, Pennsylvania.*—Two piers have been erected on League Island Flats, near the mouth of the Schuylkill, and beacons supplied with sixth-order illuminating apparatus placed upon them to serve as range-lights for entering the mouth of the river. The piers are connected with the river-bank by plank walks. A keeper's dwelling has been erected adjacent to the two piers, according to plans approved by the board. The lights were exhibited, for the first time, December 15, 1875.

Cherry Island Flats, Delaware River.—There is a bad shoal at this point, with a narrow channel on either side. It should be marked by a light or lights, the exact positions of which can only be determined by a survey. By act approved July 31, 1876, the Light-House Board is authorized to make a survey for the purpose of determining this question; but no money was appropriated for this purpose. A proper survey will cost \$3,000. It is recommended that an appropriation of \$50,000 be made for a light or lights to guide past this shoal.

REPAIRS.

At each of the following-named light-stations repairs and renovations, more or less extensive, have been made since the last annual report:

234. *Barnegat, Barnegat Inlet, New Jersey.*

235. *Tucker's Beach, Little Egg Harbor Inlet, New Jersey.*

236. *Absecum, Absecum Inlet, New Jersey.*

239. *Cape May, entrance to Delaware Bay, New Jersey.*

240. *Cape Henlopen, entrance to Delaware Bay, Delaware.*

241. *Cape Henlopen beacon, entrance to Delaware Bay, Delaware.*

242. *Delaware Breakwater, entrance to Delaware Bay, Delaware.*

244. *Brandywine Shoal, Delaware Bay, Delaware.*

- 246. *Egg Island*, Delaware Bay, New Jersey.
- 250. *Cohansey*, entrance to Cohansey Creek, New Jersey.
- 251. *Bombay Hook*, Delaware Bay, Delaware.
- 256. *Reedy Island*, Delaware Bay, Delaware.
- 261. *Christiana*, entrance to Christiana River, Delaware.
- 262. *Fort Mifflin*, Delaware River, Pennsylvania.
- 265. *Fenwick's Island*, coast of Delaware, Delaware.
- 267. *Assateague*, coast of Virginia, Virginia.

LIGHT-SHIPS.

238. *Five-Fathom Bank*, No. 37, on *Five-Fathom Bank*, off the capes of the *Delaware*.—This vessel parted her moorings on the 14th of December last, during a severe northwest gale, losing a heavy mushroom anchor and 75 fathoms of cable. She was brought up with her spare anchor about one mile to seaward of her station, where she remained until replaced in proper position, December 20. Being to seaward of all dangers her lights were exhibited as usual during this time. She is in need of repairs, which will be made during the season.

Cross Ledge light-ship No. 19, *Delaware Bay*.—On December 8, 1875, the light-house on Cross Ledge Shoal was completed, and the light exhibited for the first time. By the terms of the law establishing this station, the light-ship station was discontinued, and on the 9th the light-ship was withdrawn. This vessel has been carefully surveyed, and is now undergoing repairs to fit her for service where needed. The repairs will make her one of the best ships of her class in the service, and will cost about \$11,000.

266. *Winter-Quarter Shoal light-ship* No. 2.—Light-ship No. 24 upon this station was replaced by light-ship No. 2 in November, 1875. Neither of these vessels is sufficiently large and sea worthy for so exposed a station, and the board contemplates sending a better vessel to this point before the close of the pleasant season.

Light-ship No. 18.—This vessel, being much decayed, was surveyed and pronounced unworthy of repairs. After due public advertisement, she was sold to the highest bidder, and the net proceeds, amounting to \$985.46, were turned into the Treasury.

Light ship No. 24.—This vessel was withdrawn from Winter-Quarter Shoal station in November last, her place being supplied by No. 2. A new lantern has been placed upon her foremast, and she is now used as the relief-ship for the district.

FOG-SIGNALS.

Cape Henlopen, Delaware.—First-class steam-siren in duplicate; completed and first put in operation December 29, 1875; in good order and efficient in every respect.

BUOYAGE.

The buoyage of this district is in good condition.

The following additional buoys have been added to the list during the year:

One first class spar to mark lump off Delaware breakwater. Three spars to mark Schooner Ledge in the Delaware, near Chester, Pa. Five spars to mark channel of the Schuylkill River. Three spars to mark rocks near Torresdale, Delaware River; and three spars to mark the channel across Chincoteague Bay.

TENDERS.

The *Violet*, used for purposes of inspection, supply, and buoyage, is entirely too small for the important work required of her, and her place should be supplied by a larger, more powerful, and more sea-worthy vessel.

The *Rose*, used by the engineer for purposes of construction and repair, is small and of little consequence. As soon as her place can be supplied by a better vessel she should be sold.

DEPOTS.

The depots for buoys and supplies in this district are in fair condition. A place at which buoys can be cleaned, repaired, and painted is required at a point near Cobansey light-station. A suitable piece of land can be purchased near the light-house for a small sum, and it is recommended that an appropriation of \$1,000 be made for this purpose.

FIFTH DISTRICT.

The fifth light-house district extends from Metomkin Inlet, Virginia, to include New River Inlet, North Carolina, and embraces part of the sea-coast of Virginia and North Carolina, Chesapeake Bay; sounds of North Carolina, and the James and Potomac Rivers.

Inspector.—Commander E. C. Merriman, United States Navy, until October 1, 1875; Commander F. H. Baker, United States Navy, present inspector.

Engineer.—Major Franklin Harwood, Corps of Engineers, brevet lieutenant-colonel United States Army.

In this district there are—

Light-houses	73
Light-ships	0
Fog-signals operated by steam or hot-air engines	0
Day or unlighted beacons	69
Buoys actually in position	689
Spare buoys for relief and supply losses	935
Tenders (steam) Heliotrope (buoy-tender) and Tulip, (for construction and repairs)	2
Tender (sail) Maggie, (buoy-tender)	1

The numbers preceding the names of the stations correspond with the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

270. *Cape Henry, on the south side of the main entrance to Chesapeake Bay, Virginia*.—As stated in the last annual report, the tower at this station is one of the oldest on the coast of the United States, and a new one should be built at the earliest day practicable.

284. *York Spit, entrance to York River, Virginia*.—On the 6th of August, 1875, the illuminating apparatus at this station was changed from a fifth to a fourth order, with double-wick lamp-burner. The change has been highly appreciated by mariners.

285. *Too's Marshes, south side of entrance to York River, Virginia*.—This station was completed and the light exhibited for the first time on the 15th of August, 1875.

294. *Solomon's Lump, in Kedges Strait, Virginia.*—This light-house was completed and the light exhibited for the first time on the 10th of September, 1875. At the same time the light at Fog Point was discontinued.

301. *Thomas's Point Shoal, north side of mouth of South River, Maryland.*—This light-house was completed and the light exhibited on the 20th of November, 1875. The old light on the shore was then discontinued. The new structure rests on 10-inch wrought-iron piles. It is situated on a shoal about a mile from Thomas's Point. The light is of the 3½ order, showing a red flash every 20 seconds.

303. *Sandy Point, west side of Chesapeake Bay, Maryland.*—The light at this station, situated on the main-land, is too far from the channel to be efficient. The shoals make out from the point a distance of about one mile, and vessels drawing more than ten feet of water cannot approach within that distance of the light-house. The fog-bell at this station can seldom be heard on account of its distance from the channel. This light-house marks a turning-point. A change in the location to the outer edge of the shoal and the establishment of an efficient fog-signal is recommended, and an estimate of \$25,000 is submitted for that purpose. A structure somewhat similar to that at Thomas's Point Shoal it is believed will answer the purpose.

304. *Love Point, on the shoal making out from the upper end of Kent Island, Maryland.*—Serves as a guide into Chester River. The lens at this station was, on the 15th of November last, changed from a 3½ order, flashing red, to a 5th order, fixed white.

320. *Mathias Point Shoal, Potomac River, Virginia.*—The iron-work for the foundation was finished a short time ago and is now stored at the Lazaretto Depot, Baltimore, Md. The erection of the structure is postponed until the fall, owing to more pressing and important work required at other points in the district. The framing of the superstructure is at present in course of preparation, and it is expected that operations will soon begin at the site. It is believed that the light can be exhibited during the coming season.

325. *Currituck Beach, coast of North Carolina.*—The tower at this station was completed and the light exhibited December 1, 1875. It is of the first order, fixed white, varied at intervals of 1½ minutes by red flashes. The tower is built of brick. Work on the keeper's dwelling was commenced in November, 1875. At the close of the fiscal year the station was entirely complete.

327. *Cape Hatteras, coast of North Carolina.*—In March and April, 1876, extensive repairs were made at this station, placing the keeper's dwellings in thorough repair, and making various improvements on the premises. The tower was also thoroughly repainted and the exterior marking renewed. The station is now in good order.

332. *Northwest Point Royal Shoal, on northwest point of Royal Shoal, North Carolina.*—In April, 1876, the dwelling was re-roofed, and the station put in thorough repair.

334. *Brant Island Shoal, southern part of Pamlico Sound, North Carolina.*—This station was destroyed by fire, May 24, 1876, but the iron-work remaining intact, with a few minor exceptions, the station can be restored at an expense not to exceed \$10,000, for which an appropriation is needed.

338. *Roanoke Marshes, in channel connecting Pamlico and Croatan Sounds, North Carolina.*—The iron material for rebuilding this station is stowed at the Lazaretto Depot, Baltimore, Md., but, an additional appropriation having been made, it is proposed to build the new house during the winter of 1876-77. A site has been selected one hundred yards south-southeast of the present old structure.

REPAIRS.

At each of the following-named stations there have been repairs and renovations, more or less extensive, during the year:

- 268. *Hog Island*, sea coast of Virginia.
- 273. *Crane Island*, near the mouth of Elizabeth River, Virginia.
- 274. *Lambert's Point*, Elizabeth River, Virginia.
- 276. *White Shoal*, James River, Virginia.
- 277. *Point of Shoals*, James River, Virginia.
- 278. *Deep-Water Shoals*, James River, Virginia.
- 280. 281. *Dutch Gap Canal*, James River, Virginia.
- 282. *Cherrystone*, entrance to Cherrystone Inlet, Virginia.
- 284. *York Spit*, entrance to York River, Virginia.
- 287. *Wolf-Trap*, east end of Wolf-Trap Shoal, Chesapeake Bay, Virginia.
- 288. *Stingray Point*, mouth of Rappahannock River, Virginia.
- 289. *Windmill Point*, mouth of Rappahannock River, Virginia.
- 291. *Jane's Island*, entrance to Little Annemessex River, Maryland.
- 292. *Somer's Cove*, north side of Little Annemessex River, Maryland.
- 297. *Hooper's Straits*, abreast of entrance to Honga River, Maryland.
- 298. *Core Point*, north entrance to Patuxent River, Maryland.
- 299. *Sharp's Island*, off north end of Sharp's Island, Maryland.
- 300. *Choptank River*, opposite entrance to Choptank and Treadhaven Rivers, Maryland.
- 305-306. *Craighill Channel Range-lights*, Chesapeake Bay, Maryland.
- 307. *Seven-foot Knoll*, mouth of Patapsco River, Maryland.
- 309-310. *Hawkins's Point*, upper and lower lights, south side of Patapsco River, Maryland.
- 313. *Pool's Island*, off mouth of Gunpowder River, Maryland.
- 316. *Ocracoke*, entrance to Ocracoke Inlet, North Carolina.
- 319. *Lower Cedar Point*, west side of Potomac River, Virginia.
- 324. *Bowler's Rock*, Rappahannock River, Virginia.
- 326. *Body's Island*, coast of North Carolina.
- 327. *Cape Hatteras*, coast of North Carolina.
- 329. *Hatteras Inlet*, Pamlico Sound, North Carolina.
- 331. *Southwest Point Royal Shoal*, Pamlico Sound, North Carolina.
- 332. *Northwest Point Royal Shoal*, Pamlico Sound, North Carolina.
- 333. *Harbor Island*, between Pamlico and Core Sounds, North Carolina.
- 335. *Neuse River*, entrance to Neuse River, North Carolina.
- 337. *Long Shoal*, Pamlico Sound, North Carolina.
- 339. *Croatan*, between Croatan and Albemarle Sounds, North Carolina.
- 340. *North River*, entrance to North River, North Carolina.
- 341. *Wade's Point*, west side of Pasquotank River, North Carolina.
- 342. *Roanoke River*, near the mouth Roanoke River, North Carolina.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT AIR.

There are no fog-signals operated by steam or hot-air engines in this district.

DAY OR UNLIGHTED BEACONS.

From the changing of the Core Sound Channel, and after a thorough examination, it was found advisable to discontinue a number of the

stake-beacons. Five stake-beacons have been placed in the Nansemond River, Virginia, to guide vessels over the bar at the mouth of Suffolk Creek. Material for four day-beacons, to be built in the Potomac River, has been prepared and is now stored at the depot at the Lazaretto. The work of placing them will be commenced at once. These beacons are to be built of iron, three of them with screw-pile foundations and one of cast iron, filled with concrete. They will be placed on the following shoals, viz: Metrinkin Point Shoal, Lower Cedar Point Shoal, Port Tobacco Flats, and Persimmon Point Shoal.

BUOYS.

New buoys have been placed during the year as follows: A third-class can-buoy has been placed at the entrance to Cherrystone Inlet, Virginia, to mark a shoal. A third-class nun-buoy and fourteen spar-buoys have been placed in the Nansemond River, Virginia, a large number of citizens of Suffolk and vicinity having applied to have that river buoyed. A small spur buoy has been placed off Washington, D. C., near the arsenal-grounds, to mark a number of sunken piles, dangerous to navigation. The upper rock near the Georgetown, D. C., aqueduct having been removed, the buoy which marked it has also been removed.

The wreck-buoy which was placed to mark a sunken canal-boat near Turkey Point, Chesapeake Bay, Maryland, has been removed, as the wreck has disappeared. Two third-class iron nuns and ten spar-buoys were carried away by ice, the sea, run down by vessels, and worn out during the year, of which one third-class iron nun was recovered. All the buoys of the district have been examined or exchanged, and are in their proper positions. A great number of them require exchanging, which will be done as fast as possible by the one slow steamer and sailing-tender at command.

TENDERS.

The steam-tender *Heliotrope* and sailing-tender *Maggie* have been constantly employed examining and exchanging buoys, supplying light-houses with fuel and other articles, and carrying the inspector about the district on his tours of inspection. The steamer *Heliotrope* is in fair working-order. The schooner *Maggie* is in good condition, and is well suited for work in the sounds of North Carolina, where she is mostly employed. The steam-tender *Tulip* has been engaged during the year, carrying material and workmen to stations undergoing repairs or in process of construction. The schooner *Spray* was employed during a portion of the year in carrying material to works in process of construction. There being no further need of her services in the fifth district, she was in April, 1876, transferred to the seventh district.

DEPOTS.

Lazaretto Point, near Baltimore, Maryland.—At this depot a number of buoys and their appurtenances are kept for use as reliefs, and to supply losses in the channels leading to Baltimore and the upper part of the Chesapeake Bay and tributaries. The depot is in need of repair, and the recommendation of last year for an appropriation of \$4,000 for this purpose is renewed.

Portsmouth, Virginia.—This is the main depot of the district, and contains the principal supply of spare buoys and their appurtenances, coal for the use of the steam-tenders, and coal and wood for the light-

houses; also supplies to meet cases of emergency. Most of the spar-buoys used in the district are made at this depot.

Washington, Pamlico River, North Carolina.—The buoys and appurtenances for the sounds of North Carolina and their tributaries are kept at this depot, which is in good condition.

SIXTH DISTRICT.

The sixth district extends from New River Inlet, North Carolina, to and including Cape Canaveral light-house, Florida, and embraces part of the coast of North Carolina, the coasts of South Carolina and Georgia, and part of the coast of Florida.

Inspector.—Captain A. E. K. Benham, United States Navy.

Engineer.—Captain W. A. Jones, Corps of Engineers, United States Army.

In this district there are—

Light-houses.....	35
Light-ships.....	5
Fog-signals operated by steam or hot-air engines.....	0
Day or unlighted beacons.....	74
Buoys actually in position.....	243
Spare buoys for relief and to supply losses.....	42
Tender (steam) Alanthus, buoy-tender.....	1
Tender (sail) Mignonette, used for constructions and repairs.....	1
Steam-launch Crocus.....	1

The numbers preceding the names of the stations correspond with those given in the "List of Light-houses, Lighted Beacons, and Floating Lights of the Atlantic, Gulf, and Pacific coasts of the United States," published January 1, 1876.

LIGHT-HOUSES.

344. *Federal Point, entrance to the New Inlet, North Carolina.*—This is a two-story frame house on nine iron piles, lantern on top. The house is in need of considerable repairs, which will be made at an early day.

346-347. *Oak Island Range Beacons, entrance to Cape Fear River, North Carolina.*—At the date of the last report the work of building two new frame beacons to take the place of the present ones, and to secure a better range through the western or Oak Island Channel, for which an appropriation of \$4,000 had been made by Congress, was suspended by order of the board until it could be determined whether the changes in the channels then taking place were of a permanent character. The Bald Head channel has improved in depth, and is now generally used by vessels. Owing, however, to the frequent changes in this channel, any project for lighting it would be premature. The Oak Island beacons must therefore be retained as a guide for vessels at night, and in view of the indefinite period that may elapse before any other channel could be lighted, and as the present beacons require extensive repairs which have already been postponed until they have become a matter of necessity, it is proposed to build the beacons provided for. It is believed they may be so constructed of iron that they can be readily removed to another site should a change become necessary. The appropriation of \$4,000 is still available and it is believed will be sufficient to complete the work.

348. *Georgetown, South Carolina.*—The upper part of the tower has been coated with cement-mortar to stop the leaks through the defective

joints of the brick-work. The other portions of the tower have been painted and whitewashed. The premises have been inclosed by a wooden fence, and the station left in complete order.

349. *Cape Romain, South Carolina.*—Measurements made during the year show no further settlement of this tower, the total deflection remaining as before reported, $27\frac{1}{4}$ inches.

352. *Morris Island main light, on the south end of Morris Island, entrance to Charleston Harbor, South Carolina.*—At the date of the last report the foundations of the tower had been completed and the work suspended during the unhealthy season. Operations were resumed in October, 1875, when the work on the superstructure was commenced and has since been steadily continued to completion. The illuminating apparatus, a first-order lens, fixed white, with an arc of 270° , and a catadioptric reflector of 90° , has been set up. The oil and work rooms have been built, and the tower is ready for lighting. The keeper's dwelling has been commenced and is nearly completed. Cisterns of an aggregate capacity of 7,000 gallons have been built. The ground in the vicinity of the tower, originally nearly on a level with the adjoining marsh-land, and subject to overflow at spring-tide, has been raised to an average height of 3 feet over an area of 300 by 200 feet, with sand hauled from the site of the old tower (the nearest available point) and covered with the soil excavated from the foundation. The easterly side bounded by the marsh has been protected from the tides by a timber and plank scarp faced with the *débris* of the old tower. Examinations and soundings of the southeast and Pumpkin Hill channels, with a view of determining whether it is necessary to retain the present range-beacons, have been made.

Fort Ripley, Charleston Harbor, South Carolina.—An appropriation having been made for building a light-house on Fort Ripley Shoal, to take the place of Castle Pinckney light, the work will be taken in hand at an early day.

358. *Castle Pinckney, Charleston Harbor, South Carolina.*—The work of rebuilding this beacon, for which an appropriation of \$2,000 was made by Congress, will not be commenced, as the light will be discontinued when the one on Fort Ripley Shoal is built.

359. *Combahee Bank, Saint Helena Sound, South Carolina.*—The shoal on which this light-house was built has been washed away to such an extent as to endanger the safety of the structure and render it useless to navigation. The board, therefore, ordered the discontinuance of the light and the removal of the lens and lantern. The order was carried into effect June 30, 1876, the building remaining as a day-mark.

360. *Hunting Island, South Carolina.*—Under the appropriation made by act approved March 3, 1875, for keeper's dwelling, a frame building of two stories and attic has been built on a brick foundation, with brick cisterns of an aggregate capacity of 7,000 gallons, the whole inclosed by a picket fence. The dwelling was completed, ready for occupation, May 1, 1876. At the date of the last report the fresh-water ponds in the vicinity of the site had been drained, the ditches discharging on the beach through a flood-gate, built into a timber-crib filled with stone, intended to form the nucleus of a breakwater to be built to protect the site. The building of the keeper's dwelling exhausted the appropriation, leaving no funds to be applied to the proposed breakwater; and the encroachment of the sea during the past year has been so great as to wash away the land to a line considerably in rear of the crib and flood-gate, rendering the latter useless, and entirely stopping the drainage of the ponds, upon which the health of the station mainly depends.

Some other arrangement will have to be made for draining the ponds.

364. *Tybee main light, on Tybee Island, entrance to Savannah River, Georgia.*—The following remarks, taken from the last annual report, are repeated, viz:

This tower, the dangerous condition of which has been described in a former report, has recently exhibited further signs of instability. The tower has lately been carefully examined, and the measurements taken show that no departure from verticality has taken place. The cracks, however, have increased in number and extent, one of them being open $\frac{1}{2}$ inch on the inside, and several others from $\frac{3}{8}$ to $\frac{1}{4}$ inch, while on the outside the jambs and arches of all the windows are cracked, that of the third landing being $\frac{3}{8}$ inch, and the others being from $\frac{1}{8}$ to $\frac{3}{8}$ inch opened. The cracks have been calked in places to show any further movement. This tower, which is one of the oldest on the coast of the United States, having been built in 1793, should be rebuilt, with the least practicable delay, and an appropriation of \$50,000 is asked to commence the work.

365. *Tybee Beacon, Georgia.*—This is a skeleton-frame, wooden structure, has been built nearly ten years, and twice moved back on account of the encroachments of the sea. These removals have, by opening the joints of the framing and admitting water, caused the wood to rot. It would be better policy to rebuild the beacon than to further repair it, and an appropriation of \$4,000 is recommended therefor.

Tybee Knoll Shoal, entrance to Savannah River, Georgia.—The appropriation for a light-house on Tybee Knoll having been made available for the establishment of range-lights to guide through the dredged channel of Tybee Knoll, the work will be commenced at as early a day as practicable.

367. *Cockspur Island Beacon, Georgia.*—The tower has been fitted with storm-doors for the lantern, and the stairs and landing repaired. The keeper's dwelling, a small one-story frame building, built on a wooden foundation, is more than twenty years old, and so decayed that further repairs are unadvisable. It is also so near the ground that during severe gales the water rises above the floor. This dwelling accommodates the keepers of both the Oyster Beds and Cockspur beacons. An appropriation of \$7,000 is recommended to build a suitable dwelling.

371. *Sapelo Beacon, entrance to Doboy Sound, Georgia.*—The old wooden beacon is rotten and in danger of falling. Plans and specifications for a new iron beacon to take its place have been made, and a beacon is being built.

374. *Saint Simons, Georgia.*—This station has received extensive repairs and improvements. The iron windows of the tower have been refitted, closets and fittings for storm-panes of lantern-glass and keeper's implements have been constructed in the watch and oil rooms. A speaking-tube to connect the watch-room and dwelling for calling the relief-keeper has been fitted. The tower has been painted outside and inside. The walls of the keeper's dwelling have been furred and plastered to prevent dampness. The roof has been repaired, made watertight, and the dwelling painted and whitewashed. The machinery of the lens has received a thorough overhauling.

375. *Little Cumberland Island, Georgia.*—The foundation, which was being undermined by the drifting away of the sandy soil, has been protected by a brick wall built around the tower at a distance of 6 feet from the base and extending down 2 feet below the tower foundation, the intervening space being covered with concrete and paved with brick. The tower doors and windows have been refitted and repaired, and the tower painted and whitewashed. The foundation of the dwelling has been protected from drift by a heavy covering of oyster-shells.

379. *Amelia Island, (front beacon,) Florida.*—A new iron beacon has

been erected to take the place of the old wooden one. The cost was defrayed from the appropriation for repairs of light-houses, 1876.

382. *Saint Augustine, Florida*.—At the date of the last annual report, the brick walls of the keeper's dwelling had been raised and the building roofed in. The dwelling has since been completed and the premises inclosed with a brick wall. A wire rope with attachments to take the place of the iron weight-rods has been sent to the station. Through the carelessness of a keeper, the lamp-weight was permitted to fall through the machinery case, damaging some parts of the machinery. The damaged portions were repaired by the district lampist, and the machinery put in good order.

383. *Cape Canaveral, on the northeast pitch of Cape Canaveral, Florida*.—The keeper's dwelling at this station is an old frame structure, fitted up for the use of the principal keeper. When the tower was first built, it was supposed that the rooms in the tower could be used by the assistants. This has been found impracticable, owing to the excessive heat of the climate, the tower being a cast-iron shell, lined with brick. The assistants have, therefore, been living in sheds fitted up by themselves. It is recommended that a permanent dwelling for three keepers be built at this station, and an appropriation of \$12,000 is recommended. It may be added that the great cost of building a keeper's dwelling at this station is owing to its inaccessibility.

REPAIRS.

At each of the following light-stations, repairs more or less extensive have been made during the year, viz:

- 348. *Georgetown*, entrance to Pedee River, South Carolina.
- 349. *Cape Romain*, on Raccoon Key, sea-coast of South Carolina.
- 350. *Bull's Bay*, on Bull's Island, South Carolina.
- 353 and 354. *Morris Island*, range-lights on Morris Island, South Carolina. •
- 357. *Fort Sumter*, Charleston Harbor, South Carolina.
- 358. *Castle Pinckney*, Charleston Harbor, South Carolina.
- 362 and 363. *Daufuskie beacons*, on Daufuskie Island, South Carolina.
- 364. *Tybee Main light*, mouth of Savannah River, Georgia.
- 365. *Tybee beacon*, mouth of Savannah River, Georgia.
- 367. *Cockspur beacon*, Savannah River, Georgia.
- 369. *Pig Island*, Savannah River, Georgia.
- 374. *Saint Simon's*, entrance to Saint Simon's Sound, Georgia.
- 375. *Little Cumberland Island*, entrance to Saint Andrew's Sound, Georgia.
- 376, 377. *Amelia Island*, north range, on Amelia Island, Florida.
- 378, 379. *Amelia Island*, main light and beacon, on Amelia Island, Florida.
- 380. *Saint John's*, mouth of Saint John's River, Florida.
- 381. *Dames Point*, Saint John's River, Florida.

LIGHT-SHIPS.

345. *Frying Pan Shoals light-ship No. 29*.—This vessel is in good condition, requiring no repairs.

351. *Rattlesnake Shoal light-ship No. 38*.—At the date of the last annual report this vessel was undergoing repairs at Charleston, South Carolina. The repairs were completed and she was returned to her station September 4, 1875, and is now in good condition.

361. *Martin's Industry light-ship No. 32.*—This vessel is considerably decayed, and will probably require somewhat extensive repairs during the coming year.

366. *Tybee Knoll light-ship No. 21.*—The hull of this vessel is unsound, but as the station is sheltered by the neighboring shoals, it is hoped that she will be able to remain until the establishment of range-lights renders her presence no longer necessary.

— *Relief light-ship No. 34.*—This vessel has been thoroughly repaired and refitted during the past year, and is now in good serviceable condition.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are none in this district.

DAY-BEACONS.

Savannah River day-marks.—Two wooden beacons on Long Island, two on Jones's Island, two on Elba Island, and one on the main-land, opposite Elba Island; total, 7. A balance of \$325.61 remains from the appropriation of \$2,500, approved by Congress March 3, 1873, for "day-beacons in Savannah River, Georgia," and is retained for the purpose of erecting day-beacons for a channel now being dredged above the obstructions.

Saint John's River, Florida.—The old tower at the south entrance to Saint John's River. Fifty-four wooden piles and groups of piles, driven along the Saint John's River between its mouth and Pilatka, Florida. Other day-beacons remain essentially as at the date of last annual report.

BUOYS.

The buoyage of the district is in good condition.

TENDERS.

The steam-tender *Alanthus*, used for purposes of inspection, supply, and buoyage, is in good condition and efficient for the services required.

The schooner *Mignonette*, used for engineering purposes, is nearly worn out and so far decayed as to render her repair inexpedient. She will be sold and the proceeds turned into the Treasury.

DEPOTS.

The following remarks taken from the last annual report are repeated :

The buoys and supplies are now stored at Fort Johnson, Charleston Harbor, belonging to the War Department, but the wharf is in such a dilapidated condition that it is comparatively useless, and is a dangerous place for the tenders to lie. The wharf will have to be entirely rebuilt, and as its location is not a desirable one for a depot, it is recommended that a site be procured in the city of Charleston, and the depot established there.

SEVENTH DISTRICT.

The seventh light-house district extends from Cape Canaveral, on the eastern coast of Florida, to the Perdido River, on the Gulf coast, and embraces all the aids to navigation within those limits.

Inspector.—Commander H. B. Seely, United States Navy.

Engineer.—Maj. Jared A. Smith, Corps of Engineers, United States Army.

In this district there are—

Light-houses.....	17
Light-ships.....	0
Fog-signals operated by steam or hot-air engines.....	0
Day or unlighted beacons.....	60
Buoys actually in position.....	143
Spare buoys for relief and to supply losses.....	88
Tender (steam) Geranium, used by inspector.....	1
Tender, (sail,) Spray, used in construction and repairs.....	1

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LIGHT-HOUSES.

385. *Cape Florida, Florida*.—Only indispensable repairs have been made at this station, as it is proposed to abandon it on the completion of the new light-house on Fowey Rocks.

386. *Fowey Rocks, Florida Reef, east coast of Florida*.—During the summer and early autumn months of 1875, a party was employed at Soldier Key, $4\frac{1}{2}$ miles distant from the reef, constructing preliminary works connected with the erection of this light-house.

A substantial wharf, 390 feet long, on mangrove piles, has been completed, to a depth of 7 feet at low water. On this wharf an iron track has been laid to a store-house. As the sea sweeps entirely over the key in hurricanes, all buildings are raised 6 feet above the surface, and strongly secured. The working platform on the reef is now nearly completed. It will be 80 feet square, supported on 81 iron-shod mangrove piles driven into the hard coral rock. The platform is about 12 feet above the water, and a wharf, on piles, about 75 feet long, will extend to sufficiently deep water. To hasten the construction of the work, in October, 1875, a contract was made for the material for the foundation and first series of the light-house; this work was completed, and arrived at Key West the latter part of May. It was transported to Soldier Key, and the foundation-piles are now being driven, and it is expected to have the entire foundation in place during the present season. A contract has been made for the entire superstructure, and it is now in course of construction.

387. *Carysfort Reef, sea-coast of Florida*.—This iron structure has been thoroughly cleaned, and the portions which had been rusted, painted with red lead while the surface was bright. All the iron-work above low water has been twice painted. The lantern, the wood-work of dwelling, stair-mantel, and watch room have been painted. A new floor has been laid upon the balcony around dwelling. A new tension brace of the foundation series has been made to replace one to be removed for examination. The exchange of a new brace for an old one is difficult, as both rust and coral have formed in the deep water about the foundation; and it is hoped that the entire removal of these braces may not be found necessary.

388. *Alligator Reef, sea-coast of Florida*.—The entire structure has been scaled, scraped, and painted in the same manner as at Carysfort Reef. A new iron crane has been constructed for use in raising supplies, and will be erected the first opportunity. Some small repairs are required, which will soon be completed.

389. *Sombrero Key, near Coffin's Patches, Florida Reef*.—This iron-work has been scaled, scraped, and painted. As at Carysfort Reef, a new iron brace has been made to replace one of the foundation series to be removed for examination.

390. *Sand Key, Florida.*—The old dwelling, somewhat damaged by a hurricane in September, 1875, had become so much rusted and decayed as to render the station scarcely habitable. An appropriation being available, designs were completed, and the work of repair was begun November 13, 1875. Temporary dwellings were constructed for keepers, workmen, and for shops. The removal of the old iron dwelling and tower consumed considerable time, as parts were so thoroughly rusted as to require much cutting of the iron, as well as all the bolts and rivets. Many of the floor-plates, girders, and other parts were broken, and had to be replaced with new. All the girders, plates, &c., were so rusted as to greatly impair their strength, and as the weight of the new work greatly exceeded the old, to make the structure secure, a system of iron beams supported by brackets was fitted to the columns beneath the floor of the dwelling. Other devices were required for sustaining the weight of the tower. The work was arranged so as not to interfere with the regular exhibition of the light. The new dwelling has the same dimensions as the old one, viz, 38 feet square, but is better arranged for the convenience of the keepers. The water-tanks are of boiler-plate, four in number, and have an aggregate capacity of 5,000 gallons. They are placed underneath the central part of the dwelling, on heavy iron beams fitted to sockets bolted to the columns. The outer walls and roof of the dwelling are of cast-iron plates bolted together. The roof-plates rest on a system of iron girders, supported on the walls and columns. The tower or stair-mantel, is of boiler-plate, well fastened with covering strips without and T-pieces within. No iron doors, windows, or shutters have been used, as previous experience in this climate shows that they rust so that they are not easily moved. An iron railing has been furnished for the balcony around dwelling. The entire structure has been carefully cleaned from rust, and twice painted. Excepting the lantern, the structure is now one of the best arranged in the district. Some of the lower braces may require renewing soon, as the hooks at the lower ends have been considerably weakened by rust, which has in many instances eaten away more than one-third of the section.

American Shoal, Florida Keys, Florida.—The remarks made in the annual reports for 1874 and 1875 are respectfully repeated :

The navigation of this portion of the Gulf is always dangerous, particularly to vessels bound to the southward and westward, because of the strong and variable currents near the reef, causing many wrecks and much loss of property. A light on or in the vicinity of American Shoal, illuminating the now unlighted space between Sombrero and Sandy Key lights, would be most useful to mariners, and is strongly recommended.

An appropriation of \$75,000 is asked for commencing this work.

391. *Key West, Florida.*—A new cistern, about 6 by 12 feet, and 8 feet deep, has been constructed by cutting out the coral rock and building inside. Two feet only of the cistern is above the surface. The water-supply, heretofore inadequate, will now be sufficient for all the requirements of the station.

392. *Northwest Passage, Florida.*—All the iron-work has been cleaned, as at the other stations, and twice painted.

393. *Dry Tortugas, Loggerhead Key, Florida.*—The hurricane of September, 1875, damaged this station somewhat, though not seriously. The water-gutters were broken from the dwelling, the lightning-conductor from the tower, the doors and windows much injured. The entire station has been put in good order. An appropriation of \$75,000 was made March 3, 1875, for building a new tower here. The work has, how-

ever, been deferred in the hope that it might not be found necessary. Owing to the isolated location, the engineer has had no opportunity of observing the present tower in high winds. Reports from keepers, however, show that the vibrations are very great and injure the masonry. Plans for a new structure are being prepared.

394. *Dry Tortugas Harbor, Garden Key, Florida.*—An appropriation of \$5,000 was made March 3, 1875, for constructing a new tower on an adjacent bastion of Fort Jefferson. In September, 1875, a hurricane rendered the old tower and lantern almost useless, and every effort was made to replace it with the new one as early as possible. Designs were completed for a hexagonal tower of boiler-plate iron, having a balcony and cylindrical parapet, and the iron was ordered November 26, 1875. This was finished and the erection begun in February. The interior of the structure is finished with wood. The lens was removed to the new tower, and the light exhibited for the first time April 5, 1876. The location is 93 feet east, 21° 30' south, from its former position.

395. *Egmont, entrance to Tampa Bay, Florida.*—The pile-wharf at this station has been entirely rebuilt, the trestle-wharf connecting it with the buoy-depot repaired, the railroad-track relaid, and other repairs of a general nature made. The water-supply being insufficient, a new cistern, 6 by 12 feet inside and 6 feet 6 inches deep, has been built of concrete. The old cistern has been repaired and strengthened, and the whole well covered with a substantial decking of plank.

400. *Cape San Blas.*—The necessity for protecting the tower against encroachments of the sea was referred to in the last annual report. The recommendation that an appropriation of \$5,000 be made for this purpose is renewed.

401. *Pensacola, entrance to Pensacola Bay, Florida.*—The roof of piazza has been newly shingled, and the slating of dwelling and oil-house thoroughly repaired. Other repairs of a general nature have been made, and the station put in good order.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are no fog-signals operated by steam or hot-air engines in this district.

BEACONS.

Rebecca Shoal.—Designs have been completed for a new iron pile-beacon 75 feet high. It has not been possible to complete the work, but it will probably be erected during the ensuing year.

Sea-Horse Key beacon.—Owing to the limited facilities for work, it has not been possible to complete the repairs contemplated for this beacon. They will receive attention at the earliest opportunity. The other iron beacons in the district have not required repairs during the year, and are in good condition.

BUOYAGE.

The buoyage of this district is in good condition.

TENDERS.

The need of a steamer for engineering purposes has been greatly felt, that for which an appropriation was made March 3, 1875, not having

been completed, the *Geranium* has been transferred to the engineer for use at Fowey Rocks, and the schooner *Spray* has been transferred from the fifth district, arriving at Key West on the 11th of June.

DEPOTS.

There are now four depots in the district. A small coal and buoy depot at Fort Pickens, on grounds of the War Department, a small buoy-depot at Egmont Key, and buoy-depot at Key West, consisting of a small lot and building, on grounds belonging to the custom-house, with a wharf belonging to the Navy Department. They are all small, of little consequence, and none of them afford any facilities for storage of engineers' implements or materials. The temporary depot established for use in the construction of the light-house at Fowey Rocks, will serve in future as an auxiliary depot for buoys.

EIGHTH DISTRICT.

The eighth light-house district extends from the Perdido River, Florida, to the Rio Grande, Texas, and embraces the coasts of Alabama, Mississippi, Louisiana, and Texas.

Inspector.—Commander C. M. Schoonmaker, United States Navy.

Engineer.—Captain A. N. Damrell, Corps of Engineers, brevet major United States Army.

In this district there are—

Light-houses	44
Light-ships	1
Fog-signals operated by steam or hot-air engines	3
Day or unlighted beacons	8
Buoys actually in position	98
Spare buoys for relief and to supply losses	79
Tender, (steam,) <i>Dandelion</i> , buoy-tender	1
Tender, (sail,) <i>Magnolia</i> , used in construction and repairs	1

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LIGHT-HOUSES.

404. *Mobile Point, Mobile Bay, Alabama*.—The keeper's dwelling at this station is now so close to the water, owing to the encroachments of the sea, that the foundation-piers are liable to be undermined and the building destroyed during heavy northers in winter. The building is in good order, and well located with reference to the light-house. A breakwater of heavy sheet-piling will be built to protect it, the expense to be defrayed from the general appropriation for repairs.

411. *Biloxi, Mississippi Sound, Mississippi*.—During the month of March last the old brick sea-wall was badly damaged by the sea, a considerable portion being completely destroyed. This left the tower, which is of cast iron on a brick foundation, in a very exposed and dangerous position. The old brick wall was therefore abandoned and a breakwater of heavy timber constructed. This was completed during the month of June, and the sand and earth washed from around the tower and in the rear of the wall replaced. The dwelling at this station is old, and should soon be replaced by a more substantial one.

417. *Point Aux Herbes, Lake Pontchartrain, Louisiana*.—This structure was completed during the month of July, and the light exhibited for the first time August 1, 1875.

419. *Bayou Saint John, Lake Pontchartrain, Louisiana.*—The keeper's dwelling at this station was badly damaged during a gale in the month of March, 1876. As the building was old, the violence of the gale rendered it utterly uninhabitable, and a small wooden building has been erected for the temporary accommodation of the keeper. On the 4th of May the platform and small store-room at the base of the shaft, which supports the lantern of this light, was completely destroyed by fire. A new platform and store-room have been constructed to replace those burned.

421. *Tchefuncti River, Lake Pontchartrain, Louisiana.*—A substantial breakwater, for the protection of the tower and keeper's dwelling, has been built during the year, the work being authorized by act of March 3, 1875.

426. *Head of the Passes, Mississippi River, Louisiana.*—Under an appropriation of \$3,500 a breakwater for the protection of this station has been built and the station put in good order.

430. *Ship Shoal, Gulf of Mexico, off coast of Louisiana.*—No change has been noted in the inclination of this tower. Steps will be taken at an early date to place a quantity of granite, now stored at Fort Pickens, around the foundation, and put the station in good condition.

432. *Trinity Shoal, Gulf of Mexico, off coast of Louisiana.*—Nothing has been done toward the establishment of a light at this point. Indeed, the board is by no means satisfied that a permanent structure can be established at any reasonable cost. It is therefore recommended that an appropriation of \$50,000 be made to place a light-ship on this station.

433. *Calcasieu, entrance to river and lake Calcasieu, Louisiana.*—Considerable delay has been caused by the fact that the land selected for the site could not be purchased at reasonable cost. It was found, however, upon a careful examination of the locality, that the channel had so changed its direction that a good site could be had on the west side, upon land owned by the United States. The proper steps were immediately taken to have the land reserved for light-house purposes. A survey was made of the locality and the boundaries of the reservation marked. The structure is now in process of erection.

— *East and West Shoals, Matagorda Bay, Texas.*—On the 17th of September, 1875, the two screw-pile light-houses which marked the channel between these shoals were completely destroyed by a hurricane, and four keepers drowned. It is not proposed to re-establish the lights in the same positions, as two small range-lights, placed on Decros Point, will effectually meet all the requirements of navigation.

443. *Brazos Island beacon, entrance to Brazos de Santiago, Texas.*—The board is awaiting the action of the authorities of the State of Texas relative to title and cession of jurisdiction to site. No work, therefore, has been undertaken toward the establishment of this new light, for which an appropriation of \$25,000 is now available.

REPAIRS.

At each of the following named stations in the eighth district repairs more or less extensive have been made during the past year:

408. *Round Island, Mississippi Sound, Mississippi.*

411. *Biloxi, Mississippi Sound, Mississippi.*

420. *New Canal, Lake Pontchartrain, Louisiana.*

421. *Tchefuncti River, Lake Pontchartrain, Louisiana.*

431. *Southwest Reef, entrance to Atchafalaya Bay, Louisiana.*

- 434. *Sabine Pass*, entrance to Sabine River, Louisiana.
- 436. *Bolivar Point*, entrance to Galveston Bay, Texas.
- 437. *Half Moon Shoal*, Galveston Bay, Texas.
- 438. *Red Fish Bar*, Galveston Bay, Texas.
- 440. *Matagorda*, entrance to Matagorda Bay, Texas.
- 441. *Half Moon Reef*, Matagorda Bay, Texas.
- 442. *Aransas Pass*, Texas.

LIGHT-SHIPS.

435. *Galveston light-ship No. 28*. Moored inside of Galveston Bar. This vessel is in good condition, but very old. In August last new main-rigging was fitted, and deck and upper works calked. During the cyclone of September, 1875, she parted her moorings, and went ashore on Pelican Spit, receiving considerable damage. She was hauled off, with some difficulty, by the tender Dandelion, and taken to New Orleans, where she was docked and repaired throughout. She was replaced November 7, having been off her station since September 16.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Pass à l'Outre, mouth of Mississippi River, Louisiana.—A 12-inch steam-whistle in good condition.

Southwest Pass, mouth of Mississippi River, Louisiana.—A 12-inch steam-whistle, in good condition.

Atchafalaya, entrance to Atchafalaya Bay, Louisiana.—A 12-inch steam-whistle, in good condition.

DAY, OR UNLIGHTED BEACONS.

Stake Island, Southwest Pass, Mississippi River.—Iron-pile beacon. Owing to the steady washing away of Stake Island, this beacon will have to be removed. Nothing can be done until the water in the river recedes, when it will be taken down and placed in a more secure position.

BUOYS.

The buoyage of this district is in good condition, and agrees with the printed buoy-list distributed to mariners.

TENDERS.

The Ivy, used by the engineer of the district for construction and repairs, being small, worn-out, and unfitted for the service, was sold at auction, and the proceeds covered into the Treasury. The tender Dandelion used for inspection, buoyage, and supply, is in poor condition, and unsuited to the needs of the district. She is a small paddle-wheel vessel, low in the water, with wide guards, and dangerous, if caught at sea in the heavy gales common to this coast at certain seasons. As the harbors are few and difficult to enter during gales, a good sea-going steamer, capable of keeping the sea in any weather, should be furnished for the district.

DEPOTS.

Coal depot, Mobile Point, entrance to Mobile Bay.—The coal-platform at this place is in fair condition.

Southwest Pass, Louisiana.—An appropriation of \$15,000 is now available for building a light-house and buoy-depot at Southwest Pass, Lou-

isiana. Owing to the shoaling of the bar at the entrance of the bayou in which the depot was proposed to be located, work was suspended until a more suitable location could be selected. It is therefore suggested that the appropriation made by act of June 23, 1874, be amended to read that the money shall be available to establish a depot at such place as the Light-House Board may select.

TENTH DISTRICT.

The tenth district extends from the mouth of Saint Regis River, New York, to include Grassy Island light-house, Detroit River, Michigan, and embraces all the aids to navigation on the American shores of Lakes Erie and Ontario, and Saint Lawrence River.

Inspector.—Commander Edward E. Potter, United States Navy.

Engineer.—Lieut. Col. C. E. Blunt, Corps of Engineers, brevet colonel United States Army.

In this district there are—

Light-houses	60
Light-ships	0
Fog-signals operated by steam or hot-air engine.....	0
Day, or unlighted beacons	1
Buoys actually in position	100
Spare buoys for relief to supply losses	39
Tender, Haze, buoy tender and supply vessel.....	

The numbers preceding the names of stations correspond with the "Light-house List of the Northern and Northwestern Lakes," issued January 1, 1876.

527. *Thirty-mile Point, Lake Ontario, New York*.—The tower and dwelling at this station were completed in the early part of January, and a flashing white light of the 3d order has been shown since April 27, 1876. Improvements to the roads and a cobble-stone walk down the slope, are in progress.

534. *Dunkirk, Lake Erie, New York*.—The work of construction at this station was essentially completed June 30, 1876, and the light, third order, fixed white varied by white flashes, was shown for the first time from the new tower on the 1st of July, the light on the temporary wooden beacon being discontinued.

535. *Dunkirk beacon, Lake Erie, New York*.—This beacon is old, and the wood-work much decayed; an appropriation of \$5,000 is asked for rebuilding it.

544. *Ashtabula, Lake Erie, Ohio*.—The new beacon, for which an appropriation was made March 3, 1873, has been erected near the terminus of the present extension of the west pier, at the mouth of Ashtabula River. The light was exhibited upon the opening of navigation, (April 8, 1876.) When the extension of the west pier is completed, this beacon will be moved to the head of the pier. The old beacon on crib behind the east pier has been removed.

549. *Cleveland beacon No. 2, Lake Erie, Ohio*.—This beacon was completed on September 1, 1875, and two fixed lights of the sixth order exhibited one above the other; the upper one white, the lower red. The mast-head lights heretofore used were removed. An elevated walk connects the beacon with the life-chain of east pier, Cleveland Harbor.

550. *Black River, Lake Erie, Ohio*.—The beacon at the head of the extension of the west pier, mouth of Black River, Ohio, was completed and the light exhibited September 18, 1875. The old and damaged brick tower on the shore was removed, and the site connected with the new beacon by an elevated walk.

— *Sandusky Bay beacons, Ohio.*—The original appropriation for day beacons in this harbor having been made available for *lighted* beacons, with an additional appropriation of \$8,000, the necessary title to site and cession of jurisdiction were obtained from the State of Ohio, and the construction of the three cribs upon which the range-lights are to be placed has been commenced. It is hoped that these cribs can be placed in position during July.

553. *Cedar Point, Lake Erie, Ohio.*—The site of the buoy-shed at this station has been protected from the action of the lake by a solid crib-work, with a wing projection to the eastward, all thoroughly tied together, and well ripped. A good landing-pier for the buoys, 166 feet long, has been carried out into the lake.

558. *Turtle Island, Lake Erie, Ohio.*—The piling and shore protection of part of this island were severely damaged by the great gale of May 15, 1876. Another such storm might seriously endanger the light. New piles and riprap will be put down without delay.

— *Maumee day beacons, Maumee Bay, Ohio.*—The board has asked that a portion of the appropriation of \$14,000 for day beacons in Maumee Bay may be made available for continuing the temporary lights along the lines of the dredged channel. The temporary lights on piles, by which the channel was marked last season, were very useful, and they should continue to be used until a more permanent arrangement for marking the channel is completed.

559–560. *Maumee outer range, Lake Erie, Ohio.*—The lake front at these ranges is subject to the destructive action of the lake during gales, and was protected in 1875 by a substantial construction of crib-work and riprap, which has been very efficient. It is to be regretted that the adjoining private property on each side is not similarly protected. The severe gale of May 15, 1876, washed these unprotected shores so much that some additional riprap was required in front of the light-house site.

REPAIRS.

Repairs and improvements, more or less extensive, have been made at each of the following-named stations in the tenth district during the year:

509. *Ogdensburgh, Saint Lawrence River, New York.*
510. *Cross-over Island, Saint Lawrence River, New York.*
511. *Sister Islands, Saint Lawrence River, New York.*
513. *Rock Island, Saint Lawrence River, New York.*
514. *Tibbett's Point, entrance to Saint Lawrence River, New York.*
516. *Sackett's Harbor, Lake Ontario, New York.*
517. *Stony Point, Lake Ontario, New York.*
518. *Oswego, Lake Ontario, New York.*
519. *Oswego Pier-head, Lake Ontario, New York.*
520. *Fair Haven, Lake Ontario, New York.*
523. *Bigodus, Lake Ontario, New York.*
524. *Genesee, Lake Ontario, New York.*
526. *Oak Orchard, Lake Ontario, New York.*
527. *Thirty-mile Point, Lake Ontario, New York.*
530. *Horseshoe Reef, Buffalo, New York.*
531. *Buffalo Breakwater, Lake Erie, New York.*
533. *Buffalo, Lake Erie, New York.*
534. *Dunkirk, Lake Erie, New York.*
535. *Dunkirk Beacon, Lake Erie, New York.*
536. *Erie Harbor, Lake Erie, Pennsylvania.*

- 537, 538. *Presque Isle beacon-ranges*, Lake Erie, Pennsylvania.
 542. *Presque Isle*, Lake Erie, Pennsylvania.
 544. *Ashtabula*, Lake Erie, Ohio.
 545. *Grand River*, Lake Erie, Ohio.
 546. *Grand River beacon*, Lake Erie, Ohio.
 547. *Cleveland*, Lake Erie, Ohio.
 548, 549. *Cleveland beacons*, Lake Erie, Ohio.
 550. *Black River*, Lake Erie, Ohio.
 553. *Cedar Point*, Lake Erie, Ohio.
 554. *Cedar Point beacon*, Lake Erie, Ohio.
 —. *Sandusky Bay beacons*, Lake Erie, Ohio.
 555. *Marblehead*, Lake Erie, Ohio.
 557. *West Sister*, Lake Erie, Ohio.
 558. *Turtle Island*, Lake Erie, Ohio.
 —. *Maumee Bay stake-lights*, Lake Erie, Ohio.
 559. *Maumee outer range*, Lake Erie, Ohio.
 561. *Maumee middle range*, Lake Erie, Ohio.
 563. *Maumee inner range*, Lake Erie, Ohio.
 565. *Monroe*, Lake Erie, Michigan.

LIGHT SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

There are no fog-signals operated by steam or hot-air engines in this district.

DAY OR UNLIGHTED BEACONS.

Dunkirk Harbor, New York, in good condition.

BUOYAGE.

The buoyage of this district is in satisfactory condition, and remains substantially as at the date of the last report.

TENDER.

The steam-tender *Haze* was employed in supply and inspection duty and in the performance of buoy-service until the close of navigation last season. Soon after that time work was commenced upon the repairs of the vessel under the appropriation of March 3, 1875. The repairs are now nearly completed.

DEPOT.

The district depot is in good repair and meets all present requirements.

ELEVENTH DISTRICT.

The eleventh district embraces all aids to navigation on the northern and northwestern lakes above Grassy Island light-station, Detroit River, and includes lakes Saint Clair, Huron, Michigan, and Superior, and the straits connecting them.

Inspector.—Commander William P. McCann, United States Navy.

Engineer.—Maj. Godfrey Weitzel, Corps of Engineers, brevet major-general, United States Army.

There are in this district—

Light-houses	116
Light-ships	0
Fog-signals operated by steam or hot-air engines	13
Day, or unlighted beacons	1
Buoys actually in position	145
Spare buoys for relief and to supply losses	60
Tender, steamer <i>Dahlia</i> , buoy-tender and supply-vessel	1
Tender, steamer <i>Warrington</i> , used in construction and repairs	1

The numbers preceding the names of stations correspond with the "Light-house List of the Northern and Northwestern Lakes," issued January 1, 1876.

LIGHT HOUSES.

560. *Windmill Point, entrance to Lake Saint Clair, Michigan.*—This station, rebuilt during the year, was completed in the month of October, 1875. In this connection it is proper to remark that a light should be established at the northern point of Belle Isle to guide vessels into the south channel, which is almost exclusively used. On account of the bad reefs which extend out from Isle aux Pêches and Belle Isle, it is extremely difficult to strike this channel in dark nights, and a very large number of vessels annually ground on one or the other of these reefs, and are thus subjected to serious loss of money and time. An appropriation of \$10,000 is recommended for a light at this point.

— *Light-house between Fort Gratiot and Point aux Barques, Lake Huron, Michigan.*—The recommendation, made in several previous reports, to build a coast-light to divide the long distance of 75 miles between Point aux Barques and Fort Gratiot is renewed. This light-house would be one of the coast-lights of the general system, and is not intended to serve any local interest; as nearly all of the commerce of the lakes passes along this coast, the necessity for it will be evident. An appropriation of \$40,000 to build it is submitted.

576. *Harbor of Refuge, (Sand Beach,) Lake Huron, Michigan.*—The pier-head light at the angle of the breakwater was completed during the year, and the light first exhibited October 25, 1875.

578. *Port Austin, Saginaw Bay, Michigan.*—During the year the site for this station was purchased and the plans for the structure were approved. Work was about to be commenced when, owing to the action of Congress in providing for the construction of the light-house on the reef, it was suspended. An appropriation of \$75,000 will be required in addition to that made by act approved March 3, 1873, to place it on the reef.

579. *Saginaw Bay, at the head of Saginaw Bay and mouth of the Saginaw River, Michigan.*—The construction of the range-lights at the mouth of this river was begun in May, 1876, and will be completed during September. The rear light will then serve as a coast-light, and the old one will be discontinued.

581. *Tawas, (Ottawa,) Lake Huron, Michigan.*—The title to the site for the new station having been perfected, the site purchased, and the plans approved, work on it will be begun immediately and it will probably be completed during the present season.

584. *Thunder Bay River, Lake Huron, Michigan.*—A temporary light has been exhibited here since September, 1875. The greater part of the appropriation of \$20,000, made by the act approved June 23, 1874, is still available, but it is not proposed to use it at present.

596. *Skulligallee, (Isle aux Galets,) Lake Michigan, Michigan.*—The sum of \$5,000 appropriated by the act of Congress approved March 3, 1875,

has been expended in building a substantial protection around the whole island. A first-class steam-siren has also been placed at this station.

605. *Manistee, Lake Michigan, Michigan.*—The pier-head light near the end of the south pier at the entrance to Manistee River was completed and lighted October 15, 1875. The main light was discontinued on the same day.

607. *Père Marquette, Lake Michigan, Michigan.*—The following remarks contained in the last annual report are repeated, viz: "The last four annual reports have urged an appropriation of \$5,000 for a keeper's dwelling at this point. It is much needed, and the recommendation is renewed. The dredging of the channel to a width of 200 feet will take the old house the keeper has been living in, which is not worth moving. No residence can be had within a half-mile, and that on the opposite side of the river from the light."

610. *White River, Lake Michigan, Michigan.*—The new station was completed last season, and lighted on the opening of navigation 1876. It is a brick dwelling with a square tower rising from the northwest corner.

614. *Grand Haven pier-light, Lake Michigan, Michigan.*—A first-class steam-siren has been placed directly under the beacon at the end of the south pier. It went into operation December 1, 1875.

617. *Kalamazoo pier-light, Lake Michigan, Michigan.*—A pier-head light has been erected near the end of the south pier, and the apparatus transferred to it from the main light. The latter was then discontinued.

623. *Calumet, Lake Michigan, Michigan.*—The beacon near the end of the north pier at the mouth of Calumet River will be flashed during the month of August and the apparatus transferred to it from the main light, when the latter will be discontinued.

624. *Chicago, Lake Michigan, Illinois.*—An appropriation of \$1,200 was made by Congress at its last session for furnishing a water-supply to the station from the city water-works. This has been done and the station has now an abundant supply of good water.

625. *Chicago pier-light, Lake Michigan, Illinois.*—This light will be moved out to the end of the north pier during the present season.

626. *Grosse Pointe, Lake Michigan, Illinois.*—The shore in front of this light is rapidly washing away and should be protected. An appropriation of \$5,000 is needed for this purpose.

— *Racine Point, Lake Michigan, Wisconsin.*—The recommendation contained in the last six annual reports to erect a lake coast-light at this point is renewed, and an appropriation of \$40,000 is again recommended. The importance of this light has been often urged. The present light at Racine, which does not answer the purpose of a lake coast light, will then be discontinued.

632. *Milwaukee Pier, Lake Michigan, Wisconsin.*—A lens and lamps of the fourth order have been substituted for the sixth-order apparatus heretofore used. The change was made last March. A steam fog-signal is needed at this station, and an appropriation of \$5,000 is recommended.

643. *Port du Mort, Lake Michigan, Wisconsin.*—A first-class steam-siren was placed at this station during the last season.

645. *Poverty Island, Lake Michigan, Wisconsin.*—The tower and dwelling-house at this station have been entirely completed and the light was exhibited from the completed tower for the first time on the night of August 10, 1875.

650. *Green Island, off Menomonee River, Wisconsin.*—It is quite difficult to reach this station, and it is suggested that an appropriation of \$200 be made for the purchase of additional land adjacent to the present site to be used as a landing.

— *Stannard's Rock, Lake Superior, Michigan.*—The following remarks contained in the last annual report are repeated :

A survey of this dangerous shoal was made under the appropriation made by act of March 3, 1873. The result of the survey proved that it is entirely practicable to build a light-house on it, the water varying from 10 to 12 feet in depth on the approaches from three sides. A light-house should be built, and a fog-signal established. The rock lies in the track of all vessels running to the north side of the western portion of Lake Superior, and is an object of great concern, especially on dark nights and during the almost interminable fogs which prevail in this vicinity during the greater part of the season of navigation. The construction of this station will greatly benefit the large, growing, and valuable commerce of the Lake Superior region. This is the proper time to begin it, as it can be built now cheaper than at any future time, as the costly apparatus and machinery used in building the light-house at Spectacle Reef is now available, and is especially adapted to works of this nature. The rock is nearly 20 miles distant from the nearest land, and 40 miles from a suitable harbor; and as it will have to be placed in from 10 to 12 feet of water, it will require a structure of the most costly and substantial character. It is estimated that the cost will not be less than \$300,000, but no accurate estimate can be given in advance on account of the liability to accidents and delay while the work is in progress. Large as this sum is its outlay is fully warranted by the necessities of the navigation of the lakes.

It is recommended that an appropriation of \$100,000 be made, to begin the work.

— *L'Anse, Lake Superior, Michigan.*—A site for this station on the opposite side of the bay from the village of L'Anse has been selected. Plans for the structure have been approved. A deed of the land has been made to the United States, and it and other papers relating to the title are now in the hands of the United States district attorney for examination.

675. *Eagle Harbor, Lake Superior, Michigan.*—An appropriation of \$8,000 was made by act approved March 3d, 1875, for re-establishing range lights to guide into this harbor. The site has been selected, but there has been the usual delay in procuring title. The papers are, however, now in the hands of the United States district attorney for examination.

686. *Isle Royale, (Menagerie Island,) Lake Superior, Michigan.*—This station was completed during the past season, and was lighted for the first time on the night of September 20, 1875.

— *Passage Island, Lake Superior, Michigan.*—A conditional appropriation was made by act of Congress approved March 3, 1875, for a light-station at this place. No steps have yet been taken toward its establishment.

REPAIRS.

Repairs, of greater or less extent, have been made or are in process of execution at the following stations :

- 571. *Saint Clair Flats, Michigan.*
- 573, 574. *Saint Clair Flats Canal, Michigan.*
- 575. *Fort Gratiot, Lake Huron, Michigan.*
- 577. *Point aux Barques, Lake Huron, Michigan.*
- 583. *Sturgeon Point, Lake Huron, Michigan.*
- 585. *Thunder Bay Island, Lake Huron, Michigan.*
- 589. *Spectacle Reef, entrance to the Straits of Mackinac, Lake Huron, Michigan.*
- 590. *Detour, river Sault Ste. Marie, Lake Huron, Michigan.*
- 592. *Cheboygan, near eastern entrance to the Straits of Mackinac, Michigan.*
- 595. *Waugoshance, Straits of Mackinac, entrance to Lake Michigan, Michigan.*
- 598. *Beaver Island, Lake Michigan, Michigan.*
- 599. *South Fox Island, Lake Michigan, Michigan.*

- 600. *Grand Traverse*, Grand Traverse Bay, Lake Michigan, Michigan.
- 602. *South Manitou*, Lake Michigan, Michigan.
- 603. *Point Betsy*, (Point aux Bees Seles,) east side of Lake Michigan, Michigan.
- 604. *Frankfort pier-head*, Lake Michigan, Michigan.
- 605. *Manistee*, Lake Michigan, Michigan.
- 606. *Grande Pointe au Sable*, Lake Michigan, Michigan.
- 607. *Père Marquette*, Lake Michigan, Michigan.
- 608. *Pentwater*, Lake Michigan, Michigan.
- 609. *Petite Pointe au Sable*, Lake Michigan, Michigan.
- 611. *White River pier-head*, Lake Michigan, Michigan.
- 613. *Muskegon*, Lake Michigan, Michigan.
- 614. *Grand Haven*, Lake Michigan, Michigan.
- 616. *Holland*, (Black Lake,) Lake Michigan, Michigan.
- 618. *South Haven*, Lake Michigan, Michigan.
- 619, 620. *Saint Joseph*, Lake Michigan, Michigan.
- 621. *Michigan City*, Lake Michigan, Indiana.
- 623. *Calumet*, Lake Michigan, Illinois.
- 625. *Chicago pier-head*, Lake Michigan, Illinois.
- 626. *Grosse Point*, Lake Michigan, Illinois.
- 627. *Waukegan*, Little Fort River, Illinois.
- 628. *Kenosha*, on Warrenton Island, Lake Michigan, Wisconsin.
- 630. *Racine*, Lake Michigan, Wisconsin.
- 631. *Racine pier-head*, Lake Michigan, Wisconsin.
- 632. *Milwaukee pier-head*, Lake Michigan, Wisconsin.
- 633. *Milwaukee* (north point,) Lake Michigan, Wisconsin.
- 634. *Port Washington*, Lake Michigan, Wisconsin.
- 635. *Sheboygan pier-head*, Lake Michigan, Wisconsin.
- 636. *Sheboygan*, Lake Michigan, Wisconsin.
- 637, 638. *Manitowoc*, Manitowoc River, Lake Michigan, Wisconsin.
- 639. *Twin River Point*, Lake Michigan, Wisconsin.
- 640, 641. *Bailey's Harbor ranges*, Lake Michigan, Wisconsin.
- 642. *Cana Island*, Green Bay, Wisconsin.
- 643. *Port du Mort*, Pilot Island, Green Bay, Michigan.
- 644. *Pottawatomie*, Rock Island, Green Bay, Michigan.
- 648. *Eagle Bluff*, Green Bay, Wisconsin.
- 649. *Chambers's Island*, Green Bay, Wisconsin.
- 650. *Green Island*, Green Bay, Wisconsin.
- 651. *Tail Point*, mouth of Fox River, Wisconsin.
- 652, 653. *Grassy Island ranges*, Green Bay, Lake Michigan, Wisconsin.
- 655. *Point Iroquois*, White Fish Bay, Lake Superior, Michigan.
- 656. *White Fish Point*, Lake Superior, Michigan.
- 657. *Big Sable*, Lake Superior, Michigan.
- 658. *Grand Island*, Lake Superior, Michigan.
- 659. *Grand Island Harbor*, Lake Superior, Michigan.
- 660, 661. *Grand Island Harbor ranges*, Lake Superior, Michigan.
- 662. *Marquette*, Lake Superior, Michigan.
- 664. *Granite Island*, Lake Superior, Michigan.
- 665. *Huron Island*, Lake Superior, Michigan.
- 668, 669. *Portage River ranges*, Keweenaw Bay, Lake Superior, Michigan.
- 670. *Manitou Island*, Lake Superior, Michigan.
- 671. *Gull Rock*, Lake Superior, Michigan.
- 675. *Eagle Harbor*, Lake Superior, Michigan.

- 678. *Ontonagon*, Lake Superior, Michigan.
- 680. *Outer Island*, (Apostle group,) Lake Superior, Wisconsin.
- 682. *La Pointe*, Lake Superior, Wisconsin.
- 684. *Minnesota Point*, mouth of Saint Louis River, Lake Superior, Minnesota.
- 685. *Duluth*, Lake Superior, Minnesota.
- 687. *Rock Harbor*, Lake Superior, Michigan.

LIGHT-SHIPS.

There are none in this district.

FOG-SIGNALS.

Since the last annual report, first-class steam-sirens have been erected at Skilligallee, Grand Haven, and Port du Mort light-stations, Lake Michigan, and a steam-whistle at the north end of West Huron Island, Lake Superior. The signal at Outer Island has been moved to a more secure position.

BUOYS.

The buoyage of the district has been carefully attended to during the year, new buoys have been placed as needed, and those swept from position promptly replaced. It is generally in good order and agrees with the printed buoy-list.

TENDERS.

The steam-barge *Warrington* has been constantly in service during the season of operations in carrying materials for the construction of new stations, the repair of others, and in conveying working-parties. During the winter she was overhauled and necessary repairs made.

The steam-tender *Dahlia*, used for inspection, supply, and buoyage, has been constantly employed during the season of navigation, is in an efficient condition, and meets the wants of the district.

DEPOT.

Detroit, Michigan.—The appropriation of \$10,000 made by Congress at its last session was expended in removing the old dock and building a new one, dredging out the slips on either side of the new dock, and providing iron doors and shutters for the store-house. Some old buildings have been torn down and the grounds graded, the premises inclosed with an iron fence, an iron buoy and boat shed built, a car-track laid from the store-house and buoy and boat shed to the end of the dock, slopes sodded, &c. It is intended to complete the depot this season.

TWELFTH DISTRICT.

CALIFORNIA.

This district embraces all aids to navigation on the Pacific coast of the United States between the Mexican frontier and the southern boundary of Oregon, and includes the coast of California.

Inspector.—Commander A. T. Snell, United States Navy.

Engineer.—Lieut. Col. R. S. Williamson, Corps of Engineers, United States Army.

In this district there are—

Light-houses and lighted beacons	22
Light-ship	0
Fog-signals operated by steam or hot-air engines	10
Day or unlighted beacons	27
Buoys actually in position	29
Spare buoys for relief and to supply losses	29
Tender Shubrick, common to twelfth and thirteenth districts, used for inspector's and engineer's purposes	1

The numbers preceding the names of stations correspond with those of the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

433. *Point Loma, entrance to San Diego Bay, sea-coast of California.*—The dwelling has been repaired, a portion of the wood-shed converted into a dwelling for the assistant keeper, and a barn built. The station is now in good condition.

447. *Point Hueneme, sea-coast of California.*—A close board fence, 10 feet high, has been erected to protect dwelling and out-houses from drifting sands. Portions of the reservation have been planted in grasses and shrubs, which by frequent irrigation have been made to grow.

448. *Santa Barbara, sea-coast of California.*—The structures at this station have been thoroughly renovated and repaired.

449. *Point Conception, sea coast of California.*—The recommendation contained in the last annual report for an appropriation of \$12,000 for repairing this station and building a keeper's dwelling to take the place of the present structure, which is in a very bad condition, is renewed.

450. *Piedras Blancas, sea-coast of California.*—A keeper's dwelling in progress at the date of last annual report has been completed.

451. *Point Pinos, sea-coast of California.*—The tower, parapet, and dwelling have been thoroughly repaired and renovated.

456. *Farallones, off San Francisco, California.*—The recommendations contained in the two last annual reports are repeated.

The dwelling at this station is very much out of repair, and much too small for the wants of a first-order station. It was built in 1855 out of rock quarried on the island, and is very damp. A substantial wooden structure is needed.

An appropriation of \$12,000 for repairs and for building a new keeper's dwelling is asked.

457. *Point Bonita, sea-coast of California.*—Considerable work has been done in removing the rock-obstructions in front of the fog-signal. A survey has been made to determine the best method of improving and protecting that portion of the roadway, about midway between the tower and the fog-signal, where slides have occurred. The plan determined upon is to make a tunnel through the rock, to avoid the most dangerous part of the present roadway, and to cut away and properly slope the dangerous part of the crest, without which another slide would almost certainly occur when the rainy season sets in. An appropriation of \$25,000 having been made, the light and tower will be moved to a lower point, the present location being so high that the light is sometimes obscured by fog, when it might be seen from a less elevated position.

458. *Fort Point, entrance to San Francisco Harbor, California.*—A bridge has been built from the bluff near the keeper's dwelling to the fort on which the light and fog-bell are placed. Formerly the keepers were compelled to go from the dwelling down steep stairs and up through

the fort in order to get to the tower or fog-signal, a very dangerous task during dark and stormy nights.

460. *Yerba Buena Island, San Francisco Bay, California.*—The steam fog-signal mentioned in the last annual report as being nearly completed was put in operation October 1, 1875.

461. *East Brother Island, in straits connecting San Francisco and San Pablo Bays, California.*—Considerable repairs and renovations have been made to the light-house and fog-signal structures and machinery during the past year. The wharf has been strengthened by driving six piles, and thoroughly binding them together with 12-inch by 12 inch timbers, and iron straps and bolts. A truss bridge from the wharf to the bluff of the island, and a new boat-house, have also been built. The wharf is now 3 feet higher, and is so strengthened as to withstand any ordinary storm.

465. *Cape Mendocino, sea-coast of California.*—Quite extensive repairs have been made at this station during the past year. The dwelling, which is exposed to the heavy winds frequent at this point, had become quite shaken, the chimneys were blown off, and windows stove in. The structure was thoroughly braced from the outside by 12-inch by 12-inch timbers extending from masonry abutment on the ground to the timbers of the second story of the structure. Substantial shutters were also made for the windows, and the chimneys repaired. As large droves of cattle roam over the cape, a fence to inclose a sufficient portion of the reservation for the keepers is required and will be built.

— *Point Saint George, or vicinity, near Crescent City, sea-coast of California.*—The recommendations in the two last annual reports are repeated:

This is one of the most important points for a sea-coast light on the coast of California. The bluff point is about one hundred and thirty feet high, with level land for some distance back of it. Off the point, extending some six or seven miles, is a very dangerous reef of rocks, quite a number of which show above water, and many are awash at low tide; others have from three to four fathoms of water on them. The passage between the outlying rocks of this reef and Point Saint George is quite wide, and is used by the coasting-steamers and sailing-vessels. The steamer Brother Jonathan was wrecked on this reef some years ago during a fog, and many lives were lost, among them General Wright and staff, with the families of himself and several of his staff. A light-house and fog-signal should be erected here. An appropriation of \$50,000 is asked to commence the work.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Point Conception.—A 12-inch steam-whistle.

Año Nuevo Island.—A 12-inch steam-whistle.

Pigeon Point.—A 12-inch steam-whistle.

Point Montara.—A 12-inch steam-whistle.

Point Bonita.—A first-order steam-siren.

East Brother Island.—A 12-inch steam-whistle.

Yerba Buena Island.—A 10-inch steam-whistle.

Point Reyes.—A 12-inch steam-whistle.

Point Arena.—A 12-inch steam-whistle.

Humboldt.—A 12-inch steam-whistle.

DAY OR UNLIGHTED BEACONS.

San Diego Bay, California.—In October last, the third-class buoys, which had marked the channel from Ballast Point to New San Diego, were removed and eight pile-beacons constructed. These beacons con-

sist of four piles driven to give an 8-foot face perpendicular to channel, by a 6-foot face parallel to it. The piles were driven 10 feet into the hard sand, and were sheathed, where exposed to the water, with yellow metal. The beacons were constructed in about 10 feet low water, and the tops of piles were about 10 feet above high-water mark. The box, 5 feet deep, of 2-inch plank, was well spiked to the piles. These beacons have required no repairs, and have given great satisfaction to navigators entering the bay.

The pile-beacons in San Francisco Bay and branches are as follows:

To mark entrance to Redwood Creek, 4.

To mark end of shoal north of Yerba Buena Island, 1.

To mark Berkley Rock, 1.

To mark Southampton Shoal, 2.

To mark end of shoal between Karquines Straits and Napa Creek, 1.

To define channel through San Pablo Bay to Petaluma Creek, 4.

To define channel through Suisun Bay, 3.

To mark end of mud-flat between Montezuma and Suisun Creeks, Suisun Bay, 1.

A concrete beacon has been erected on Commission Rock, Mare Island Straits.

— *Anita Rock, harbor of San Francisco, California.*—The remarks made in last year's report are repeated:

This rock is a serious obstruction to navigation and should be marked by spindle. An appropriation of \$2,300 is asked for this purpose.

The iron spindle, crowned by cage, was replaced on Fauntleroy Rock, Crescent City, last fall.

BUOYS.

On January 29th, an iron nun sea-buoy, built for the purpose, was placed near Noon-day Rock. The buoy is 16 feet long and 9 feet greatest diameter. A second-class buoy was placed in the edge of breakers at entrance to channel to Humboldt Bay; it has proved of material aid to steamers running there. During the year two first-class buoys, two second class buoys, and one third-class buoy have been lost.

TENDER AND SUPPLY VESSEL.

The Shubrick is the only light-house vessel on the Pacific Coast. The coast-line is nearly 1,500 miles in extent, and it is impossible for the Shubrick to do all the work required in both twelfth and thirteenth districts. There should be a tender for each district to keep the buoyage in good condition, and to properly perform the work of the inspectors and engineers. An appropriation of \$100,000 for a steam-tender is asked.

DEPOTS.

There are two depots in this district. That at Yerba Buena is used as a buoy-depot and for general supplies of light-houses. That at Fort Point contains engineer's stores and lampists' tools.

THIRTEENTH DISTRICT.

This district embraces all aids to navigation on the Pacific coast of the United States north of the southern boundary of Oregon. It extends from the forty-first parallel of latitude to British Columbia, and includes the coasts of Oregon and of Washington Territory.

Inspector.—Lieutenant-Commander Louis Kempff, United States Navy.

Engineer.—Major Nathaniel Michler, Corps of Engineers, brevet brigadier-general United States Army, until December 28, 1875. Major John M. Wilson, Corps of Engineers, brevet colonel United States Army, present engineer.

There are in this district—

Light-houses	11
Light-ships	0
Fog-signals operated by steam or hot-air engines.....	3
Day or unlighted beacons.....	12
Buoys actually in position.....	61
Spare buoys for relief and to supply losses	74

There is, properly speaking, no tender in this district. The Shubrick, used in the twelfth district, does occasional duty for inspection, supply, and engineer purposes.

The numbers preceding the names of stations correspond with the "Light-house List of the Atlantic, Gulf, and Pacific Coasts of the United States," issued January 1, 1876.

LIGHT-HOUSES.

470. *Cape Arago, (Gregory,) sea-coast of Oregon.*—A bridge connecting the island on which the light is situated with the main-land has been built, the keeper's dwelling repainted and resingled, a concrete floor laid in the cellar, kitchen floor renewed, a new plank walk laid from the keeper's dwelling to the tower, and a new cistern built. In June a double-wick Funck lamp was put up in place of the Franklin lamp formerly used. Everything connected with this station is now in good order.

472. *Point Adams, south side of entrance to the Columbia River, Oregon.*—The light-house and dwelling have been repainted, and other minor repairs made.

473. *Cape Disappointment, (Hancock,) north side of entrance to Columbia River, Oregon.*—A new cistern for keeper's dwelling has been constructed, and about twenty acres of land for pasture have been inclosed by a substantial fence.

— *Range-lights at Saint Helen's Bar, Columbia River, Oregon.*—Congress having appropriated \$1,000 for range-lights, the work will be commenced as soon as the proper location can be decided upon. The engineer in charge of the improvement of the river is endeavoring to open a new channel through the bar on the Oregon side, where there will be no danger from rocks.

474. *Shoalwater Bay, on Toke Point, entrance to Shoalwater Bay, Washington Territory.*—About 25 acres of land for pasture have been surrounded with a substantial board fence, the roof of the dwelling-house has been resingled, and other repairs made, placing the station in good condition.

477. *New Dungeness, Strait of Juan de Fuca, Washington Territory.*—The water-shed for supplying the cisterns used for the fog-signal has been enlarged 2,400 square feet. Extra storm and lantern panes were furnished in June, 1876.

479. *Admiralty Head on Red Bluff, Whidby's Island, entrance to Puget Sound, Washington Territory.*—A new road has been constructed from the boat-landing to the tower, and some repairs have been made.

480. *Point no Point, Puget Sound, Washington Territory.*—The extreme point of Point no Point has been selected for this light, the focal plane

to be not more than 35 feet above low water. Negotiations have been in progress for the land, but the exorbitant price asked for it has prevented its purchase. No work has been done other than to prepare plans and specifications.

LIGHT-SHIPS.

There are no light-ships in this district.

FOG-SIGNALS OPERATED BY STEAM OR HOT-AIR ENGINES.

Cape Flattery—a 12-inch whistle.

New Dungeness—a 12-inch whistle.

Point Adams—a 12-inch whistle.

DAY OR UNLIGHTED BEACONS.

There are twelve beacons in this district, two on Sand Island (range-beacons) for entering and leaving the Columbia River, nine driven to mark the channel of the Columbia River between Tongue Point and Woody Island, and one on Minor Island in the Straits of Fuca; of the beacons, the two on Sand Island are built of logs bolted together in the shape of a frustum of a pyramid; the other ten are single piles, with cross-boards at the top.

BUOYAGE.

The buoyage of this district is in as good order as possible with the limited means at the disposal of the inspector.

TENDERS.

There is no tender for this district, the steamer Shubrick, belonging to the twelfth district, being occasionally sent when such service is indispensable.

The want of another steamer for light-house purposes on the Pacific Coast is a serious inconvenience to the establishment. An appropriation for a new vessel would relieve the board from embarrassment.

DEPOT.

A site for the depot for the thirteenth district has been selected by the Light-House Board on Tongue Point, Columbia River; a survey has been made of the locality and of the Columbia River immediately in front, and negotiations are in progress for the purchase of five acres of land.

FOURTEENTH DISTRICT.

The fourteenth light-house district extends from Pittsburgh, Pa., to Cairo, Ill., and embraces all the aids to navigation on the Ohio River.

Inspector.—Lieut. Charles H. Rockwell, United States Navy, until February 19, 1876. Commander Albert Kautz, United States Navy, present inspector.

Engineer.—Maj. W. E. Merrill, Corps of Engineers, United States Army.

In this district there are—

Lights	133
Buoys actually in position	10
Tender (steam) Lily.....	1

On the 1st of April, 1876, that part of the Mississippi River between Cairo, Ill., and New Orleans, was transferred to the fifteenth district, as it was found that more economical service could be rendered by making this district include the Ohio River alone, leaving the entire Mississippi River to the fifteenth district. The stake-lights heretofore established have been found efficient and valuable aids to navigation. Owing to the limited appropriation, but two new lights have been established during the year.

The steam-tender Lily, used for inspection and supply, is found to be economical and efficient.

List of lights established in the fourteenth light-house district from date of organization, and in operation at the close of the year ending July 15, 1876.

Name of light.	Date established.	Character.	Distances from Pittsburgh.
			Miles.
Bruno Island	May 19, 1875	Fixed stake-light...	2
Horse Tail Ripple	do.	do.	6
Duff's Bar	do.	do.	8
Merriman's Bar	do.	do.	9½
Merriman's Bar	do.	do.	10
White's Ripple	May 18, 1875	do.	11
Deadman's Island	do.	do.	15
Logstown Bar	do.	do.	18
Baden Bar	Oct. 27, 1875	do.	20
Wallory Bar	May 18, 1875	do.	21
Laycock's Bar	do.	do.	25
Beaver Shoals	May 19, 1875	do.	26
Beaver Shoals	do.	do.	26½
Raccoon Bar	May 18, 1875	do.	29
Phillisi Island	May 20, 1875	do.	35
Georgetown Island	May 17, 1875	do.	37
Line Island	do.	do.	40
Baker's Island	do.	do.	49
Black's Island	do.	do.	53
Brown's Island	do.	do.	60
Brown's Island	do.	do.	62
Captina Island	May 15, 1875	do.	106
Captina Island	May 20, 1875	do.	107
Fish Creek	May 21, 1875	do.	109
Oppossum Creek	May 15, 1875	do.	113
Petticoat Bar	do.	do.	146
Bat and Grape Islands	May 14, 1875	do.	150
Carpenter's Bar	do.	do.	166
Carpenter's Bar	do.	do.	167
Mustapha Island	do.	do.	194½
Mustapha Island	do.	do.	196
Bulleville Island	do.	do.	198
Buffington Island	May 13, 1875	do.	212
Buffington Island	do.	do.	213
Sand Creek	do.	do.	218
Old Town Island	do.	do.	224
Goose Island	May 22, 1875	do.	226
Letart Falls	May 13, 1875	do.	229
Letart Falls	do.	do.	230
Eight-mile Island	May 22, 1875	do.	258
Gallipolis Island	do.	do.	266
Gallipolis Island	do.	do.	266½
Raccoon Island	Jan. 6, 1875	do.	273
Raccoon Island	do.	do.	273½
Straight Ripple	do.	do.	282
Straight Ripple	do.	do.	283
Green Bottom	May 12, 1875	do.	290
Gayandotte	Jan. 6, 1875	do.	302
Twelve Pole	Jan. 7, 1875	do.	311
Twelve Pole	do.	do.	311½
Greenup Bar	Jan. 5, 1875	do.	331
Selota Bar	Jan. 5, 1875	do.	355
Conocoqueque Bar	May 24, 1875	do.	364
Conocoqueque Bar	Jan. 5, 1875	do.	365
Fairview	Apr. 21, 1876	do.	377
Quick's Run	Jan. 4, 1875	do.	379
Brush Creek Island	May 24, 1875	do.	384
Manchester Island	Jan. 4, 1875	do.	391

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List of lights established in the fourteenth light-house district, &c.—Continued.

Name of light.	Date estab- lished.	Character.	Distances from Pittsburgh. Miles.
Manchester Island	Jan. 4, 1875.	Fixed stake-light.	392
Charleston Bar	Jan. 8, 1875	do	412
Augusta Bar	May 25, 1875	do	423
Locust Bar	do	do	429
Locust Bar	do	do	430
Swag Bar	do	do	431
Richmond Bar	Dec. 12, 1874	do	446
Nine Mile Bar	May 25, 1875	do	453
Four Mile Bar	Dec. 12, 1874	do	455
Four Mile Bar	do	do	456
Four Mile Bar	do	do	457
Cullum's Ripple	Jan. 31, 1875	Fixed stake light.	471
Cullum's Ripple	Jan. 1, 1875	do	471
Medoc Bar	do	do	480½
Longhery Island	Aug. 24, 1875	do	497
Rising Sun Bar	Dec. 31, 1874	do	501
Rising Sun Bar	do	do	502½
Ranty Bar	Aug. 24, 1875	do	503
Gunpowder	do	do	509½
Gunpowder	do	do	510
Big Bone	Dec. 31, 1874	do	512
Sugar Creek	do	do	518
Warsaw Bar	do	do	524
Vevay Bar	July 6, 1876	do	533
Craig's Bar	Dec. 31, 1874	do	537
Locust Bar	Aug. 24, 1875	do	544
Hoagland Bar	Dec. 31, 1874	do	550½
Cooper's Bar	Aug. 23, 1875	do	558
Grassy Flats	Jan. 1, 1875	do	581
Louisville	Apr. 1, 1875	do	598
Falling Run	Dec. 30, 1874	do	602
Salt River	Dec. 23, 1874	do	624
Mosquito Creek	Aug. 21, 1875	do	626
Blue River	Aug. 20, 1875	do	654
Peckinpangh Bar	Dec. 23, 1874	do	669½
Flint Island	do	do	633
Flint Island	do	do	633
Oil Creek	Aug. 20, 1875	do	655
Chenault's Reach	Dec. 23, 1874	do	690
Holts Bar	Aug. 20, 1875	do	698
Hog's Point	do	do	710½
Troy Reach	Aug. 19, 1875	do	716
Anderson Bar	do	do	723
Anderson Bar	do	do	731
French Island	Dec. 26, 1875	do	756
French Island	Dec. 26, 1874	do	758
French Island	do	do	759
Scuffletown Bar	do	do	764
Scuffletown Bar	do	do	765
Three Mile Island	do	do	771
Evansville Bar	do	do	782
Evansville Bar	do	do	783
Henderson Island	Dec. 23, 1874	do	796
Henderson Island	do	do	797
Highland Rocks	Dec. 24, 1874	do	843
Highland Rocks	do	do	854
Shawneetown Bar	do	do	849
Saline Bar	Feb. 23, 1875	do	855
Treadwater Island	Dec. 24, 1874	do	902
Treadwater Island	do	do	863
Flan's Bar	do	do	864
Walker's Bar	do	do	870
Cumberland Bar	Dec. 23, 1874	do	107
Cottonwood Bar	do	do	912
Cottonwood Bar	do	do	913
Cottonwood Bar	do	do	914
Little Chain	Dec. 22, 1874	do	931
Little Chain	do	do	932
Little Chain	do	do	933
Grand Chain	do	Floating light.	933
Grand Chain	do	do	944
Grand Chain	do	do	945
Grand Chain	do	do	946
Grand Chain	do	do	947
Grand Chain	Dec. 21, 1874	Fixed stake-light.	948

FIFTEENTH DISTRICT.

The fifteenth light-house district extends on the Mississippi from the head of navigation to New Orleans, and on the Missouri from the head of navigation to its mouth, and embraces all the aids to navigation within these limits.

Inspector.—Commander R. R. Wallace, United States Navy.

Engineer.—Maj. Charles R. Suter, Corps of Engineers, United States Army.

In this district there are—

Lights	153
Buoys actually in position	5
Tender (steam) Alice	1

The annual rise of the Missouri and Mississippi usually occurs in June. The force of the water then levels off the sand-bars and obliterates the channel. During the months of July and August the river recedes to its low-water stage, cutting out a new channel each year, differing in many respects from that of the year before. A change in the location of many of the lights is therefore required, and the whole system is re-arranged annually. The changes in the river have been greater than usual during the past year, and the labors of the officers in charge have been correspondingly arduous. A few lights have been established on the Missouri River. It is intended during the coming season to place from 14 to 18 more.

The last winter was unusually mild, and navigation was closed but a short time between Keokuk, Iowa, and Saint Louis. The Lower Mississippi was open all winter, and the lights were exhibited the entire season. Experiments are being made to further perfect the form of lantern used.

List of lights established in the fifteenth light-house district from date of organization, and in operation at the close of the year ending June 30, 1876.

MISSISSIPPI RIVER, SAINT PAUL, MINNESOTA, TO NEW ORLEANS, LOUISIANA.

Name of light.	Date established.	Character.	Distances from Saint Paul.
			<i>Miles.</i>
Newport.....	Aug. 24, 1875	Fixed stake-light.....	7.8
Pine Bend	May 11, 1875	do.....	7.15
Gray Cloud	May 11, 1875	do.....	4.19
Hastings	Aug. 26, 1875	do.....	10.29
Head Lake Pepin, 1.....	May 11, 1875	do.....	30.59
Head Lake Pepin, 2.....	Sept. 1, 1875	do.....	1.60
Maiden Rock	May 11, 1875	do.....	12.72
Lake City	May 11, 1875	do.....	6.78
Foot Lake Pepin.....	May 13, 1875	do.....	10.88
Wabasha, West.....	Aug. 23, 1875	do.....	4.92
Wabasha, East.....	Aug. 23, 1875	do.....	1.93
Beef Slough, Upper.....	Aug. 26, 1875	do.....	4.97
Beef Slough, Middle.....	Aug. 26, 1875	do.....	1.98
Beef Slough, Lower.....	Aug. 26, 1875	do.....	1.99
Bett's Chute.....	Aug. 23, 1875	do.....	30.129
Eastmore.....	Aug. 26, 1875	do.....	12.142
Black River	May 13, 1875	do.....	25.166
Warner's Landing	May 13, 1875	do.....	39.205
Coon Slough	May 14, 1875	do.....	4.209
Crooked Slough.....	May 14, 1875	do.....	32.241
North McGregor.....	June 17, 1876	do.....	17.258
Clayton, First.....	Aug. 21, 1875	do.....	16.274
Clayton, Second.....	Aug. 21, 1875	do.....	1.275

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List of lights established in the fifteenth light-house district, &c.—Continued.

MISSISSIPPI RIVER, SAINT PAUL, MINNESOTA, &c.—Continued.

Name of light.	Date established.	Character.	Distances from Saint Paul.
			<i>Miles.</i>
Clayton, Third.....	Aug. 21, 1875	Fixed stake-light.....	1.276
Clayton, Fourth.....	Aug. 21, 1875	do.....	2.278
Glenhaven.....	Aug. 21, 1875	do.....	6.2-4
Cassville, Upper.....	Aug. 21, 1875	do.....	12.296
Cassville, Lower.....	June 17, 1876	do.....	2.298
Fairport.....	Aug. 19, 1875	do.....	152.450
Muscantine Prairie.....	Aug. 20, 1875	do.....	20.470
Barness City Light.....	June 19, 1876	do.....	38.508
Kentuck Crossing.....	Aug. 19, 1875	do.....	4.512
Burlington Bar, 1.....	Aug. 26, 1875	do.....	12.521
Burlington Bar, 2.....	Aug. 26, 1875	do.....	12.524
Pontoosc.....	Aug. 18, 1875	do.....	25.549
Gregory's Crossing, 1.....	May 17, 1875	do.....	42.591
Gregory's Crossing, 2.....	Sept. 4, 1875	Floating light.....	1.592
Gregory's Crossing, 3.....	Sept. 4, 1875	do.....	1.592
Gregory's Crossing, 4.....	May 17, 1875	Fixed stake-light.....	1.593
Dodd's Point.....	Sept. 6, 1875	do.....	4.597
Tully Island.....	May 7, 1875	do.....	4.601
Canton, East.....	Sept. 6, 1875	do.....	3.604
Canton, West.....	Sept. 6, 1875	do.....	1.605
Lone Tree.....	May 17, 1875	do.....	15.620
Quincy.....	Sept. 6, 1875	do.....	10.630
South River.....	Sept. 6, 1875	do.....	6.636
Whitney's.....	Sept. 6, 1875	do.....	5.641
Gilbert's.....	Sept. 7, 1875	do.....	92.663
Munday's.....	May 17, 1875	do.....	5.668
Hickory Island.....	Sept. 7, 1875	do.....	4.672
Scott's Landing.....	Sept. 7, 1875	do.....	3.675
Stag Island, 1.....	Sept. 7, 1875	do.....	40.715
Stag Island, 2.....	Sept. 7, 1875	do.....	1.716
Gilead's.....	April 9, 1875	do.....	2.718
Carroll's.....	May 18, 1875	do.....	2.720
Wilson's Landing.....	April 9, 1875	do.....	2.722
Convey River.....	Sept. 10, 1875	do.....	10.732
Fruitland.....	Sept. 7, 1875	do.....	2.744
Iowa Island.....	Sept. 8, 1875	do.....	3.747
Squaw Island.....	Sept. 8, 1875	do.....	2.749
Grafton, Upper.....	Sept. 8, 1875	do.....	2.751
Grafton, Lower.....	May 21, 1875	do.....	2.753
Franklin.....	Sept. 8, 1875	do.....	6.759
King's Crossing.....	Nov. 11, 1875	do.....	1.760
Eagle Island.....	May 6, 1875	do.....	2.762
Piasa.....	April 7, 1875	do.....	1.763
Broom Corn.....	Sept. 8, 1875	do.....	25.788
Chain Dyke.....	Sept. 24, 1875	do.....	1.789
Twin Hollows.....	Oct. 19, 1875	do.....	10.791
Horsetail.....	Sept. 9, 1875	do.....	5.801
Jefferson Barracks, Lower.....	Dec. 4, 1874	do.....	1.805
Widow Beard's.....	June 26, 1875	do.....	8.813
Forrest Home.....	Dec. 10, 1874	do.....	14.827
Fish Landing.....	Dec. 10, 1874	do.....	6.833
John Brickey's.....	Dec. 15, 1874	do.....	7.840
Fort Chartres.....	Dec. 10, 1874	do.....	2.842
Frank Brickey's.....	Dec. 10, 1874	do.....	2.841
White Sand.....	Dec. 10, 1874	do.....	3.847
Sainte Genevieve Island.....	April 17, 1875	do.....	6.853
Sainte Genevieve Bend.....	June 25, 1875	do.....	4.857
Kaskaskia.....	Dec. 15, 1874	do.....	4.831
Fairy Island.....	Dec. 15, 1874	do.....	3.864
Saint Mary's Crossing.....	Sept. 10, 1875	do.....	4.868
Liberty Island.....	Nov. 5, 1875	do.....	16.884
Hat Island.....	Nov. 5, 1875	do.....	15.890
Devil's Island.....	Nov. 7, 1875	do.....	30.929
Grand Chain, Upper.....	Dec. 11, 1874	do.....	20.949
Thebes, Upper.....	Dec. 11, 1874	do.....	3.952
Thebes, Lower.....	Dec. 12, 1874	do.....	1.953
Uncle Joe's Hill.....	Mar. 12, 1875	do.....	2.955
Uncle Joe's Bank.....	Dec. 12, 1874	do.....	2.955
Burnham Island.....	Mar. 12, 1875	do.....	3.958
Goose Island.....	Nov. 5, 1875	do.....	6.964
Sliding Island.....	Nov. 5, 1875	do.....	10.974
Orion Field.....	Nov. 5, 1875	do.....	4.978

REPORT ON THE FINANCES.

List of lights established in the fifteenth light-house district, &c.—Continued.

MISSISSIPPI RIVER, SAINT PAUL, MINNESOTA, &c.—Continued.

Name of light.	Date established.	Character.	Distances from Saint Paul. <i>Miles.</i>
Foot Missouri Sister.....	Nov. 6, 1875	Fixed stake-light ..	8.986
Foot Able's Tow-Head.....	Nov. 6, 1875	do	4.990
James' Bayou.....	Sept. 4, 1875	do	50.1040
Island No. 10.....	Sept. 14, 1875	do	41.1091
New Madrid Bend.....	Sept. 14, 1875	do	12.1103
Tennessee State Line.....	Sept. 14, 1875	do	7.1110
Point Pleasant, Mo.....	Apr. 19, 1876	do	5.1115
Tiptonville.....	Sept. 14, 1875	do	8.1123
Stewart's Landing.....	Sept. 14, 1875	do	6.1129
Bass Field.....	Sept. 14, 1875	do	6.1135
Linwood Field.....	Sept. 14, 1875	do	24.1159
Hickman's Landing.....	Sept. 15, 1875	do	20.1179
Buckner's Landing.....	Sept. 15, 1875	do	10.1189
O'Donnel's Landing.....	Sept. 29, 1875	do	12.1201
Johnson's Landing.....	Sept. 15, 1875	do	10.1211
Fletcher's Landing.....	Sept. 15, 1875	do	3.1214
Plumb Point.....	Sept. 15, 1875	do	10.1224
Bullerton Tow-Head.....	Sept. 15, 1875	do	2.1226
Fort Pillow.....	Sept. 29, 1875	do	8.1234
Dean's Island Bend.....	Apr. 18, 1876	do	33.1267
Brandywine Tow-Head.....	June 1, 1876	do	4.1271
Bateman's Field.....	June 1, 1876	do	2.1273
W. R. Arthur's Wreck.....	Sept. 16, 1875	do	15.1288
Ensley's Field.....	Sept. 17, 1875	do	13.1306
Reeves's Bar.....	Sept. 17, 1875	do	2.1308
Cow Island.....	Sept. 28, 1875	do	2.1310
Harklerode's Crossing.....	Sept. 17, 1875	do	14.1324
De Mumbrey's.....	Sept. 17, 1875	do	18.1342
Moon's Two Head.....	Sept. 17, 1875	do	2.1344
Fox Island.....	Sept. 17, 1875	do	8.1352
"O. K." Landing.....	Sept. 17, 1875	do	3.1355
Shoo Fly Crossing.....	Sept. 18, 1875	do	5.1360
Island No. 60.....	Sept. 18, 1875	do	10.1370
Grant's Pass.....	Sept. 19, 1875	do	10.1380
Victoria Landing.....	Sept. 19, 1875	do	110.1490
Neblett's Landing.....	Apr. 16, 1876	do	39.1520
Island No. 76.....	Sept. 20, 1875	do	30.1550
Entaw Landing.....	Sept. 26, 1875	do	15.1565
Glencoe.....	Sept. 20, 1875	do	4.1569
Fanny Bullitt's Tow-Head.....	Jan. 20, 1876	do	34.1603
Ashton's Bar.....	Sept. 26, 1875	do	20.1623
Bale Shed.....	Apr. 15, 1876	do	16.1639
McMillen's.....	Sept. 21, 1875	do	3.1642
Bavarian Crossing.....	Sept. 21, 1875	do	4.1646
Island No. 96.....	Sept. 21, 1875	do	12.1658
Burleigh's Landing.....	Sept. 21, 1875	do	12.1670
Omega.....	Sept. 21, 1875	do	5.1678
Bricecount's.....	Sept. 22, 1875	do	22.1700
Point Pleasant, La.....	Apr. 15, 1876	do	55.1755
Buck Ridge.....	Sept. 22, 1875	do	10.1765
Bonjourant's Landing.....	Sept. 23, 1875	do	20.1785
Burnsburgh Landing.....	Sept. 23, 1875	do	2.1787
General Taylor's.....	Sept. 23, 1875	do	15.1802
Natchez Island.....	Sept. 23, 1875	do	45.1847
Ashley Avenue.....	Sept. 23, 1874	do	5.1852
Avalanche Landing.....	Sept. 23, 1875	do	8.1860
Green's Landing.....	Sept. 23, 1875	do	4.1864
Morgan's Bend.....	Apr. 15, 1876	do	70.1934

REPORT OF THE LIGHT-HOUSE BOARD.

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MISSOURI RIVER.—KANSAS CITY TO MOUTH OF RIVER.

Name of light.	Date established.	Character.	Distances from
Sibley Chain, 1	Sept. 20, 1875	Fixed stake light ..	<i>Miles.</i> 40
Sibley Chain, 2	Sept. 20, 1875	do	3. 43
Deering's	Sept. 16, 1875	do	230, 273
Dodd's Island	July 30, 1875	do	2. 275
Howard's Bend	July 29, 1875	do	63. 338

List of lights established in the 15th light-house district and discontinued from date of organization to the close of the year ending June 30, 1876.

Name of light.	Date established.	Date discontinued.	Remarks.
Strong's	Sept. 6, 1875	Mar. 10, 1876	Channel not yet defined.
Thomas Chute	Aug. 16, 1875	Mar. 15, 1876	Change of channel.
Beck's Landing	Sept. 7, 1875	June 30, 1876	Channel not yet defined.
Rhode's Point	Mar. 18, 1875	Aug. 31, 1875	Do.
Jefferson Barracks Dike	Dec. 4, 1874	Nov. 1, 1875	On wreck, not required in high water.
Glendale	Dec. 10, 1874	June 7, 1876	Do.
Olive Branch	Sept. 10, 1875	Nov. 1, 1875	Not required in high water.
Ryan's Landing	Sept. 10, 1875	Nov. 1, 1875	Channel changed for the present.
Paul Jones	Dec. 12, 1874	Dec. 31, 1875	Of use, but not absolutely required.
Rock Pile	Nov. 1, 1875	Mar. 1, 1876	Channel increased in width, not required.
Bird's Tow-Head	Dec. 12, 1874	May 15, 1876	Channel not yet defined.
Greenfield	Dec. 12, 1874	May 15, 1876	Do.
Bates's Island	July 29, 1875	Nov. 30, 1875	Do.

RECAPITULATION.

Total number of lights on the Mississippi River in operation June 30, 1876.....	148
Total number of lights on the Missouri River in operation June 30, 1876	5
Aggregate number of lights in operation in the fifteenth light-house district June 30, 1876	153
Total number of lights established in the fifteenth light-house district and discontinued prior to June 30, 1876	13
Aggregate number of lights established in the fifteenth light-house district from date of organization to close of year ending June 30, 1876	166

CONCLUSION.

In conclusion, the board begs leave to say that it will be seen by this report that no efforts have been spared by its members or its officers to keep the establishment up to the high standard of past years, and that its efforts to accomplish this result have been attended with a large measure of success.

All of which is respectfully submitted.

JOSEPH HENRY,
Chairman.

J. G. WALKER,
Commander, U. S. N., Naval Secretary.
PETER C. HAINS,
Major of Engineers, U. S. A., Engineer Secretary.