

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No.
Registry No. H02298

LOCALITY

State Georgia
General Locality Brunswick Outer Bar
Sublocality

1897

CHIEF OF PARTY
Lt. R. G. Peck USN

LIBRARY & ARCHIVES

DATE

"copy"

2298

Notes from original sheet:

The soundings are expressed in feet and show the depths at mean high water, the plane of reference, which is 3.65 feet below the cross cut in the top side of the horizontal beam on the westerly face of the automatic tide-gauge structure on the outer bar.

Of the 39,000 soundings that were taken about 75% are shown on this sheet.

The buoys were located at half ebb tide.

The 22 foot contour is shown in green

" 23 " " " " " red

" 24 " " " " " blue

" 25 " " " " " brown

H. S. Meridian

SURVEY OF OUTER BAR OF BRUNSWICK, GA.

JULY 2, 1897.—Referred to the Committee on Commerce and ordered to be printed.

The VICE-PRESIDENT presented the following

LETTER FROM THE SECRETARY OF WAR, TRANSMITTING REPORT, WITH ACCOMPANYING MAP, OF A SURVEY OF THE OUTER BAR OF BRUNSWICK, GA., MADE BY LIEUT. R. G. PECK, U. S. N., ASSISTANT, COAST AND GEODETIC SURVEY, PURSUANT TO THE PROVISIONS OF THE ITEM IN THE RIVER AND HARBOR ACT OF JUNE 3, 1896, FOR THE IMPROVEMENT OF BRUNSWICK BAR.

WAR DEPARTMENT,
Washington, July 1, 1897.

SIR: I have the honor to transmit herewith report, with accompanying map, of a survey of the outer bar of Brunswick, Ga., made by Lieut. R. G. Peck, U. S. N., assistant, Coast and Geodetic Survey, pursuant to the provisions of the item in the river and harbor act of June 3, 1896, for improvement of Brunswick Bar, with indorsement of the Chief of Engineers submitting the said report.

Very respectfully,

G. D. MEIKLEJOHN,
Acting Secretary of War.

The PRESIDENT OF THE UNITED STATES SENATE.

UNITED STATES COAST AND GEODETIC SURVEY,
STEAMER A. D. BACHE,
Navy-Yard, New York, June 21, 1897.

SIR: I have the honor to submit the following report of my survey of the outer bar at Brunswick, Ga., executed under the instructions dated November 30, 1896, of the honorable the Secretary of War and in accordance with the provisions of the river and harbor act of Congress of June 3, 1896.

Under item for "Improving the outer bar of Brunswick, Ga.," the river and harbor act of August 17, 1894, authorizes the payment to Mr. C. P. Goodyear of certain sums of money for the procurement of channels of specified widths and depths at specified dates by the explosion of dynamite on the bottom of the channel.

The river and harbor act of June 3, 1896, amends the provisions of the former act as to the date at which a 23-foot channel is to be obtained, extends the provisions as to widths and depths, and requires

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that the survey provided for in the former act "shall be made personally under the supervision of the Secretary of War by an experienced official of the Coast and Geodetic Survey," and "that no payments shall be made to said Goodyear or his legal representatives except upon a certificate of the Secretary of War, made after personal survey by an experienced officer of the Coast and Geodetic Survey, selected by him for that purpose, that such depths and widths have severally been obtained by him or them; and said officer shall make to Congress report in detail of the amount of work done, its cost, and its value to the Government."

Under these acts the first payment was to be made to Mr. Goodyear upon his procuring, by the explosion of dynamite, on or before the 1st day of January, 1897, a "practical" channel over the outer bar at Brunswick, Ga., of a width of not less than 100 feet and of a minimum depth of 24 feet at "ordinary mean high tide."

Under dates of November 7 and November 25, 1896, Mr. Goodyear reported to the honorable the Secretary of War that he had procured the required 24-foot depth of channel for a width of 200 feet, and 25-foot depth of channel for a width of 100 feet, and that he had thus fully complied with the requirements of the acts of Congress authorizing his work. An immediate survey was therefore requested.

Although it had not been expected that my vessel would be ready for service before January 1, 1897, nevertheless in order to comply with the wishes of Mr. Goodyear, on the receipt of my instructions from the honorable the Secretary of War, I hastened the repairs, which were in progress at the time, and prepared my vessel for sea with all possible dispatch.

Leaving New York December 19, 1896, I arrived at St. Simon Sound, Georgia, December 27; but it was not until January 4, 1897, that the weather permitted a beginning to be made in the work. The survey was finished April 16, 1897, after an exceptionally stormy and unfavorable season, in consequence of which the work was prolonged much beyond the date anticipated for its completion.

SCALE AND LIMITS OF SHEET.

Owing to the very minute requirements as to widths and depths of channel, a scale of 1 to 1,250 was decided upon for the sheet of the survey, this sheet, roughly speaking, covering the area from the bell buoy, outside the bar, to spar buoy No. 5, inside the bar, and from the observing stations to the north breakers.

SCHEME OF LINES FOR DEVELOPMENT.

The development of the ground covered by the survey was obtained by means of one system of lines approximately at right angles to the channel across the bar, and a second system in the direction thereof and at right angles to the first system. The lines of both systems were run, as a rule, at intervals of 25 feet, the boat while sounding being kept on the line by means of ranges. For the first system of lines the back object of the range was a distant natural object, and for the second system the light-house of St. Simon. The front object of range was in both systems the mast of a boat, moved successive distances of 25 feet by means of a hauling line laid out between two anchors in a direction athwart the direction of the distant object.

SOUNDINGS.

For the greater part of the work the soundings were taken from the steam launch at exact time intervals of ten seconds by two leadsmen taking alternate casts, both leadsmen standing in close proximity to the signal staff on which the fixing angles were observed. Positions of the launch on the lines were obtained at one-minute intervals by theodolite observers on the observing stations, which had been established for the purpose on the bar, the signal being given sharply from the boat on the even minute by means of a collapsible cylinder sliding on a vertical staff. All soundings were called and recorded to tenths of a foot. The lead lines were carefully examined, and the timepieces of all observers were carefully compared at the beginning and end of each day's work.

During the latter part of the survey, a whaleboat pulling four oars was also used for a second sounding party. The soundings were taken at equal time intervals of fifteen seconds, the locations of the boat being obtained at one-minute intervals by means of two sextant observers on the observing stations, the signal being given from the boat, as in the case of the steam launch, by means of a collapsible cylinder sliding on a staff in close proximity to the leadsmen.

The theodolite and sextant parties, though occupying the observing stations at the same time, worked independently of each other, the signal for position being given by one boat on the minute, and by the other boat on the half minute.

The same ranges were used as with the steam launch, the coxswain of the whaleboat steering from the forward thwart near the signal staff by means of a long yoke and lines led forward under the gunwale. This position of the coxswain near the observation staff was necessary because of the sharpness of the range, the variation between the bow and the stern of the boat as referred to the range being very marked.

By means of the second boat the progress of the work was much increased.

TIDE GAUGE.

At the tide station established on the outer bar by Captain Abbot, Corps of Engineers, United States Army, a 4 by 4 inch scantling was driven into the bottom and securely lashed to the heavy iron cylinder which carries the float of the automatic tide gauge in the house above, and to this scantling was screwed a plain gauge, graduated in feet and tenths, with numbers increasing with rise of tide. To eliminate the effects of waves or swell in reading the gauge, two glass tubes were secured on its face, the lower ends nearly closed, and the level of the water within the tubes marked by small bulbs of colored glass. The two rods overlapped by about 4 feet, and together secured readings of the gauge through a space of 12 feet.

While soundings were in progress readings of the gauge to hundredths of a foot were observed and recorded every five minutes, and these actual readings of the gauge, with necessary small interpolations, were used in the reductions of all soundings.

AUTOMATIC TIDE GAUGE.

The automatic tide gauge used by Captain Abbot in previous surveys was found in good condition and was kept in operation during the whole course of the present survey. It was, however, thought preferable to use for tidal reductions the readings obtained directly from the plain gauge, thus avoiding the objection made by the contractor in former surveys that the automatic gauge was inaccurate and

unfavorable to him, owing to the frictional element of resistance of the wire carrying the float.

It may be here stated, however, that careful investigation of this automatic gauge has proved the error due to said frictional element of resistance, though existing theoretically, to be practically quite inappreciable.

PLANE OF REFERENCE.

The year's record of the outer bar automatic gauge, extending from March 13, 1895, to February 25, 1896, from 673 high waters and 673 low waters, gives for the mean range from first reduction 6.38 feet. Corrected for phase, parallax, and inclination of the lunar orbit to the plane of the ecliptic the resulting mean range becomes 6.56 feet, which is the range accepted for this survey.

From the same record of the automatic gauge the mean of the low waters is 10.02 feet below the outer-gauge bench mark. Since the reductions mentioned above produce a correction to mean range of +0.18 foot, the correction to the mean of the low waters is -0.09 foot. Mean low water at Fort Sumter for 1895 is 0.10 foot above the mean for all the years of observation there, and as a like condition must be inferred for Brunswick Bar the mean of the low waters at the bar is further corrected by -0.10 foot.

The plane of mean low water at the outer gauge is therefore 10.21 feet below the outer-gauge bench mark, and mean high water, the plane of reference, is 10.21 feet - 6.56 feet = 3.65 feet below the same bench mark.

The following table gives the elevation of the bench mark above the plane of mean high water as accepted at the periods of Captain Abbot's surveys, as follows:

	Feet.
March, 1895.....	3.87
July, 1895.....	3.91
December, 1895.....	3.70
March, 1896.....	3.71

The plane of reference accepted in the present survey, and to which all soundings have been reduced, is therefore 0.06 foot higher than any used heretofore since the establishment of the tide gauge on the outer bar.

THE BENCH MARK.

The bench mark at the outer gauge consists of a cross cut into the horizontal beam or stringer on the northerly face of the tide-gauge structure, and is identical with that established by Captain Abbot, of the United States Engineers, at the time of his first survey.

The bench mark corresponds with the reading, 14.87 feet on the plain gauge of the present survey. The reading of mean low water on this gauge is therefore 4.66 feet, and the reading of mean high water, the plane of reference, is 11.22 feet.

OBSERVING STATIONS.

The geographical positions of the observing stations, as determined by Captain Abbot, are as follows:

	Latitude.			Longitude.			Distance between stations.
	°	'	"	°	'	"	
Tide gauge.....	31	05	49.38	81	20	18.36	4,189.7 feet (1,277 meters).
Outer.....	31	05	23.50	81	19	40.74	

The outer station was found to be in bad condition, the heavy bolt securing the three heads of the piles having broken in the middle of one of them, thus allowing the heads to separate. By watching for a favorable opportunity and anchoring the ship on the shoal water near the structure, after cutting off and backing out the pieces of the old bolt, the heads of the piles were hove together by means of a hawser brought to the ship's capstan, and another bolt was driven in a new hole bored through all the heads, with the result that the structure was made as strong as ever, and without expense to the Government.

THE RECORDS.

In the reduction of the soundings and the preparation of the records all parts of the work received a double computation and treatment, each officer making himself responsible for his share of the work by affixing his signature thereto.

SUMMARY OF APPROPRIATIONS.

The following is a tabulated summary of the amounts appropriated by Congress for the procurement of the specified widths and depths of channel across Brunswick Bar and limiting dates for such procurement:

UNDER RIVER AND HARBOR ACT OF 1894.

Width.	Depth, mean high water.	Appropriation.	Time limit.
<i>Feet.</i>	<i>Feet.</i>		
100	23	\$30,000	Nov. 1, 1895.
100	24	40,000	Jan. 1, 1897.
100	25	50,000	Jan. 1, 1898.
100	25	25,000	Maintaining two years.

UNDER RIVER AND HARBOR ACT OF 1896.

200	23	\$30,000	June 3, 1899.
200	24	40,000	Do.

The river and harbor act of 1896 also amends the act of 1894 as to time for the procurement of the 23-foot depth by providing that Mr. Goodyear "shall be paid the sum of \$30,000 for a 23-foot depth when he shall receive a certificate that a 24-foot depth has been obtained, under said act, together with the \$40,000 to which he will be entitled for such 24-foot depth."

The date specified for the procurement of the 24-foot depth is January 1, 1897.

RESULTS.

An examination of the chart of the survey which accompanies this report shows the following results as regards depths and widths of channel now existing across the bar:

There is no channel 25 feet deep of any width.

There is no channel 24 feet deep of any width.

The least depth in best "practical" channel 100 feet wide is 22.7 feet; 200 feet wide is 22.4 feet. The least width of best "practical" channel 23 feet deep is 80 feet.

In the best practicable channel 100 feet wide, depths less than 23 feet occur but three times. In those parts of the channel where the general depth is less than 24 feet, depths varying in tenths of a foot from 23.1 to 23.9 feet occur with a fair average frequency, the average depth being about 23½ feet.

Between the 23-foot contour on the north side and that on the south side of the channel the width is less than 200 feet for only a short distance.

But little is now lacking for a channel 23 feet deep, of the full width of 200 feet.

With the exception of a few shoaler spots of small extent, a least depth of 24 feet is shown over a closed area which is separated from the 24 foot contour inside the bar by a distance of 705 feet and from the 24-foot contour outside the bar by a distance of 985 feet. In this latter distance a second 24-foot closed area occurs, the length of which is 360 feet and the average width about 60 feet.

The distance separating the 25-foot contour inside the bar from the 25-foot contour outside the bar is about 4,700 feet.

NO PAYMENT EARNED BY THE CONTRACTOR.

It therefore appears that the requirements as to widths and depths of channel and dates of procurement thereof, set forth in the river and harbor acts of August 17, 1894, and June 3, 1896, as preliminary to any further payment to the contractor for deepening the outer bar at Brunswick, Ga., have not been complied with, and that no payment is due to Mr. Goodyear under said acts.

Inasmuch as the contractor's work of deepening the bar is so far from its completion, it is assumed that the report to Congress relative to the amount of work done, its cost and its value to the Government, should be deferred until the final survey after the required widths and depths of channel have been obtained.

A table of statistics relating to the survey and a list of the officers engaged in its prosecution are appended hereto.

I have the honor to be, with great respect, your obedient servant,

ROBERT G. PECK,

Lieutenant, U. S. N., Chief of Party,

U. S. Coast and Geodetic Survey, Commanding Bache.

HON. RUSSELL A. ALGER,

Secretary of War.

The following documents accompany this report and form a part thereof: Chart of survey; 20 original books of soundings;* 15 original books of angles;* 2 original books of tides;* photograph showing Mr. Goodyear's present method of "smoothing the bottom of the bar."

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,

U. S. ARMY,

June 28, 1897.

Respectfully returned to the Secretary of War.

The river and harbor act of June 3, 1896, in the item regarding the improvement of the outer bar at Brunswick, Ga., provided that a survey should be made under the supervision of the Secretary of War, by an experienced official of the Coast and Geodetic Survey, to be

* Not printed.

designated by the Secretary of War. The object of the survey was to determine whether Mr. C. P. Goodyear had obtained the depths and widths of channel fixed by the act, and, upon the obtaining of which, certain sums of money were appropriated to be paid to Mr. Goodyear. To perform the duty of making this survey the Secretary of War appointed Lieut. R. G. Peck, U. S. N., assistant, Coast and Geodetic Survey, commanding the Coast Survey steamer *Bache*.

It having been reported by Mr. Goodyear and others interested in the proposed improvement that the amounts to be paid under the law for certain depths and widths had been earned, and an urgent request for a survey having been made, Lieutenant Peck was instructed by the Secretary of War to proceed with the work assigned him.

The accompanying report of Lieutenant Peck gives in detail the results of a careful and exhaustive survey made by him, and from such report it appears that the provisions of the law have not been complied with and that no payment thereunder is due Mr. Goodyear.

With the understanding that Mr. Goodyear will continue his operations and that further surveys will be necessary, this report must be considered simply one of progress, and not the final report called for by Congress. But inasmuch as the report contains information as to the progress of work which may be of interest, it is suggested that it be forwarded to Congress for such action as it may deem proper to take in the premises.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers, U. S. Army.

HYDROGRAPHY—OUTER BAR AT BRUNSWICK, GA.—1897—UNITED STATES
COAST AND GEODETIC SURVEY STEAMER A. D. BACHE, LIEUT. ROBERT
G. PECK, U. S. N., CHIEF OF PARTY.

Date.	Day letter.	Volume.	Number of—			Boat or vessel.
			Angles.	Sound-ings.	Nautical miles.	
1897.						
Jan. 4.....	a	1	82	224	2.00	Oil launch.
6.....	b	1	194	527	4.00	Do.
8.....	c	1	22	61	.35	Do.
11.....	d	1	48	146	.75	Do.
12.....	e	1	294	830	6.00	Do.
21.....	f	2	256	718	5.00	Do.
22.....	g	2-3	624	1,773	10.50	Do.
23.....	h	3	348	989	5.50	Do.
25.....	i	3	166	480	2.50	Do.
Feb. 3.....	k.	3-4	430	1,214	8.00	Do.
4.....	l.	4-5	646	1,849	10.00	Do.
10.....	m.	5	694	2,027	9.50	Do.
16.....	n.	6	350	1,000	4.50	Do.
17.....	o.	6-7	740	2,147	9.00	Do.
18.....	p.	7	242	711	3.00	Do.
19.....	q.	7-8	304	892	3.00	Do.
Mar. 3.....	r.	8	634	1,859	9.00	Do.
10.....	s.	9	460	1,345	5.50	Do.
11.....	t.	9-10	562	1,651	7.00	Do.
22.....	u.	10	332	960	4.00	Do.
25.....	v.	11	346	983	5.00	Do.
Apr. 6.....	w.	11-12	482	1,415	6.25	Do.
7.....	x.	12	410	1,194	5.25	Do.
8.....	y.	12-13	446	1,308	6.00	Do.

HYDROGRAPHY—OUTER BAR AT BRUNSWICK, GA., ETC.—Continued.

Date.	Day letter.	Volume.	Number of—			Boat or vessel.
			Angles.	Soundings.	Nautical miles.	
Apr. 10.....	z.	14	458	1,344	6.00	Oil launch.
12.....	a.	14-15	546	1,598	7.00	Do.
13.....	b.	15	72	211	1.00	Do.
14.....	c.	15	76	223	1.00	Do.
15.....	d.	15-16	618	1,836	10.00	Do.
16.....	e.	16	682	1,956	11.00	Do.
Total, oil launch.....			11,564	33,471	167.60	
Apr. 7.....	a.	1	418	813	7.50	Whaleboat
8.....	b.	2	414	799	5.50	Do.
12.....	c.	3	540	1,038	7.00	Do.
13.....	d.	3	64	122	1.00	Do.
14.....	e.	1	68	130	1.00	Do.
15.....	f.	1	466	884	8.00	Do.
16.....	g.	4	852	1,626	13.00	Do.
Total, whaleboat.....			2,822	5,412	43.00	

RECAPITULATION.

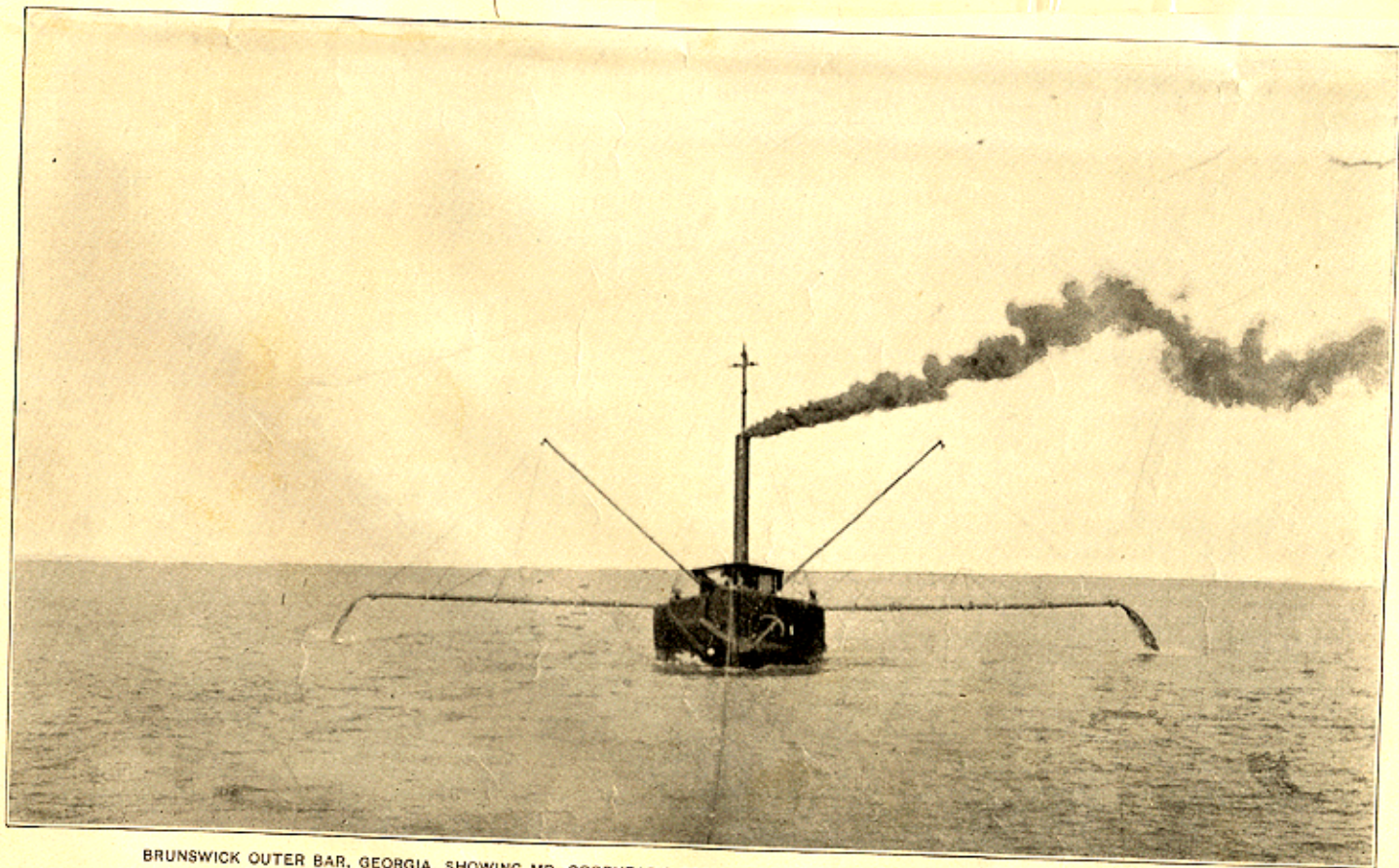
	Angles.	Soundings.	Nautical miles.
Oil launch.....	11,564	33,471	167.60
Whaleboat.....	2,822	5,412	43.00
Total on sheet.....	14,386	38,883	210.60

Number of days on station, and how employed.

Number of days on which hydrographic work was done.....	30
Number of days on which hydrographic work was prevented—	
By bad weather.....	64
By other causes.....	6
Number of Sundays.....	18
Total number of days on station (December 27, 1896, to April 23, 1897) ..	118

List of officers, aids, etc., on board U. S. Coast and Geodetic Survey steamer A. D. Bache, under command of Lieut. Robert G. Peck, U. S. N., chief of party, engaged in the survey of the outer bar at Brunswick, Ga., during the winter and spring of 1896-97.

Lieut. H. K. Hines, U. S. N., observer.
 Ensign A. H. Davis, U. S. N., observer.
 Ensign F. M. Russell, U. S. N., observer.
 Ensign F. B. Sullivan, U. S. N., observer.
 Chief Machinist A. J. Miskimon, U. S. N., engineer officer.
 Apothecary J. E. Shepherd, U. S. N., medical officer.
 Chief Yeoman J. L. Dunn, U. S. N., draftsman.
 Master at Arms (first class) Thos. S. Martin, U. S. N., recorder, etc.
 Seaman John Craig, U. S. N., recorder and observer.
 Seaman Andreas Andersen, U. S. N., recorder.



BRUNSWICK OUTER BAR, GEORGIA, SHOWING MR. GOODYEAR'S PRESENT METHOD OF "SMOOTHING THE BOTTOM OF THE BAR."
(Accompanying the report of Lieutenant Peck, dated June 21, 1897.)

S. Doc. 171-55-1