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COAST AND GEODETIC SURVEY
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UNITED STATES COAST PILOT

ATLANTIC COAST

PART IV.

U. S. COAST & GEODETIC SURVEY
JUN 22 1889
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LONG ISLAND SOUND, WITH APPROACHES AND ADJACENT WATERS

FIRST EDITION

PRICE $1.00

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1888

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UNITED STATES

COAST AND GEODETIC SURVEY OFFICE,

WASHINGTON, D. C., *October 15, 1888.*

This volume covers the coast from Point Judith to the East River, including Block Island Sound, Gardiner's Bay, Fisher's Island Sound, Long Island Sound, and the East River, with the harbors adjacent to these waters. It has been prepared as part of a large volume, now in preparation, which is designed to embrace the Atlantic coast of the United States. This part is now issued separately to meet the demand for a Coast Pilot covering the section of coast included herein; in the present issue some matters are treated more in detail than would be practicable in the larger volume.

This publication is based mainly upon the work of the Coast and Geodetic Survey, including the results of special examinations and investigations carried on in connection with its preparation. A considerable part of the general information concerning the ports and harbors has not been published heretofore.

The system adopted in this publication includes—

I. A tabular description of all light-houses, light-vessels, and fog-signals; lists of life-saving stations, Signal Service display stations, and seacoast telegraph stations; and information regarding tides, tidal currents, variation of the compass, etc.

II. General information concerning the several bodies of water and harbors, including notes relative to pilots and pilotage, tow-boats, depth of water, draught of vessels entering, harbor and quarantine regulations, supplies, facilities for making repairs, usual or best anchorages, and other matters of practical interest. In each case the information of this nature precedes the sailing directions and is printed in smaller type.

III. Sailing directions, with subordinate paragraphs treating of prominent objects, dangers, aids to navigation, etc. In the arrangement adopted the aim has been to conform, as far as practicable, to the order in which these matters would be considered in practice, and to render available such information as may be wanted promptly. For this purpose, and to afford a ready means of reference from one part to another, the sailing directions, where long, are divided into numbered or lettered paragraphs, printed in large type, each followed by its own subordinate remarks in smaller type.

IV. Views of important points.

V. Appendices.

This volume has been prepared by Lieut. George H. Peters, U. S. N., assisted by Ensign Edwin H. Tillman, U. S. N., and Mr. John Ross, the work being under the general direction of Lieut.-Comdr. Willard H. Brownson, U. S. N., Hydrographic Inspector Coast and Geodetic Survey. In matter and general arrangement, the plan followed was formulated by Lieut. Peters, and has been developed by him and his assistants. Before its final adoption the merit of this plan was demonstrated by the responses received from a number of experts to whom was submitted, for criticism and suggestions, a sample of several printed pages illustrative of its general features.

The views were originally drawn by the late Mr. John R. Barker. The plates have been corrected from sketches made for the purpose, in 1887, by Mr. John Ross.

Great courtesy has been shown by local authorities in furnishing information desired for incorporation in this work.

The aids to navigation are correct to October 15, 1888.

As absolute accuracy in a work of this class is scarcely possible, navigators will confer a favor by notifying the Superintendent of the Coast and Geodetic Survey of errors or omissions which they may discover, or of additional matter which they think, for the good of mariners, should be inserted.

F. M. Thorn,
Superintendent.

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NOTE.

All **bearings** and **courses** are *magnetic.*

All **distances** are in *nautical miles.*

Except where otherwise stated, all **depths** are at *mean low water.*

All **can** or **nun-buoys** marked thus * in this volume are replaced during the winter months by **spar-buoys.**

SYSTEM OF BUOYAGE ADOPTED IN UNITED STATES WATERS.

The following order is observed in coloring and numbering the buoys in United States waters, viz:

1. In approaching the channel, &c., from seaward, RED BUOYS, with EVEN NUMBERS, will be found on the STARBOARD side of the channel, and must be left on the STARBOARD hand in passing in.

2. In approaching the channel, &c., from seaward, BLACK BUOYS, with ODD NUMBERS, will be found on the PORT side of the channel, and must be left on the PORT hand in passing in.

3. BUOYS painted with RED and BLACK HORIZONTAL STRIPES will be found on OBSTRUCTIONS, with channel-ways on either side of them, and may be left on either hand in passing in.

4. BUOYS painted with WHITE and BLACK PERPENDICULAR STRIPES will be found in MID-CHANNEL, and must be passed close-to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing, and may be employed to mark particular spots; *a description of such special marks will be given in the printed list of buoys,* issued by the Light-House Board. (See page 9.)

Perches, with balls, cages, &c., will, when placed on buoys, be at turning-points, the color and number indicating on what side they shall be passed.

Different channels in the same bay, sound, river, or harbor will be marked, as far as practicable, by different descriptions of buoys. Principal channels will be marked by nun-buoys; secondary channels, by can-buoys; and minor channels, by spar-buoys. When there is but one channel, nun-buoys, properly colored and numbered, are usually placed on the starboard side, and can-buoys on the port side of it.

Day-beacons, stakes, and spindles (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the background upon which they are projected.

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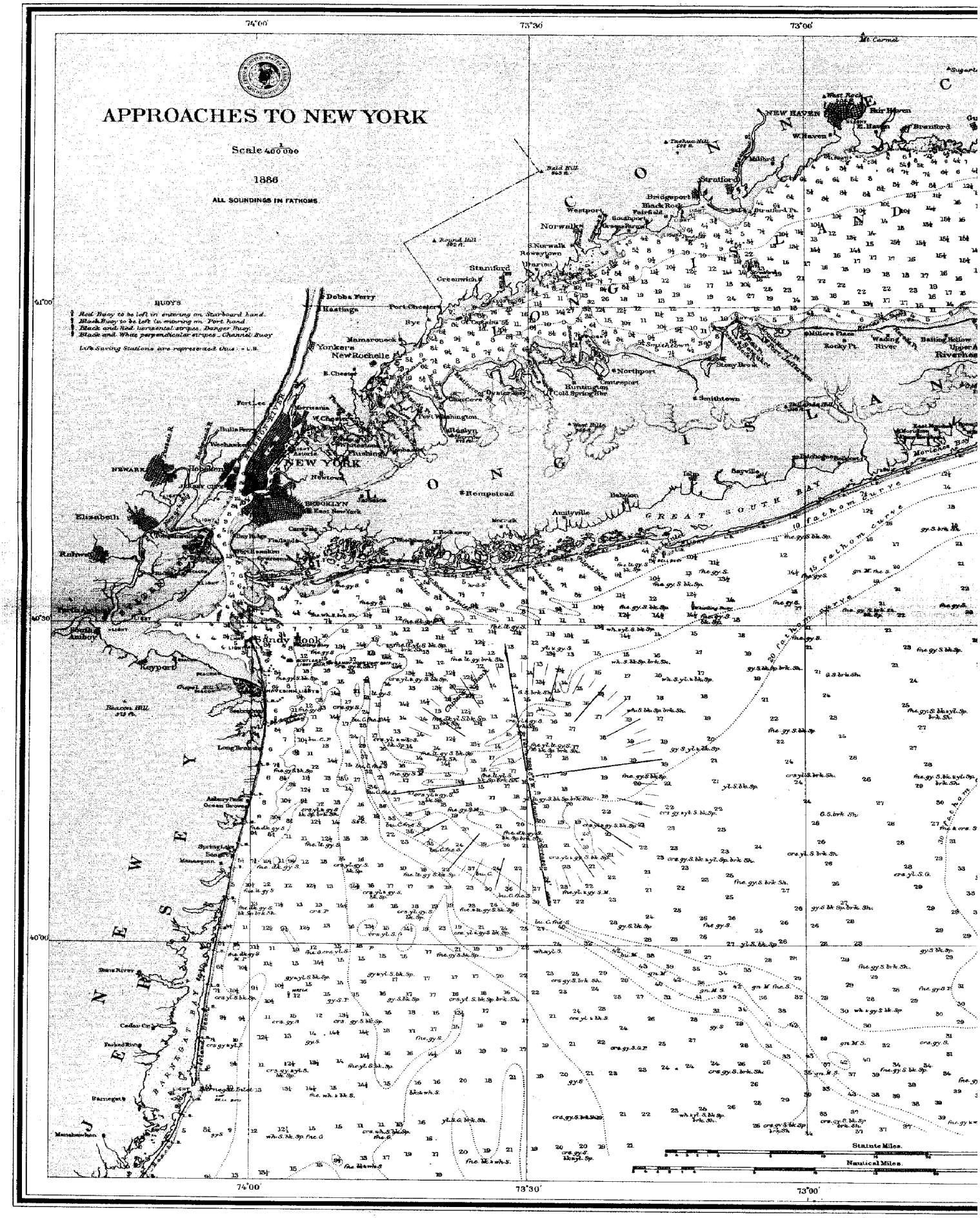
APPROACHES TO NEW YORK
Scale 1/400 000
1886
ALL SOUNDINGS IN FATHOMS
BUOYS
Red Buoy to be left in entering on Starboard hand.
Black Buoy to be left in entering on Port hand.
Black and Red horizontal stripes. Danger Buoy.
Black and White perpendicular stripes. Channel Buoy.
Life Saving Stations are represented thus: L.S.
74°00'
73°30'
73°00'
41°00'
40°30'
40°00'
NEW HAVEN
Stratford
Bridgeport
Norwalk
Stamford
Greenwich
Dobbs Ferry
Hastings
Yonkers
New Rochelle
Mamaroneck
Port Chester
Rye
Northport
Huntington
Smithtown
Hempstead
Amityville
Babylon
Sayville
NEW YORK
BROOKLYN
NEWARK
Hoboken
Elizabeth
Rahway
Sandy Hook
Keyport
Long Branch
Asbury Park
Barnegat
GREAT SOUTH BAY
LONG ISLAND
CONNECTICUT
NEW JERSEY
Statute Miles.
Nautical Miles.

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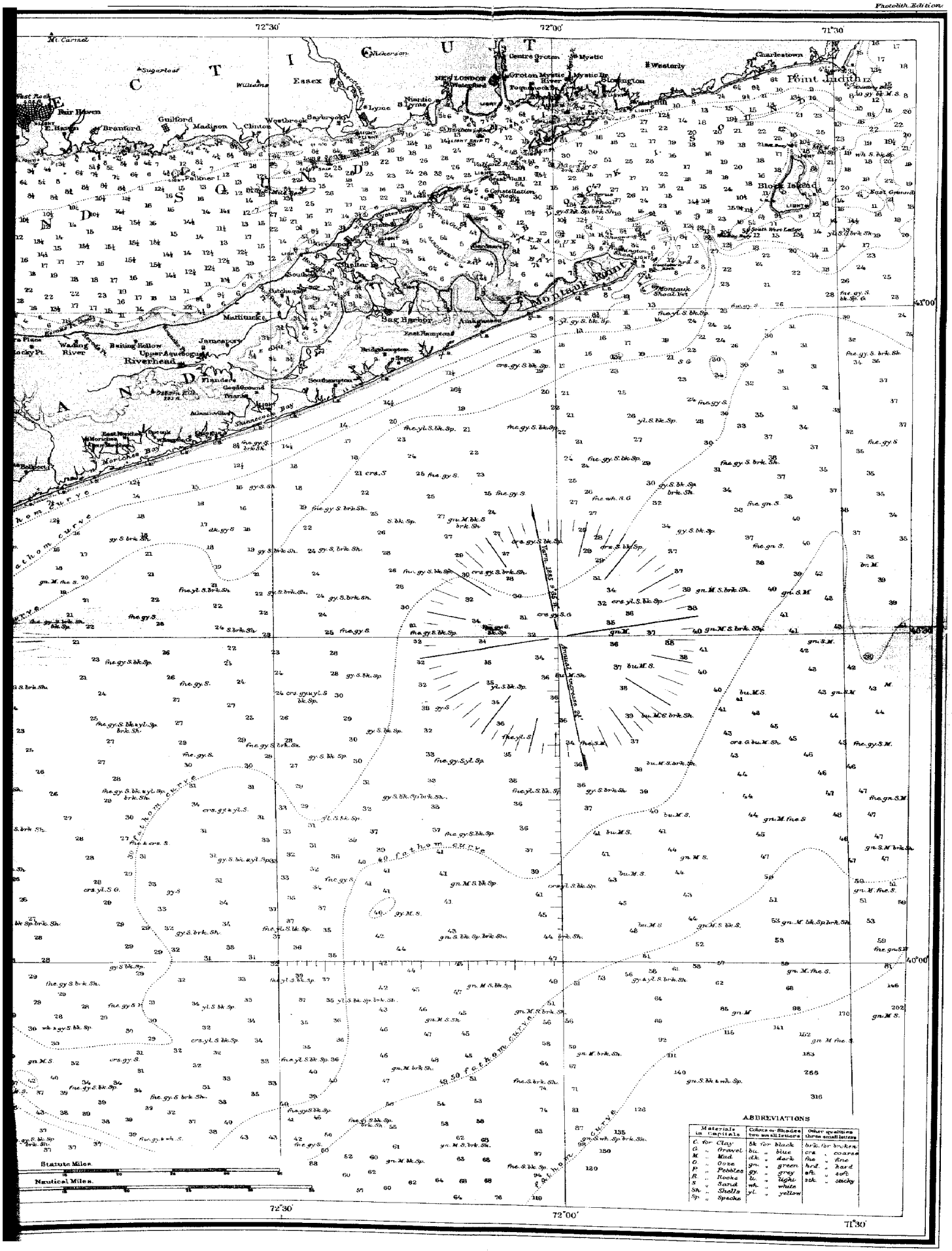

ABBREVIATIONS

Materials in Capitals	Colors or Shades two small letters	Other qualities three small letters
C. for Clay	bk for black	brk. for broken
G. " Gravel	bu. " blue	crs. " coarse
M. " Mud	dk. " dark	fne. " fine
O. " Ooze	gn. " green	hrd. " hard
P. " Pebbles	gy. " grey	sft. " soft
R. " Rocks	lt. " light	stk. " sticky
S. " Sand	wh. " white	
Sh. " Shells	yl. " yellow	
Sp. " Specks		

UNITED STATES COAST PILOT.

ATLANTIC COAST—PART IV.

LONG ISLAND SOUND, WITH APPROACHES AND ADJACENT WATERS.†

GENERAL REMARKS.

This volume covers the coast from Point Judith to the East River. The waters included between these limits have comparatively few dangers which menace vessels standing through Block Island Sound and Long Island Sound, though the approaches to some of the harbors are much obstructed. The chief obstacles to navigation on this coast are the fogs and the tidal currents, the former being particularly prevalent in the vicinity of Point Judith—a locality known to coasters as the "fog-hole." The tidal currents have considerable strength in Block Island Sound, Fisher's Island Sound, and Long Island Sound, though not forming any great hindrance to navigation; but in the Race, and through Hell Gate in the East River, the tidal currents have great force, and at the latter place are dangerous. Sailing-vessels approaching the Race with the current against them are frequently unable to get through until the tide turns; sailing-vessels are generally towed through the East River.

Block Island Sound has but few dangers; its shores are bold-to as a rule. Gardiner's Bay is one of the best natural harbors in the world. Fisher's Island Sound has a number of dangers, and the currents have considerable force; strangers should not pass through it when the buoys cannot be seen readily. The Race, except for its strong current, is practically free from dangers for most of the vessels using it—Valiant Rock, in the middle of the Race, having 19 feet over it at mean low water. Long Island Sound has some shoals lying alongshore, but in mid-sound there are very few dangers, and these are well marked or are easily avoided. In the East River strangers should have a pilot or a tow-boat.

The **prevailing winds** are northwesterly and northerly in winter, and southwesterly and southerly in summer, subject to many variations at all seasons.

Fogs are liable to occur at any season, but are more prevalent from April to October than during the rest of the year. They come most frequently with easterly and southeasterly winds, often with southerly winds, and occasionally with the wind to the westward of south. Off Montauk Point and Point Judith winds between south and southwest are nearly as apt to bring fog as those from the southeastward. Westerly and northerly winds clear away fog, this holding good for all parts of the Atlantic coast.

In Block Island Sound and in the eastern part of Long Island Sound fogs are generally heaviest with southeast winds. In these waters the usual duration of a fog is from 4 to 12 hours, but periods of 4 to 6 days have been known with very short clear intervals. As already stated, the vicinity of Point Judith is known to coasters as the "fog-hole." In the autumn "land-fogs," as they are termed locally, sometimes occur with northerly breezes, but they are generally "burnt off" before mid-day.

In Long Island Sound the north and south shores are equally subject to fog, except that on spring and summer mornings, when there is little or no wind, fog will often hang along the Connecticut shore when it is clear off shore and to the southward.

In the western end of Long Island Sound, although fogs are liable to occur at any season, they are not encountered so often, nor do they generally last so long as is the case to the eastward.

LIGHT-HOUSE DISTRICT, ETC.

The coast and the waters covered by this volume lie within the **Third Light-house District** of the United States. This district extends from Gooseberry Point, Massachusetts, to the westward and southward as far as Squan Inlet, New Jersey. The Light-list for the sea-coasts of the United States and the Buoy-list for the Third District give full descriptions of the aids to navigation. These pamphlets, which are corrected and reprinted from time to time, are sent free of charge to any ship-master on application to the Office of the Light-house Board, Washington, D. C., or to the Inspector of the district, P. O. box No. 2128, New York city, N. Y. They can also be had on application at the U. S. Branch Hydrographic Office, Maritime Exchange, Produce Exchange building, New York city.

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†The coast from Point Judith to the East River falls within the limits of the following Coast and Geodetic Survey charts: **A**, Sailing chart, Atlantic coast, scale $\frac{1}{1,200,000}$, price $1.00; **8a**, Approaches to New York, scale $\frac{1}{400,000}$, price $0.60. This coast is shown also on charts **114, 115, 116**, Long Island Sound, in three sheets, the scale of each being $\frac{1}{80,000}$, or one mile = 0.912 inch, price of each $0.40; **114**, Eastern sheet, Point Judith and Block Island to Plum Island; **115**, Middle sheet, Plum Island to Welch's Point; **116**, Western sheet, Welch's Point to New York; the eastern part of Long Island Sound is also shown on chart **114a**, a late photo-lithograph, scale $\frac{1}{80,000}$, price $0.50. Portions of the coast are shown more in detail on harbor charts, as noted under the several headings.

Coast and Geodetic Survey Charts can be obtained from the agents named in the list given on page VII. Index maps, showing the location and limits of charts, are published by the Survey, and will be furnished free of charge upon application to the Coast and Geodetic Survey Office. A new catalogue of charts and other publications of the Survey (edition of 1887) also contains similar index maps; copies of this catalogue can be obtained free of charge on personal application at any of the sale agencies (see page VII), or by letter addressed to the Coast and Geodetic Survey Office, Washington, D. C.

TABLE OF LIGHTS, POINT JUDITH TO EAST RIVER.

Number.		Name.	Latitude, north. Longitude, west.	Characteristic of light.	Order of light.	Height of light above sea-level, in feet.	Distance visible, in nautical miles.
			° ′ ″				
1		POINT JUDITH	41 21 (40) 71 28 (55)	Flashing white every 15 secs	4	67	14
2		BLOCK ISLAND (N.)	41 13 40 71 34 35	Fixed white	4	61	13½
3		Block Island Breakwater Range (front)	----------	Fixed red	Lens lantern	12	--------
4		Block Island Breakwater Range (rear)	----------	Fixed red	Lens lantern	60	--------
5		BLOCK ISLAND (SE.)	41 09 10 71 33 08	Fixed white	1	204	21
6		WATCH HILL	41 18 14 71 51 32	Fixed white	4	62	13
7		MONTAUK POINT	41 04 16 71 51 27	Fixed white, varied by a white flash every 2 minutes.	1	169½	19¼
8	FISHER'S ISLAND SOUND.	Stonington Harbor	41 19 43 71 54 21	Fixed white	6	59½	11
9	FISHER'S ISLAND SOUND.	Latimer's Reef	41 18 16 71 56 02	Flashing white every 10 secs	5	56	13
10	FISHER'S ISLAND SOUND.	*Race Island Reef Light-Vessel*	41 18 (10) 71 58 (31)	Fixed white	Refl'r	43	11¾
11	FISHER'S ISLAND SOUND.	Morgan's Point (Mystic)	41 18 59 71 59 24	Fixed white	6	61	11
12	FISHER'S ISLAND SOUND.	North Dumpling	41 17 16 72 01 11	Fixed red	6	70½	7½
13	LONG ISLAND SOUND.	New London Harbor	41 19 00 72 05 25	Fixed white	4	90	15
14	LONG ISLAND SOUND.	*Bartlett's Reef Light-Vessel*	41 16 (17) 72 07 (50)	Two fixed white	Refl'rs	28	10
15	LONG ISLAND SOUND.	Race Rock	41 14 37 72 02 51	Alternate red and white flashes at intervals of 10 secs.	4	68½	14
16	LONG ISLAND SOUND.	LITTLE GULL ISLAND	41 12 23 72 06 26	Fixed white	2	92	17
17	GARDINER'S BAY.	Gardiner's Island	41 08 32 72 08 44	Fix d white	6	33	11
18	GARDINER'S BAY.	Plum Island	41 10 25 72 12 43	Flashing white every 30 secs	4	76	14
19	GARDINER'S BAY.	Long Beach Bar	41 06 33 72 18 23	Fixed red	5	54	8½
20	GARDINER'S BAY.	Cedar Island	41 02 27 72 15 41	Fixed white	6	45	11
21		Saybrook Breakwater	41 15 48 72 20 35	Fixed white	5	50	13
22	CONNECTICUT RIVER.	Saybrook (Lynde Point)	41 16 17 72 20 37	Fixed white	4	73	14
23	CONNECTICUT RIVER.	Calves' Island	41 19 26 72 21 (00)	Fixed white	Lens lantern	--------	5
24	CONNECTICUT RIVER.	Brockway's Reach	41 22 20 72 23 (50)	Fixed white	Lens lantern	--------	5
25	CONNECTICUT RIVER.	Devil's Wharf	41 23 32 72 26 (08)	Fixed white	Lens lantern	--------	5
26	LONG ISLAND SOUND.	*Cornfield Point Light-Vessel*	41 13 (30) 72 23 (37)	Fixed red	Refl'r	40	12
27	LONG ISLAND SOUND.	HORTON'S POINT	41 05 07 72 26 46	Fixed white	3	105	16
28	LONG ISLAND SOUND.	Falkner's Island	41 12 43 72 39 15	Fixed white, varied by a white flash every 90 secs.	4	96	15
29	LONG ISLAND SOUND.	SOUTHWEST LEDGE	41 14 04 72 54 45	Fixed white	4	57	13
30	LONG ISLAND SOUND.	New Haven Long Wharf	41 17 34 72 54 56	Fixed red	Lens lantern	21	--------
31	LONG ISLAND SOUND.	Stratford Point	41 09 07 73 06 13	Flashing white every 45 secs	3	55	12½

TABLE OF LIGHTS, POINT JUDITH TO EAST RIVER.

Number.	Color and peculiarity of light-house or vessel.	Height, in feet, from base of structure to center of lantern.	Fog-signal.
1	White tower, connected with dwelling	46	1st-class steam-siren; blasts of 6 secs., intervals of 40 secs.
2	Light-brown tower, on a gray granite dwelling	46	
3	Lantern hung on a stake standing at end of pier, W. side of entrance to basin	12	
4	Lantern on a mast near a small white house, located on the land back of the bulkhead of the basin.	48	
5	Octagonal tower, attached to red brick dwelling with granite trimmings; lantern, black. Fog-signal building 100 feet SE.	52	1st-class steam-siren; blasts of 4 secs., intervals 30 secs.
6	Gray granite tower, attached to SE. corner of white building	40	
7	White tower; brown dwelling on hill near by	97	1st-class Daboll trumpet; blasts 12 secs., intervals 50 secs.
8	Light on tower attached to dwelling	32¼	
9	Iron pier, painted red, surmounted by a brown iron tower, with a black lantern	44	Bell struck by machinery every 15 secs.
10	Two masts, schooner-rigged; circular red cage-work day-mark at each mast-head. Hull, straw-color, with the words "RAM ISLAND" in large black letters on each side, and "No. 19" in black on each quarter.		Bell and horn.
11	Light on granite dwelling	44	
12	White tower on dwelling	39¼	Bell struck by machinery every 15 secs.
13	White tower, attached to drab dwelling	85	1st-class Daboll trumpet; blasts 6 secs., intervals 30 secs.
14	Two masts, schooner-rigged; circular straw-colored day-mark at each mast-head. Hull, black, with white streak; "BARTLETT'S REEF" in large letters on each side.		Bell or horn.
15	Tower, square at base and octagonal above, attached to granite dwelling with gable roof; all standing on a circular granite pier, with a rectangular landing wharf; lantern, black.	40	Bell struck by machinery, double blow every 20 secs.
16	Gray granite tower, connected with red dwelling with Mansard roof and granite trimmings. The buildings stand on a pier of granite.	74	2d-class steam-siren; blasts 5 secs., intervals 40 secs.
17	Dark-brown circular tower, with dwelling attached	26	
18	White tower, on granite dwelling; lantern, black	46	Bell struck by machinery every 15 secs.
19	Screw-pile structure; piles, red; dwelling and tower, white; lantern, black	34	Bell struck by machinery every 15 secs.
20	Light on granite dwelling	35	Bell struck by machinery every 20 secs.
21	Brown iron pier and tower, surmounted by a black lantern	44	Bell struck by machinery every 20 secs.
22	White tower, with straw-colored dwelling attached	64	Bell struck by machinery every 12 secs.
23	A black iron column, with lantern on top		
24	A black iron column, with lantern on top		
25	A black iron column, with lantern on top		
26	Schooner-rigged; black circular cage day-mark at each mast-head. Hull, red, with "CORNFIELD POINT" on each side in large white letters.		Bell or horn.
27	Square white tower, with dwelling attached	35	
28	White octagonal tower, with dwelling attached. Fog-signal building 150 feet to the northward.	46	10-inch steam-whistle; blasts 8 secs., intervals 52 secs. A bell struck by machinery every 15 secs. in case whistle is disabled.
29	A red octagonal house, on a cylindrical foundation, surmounted by a lantern	32	Daboll trumpet; blasts 8 secs., intervals 22 secs. A bell struck by machinery every 15 secs. if Daboll trumpet be disabled.
30	Square drab tower, with brown trimmings	16	
31	Round white tower; lantern, black. White dwelling detached. Fog-signal building, white.	35	Bell struck by machinery every 15 secs.

TABLE OF LIGHTS, POINT JUDITH TO EAST RIVER—Continued.

Number.		Name.	Latitude, north. Longitude, west.	Characteristic of light.	Order of light.	Height of light above sea-level, in feet.	Distance visible, in nautical miles.
32	Long Island Sound.	Stratford Shoal (Middle Ground)	41 03 36 72 06 06	Flashing white every 10 secs	4	63	13¼
33	Long Island Sound.	Old Field Point	40 58 37 73 07 09	Fixed white	4	79	14½
34	Long Island Sound.	Bridgeport Harbor	41 09 24 73 10 49	Fixed red	4	56	11¼
35	Long Island Sound.	Black Rock	41 08 33 73 13 04	Fixed white	5	43	12
36	Long Island Sound.	Penfield Reef	41 07 02 73 13 21	Flashing red every 5 secs	4	54	12¾
37	Long Island Sound.	Norwalk Island	41 02 56 73 25 11	Fixed white, varied by a red flash every minute.	4	52	12½
38	Long Island Sound.	Eaton's Neck	40 57 14 73 23 45	Fixed white	3	147	18
39	Long Island Sound.	Lloyd's Harbor	40 54 54 73 26 06	Fixed red	5	40	8½
40	Long Island Sound.	Stamford Harbor	41 00 49 73 32 35	Fixed red	4	60	11¼
41	Long Island Sound.	Great Captain's Island	40 58 57 73 37 26	Fixed white	4	74	14
42	Long Island Sound.	Execution Rocks	40 52 41 73 44 17	Fixed white	4	58	13
43	Long Island Sound.	Sands' Point	40 51 57 73 43 48	Flashing white every 30 secs	4	68	13
44	Long Island Sound.	Stepping Stones	40 49 28 73 46 31	Fixed red	5	49	8½
45	Long Island Sound.	Throg's Neck	40 48 21 73 47 27	Fixed white	5	66	12¾
46	East River.	North Brother Island	40 47 57 73 54 00	Fixed white	6	50	11
47	East River.	Sunken Meadow	40 47 (48) 73 54 (57)	Fixed red	Lens lantern	26	
48	East River.	Hell Gate	40 46 (38) 73 55 (45)	Fixed white	Lens lantern	25	
49	East River.	Flood Rock		Two fixed red	Lens lanterns	30	
50	East River.	Blackwell's Island	40 46 17 73 56 (27)	Fixed red	4	54	11¼
51	East River.	Man-o'-War Rock		Fixed red	Lens lantern	32	
52		Governor's Island	40 41 35 74 01 (13)	Two fixed red	Lens lanterns	62	

In the foregoing table the names of the lights are printed as follows, viz:

1st. PRIMARY SEA-COAST LIGHTS.

2d. SECONDARY SEA-COAST LIGHTS.

3d. *Light-vessels.*

4th. Sound, bay, river, and harbor lights.

The geographical positions of light-houses which are uncertain by some seconds, not having yet been very accurately determined, and those of light-vessels, which vary somewhat in position, have the seconds inclosed thus: 30° 45′ (57″).

TABLE OF LIGHTS, POINT JUDITH TO EAST RIVER—Continued.

Number.	Color and peculiarity of light-house or vessel.	Height, in feet, from base of structure to center of lantern.	Fog-signal.
32	Gray octagonal tower, projecting from S. side of square house standing on pier	40	2d-class Daboll trumpet; blasts 6 secs., intervals 21 secs. If Daboll trumpet be disabled, a bell will be struck by machinery, a triple blow every 15 secs.
33	Lantern on a gray dwelling	46	
34	Screw-pile structure; piles, red; tower and dwelling, white; Mansard roof, slate-color; lantern, black.	34	Bell struck by machinery every 15 secs.
35	Tower, white; lantern, black	33	
36	White tower, on gray dwelling with Mansard roof, standing on dark pier; lantern, white; dome, black.	37	Bell struck by machinery, a double blow every 20 secs.
37	A gray octagonal tower on gable end of granite dwelling; lantern, black	46	
38	White tower, and dwelling attached; lantern, black	62	2d-class steam-siren; blasts 9 secs., intervals 35 secs.
39	Square white tower, and dwelling attached	34	
40	A round brown tower, standing on a red pier; lantern, black	60	Bell struck by machinery every 20 secs.
41	White tower on south gable of a granite dwelling	46	
42	White tower, with granite dwelling attached on W. side	47	1st-class Daboll trumpet; blasts 7 secs., intervals 43 secs. If Daboll trumpet be disabled, an Anderson fog-horn is in reserve.
43	White tower, with light-brown dwelling attached; lantern, black	46	
44	Lantern, on a red brick dwelling with stone trimmings and Mansard roof, erected on a granite pier.	36	Bell struck by machinery, a double blow every 20 secs.
45	White tower	61	Bell struck by machinery every 15 secs.
46	White dwelling with Mansard roof, surmounted by a black lantern	38	
47	Iron spindle, with bracket to support lantern at top, painted brown		
48	Small wooden derrick, in corner of N. leg of electric-light tower		
49	Lanterns suspended from a white post		
50	Tower of gray gneiss, with cut-granite base and capital; lantern, party-colored and gilded, with blue and gilt spire, weathercock, and pointers.	48	
51	Iron spindle, lantern suspended from arm, spindle painted alternate brown and white stripes 6 feet wide.		
52	Lanterns on parapet of Castle William, upper light 14 feet and lower light 4 feet above parapet.		Bell struck by machinery, a double blow every 20 secs.

In the column of "Distance visible, in nautical miles," will be found the distances at which the lights can be seen, under ordinary states of the atmosphere, by observers at elevations of fifteen feet above the level of the sea.

In the column of "Characteristic of light," the time between flashes is given from beginning of one flash to the beginning of the next succeeding one.

Vessels approaching or passing light-vessels of the United States in *foggy* or *thick weather* will be warned of their proximity by the sounding of a *bell*, *fog-horn*, or *whistle* on board of the light-vessels, at intervals not exceeding five minutes.

The fact should be noted that sound signals are not always reliable. The sound may be lost while really approaching it, after being heard; or even when approached until close-to, it may not be heard at all, though properly made. These conditions are the exception, not the rule. They are, however, always possible and render great care necessary.

BEARINGS AND DISTANCES.

NOTE.—The meaning of the letters in parentheses, placed after the bearings, is as follows:

(*l*) indicates that the bearing in this case leads across land.

(*d*) indicates that the bearing in this case leads across some danger distant more than two miles from either object.

(*n*) indicates that the bearing leads near to but clears dangers which are distant more than two miles from either object.

(*o*) indicates open water between the two objects; no dangers unless the objects are approached closer than two miles on the bearing.

Thus under bearings and distances from Point Judith Light-house is given the bearing: Montauk Point Light-house, **SW.** ¾ **W.**, (*o*) 24¼ miles. This indicates that from a position two miles **SW.** ¾ **W.** from Point Judith Light-house a **SW.** ¾ **W.** course will lead clear of all dangers to within two miles of Montauk Point Light-house.

In this and in some other cases one or both of the light-houses may be approached closer than two miles on the given bearing, but the two-mile limit is given as being a general rule safe in all cases. Where a closer approach is desirable or necessary, the Sailing Directions and Descriptions (given elsewhere in this volume) give the desired information.

Point Judith Light-house.—The following are bearings and distances from Point Judith Light-house:—

		Miles.
Nantucket New South Shoal Light-vessel, **SE.** by **E.** ¼ **E. Easterly**	(*n*)	79½
Gay Head Light-house, **E.** by **S. Southerly**	(*o*)	30
Vineyard Sound Light-vessel, **E.** ⅝ **S.**	(*o*)	21¾
Cuttyhunk Light-house, **E.** ¼ **S.**	(*o*)	24
Hen and Chickens Light-vessel, **E.** ¼ **N.**	(*o*)	21½
Sakonnet Light-house, **E.** by **N. Northerly**	(*o*)	13¾
Brenton's Reef Light-vessel, **NE.** by **E.** ¼ **E.**	(*o*)	6½
Watch Hill Light-house, **W. Southerly**	(*n*)	17¾
Race Rock Light-house, **W.** ½ **S.**	(*n*)	26½
Little Gull Island Light-house, **W.** ¾ **S.**	(*o*)	30
Gardiner's Island Light-house, **W SW.** ¾ **W.**	(*o*)	32¾
Montauk Point Light-house, **SW.** ¾ **W.**	(*o*)	24¼
Block Island (N.) Light-house, **SW.** ½ **S.**	(*o*)	9½
Block Island (SE.) Light-house, **S SW.** ¼ **W.**	(*o*)	13

Block Island (N.) Light-house.—The following are bearings and distances from Block Island (N.) Light-house:—

		Miles.
Nantucket New South Shoal Light-vessel, **E SE. Southerly**	(*n*)	81½
Gay Head Light-house, **E.** ⅛ **N.**	(*o*)	34¼
Vineyard Sound Light-vessel, **E.** ⅝ **N.**	(*o*)	27½
Cuttyhunk Light-house, **E.** by **N.**	(*o*)	30¼
Hen and Chickens Light-vessel, **E NE.** ½ **E.**	(*o*)	28¼
Sakonnet Light-house, **NE.** by **E.** ½ **E.**	(*o*)	21⅝
Brenton's Reef Light-vessel, **NE.** ¼ **E.**	(*o*)	15
Watch Hill Light-house, **NW.** by **W.** ⅝ **W.**	(*o*)	13⅝
Race Rock Light-house, **W NW.** ⅞ **W.**	(*o*)	21¼
Little Gull Island Light-house, **W.** ½ **N.**	(*o*)	24
Gardiner's Island Light-house, **W. Southerly**	(*d*)	26¼
Montauk Point Light-house, **SW.** by **W.** ⅝ **W.**	(*o*)	15⅞

Montauk Point Light-house.—The following are bearings and distances from Montauk Point Light-house:—

		Miles.
Nantucket New South Shoal Light-vessel, **E SE.** ½ **E.**	(*n*)	92½
Gay Head Light-house, **E.** ⅞ **N.**	(*d l*)	49
Block Island (SE.) Light-house, **E.** ⅞ **N.**	(*d*)	14½
Watch Hill Light-house, **N.** ⅞ **E.**	(*o*)	14
Race Rock Light-house, **N NW.** ⅝ **W.**	(*n*)	13½
Little Gull Island Light-house, **NW.**	(*d*)	14

Little Gull Island Light-house.—The following are bearings and distances from Little Gull Island Light-house:—

		Miles.
Montauk Point Light-house, **SE.**	(*d*)	14
Block Island (N.) Light-house, **E.** ½ **S.**	(*o*)	24
Point Judith Light-house, **E.** ¾ **N.**	(*o*)	30
Watch Hill Light-house, **E NE.** ⅝ **E.**	(*n*)	12¾
Race Rock Light-house, **NE.** by **E.** ⅝ **E.**	(*n*)	3½
North Dumpling Light-house, **NE.** ¼ **E.**	(*o*)	6¼
New London Light-house, **N.** by **E.** ½ **E.**	(*o*)	6¾
Bartlett's Reef Light-vessel, **N.** ½ **W.**	(*o*)	3¾
Saybrook Breakwater Light-house, **NW.** by **W.** ¼ **W.**	(*o*)	11¼
Cornfield Point Light-vessel, **W NW.** ⅝ **W.**	(*o*)	12½

		Miles.
Southwest Ledge Light-house, W. by N.	(n)	37¼
Falkner's Island Light-house, W. ⅞ N.	(o)	25
Stratford Point Light-house, W. ½ N.	(n)	45
Norwalk Island Light-house, W. Northerly	(n)	62¾
Stratford Shoal (Middle Ground) Light-house, W. ⅛ S.	(o)	45¾
Eaton's Neck Light-house, W. ½ S.	(d)	60¼
Old Field Point Light-house, W. ⅝ S.	(l)	47¾
Great Captain's Island Light-house, W. ¼ S.	(d)	69¾
Cedar Island Light-house, SW.	(n)	12¼
Gardiner's Island Light-house, SW. by S.	(n)	4¼

Falkner's Island Light-house.—The following are bearings and distances from Falkner's Island Light-house:—

		Miles.
Horton's Point Light-house, SE. ¼ S.	(o)	12
Plum Island Light-house, E SE. ⅝ E.	(n)	20¼
Little Gull Island Light-house, E. ⅞ S.	(o)	25
Cornfield Point Light-vessel, E. ½ S.	(d)	12¾
Race Rock Light-house, E. ½ S.	(d)	27½
Bartlett's Reef Light-vessel, E. ⅛ S.	(d)	24
Saybrook Breakwater Light-house, E. ¼ N.	(d)	14⅝
Southwest Ledge Light-house, W NW. ⅝ W.	(d)	11¾
Branford Reef Beacon, W NW. ¾ W.	(o)	6⅝
Stratford Point Light-house, W. Southerly	(o)	20¾
Stratford Shoal (Middle Ground) Light-house, W SW. ⅝ W.	(o)	22⅜
Old Field Point Light-house, SW. by W. ¾ W.	(o)	25¼

Stratford Shoal (Middle Ground) Light-house.—The following are bearings and distances from Stratford Shoal (Middle Ground) Light-house:—

		Miles.
Horton's Point Light-house, E. ⅝ S.	(o)	29¾
Plum Island Light-house, E.	(o)	40¾
Little Gull Island Light-house, E. ⅛ N.	(o)	45¾
Race Rock Light-house, E. ¼ N.	(o)	48⅞
Bartlett's Reef Light-vessel, E. ⅝ N.	(n)	45¾
Cornfield Point Light-vessel, E. ¾ N.	(n)	33½
Falkner's Island Light-house, E NE. ⅝ E.	(o)	22⅜
Southwest Ledge Light-house, NE. ¼ E.	(o)	nearly 13½
Stratford Point Light-house, N. ¾ E.	(o)	5⅜
Bridgeport Light-house, N NW.	(o)	6¾
Black Rock Light-house, NW. ⅝ N.	(o)	7⅛
Penfield Reef Light-house, NW. ⅜ W.	(o)	6⅜
Norwalk Island Light-house, W. ½ N.	(o)	14⅜
Stamford Light-house, W.	(n)	20
Great Captain's Island Light-house, W. ¼ S.	(n)	24⅛
Execution Rocks Light-house, W. by S.	(d)	30⅞
Eaton's Neck Light-house, W SW. ½ W.	(o)	14¾
Old Field Point Light-house, S. by W. ½ W.	(o)	5

Great Captain's Island Light-house.—The following are bearings and distances from Great Captain's Island Light-house:—

		Miles.
Red can-buoy No. 26 on The Cows, E. ¾ N.	(n)	4¾
Stratford Shoal (Middle Ground) Light-house, E. ¼ N.	(n)	24⅛
Old Field Point Light-house, E. ⅞ S.	(d)	22⅞
Eaton's Neck Light-house, E SE. ½ E.	(n)	10½
Execution Rocks Light-house, SW. ¼ W.	(o)	8⅛
Sands' Point Light-house, SW. ¼ S.	(o)	8⅝

Execution Rocks Light-house.—The following are bearings and distances from Execution Rocks Light-house:—

		Miles.
Great Captain's Island Light-house, NE. ¼ E.	(o)	8⅛
Stamford Light-house, NE. by E.	(o)	12⅛
Black spar-buoy No. 15 off Lloyd's Point, E NE. ¾ E.	(n)	12¼
Norwalk Island Light-house, NE. by E. ⅝ E.	(o)	17¾
Penfield Reef Light-house, E NE. Northerly	(n)	27¼
Stratford Point Light-house, E NE. ⅛ E.	(d)	33⅛
Stratford Shoal (Middle Ground) Light-house, E. by N.	(d)	30⅞
Sands' Point Light-house, S. by E. ⅞ E.		⅞
Stepping Stones Light-house, SW. ⅞ S.	(o)	3⅝
Throg's Neck Light-house, SW. ¾ S.		4⅞

WIND-SIGNAL STATIONS AND SEA-COAST TELEGRAPH STATIONS — COAST OF RHODE ISLAND, CONNECTICUT, AND NEW YORK.

The Wind-signals of the U. S. Signal Service are shown for the benefit of mariners at the following points. The list of stations has been corrected to October, 1888. The signals are described and their meaning is explained in Appendix III.

Newport, R. I.
Bristol, R. I.
Point Judith, R. I.
Block Island (near basin), R. I.
Block Island (Southeast Light), R. I.
Stonington, Conn.
New London, Conn.
New Haven Entrance, Conn.
City Island, N. Y.
New York City, N. Y.

There are sea-coast telegraph stations at the following places, with which passing vessels may communicate by the use of the International Code of Signals:

Narragansett Pier, R. I. **Block Island (near basin), R. I.**

UNITED STATES LIFE-SAVING STATIONS—POINT JUDITH TO EAST RIVER.

The following list of life-saving stations has been corrected to October, 1888. The geographical positions given are approximate and are taken from the Official Register of the service. These stations are furnished with life-boats, mortars, and all other appliances for affording assistance in cases of shipwreck.†

Name of Station.	State.	Locality.	Approximate Position. Latitude North. °	′	″	Longitude West. °	′	″
Point Judith	R. I.	Near light	41	21	40	71	29	00
Watch Hill	R. I.	Near light	41	18	20	71	51	30
New Shoreham	R. I.	Block Island, east side, near landing	41	10	20	71	33	30
Block Island	R. I.	Block Island, west side, near Dickens' Point	41	09	40	71	36	40
Montauk Point	N. Y.	At the light	41	04	00	71	51	30
Ditch Plain	N. Y.	3½ miles southwest of Montauk light	41	02	10	71	54	30
Eaton's Neck	N. Y.	East side entrance to Huntington Bay, Long Island Sound	40	57	10	73	24	00

† Instructions to enable mariners to avail themselves fully of the assistance thus afforded will be sent free of charge upon application to the General Superintendent of the Life-Saving Service, Washington, D. C.

TIDES.—POINT JUDITH TO THE EAST RIVER.†

GENERAL TABLE.

Locality.	Corrected Establishment. h.	m.	Mean Rise and Fall. Mean tides. Feet.	Spring tides. Feet.	Neap tides. Feet.	Mean Duration of— Rise. h. m.	Fall. h. m.	Stand. h. m.	Rise of highest tide observed. Feet.
Point Judith	7	32	3.1	3.6	2.6	6 15	6 10	0 50	5.0
Stonington	9	07	2.7	3.3	2.2	6 06	6 19	0 25	4.6
Gardiner's Bay	9	30	2.7			5 56	6 29		3.5
Little Gull Island Light	9	26	2.5	2.9	2.1	6 22	6 03		3.4
Plum Gut	10	12	2.6			6 44	5 41		3.2
New London	9	29	2.6	3.1	2.2	5 58	6 27		4.5
Connecticut River Entrance	10	17	3.9	4.5	3.3	6 09	6 16	0 36	5.4
Falkner's Island	10	37	5.4	6.2	4.5	6 17	6 08	0 40	6.4
Thimble Islands	10	49	5.3	6.9	3.7	6 22	6 03		6.8
New Haven Entrance	11	04	6.2	7.1	5.2	6 10	6 15		7.8
Port Jefferson	11	38	6.1	6.9	5.3	5 47	6 38		8.1
Stratford Shoal (Middle Ground) Light	11	07	6.6	7.4	5.8	6 08	6 17		8.6
Black Rock (Bridgeport)	11	11	6.5	7.9	5.1	6 10	6 15	0 29	8.9
Sheffield Island Harbor	10	58	7.4	8.2	6.6	6 12	6 13	0 19	8.8
Huntington Bay	10	51	7.6	8.8	6.5	6 12	6 13	0 15	9.6
Lloyd's Harbor	11	01	7.6	8.8	6.5	6 07	6 18	0 15	9.0
Oyster Bay	11	07	7.3	8.6	5.9	6 05	6 20	0 25	10.4
Captain's Harbor	11	01	7.4	8.2	7.0	5 51	6 34		9.1
Hempstead Harbor	11	03	7.2	8.5	5.9	6 01	6 24		8.7
New Rochelle	11	22	7.6	8.5	6.7	5 51	6 34	0 13	9.0
Manhasset Bay	11	13	7.7	8.9	6.4	5 55	6 30	0 14	10.1
Throg's Neck	11	20	7.3	8.6	6.0	5 51	6 34	0 43	11.7
Pot Cove	11	10	5.9	6.5	5.3	5 51	6 34	0 16	8.2
Hell Gate Ferry	10	00	5.1	6.0	4.2	6 00	6 25	0 15	7.4
Governor's Island	8	07	4.4	5.2	3.5	5 54	6 31	0 28	7.1

It will be noticed that there is in Long Island Sound a gradual increase of rise and fall from east to west until the contracted part of the Sound is reached at Eaton's Neck; to the westward of this there is but a slight increase in the range. Between Stratford Shoal (Middle Ground) and Throg's Neck the differences in the times of high and of low water are but small.

† **Tide Tables for the Atlantic Coast,** published annually by the U. S. Coast and Geodetic Survey, predicting the times and heights of tides for every day of the year, at all the principal ports, can be obtained from the agents named in the list given on page VII; price $0.25.

TIDAL CURRENTS IN BLOCK ISLAND SOUND AND LONG ISLAND SOUND.

Stations.		*Strength* of Flood Current.		*Strength* of Ebb Current.		Current turns from Flood to Ebb *before* or *after* Moon's Transit.
No.	Locality.	Set.	Drift.	Set.	Drift.	
						h. m.
1	2½ miles NE. ¼ N. from the northern end of Block Island North Reef.	N. ⅝ W.	1.6	E. by N.	2.8	0 18 before.
2	Between Montauk Point and Block Island	NW. ¼ N.	1.3	SE. by S.	2.4	0 44 "
3	2 miles SE. of Watch Hill Point	W. ⅛ N.	1.2	SE. ⅝ E.	1.1	0 44 "
4	2 miles E SE. from Montauk Point	N. ⅛ W.	2.1	S. by E. ⅛ E.	2.1	0 22 "
5	2 miles N. from Montauk Point	NW. ¼ N.	2.0	SE. ⅜ S.	1.9	2 1 "
6	1½ miles N NE. ¾ E. from Cerberus Shoal	W NW. ⅝ W.	1.4	E. ½ S.	1.9	0 46 "
7	Off Fort Pond Bay	W. ⅛ N.	0 8	E. by N. ⅞ N.	1.0	2 7 "
8	In The Race	W NW. ⅛ W.	4.7	SE. ⅛ E.	4.5	0 20 after.
9	Off New London Entrance	W. ¼ S.	1.0	E NE.	1.3	1 43 before.
10	2½ miles to the eastward of Gardiner's Point	NW.	1.6	E SE.	1.9	0 58 "
11	Between Plum Island and Great Gull Island	NW. ⅛ N.	2.1	SE. by E. ⅛ E.	2.8	0 15 "
12	¼ mile to the eastward of Bartlett's Reef Light-vessel.	W NW. ⅜ W.	2.0	E. ¼ S.	2.0	2 0 "
13	Between Plum Island Point and Black Point	W. ⅜ S.	2.6	E. by N.	2.7	0 45 "
14	In Plum Gut	W. ⅛ N.	1.8	SE. by E. ½ E.	2.5	1 56 "
15	Off the mouth of Connecticut River	W. ¼ N.	1.8	E SE. ¼ E.	1.7	1 57 "
16	2 miles to the southward of Cornfield Point Light-vessel.	SW. by W. ½ W.	1.4	NE. by E. ½ E.	2.0	0 0
17	In the North Channel, between Cornfield Point and Long Sand Shoal.	W NW. ⅛ W.	1.5	E SE. ⅜ E.	1.5	1 49 before.
18	1⅝ miles to the westward of the western end of Long Sand Shoal.	NW. by W. ⅛ W.	1.4	E SE. ½ E.	1.6	0 9 after.
19	3½ miles E SE. from Falkner's Island Light-house	W. ¼ N.	1.2	SE. by E. ⅛ E.	1.5	0 55 before.
20	5 miles N. of Friar's Head	W NW. ¾ W.	1.9	E SE.	2.0	0 38 "
21	2 miles S. of Branford Reef	W. ⅞ S.	0.6	E. by N.	0.8	0 8 "
22	2¾ miles S SW. ¾ W. from Southwest Ledge Light-house.	NW. ⅞ W.	1.5	E. ½ N.	1.5	1 2 "
23	1½ miles SE. ½ E. from Middle Ground Light-house	W.	1.9	E. ⅜ N.	2.2	0 20 after.
24	1¾ miles N NE. from Middle Ground Light-house	W SW. ¼ W.	1.2	E. ¾ N.	1.3	0 47 "
25	Between Old Field Point and The Middle Ground	SW. ¼ S.	1.4	NE. by E. ⅞ E.	1.5	0 55 "
26	2 miles W NW. ¼ W. from Middle Ground Light-house.	W SW. ½ W.	1.0	E NE. ⅛ E.	0.8	0 49 "
27	3⅛ miles N NE. from Eaton's Neck Light-house	W. ½ S.	1.2	E NE. ¾ E.	1.2	0 6 before.
28	Off Huntington Bay	SW. ⅞ W.	1.3	E. ⅜ N.	1.1	0 0
29	Off Oyster Bay	SW. ½ W.	0.6	NE. by E. ⅛ E.	0.6	0 12 "
30	1½ miles S SE. from Great Captain's Island Light-house.	SW. by W. ⅞ W.	0.6	NE. ⅛ N.	0.7	1 48 after.
31	1⅞ miles S. by E. ¼ E. from Rye Point	SW. by S.	0.6	NE. ¼ N.	0.9	0 44 "
32	1 mile E NE. from Execution Rocks	SW. by S.	0.5	NE. ⅜ E.	1.0	0 42 "
33	Main Channel, between Execution Rocks and Sands' Point.	S SW.	0.5	NE. ¾ E.	0.9	0 46 "
34	Northern Passage, between Execution Rocks and Whortleberry Island.	SW. by S.	0.7	NE. ¾ N.	1.0	4 0 before.

Remarks.—The Tidal currents in Long Island Sound turn and commence running in the opposite direction along the northern and southern shores of the eastern part of the Sound at various intervals from one to two hours before they turn in the middle of the Sound. The currents along the shore, between New Haven and New London, are earlier by one hour than between Fisher's Island and Point Judith, making, in all, a difference of two and a quarter hours between the first-named places, and of one and a quarter hours between the last-named and the beginning of the motion in the channel. The currents through the entrances formed by Block Island begin to run simultaneously, and about one hour earlier than in the Race. The ebb through Plum Gut lasts about two hours longer, and the flood so much shorter, than at other places in the vicinity.

The duration of the ebb stream at the entrance, middle, or head of the Sound appears to be the same, and this holds good for the duration of the slack-water. The means for the eastern entrance, the middle and head of the Sound, give the duration as follows: 6 h. 34 min., 6 h. 38 min. 6 h. 3 min. for the ebb, and 6 h. 8 min., 6 h. 8 min., 5 h. 48 min. for the flood, and 5, 3, and 16 minutes for the slack-water.

VARIATION OF THE COMPASS.

The magnetic variation at different points from Point Judith to the East River for 1888 is as follows:

Locality.	Compass Variation.		Annual Increase.
	°	′	′
Off Point Judith	11	15 W.	3
Between Watch Hill and Montauk Point	10	20 W.	3¼
Between Block Island and Montauk Point	11	10 W.	3¼
In Gardiner's Bay	9	55 W.	3¼
In Stonington Harbor	10	25 W.	3¼
In New London Harbor	10	15 W.	3¼
In Connecticut River Entrance	9	50 W.	3½
North of Horton's Point Light-house	9	45 W.	3½
In New Haven Harbor Entrance	9	20 W.	3⅝
In Bridgeport Harbor Entrance	9	10 W.	3¾
Off Norwalk Island Light-house	9	05 W.	3½
In Huntington Bay	9	00 W.	3½
In Oyster Bay	8	55 W.	3½
Off Great Captain's Island Light-house	8	50 W.	3½
At Throg's Neck	8	30 W.	3¾

BLOCK ISLAND SOUND †

Is the approach to Long Island Sound, Fisher's Island Sound, and Gardiner's Bay, and is otherwise of no special importance. Its eastern and its southern limits are defined by Point Judith, Block Island, and the eastern end of Long Island. It is free of dangers in the northern part, and easily navigated in clear weather; the aids are numerous and the important dangers are marked by buoys.

Point Judith, the eastern limit of the northern part of Block Island Sound, is marked by a light-house (see page 10); about 1¼ miles to the southward of this light-house a whistling-buoy is moored. To the northward of Point Judith, near Narragansett Pier, is a massive square granite tower over 100 feet high, which can be seen 20 miles on a clear day.

Montauk Point, the eastern point of Long Island, presents high sand bluffs covered with grass when seen from the eastward; Montauk Point Light-house on top of one of the bluffs shows a primary sea-coast light.

Block Island, 8 miles **SW.** by **S.** from Point Judith, is a prominent feature in approaching from the eastward; it is 5 miles long in a **N.** and **S.** direction, is high at both ends, and is marked by a light-house on its northern end and another on its southeastern end, the latter showing a primary sea-coast light.

Block Island Harbor is treated of separately below.

Fort Pond Bay is a semi-circular bay about 1 mile wide, making into the northern shore of Long Island about 5½ miles to the westward of Montauk Point. The bay is entirely free from dangers; flats make out from its eastern shore for ¼ mile. In approaching, the dangers lying off shore must be avoided when to the westward of Montauk Point. Fort Pond Bay affords good anchorage in 7 to 8 fathoms of water, soft bottom, but is exposed to northerly winds, being entirely open to the northward, and is little used except by the menhaden fishermen who frequent the waters about Gardiner's Island. There is good fishing, and in summer provisions can be obtained from the adjacent farms. There is no village or post-office near. This bay is now (1887) under discussion as a possible terminus of the route of a new line of ocean steamers.

Napeague Bay, a part of Block Island Sound, lies to the southward and southeastward of Gardiner's Island, between it and the Long Island shore. Vessels anchor here occasionally, but the bottom is sand and not good holding ground. The flats of the channel from Napeague Bay to Gardiner's Bay yield unusually fine clams. There is considerable *tidal current* in the bay.

These bays are not sheltered against northerly winds: strong northerly squalls occur frequently in summer. Of the two, Fort Pond Bay is the better anchorage.

Napeague Harbor, in the southern part of Napeague Bay, has about 6 feet over the bar at low water; the channel is crooked and unfit for a stranger. It is used by the menhaden fishermen and by small craft well acquainted.

The **variation of the compass** for 1888 off Point Judith is **11° 15′ W.**, with an annual increase of about 3′; between Watch Hill and Montauk Point, **10° 20′ W.**, with an annual increase of about 3¼′.

Tides.—The mean rise and fall of tides at Point Judith is 3.1 feet, corrected establishment $7^h\ 32^m$; the mean rise and fall at Montauk Point is 1.9 feet, corrected establishment $8^h\ 20^m$. For other tidal data see page 16.

Tidal currents in Block Island Sound.—The results of current observations are given on page 17.

Lists of light-houses, life-saving stations, and signal-service display stations, with other general matters, will be found on preceding pages.

BLOCK ISLAND HARBOR. ‡

This artificial harbor, constructed under government appropriations, is on the eastern side of Block Island, about 1⅝ miles to the northward of Block Island SE. Light-house; it consists of an inner crib-work basin 250 by 300 feet, and an outer harbor sheltered by a rip-rap breakwater extending in a **N NE.** direction 1,900 feet, with a gap of 200 feet which is being filled in. It is proposed to build a breakwater from the shore and enlarge the inner basin to an area of 18 acres. Engineers in charge of these improvements report a depth of 9 feet in the inner basin at mean low water in 1884; local authorities state that the depth is decreasing. At present (1887) the deepest draught of vessels entering the inner basin is 10½ feet, the average draught 6½ feet; deepest draught that can enter at mean low water is 8 feet. The entrance to the inner basin is 80 feet wide; vessels entering run lines and haul in.

The outer harbor affords shelter except against northerly and northeasterly winds. The heaviest draught entering the outer harbor is 13 to 14 feet, the average draught is 7 feet. The anchorage is most used during the spring and summer months; the bottom in the outer harbor is sand and clay, and vessels can ride out any but northeasterly gales. In the inner basin vessels generally moor with lines to the shore and crib-work.

Two lighted beacons (see Table of Lights, page 10) form a range to clear the end of the breakwater and are guides to the entrance to the inner basin; the outer beacon is a lantern hung on a stake on the western side of the entrance to the basin, and the inner one bears about **S. ¾ W.** from it.

This harbor has the only landing on Block Island; there are two wharves, each with a depth of 7 feet at low water—one in the basin, the other in the outer harbor. The island has some trade in fish and produce, carried in

† Shown on Coast and Geodetic Survey charts **114, 114 a,** and **8 a**; is also within the limits of chart **A**. See the foot-note on page 9.

‡ Shown on Coast and Geodetic Survey chart **356**, Block Island, with hydrography; scale $\frac{1}{10,000}$, or one mile = 7.296 inches, price $0.50. See also the foot-note on page 9.

Montauk Point from the Eastward, the Lt.Ho. bearing W. by N.½ N. distant 3 Miles.

Montauk Point from the Westward, the Lt.Ho. bearing N.E. by N.¼ N. distant 2 Miles.

local vessels and by strangers. In the summer it has steamboat communication with Norwich, Conn., and Providence and Newport, R. I.; in the winter a steamer runs to the island from Newport.

Pilots.—Strangers entering sometimes take a pilot, standing off and on, or anchoring outside the breakwater, until one comes on board.

Supplies.—Limited quantities of anthracite coal for steamers, and water through pipe and hose, can be obtained at the wharf in the inner basin. Provisions and ship-chandler's stores can be had at New Shoreham, the settlement west of the harbor.

Wind signals are displayed near the landing, and are visible to the shipping in the harbor (see page 16 and Appendix III).

Ice usually forms the whole length of the breakwater during January.

Tides.—The mean rise and fall of tides is 2.77 feet; for other tidal data see page 16.

COURSES THROUGH BLOCK ISLAND SOUND.

For convenience in comparison and reference courses are given from several positions. Although the position of a vessel in entering this sound may not agree exactly with any of the positions here given, yet a comparison of the paragraphs which most nearly meet each case may facilitate shaping the proper course.

General outline of arrangement.—The arrangement adopted under this heading is as follows:—

I. Entering by the passage between Point Judith and Block Island:

- A. If bound to Gardiner's Bay.
- B. If bound to Long Island Sound.
- C. If bound to Fisher's Island Sound.

II. Entering by the passage between Block Island and Montauk Point:

- A. If bound to Gardiner's Bay.
- B. If bound to Long Island Sound.
- C. If bound to Fisher's Island Sound.

I. ENTERING BY THE PASSAGE BETWEEN POINT JUDITH AND BLOCK ISLAND.

The entrance by this passage is clear and unobstructed except that an ugly ledge makes out for $\frac{7}{8}$ mile from the northern end of Block Island. A *black bell-buoy* marks the northern end of the ledge (see "Block Island North Reef" under paragraphs A following).

A *red whistling-buoy* is moored about $1\frac{1}{4}$ miles to the southward of Point Judith Light-house. It is a useful thick-weather aid.

Note the information concerning tidal currents, page 17.

A. ***If bound to Gardiner's Bay.***—Proceed as directed below, according to position, and then follow the directions under the heading "Gardiner's Bay."

A 1. ***From a position 1 mile S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **S.**, distant about $\frac{1}{4}$ mile. Make good the course **W.** $\frac{7}{8}$ **S.**, distance $32\frac{1}{2}$ miles, until Gardiner's Island Light-house bears **S.** by **E.** $\frac{1}{2}$ **E.**, distant about $\frac{3}{4}$ mile to 1 mile.

A 2. ***From a position $2\frac{3}{4}$ miles S. of Point Judith Light-house.***—The whistling-buoy off this point will bear **N.**, distant about $1\frac{1}{2}$ miles. The course is **W.** $\frac{5}{8}$ **S.** for $32\frac{1}{4}$ miles, until Gardiner's Island Light-house bears **S.** by **E.** $\frac{1}{2}$ **E.**, distant about $\frac{3}{4}$ mile to 1 mile.

A 3. ***From a position $4\frac{1}{4}$ miles S. of Point Judith Light-house.***—The whistling-buoy off this point bearing **N.**, about $2\frac{3}{4}$ miles distant, the course is **W.** $\frac{3}{8}$ **S.**, passing $1\frac{1}{4}$ miles to the northward of Block Island North Reef bell-buoy. The **W.** $\frac{3}{8}$ **S.** course should be made good for $32\frac{1}{4}$ miles, until Gardiner's Island Light-house bears **S.** by **E.** $\frac{1}{2}$ **E.**, distant about $\frac{3}{4}$ mile to 1 mile.

A 4. ***If farther to the southward than the position of par. A 3, foregoing,***—Exercise caution in rounding the north end of Block Island, giving the northern shore a berth of at least 1 mile and keeping to the northward, as necessary to do so. Pass about $1\frac{1}{2}$ miles north of the light-house on the northern end of Block Island, going well to the northward of Block Island North Reef bell-buoy; afterwards shape course about **W.** $\frac{1}{8}$ **S.** for Gardiner's Bay entrance.

In rounding the north end of Block Island the following rule will insure safety: While Block Island North Light-house bears to the westward of **SW.** by **S.**, keep well outside of 12 fathoms; with this light-house bearing from **SW.** by **S.** to **S.**, keep outside of 8 fathoms; haul sharply to the northward if you get shoaler water than this.

Remarks.—*To the northward* is passed Point Judith Light-house, and $17\frac{1}{2}$ miles farther west is Watch Hill Light-house; extending to the westward from the latter are Fisher's Island Sound entrance, Fisher's Island (hilly, bare of

trees), the Race with its two light-houses, and then the islands defining the northern side of Gardiner's Bay entrance; these will be made after getting well to the westward. For description of the light-houses, see pages 10–11.

To the southward is passed Block Island, about 12 miles to the westward of which is Montank Point; Fort Pond and Napeague bays are passed, and when well to the westward Gardiner's Island will be made on the port bow stretching away to the southward.

Dangers.—On any of these courses, when to the westward of Squid's Ledge and Block Island North Reef, and until nearly up with Gardiner's Bay entrance, there are only two dangers requiring special notice; these are Cerberus Shoal and Constellation Rock.

When coming abreast Fisher's Island, having made good about 20 miles on the course, keep a lookout for Cerberus Shoal buoys. When coming abreast Little Gull Island Light-house, keep a lookout for Constellation Rock buoy.

The courses as given lead 1 to 2 miles north of Cerberus Shoal; *on the ebb* you will be set to the southward towards the shoal and must allow for this. The courses as given lead ½ to ¾ mile south of Constellation Rock; *on the flood* you will be set to the northward towards this rock,—if drawing 14 feet or more guard against this set.

The northern shores, when past Squid's Ledge, are free from dangers if given a berth of ½ mile.

Squid's Ledge, 1½ miles to the westward of Point Judith Light-house, extends 1¼ miles from the shore, lies **N.** by **W.** and **S.** by **E.**, and near each end has 13 feet of water, rocky bottom.

Block Island North Reef extends ⅞ mile to the northward from the northern point of Block Island, has from 8 to 13 feet of water, and is marked off its northern end by a bell-buoy (black, No. 1). This rocky shoal is dangerous to approach, the tidal currents setting across it with great strength. The marks to clear this danger are Old Harbor Point (**SE.** part Block Island) open with Clay Head (**NE.** part Block Island) and Point Judith Light-house bearing **NE.**

Cerberus Shoal, to the southward of the course, is mid-way between Fisher's Island and Long Island and 7¼ miles **SE.** by **E.** ¾ **E.** from Little Gull Island Light-house. It has 14 feet of water and is marked by a whistling-buoy and a spar-buoy (both have red and black horizontal stripes). The whistling-buoy is ¼ mile to the eastward of the shoal; the spar-buoy is on the shoal, in rocky bottom. The shoal is small; ordinarily there are strong tide-rips near it.

Constellation Rock, to the northward of the course, is 1⅞ miles **S.** by **W.** ¼ **W.** from Little Gull Island Light-house. It has 17 feet of water and is marked by a buoy (spar, red and black horizontal stripes). This rock lies directly on the range of Little Gull Island Light-house and New London Light-house. About ¾ mile **W.** from Constellation Rock is a 16-foot rock, and to the northwestward of this, between Plum Island and Great Gull Island, are foul rocky patches.

Gardiner's Island Light-house is not readily recognized as a light-house, appearing more like an ordinary dwelling simply. The northern point of the island is long and low.

The Eastern Shore of Gardiner's Island should not be approached nearer than ¾ mile while Gardiner's Island Light-house bears to the northward of **W.**, on account of the shoals which make off from the shore for that distance.

A 5. ***At night,*** follow any of the foregoing directions until Little Gull Island Light is made (Race Rock Light should be made about the same time). Then steer for Little Gull Island Light on any bearing between **W.** by **S.** and **W NW.** ¼ **W.** (through **W.**) until Gardiner's Island Light is made bearing to the southward of **W.** ½ **S.** Then steer for Gardiner's Island Light on any course between **SW.** by **W.** and **W.** ½ **S.**, and when about ¾ mile to 1 mile from this light round the northern point of Gardiner's Island, leaving the light ¾ mile to 1 mile on the port hand.

Remarks.—These directions, if followed, will lead clear of all dangers, passing at least ½ mile north of the buoys on Cerberus Shoal and ¾ mile south of the buoy on Constellation Rock.

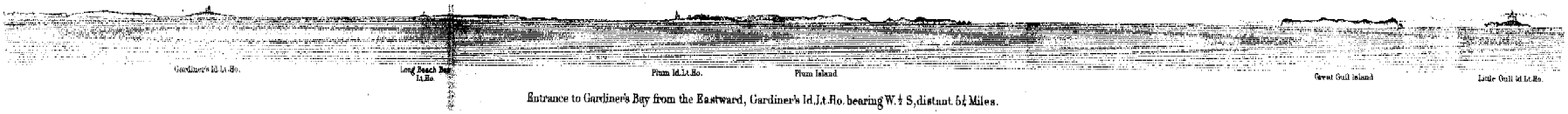
These dangers are described under the preceding paragraphs A.

B. ***If bound to Long Island Sound.***—Proceed as directed below, according to position, until nearing the Race. Race Rock Light-house and Little Gull Island Light-house then become the guides. In approaching and passing through the Race follow the directions under the heading "Long Island Sound."

B 1. ***From a position 1 mile S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **S.**, distant about ¼ mile. Make good a course **W.** ½ **S.** until, in approaching the Race, Race Rock Light-house and Little Gull Island Light-house become the guides. The **W.** ½ **S.** course made good for 29½ miles would lead about ½ mile to the northward of Little Gull Island Light-house.

B 2. ***From a position 2¾ miles S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **N.**, distant about 1½ miles. Make good a course **W.** ⅛ **S.** This course, if made good for 29½ miles, leads about ½ mile to the northward of Little Gull Island Light-house.

B 3. ***From a position 4¼ miles S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **N.**, distant about 2¾ miles. Make good a course **W.** ⅛ **N.** This course, if made good for 29¼ miles, would lead about ½ mile to the northward of Little Gull Island Light-house.



Entrance to Gardiner's Bay from the Eastward, Gardiner's Id. Lt. Ho. bearing W. ½ S, distant 5¼ Miles.

B 4. ***If farther to the southward than the position of B 3, foregoing.***—Steer so as to pass 1½ miles north of the light-house on the northern end of Block Island, and pass to the northward of the bell-buoy marking Block Island North Reef. When the bell-buoy bears **S.**, distant about ¼ mile, make good the course **W. ½ N.** This course, if made good for 24 miles, would lead about ½ mile to the northward of Little Gull Island Light-house.

In rounding the northern end of Block Island note the rule of paragraph A 4, page 19, with regard to depth.

Remarks.—When past Squid's Ledge (on north side of passage) and Block Island North Reef (on south side of passage), the courses as given in the foregoing paragraphs B lead well clear of all dangers until up with the Race.

The Courses lead 1¾ to 3½ miles to the southward of the dangers in Fisher's Island Sound entrance, and 3¼ to 4⅜ miles to the northward of Cerberus Shoal; *on the flood* a vessel may be set towards the former, *on the ebb* towards the latter.

Prominent Features.—About 17¾ miles to the westward of Point Judith is Watch Hill Light-house; extending to the westward from the latter are Fisher's Island Sound entrance, Fisher's Island, and the Race, through which the course will lead. About ½ mile to the southwestward of Race Point (the southwestern end of Fisher's Island) is Race Rock Light-house (see page 10), marking the northern side of the Race. About 3½ miles **SW.** by **W.** ⅝ **W.** from Race Rock Light-house is Little Gull Island Light-house (see page 10), marking the southern side of the Race; beyond the latter are the islands, all to be left on the port hand, separating Long Island Sound from Gardiner's Bay entrance.

Dangers.—Squid's Ledge, Block Island North Reef, and Cerberus Shoal are described on page 20. The dangers of Fisher's Island Sound entrance are described under the heading "Fisher's Island Sound," and those of the Race are described in connection with the sailing directions for that passage (see heading "Long Island Sound").

B 5. ***At night,*** follow any of the foregoing directions under paragraphs B, according to position, until you make Race Rock Light and Little Gull Island Light. Then follow the directions for the Race, under the heading "Long Island Sound."

C. ***If bound to Fisher's Island Sound.***—Proceed as directed below, according to position, and then follow the directions under the heading "Fisher's Island Sound" in approaching and entering.

Strangers should not attempt to enter Fisher's Island Sound at night.

C 1. ***From a position 1 mile S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **S.**, distant ¼ mile. Make good a course **W. Northerly.** This course made good for 17¼ miles will lead up to Gangway Rock buoy (spar, red, No. 2).

Remarks.—The **W. Northerly** course leads clear of all dangers and does not approach the north shore closer than ⅞ mile until nearly up to Watch Hill Light-house. Watch Hill and the light-house will be made a little on the starboard bow. Fisher's Island (hilly and bare of trees) will be made ahead or on the port bow. Drawing near Watch Hill Light-house several buoys and spindles will be seen, which mark some of the many rocks and ledges which obstruct the eastern entrance to Fisher's Island Sound.

Squid's Ledge (on north side of passage) and Block Island North Reef (on south side of passage) are described on page 20.

The Northern shore should be given a berth of not less than ½ mile after passing Squid's Ledge.

Gangway Rock, ⅛ mile south of Watch Hill Light-house, is marked by a buoy (spar, red, No. 2) placed ⅛ mile south of the rock on the end of a shoal making to the southward from Watch Hill Point.

The Dangers at the entrance to Fisher's Island Sound are described under the heading "Fisher's Island Sound."

C 2. ***From a position 2¾ miles S. of Point Judith Light-house.***—The whistling-buoy off Point Judith will bear **N.**, distant about 1½ miles. Make good a course **W. ½ N.** This course made good for 17½ miles will lead up to Gangway Rock buoy (spar, red, No. 2).

The Remarks, etc., under paragraph C 1, foregoing, will apply to this course.

C 3. ***From a position 4¼ miles S. of Point Judith Light-house.***—The whistling-buoy off this point will bear **N.**, distant about 2¾ miles. Make good a course **W.** by **N.** This course made good for 17½ miles will lead up to Gangway Rock buoy.

Note the remarks, etc., under paragraph C 1, foregoing. The **W.** by **N.** course passes about 2¾ miles to the northward of the bell-buoy marking Block Island North Reef.

C 4. ***If farther to the southward than the position of par. C 3, foregoing.***—Follow the directions of paragraph A 4, page 19, in rounding the north end of Block Island, until to the northward of the bell-buoy marking Block Island North Reef. When this buoy bears **S.**, distant ¼ mile, shape the course **W NW.** This course made good for 13 miles leads up to Gangway Rock buoy at Fisher's Island Sound entrance.

Note the remarks, etc., under paragraph C 1, foregoing.

COURSES THROUGH BLOCK ISLAND SOUND.

II. ENTERING BY THE PASSAGE BETWEEN BLOCK ISLAND AND MONTAUK POINT.

Entrance by this passage is somewhat obstructed by Southwest Ledge and Great Eastern Rock and Phelps' Ledge.

Southwest Ledge lies 2½ to 4 miles southwest from the southwestern point of Block Island. It has 31 feet of water and is marked by a whistling-buoy (red and black horizontal stripes) moored to the southward of the ledge; the sea breaks on this ledge in heavy weather.

Phelps' Ledge and *Great Eastern Rock* lie 1⅝ miles to the eastward of Montauk Point. This shoal ground has from 25 to 31 feet of water, and Great Eastern Rock, at its southern end, is marked by a buoy (nun,* black, No. 3).

Montauk Shoal lies 2½ miles **S.** by **E.** from Montauk Point Light-house. It has 24 feet of water and breaks in heavy southerly gales; inside of the shoal a depth of 12 fathoms is found. The shoal is generally plainly shown by the rip.

The *Tidal currents* off Montauk Point form tide-rips which are most marked on the ledges and shoals. The flood here sets northerly and the ebb southerly, both with considerable force.

A. ***If bound to Gardiner's Bay.***—Proceed as directed below, according to position, and then follow the directions under the heading Gardiner's Bay.

On the flood, you will be set to the northward; look out for Cerberus Shoal (see page 20); the courses as given lead 1⅜ to 2¼ miles south of this shoal.

On the ebb, you will be set to the southward; look out for Shagwong Reef, described below; the courses as given lead ½ mile to 2 miles north of this shoal.

A 1. ***From a position 1¼ miles S SW. of Block Island SE. Light-house.***—Make good a course **W NW. ⅞ W.**, distance 27 miles, until Gardiner's Island Light-house bears **S.** by **E. ½ E.**, distant ¾ mile to 1 mile.

Remarks.—The **W NW. ⅞ W.** course leads ¾ mile south of the shore of Block Island, 1½ miles north of the whistling-buoy on Southwest Ledge, 4½ miles north of Montauk Point Light-house, 2 miles north of Shagwong Reef buoy (nun,* black, No. 5), 1½ miles south of the Cerberus Shoal buoys (a whistling-buoy and a spar-buoy, both red and black horizontal stripes) and 1¼ miles south of Constellation Rock buoy (spar, red and black horizontal stripes). Gardiner's Island Light-house should be made on the port bow.

The south shore of Block Island can be approached to within ½ mile.

Dangers.—**Southwest Ledge**, marked by a whistling-buoy, is described above.

Shagwong Reef, 3¾ miles **NW.** by **N.** from Montauk Point Light-house, has 7 feet of water and is marked by a buoy (nun,* black, No. 5) placed at the eastern end of the reef. *Washington Shoal*, about midway between Shagwong Reef and the north shore of Long Island, has 15½ feet of water. *Shagwong Rock*, about 600 yards **N.** by **E. ¼ E.** from Shagwong Point, has 7½ feet of water. It is marked by a buoy (spar, red and black horizontal stripes). *A spot* with 17½ feet of water over it lies about 600 yards north of Shagwong Rock.

Cerberus Shoal and **Constellation Rock** are described on page 20.

A 2. ***From a position 4 miles S SW. of Block Island SE. Light-house.***—The course is **W NW. ¼ W.** for 26½ miles until Gardiner's Island Light-house bears **S.** by **E. ½ E.**, distant ¾ mile to 1 mile.

Remarks.—The **W NW. ¼ W.** course leads about ¾ mile south of the whistling-buoy on Southwest Ledge, 3 miles north of Montauk Point Light-house, ¾ mile north of the buoy on Shagwong Reef, 2½ miles south of the buoys on Cerberus Shoal, and 1½ miles south of the buoy on Constellation Rock.

These Dangers are described above and on page 20.

A 3. ***From a position to the southwestward of that of par. A 2, foregoing.***—Steer to the northward and westward and round Montauk Point Light-house, giving it a berth of 3 miles on the port hand. When Montauk Point Light-house bears **S SW. ½ W.**, distant 3 miles, steer **W NW. ¼ W.**, as directed in paragraph A 2, foregoing.

Remarks.—Following the above directions, Great Eastern Rock and Phelps' Ledge will be left at least 1 mile on the port hand. The course leads past Shagwong Reef and dangers to the westward of it, as in paragraph A 2, immediately foregoing.

A 4. ***To round Montauk Point close inshore.***—Steer for Montauk Point Light-house on any course between **W.** and **N.** by **W. ½ W.** When ¾ mile from the light-house, keep that distance from the shore and steer to the northward. When Montauk Point Light-house bears **W.**, distant ¾ mile, steer **N.** by **E.** until the light-house bears **SW.**, distant 1¼ miles; now change the course to **NW.** for 4½ miles, or until Shagwong Reef buoy (nun,* black, No. 5) bears on the port quarter,

*Spar-buoy in winter. See the note on page V.

Entrance to Long Island Sound from the Eastward, Gull Island Lt.Ho. bearing W. by N. distant 5¼ Miles.

and then steer **W NW.** ¼ **W.** for Gardiner's Bay entrance. *Strong tide-rips* are apt to be met in rounding Montauk Point close inshore.

Remarks.—Steering for Montauk Point Light-house on the above courses will lead between Montauk Shoal and Great Eastern Rock. The **N.** by **E.** course leads nearly midway between Montauk Point and Great Eastern Rock (Phelps' Ledge). The **NW.** course leads ½ mile north of the buoy on Shagwong Reef.

Dangers.—**Montauk Shoal** is described on page 22. **Great Eastern Rock** lies 1½ miles **E.** ¼ **N.** from Montauk Point Light-house, has 25 feet of water, and is marked by a buoy (num.* black, No. 3). **Phelps' Ledge** extends about 1¼ miles in a northerly direction from Great Eastern Rock, and has spots with 27 to 31 feet of water. **Shagwong Reef** is described on page 22.

Other dangers, passed on the **W NW.** ¼ **W.** course as in paragraph A 2 foregoing, are Cerberus Shoal and Constellation Rock, described on page 20.

A 5. ***At night.***—Bring Montauk Point Light to bear **W.** by **N.**, distant 4 miles (when Block Island SE. Light will bear about **E NE.** ½ **E.**), and steer **NW.** by **N.** until Little Gull Island Light is made and bears **NW.** by **W.** Then steer **NW.** by **W.**, heading for Little Gull Island Light until Gardiner's Island Light is made bearing between **W.** ¼ **N.** and **W NW.** ½ **W.** Steer for Gardiner's Island Light, heading about **W.** by **N.**, and when 1½ miles from the light steer so as to pass ¾ mile to 1 mile to the northward of it. When Gardiner's Island Light bears **S.** by **E.** ½ **E.**, distant ¾ mile to 1 mile, follow the directions under heading "Gardiner's Bay."

Remarks.—Little Gull Island Light (see Table of Lights, page 10) should be made shortly after heading up on the **NW.** by **N.** course. Gardiner's Island Light (see Table of Lights, page 10) should be made on the **NW.** by **W.** course when about midway between Cerberus Shoal and Shagwong Reef.

The Dangers between Montauk Point and Block Island are described on page 22. Shagwong Reef (see page 22) will be left on the port hand, Cerberus Shoal and Constellation Rock (see page 20) will be left on the starboard hand.

B. ***If bound to Long Island Sound.***—Proceed as directed below, according to position, until nearing the Race. Race Rock Light-house and Little Gull Island Light-house then become the guides. In approaching and passing through the Race follow the directions under the heading "Long Island Sound." For descriptions of light-houses see pages 10–11.

The *Tidal currents* have considerable strength and proper allowance should be made.

B 1. ***From a position 1¼ miles S SW. of Block Island SE. Light-house.***—Make good a course **W NW.** This course if made good for 25¼ miles leads about ½ mile to the northward of Little Gull Island Light-house.

The **W NW.** course passes about ⅝ mile south of the south shore of Block Island, about 2¼ miles north of the whistling-buoy on Southwest Ledge (see page 22) and about 1½ miles north of Cerberus Shoal buoys (see page 20).

B 2. ***From a position 4¾ miles S SW. of Block Island SE. Light-house.***—Make good a course **NW.** by **W.** ¼ **W.** This course if made good for 25¼ miles leads about ½ mile to the northward of Little Gull Island Light-house.

The **NW.** by **W.** ¼ **W.** course passes ½ mile south of the whistling-buoy on Southwest Ledge (see page 22), 5 miles north of Montauk Point Light-house, and about ½ mile north of Cerberus Shoal buoys (see page 20). Keep a good lookout for the whistling-buoy marking Cerberus Shoal.

B 3. ***From a position to the southwestward of that of B 2, foregoing.***—Steer so as to pass about midway between Montauk Point and Block Island, and when fair between them steer **NW.** until Montauk Point is abaft the abeam. Then shape a course **NW.** by **W.**, and when nearing the Race head a little more to the westward, if necessary, and follow the directions for that passage.

B 4. ***To round Montauk Point close inshore.***—Follow the directions of paragraph A 4, page 22, until Montauk Point Light-house bears **SW.**, distant 1¼ miles. Then make good a course **NW.** This course made good for 14½ miles leads about ½ mile to the northward of Little Gull Island Light-house. *Strong tide-rips* are apt to be met in rounding Montauk Point close inshore.

Remarks.—The courses of paragraphs B 1—B 3 lead ½ mile to 1¼ miles to the northward of Cerberus Shoal (see page 20). The **NW.** course of paragraph B 4 leads about ½ mile to the northward of Shagwong Reef (see page 22) and 1½ miles to the southward of Cerberus Shoal.

B 5. ***General remarks on entering and passing through Block Island Sound at night.***—***Entering between Block Island and Montauk Point, bound to Long Island Sound.***—Block Island SE. Light and Montauk Point Light are the guides entering by this passage; after passing

to the northward of a line drawn between these two lights, Watch Hill Light, Race Rock Light, and Little Gull Island Light will be made to the northward and westward, and Block Island N. Light to the northeastward.

On approaching the Race, New London Light and Bartlett's Reef Light-vessel will be made to the northwestward of the Race, and Gardiner's Island Light will be made to the southwestward.

For description of lights, see table, page 10.

Little Gull Island Light and Race Rock Light, the two lights leading through the Race, will be made nearly at the same time.

Little Gull Island Light can be steered for on any course between **NW.** by **W.** ¼ **W.** and **NW.** ¾ **W.**, leaving the light 1 mile on the port hand when passing, or it can be steered for on any course between **W.** by **S.**, through **W.**, to **W NW.** ¼ **W.**, leaving it 1 mile on the port hand when passing.

Race Rock Light can be steered for on any course between **W.** and **NW.** ¼ **N.**, leaving the light about ¼ to ½ mile on the starboard hand when passing.

See directions under the heading "Long Island Sound."

C. ***If bound to Fisher's Island Sound.***—Proceed as directed below, according to position, and then follow the directions under the heading "Fisher's Island Sound."

Strangers should not attempt to enter Fisher's Island Sound at night.

C 1. ***From a position 1 mile S. of the southwestern point of Block Island.***—Steer **NW.** ⅝ **N.** This course made good for 15 miles leads up to Gangway Rock buoy (spar, red, No. 2) at Fisher's Island Sound entrance.

Remarks.—Watch Hill Light-house should be made right ahead. The course leads clear of all dangers unti up to Fisher's Island Sound entrance. For description of dangers between Block Island and Montauk Point see page 22; for other dangers see heading "Fisher's Island Sound."

C 2. ***From a position 6 miles E. of Montauk Point.***—Steer **N.** by **W.** ¼ **W.** This course made good for nearly 14 miles leads up to Gangway Rock buoy (spar, red, No. 2).

Remarks.—The **N.** by **W.** ¼ **W.** course leads midway between Block Island and Montauk Point, and clear of all dangers until up to Gangway Rock buoy. Watch Hill Light-house should be made right ahead. For descriptions of dangers see page 22 and the heading "Fisher's Island Sound."

C 3. ***From close around Montauk Point.***—Keep ¾ mile off the south shore of Long Island and round Montauk Point, keeping the same distance from the shore. When Montauk Point Light-house bears **W.**, distant ¾ mile, steer **N.** ⅝ **E.** This course made good for 13½ miles leads up to Gangway Rock buoy (spar, red, No. 2). *Strong tide-rips* are apt to be met in rounding Montauk Point close inshore.

Remarks.—The **N.** ⅝ **E.** course leads midway between Montauk Point and Great Eastern Rock (Phelps' Ledge) and about 3 miles east of Shagwong Reef; Cerberus Shoal will be left about 4½ miles on the port hand. As Watch Hill Light-house is approached, the bell-buoy on Watch Hill Reef should be made well on the port bow.

For descriptions of dangers see page 22 and the heading "Fisher's Island Sound."

GARDINER'S BAY.†

Gardiner's Bay is at the western end of Block Island Sound, from which it is separated by Gardiner's Island, and makes into the northern shore of the eastern part of Long Island; the entrance is about 14 miles **NW.** by **W.** from Montauk Point and 32½ miles **W.** ⅞ **S.** from Point Judith.

The bay is irregular in form, has an average diameter of about 6 miles, and is comparatively free from dangers. It forms the approach to Shelter Island Sound and the Peconic bays, is a favorite cruising-ground for yachts, and is sometimes used by naval practice ships. The adjacent waters have some trade.

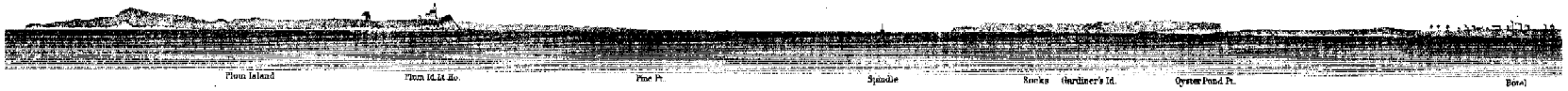
Gardiner's Bay is important as an anchorage for vessels bound into Long Island Sound and overtaken by unfavorable weather. It is one of the best natural harbors of refuge on the Atlantic seaboard, and has a depth of water suitable for vessels of the heaviest draught.

Entrances.—The approach to Gardiner's Bay from the eastward is through Block Island Sound and between Gardiner's and Plum islands; this entrance, leading in past the northern end of Gardiner's Island, has an unobstructed width of 1¾ miles, with a depth of 5½ to 21 fathoms.

There is a narrow, crooked and obstructed channel, partly buoyed, leading in to the southward of Gardiner's and Ram islands, but it is not used by strangers.

†Shown on Coast and Geodetic Survey chart 114 a. Shown also in part on chart 114 and in part on chart 115. See the foot-note on page 9.

Approaches to Plum Gut from the Eastward, Plum Island Lt. Ho. bearing N.N.W. ½ W. distant 2 Miles.



Approaches to Plum Gut from the Westward, Plum Island Lt. Ho. bearing E. S. E. ½ E. distant 2½ Miles.

Plum Gut, the entrance to Gardiner's Bay from Long Island Sound, is nearly ¾ mile wide and has sufficient water for large vessels, but there are several dangers and the tidal currents are very strong. It is not advisable for vessels drawing more than 15 feet to use this passage. On its eastern side is Plum Island Light-house.

Adjacent waters.—Shelter Island Sound, divided by Shelter Island into a northern and a southern part, is on the western side of Gardiner's Bay, and connects it with Little and Great Peconic bays. Orient Harbor, Greenport Harbor, Sag Harbor, and other waters having special names, are mentioned under the heading "Shelter Island Sound," and some of them under separate headings also.

Light-houses and other aids.—At night, in clear weather, a sufficient number of lights will be in sight to guide to an anchorage. It is not advisable for a stranger to attempt to enter Shelter Island Sound at night, although the entrances to the sound are marked by buoys and light-houses (see table, page 10).

Repairs.—Greenport has facilities for making ordinary repairs to the machinery of steamers, with well equipped ship-yards for repairs to hulls of vessels, and 6 marine railways, the largest capable of hauling out vessels of 1,000 tons. (See also "Fisher's Island Sound" and "Long Island Sound.")

The **Variation of the compass** in Gardiner's Bay for 1888 is 9° 55′ W., with an annual increase of about 3¼′.

Tides.—The mean rise and fall of tides in Gardiner's Bay is 2.7 feet, corrected establishment $9^h\ 30^m$; corrected establishment for Plum Gut $10^h\ 12^m$. For other tidal data see page 16.

Consult also pages 9–17.

SAILING DIRECTIONS, GARDINER'S BAY.

I. ***From the eastward.***—Directions for approaching through Block Island Sound are given in paragraphs A, pages 19–20 and 22–23.

If bound into Shelter Island Sound, or Little or Great Peconic Bay, see page 28, under the heading "Shelter Island Sound," etc. If seeking an anchorage for shelter—

(*a*) *Against westerly winds.*—When Gardiner's Island Light-house bears **S.** by **E.** ½ **E.**, distant ¾ mile to 1 mile, work over towards the western shore of the bay and anchor in about 5 fathoms water, bottom blue mud, with Gardiner's Island Light-house bearing between **E.** and **E.** by **N.**, and Plum Island Light-house bearing about **NE.** ¾ **N.**

Remarks.—The western shore for a distance of 3 miles to the southward of Oyster Pond Point should not be approached nearer than ¾ mile by vessels of 18 feet draught or over.

(*b*) *Against easterly winds.*—When Gardiner's Island Light-house bears **S.** by **E.** ½ **E.**, distant ¾ mile to 1 mile, haul to the southward. Pass about ⅜ mile to the westward of the light-house, and anchor in 4¼ fathoms water, soft bottom, with the light-house bearing about **N.** by **E.**, distant 1 to 1½ miles.

Remarks.—The shore in Bostwick's Bay, the bight south of Gardiner's Island Light-house, can be approached to within 500 yards in 3¾ fathoms water; but keep clear of Crow Shoal.

Crow Shoal makes out to the southwestward from the point south of Bostwick's Bay for a distance of 1¾ miles; it has from 6 to 17 feet over it, and is marked at its southwestern extremity by a buoy (spar, red and black horizontal stripes); 13 feet can be carried across the shoal midway between this buoy and the point.

For sailing directions through Gardiner's Bay to Greenport and beyond, see heading "Shelter Island Sound," etc.

For sailing directions through Gardiner's Bay to Sag Harbor, see heading "Sag Harbor."

II. ***From the westward, through Plum Gut.***—Owing to the strength of the tidal currents, this passage is often extremely difficult and at times is impracticable. Strangers should not use it unless the wind and tide are favorable. The following directions are available for vessels drawing 15 feet or less.

Steer for Plum Island Light-house on any course from **E.** ½ **S.**, through **S.**, to **S.** by **W.** Give the light-house a berth of at least ¼ mile and pass about midway between the light-house and Oyster Pond Reef beacon. Then steer for Gardiner's Island Light-house, bearing **SE.** ¾ **E.**, and leave the shore of Pine Point, the southernmost point of Plum Island, about 300 yards on the port hand.

When Little Gull Island Light-house shows clear of the southern end of Plum Island, bearing about **E NE.**, *if bound to Orient, Greenport, Southold, or into Little Peconic Bay,* turn to the southward and follow the directions of heading II of the "Sailing Directions for Shelter Island Sound," etc. (see pages 29–30).

If bound to Sag Harbor, follow the directions just given until past Oyster Pond Reef beacon, then bring Plum Island Light-house to bear **N.** by **E.** ¼ **E.**, and make good the course **S.** by **W.** ¼ **W.** for about 6¾ miles, until Cedar Island Light-house bears **SW.** by **W.** ¼ **W.**, when head for it and follow the directions for this course under the heading "Sag Harbor" (see page 32).

The ***Tidal currents*** in the Plum Gut are very strong; the velocity here at strength is as great as in the Race, but while the current there has very great force nearly all the time, the period of such marked strength is perhaps somewhat shorter in the Gut.

On the flood the current sets to the westward in Plum Gut directly on Oyster Pond Reef.

Remarks.—Approaching Plum Island, the large stone beacon surmounted by a spindle, near the end of Oyster Pond Reef, will be made to the southwestward of Plum Island Light-house, and Gardiner's Island Light-house will be made showing between Plum Island and Oyster Pond Point as Plum Island Light-house is approached. *Oyster Pond Point* will be distinguished from the westward as a low bare point with straggling trees at a distance from its end, and several houses and a large hotel backed by trees some distance to the right of the point. *Crow Head*, the high bluff on the western side of Gardiner's Island, will be seen showing between Plum Island and Oyster Pond Point.

Ram Head.—To a vessel which has entered Gardiner's Bay through Plum Gut, several prominent bluffs will show on the shore to the southwestward. Of these Ram Head is the nearest, and the smoothest in appearance and outline. When well within the bay another bare patch will be seen to the northward of it, somewhat similar in appearance but farther away.

Dangers.—**A Reef** with 6 to 10 feet of water over it makes off to the westward for about 150 yards from the northwestern point of Plum Island. About 75 yards **SW.** by **W.** from the point is Beebe Rock, with 8 feet of water. The reef causes a dangerous rip or overfall, and the point must be given a berth of not less than ¼ mile.

Oyster Pond Reef makes off to the eastward from Oyster Pond Point for a long distance, and has less than 4 feet at a distance of 800 yards from shore. About 750 yards from the shore, near the eastern edge of the reef, in 3 feet of water, is a circular granite structure surmounted by a spindle. Vessels drawing 10 feet should pass at least 125 yards to the eastward of the beacon; vessels drawing 15 feet should give it a berth of not less than 250 yards.

A Spot with 16 feet of water over it lies about 300 yards **NE.** of Oyster Pond Point Beacon. **A Spot** with 17 feet over it lies ½ mile **E SE. ¼ E.** from the beacon, and a little less than ½ mile from the shore of Plum Island. *There are several spots* with 19 feet over them on the south side of the channel, about ½ mile from the shore of Plum Island, between the beacon and the 17-foot spot. *There is also a spot* with 19 feet over it lying ¼ mile **S SW. ¾ W.** from Plum Island Light-house.

III. ***From Gardiner's Bay into Long Island Sound, through Plum Gut.***—Vessels bound into the sound, if they have anchored in Gardiner's Bay, find it a great saving in distance to go through the Gut. With a favorable strong breeze and flood current, vessels drawing 15 feet or less may pass through without danger by observing the following directions:

Pass about 300 yards south of the southern end of Pine Point, the southernmost point of Plum Island, and steer so as to pass about midway between Oyster Pond Reef Beacon and Plum Island Light-house.

Or, bring Plum Island Light-house to bear **N NE.**, and keep it on that bearing, taking care not to be set nearer than 500 yards to the beacon.

When the light-house is ⅜ mile distant ahead, bearing **N NE.**, steer more westerly so as to pass midway between it and the beacon.

The ***Tidal currents*** through Plum Gut are very strong; see heading II, foregoing.

On the flood, the current sets to the westward directly on Oyster Pond Reef.

On the ebb, vessels bound to the westward through Plum Gut, and acquainted with the locality, are often able to slip through by hugging the Oyster Pond Reef Beacon as closely as is safe and keeping in with the Long Island shore, when otherwise the passage would be impracticable for them.

Note the Remarks, etc., under heading II, foregoing.

SHELTER ISLAND SOUND, LITTLE AND GREAT PECONIC BAYS, AND PECONIC RIVER.†

These waters lie in the order mentioned, extending to the westward of Gardiner's Bay in a general **W SW.** direction about 22 miles, to Riverhead, which is the head of navigation on the Peconic River. At low water 20 feet can be carried through Shelter Island Sound and Little Peconic Bay, and as far as Robbins' Island at the entrance to Great Peconic Bay. Across the bar between Little and Great Peconic bays 13 feet can be carried at low water. When across this bar, a greater depth is found in Great Peconic Bay. Up to Jamesport, at the mouth of the Peconic River, 5 feet can be carried at low water; above this only small craft and lighters go as far as Riverhead. Above Greenport and Sag Harbor these waters are mostly navigated by small vessels only, carrying coal, lumber, building material, firewood, and produce, and by yachts,—Shelter Island being a prominent summer resort. In the summer several lines of small steamers ply between the different towns and villages on these waters and the ports in Long Island Sound, and New York. In the winter many of these vessels are laid up.

Principal waters, settlements, etc.—Shelter Island Sound is divided into a northern and a southern part by Shelter Island. On the arm to the northward are Orient Harbor, Greenport Harbor, Pipe's Cove, Derring's Harbor, and Southold Bay; on the southern arm are Sag Harbor and Noyack Bay.

†Shown on Coast and Geodetic Survey chart **115**. See the foot-note on page 9.

The more important places are Orient Harbor with Orient and East Marion (Rocky Point), Greenport Harbor and Greenport, Southold Bay and Southold, and Sag Harbor; these are mentioned more fully under separate headings.

Little Peconic Bay is about 5 miles long and is 3¾ miles wide at its widest part; on its northern side is Hog Neck Bay. To the westward of Hog Neck Bay, and separated from it by a long peninsula, is Cutchogue Harbor, on the western side of which is New Suffolk.

Great Peconic Bay, nearly circular in form and about 5 miles in diameter, is separated from Little Peconic Bay by Robbins' Island, which lies about midway between the north and the south shore, leaving a channel on its northern and southern sides; the passage to the northward is not practicable for strangers.

Peconic River, at the western end of Great Peconic Bay, is navigable for very small craft up as far as Riverhead, 4¼ miles above its mouth.

New Suffolk, on the western side of Cutchogue Harbor, in the western part of Little Peconic Bay, has a little trade in produce carried by small vessels. In summer a steamer stops here, communicating with Saybrook and New York. The entrance to this harbor is obstructed by flats, and strangers should not enter without a pilot.

Jamesport Harbor and the village of Jamesport are at the western part of Great Peconic Bay; they are on the north shore, opposite Southport. Jamesport has some coasting trade and also some vessels engaged in fishing. Strangers and vessels owned here are engaged in the carrying trade, which consists of cargoes of coal, wood, lumber, general merchandise, and fertilizers. Vessels of 8 to 9 feet draught go up as far as Jamesport. The least depth in the channel at mean low water is 5 feet, which depth is said to be increasing. The depth alongside the wharves at low water is 5 feet.

Southport is a small settlement on the south side of the entrance to the Peconic River, and has a little trade in firewood and produce. It is 1¼ miles south of Jamesport, and the same draught can be carried there as to Jamesport.

Flanders, 2½ miles to the westward of Southport and at the head of Reeves Bay (a shallow bight), has some trade in pine firewood, carried in small vessels owned in the vicinity.

Riverhead, on the Peconic River, is 4½ miles above Jamesport, and is at the head of navigation, but the deepest draught of vessels going there is 4½ feet at high tides. Vessels having cargoes for Riverhead unload at Jamesport, and the cargoes are sent up in lighters.

Channels.—Shelter Island Sound forms two channels leading from Gardiner's Bay into Little Peconic Bay. *The channel north of Shelter Island* has the best water and is the easiest to navigate, there being no shoals and flats except at the entrance and in the bights and coves. *The channel south of Shelter Island* is obstructed by a bar at its entrance having 14 feet at low water, and has numerous shoals, but up to Sag Harbor, along the most dangerous part, it is well buoyed and easily followed.

To the southwestward of Shelter Island these two channels unite and lead into Little Peconic Bay, through a passage about ½ mile wide between Great Hog Neck and Jessup's Neck. There is a good unobstructed channel through Little Peconic Bay, but it narrows when approaching the 13-foot bar south of Robbins' Island, where, at its narrowest part, it is a little over ¼ mile wide between the 12-foot curves. North of Robbins' Island are numerous shoals and shoal spots, making this channel into Great Peconic Bay unfit for a stranger unless of less than 6 feet draught. There is deeper water through Great Peconic Bay; shoals make out from the shores, but the middle of the bay is unobstructed. The channel into Peconic River narrows, and is only 200 yards wide, with a depth of 5 feet at low water; at Jamesport it widens again to the southwestward and forms a good anchorage for vessels that are able to come so far. Above Jamesport the channel is crooked and unfit for anything but vessels of very light draught.

Lights and other aids.—There are two light-houses, one at each entrance to Shelter Island Sound (see Table of Lights, page 10). For a stranger bound in at night they are good guides to an anchorage in Gardiner's Bay, but it is not advisable to proceed farther unless the buoys can be seen. The most dangerous shoals are buoyed (see System of Buoyage, page V).

Pilots can be found in Gardiner's Bay, or at Orient, Greenport, or Sag Harbor; they are generally fishermen or masters of small vessels trading in these waters. Pilotage is not compulsory for any vessels.

Vessels bound in by the northern arm of Shelter Island Sound and desiring a pilot can set signal and either stand off and on outside the Mid-channel buoy (see page 28) or anchor well to the southeastward of Long Beach Bar Light-house.

If bound to Sag Harbor, see "Pilots" under that heading.

Tow-boats are seldom used in these waters; the nearest point at which they can be found is New London, Conn.

Ice obstructs navigation above Greenport in winter, but to that place the channel is nearly always open.

The **Tidal currents** have considerable force wherever the channel is narrowed; at some such places there are sand-spits making out shoal, with a strong tidal current setting across.

Additional information of a general nature will be found on pages 9–17; see also pages 24–25.

Sailing directions will be given here for the northern arm of Shelter Island Sound, the more important branch, and the one generally used by vessels bound through. For the southern arm, see directions on page 32 under the separate heading "Sag Harbor."

SAILING DIRECTIONS, SHELTER ISLAND SOUND, ETC., PASSING NORTH OF SHELTER ISLAND.

I. FROM THE EASTWARD, ENTERING GARDINER'S BAY BETWEEN GARDINER'S AND PLUM ISLANDS.

Directions for approaching Gardiner's Bay from the eastward are given in paragraphs A, pages 19–20 and 22–23; see also page 25. The following directions are available for vessels drawing 12 feet or less.

1. ***Up to the Mid-channel buoy.***—Round Gardiner's Island Light-house, leaving it about ¾ mile distant on the port hand. Bring this light-house to bear **E NE.** ½ **E.** and steer **W SW.** ½ **W.**, keeping the bearing; this should lead up to the Mid-channel buoy. The depth should not be less than 22 feet.

Remarks.—The **W SW.** ½ **W.** course across Gardiner's Bay is free from dangers. On this course Shelter Island will be directly ahead, and Ram Head, a prominent bluff on the island (see page 26), should be made a little on the port bow; well to the southward Cedar Island Light-house may be picked up. Long Beach Bar Light-house will be made on the starboard bow, and Plum Island Light-house will be left on the starboard hand. The channel buoy should be made ahead.

Mid-channel buoy (spar, black and white perpendicular stripes) marks the entrance to the northern arm of Shelter Island Sound. From this buoy, when in position, Gardiner's Island Light-house bears **E NE.** ½ **E. Easterly**, distant 5⅞ miles; Long Beach Bar Light-house **NW.** by **W.** ¾ **W.**, distant 2⅛ miles. There are shoals (14 feet and 16 feet) about ¼ mile to the northward and about the same distance to the southwestward of this buoy.

2. ***Mid-channel buoy to Long Beach Bar Light-house.***—Pass the Mid-channel buoy close-to on either hand and steer **W NW.** ⅝ **W.**, with the buoy right astern, and keeping the end of Hay Beach Point (the north end of Shelter Island) a little on the starboard bow.

When on the line of Long Beach Bar Light-house, on the starboard hand, and Ram Head on the port, the light-house will bear **N NW.** ¼ **W.** and Ram Head **S SE.** ¼ **E.**; the depth should be 7 to 10 fathoms. The **W NW.** ⅝ **W.** course will now be continued for only about ¼ mile farther, through a somewhat narrow channel.

When Long Beach Bar Light-house bears **N.**, distant a little over ⅜ mile, change the course to **N NW.** ¾ **W.**, keeping the seaward end of Ram Head bluff directly astern on this course; a small steeple in East Marion (Rocky Point) will be nearly ahead. The channel here is narrow. Keep the lead going. If in doubt, work across the channel from side to side, hauling into the deeper water whenever the water shoals to 18 or 20 feet.

The **N NW.** ¾ **W.** course should lead a little less than ¼ mile to the westward of Long Beach Bar Light-house.

Now, if bound to Orient Harbor, proceed as directed under that heading.

The ***Tidal currents*** have considerable force at times, but generally follow the channel.

Remarks.—On the **W NW.** ⅝ **W.** course, the trees on the northern end of Hay Beach Point will be ahead; on Long Beach, to the northeastward of Long Beach Bar Light-house, is a large and prominent fish factory. To the northwestward of the light-house, on the more distant northern shore, is the village of East Marion (Rocky Point). On getting well in, Orient will open to the westward of Long Beach Point. Just to the westward of Orient is a round bare hill, on the top of which is (in 1887) a large square house. When the course is changed from **W NW.** ⅝ **W.** to **N NW.** ¾ **W.** this house shows nearly in range with Long Beach Bar Light-house.

The **Channel** narrows as the **W NW.** ⅝ **W.** course is followed, and near the turning-point and on the **N NW.** ¾ **W.** course, the shoaling is abrupt to 12 feet on either side; inside this depth the shoaling is more gradual.

Long Beach Shoal, left on the starboard hand, is an extensive shoal, irregular in shape, making out from Long Beach. Its western side is marked by Long Beach Bar Light-house, from which its edge stretches to the southward for nearly ½ mile, then turns to the eastward.

To the southeastward from Long Beach Point this shoal extends 1⅛ miles, here shoaling gradually inside of 18 feet. On the southern and western edges the shoaling is abrupt to 12 feet, and gradual inshore of this over large flats. The portion of these flats adjacent to Long Beach Point is also known as *Long Beach Point Shoal.*

Extensive flats, left on the port hand, make off from Ram Head and between this and Hay Beach Point. The depth of 6 feet is found ¼ to ⅓ mile off shore; 12 feet, ⅜ to ⅞ mile off shore.

Hay Beach Point Flats, the northern part of the shoal ground just mentioned, have from 6 to 16 feet of water and are marked by a buoy at their northeastern end (spar, black, No. 1), about ½ mile **W.** ⅛ **N.** from Long Beach Bar Light-house. For about 1 mile to the southeastward of this buoy the shoal is quite abrupt.

3. ***Long Beach Bar Light-house to Greenport.***—Passing a little less than ¼ mile to the westward of Long Beach Bar Light-house, round Hay Beach Point Flats buoy (spar, black, No. 1), leaving the buoy about 200 yards on the port hand. Now steer about **W.** ⅜ **N.**, passing about 350 yards to the northward of Hay Beach Point, which has good water on its northern side; when this point is abeam, steer about **SW.** by **W.** past the end of Greenport breakwater.

If intending to anchor off Greenport, come to in from 18 to 30 feet of water, between the Railroad wharf and the breakwater (see "Off Greenport" on this page).

If bound farther up the sound, proceed as directed in paragraph 4, following.

Remarks.—When past the light-house, Greenport breakwater, with Greenport just beyond, will open gradually to the northward of Hay Beach Point.

A Shoal with from 7 to 12 feet over it, left on the starboard hand, makes to the eastward from Cleaves' Point, on the western side of the entrance to Orient Harbor. The southeastern point of the shoal has 12 feet of water and is about ½ mile **NW.** from Long Beach Bar Light-house.

Sheephead Rocks, marked by a buoy (spar, red, No. 2), have 3 feet of water over them and lie off Cleaves' Point, opposite Hay Beach Point.

Greenport Flats are to the southeastward of Joshua's (Young's) Point, at the eastern end of Greenport; here is the breakwater extending (in 1887) nearly to the 18-foot curve. A buoy (spar, red, No. 4) is placed off the end of the breakwater.

Off Greenport the water shoals abruptly inside the depth of 24 feet. There is a deep hole, with 12 fathoms, 450 yards **E. ¾ S.** from the Railroad wharf.

4. ***Greenport to Little Peconic Bay.***—After passing Greenport breakwater shape the course to pass to the southward of Fanning's Point (the next point on the north shore to the westward of Greenport) and to the southward of the buoy (spar, red, No. 6) off this point.

Then keep a mid-sound course, following the trend of the south shore and passing Conkling's Point on the north shore and Rocky Point (the northwestern point of Shelter Island) on the south shore; give Rocky Point a berth of nearly ¼ mile on the port hand. To the westward of Rocky Point, and making into the opposite shore, is Southold Bay (see page 31), with the village of Southold on its western side.

Rounding Rocky Point, the course turns more to the southward, and Hallock's Point, marked by a buoy (spar, red, No. 8), will be ahead or a little on the starboard bow. Pass midway between Hallock's Point and the western shore of Shelter Island, and steer **S.** for ¾ mile; then steer **SW. ¾ S.**, with Jessup's Neck (sand-spit, long, low, narrow, backed by trees) on the port bow; off the northern end of Jessup's Neck is Jessup's Neck Shoal buoy (spar, black, No. 3). Noyack Bay (see page 31) lies to the eastward of Jessup's Neck, Little Peconic Bay to the westward.

Now, if bound into Noyack Bay, proceed as directed under that heading.

To stand on into Little Peconic Bay, pass about 150 yards to the northward of Jessup's Neck Shoal buoy, and proceed as directed in paragraph 5, following.

5. ***Through Little Peconic Bay.***—Passing 150 yards to the northward of Jessup's Neck Shoal buoy (spar, black, No. 3), steer **SW. ½ S.**, passing a little more than ¼ mile to the southward of Great Hog Neck Shoal buoy (spar, red, No. 10), and when past this buoy make good the course **SW. ¼ W.** for about 5 miles, through Little Peconic Bay; this course leads a little more than ¼ mile to the southward of Little Hog Neck Shoal buoy (spar, red, No. 12) and about the same distance to the northward of Cow Neck Flat buoy (spar, black, No. 5), and nearly ¼ mile to the southward of Robbins' Island.

6. ***Through Great Peconic Bay.***—In crossing the 13-foot bar which lies between Little and Great Peconic bays, stretching from Robbins' Island to the south shore, pass about ¼ mile to the northward of Cow Neck Flat buoy (spar, black, No. 5) and nearly the same distance to the southward of Robbins' Island, course about **SW. ¼ W.** The channel between the 12-foot curves is here only about ¼ mile wide.

Passing the south point of Robbins' Island thus, a mid-channel buoy (spar, black and white perpendicular stripes) should be made a little on the starboard bow. Steer for this buoy and pass it on either hand. Then steer **W. ½ S.** for about 3¼ miles and anchor at discretion about ½ mile to the southward of Aquebogue Flat buoy (spar, red, No. 14); you will then be a little more then 1½ miles to the eastward of the mouth of the Peconic River. *If bound into the river,* take a pilot if one has not already been taken in Gardiner's Bay, or at Orient, or at Greenport.

II. FROM THE WESTWARD, ENTERING GARDINER'S BAY THROUGH PLUM GUT.

Directions for Plum Gut are given on pages 25–26.

When through the Gut, bring Plum Island Light-house to bear **N NE. ¼ E.**, and steer **S SW. ¼ W.** for a little over 4 miles.

When Gardiner's Island Light-house bears **E NE. ½ E.**, the Mid-channel buoy marking the entrance to the northern arm of Shelter Island Sound (spar, black and white perpendicular stripes) should bear **W SW. ½ W.**, distant about 1¼ miles. Now steer for this buoy and follow the directions of paragraph 2, page 28.

Remarks.—On the **S SW. ¼ W.** course Cedar Island Light-house will be ahead, but may not be readily distinguished. Ram Head (see page 26) will be on the starboard bow. Long Beach Bar Light-house will be opened out broad off the starboard bow. The large fish factory on Long Beach is a conspicuous object.

ORIENT HARBOR.

This is a well-sheltered harbor north of Shelter Island and just inside of Shelter Island Sound, affording excellent anchorage for vessels up to 15 feet draught. It is seldom used except by vessels trading to Orient. The entrance is obstructed by flats which contract the channel to a width of ¼ mile. Strangers should not attempt to enter with vessels drawing more than 10 feet.

Orient, a village of little commercial importance, is at the northeastern end of the harbor, and has 7 feet of water at the end of the wharf at low water. The principal trade is in produce and fertilizers, shipped from Orient and from the large fish works to the southeastward of the village.

East Marion (Rocky Point), a small village on western shore of the harbor, is of no commercial importance. Pilots for Shelter Island Sound and the Peconic bays are sometimes found here.

Provisions and ship-chandler's stores can be obtained in Orient. **Greenport**, 4 miles to the westward of Orient, is the nearest place for railroad communication, or for repairs to vessels or to machinery. **Steamers** to Saybrook and New York touch at Orient during the season.

Strangers bound to Orient are advised to take a pilot in Gardiner's Bay (see page 27).

SAILING DIRECTIONS, ORIENT HARBOR.

Directions for approaching are given in paragraphs 1–2, page 28. The following directions are available for vessels drawing 10 feet or less. On the **N NW. ¾ W.** course of paragraph 2, page 28, pass a little less than ¼ mile to the westward of Long Beach Bar Light-house and then steer about **N.**, edging a little to the eastward. When about ¼ mile past the light-house keep more to the eastward until it bears **S. ½ E.**, when steer **N. ½ W.** and anchor in about 15 feet (low water), soft bottom, with the beach distant a little more than ¼ mile.

Remarks.—Prominent features are mentioned on pages 28–29. *Long Beach Point Shoal*, left on the starboard hand, is described on page 28. *A Shoal* with 7 to 12 feet over it makes off to the eastward from Cleaves' Point and is left on the port hand; it is described on page 29.

GREENPORT HARBOR.

Greenport Harbor, in Shelter Island Sound, is just to the westward of Orient Harbor. The entrance is between Cleaves' Point on the north and Hay Beach Point, the northernmost point of Shelter Island, on the south. The U. S. Engineers have constructed a breakwater, which, in 1887, extended 1,325 feet in a southeasterly direction from Joshua's (Young's) Point; this breakwater is to be built out to the 18-foot curve, to afford a sheltered anchorage.

During heavy easterly gales, with spring tides, the breakwater is submerged, and vessels lying alongside the eastern side of wharves are moved to the western side to prevent chafing.

Greenport is a flourishing town on the northern side of the harbor, having extensive fishing interests and a large coasting trade; it is also engaged in shipbuilding to some extent. The carrying trade employs a considerable number of vessels, some transient and some owned in the vicinity. Greenport is the terminus of the Long Island Railroad. During the summer steamboats run to New London, Hartford, Saybrook, New York, and Montauk.

The **Least water** in the channel at mean low water is 21 feet. The deepest draught of vessels entering Greenport Harbor is 15 feet and the usual draught not more than 12 feet. The depth of water alongside wharves at mean low water is from 7 to 20 feet, there being three wharves,—Main street wharf, 20 feet; Railroad wharf, 8 feet; and Union wharf, 7 feet.

Pilots can be obtained in Gardiner's Bay. Strangers usually take one, but not always. There are no regular pilots. The piloting is generally done by fishermen or by masters of small vessels trading in these waters. Vessels desiring a pilot, and not having found one in Gardiner's Bay, can anchor outside of Long Beach Bar Light-house, near the Mid-channel entrance buoy, with signal flying, when one will come on board.

Tow-boats are rarely used, but they can be obtained from New London, Conn.

Anchorage, etc.—The usual and best anchorage is between Union and Railroad wharves. Vessels up to 1,000 tons anchor in this harbor. There are no harbor regulations or harbor dues. The custom-house landing and public landing are at Main street wharf.

Supplies.—Anthracite coal in limited quantity for steamers, and water, can be obtained alongside wharves. Provisions and ship-chandler's stores can be obtained in Greenport.

Marine railways are six in number; there is one capable of hauling out vessels up to 1,000 tons. The charges for hauling out are 12 to 15 cents per ton. Ordinary repairs to machinery can be made.

The **Tidal currents** follow the general direction of the channel (see page 27).

Ice.—During the winter months there is some drift ice at Greenport, but not sufficient to interfere with navigation.

Tides.—The mean rise and fall of tides is **2.6** feet; corrected establishment 10^h 05^m.

Consult also pages 9–17, 24–25, and 26–27.

Sailing Directions are given on pages 28–29; see also heading II, pages 25–26.

SOUTHOLD BAY.

Southold Bay and the village of Southold are in a bight at the northwestern part of Shelter Island Sound, opposite Rocky Point, the northwestern end of Shelter Island. Great Hog Neck separates Southold Bay, on the southward, from Little Peconic Bay, narrowing this end of Shelter Island Sound to a width of ⅜ mile. The waterborne trade of Southold consists of general merchandise, employing 150 to 200 vessels each year. The deepest draught of vessels entering Southold Bay is 10 to 14 feet. There is 8 feet of water alongside the wharves at mean low water.

Southold is on the line of the Long Island Railroad, and has steamboat communication with Saybrook and New York in the summer.

Pilots are usually taken by strangers (see page 27). **Tow-boats** are not much used (see page 27).

The **best anchorage** is about ½ mile to the eastward of the wharves.

Ice obstructs navigation during the winter.

DIRECTIONS FOR ANCHORING IN SOUTHOLD BAY.

Directions for approaching are given on pages 28–29; see also heading II, pages 29–30.

Rounding Rocky Point, giving it a berth of 400 yards, steer **SW. ½ S.** until the wharves in Southold bear about **W.** by **N.**; then haul over for the wharves and anchor when they are about ½ mile distant.

Remarks.—The shore for over a mile to the northeastward of the wharves at Southold should not be approached nearer than ⅜ mile, as shoal water extends out that distance and deepens very abruptly. The western part of the bay is also shoal, and strangers seeking anchorage should use the lead, and anchor when the water shoals to 18 feet,—the wharves bearing to the northward of **W.**

NOYACK BAY.

This bay lies to the southward of the western end of Shelter Island, between Hog Neck on the east and Jessup's Neck on the west. It makes in about 2¼ miles and the width is about the same; the average depth is about 21 feet. This bay is of no importance except for the beds of clams and scollops which are found in it. Shoals extend out from the shore about ½ mile all around the bay, but on the eastern side, ¾ mile to the southward of the northwestern point of Hog Neck, the shore can be approached to within 400 yards.

GENERAL DIRECTIONS, NOYACK BAY.

From the eastward.—Give the northwestern point of Hog Neck a berth of 600 yards, and steer **S SW.** Anchor at least ½ mile from the beach.

From the northward or from the westward.—Pass 600 yards to the eastward of the buoy (spar, black, No. 3) off Jessup's Neck, and steer **SE.** Anchor at least ½ mile from the beach.

SAG HARBOR.

Sag Harbor is south of Shelter Island and about 3 miles southwest from Cedar Island Light-house. It lies on the southwestern side of the bight included between Cedar Point on the east and Hog Neck on the west, which is full of shoals, but has a narrow channel, well buoyed from the eastward as far as Sag Harbor, and leading to Sag Harbor and the Peconic bays.

Sag Harbor is a town which had formerly large whaling interests, but is now of little commercial importance; about 200 vessels, mostly small, are engaged in the carrying trade, which comprises cargoes of coal, lumber, building material, grain, and produce, the latter being generally carried in summer by steamers.

Sag Harbor is the terminus of a division of the Long Island Railroad; in summer it has steamboat communication with New London, Hartford, Saybrook, and New York.

The deepest draught of vessels entering Sag Harbor is 13 feet, the usual draught is 9 to 10 feet; 8 to 12 feet can be taken alongside the wharf. The shoalest water is on the bar, about ⅜ mile to the northward of the wharf,—10 feet at low water.

Pilots.—A pilot can be taken at Cedar Island Light-house; or come to anchor in Northeast Harbor and one will come from Sag Harbor in answer to signal. There are no regular pilots.

Tow-boats are rarely used; the nearest place at which they can be found is New London. Fishing steamers sometimes do towing.

Anchorage.—The usual anchorage for vessels bound to Sag Harbor is in Northeast Harbor, to the southward and westward of Cedar Island Light-house, between it and Mashomuck Point; the depth is 15 feet to 6½ fathoms, bottom sand and mud. Small craft can find snug shelter here in northerly gales with Cedar Island Light-house bearing **N.** ¾ **E.** With strong northerly winds it is not advisable for any vessel to anchor out in mid-channel between the light-house and Mashomuck Point, as there will be a rough sea at such times on the ebb. In the eastern part of this harbor flats rise rather abruptly (see "West Harbor Flats," this page). By conforming to the directions given below vessels can anchor out of the strength of the current and at the same time keep clear of these flats.

Supplies.—Anthracite coal in limited quantity for steamers, and fresh water through pipe and hose, can be had alongside the wharf. Provisions and ship-chandler's stores can be obtained at Sag Harbor.

Harbor regulations are not in force, but vessels are docked by a wharf-master.

Tides.—The mean rise and fall of tides is 2.3 feet; corrected establishment $10^h\ 08^m$.

The **Tidal currents** are strong at full and change; they follow the general direction of the channel.

Ice obstructs navigation in the winter.

Consult also pages 9–17, 24–25, and 26–27.

SAILING DIRECTIONS, SAG HARBOR.

I. ***From the eastward, entering Gardiner's Bay between Gardiner's Island and Plum Island.***—Directions for approaching Gardiner's Bay entrance are given in paragraphs A, pages 19–20 and 22–23; see also heading II, pages 25–26.

The following directions are available for vessels drawing 11 feet or less. Vessels of heavier draught should anchor outside the outer buoys off Cedar Island Light-house and take a pilot.

Rounding Gardiner's Island Light-house, leaving it about ¾ mile on the port hand, bring this light-house to bear **NE.** ⅜ **E.** astern and steer **SW.** ⅜ **W.**, keeping the bearing. On this course Cedar Island Light-house should be made ahead.

Having made good about 4 miles on the **SW.** ⅜ **W.** course, edge to the southward, bringing Cedar Island Light-house to bear **SW.** by **W.** ¼ **W.**, and stand for it on this bearing until up to Outer Bar buoy (spar, red, No. 2). From this buoy the course is **W SW.** ⅛ **W.**, crossing a 14-foot bar and leaving on the port hand a danger buoy (spar, red and black horizontal stripes), well to the southward of the course, and the two Cedar Point Shoal buoys (both spars, both black, No. 1 and No. 3).

Continue the **W SW.** ⅛ **W.** course, passing about 300 yards to the northward of Cedar Island Light-house. Round this light-house, and when past it anchor in Northeast Harbor in 15 to 25 feet of water, soft bottom, with the light-house bearing between **N.** ¾ **E.** and **N NE.**, and distant about ¼ mile (see "Anchorage" above on this page). Here take a pilot if bound farther up.

Or, desiring to stand farther up without a pilot, when past Cedar Island Light-house steer about **S.** by **W.** until up with Mashomuck Point (the next one passed on the starboard hand), and beyond this be guided by the chart, the buoys, and the lead.

Remarks.—On the **SW.** ⅜ **W.** course, with Cedar Island Light-house ahead, Ram Head, a prominent bare bluff (see page 26), will be well on the starboard bow; Long Beach Bar Light-house is to the northwestward of it. A little on the port bow will be several sand bluffs showing bare faces. A large fish factory and two high chimneys will be seen on Cedar Point. *Crow Shoal* (see page 25) will be left a good distance on the port hand.

A Shoal with from 7 to 15 feet of water extends from Ram Island in a southeasterly direction to the shore east of Cedar Point. The northern end of this shoal is called *Ram Island Flats;* the part across which the channel leads is called *Sag Harbor Bar*, good for 14 feet of water; *Outer Bar buoy* (spar, red, No. 2) is placed as a guide for this bar.

Dangerous Rock buoy (spar, red and black horizontal stripes), well to the southward of the course, marks a rock about ¼ mile from shore.

Cedar Point Shoal extends about ⅝ mile to the northward of Cedar Point. It is marked by two buoys (both spars, both black, No. 1 and No. 3), both left on the port hand.

Nichol's Point Shoal extends about ½ mile to the eastward of Nichol's Point (the next prominent point to the southward of Ram Head). It is marked by a buoy (spar, red, No. 4) placed about ¼ mile from shore, to the eastward of some sunken rocks; this buoy, left well on the starboard hand, is ⅛ mile **N.** by **W.** ½ **W.** from Cedar Island Light-house.

Single Rock, marked by a buoy (spar, red, No. 6), lies ½ mile **W.** by **S.** from Cedar Island Light-house, and has 3 feet over it; the water is shoal to the westward of this buoy.

West Harbor Flats extend from the eastern shore to the line of Cedar Island Light-house and the black buoys to the southward of the light-house; over the greater part of the flats the depth is less than 6 feet.

Beyond this the channel is narrow, but well marked by buoys as far as Sag Harbor.

II. ***Having entered Gardiner's Bay through Plum Gut,*** follow the directions given on page 25 (heading II) until Cedar Island Light-house bears **SW.** by **W.** ½ **W.** and then follow the directions just given, for proceeding after bringing the light-house on that bearing.

FISHER'S ISLAND SOUND†

is at the northeastern end of Long Island Sound, and lies between the mainland of Connecticut and Fisher's Island. It is a little over seven miles long and forms one of the passages into Long Island Sound. Strangers should not use this passage at night; if drawing more than 10 feet they should not use it at any time except with a fair wind. The directions given hereafter under this heading will serve for vessels of as much as 15 feet draught, with favorable winds.

The **Prominent landmarks** in approaching from the eastward are Watch Hill, a high bare bluff, with several large hotels and summer houses back a little from its edge, and Watch Hill Light-house, standing on the low point to the southward of the bluff; Fisher's Island, a hilly island, bare of trees, lying to the westward and southward of Watch Hill. Chocomount, on Fisher's Island, 136 feet high, 1 mile from its eastern end, is the highest land in this vicinity (see view).

The **Channels** to enter Fisher's Island Sound from the eastward lead between the ledges and rocks which extend in a broken line from Watch Hill to East Point, the eastern point of Fisher's Island.

Watch Hill Passage is between Watch Hill Light-house and Watch Hill Reef. This is the best passage for vessels coming from the eastward and is the one generally used; it is good for 17 feet of water at mean low water and is better marked than the others; near the middle of the passage is a 12-foot rock, but this is easily avoided.

Next to the westward is *Sugar Reef Passage*, between Watch Hill Reef and Sugar Reef. This passage is ¼ mile wide and has a least depth of 21 feet. The tidal currents set with strength directly on the reefs in this passage. Between Sugar Reef and the Catumb Rocks is the *Catumb Passage*, 250 yards wide, with a least depth of 20 feet. The tidal currents make this channel dangerous.

Lord's Passage lies between East Spindle and Wicopesset Rock; it is ¼ mile wide and has a least depth of 20 feet. The tidal currents here run more in the general direction of the channel, and if the eastern end of Stonington southeast breakwater can be seen to steer for, the dangers can be avoided.

Wicopesset Passage lies between Wicopesset Island and East Point. This channel is quite narrow and has a least depth of 13 feet. The tidal currents set in the direction of the channel.

Lights and other aids.—There are several lights to serve as guides through the sound at night (see Table of Lights, page 10), but strangers are advised not to run through unless the buoys can be seen readily. All the important dangers are marked by buoys or spindles. The buoyage is on the system adopted for U. S. waters (see page V).

Little Narragansett Bay, a shallow bay at the eastern end of Fisher's Island Sound, is about 1¾ miles long and nearly 1 mile wide at its narrowest part. It has a dredged channel 200 feet wide and 7½ feet deep, leading to the mouth of Pawcatuck River, at the eastern end of the bay, and to Watch Hill landing, in the southeastern end of the bay. **Westerly**, a town 4½ miles above the mouth of the Pawcatuck River, has considerable trade in coal and lumber. It is approached by a channel which is being dredged under government appropriation to a depth of 8 feet at mean low water, with a width of 100 feet. In 1887 vessels of 8 feet draught could go up to Westerly on a high tide. These waters are only navigated by vessels of light draught. Vessels with cargoes for Westerly sometimes stop at the village of **Lottery**, on the east bank of the river and about 2½ miles below Westerly, and discharge the cargoes into lighters, which are then taken up to Westerly. Cargoes for Westerly are sometimes discharged at Stonington and lightered from there. Strangers should take a pilot, and if bound to Westerly a tow-boat is required. A pilot or a tug may be had at Stonington. Navigation in Little Narragansett Bay is closed by ice during the winter.

Stonington Harbor lies in the northeastern part of the sound. A breakwater ⅝ mile long, off the entrance of the harbor, is intended to afford a sheltered anchorage for vessels of 18 feet draught. It is not completed and does not yet (1887) fully meet the requirements.

Mystic River has a crooked, narrow channel, which should not be attempted by strangers.

East Harbor, **Chocomount Cove**, and **West Harbor** are the names of three indentations, given in order from the eastward, in the north shore of Fisher's Island. They are sometimes used as anchorages for small craft owned in the vicinity, but as the holding-ground is not good and the approaches to the two latter lead over foul ground, it is not advisable for strangers to use them. Vessels bound in to load at the brick-yards at West Harbor should take a pilot.

Repairs.—Noank, on Mystic River, has 4 marine railways, the largest capable of hauling out vessels of 2,000 tons; also well equipped ship-yards, at which vessels are repaired. The nearest place for extensive repairs to machinery of steamers is New London (see heading "Long Island Sound").

Quarantine is regulated by the state law of Connecticut; local boards of health have power to make sanitary regulations for their ports (see heading "Stonington Harbor"; also Appendix II).

Wind-signals are shown from a flag-staff close to the light-house on Stonington Point, this being one of the stations named in the list on page 16 (see also Appendix III).

Consult also pages 9–17 for information concerning light-houses, life-saving stations, variation of the compass, tides, fogs, etc.

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†Shown on Coast and Geodetic Survey chart No. **358**, Fisher's Island Sound, scale $\frac{1}{40,000}$, or 1 mile = 1.824 inches, price $0.20. Shown also on charts **114** and **114 a**. See the foot-note on page 9.

TIDAL CURRENTS IN FISHER'S ISLAND SOUND.

In the Watch Hill Passage the current of flood sets nearly in the direction of the channel, though with a slight tendency to the northward, while the ebb shows the same tendency to the southward. Neither current will materially affect the sailing courses.

South of the Eel-Grass Ground the current of flood has a tendency to the southward of **W.**, while the ebb runs nearly due **E.**,—the average velocity being but little over a mile an hour.

Off Groton Long Point the flood sets nearly **W.**, while the ebb has a tendency to the southward of **E.**,—the latter having a velocity of nearly a mile and a half.

In the Main channel, to the northward of Wicopesset, the flood runs about **NW. ¾ W.** and the ebb nearly **SE. ¾ E.**, with a velocity of two miles an hour.

Off East Harbor the flood runs **W. ¾ S.** and the ebb **E. ¾ N.**, while between Horse-Shoe and Sea-Flower reefs the flood runs nearly **W NW.** and the ebb **E SE.**, with a velocity of two miles an hour.

In the Catumb and Sugar Reef passages the tidal current sets obliquely across the axes of the channels; and these passages should, therefore, not be attempted by strangers.

The following table will show the set and drift of the current at those positions in the sound where observations have been made by the Coast Survey:

TABLE.

No.	Station.	Second Quarter.		Third Quarter.		Flood or Ebb.
		Set.	Drift.	Set.	Drift.	
1	Between Gangway Rock and Sugar Reef	W NW. ¾ W.	1.17	W NW.	1.20	Flood.
		E SE. ¾ E.	1.25	E SE. ¾ E.	1.10	Ebb.
2	Near Eel-Grass Ground	W. ¾ S.	1.22	W SW. ¾ W.	1.12	Flood.
		E. ½ N. Northerly	1.05	E. ½ N. Northerly	1.25	Ebb.
3	Off Groton Long Point	W. ¼ N.	1.18	W.	1.22	Flood.
		SE. by E. ¾ E.	1.11	E SE. ¼ E.	1.43	Ebb.

SAILING DIRECTIONS, FISHER'S ISLAND SOUND.

I. ENTERING BY WATCH HILL PASSAGE.

Watch Hill Passage has on its northern side Watch Hill Light-house and Gangway Rock buoy (spar, red, No. 2); on its southern side are Watch Hill Reef spindle and a black bell-buoy. Between Gangway Rock buoy and the bell-buoy are several rocky heads (least depth 12 feet at mean low water); to avoid these rocks vessels pass close to the southward of Gangway Rock buoy, or close to the northward of the bell-buoy, never attempting to pass south of the latter in using this channel.

Of the rocks in the channel, those having the least water over them, 12 to 16 feet, are rather to the southward of a mid-channel line, being nearer to the bell-buoy than to the Gangway Rock buoy.

Refer to pages 10–11 for descriptions of light-houses, page 14 for bearings and distances. With a favorable wind the following directions are available for vessels drawing as much as 15 feet.

1. ***Approaching from the eastward or southward.***—Steer for Watch Hill Light-house on any bearing from **W.** to **N. ½ W.**; so continue until the light-house is ¾ mile distant, then steer for Gangway Rock buoy (spar, red, No. 2), ¼ mile to the southward of Watch Hill Light-house.

Remarks.—Prominent objects are mentioned on page 33. Nearing the entrance, the spindles marking some of the reefs lying between Watch Hill and Fisher's Island will be seen.

2. ***Gangway Rock buoy to Ram Island Reef Light-vessel.***—Leaving Gangway Rock buoy close-to on the starboard hand, steer **W NW. ⅞ W.** for Ram Island Reef Light-vessel, 5¼ miles distant, keeping the bearing.

Napatree Point Ledge buoy (can,* red, No. 4) should be right ahead, 1⅜ miles distant; pass 75 yards south of this buoy.

Continue the **W NW. ⅞ W.** course for the light-vessel, allowing as necessary for tidal current; the course leads south of the spar-buoy (red and black horizontal stripes) on the east end of Latimer's Reef and leads north of the spar-buoy (red and black horizontal stripes) on the 13-foot spot, about ½ mile north of the eastern end of Fisher's Island; leave the latter buoy 50 to 200 yards on the port beam.

* Spar-buoy in winter. See the note on page V.

View of Approaches to Fisher's Id. Sound from the Eastward alongshore, Light House on Watch Hill bearing W. ½ N, distant 2¾ Miles.

View of Approaches to Fisher's Id. Sound from the Eastward, Watch Hill Lt. Ho. bearing N.NW, distant 3¼ Miles.

View of Approaches to Fisher's Id. Sound from the Westward, Race Rock bearing E. by S. ¼ S, distant 5¾ Miles.

Latimer's Reef Light-house will be left about ¼ mile on the starboard beam.

When up with the light-vessel pass to the southward of it.

Tidal currents.—*Between Napatree Point and Latimer's Reef* the ebb current sets to the southward and the flood current to the northward, both directly across the sailing line. Make allowance for this. *To the westward of Latimer's Reef* the tidal currents do not affect the sailing line to so great an extent.

Just to the westward of Latimer's Reef, vessels becalmed and finding that they are drifting down on the reef, should not attempt to tow to the southward, but should go to the northward of the light-house, as the ebb current sets to the northward and eastward on the western side of the reef.

Remarks.—When passing Gangway Rock buoy, Ram Island Reef Light-vessel should be made ahead, with Latimer's Reef Light-house a little on the starboard bow, and open to the northward of the latter are the large hotel on the southern end of Ram Island, and the houses of Noank. Directly ahead, off Napatree Point, is Napatree Point Ledge buoy. Broad off the starboard bow, across Napatree Point, is Stonington. On the port bow are the spindles marking the broken line of reefs and rocks lying between Watch Hill and the eastern end of Fisher's Island (the latter showing hilly appearance).

Approaching Latimer's Reef, North Dumpling Light-house will be seen on the port bow.

Gangway Rock, left on the starboard hand, is about ¼ mile south of Watch Hill Point, has 3 feet of water over it, and is marked by a buoy (spar, red, No. 2) placed in 13 feet of water, ¼ mile to the southward of the rock. **A 17-foot Spot** lies about 120 yards **S SW.** from the buoy; the draft of most vessels using this passage does not require them to pay any attention to it; to avoid it pass but 50 to 100 yards to the southward of the red buoy.

Watch Hill Reef, left on the port hand, marked by a black iron spindle with square cage, placed on a rock bare at low water, lies about ⅝ mile **SW.** by **S.** from Watch Hill Light-house. The reef extends a short distance to the eastward from the spindle. To the northeastward of the spindle, a little to the southward of a mid-channel line, are detached spots with 12 to 16 feet over them. Between these and the reef is a deep but narrow channel, marked by a black bell-buoy. Never attempt to pass to the southward of the bell-buoy.

The line of reefs and rocks which, with narrow passages between them, extends from Watch Hill to Fisher's Island, includes Gangway Rock and Watch Hill Reef, just described. To the westward of the latter are the following, all of which will be left on the port hand: *Sugar Reef,* 2 to 11½ feet of water, black iron spindle, cone cage;† *Catumb Rocks,* ½ foot to 18 feet of water, extending ¾ mile westward in a broken line to East spindle, a red iron spindle with cask, this spindle marking the eastern side of Lord's Passage; *Wicopesset Rock,* 4 to 12½ feet over it, black iron spindle with cask, ⅝ mile **E. ½ N.** from Wicopesset Island.

Napatree Point Ledge, left on the starboard hand, is marked by a buoy (can,* red, No. 4) at its southern end. This ledge extends in a cluster of shoal spots in a southwesterly direction from Napatree Point.

Middle Ground, well to the northward of the course, marked off its western side by a buoy (can,* red, No. 6), has 9 feet of water over it and lies 1½ miles **NW.** by **W.** from Napatree Point. The western end of the *southeast breakwater* of Stonington Harbor extends nearly to the northern part of the Middle Ground, and is being carried farther to the westward.

Wicopesset Island, to the southward of the course, is small and surrounded by foul ground.

Latimer's Reef Light-house marks the western end of Latimer's Reef, which is 2 miles **W. ½ N.** from Napatree Point, and ⅞ mile **N.** of the eastern part of Fisher's Island. The eastern end of the reef is marked by a buoy (spar, red and black horizontal stripes). *A Spot* with 15½ feet over it lies nearly 300 yards **SW.** by **S.** from this last-named buoy and a little to the northward of a mid-channel line. *North Latimer's Reef,* marked by a buoy (spar, red and black horizontal stripes), has 11 feet of water and is ⅜ mile **NE. ¼ E.** from the light-house. The sailing line leads to the southward of these dangers.

A Spot with 13 feet of water, marked by a buoy (spar, red and black horizontal stripes) lies 50 to 200 yards to the southward of the course by special direction, and is about ⅝ mile **S. ¾ W.** from the buoy on the eastern end of Latimer's Reef, and 400 yards **NE.** by **E.** from Seal Rocks buoy.

Seal Rocks, marked off their northern side by a buoy (spar, black, No. 3), lie about ⅝ mile **NW.** from the eastern end of Fisher's Island.

Young's Rocks, 1½ to 13 feet of water, marked by a buoy (spar, black, No. 5), lie about ⅝ mile **W.** from Seal Rocks buoy.

An 18-foot Spot lies $\frac{5}{16}$ mile **NW.** by **N.** from Young's Rocks buoy, and is a little to the southward of the course.

Eel-Grass Ground is well to the northward of the course, being about ⅝ mile **NW. ½ W.** from Latimer's Reef Light-house; has 5 to 14 feet of water, and is marked by two buoys, one at its northwestern end and the other at its southeastern (both spars, both red, No. 10 and No. 12).

East Clump is an islet well to the southward of the course.

Ram Island Reef Light-vessel, described on pages 10–11, is to the southward of Ram Island Reef. Keep to the southward of the light-vessel.

Middle Clump is an islet about ⅝ mile **S SW.** from Ram Island Reef Light-vessel. A buoy (spar, black, No. 5½) is placed nearly ¼ mile **N.** by **E.** from the islet, and marks several 17-foot spots lying between them.

3. ***Ram Island Reef Light-vessel to Long Island Sound.***—Bring Ram Island Reef Light-vessel to bear **E. ½ N.**, and steer **W. ½ S.** for Bartlett's Reef Light-vessel, passing about midway between Potter's (Sea-Flower) Reef Beacon and North Dumpling Light-house.

† When ½ mile past Sugar Reef spindle, you pass Napatree Point Ledge buoy, left on the starboard hand.

Remarks.—After passing Ram Island Reef Light-vessel, Potter's (Sea-Flower) Reef Beacon should be seen on the **W. ½ S.** course, showing a little to the northward of North Dumpling Light-house, and New London Light-house will be made well on the starboard bow. To the northward is the western approach to Noank and Mystic River. To the southward and a little farther west is West Harbor; dangers lie in a broken line between Middle Clump and South Dumpling.

West Clump is a small island lying on a line between Middle Clump and South Dumpling Island. A long shoal with from 3 to 11 feet over it, extends a little over ½ mile to the eastward and nearly ⅜ mile to the westward of West Clump.

Pulpit Rock, marked by a black iron spindle (barrel on top), has 5 feet of water over it, and lies near the western end of the shoal making to the westward from West Clump.

Flat Hammock is an island about ½ mile southeast of North Dumpling Light-house. A shoal with 4 feet over it extends ¼ mile to the northeastward from the northern end of this island.

South Dumpling is an island lying about ¼ mile west of Flat Hammock and a little over ¼ mile **S. by E.** from North Dumpling Light-house.

North Dumpling, marked by North Dumpling Light-house, is an island at the western end of Fisher's Island Sound, and is about 1¼ miles **SW. ½ S.** from Groton Long Point. A shoal with from 9½ to 16 feet of water over it makes out ¼ mile to the eastward from the light-house.

Potter's (Sea-Flower) Reef, marked by a large granite beacon, lies a little over ¾ mile northwest from North Dumpling Light-house. This reef is a little more than ¼ mile long in a general **E NE.** and **W SW.** direction.

A Spot with 18 feet over it lies to the northward of the course, when one-third the way from Ram Island Reef Light-vessel to Potter's Reef Beacon. This spot is ½ mile **SE. ½ E.** from Groton Long Point spindle.

SAILING DIRECTIONS, FISHER'S ISLAND SOUND.

II. TO PASS INTO FISHER'S ISLAND SOUND THROUGH LORD'S PASSAGE.

(*a*) Passing south of the dangers between Watch Hill and Fisher's Island, bring the eastern end of Stonington southeast breakwater to bear **N. by E. ¼ E.**, and stand in, keeping it on that bearing, and passing midway between East spindle and Wicopesset Rock spindle.

To aid in keeping the bearing, when still outside the reefs and the eastern end of the breakwater comes on the bearing **N. by E. ¼ E.**, pick up a range over the end of the breakwater and keep on the range until inside the reefs.

When inside, with Latimer's Reef Light-house bearing **W NW. ¼ W.**, steer **W NW. ⅛ W.** for Ram Island Reef Light-vessel, and follow such of the directions given in paragraph 2, page 34, as remain to be followed after passing Napatree Point Ledge buoy.

If bound to Stonington, see heading "Stonington Harbor."

(*b*) Other directions for Lord's Passage are as follows: Bring Stonington Light-house to bear **N. ⅝ E.**, a little over 3 miles distant, with 14 fathoms water, and steer for it, which will lead, with not less than 20 feet, into the Main channel. On this course, when Latimer's Reef Light-house bears **W NW.**, steer for it on this bearing, and when within about 1 mile of it steer **W NW. ⅛ W.**, heading for Ram Island Reef Light-vessel, and proceed as already directed.

The **N. ⅝ E.** course passes 350 yards to the westward of East spindle, 200 yards to the eastward of the eastern extremity of Wicopesset Reef, and 325 yards to the eastward of West spindle, on Wicopesset Rock.

As the set of the tidal current is diagonally across this channel and reaches a velocity of two miles an hour, you should catch a range with the light-house to avoid being set on to the shoals on either side.

III. TO PASS THROUGH FISHER'S ISLAND SOUND FROM THE WESTWARD.

Pass midway between North Dumpling Light-house and Potter's (Sea-Flower) Reef Beacon, steering **E. ¾ N.** for Ram Island Reef Light-vessel. Pass the light-vessel, leaving it on the port hand, and bring it to bear **W. by N. Northerly**, over the stern, and steer **E. by S. Southerly**, passing 350 yards south of Latimer's Reef Light-house, and heading directly for the red can-buoy * off Napatree Point.† Pass this buoy, leaving it about 50 yards on the port hand, and continue the course, passing south of and close-to Gangway Rock buoy (spar, red, No. 2).

STONINGTON HARBOR.‡

Stonington Harbor is on the northeastern side of Fisher's Island Sound. A great many vessels, ranging in size up to 600 tons, anchor here each year. In order to increase the usefulness of this harbor as a place of refuge, the U. S. Engineers are making improvements. A rip-rap breakwater is building, extending 2,150 feet, in 1887, in a **W SW. ½ W.**

† See note on currents between Napatree Point and Latimer's Reef, page 35, under paragraph 2.

‡ Shown on Coast and Geodetic Survey charts 358, 114, and 114 a. See the foot-note on page 33.

direction from the southwestern end of Bartlett's Reef; it is proposed to extend this breakwater to the westward still farther, and eventually to erect a light-house on its western end; when finished, this breakwater is expected to afford a protected anchorage for vessels drawing 18 feet; it has not yet accomplished its purpose fully. A completed breakwater 2,000 feet long extends in a southeasterly direction from off Wamphassuck Point; this affords protection to vessels in the upper harbor, which is small. About 200 yards to the northward of the light-house on Stonington Point, a stone breakwater extends to the westward about 250 yards; on its western extremity a gray stone pyramid is erected against a square brown tower, with a bell and lantern on top. The steamboat company has the bell rung in foggy weather and maintains a small light in the lantern.

About 350 vessels per year are engaged in the carrying trade of Stonington, more than half of them owned elsewhere. The trade comprises coal, lumber, iron, sand, salt, grain, and stone. The deepest draught of vessels entering the harbor at mean low water is 13 feet; the depth alongside wharves at mean low water is from 7 to 13 feet, according to locality. The usual draught of vessels entering is about 9½ or 10½ feet.

Approaches.—The harbor is approached from the southward and from the westward; the former approach is the better, having fewer dangers, and the light-houses serving as guides to avoid them.

Approaching from the westward several changes of course are necessary, and the only guides are buoys placed to mark the dangers.

Pilots can be obtained from fishing boats, or from the shore by signaling. Fishermen, etc., bring vessels into the harbor. Strangers generally take a pilot. Vessels wishing a pilot and not finding one outside, stand off and on, or anchor between Latimer's Reef and the Middle Ground, with signal flying until one comes off from shore. Pilotage is not compulsory.

Tow-boats are not much used; a small one tows vessels to Westerly; others may be had by telegraphing or telephoning to New London. Large vessels sometimes tow with a head wind or in a calm.

Anchorage is found anywhere inside the breakwaters. In the upper harbor a channel 300 feet wide must be left clear, from the end of the inner breakwater to the head of the steamboat wharf.

Quarantine regulations are established by the local board of health. Vessels are not boarded by the health officer unless they have sickness on board, when they should anchor inside the southeast breakwater and set signal.

Hospitals.—Emergency cases and those requiring office relief only are treated at Stonington; continuous treatment patients are sent to the marine-hospital at Stapleton, Staten Island,—transportation furnished. (See Appendix IV.)

Steamers.—The Stonington line of steamers make daily trips (Sundays excepted) between New York and Stonington, connecting with the N. Y., P. & B. Railroad.

Wind-signals are shown at the light-house on Stonington Point (see page 16 and Appendix III).

Supplies.—Anthracite coal can be obtained for steamers in limited quantity. It is put on board alongside wharf. Water can be obtained alongside the railroad wharf from hydrant through hose. Provisions and ship-chandler's stores can be had in Stonington.

Repairs.—Noank is the nearest place for repairs to hull, New London for extensive repairs to machinery.

The **Variation of the compass** in Stonington Harbor for 1888 is **10° 25′ W.**, with an annual increase of about 3¼′.

Tides.—The mean rise and fall of tides at Stonington is **2.7** feet; corrected establishment **9h 07m**. For other tidal data see page 16.

Ice seldom forms except in very cold weather; steamers running daily keep the channel open.

Consult also pages 9–17 and 33–34.

SAILING DIRECTIONS, STONINGTON HARBOR.

The following directions carry not less than 17 feet of water until abreast Stonington Harbor Light-house, when, after entering the inner harbor, the sailing line is not good for more than 11 feet. Vessels drawing 10 feet or over must exercise care in passing Napatree Point Shoal, the Middle Ground and the shoal left on the port hand when passing the Middle Ground buoy.

I. ***From the Eastward.***—Follow the directions of paragraphs 1–2, page 34, until abreast of Napatree Point Ledge buoy (can,* red, No. 4), then steer **NW.** by **W.** until the Middle Ground buoy (can,* red, No. 6) is in range with Stonington Harbor Light-house. Now shape the course about **N.** by **E.**, leaving the Middle Ground buoy about 100 yards distant on the starboard hand (but not more than 300 yards distant) and heading for Stonington entrance. Give the western end of southeast breakwater a good berth (250 yards or more) on the starboard hand, edging to the westward if necessary in passing the breakwater, and edging a little to the eastward again when past it. Now—

(*a*) *If desiring an anchorage inside the southeast breakwater*, turn to the eastward and anchor to the northward of the breakwater, in 12 to 15 feet of water, before its eastern end bears **S.** by **E.** Vessels drawing more than 12 feet should anchor with Stonington Harbor Light-house bearing to the eastward of **N NE.**

*Spar-buoy in winter. See the note on page V.

(*b*) *If bound up to Stonington*, continue the **N.** by **E.** course, leaving the western (Wamphassuck Point) breakwater on the port hand. Pass between black buoy No. 1 and the end of the eastern (or old) breakwater, and come to anchor, leaving a channel 300 feet wide from the end of the old breakwater to the steamboat dock.†

Remarks.—On the **NW.** by **W.** course, Latimer's Reef Light-house, Ram Island Reef Light-vessel, and the town of Noank will be on the port bow. The town of Stonington will be broad off the starboard bow, behind the southeast breakwater.

Dangers.—**Napatree Point Ledge** and the **Middle Ground**, both left on the starboard hand, have been described on page 35.

A Shoal with from 10½ to 11 feet over it commences about ¼ mile **W.** by **N.** from the Middle Ground buoy (can,* red, No. 6) and extends about ⅞ mile in a **NW.** by **W.** direction. The sailing line passes between this shoal and the Middle Ground buoy.

Noyes' Rock, marked by a buoy (spar, red, No. 8), has 9 feet of water over it, and lies ½ mile **W SW.** from the eastern end of the breakwater making out from Wamphassuck Point. Pass to the eastward of the buoy in entering from the southward.

The Shoal making out to the southward from Stonington Point is marked by a buoy (spar, red and black horizontal stripes). This buoy will be left on the starboard hand in entering the inner harbor.

Penguin Shoal buoy (spar, black, No. 1), inside of the harbor, is nearly ⅜ mile **W NW.** from Stonington Light-house, and marks a shoal with 4½ to 10 feet of water upon it.

II. ***Approaching from the Westward.***—Leave Ram Island Reef Light-vessel 150 yards on the port beam, and steer **NE.** by **E.** ½ **E.**, heading for White Rock and passing about midway between the spindle on Ellis' Reef and the red buoy (spar, No. 12) on the western end of the Eel-Grass Ground.

When nearly up to White Rock, leave it 300 yards on the port hand and steer **E.** ¼ **S.**, heading just to the southward of the outer end of the western (Wamphassuck Point) breakwater, passing about 400 or 500 yards north of the red buoy (spar, No. 8) on Noyes' Rock.

When past the end of the breakwater, head to the northward and follow directions for entering from the eastward.

Dangers.—**Ellis' Reef**, marked near its eastern end by a spindle, lies **E.** ¾ **N.**, distant 1 mile from the southern end of Ram Island; about 300 yards to the northward of the spindle is the black buoy (spar, No. 1) marking the entrance to Noank from the eastward.

Eel-Grass Ground, left on the starboard hand, is described on page 35.

White Rock is a rocky islet, conspicuous on account of its solitary position. It lies **NE.** by **E.** ½ **E.**, distant 2⅛ miles from Ram Island Reef Light-vessel, and **N.**, distant 1⅛ miles from Latimer's Reef Light-house.

Noyes' Rock, left on the starboard hand, is described on this page.

Or, to follow the Main channel through Fisher's Island Sound in approaching, proceed as directed on page 36 (heading III) until well past Latimer's Reef Light-house, which will be left on the port hand. Then steer **E.** by **N.** until Stonington Harbor Light-house bears **N NE.**, when head for it on that bearing. Middle Ground buoy (can,* red, No. 6) should be directly ahead. Continue the **N NE.** course until nearly up with this buoy, which is to be left 100 to 300 yards distant on the starboard hand. Then turn more to the northward, course about **N.** by **E.**, and proceed as already directed (see page 37, heading I).

Latimer's Reef, left on the port hand in following these directions, is described on page 35. The **Middle Ground**, left on the starboard hand, is described on page 35. A **Shoal** to the westward of the Middle Ground, and left on the port hand, is described on this page.

MYSTIC RIVER.‡

This river flows into Fisher's Island Sound about 3¾ miles to the westward of Stonington Harbor. It has a very narrow and crooked channel, but is navigable for vessels of 8 feet draught for about 1 mile above the villages of Mystic River and Mystic Bridge. These villages, about one mile below the head of navigation, are connected by two bridges crossing this river,—town bridge (width of draw 58 feet) and railroad bridge (width of draw 62 feet). About 100 vessels a year, mostly transient, are engaged in the carrying trade up the river. The cargoes consist principally of coal, lumber, iron, grain, granite, lime, etc.

Noank, a village on the western bank, at the entrance, is on the N. Y., P. & B. Railroad. The chief industries are ship-building and fishing. The principal trade is in ship timber and coal, partly carried in vessels owned elsewhere. The deepest draught of vessels going to Noank is 18 feet; depth alongside wharves at low water, 10 feet.

† Vessels anchor either on the east or west side of the 300-foot channel, as is most convenient. Vessels anchoring inside the western breakwater should keep to the southward of Stonington Light-house, bearing **E.** ¼ **S.** to keep clear of the southern end of Penguin Shoal, marked by a buoy (spar, black, No. 1).

‡ See the foot-note on page 33.

Mystic Bridge and **Mystic River** are two villages on the N. Y., P. & B. Railroad, about 1½ miles above Noank; the former is on the east and the latter on the west bank of the river, and they are connected by two bridges. There are several manufactories and ship-yards at Mystic Bridge and Mystic River. The deepest draught of the vessels going up as far as these villages at high water is 12 to 14 feet. The least depth in the channel at low water is 10 feet, and the depth alongside the wharves at low water is 10 feet.

Prominent features.—Morgan's Point (Mystic River) Light-house is on the southern end of Morgan's Point (see table, page 10), south of the village of Noank; it is one of the guides leading up to the entrance of the river. Ram Island Reef Light-vessel is about ½ mile to the southward of Ram Island (see table, page 10). Ram Island, about ½ mile **E SE.** from Morgan's Point Light-house, is readily distinguished by the large hotel and buildings near its southern end.

Channels.—The entrance of the river is approached through two narrow and crooked channels, one from the eastward, passing north of Ram Island, and one from the westward and southward, passing south of Groton Long Point. These channels are both marked by spindles, beacons, and buoys, but strangers should not attempt them without a pilot. The eastern channel is generally used: vessels of 18 feet draught can enter by this channel. The deepest draught coming through the southern channel at low water is 12 feet.

Pilots are generally taken by strangers entering the river. Vessels from the westward desiring a pilot will get one by making signal off Groton Long Point. When coming from the eastward, if not boarded by a pilot, vessels sometimes anchor ¼ mile southwest of Baker's Island, and wait, with signal flying, until one comes from Noank. Pilotage is not compulsory.

Tow-boats.—Vessels bound to Noank or Mystic Bridge generally take a tug, which can be had at Noank by telephoning to New London for one. A small Noank oyster steamer sometimes does towing.

Anchorage.—The anchorage for vessels bound into the Mystic River from the eastward is about ¼ mile southwest from Baker's Island—between it and the northern end of Ram Island—in 20 feet of water, soft bottom.

Small vessels of 50 to 100 tons sometimes anchor in the channel abreast of Noank. Good holding-ground will be found anywhere in the channel of the river.

Repairs.—There are several well-equipped ship-yards and 4 marine railways at Noank; the largest railway, it is claimed, is able to haul out any class of vessel except ocean steamers. Ordinary repairs to the machinery of steamers can also be made here.

Supplies.—Anthracite and bituminous coal, in limited quantities, for steamers, and fresh water through hose, can be obtained alongside the wharves at Noank and Mystic Bridge. Provisions and ship chandler's stores can be obtained at these places.

Consult also pages 9–17 and 33–34.

SAILING DIRECTIONS FOR APPROACHING MYSTIC RIVER.

I. ***From the Eastward.***—The following directions, if strictly observed, are good for 17 feet of water, but there are unmarked shoal spots near the sailing-line, and vessels are liable to be set on these by the tidal currents. With vessels drawing more than 10 feet great care is necessary, and it is advisable to have a pilot in approaching.

When Napatree Point Ledge buoy (can,* red, No. 4) bears **N.**, distant 200 yards, make good the course **NW.** by **W.** for 3¼ miles, passing well to the southward of the red buoy (can,* No. 6) off the west side of the Middle Ground and about ⅛ mile to the northward of North Latimer Reef buoy (spar, red and black horizontal stripes).

Pass about 200 yards to the northward of black buoy No. 1 north of the spindle on Ellis' Reef, and steer **W. ¼ S.** for the northern end of Ram Island. When Mason's Point bears **N.**, distant a little over ⅛ mile, come to anchor in 20 feet of water, and wait for a pilot if one has not already come on board, or take a tow-boat.

Remarks.—On the **NW.** by **W.** course when off Napatree Point, Latimer's Reef Light-house will be on the port bow, showing open just to the southward of Noank. Stonington and the southeast breakwater will be broad on the starboard bow. When up with the buoy (spar, red and black horizontal stripes) on North Latimer Reef the spindle on Ellis' Reef will be made a little on the port bow and Baker's Island will be ahead. Ram Island will be distinguished by the large summer hotel on its southern end and the out-buildings extending to the northward from the hotel.

On the **W. ¼ S.** course, heading for the northern end of Ram Island, Morgan's Point Light-house will be well open to the northward of the northern end of Ram Island.

Dangers.—**Scattered shoal spots** having 10 and 11 feet over them, and not marked, are left on the starboard hand, 300 to 600 yards distant, on the **NW.** by **W.** course, until within about ½ mile of White Rock.

North Latimer's Reef, left on the port hand, lies ⅝ mile **NE ¼ E.** from Latimer's Reef Light-house, has 11 feet of water, is of small extent, and is marked by a buoy (spar, red and black horizontal stripes).

Eel-grass Ground, left well on the port hand, is described on page 35.

White Rock, out of water at all stages of the tide, lies about 1⅛ miles north of Latimer's Reef Light-house and a little over ¼ mile **N NW. ½ W.** from the northwestern end of the long reef which extends in a northwesterly direction from ¼ mile west of the red buoy (can,* No. 6) off the Middle Ground. Some of the *scattered shoal spots* already mentioned form part of this long reef.

Ellis' Reef, marked by a spindle near its southern end and by a black buoy (spar, No. 1) off its northeastern end, has from 2 to 9 feet of water over it and lies ⅝ mile northwest of the Eel-grass Ground.

A Spot with 10 feet over it, not marked, lies about ¼ mile **NE.** by **E. ½ E.** from Gates' Island and about 400 yards **S. ½ E.** from the southern end of Baker's Island. The sailing line passes about midway between this shoal spot and Baker's Island.

Gates' Island is a small island lying about ⅝ mile **S. ½ E.** from Mason's Point.

II. ***From the Westward.*** — Pass about midway between North Dumpling Light-house and Potter's Reef beacon, steering about **E. ½ N.** for Ram Island Reef Light-vessel and making signal for pilot. Do not go to the northward of the line of Groton Long Point spindle and Ram Island Reef Light-vessel, standing off and on until pilot comes off. Keep well to the northward of the Clumps (see pages 35–36).

Remarks.—The entrance to the Mystic River from the southward is buoyed, but it is advisable for a stranger, unless of very light draught, to remain outside as just directed until a pilot is obtained.

LONG ISLAND SOUND.†

Long Island Sound lies between the shores of Connecticut and New York on the north and Long Island on the south. To the eastward is Block Island Sound; at the western end Long Island Sound joins the East River between Throg's Neck and Willett's Point. The distance from Little Gull Island Light-house to Execution Rocks Light-house is about 77 miles; the greatest width, nearly abreast New Haven entrance, is a little more than 16 miles, decreasing gradually to the eastward and to the westward. Long Island Sound affords sufficient room for beating to windward and has comparatively few dangers.

This large body of water is important as an approach to New York from the eastward, nearly all of the coasting vessels and steamers between New York and the eastern states passing through bound both ways. It forms the approach to several important harbors and has a number of "tidal harbors."

A vessel drawing 25½ feet has been taken through Long Island Sound and East River, but this was exceptional. Ordinarily, the greatest draught passing through does not exceed 23 to 23½ feet; vessels of as deep draught as this, trading to New York, sometimes go to sea by way of the Sound, but generally come in by way of Sandy Hook.

Channels leading into the Sound.—The principal approach to Long Island Sound from the eastward is through Block Island Sound and the Race. Besides the Race there are two other passages leading into Long Island Sound, one to the northward through Fisher's Island Sound (see page 33), and one from Gardiner's Bay through Plum Gut (see page 24). Vessels of heavy draught pass in through the Race. Vessels of 14 feet draught or less, with a strong, favorable breeze, sometimes pass through Fisher's Island Sound with an adverse tide, the tidal current here being weaker than in the Race. Plum Gut has water for vessels of deep draught, but is not generally used by vessels over 15 feet draught on account of the strong tidal current and the dangers.

There is also a passage to the westward of Great Gull Island, between it and Plum Island, but it is dangerous and should not be attempted.

Lights and other aids.—At night, in clear weather, no difficulty should be experienced in entering through the Race and passing through the Sound, as the lights are numerous and readily distinguished; they are described on pages 10–13. In many places in the Sound 5 or 6 lights will be in sight at the same time, making navigation comparatively easy. The buoyage accords with the system adopted in U. S. waters (see page V).

Pilots for the Sound and East River (Hell Gate pilots) will sometimes be found cruising in small boats near Little Gull Island Light-house, or just inside the Race off New London, and are generally to be found cruising in small boats off New Haven Harbor, Huntington Bay, Hempstead Harbor, and to the westward as far as Whitestone (see heading "East River"). A number of the Hell Gate pilots have their headquarters at City Island. To the westward of New Haven one is pretty sure to be obtained upon making signal, except in very bad weather; at such times vessels desiring a pilot and failing to pick one up generally go into Huntington Bay or Hempstead Harbor, or seek some other suitable anchorage, until the weather moderates.

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† Long Island Sound is shown, in three sheets, on Coast and Geodetic Survey charts 114, 115, 116 as follows, the scale of each being $\frac{1}{80,000}$, or one mile = 0.912 inch, price $0.40 each chart: **114**, Eastern sheet, Point Judith and Block Island to Plum Island; **115**, Middle sheet, Plum Island to Welch's Point; **116**, Western sheet, Welch's Point to New York. The eastern part of the Sound is also shown on chart **114a**, a photo-lithograph based on a late re-survey, scale of this chart $\frac{1}{80,000}$, price $0.50. Long Island Sound is also included within the limits of charts **5a** and **A**; see the foot-note on page 9. These charts can be obtained from the agents named in the list given on one of the introductory pages of this volume (see page VII). Index maps showing the limits of charts are published by the Survey, and will be furnished free of charge upon application to the Coast and Geodetic Survey Office, Washington, D. C. A new Catalogue of Charts and other publications of the Survey (edition of 1887) also contains diagrams or index maps showing the location and limits of charts; copies of this catalogue can be obtained free of charge on personal application at any of the sale agencies, or by letter addressed to the Coast and Geodetic Survey Office, Washington, D. C.

Pilotage is compulsory for foreign vessels and vessels from a foreign port, and all vessels sailing under register, going to the port of New York. Extracts from the laws of Connecticut and New York, relating to Pilots and Pilotage, are given in Appendix II.

Tow-boats are generally to be found in the vicinity of City Island in the western part of the Sound, and in East River. In case of necessity they can be obtained from New York by telegraphing at City Island or at Whitestone. Vessels bound to New York and intending to take a tow-boat should do so before going to the westward of Riker's Island (see heading "East River"). At some of the principal ports in the Sound tow-boats can be obtained also, as stated under the several headings.

Harbors and Anchorages.—A number of the shoal harbors which were formerly used by the comparatively small vessels then engaged in the coasting trade are now of little importance. Much of the carrying trade of these places is now done by the railroads and such harbors are seldom entered for shelter merely, the sloops and very small schooners of former days having been succeeded by larger schooners, much of the coasting trade being now carried by three-masted and even by four-masted schooners. Under present conditions, coasters bound to the westward sometimes almost reach New Haven, and then being driven back return all the way to Niantic Bay or to New London Harbor for shelter. To the westward of the Norwalk Islands sea-going vessels frequently anchor on shoaling their water sufficiently towards the north shore, and with good ground-tackle thus find sufficient shelter against northerly wind and sea without attempting to make any particular harbor.

New London Harbor is the most important of the anchorages sought for shelter in the eastern part of Long Island Sound. *Niantic Bay* is used considerably, and serves as a general anchorage ground for vessels bound foreign and having unfavorable winds on reaching the eastern part of the Sound. The anchorage ground used by such vessels lies within the limits of Bartlett's Reef, Hatchett's Reef, and the north shore. The holding-ground is good and it is easy to get in and out. This is frequently spoken of as the *anchorage off Black Point*. Smaller vessels stand farther inside, going well up into Niantic Bay. The small harbors along the north shore between Niantic Bay and New Haven are not often entered merely for shelter. Sea-going vessels sometimes anchor off shore in northerly winds. *Off Madison* there is good anchorage. With westerly winds vessels sometimes anchor under the lee of *Falkner's Island* (see the detailed directions for Long Island Sound). *New Haven Harbor* is an important harbor of refuge. On the south shore there is an anchorage to the westward of *Crane Neck*, but it is dangerous in winter, and should always be left upon the first indication of a northerly or northwesterly wind. Large vessels frequently anchor in the *bight outside Bridgeport Harbor Light-house*, and *Black Rock Harbor* is frequently sought by light-draught vessels. *Huntington Bay*, on the south shore, is much used, and the large Sound steamers sometimes seek shelter in it. *Oyster Bay* is also used, on the south shore. *Cockenoe's Island Harbor*, on the north shore, is not often entered for shelter; vessels in this vicinity prefer to make *Sheffield Island Harbor* (Norwalk Harbor), which is also often used by tows. *Captain's Harbor* affords good shelter, but it is not very much used. *To the westward of the Norwalk Islands* it is usual for vessels to anchor along the north shore of the Sound, as already noted. *Hempstead Harbor* is used a great deal, and vessels of suitable draught often use *Manhasset Bay*. *City Island Harbor* (Hart Island Roads) is a great resort for coasters; small vessels anchor between Hart and City islands, large vessels anchor to the southward of City Island.

The following is a more detailed list of harbors in Long Island Sound: 1. *New London Harbor*, at the eastern end of the Sound, in the entrance of the Thames River, is easy of access and has deep water. 2. *Niantic Bay*, on the north shore, west of New London, is sheltered against winds from **W.** through **N.** to **E.**, and well within the bay has 18 feet at low water, with deep water farther out. 3. *Saybrook Harbor*, in mouth of Connecticut River, has a dredged channel between the jetties with 10 feet at low water, strong currents; entrance obstructed by a shifting bar. 4. *Clinton (Killingworth) Harbor*, east of Hammonasset Point, sheltered against northerly winds, affords anchorage for small vessels in 8 to 13 feet (low water). 5. *Madison Harbor*, west of Hammonasset Point, affords shelter against northerly and northeasterly winds; anchorage in 16 to 21 feet at low water. 6. *Guilford Harbor*, east of Sachem's Head, is only fit for small vessels and not easy of access. 7. *Thimble Islands Harbor*, 2½ miles west of Sachem's Head, is small and not easy of access; a limited number of vessels up to 12 feet draught can find shelter in all winds. 8. *Branford Harbor*, about 4 miles east of New Haven, affords shelter in winds from **W.** through **N.** to **E.**; it has a depth of 10 to 13 feet (low water). 9. *New Haven Harbor*, depth in channel up to wharves, 13 feet; vessels of 18 feet draught can find shelter against all but southwesterly winds inside the breakwater at the entrance; channel at entrance rather narrow for vessels drawing more than 16 feet. 10. *Shelter* against winds from **W.** through **N.** to **N NE.**, will be found to the eastward of Stratford Point, in 18 feet to 5 fathoms (low water). 11. *Port Jefferson Harbor*, on the south shore east of Old Field Point Light-house, is completely land-locked; it is entered between jetties; depth in channel 7 feet; very strong tidal-currents at entrance. 12. *Smithtown Bay*, just to the westward of *Crane Neck*, is a summer anchorage in 5 to 9 fathoms, sheltered from winds from **N NE.** through **E.** and **S.** to **SW.**; to be avoided in northerly winds. 13. *Bridgeport Harbor* has 11½ feet in the improved channel up to the wharves. There is a good anchorage against winds from **W.** to **E.** through **N.**, in 18 to 24 feet, in the bight outside of Bridgeport Harbor Light-house, between Stratford Point and Penfield's Reef. 14. *Black Rock Harbor*, to the westward of Bridgeport, affords shelter against winds from any direction for vessels of 8 feet draught or less; in westerly winds larger vessels can

anchor on a line between Black Rock and Penfield's Reef light-houses. 15. *Southport Harbor*, between Penfield's Reef Light-house and the Norwalk Islands, can only be entered at high water. 16. *Cockenoe's Island Harbor*, among the eastern of the Norwalk Islands, is an eastern entrance to Norwalk River, and used by vessels, well acquainted with the locality, with an easterly wind. 17. *Sheffield Island Harbor* (Norwalk Harbor), at the western end of the Norwalk Islands, affords shelter against all winds, and has from 7 to 11 feet at low water; shelter against winds from W. through N. to E., in 14 to 24 feet water. 18. *Huntington Bay*, *Northport Bay*, and *Lloyd's Harbor:* On the south shore, just west of Eaton's Neck, Huntington Bay affords shelter against all but northerly winds, in from 18 feet to 6 fathoms. Northport Bay, entered from the southeastern end of Huntington Bay, through a narrow channel with 19 feet water, is completely land-locked, and has a depth of from 10 feet to 7½ fathoms. Lloyd's Harbor, on the western side of Huntington Bay, is protected against all winds, but has only from 4 to 10 feet at low water. 19. *Oyster Bay*, *Cold Spring Harbor*, and *Oyster Bay Harbor:* On the south shore, west of Lloyd's Point, Oyster Bay affords shelter against all but northerly winds. Cold Spring Harbor, at the southern end of Oyster Bay, is sheltered from all but northerly winds, but the latter lose their power and there is little sea; depth 15 to 18 feet at low water. Oyster Bay Harbor, on the west side of Oyster Bay, is completely land-locked, and affords anchorage in the channel in from 18 feet to 5 fathoms low water. 20. *Captain's Harbor* (Greenwich Harbor), to the northeastward of Great Captain's Island Light-house, is well sheltered, and is good for from 10 to 21 feet at low water. 21. *Port Chester Harbor*, to the westward of Great Captain's Island Light-house, is sheltered from all but southerly winds; the anchorage has from 10 to 16 feet at low water. 22. *Hempstead Harbor*, about 2 miles east of Sands' Point Light-house, is sheltered against all but northerly winds; anchorage in 5 fathoms; shoals gradually towards the head of the harbor. 23. *Mamaroneck Harbor*, sheltered against all but southerly winds, depth 7 to 11 feet at low water; used in summer, by yachts. 24. *Larchmont Harbor* (Delancey Cove) is shoal; used in summer, by yachts. 25. *Echo Harbor* is sheltered against northerly winds, but has no good anchorage for vessels drawing more than 6 feet. 26. *Manhasset Bay* is sheltered against all winds; depth from 10 to 18 feet. 27. *City Island Harbor* (Hart Island Roads) is a great resort for coasters; depth from 11 feet to 7½ fathoms. 28. *East Chester Bay*, on the north shore, and (29) *Little Neck Bay*, on the south shore, are both shoal.

Repairs, etc.—Machine shops for repairs to the machinery of steamers will be found at the following places to the eastward of New York: New London, New Haven, Bridgeport, Hartford, and City Island. Vessels requiring heavy work generally go to New York. (See also pages 25 and 33.)

Marine railways and ship-yards for the repair of vessels will be found at the following places: New London, capacity of railways up to 500 tons, or 125 feet keel; Port Jefferson, capacity of railways from 50 to 1,500 tons; Black Rock has 2 small marine railways; Cold Spring has 2 marine railways of small capacity; Northport has 3 marine railways, the largest with a capacity of 800 tons; City Island 7 railways, capacity up to 800 tons; Hartford 1 railway, capacity 500 tons; New Haven 1 railway, capacity 400 tons. (See also pages 25 and 33.)

Quarantine.—The Quarantine laws of Connecticut govern the ports in that State; local boards of health have the power to make sanitary regulations for the ports under their control. The laws of the State of New York govern the ports of that State, including those on the shore of Long Island; the quarantine laws for the City of New York control vessels to the westward of Execution Rocks Light-house. (See Appendix II.)

Ordinarily there is no special boarding station for vessels coming through the Sound bound to New York. During periods when the necessity for such course has been felt, health officers have been detailed and temporary boarding stations established at or near the Sound entrance of the East River. The health officer of the port of New York has his headquarters at Clifton, Staten Island, as stated in Appendix II.

The **Marine Hospital** at Stapleton, Staten Island, New York, under the charge of the Marine Hospital Service, is the one to which seamen entitled to hospital treatment are sent from relief stations in the Sound, if there is no local hospital available. At Hartford and at New Haven such patients are sent to a local hospital. (See Appendix IV.)

Wind-signals.—A list of display stations of the U. S. Signal Service, from which wind-signals are shown, is given on page 16.

Supplies.—Coal, fresh water, provisions and ship-chandler's stores can be obtained at New London, Hartford, Bridgeport, and New Haven. Supplies other than coal can be obtained at City Island. As mentioned under their separate headings, there are other places in the Sound where coal and other supplies can be obtained, but the quantity to be had is apt to be limited and the facilities are not always good. New London is available as a coaling port for large vessels.

Reporting Stations.—In the western part of the Sound there is a station at City Island from which vessels are reported. There is also one at Whitestone, Long Island (see headings "City Island Harbor" and "East River"; see also page 16).

Oyster Grounds, marked off by buoys, stakes or poles, occupy a considerable part of some of the bays and harbors of the Sound, and also extend well off shore into the Sound at some points, as off New Haven entrance, where they are carried out into 5 to 8 fathoms of water.

Steamboat courses.—Each line or each steamer has its own track, which differs somewhat from others. A route sometimes followed by the steamers of one line is given as an example: Bound west, passing through the Race, the course is shaped to pass about 1 or 1½ miles to the southward of Cornfield Point Light-vessel; the course is then changed so as to pass about 1 mile to the southward of Stratford Shoal (Middle Ground) Light-house; here the course is changed again so as to lead about 1 or 1½ miles to the southward of Norwalk Island Light-house, thence heading for Execution Rocks Light-house.

Bound east, the reverse courses are followed.

In clear weather, bound west, after passing through the Race, the course is sometimes shaped to pass 1½ miles to the northward of Horton's Point Light-house (south shore), and thence to pass 1 mile to the southward of Stratford Shoal Light-house, as before, and continuing the route already given.

Eaton's Neck is generally given a wide berth on account of the number of small vessels frequently found in its vicinity. Apart from this, the foregoing route is based mainly upon convenience in using the thick-weather aids when they are needed.

A direct route, frequently used under favorable circumstances, is as follows: Having entered through the Race, when passing to the northward of Little Gull Island Light-house the course is shaped **W. ½ S.**, with Race Rock Light-house almost directly astern. This leads about 3 miles south of Cornfield Point Light-vessel and more than 5 miles to the southward of Falkner's Island Light-house. When Stratford Shoal (Middle Ground) Light-house is made the course is shaped to pass about 1 mile to the southward of it. Vessels drawing less than 15 feet often continue the **W. ½ S.** course from Stratford Shoal Light-house, passing to the northward of the black buoys off Eaton's Neck and Lloyd's Neck, and when abreast the latter steering **W.** by **S.** until past Great Captain's Island Light-house (north shore), or until Execution Rocks Light-house bears **W SW.**, then heading for the latter on this bearing.

The **Prevailing winds** in Long Island Sound are referred to on page 9. For remarks concerning **fogs** in the Sound and adjacent waters, see page 9.

TIDES IN LONG ISLAND SOUND.

The table on page 16 gives tidal data for Long Island Sound and the adjacent waters.

TIDAL CURRENTS IN LONG ISLAND SOUND.

The results of current observations at different points in Long Island Sound are given on page 17.

VARIATION OF THE COMPASS.

The variation of the compass at different points for 1888 is given on page 17.

ICE IN LONG ISLAND SOUND AND ADJACENT HARBORS.†

In ordinary winters the floating and pack-ice in this Sound, while impeding navigation, does not render it absolutely unsafe. But in exceptionally severe winters, like that of 1874–5, the reverse is the case,—none but powerful steamers being able to make their way. During that winter ice caused more general obstruction and delay in the movements of vessels of all classes here than in any other locality west of the Gulf of Maine.

The first large formation extended along the southern shore of the Sound from Eaton's Neck to Throg's Neck, and was composed of partly local and partly drift-ice. The latter (formed originally along the northern shore of the Sound) was driven across to the southern side and accumulated there,—massing into large fields and remaining until removed by southerly winds, when it would drift back to the northern shore, and increased continually in area until the whole Sound was covered; and where forced upon the shore it measured from three to twelve feet in thickness.

In the western part of the Sound these formations began to interfere with navigation about the middle of January, 1875, and thence until the 23d of March they rendered the movements of sailing vessels very uncertain and dangerous, and between February 5th and March 10th altogether impossible. From February 5th to February 23d none but powerful steamers could be forced through the ice; and between the 16th and 23d even these, with one exception, were obliged either to go outside of Long Island or discontinue their trips altogether,—the whole Sound being completely covered with heavy ice extending through The Race and as far to the eastward as Point Judith and Block Island, and outside of Montauk Point to a distance varying from five to fifteen miles from land.

Such conditions are of very rare occurrence.

New London Harbor.—The lower part of the Thames River is rarely much obstructed by ice. In extremely severe winters, however, the pack has been known to extend about 1¾ miles above the light-house. Between New London and the mouth of the river sailing vessels may navigate with comparative safety in ordinary winters; and even in severe weather there is rarely a stoppage of navigation of more than a week's duration. Steamers can nearly always enter and leave with safety. Drift-ice sometimes forms a decidedly dangerous obstruction in the approaches through Long Island Sound during severe winters, especially during February and March; and sailing vessels are much hindered in their movements during the months of January, February, and March.

New Haven Harbor.—During severe winters the accumulation of ice is local, and begins to obstruct the movements of sailing vessels in December. From that month until the latter part of March it frequently bars the ingress or

†The remarks given here concerning ice in Long Island Sound are reprinted, with some slight changes, from the Atlantic Coast Pilot, Division B—Boston to New York,—edition 1880, and are based upon an able report by Lieut. C. A. Bradbury, U. S. N., who made an examination of this subject during the very cold winter of 1874–'75.

egress of sailing vessels without the assistance of tug-boats. Except in extraordinarily severe weather, however, steamers can always enter and leave the harbor without much difficulty.

Bridgeport Harbor.—In exceptionally severe winters this harbor is liable to be completely closed to all navigation unless a channel is cut through "the pack" by ice-boats. Ordinarily the regular steamers keep the channel open.

Effect of Tides, Winds, etc., on the Ice in the Sound and the above Harbors.—In Long Island Sound northerly winds drive the ice to the southern shore of the Sound and southerly winds carry it back to the northern shore. Northeasterly winds force the ice to the westward, and cause formations heavy enough to prevent the passage of vessels of every description until the ice is removed by westerly winds. These winds carry the ice to the eastward; and if of long enough duration drive it through The Race into Block Island Sound, whence it goes to sea and disappears.

The Race may be said to be the only locality where tidal currents have any decided influence on the movements of the ice. Large quantities of "floe" ice usually pass through The Race during the ebb, especially if the wind be westerly; and in severe winters this ice causes serious obstructions in Block Island Sound and around Montauk Point. These obstructions are the most extensive about the middle of February.

Navigators must not depend too implicitly upon the light-vessels and buoys. In severe winters these are liable to be carried away; and in fact during every winter it is better to go by the ranges of the lights and other permanent objects than by the buoys. In New London Harbor winds from **E.** around by the northward to **W.** remove all drift-ice from the approaches to the Thames River; while those from **E SE.** by the southward to **W SW.** carry the ice away. The buoys in the river are not usually disturbed; but Bartlett's Reef Light-vessel is sometimes drifted from position off the mouth of the harbor and may in extreme cases remain so for several days.

In New Haven Harbor the influence of the northerly winds is to clear the harbor and its approaches unless the local formation is too heavy to be moved. Southerly winds force the drift-ice in from the Sound and prevent the local formations from leaving the harbor. Tides have little effect upon the ice.

In Bridgeport Harbor winds from **N.** to **NW.** clear the harbor of drift-ice; and those from **SE.** by southward to **SW.** force the ice into the harbor from the Sound. The outer buoys are apt to be carried out of position and the jetty damaged by heavy ice during severe winters.

THE RACE.

The Race is the main channel leading into the eastern end of Long Island Sound. From Race Point, the southwestern end of Fisher's Island, to Little Gull Island the width is about 4 miles.

Race Rock Light-house marks the northern side of the passage. Little Gull Island Light-house marks the southern side. Between these light-houses the only dangers are Valiant Rock and Little Gull Island Reef (see page 45).

There is also a narrow passage to the northward of Race Rock Light-house.

The **Tidal currents** through the Race are very strong, the velocity at strength being about 5 miles an hour, and sometimes exceeding 6 miles. The ebb current sets southeasterly and the flood sets northwesterly and westerly. The current turns from flood to ebb about 20 minutes after the moon's southing (transit), and turns to run to the westward again about 6½ hours later (see table, page 17). There is always a strong **tide-rip** in the Race except for about half an hour at slack water, during which period only is there any marked decrease in the force of the current.

Vessels approaching the Race with an adverse current often find it to their advantage to pass through near Race Rock, as the current turns here about an hour before it does in the middle of the Race. On the last of the ebb or the flood in the middle of the Race the current on either side will be running in the opposite direction.

During the ebb eddies are formed to the southeastward of Race Rock Light-house; these cover several acres. While the flood is running similar eddies are formed to the northwestward of the light-house. Small craft are sometimes seen anchored in these eddies, but they always get underway as soon as the current slacks, to avoid the danger of lying in the full strength of the current during the next tide.

Vessels attempting to beat through the Race with the current against them are often unable to get through until the tide turns.

SAILING DIRECTIONS, LONG ISLAND SOUND.

General outline of arrangement.—The following are the general headings under which the directions given for Long Island Sound are arranged:

Approaching and entering through the Race.
Through courses, the Race to Execution Rocks.
Sailing directions in detail for the Sound.
General directions for beating through the Sound.

APPROACHING AND ENTERING THROUGH THE RACE.

Courses through Block Island Sound are given in paragraphs B, pages 20–21 and 23–24. When approaching and going through the Race the guides are Race Rock Light-house, on the northern side of the Race, and Little Gull Island Light-house, on the southern side (see page 10).

I. ***From the Eastward.***—Any of the following rules may be used:

(*a*) Keep Race Rock Light-house on any bearing between **W.** ¼ **N.** and **NW.** ¼ **N.** in approaching, and pass 150 yards to ½ mile south of this light-house in going through The Race. ***Or***, approaching as just directed, pass to the northward of this light-house, giving it a berth of 200 yards or more, and leaving Race Point buoy (spar, red, No. 2) on the starboard hand; this passage is narrow, but has good water.

NOTE.—The *tidal current* turns near Race Rock about an hour earlier than it does in the middle of the Race. Vessels approaching the Race with the current against them often take advantage of this, keeping Race Rock Light-house the best aboard in passing through.

(*b*) Keep Little Gull Island Light-house on any bearing between **W.** by **S.** and **W. NW.** ¼ **W.** (through **W.**) in approaching, and pass ½ mile to 1 mile to the northward of this light-house in going through the Race.

(*c*) *In beating* keep Race Rock Light-house bearing to the northward of **W.** and keep Little Gull Island Light-house bearing to the westward of **W NW.** ¼ **W.**, in approaching. In passing hrough the Race, avoid Valiant Rock and give the light-houses a berth as directed in (*a*) and (*b*).

(*d*) *At night,* Race Rock Light and Little Gull Island Light should be made about the same time, and any of the foregoing rules may be followed. In passing through the Race, when New London Light bears **N.** if you are on, or to the westward of, a line drawn from Race Rock Light to Little Gull Island Light, you will be clear of Valiant Rock.

The ***Tidal currents*** are very strong in the Race (see the remarks immediately preceding these directions).

Dangers.—*In the passage to the northward of Race Rock Light-house* the only danger is Race Point Ledge, on the northern side of the passage. Race Rock Light-house, on the southern side of the passage, should be given a berth of 200 yards or more.

In the main passage, between the two light-houses, the only dangers are Valiant Rock, in the middle of The Race, and Little Gull Island Reef, on the southern side of the passage. *Cerberus Shoal*, the chief danger in approaching, is described on page 20.

Race Point Ledge makes out southwesterly for nearly ¼ mile from the southwestern end of Fisher's Island. It has boulders with from 3 to 9 feet over them at lowest tides; outside these is a buoy (spar, red, No. 2, in 17 feet water).

Race Rock, on the northern side of the Race, is marked by Race Rock Light-house (see page 10).

Valiant Rock, nearly in the middle of the Race, has 19 feet of water over it at mean low water, and was formerly marked by a buoy (spar, red and black horizontal stripes). The strong tidal currents were liable to change the position of this buoy,—it frequently towed under and often could not be seen except at slack water; the buoy was therefore removed. From the rock Race Rock Light-house bears **NE.** ½ **E.**, distant 1½ miles, and Little Gull Island Light-house bears **SW. Southerly**, distant 2⅛ miles.

Little Gull Island Reef extends nearly ¼ mile in a northeasterly direction from Little Gull Island Light-house, and is marked at its eastern end by a buoy (2d class nun,* black No. 1).

Little Gull Island Light-house is described in the Table of Lights, page 10; for bearings and distances from it see pages 14–15.

II. ***From the Southeastward.***—Courses through Block Island Sound are given on pages 23–24.

Having passed to the northward of Cerberus Shoal, in approaching and passing through the Race follow any of the directions given under heading I, foregoing, for vessels coming from the eastward.

Having passed to the northward of Shagwong Reef and to the *southward of Cerberus Shoal*, in approaching the Race, shape the course for Race Rock Light-house on any bearing from **N NW.** ⅝ **W.** to **NE.** ¾ **N.** (by way of **N.**), or shape the course for Little Gull Island Light-house on any bearing from **NW.** by **W.** ¼ **W.** to **N.** by **W.** In passing through the Race follow the directions of heading I, foregoing.

Dangers to be avoided when past Montauk Point and before coming up with the Race are Shagwong Reef and Cerberus Shoal (see pages 20 and 22). Dangers in the Race are described under heading I, foregoing.

SAILING DIRECTIONS, LONG ISLAND SOUND.

THROUGH COURSES FROM THE RACE TO EXECUTION ROCKS LIGHT-HOUSE.

Note.—An outline is given on page 44 of the general headings under which the directions for Long Island Sound are arranged.

(a) ***A Direct route*** through Long Island Sound is the following, which is available for vessels of less than 20 feet draught in clear weather. In thick weather it would not be used, owing to the distance at which it passes some of the important fog-signals.

*Spar-buoy in winter. See the note on page V.

With Little Gull Island Light-house bearing **S.**, distant a little more than 1 mile, make good the course **W. ½ S.** This course made good for a little more than 60 miles leads a little to the northward of the black buoy (spar, No. 13) off Eaton's Neck Light-house, and when nearing this light-house the course should be shaped so as to pass about ¼ mile to the northward of black buoy No. 13. Farther to the northward, off Eaton's Neck, there are rocky shoal spots (16 to 19 feet).

When well past Eaton's Neck Light-house, edge a little more to the northward, so as to pass ¼ mile to the northward of the black buoy (spar, No. 15) off Lloyd's Point, and when past this buoy continue the **W. ½ S.** course until Execution Rocks Light-house is made.

In approaching Execution Rocks Light-house, steer for it on any bearing from **SW.** by **W. ¾ W.** to **W SW. ½ W.** It is usual to pass to the southward of this light-house. The shoal ground making out from the light-house is marked by buoys. Directions from Execution Rocks Light-house to Throg's Neck will be found under heading V of the "Sailing Directions in detail for passing through Long Island Sound."

The ***Tidal currents*** have considerable strength, especially in the eastern part of the Sound, and allowance should be made for them (see table, page 17).

Prominent objects.—The following are some of the most prominent features passed, their distances when abeam or nearly so on the **W. ½ S.** course being given in some cases.

Left on the Port hand.	Left on the Starboard hand.
	1. Bartlett's Reef Light-vessel, about 2½ miles distant.
2. Great Gull Island.	Niantic Bay will be opened out.
3. Plum Island and Light-house, the latter about 2 miles distant.	The Connecticut River entrance will be opened out.
4. The shore of Long Island will be about 2 miles distant until you are about 7 miles to the westward of Plum Island Light-house.	
	5. Saybrook (Lynde Point) Light-house and Saybrook Breakwater Light-house, distant about 4½ miles.
	6. Cornfield Point Light-vessel, distant about 3 miles (marks the dangerous Long Sand Shoal). After passing this light-vessel Falkner's Island Light-house may be made off the starboard bow.
7. Horton's Point Light-house, distant about 4½ miles.	8. Six-mile Reef buoy, distant 2 miles (difficult to pick up).
	9. Falkner's Island Light-house, distant about 5¼ miles.
10. Friar's Head, a conspicuous high white pointed bluff, bearing **S SW.** from Falkner's Island Light-house.	
	11. Southwest Ledge Light at New Haven entrance (at night), distant about 9½ miles.
	12. Stratford Point Light (at night), distant about 7 miles.
	13. Stratford Shoal (Middle Ground) Light-house, distant nearly 2 miles.
14. Old Field Point Light-house, distant about 3 miles. About 2 miles to the westward of this light-house is Crane Neck; between the latter and Eaton's Neck is Smithtown Bay.	
	15. Penfield's Reef and Black Rock lights (at night), distant about 7 miles.

Left on the Port hand.	Left on the Starboard hand.
17. Eaton's Neck Light-house, nearly 1¼ miles distant. Pass ¼ mile to the northward of the black buoy No. 13. Shoal patches (16 to 19 feet) to the northward of the course.	16. Norwalk Island Light (at night), about 4½ miles distant.
18. Lloyd's Point, distant ¾ mile (see directions).	
To the westward of Lloyd's Point, Oyster Bay will be opened out.	19. Stamford Harbor Light (at night), distant about 4 miles.
20. Centre Island Reef buoy (spar, black, No. 17) should be left 1 mile distant on the port hand.	
	21. Great Captain's Island Light-house, distant about 3¼ miles. Greenwich church spire may show above the outline of the hills.
22. Matinicock Point, distant ⅝ mile. Pass about ½ mile to the northward of black buoy No. 19.	

Execution Rocks Light-house and Sands' Point Light-house (the latter on the south shore) should be in sight, a little on the port bow. The high red tower on David's (Davenport's) Island may be seen.

23. Pulpit (Prospect) Point should be given a berth of about ¾ mile or more.

(b) ***Or, having come through the Race, as before,*** with Race Rock Light-house bearing **E. ½ N.**, make good the course **W. ½ S.** This course made good for a little more than 49 miles from Race Rock Light-house leads a little more than 1½ miles to the southward of Stratford Shoal (Middle Ground) Light-house, the sailing line thus far agreeing nearly with that already given on the preceding page.

Now, to avoid the shoal ground off Eaton's Neck, when Stratford Shoal (Middle Ground) Light-house bears **N.**, distant about 1½ miles, make good the course **W. ½ N.** for nearly 15 miles. This should lead 1½ miles to the southward of Norwalk Island Light-house.

With Norwalk Island Light-house bearing **N.**, distant 1½ miles, shape the course **W SW.**, and proceed as directed under heading IV of the "Sailing Directions in detail for passing through Long Island Sound."

The foregoing courses (b) carry the best water through the Sound.

The *Tidal currents* have considerable strength and should be allowed for.

(c) ***Having come through the Race, and desiring to take a departure from Cornfield Point Light-vessel,*** follow the directions for the north shore given under heading I of the "Sailing Directions in detail for passing through Long Island Sound" until about ½ mile to 1 mile to the southward of Cornfield Point Light-vessel (see paragraph 1 on page 48).

Then to pass to the *northward* of Stratford Shoal (Middle Ground) Light-house, make good the course **W.** for about 12¾ miles, or until Falkner's Island Light-house bears **N.**, distant 1½ to 2 miles, when follow the directions of heading II of the detailed directions (see page 53, part A).

With Cornfield Point Light-vessel bearing **N.**, distant ½ mile to 1 mile, to pass to the *southward* of Stratford Shoal (Middle Ground) Light-house, shape the course **W. ⅞ S.**; this course made good for nearly 35 miles leads about 1½ to 2 miles to the southward of Stratford Shoal (Middle Ground) Light-house, but requires great care with deep-draught vessels on account of Six-mile Reef (19 feet). Large vessels should keep a little more to the northward or to the southward until past this reef.

In approaching Stratford Shoal Light-house, shape the course so as to pass about 1½ miles to the southward of it and then follow the directions (b) foregoing.

Six-mile Reef is directly in the track on the **W. ⅞ S.** course. This reef has a general depth of 5 to 7 fathoms. Near its western part is a small ledge about ¼ mile in diameter, over which the least water is 19 feet, 6¼ miles **W SW. ⅝ W.** from Cornfield Point Light-vessel. The ledge is marked by a buoy (3d-class nun, red and black horizontal stripes).

The *Tidal currents* have considerable strength, and allowance should be made.

SAILING DIRECTIONS IN DETAIL FOR PASSING THROUGH LONG ISLAND SOUND.

Outline of arrangement.—The detailed directions for passing through Long Island Sound are arranged under several headings, as follows: **I.** From the Race (or from Fisher's Island Sound) to Falkner's Island Light-house. **II.** From Falkner's Island Light-house to Stratford Shoal (Middle Ground) Light-house. **III.** From Stratford Shoal Light-house until abreast Norwalk Island Light-house. **IV.** From abreast Norwalk Island Light-house (north shore) and Eaton's Neck Light-house (south shore) to Execution Rocks Light-house. **V.** From Execution Rocks Light-house to Throg's Neck.

For an outline of the general headings under which the directions for Long Island Sound are arranged, see "General Outline of arrangement," page 44.

I. FROM THE RACE (OR FROM FISHER'S ISLAND SOUND) TO FALKNER'S ISLAND LIGHT-HOUSE.

Arrangement of matter.—The following arrangement is adopted under this heading: **A.** Along the north shore, passing to the southward of Long Sand Shoal (Cornfield Point Light-vessel). **Aa.** Along the north shore, passing to the northward of Long Sand Shoal. **B.** Along the south shore from the Race to Roanoke Point Shoal (on the south shore nearly abreast Falkner's Island Light-house).

A. ***Along the North Shore, passing to the Southward of Long Sand Shoal.***—If you have come through the Race, proceed as directed in paragraph 1 following. If you have come through Fisher's Island Sound, proceed as directed in paragraph 1a following.

1. ***From the Race to Cornfield Point Light-vessel.***—Directions for approaching and passing through the Race are given on pages 44–45. Having come through the Race, the course is about **W. ½ N.**, until Cornfield Point Light-vessel is made. If in coming through the Race you have favored Race Rock Light-house (on the north side of the Race), shape the course a little more southerly; if you have favored Little Gull Island Light-house (on the south side of the Race), shape the course a little more northerly.

When Cornfield Point Light-vessel (about 14 miles to the westward of the Race) is made, keep this light-vessel on the starboard bow in approaching, and pass about ½ mile to 1 mile to the southward of it.

Then to pass to the southward of Falkner's Island, follow the directions of paragraph 2 following. To pass to the northward of Falkner's Island, follow the directions of paragraph 2a following.

The ***Tidal currents*** are strong, setting to the westward on the flood and to the eastward on the ebb (see page 17).

Remarks.—New London entrance and light-house (mouth of Thames River) lie about 5 miles to the northward of the Race. On the **W. ½ N.** course Bartlett's Reef Light-vessel (about 3½ miles to the northwestward of the Race) will be left on the starboard hand; foul ground lies inshore from this light-vessel. Niantic Bay (high tower at its head) will be opened to the westward of the light-vessel. On the port hand Great Gull Island will be passed, and broad off the port bow is Plum Island (light-house on the western end of the latter will be opened out on coming up fair with it); foul ground between these two islands.

Continuing the **W. ½ N.** course, Saybrook entrance and light-house (mouth of Connecticut River) will be made on the starboard bow, and a little later the light-house on the southern end of Saybrook breakwater will be made; shoals extend off this entrance for 1¾ miles. To the southward of the course Plum Gut, to the westward of Plum Island and leading into Gardiner's Bay, will be opened.

When Saybrook Breakwater Light-house bears **NW. ¾ N.**, the opening into the passage leading to the northward of Long Sand Shoal is in range with this light-house.

When Saybrook Breakwater Light-house bears **N NW. Westerly**, the buoy (spar, red and black horizontal stripes) marking the eastern end of Long Sand Shoal is in range with this light-house.

Cornfield Point Light-vessel (described on pages 10–11, fixed red light) will be made on the starboard bow. This light-vessel, a most important guide, is moored about ¼ mile to the southward of the dangerous Long Sand Shoal, about midway of the length of the shoal.

Long Sand Shoal extends **E.** and **W.** 5¾ miles; greatest width about ⅜ mile; the depths over it are from 7 to 17 feet, bottom hard and lumpy, the lumps said to shift somewhat in position. It is claimed that with extreme low tides lumps having but 4 feet over them are sometimes to be found. The shoal is marked by Cornfield Point Light-vessel, just mentioned, on its southern side; by a spar-buoy (red and black horizontal stripes) on its eastern end; and by a 2d class nun-buoy* (red and black horizontal stripes) at its western end. From Long Sand Shoal, west end, buoy Saybrook Breakwater Light-house bears **E NE. ½ E.**, distant 5 miles; and Six-mile Reef buoy (nun, red and black horizontal stripes) bears **SW. by W.**, distant 3¾ miles.

The **Tidal currents** set strong across Long Sand Shoal; about **W NW.** on the flood and **E SE.** on the ebb.

1a. ***Having come from Fisher's Island Sound.***—Passing midway between Potter's (Seaflower) Reef beacon and North Dumpling Light-house, shape the course **W. ⅛ S.** for Bartlett's Reef Light-vessel, which is to be left on the starboard hand. When past this light-vessel bring it to bear **E. ⅝ N.** and make good the course **W. ⅝ S.**; on the flood it will be necessary to steer more southerly. The **W. ⅝ S.** course made good for a little more than 11½ miles from Bartlett's Reef Light-vessel leads nearly a mile to the southward of Cornfield Point Light-vessel. When to the southward of Cornfield Point Light-vessel follow the directions of paragraph 2 or paragraph 2a following.

The ***Tidal currents*** are strong and allowance must be made for them.

*Spar-buoy in winter. See the note on page V.

Remarks.—On the **W.** ½ **S.** course New London entrance and light-house will be passed on the starboard hand, and some of the buoys off the entrance will be made, the course leading nearly a mile to the southward of the outermost buoy. There is foul ground inshore from Bartlett's Reef Light-vessel. After passing this light-vessel Niantic Bay and the town of Niantic (high tower) will be opened out. A little later Saybrook (Lynde Point) Light-house will be made on the starboard bow; just to the southward of it is Saybrook Breakwater Light-house. The course now leads 1 to 1½ miles to the southward of the shoals making out from Saybrook Bar and of Long Sand Shoal. These dangers are described on pages 48 and 50; *on the flood* be careful to keep well to the southward of them. Cornfield Point Light-vessel, on the south side of Long Sand Shoal, will be made on the starboard bow.

2. ***From Cornfield Point Light-vessel to Falkner's Island Light-house, passing to the southward of the latter.***—With Cornfield Point Light-vessel bearing **N.**, distant from ½ mile to 1 mile, make good the course **W.** for about 12¾ miles, or until Falkner's Island Light-house bears **N.**, distant 1½ to 2 miles. From this position proceed as directed under heading II following (part A, page 53).

The ***Tidal currents*** have considerable strength; the average maximum drift is from 1 to 2 knots. On the flood, the set is to the northwestward; on the ebb, to the eastward and southeastward. To the southward of the sailing line just given the set on the ebb may be to the southward of east.

Remarks.—On this run the only dangers are Long Sand Shoal, Six-mile Reef, and the foul ground making out from Falkner's Island.

Long Sand Shoal, to the northward of the course, has been described under paragraph 1. On the flood guard against being set too far over towards the shoal. The nun-buoy* (red and black horizontal stripes) marking the western end of the shoal is sometimes difficult to pick up. From this buoy Cornfield Point Light-vessel bears **E.** ⅝ **S.**, distant about 3 miles.

Six-mile Reef, to the southward of the course, dangerous for heavy-draught vessels only, lies in the fairway of the Sound. It has a least depth of 19 feet over it and is marked by a 3d-class nun-buoy (red and black horizontal stripes), not always easy to pick up. From this buoy Cornfield Point Light-vessel bears **E NE.** ⅝ **E.**, distant about 6¼ miles; Horton's Point Light-house bears **S.** by **E.** ¼ **E.** (nearly), distant 6½ miles, and Falkner's Island Light-house bears **W NW.**, distant nearly 7¼ miles. (See also page 47.)

On the S. shore Horton's Point Light-house is passed; probably will not be distinguished; for description see pages 10–11. The light shows well at night.

On the N. shore Westbrook Harbor, Duck Island Roads, and Clinton (Killingworth) Harbor, none of them of importance to strangers, are passed. Next comes Hammonasset Point (the one projecting farthest, has boulders, rocky hillocks, white tripod, few houses) and to the westward of it the large bight off Madison; this bight is sometimes used for anchorage. See pages 41 and 51; also the separate headings for these harbors.

Falkner's Island Light-house, a little on the starboard bow, can be made out, on a clear day, while passing Cornfield Point Light-vessel or when a little farther to the westward. Falkner's Island has good water on its southern side, but a dangerous reef extends to the northward for ⅝ mile from the island. **Goose Island**, ⅝ mile to the westward of Falkner's Island, has bad rocky patches extending ⅝ to ⅝ mile from it to the northward, northeastward, and eastward, and also for ¼ mile to the southward. The **Tidal currents** set across these rocks and shoals with force and should be allowed for in approaching them; to the northward of Falkner's Island the flood sets about **W.** by **S.** at strength, to the southward of the island about **W SW.** The current turns about an hour earlier to the northward of Falkner's Island than it does to the southward; hence vessels having the current against them may often gain by going to the northward, although most vessels bound through pass well to the southward of the island.

Anchorage in the vicinity of Falkner's Island.—*With westerly winds*, protection from wind and sea can be found by anchoring under the eastern shore of Falkner's Island, in 12 to 20 feet of water, at ⅛ to ¼ mile from the shore; vessels seeking this shelter often anchor too far from the island to make a good lee, and thus, the island being small, they get the counter-swell from both sides, when by keeping closer inshore they would have smoother water. *With easterly winds*, seagoing vessels sometimes anchor to the westward of Goose Island; small craft sometimes anchor under the western side of Falkner's Island, finding there good anchorage, soft bottom, but in doing so they must be careful to avoid the reefs making out to the eastward from Goose Island, and should give the western side of the southern end of Falkner's Island a berth of 500 to 800 yards, thus keeping in depths of 10 to 18 feet.

2a. ***Cornfield Point Light-vessel to Falkner's Island Light-house, passing to the northward of the latter.***—Strangers should not attempt this passage at night, nor in thick weather. With Cornfield Point Light-vessel bearing **N.**, distant from ½ mile to 1 mile, make good the course **W.** for 3¼ miles. Then, being past the nun-buoy* (red and black horizontal stripes) marking the western end of Long Sand Shoal, steer **W NW.** ½ **W.** Pass to the northward of Kimberley's Reef buoy (spar, red and black horizontal stripes) and Falkner's Island Reef buoy (spar, black, No. 1), giving Falkner's Island Light-house a berth of ¾ mile to 1¼ miles. Then proceed as directed under heading II, part A a, following (see page 53).

Remarks.—For 3¼ miles, while on the **W.** course, the sailing line is the same as that of paragraph 2 foregoing, and Long Sand Shoal is the only danger. Note the remarks about this shoal under paragraphs 1 and 2.

On the north shore the features passed on the **W NW.** ½ **W.** course are those mentioned in referring to this shore, under paragraph 2 foregoing; but paragraph 2a carries closer inshore, the distance being from 1¼ to 1 miles; the nearest approach is off Hammonasset Point.

Several buoys along the north shore are left on the starboard hand. Kimberley's Reef buoy (spar, red and black horizontal stripes) and Falkner's Island Reef buoy (spar, black, No. 1) are left on the port hand. *Fuller description* of the north shore and its dangers will be found under paragraph 2, page 49.

Kimberley's Reef, 1⅝ miles E. ⅝ N. from Falkner's Island, has 10 feet of water over it, with 5 and 6 fathoms around it.

Falkner's Island Reef extends to the northward for ⅝ mile from Falkner's Island. Its northern end is marked by a buoy (spar, black, No. 1). The tidal currents set across this dangerous shoal with force.

A a. ***Along the North Shore, passing to the Northward of Long Sand Shoal.***—Desiring to go to the northward of Long Sand Shoal, if you have come through Fisher's Island Sound proceed as directed in paragraph 1 following; if you have come through the Race proceed as directed in paragraph 1a following. The depth of water should not be less than 21 feet.

Note.—Strangers should not attempt this passage at night, nor in thick weather. The entrance to the channel leading north of Long Sand Shoal is about 8¾ miles **W.** from Bartlett's Reef Light-vessel. This entrance, off Saybrook lights, is ⅝ mile wide, and is marked by two buoys, one on either side; the one left on the starboard hand in coming from the eastward (2d class can,* red, No. 8), is on the southern part of the sand shoal making out from Saybrook Bar mouth of Connecticut River); the one left on the port hand (spar, red and black horizontal stripes) is on the eastern end of Long Sand Shoal.

1. ***Having come from Fisher's Island Sound.***—Passing midway between North Dumpling Light-house and Potter's (Sea-flower) Reef Beacon, make good the course **W. ½ S.** for Bartlett's Reef Light-vessel, which is to be left on the starboard hand. Give this light-ve-sel a small berth; when past it, bring it to bear **E. Southerly** and make good the course **W. Northerly**, keeping the bearing.

Continue the **W. Northerly** course until up with the buoy (2d-class can,* red, No. 8) marking the entrance and placed on the southern part of the sand shoal making out from Saybrook Bar, having on this course passed about 1½ miles to the southward of Black Point and about ¾ mile to the southward of the buoy (spar, red, No. 6) marking Hatchett's Reef near the eastern end of Saybrook Bar.

In approaching the buoy marking the entrance (can,* red, No. 8) keep it bearing a little on the starboard bow. Pass to the southward of it, giving it a berth of about 200 yards, and passing to the northward of the buoy marking the eastern end of Long Sand Shoal (spar, red and black horizontal stripes). Then proceed as directed in paragraph 2 following.

The ***Tidal currents*** have considerable strength and set to the westward on the flood and to the eastward on the ebb.

Remarks.—On the **W. ½ S.** course, New London entrance and light-house will be in plain sight on the starboard beam and some of the buoys off the entrance will be made; the nearest, on Rapid Rock, will be passed ⅓ mile distant on the starboard beam. Bartlett's Reef Light-vessel will be ahead; to the northward and westward of the light-vessel, Black Point, on the western side of Niantic Bay entrance, will show conspicuously.

After passing Bartlett's Reef Light-vessel on the **W. Northerly** course, Niantic Bay and the town of Niantic will be opened out. Saybrook (Lynde Point) Light-house will be made on the starboard bow; just to the southward of it is Saybrook Breakwater Light-house (see pages 10–11). When the entrance of the Connecticut River is well open, Cornfield Point Light-vessel will be made a little on the port bow.

The dangers obstructing New London entrance are marked by beacons and buoys, all given a wide berth by the sailing-line. For fuller reference to them, see heading "Thames River and New London Harbor."

Bartlett's Reef, about 1⅝ miles long in a general **N.** by **W.** and **S.** by **E.** direction, is bare in spots at low water. It is marked by buoys and also by *Bartlett's Reef Light-vessel* (see page 10), which is moored about ⅓ mile south of the southern end of the reef.

Hatchett's Reef, about 3¼ miles **E. ¼ S.** from Saybrook Breakwater Light-house, has 5 to 10 feet over it; it is marked by two buoys. The sailing-line passes about 1 mile to the southward of it.

Saybrook Bar obstructs the mouth of the Connecticut River, is a shifting bar with depths of 4 to 16 feet; the shoals making out from it extend to the eastward as far as Hatchett's Reef, and extend in a southeasterly direction from Saybrook Breakwater Light-house for 1⅝ miles to the buoy (can,* red, No. 8) marking the southern side of the shoals and the entrance to the northern channel. From this buoy Race Rock Light-house bears **E.** by **S.** (nearly), distant a little more than 12 miles; Bartlett's Reef Light-vessel bears **E. ½ S.**, distant 8½ miles; Saybrook Breakwater Light-house **NW. ¼ W.**, nearly 1⅝ miles; Long Sand Shoal, east end, buoy (spar, red and black horizontal stripes), **W SW. ¼ W.**, ⅜ mile.

A Mid-channel buoy (spar, white and black perpendicular stripes) is placed about ½ mile to the northeastward of red buoy No. 8. Strangers should pay no attention to this mid-channel buoy, which is intended to mark a shallow channel into the Connecticut River.

When fair in the entrance to the channel leading north of Long Sand Shoal, Saybrook Breakwater Light-house bears **NW. ⅜ N.**, distant 1½ miles, and red buoy No. 8 is distant about 200 to 600 yards on the starboard hand (when entering from the eastward).

1a. ***Having come through the Race.***—From Race Rock Light-house make good the course **W.** by **N.** for 12 miles, until up with the buoy (2d-class can,* red, No. 8) off Saybrook entrance, marking the entrance to the passage which leads north of Long Sand Shoal. Pass

to the southward of this buoy, giving it a berth of about 200 yards. Then proceed as directed in paragraph 2 following.

Note the remarks under paragraph 1 immediately foregoing; the sailing-line is of course farther off shore, and the course to be steered differs.

Or, having come through the Race and being near Little Gull Island Light-house, bring this light-house to bear **E SE.** ¼ **E.** and make good the course **W NW.** ¼ **W.** for about 10 miles, keeping Saybrook (Lynde Point) Light-house and Saybrook Breakwater Light-house well on the starboard bow until well up with the buoy (2d-class can,* red, No. 8) marking the entrance to the passage which leads north of Long Sand Shoal. Then proceed as directed in paragraph 2 following.

The ***Tidal currents*** have considerable strength and proper allowance should be made.

Note the remarks under paragraph 1 foregoing, and those under paragraph 1, page 48.

1 b. ***Or, being well to the Southeastward of Saybrook entrance,*** bring Saybrook Breakwater Light-house to bear **NW.** ⅜ **N.** and steer for it, keeping the bearing. When up with the buoy (2d-class can,* red, No. 8) marking the entrance to the passage which leads north of Long Sand Shoal, proceed as directed in paragraph 2 following.

Note the remarks under paragraph 1 foregoing.

2. ***Entrance buoy to Falkner's Island, passing to the Northward of the island.***—Pass to the southward of the entrance buoy (can,* red, No. 8), giving it a berth of about 200 yards, as already directed. Now make good the course **W.** ½ **N.**, leaving the buoy (spar, red and black horizontal stripes) on the eastern end of Long Sand Shoal, about 400 yards on the port beam. The course leads about 1 mile north of Cornfield Point Light-vessel, ½ mile south of the red buoy (spar, No. 10) off Cornfield Point, ½ mile south of the spindle on Hen and Chickens, and about the same distance south of the red buoy (spar, No. 12) marking Crane Reef.

Continuing the **W.** ½ **N.** course, pass ⅜ mile south of the red buoy (spar, No. 14) on Stone Island Ledge, pass ⅞ mile south of Hammonasset Point and 1 mile north of Falkner's Island Light-house.

The ***Tidal currents*** are strong, and on the **W.** ½ **N.** course care must be taken not to be set too far over towards Long Sand Shoal on the ebb, or towards the dangers along the north shore on the flood, making allowance as necessary.

Remarks.—On the **W.** ½ **N.** course, after passing the buoy (spar, red and black horizontal stripes) on the eastern end of Long Sand Shoal, Cornfield Point will be made on the starboard bow and just to the westward the houses of Westbrook (see heading Westbrook Harbor) will be made. To the westward of Cornfield Point the land recedes to the northward, forming Westbrook Harbor and Duck Island Harbor, the latter lying between Westbrook and Clinton (see heading Clinton Harbor). Clinton is a little to the eastward and inshore from Hammonasset Point.

Fish-weirs.—The bights along the northern shore are obstructed by fish-weirs in summer, and, except in Duck Island Harbor, there are many sunken rocks in the bights and off the projecting points; there are also outlying dangers to the northward of the course of which special mention will be made. To the southward of the course is Long Sand Shoal.

Long Sand Shoal, described on page 48, is the only danger to the southward until up with Kimberly's Reef; special care should be taken to avoid it.

Cornfield Point Shoal (Mid-channel Rock), with a least depth of 3 feet, lies about ½ mile south of Cornfield Point; marked at its southeastern end by a buoy (spar, red, No. 10). There is a channel for small craft inside the buoy; strangers should never try it.

Hen and Chickens, bare in places, marked by a spindle near the southern side of the rocks, lies about ⅞ mile to the westward of Cornfield Point Shoal, and is about ⅜ mile long in an easterly and westerly direction.

Crane Reef, having a least depth of 4 feet, is ⅞ mile to the westward of the spindle marking the Hen and Chickens. A buoy (spar, red, No. 12) marks the southern side of Crane Reef.

Duck Island (small, grassy, about 10 to 15 feet high) will be seen on the starboard bow. It is surrounded by boulders.

When off Westbrook, the buoy (2d-class nun,* red and black horizontal stripes) marking the western end of Long Sand Shoal is to the southward of the course. Hammonasset Point (boulders, rocky hillocks, white tripod, few houses) will be seen on the starboard bow, and Clinton (Killingworth) Harbor will open out just to the eastward of it. Falkner's Island will be made a little on the port bow.

Stone Island Ledge, about midway between Duck Island and Hammonasset Point, lies to the southward of Stone Island and has depths of 10 to 12 feet over its southern part, which is marked by a buoy (spar, red, No. 14).

Hammonasset Point makes out shoal and should be given a berth of ¾ mile. About ½ mile to the southwestward of the point is a buoy (spar, red, No. 2).

When abreast Hammonasset Point, Sachem's Head (high, with summer houses and hotels) will be made about 7½ miles to the westward, a little on the starboard bow. Between Hammonasset Point and Sachem's Head is a long bight, near the eastern end of which is the town of Madison (see heading). Tuck's Island (small, high, rocky, covered with trees) is off Madison and close inshore. In this bight vessels sometimes find anchorage.

Charles' Reef and **Madison Reef**, marked by buoys, are in the bight off Madison and well to the northward of the sailing-line.

Kimberley's Reef (see page 50), to the southward of the course, has 10 feet over it and lies 1⅝ miles **E. ⅝ N.** from Falkner's Island Light-house; it is marked by a buoy (spar, red and black horizontal stripes).

Falkner's Island Light-house is described on page 10; bearings and distances of prominent objects from it are given on page 15. The island has shoal water making off for ⅝ mile to the eastward, and a reef extends ¾ mile to the northward from it, marked by a buoy (spar, black, No. 1). *Goose Island*, to the westward of Falkner's Island, has rocky patches showing out of water to the southward of it; shoal water also extends ½ mile to the northward of Goose Island and between it and the black buoy just mentioned (see "Falkner's Island," page 49).

Guilford Harbor (see heading) is to the eastward of Sachem's Head and to the northward of Falkner's Island. The entrance has dangers, some of which are marked by buoys. *Southwest Indian Reef buoy* (spar, red, No. 6), the outermost one, should be given a berth of at least ½ mile. *A rock* with 6 feet over it lies ⅝ mile **W SW.** from this buoy.

2 a. ***Entrance as far as Falkner's Island, passing to the Southward of the island.***—Follow the **W. ½ N.** course as directed in paragraph 2 foregoing, until Saybrook Breakwater Light-house bears **E. ¾ N.** Then make good the course **W. ¾ S.**, keeping the bearing, and leaving the buoy (nun,* red and black horizontal stripes) on the western end of Long Sand Shoal about ¾ mile distant on the port hand; the distance from this buoy to Falkner's Island Light-house is nearly 10 miles. Approaching Falkner's Island Light-house, keep it well on the starboard bow. The **W. ¾ S.** course leads nearly 1½ miles to the southward of the light-house. Then proceed as directed under heading II following (see page 53, part A).

The ***Tidal currents*** are strong; note what is said of them under paragraph 2 on the preceding page. On the **W. ¾ S.** course the tidal currents set across the course; on the flood steer more southerly, on the ebb a little more westerly.

Remarks.—The dangers, prominent objects, etc., are those described under paragraph 2 foregoing, but the course leads farther off-shore.

When abreast Hammonasset Point Falkner's Island will be on the starboard bow. Kimberley's Reef buoy (spar, red and black horizontal stripes), 1⅝ miles **E. ⅝ N.** from Falkner's Island Light-house, lies well to the northward of the course.

B. ***Along the South Shore, from the Race to Roanoke Point Shoal.***—In clear weather, having come through the Race and desiring to stand along the south shore, the following directions are available. In thick weather the south shore should be given a much wider berth.

With Little Gull Island Light-house bearing **S.**, distant 1¼ miles, make good the course **W. ½ S.**, distance 5⅛ miles, until Plum Island Light-house bears **S.**, distant about 2 miles; then change course to **W SW. ½ W.** for 25 miles, until Falkner's Island Light-house bears **N NE.** and the black buoy (spar, No. 5) on the northern end of Roanoke Shoal is 1 mile distant on the port beam. Then proceed as directed under heading II following, part B (see page 54).

A good general rule to follow is to keep at least 2 miles from the south shore between Horton's Point and Old Field Point.

The ***Tidal currents*** are strong, setting to the westward on the flood and to the eastward on the ebb. A vessel passing the opening to the westward of Great Gull Island and that to the westward of Plum Island (Plum Gut) may be drawn inshore on the ebb (see page 26).

Caution.—To the westward of Plum Island Light-house, following the **W SW. ½ W.** course, note that this course, if held too long, would lead directly for Herod's Point Shoal (5¾ miles to the westward of Roanoke Point Shoal); on the flood a vessel would overrun her reckoning, and if Roanoke Point Shoal buoy were not picked up she might stand on too far before changing course. See "Tidal currents," page 17.

Remarks.—On the **W. ½ S.** course, Great Gull Island and Plum Island will be left a little over 1 mile to the southward; foul ground between these islands. Plum Island Light-house is on the western end of the island, with the opening of Plum Gut just to the westward of it.

When the course is changed to **W SW. ½ W.**, Rocky Point will be a little on the port bow. A little broader off the port bow will be Terry's Point (round, smooth, high hill, large house on its top); back of it is Orient.

As Rocky Point is approached Horton's Point Light-house will be opened out (see pages 10–11). After passing Horton's Point Light-house there are no marked features for a long distance on the south shore by which a stranger could locate himself. Beginning about 5 miles to the westward of Horton's Point Light-house, the shore shows a succession of yellow bluffs varying in height and crowned with trees; in places the shore slopes to the water gradually, or there is a level space between the bluffs where a small stream flows into the Sound. Such features continue to Old Field Point Light-house (not reached, however, under the directions of this heading). Friar's Head shows more distinctive features than the other bluffs.

Orient Shoal, between Terry's Point and Rocky Point, is marked on its northern side by a buoy (spar, black, No. 3); the shoal has from 6 to 16 feet of water over it. From this buoy Plum Island Light-house bears **E. ½ N.**, distant nearly 5¾ miles, and Cornfield Point Light-vessel bears **N.** by **W. ¼ W.**, distant 5⅛ miles.

The Shore between Rocky Point and Horton's Point Light-house can be approached to within ⅝ mile. For a distance of 6 miles to the westward of Horton's Point the shore should be given a berth of at least 1 mile—shoals with 3 to 17 feet extending out ⅜ mile from the shore to the westward of Horton's Point.

Roanoke Point Shoal, 12½ miles to the westward of Horton's Point Light-house, makes out from the shore about 1¾ miles; the shoal has from 12 to 18 feet of water on it to within ⅝ mile of the beach, where there is a 6-foot spot. The northern end of this shoal is marked by a buoy (spar, black, No. 5). There is from 11 to 19 fathoms of water to the northward of this shoal, which is very abrupt on its northern side. From Roanoke Point Shoal buoy Horton's Point Light-house bears **E NE. ⅞ E.**, distant a little more than 12½ miles.

Friar's Head, near which Roanoke Point Shoal makes out, is prominent. Its upper part has stronger markings and a sharper point than the other bluffs near it.

II. FROM FALKNER'S ISLAND LIGHT-HOUSE TO STRATFORD SHOAL (MIDDLE GROUND) LIGHT-HOUSE.

Arrangement of matter.—The following arrangement is adopted under this heading: **A.** Along the north shore, from a position to the southward of Falkner's Island. **Aa.** Along the north shore, from a position to the northward of Falkner's Island. **B.** Along the south shore, from Roanoke Point Shoal to Old Field Point.

A. ***Along the North Shore, from a position to the Southward of Falkner's Island.***—The following directions are in continuation of those given in paragraph 2, page 49, and of those given in paragraph 2a, page 52. With Falkner's Island Light-house bearing **N.**, distant 1½ to 2 miles, steer **W. ¼ S.** This should lead fair between Stratford Point Light-house and Stratford Shoal (Middle Ground) Light-house. In passing between these two light-houses vessels drawing more than 16 feet should give the north shore a berth of at least 2¾ miles; those drawing 14 to 16 feet should give this shore a berth of at least 2 miles, and those drawing less than 14 feet should give it a berth of at least 1½ miles. Give Stratford Shoal (Middle Ground) Light-house a berth of at least 1 mile. Then follow the directions under heading III following.

The ***Tidal currents*** are moderately strong, setting to the westward on the flood, to the eastward on the ebb.

Remarks.—The dangers which lie along this part of the north shore are all given a berth of several miles by the **W. ¼ S.** course. Sachem's Head, the Thimble Islands, Branford Reef Beacon (sometimes difficult to distinguish), Branford Harbor, and New Haven entrance (about 12 miles to the westward of Falkner's Island) are passed. Fuller mention of prominent features and dangers will be found under part Aa of this heading, immediately following.

When off New Haven entrance, or a little farther to the westward, Stratford Point Light-house (on north shore) and Stratford Shoal Light-house (in mid-sound) will be made. The distance across from one to the other is 5½ miles.

Stratford Point makes out shoal for 1½ miles; a buoy (spar, red, No. 16½), in 14 feet of water, marks a 9-foot spot near the southern edge of the shoal. There are several outlying shoal spots, with 16 to 18 feet over them, from 1½ to 1¾ miles off shore and from ⅝ mile to 1 mile to the southeastward, southward, and southwestward of the red buoy just mentioned. There are also spots with 19 to 21 feet over them lying about 2½ miles off shore and bearing about **N.** by **W.** from Stratford Shoal (Middle Ground) Light-house.

Stratford Shoal (Middle Ground) extends for about ⅜ mile to the northward and to the southward of the light-house marking it, with depths of 11 to 13 feet; there are outlying shoal spots of 14 to 18 feet reaching out 1 mile to the northeastward and northward of the light-house. A buoy (spar, black, No. 1) is placed about 1 mile to the northward of the light-house to guide clear.

Aa. ***Along the North Shore, having passed to the Northward of Falkner's Island.***—Having followed the directions of paragraph 2a, page 49, or those of paragraph 2, page 51, when Falkner's Island Light-house bears **S.**, distant about 1 mile, shape the course **W.** by **S.** This course made good for about 21½ miles leads fair between Stratford Point Light-house and Stratford Shoal (Middle Ground) Light-house. In passing between these two light-houses, the former one (on the north shore) should be given a very wide berth according to draught, as noted in the directions of part A, immediately foregoing.

Or, if not drawing more than *14 feet,*—when Falkner's Island Light-house bears **S.**, distant 1 mile, make good the course **W. ¾ S.** until Stratford Shoal Light-house bears **S.**, passing nearly 2 miles to the southward of Stratford Point Light-house.

Or, if not drawing more than *14 feet, and desiring to keep closer inshore,*—with Falkner's Island Light-house bearing **S.**, distant 1 mile, steer **W. Northerly** until Southwest Ledge Light-house bears **NW.**; Townsend's Ledge buoy (spar, red and black horizontal stripes) should now be about ⅜ mile distant to the northwestward, nearly in range with Southwest Ledge Light-house. Then shape the course **W SW. ½ W.** until Stratford Shoal Light-house bears **S.**, passing about 2 miles to the southward of Stratford Point Light-house.

Remarks.—When to the westward of Falkner's Island, these courses lead to the southward of all the dangers; the third one (**W. Northerly**) keeps a little closer inshore than the others. The **W.** by **S.** course has the best water, and is available for large vessels.

On these courses Sachem's Head will be left on the starboard hand. The Thimble Islands, about 2½ miles to the westward of Sachem's Head, will be made. Branford Reef beacon will be made broad off the starboard bow; it is not easily distinguished until pretty well up with it. On a clear day, the monument on East Rock, at the head of New Haven Harbor, will be plainly seen above the outline of the hills. Branford Harbor, to the northwestward of Branford Reef beacon, will be passed. The old New Haven light-tower and the light-house on the end of the breakwater (Southwest Ledge Light-house) at entrance to New Haven Harbor will be made broad off the starboard bow.

After passing New Haven entrance, Stratford Point Light-house will be made on the starboard bow and Stratford Shoal Light-house on the port bow. As Stratford Point is approached, on a clear day, the entrances to Bridgeport and Black Rock harbors may be made to the westward of the point, and Penfield's Reef Light-house, Black Rock Light-house, and Bridgeport Harbor Light-house will be on the starboard bow, the latter nearest to Stratford Point. The light-houses are described on pages 10–13.

On the eastern side of Stratford Point is the entrance to the Housatonic River, on which are the towns of Stratford, Derby, and Shelton.

East Reef, with 11 feet over it, about ⅞ mile **S SW.** from the southernmost of the Thimble Islands, and marked by a buoy (spar, red, No. 10), is left ⅞ mile to 1⅜ miles on the starboard hand.

Branford Reef beacon is left ¼ mile to 2 miles on the starboard hand; the beacon is on the shoalest part of the reef, which extends ¼ mile to the northward and about ⅛ mile to the southward of the beacon, with depths of less than 16 feet. Depths of less than 6 feet extend 100 yards to the northward and about 75 yards to the southward of the beacon.

Townsend's Ledge, 18 feet, marked by a buoy (red and black horizontal stripes), is left ⅝ mile to 2¼ miles on the starboard hand.

Stratford Point.—Shoal water makes to the southward from this point for a distance of 1½ miles, with outlying shoal spots (16 and 18 feet) still farther off shore, (see page 53).

Stratford Shoal (Middle Ground) has shoal spots of 14 to 18 feet making out in a northeasterly and northerly direction from the light-house for nearly a mile, with shoaler water nearer the light-house. To clear these shoal spots, keep to the northward of the buoy (spar, black, No. 1) placed about 1 mile north of the light-house.

B. ***Along the South Shore, from Roanoke Point Shoal to Old Field Point.***—With the black buoy (spar, No. 5) off Roanoke Point Shoal on the port beam, distant about 1 mile, steer **W.** ¼ **N.**, keeping 2 miles off shore until nearly up to Old Field Point Light-house, which is passed, leaving it 1 mile on the port hand.

Remarks.—The south shore between Roanoke Point and Mount Misery, about 2 miles to the eastward of Old Field Point, is a line of yellowish sand bluffs covered with trees, and broken at intervals by low land where small streams flow into the Sound.

Friar's Head, about 1½ miles to the westward of Roanoke Point, is about the only feature readily recognized in this vicinity. Its upper part has stronger markings and a sharper point than the other bluffs near it.

The entrance to Port Jefferson is just to the westward of Mount Misery; between Gardiner's Bay and Huntington Bay this is the only harbor on the south shore which can be entered at low water by vessels of 7 feet draught; to enter local knowledge is necessary (see page 41, and heading "Port Jefferson Harbor").

Old Field Point when seen from the eastward appears quite low, as the land to the eastward of Port Jefferson is comparatively high. In the day time the light-house and keeper's dwelling do not show plainly until within 3½ miles of the point; they are backed by the high land of Crane Neck. A tabular description of light-houses is given on pages 10–13.

Roanoke Point Shoal is described on page 53.

Herod's Point Shoal lies about 5¾ miles to the westward of Roanoke Point Shoal, and makes out from the land for a distance of 1¾ miles; it has from 6 to 14 feet of water over it. A 6-foot spot lies 1¼ miles from the shore, and just to the northward of this shoal spot is placed a black buoy (spar, No. 7). To pass well clear of the shoal give this buoy a berth of ¾ mile on your port hand, in coming from the eastward.

A Shoal, with from 10 to 16 feet over it, lies 7 miles to the westward of the buoy on Herod's Point Shoal. This shoal is about 3 miles long in an **E.** and **W.** direction, and it extends 1¼ miles from the shore at its farthest point.

Mount Misery Shoal has from 6 to 10 feet over it, and lies to the northward of Mount Misery Point, distant about ⅝ mile from the shore. This is a small patch about ⅝ mile long in an **E NE.** and **W SW.** direction, and ¼ mile broad, marked at its northeastern end by a black buoy (spar, No. 11). There is a channel with from 13 to 18 feet of water between this shoal and the point, but it is not used except by small vessels bound in or out from Port Jefferson. There is a 17-foot spot lying about ½ mile to the northeastward of Old Field Point Light-house.

Shoal water extends to the northward from Old Field Point for a distance of nearly ⅜ mile.

III. FROM STRATFORD SHOAL (MIDDLE GROUND) LIGHT-HOUSE TO ABREAST NORWALK ISLAND LIGHT-HOUSE.

Arrangement of matter.—The following arrangement is adopted under this heading: **A.** Along the north shore. **B.** Along the south shore, from Old Field Point to Eaton's Point.

A. ***Along the North Shore.***—Vessels drawing 16 feet or more should give Stratford Point Light-house (on the north shore) a berth of at least 2¾ miles; vessels drawing 14 to 16 feet should here give the north shore a berth of at least 2 miles; vessels of less draught may give this shore a berth of 1½ miles. Give Stratford Shoal (Middle Ground) Light-house a berth of 1 mile in passing to the northward of it.

Passing to the southward of Stratford Point Light-house and to the northward of Stratford Shoal (Middle Ground) Light-house, shape the course so as to pass 1 to 2 miles to the southward of Norwalk Island Light-house.

The following courses, followed for about 15 to 16 miles, lead 1½ miles to the southward of Norwalk Island Light-house:

With Stratford Point Light-house bearing **N.** ¾ **E.**, *distant* 1½ *miles*, make good the course **W SW.** ⅝ **W. Westerly.**

With Stratford Point Light-house bearing **N.** ¾ **E.**, *distant* 2 *miles*, make good the course **W SW.** ⅞ **W.**

With Stratford Point Light-house bearing **N.** ¾ **E.**, *distant* 2¾ *miles*, being midway between this light-house and Stratford Shoal (Middle Ground) Light-house, make good the course **W.** ⅞ **S.**

With Stratford Shoal (Middle Ground) Light-house bearing **S.** ½ **W.**, *distant* 1 *mile*, make good the course **W.** ⅜ **S.**

With Norwalk Island Light-house bearing **N.**, *distant* 1½ *miles*, follow the directions of heading IV, part A, following (see page 56).

Remarks.—Stratford Point is marked on its southeastern end by Stratford Point Light-house. To the westward of Stratford Point is a bight in the northern part of which is Bridgeport Harbor and the light-house marking the entrance (see heading "Bridgeport Harbor"). A little over 5 miles to the westward of Stratford Point Light-house, in the northwestern part of the bight just mentioned, is Black Rock Harbor and light-house (see heading). Nearly 6 miles **W.** by **S. Southerly** from Stratford Point Light-house is Penfield's Reef Light-house and beacon, off the end of Fairfield Bar. Nearly 2 miles to the westward of Penfield's Reef Light-house is Pine Creek Point. To the northwestward of Pine Creek Point is a bight in which is the entrance to Mill River (Southport Harbor, see heading). About 6½ miles **W.** by **S.** from Penfield's Reef Light-house is Cockenoe's Island, the easternmost of the Norwalk Islands; this island can be distinguished by the two hillocks on its southern and eastern sides. The entrance to Saugatuck River (Westport Harbor, see heading) lies north of Cockenoe's Island. Just to the westward of Cockenoe's Island is Cockenoe's Island Harbor, which is the eastern passage into Norwalk River. Norwalk Island Light-house, on Sheffield Island, the westernmost of the Norwalk Islands, is 5¾ miles **N. Westerly** from Eaton's Neck Light-house, and is the guide into Sheffield Island Harbor (Norwalk Harbor), the western entrance to Norwalk River. The entrance to Five-mile River, a small and unimportant stream, is 1⅜ miles **NW.** by **W.** from Norwalk Island Light-house.

Stratford Point Shoal is described on page 53. Vessels drawing more than 16 feet should pass at least 2¾ miles to the southward of Stratford Point. Vessels drawing 14 to 16 feet should here give the north shore a berth of at least 2 miles. Vessels drawing less than this should give this point a berth of 1½ miles.

Stratford Shoal, in the middle of the Sound, is described on page 53. Vessels passing to the northward of the shoal should give Stratford Shoal Light-house a berth of 1 mile while it bears from **W SW.** to **S.**

Fairfield Bar is a long sand spit, bare at low water, which extends out from Shoal Point in a southeasterly direction 1½ miles. The eastern end of Fairfield Bar is marked by a beacon.

Penfield's Reef, which is a part of the shoal making out to the southeastward from Shoal Point, is to the southward of the eastern extremity of Fairfield Bar and is marked by Penfield's Reef Light-house.

Pine Creek Point Shoal extends in a southerly direction ⅝ mile from Pine Creek Point; it is marked on its southern end by a buoy (spar, red, No. 18).

Norwalk Island Shoal extends 1⅜ miles easterly from Cockenoe's Island. *George's Rock*, at the eastern end of the shoal, is awash at low water. Nearly ⅝ mile to the southward of George's Rock the shoal is marked by a buoy (can,* red, No. 20); this buoy should be left ¼ mile on the starboard hand and the islands should not be approached nearer than in 4 fathoms water.

Great Reef lies ½ mile to the southwestward of Norwalk Island Light-house, and is marked by a red spindle on its eastern side. Pass at least ¼ mile to the southward of the spindle.

Green's Ledge makes out to the westward for 1 mile from the western end of Sheffield Island; near an 8-foot spot close to its western end it is marked by a buoy (can,* red, No. 22). Passing this buoy it should be given a berth of at least ¼ mile.

Budd's Reef, small, with 27 feet over it, lies a little more than 1¼ miles **SW.** ¾ **S.** from Norwalk Island Light-house. It is not marked, and has deeper water all around it.

B. ***Along the South Shore, from Old Field Point to Eaton's Point.***—Passing about 1 mile to the northward of the black buoy (spar, No. 11) marking Mount Misery Shoal and 1 mile to the northward of Old Field Point Light-house, shape the course **W.** ¼ **N.** for about 14 miles; this should lead about 1¼ miles to the northward of Eaton's Neck Light-house and ¼ mile to the northward

*Spar-buoy in winter. See the note on page V.

of the black buoy (spar, No. 13) marking the shoal which makes off from Eaton's Point. Passing ¼ mile to the northward of black buoy No. 13, the depth should not be less than 19 feet. Farther to the northward there are shoal patches (16 to 19 feet).

Then follow the directions of heading IV, part B (see page 57).

Remarks.—Between the buoy on Mount Misery Shoal and Old Field Point is the entrance to Port Jefferson (see heading). About two miles to the westward of Old Field Point Light-house is Crane Neck Point, the eastern point of Smithtown Bay (see heading). Eaton's Neck Light-house bears **W. ¼ N.** from Old Field Point Light-house, distant 12⅞ miles.

Mount Misery Shoal is 1⅝ miles **E. ⅝ N.** from Old Field Point Light-house, and has from 6 to 16 feet of water over it. The northern end of the shoal, about ⅝ mile from the shore, is marked by a black buoy (spar, No. 11), which is placed near a 6-foot spot.

Off Old Field Point, about ½ mile to the northeastward, is a 17-foot spot which is not marked. Shoal water extends ⅝ mile in a northwesterly direction from Old Field Point and ¼ mile in a northwesterly direction from Crane Neck Point.

Stratford Shoal, in the middle of the Sound, and marked by Stratford Shoal Light-house, is described on page 53. Vessels passing to the southward of the light-house should give it a berth of at least ⅝ mile.

The shores of Smithtown Bay should not be approached nearer than 1 mile, as shoal water extends out over ¾ mile in places, except along the west shore of Crane Neck and along the east shore of Eaton's Neck; the south shore makes out shoal for a distance of over ¾ mile and the shoaling is abrupt.

To the northward of Eaton's Point are several rocky patches with 16 to 19 feet over them; to avoid them vessels should either pass not more than about ⅜ mile to the northward of the black buoy (spar, No. 13) off the point, or they should pass at least 3 miles to the northward of the Light-house, keeping closer to Norwalk Island Light-house than to Eaton's Neck Light-house.

IV. FROM ABREAST NORWALK ISLAND LIGHT-HOUSE (N. SHORE) OR EATON'S NECK LIGHT-HOUSE (S. SHORE) TO EXECUTION ROCKS LIGHT-HOUSE.

A. ***From abreast Norwalk Island Light-house.***—The distance to Execution Rocks Light-house is about 17 miles. Passing 1 to 2 miles to the southward of Norwalk Island Light-house, steer about **W SW.**, shaping the course a little more southerly or a little more westerly according to the distance from this light-house. When Execution Rocks Light-house is made steer for it, keeping it on any bearing from **SW.** by **W.** ¾ **W.** to **W SW.** ½ **W.** When nearing Execution Rocks Light-house change the course so as to pass to the southward of the light-house, passing about midway between it and Sands' Point Reef buoy (spar, black, No. 21, off Sands' Point Light-house). Stamford Harbor Light-house and Great Captain's Island Light-house are left well on the starboard hand. When past the latter the course favors the southern shore. In thick weather use the lead in passing Matinicock Point and Pulpit (Prospect) Point.

Having passed to the southward of Execution Rocks Light-house, follow the directions of heading V, page 58.

Remarks.—Just to the westward of Norwalk Island Light-house is the entrance to Sheffield Island Harbor (see heading) and to Five-mile River. About 2¾ miles to the westward of Norwalk Island Light-house is Long Neck Point, the eastern point of entrance to Darien River. About 5 miles to the westward of Norwalk Island Light-house and ¾ mile to the eastward of Stamford Harbor Light-house is Shippan Point (large yellow building—a bathing establishment—on this point in 1887). Nearly 6 miles to the westward of Norwalk Island Light-house is Stamford Harbor Light-house, at the entrance to Stamford Harbor and Mill River (see heading), and 4¼ miles to the westward of Stamford Harbor Light-house is Great Captain's Island Light-house. Midway between these light-houses is Greenwich Point, to the westward of which is the entrance to Captain's Harbor, Greenwich Cove, and Coscob Harbor. A large white hotel with red roof and 3 cupolas shows up very prominently to the westward of Coscob Harbor, bearing about **N.** by **E.** from Great Captain's Island Light-house. A tall gray spire in the town of Greenwich shows very conspicuously while in this part of the Sound; it rises well above the outline of the hills to the northward and can be distinguished farther than any other object in that direction. Between Greenwich Point and Great Captain's Island Light-house is Little Captain's Island, the western point of entrance to Captain's Harbor (see heading).

To the westward of Great Captain's Island Light-house is the entrance to Port Chester. When abreast Great Captain's Island Light-house, on a clear day, the red tower on David's (Davenport's) Island, Execution Rocks Light-house, and Sands' Point Light-house will be made to the southwestward. About 4¼ miles to the westward of Great Captain's Island Light-house is Rye Neck, the eastern point of entrance to Mill Creek and Mamaroneck Harbor (see heading). The houses on Hart Island, looking like barracks, will now be seen to the westward of Execution Rocks Light-house. Two miles to the westward of Rye Neck is Long Beach Point, the eastern entrance to Larchmont Harbor (Delancey Cove), described under a separate heading.

Dangers and aids.—*Great Reef spindle*, on the starboard hand, is an iron spindle with cage, and is placed ¼ mile **S SW.** ¼ **W.** from Norwalk Island Light-house, marking a rocky ledge.

Budd's Reef, with 27 feet of water, about 1 mile to the southwestward of Great Reef spindle, is described on page 55.

Several buoys are passed, placed off the north shore to mark the through passage in this part of the Sound. Following the directions just given, some of these buoys may be seen in very clear weather, though the course leads well to the southward of them.

Norwalk Island (west end), or Green's Ledge buoy (can,* red, No. 22) marks the western end of the ledge making off to the westward from Sheffield Island.

Smith's Rock buoy (spar, red, No. 24) is off the southern end of a ledge a great part of which is bare at low water; the ledge obstructs the western approach to Darien River entrance; the buoy is nearly 1 mile **SW. ½ W.** from Long Neck Point.

The Cows buoy (can, red, No. 26) is about 1 mile **S.** from Shippan Point, marking the southern side of the Cows, a group of detached rocks, bare at low water. About 3½ miles **S.** by **E. ¾ E.** from the Cows buoy is *Lloyd's Point Shoal buoy* (spar, black, No. 15), on the south shore (see notes under paragraph B, following).

Bluefish Reef buoy (spar, red, No. 28) will not be seen except in beating, or in following the north shore more closely than on the sailing-line here given. This buoy is about 1¼ miles **SW.** by **W. ¾ W.** from Great Captain's Island Light-house and nearly ½ mile **E NE.** from Glover's Reef; the buoy is on the outer edge of the shoal ground making out from Manursing Island.

Other buoys along the north shore, to the westward of these, are mentioned in connection with the sailing directions for Larchmont Harbor (see heading).

The buoys along the south shore are mentioned under paragraph B, following.

Execution Rocks are marked by Execution Rocks Light-house. The limits of the shoal ground are also marked by several buoys. The directions given lead to the southward of the light-house, but there is also a good channel to the northward.

On the *northern end* of the shoal ground is a spar-buoy (red and black horizontal stripes); vessels entering the southern channel should give this buoy a wide berth. On the *eastern side* of the shoal is a red spar-buoy, and on the *southwest end* of the shoal is a third spar-buoy (red and black horizontal stripes).

Vessels standing close along the north shore, with strong northerly winds, should conform to the directions for beating through this part of the Sound as given under a separate heading (see page 58–60).

B. ***Along the South Shore, from abreast Eaton's Neck Light-house.***—The distance to Execution Rocks Light-house is about 17 miles. The directions of this paragraph B should carry not less than 19 feet of water. Passing about ¼ mile to the northward of Eaton's Point Shoal buoy (spar, black, No. 13, placed about 1 mile to the northward of Eaton's Neck Light-house) make good the course **W.** for about 4¼ miles, when Lloyd's Point Shoal buoy (spar, black, No. 15) will bear **S.**, distant ⅝ mile (Stamford Harbor Light-house on the north shore will bear **N NW. ½ W.**).

Then shape the course **W SW. ½ W.** for Execution Rocks Light-house, passing about ⅜ mile to the northward of Matinicock Point Shoal buoy (spar, black, No. 19), placed about ¼ mile north of Matinicock Point. When about 1 mile distant from Execution Rocks Light-house, head so as to pass to the southward of this light-house, and proceed as directed under heading V following.

Remarks.—Eaton's Neck Light-house stands on a high bluff. To the westward of the point is Huntington Bay. About 4¼ miles to the westward of Eaton's Neck Light-house is Lloyd's Point, the eastern point of entrance to Oyster Bay; when Oyster Bay is well opened, Cooper's Bluff, seen to the southward within the bay, will show as a high yellow sand bluff with trees covering the top. About 7¼ miles to the westward of Lloyd's Point is Matinicock Point, the eastern point of entrance to Hempstead Harbor. This harbor when opened will be distinguished by four yellow sand bluffs joining each other and covered with trees on top; these bluffs are on the western shore, about midway between Mott's Point and Pulpit (Prospect) Point. When approaching Matinicock Point the red tower on David's (Davenport's) Island, Execution Rocks Light-house, and Sands' Point Light-house will be made to the westward, and the houses on Hart Island, to the westward of Execution Rocks Light-house, will be made after passing the point.

Dangers and aids.—*Several buoys* are passed on the south shore between Eaton's Neck Light-house and Execution Rocks Light-house.

Eaton's Point Shoal buoy (spar, black, No. 13) marks the shoal which makes to the northward and northeastward from Eaton's Point; depths of 2 to 6 feet are found ¼ mile to the northeastward of the light-house.

About 1 mile **NW.** from Eaton's Point Shoal buoy are several rocky patches with 16 to 19 feet of water over them, and from 1 mile to 1½ miles **N.** by **E.** from the buoy are several rocky patches, over which the least depth is 19 feet.

Lloyd's Point Shoal buoy (spar, black, No. 15) is to the northward of the shoal ground making out nearly ¾ mile northerly from Lloyd's Point; about ¼ to ⅜ mile to the northeastward of the point there are several rocks.

Centre Island Reef buoy (spar, black, No. 17), about ¼ mile off shore, is on the northwestern part of the reef making out northerly from the western point of entrance to Oyster Bay. Depths of 4 to 7 feet are found well off shore. The depth of 18 feet is found nearly ¼ mile to the northeastward of the buoy.

Matinicock Point Shoal buoy (spar, black, No. 19) is about ¼ mile to the northward of the point.

Sands' Point Reef buoy (spar, black, No. 21), nearly ¼ mile off shore, has 9 feet inside it, and 17 feet is found 250 yards to the northeastward of it. **Pulpit (Prospect) Point**, about ¾ mile to the eastward of Sands' Point, has rocky shoal ground making out nearly ½ mile from it to the northward, the most prominent boulder being the **Old Hen**, awash at low water.

V. FROM EXECUTION ROCKS LIGHT-HOUSE TO THROG'S NECK LIGHT-HOUSE.

Passing midway between Execution Rocks Light-house and the black buoy (spar, No. 21) off Sands' Point Light-house, steer about **SW.** by **W.**, heading for the houses on the southern end of Hart Island. When Execution Rocks Light-house bears **NE.** $\frac{7}{8}$ **N.**, steer **SW.** $\frac{7}{8}$ **S.**, heading for Stepping Stones Light-house and keeping on the line of these two light-houses until abreast the southern end of Hart Island. Throg's Neck Light-house will be a little open to the westward of Stepping Stones Light-house.

When abreast the southern end of Hart Island, steer a little more westerly so as to pass about $\frac{1}{4}$ mile to the northwestward of Stepping Stones Light-house, and when this light-house bears **SE.** turn to the southward, course about **S.** by **W.** $\frac{1}{2}$ **W.**, keeping Throg's Neck Light-house on the starboard bow.

Round Throg's Neck Light-house, giving it a berth of about $\frac{1}{4}$ mile in passing to the southward of it. Now conform to the general directions for the East River. If a pilot or a tow-boat has not already been taken, one should be taken before reaching Riker's Island (see "Pilots," pages 40–41, also heading "East River").

If desiring to anchor after reaching the western end of Long Island Sound, Hempstead Harbor and City Island Harbor are available and convenient (see pages 41–42; see also these headings). Farther to the westward (see heading "East River"), vessels frequently anchor on Hammond's Flats (north shore, to the westward of Throg's Neck) and also off Whitestone (south shore).

Remarks.—After passing Execution Rocks Light-house a group of islands will be seen to the northward; the high red tower is on David's (Davenport's) Island. Nearly in range and bearing about **SW.** are Gangway Rock buoy (spar, black, No. 23), Stepping Stones Light-house, and Throg's Neck Light-house. Hart Island, showing a little to the westward of this range, will be recognized by its large barrack-like building, and over Hart Island will generally be seen the masts of vessels lying in City Island Harbor (Hart Island Roads). As Hart Island is approached, Manhasset Bay (Cow Bay) will be opened on the south shore, and when past this, City Island Harbor will open to the westward of Hart Island and the wharves and ship-yards on the eastern shore of City Island will be seen. When abreast of City Island Harbor, Little Neck Bay will be open to the southward and the fort at Willet's Point (the western point at entrance to Little Neck Bay and directly opposite Throg's Neck) will be distinguished. Opposite Stepping Stones Light-house and west of City Island is East Chester Bay, shallow, forming the approach to East Chester Creek (Hutchinson's River). Fort Schuyler, the granite fort on Throg's Neck, will appear behind Throg's Neck Light-house.

Caution.—On the walls of the granite fort on Willet's Point is the following notice: *Torpedoes: don't anchor.*

Dangers and aids.—*Gangway Rock buoy* (spar, black, No. 23) and *Success Rock spindle* (red, to the southeastward of the buoy) should be left on the port hand; these aids mark the outer part of a rocky ledge making out from Barker's Point, the eastern point of entrance to Manhasset Bay.

City Island Shoal buoy (spar, red, No. 30) marks a cluster of rocks to the southwestward of the southern end of City Island; *Big Tom*, one of this cluster, is nearly bare at low water. This buoy is left well distant on the starboard hand.

Stepping Stones Light-house marks the outer part of a dangerous reef, with depths of 2 feet in places, which extends to the southeastward of the light-house, from it to the shore. The shoal ground extends nearly 200 yards to the northward and northwestward of the light-house with depths of 6 to 13 feet.

Extensive flats occupy East Chester Bay, to the westward of the course. Their eastern edge, rising abruptly, with depths of 10 to 13 feet, follows nearly the line of Throg's Neck Light-house and the southeastern end of City Island. About $\frac{1}{2}$ mile to the northeastward of the light-house and from this to the light-house the edge of the shoals extends a little farther to the eastward than the line just mentioned.

Throg's Neck Shoal buoy (spar, red, No. 32) marks a shoal making out from Throg's Neck Light-house. Pass to the southward of this buoy, giving it a berth of not less than 50 yards.

The entrance to Little Neck Bay, to the southward of the course, is shoal, the edge of the shoal ground extending to the northeastward from Willet's Point with depths of 10 and 12 feet. By keeping to the westward of the line of Stepping Stones Light-house and the fort on Willet's Point (bearing **N.** by **E.** $\frac{1}{8}$ **E.** and **S.** by **W.** $\frac{1}{8}$ **W.** from each other) you will be well to the westward of the edge of the shoal.

GENERAL DIRECTIONS FOR BEATING THROUGH LONG ISLAND SOUND.

Note.—For an outline of the general headings under which the directions for Long Island Sound are arranged, see "General Outline," page 44.

While to the eastward of Bartlett's Reef Light-vessel (see page 10), when standing to the northward go about when this light-vessel bears **SW.** by **W.** $\frac{3}{4}$ **W.**, or before, and give the northern shores a berth of at least 1 mile. Give the Gull Islands a berth of at least $\frac{1}{2}$ mile.

To the westward of Bartlett's Reef Light-vessel, in approaching the north shore, go about before this light-vessel and Race Rock Light-house come in range bearing **SE.** by **E.** $\frac{1}{4}$ **E.**; in approaching Black Point keep at least $\frac{3}{8}$ mile to the southward of it, and give the shores to the westward of the point a wide berth.

When past Great Gull Island, in standing to the southward, go about when Little Gull Island Light-house bears **E.**

To the westward of Black Point the north shore should not be approached nearer than 1¼ miles. At night, in standing to the northward, a good rule is to go about when on a line between Bartlett's Reef and Cornfield Point Light-vessels.

In passing to the southward of Long Sand Shoal, while to the eastward of Cornfield Point Light-vessel in approaching the shoal, go about when this light-vessel bears **W.**, or before; while to the westward of Cornfield Point Light-vessel, in approaching the shoal, keep this light-vessel bearing to the northward of **E.** by **N.**, going about in good time, as the water shoals suddenly. Vessels of heavy draught should avoid *Six-mile Reef* (19 feet), which lies about 6¼ miles **W SW.** ⅝ **W.** from Cornfield Point Light-vessel.

Between Plum Island Light-house and Horton's Point Light-house the south shore should be given a berth of about 1¼ miles, which will insure keeping clear of Orient Shoal.

To the westward of Long Sand Shoal you can approach the north shore until on a line between Saybrook Breakwater Light-house and Falkner's Island Light-house (bearing **E.** ¼ **N.** and **W.** ¼ **S.** from each other), and then going about; this gives the north shore a berth of not less than 1 mile. When within 1½ miles of Falkner's Island Light-house, and to the eastward of it, go about when this light-house bears **W.** ½ **N.**, and keep at least ½ mile to the southward of Falkner's Island and Goose Island until to the westward of the latter. It is not advisable for a stranger to beat through to the northward of Falkner's Island.

Between Horton's Point Light-house and Duck Pond Point, about 4½ miles to the westward of the former, the south shore should be given a berth of at least 1½ miles. Between Duck Pond Point and Roanoke Point Shoal the shore can be approached to within a mile, going about when in 6 fathoms, but near Roanoke Point Shoal, or when Falkner's Island Light-house bears between **N.** by **E.** and **N NE.** ¼ **E.**, keep off shore at least 1¾ miles; the lead cannot be depended on to keep clear of Roanoke Point Shoal, as it rises abruptly on its northern side.

Being to the westward of Falkner's Island Light-house, distant 1½ miles or more, go about when this light-house bears **E.** ½ **S.**, and so continue until past Townsend's Ledge, or until Southwest Ledge Light-house (on breakwater at New Haven entrance) bears **NW.**, when the north shore can be approached until Stratford Point Light-house bears **W SW.** ½ **W.** *Or*, being to the westward of Falkner's Island Light-house, in approaching the north shore go about on shoaling the water to 8½ fathoms, and so continue until past New Haven entrance. *The southern side of Stratford Point* should be given a berth of 2 miles or more, according to draught (see page 53), and give the northern and eastern side of Stratford Shoal (Middle Ground), marked by a light-house, a berth of 1 mile.

To the westward of Roanoke Point a stranger should give the south shore a berth of at least 2 miles until within 5 miles of Old Field Point, when the shore may be approached to within 1 mile. At night, go about when Old Field Point Light bears **W.** until within 2 miles of the light, and then go about when Eaton's Neck Light bears **W.** ¼ **S.** Keep at least ½ mile to the southward of Stratford Shoal (Middle Ground) Light-house in passing south of it.

When to the westward of a line between Stratford Shoal Light-house and Bridgeport Harbor Light-house, go about when Penfield's Reef Light-house bears **W.** by **S.**, and do not approach Penfield's Reef Light-house closer than ¾ mile from the southwestward. When 1 mile or more to the westward of Penfield's Reef Light-house, go about when this light-house bears **E NE.**

In passing the Norwalk Islands, in standing to the northward, do not approach Cockenoe's Island (see page 55) nearer than 1½ miles, and give the other islands of the group a berth of ¾ mile or more. Very large vessels should avoid Budd's Reef (27 feet over it, see page 55).

Between Old Field Point and Crane Neck Point the south shore can be approached to within ½ mile, but the south shore of Smithtown Bay should be given a berth of not less than 1 mile. In beating, no stranger should approach Eaton's Neck Light-house nearer than 1 mile. At night, in standing to the southward while between Old Field Point Light-house and Eaton's Neck Light-house, go about when the former bears **E.** ¼ **S**, or when the latter bears **W.**, and give Eaton's Neck Light-house a berth of at least 1 mile.

Off Eaton's Neck there are rocky patches having 16 to 19 feet over them, and covering a considerable area. These extend to the northward nearly to the middle of the Sound, and deep-draught

vessels beating through should keep in the northern part of the Sound in passing between Norwalk Island Light-house and Eaton's Neck Light-house.

Being to the westward of Norwalk Island Light-house, keep this light-house bearing to the northward of **NE.** by **E.** ¾ **E.** until past Stamford Harbor Light-house, and then keep Great Captain's Island Light-house bearing to the northward of **W.**, and do not approach it nearer than ¼ mile in passing.

When to the westward of Great Captain's Island Light-house, keep it bearing to the northward of **NE.** ½ **E.**, and so continue until Execution Rocks Light-house is made; this clears the dangers along this part of the north shore, giving them a good berth.

When to the westward of Eaton's Point, the eastern shore of Huntington Bay for a mile to the southward of the point can be approached to within ¼ mile, but give the shores on the western side of the entrance a berth of ¾ mile or more, between East Point and Lloyd's Point. When past the black buoy (spar, No. 15) off Lloyd's Point, give Centre Island Point, the northern point on the west side of Oyster Bay entrance, a berth of at least 1¼ miles, keeping well to the northward of the black buoy (spar, No. 17) which marks Centre Island Reef. The shore to the westward of Centre Island Reef buoy (spar, black, No. 17) should not be approached closer than ¾ mile until past the black buoy (spar, No. 19) off Matinicock Point; or, at night, go about when Execution Rocks Light bears **W SW.** ½ **W.** The eastern shore of Hempstead Harbor should not be approached closer than ¼ mile, as the water shoals rapidly within that limit; give the western shore of this harbor a berth of ½ mile, and give Pulpit (Prospect) Point a berth of ¾ mile.

If you do not desire to beat through to the westward of Execution Rocks Light-house, where the room available for beating is much narrowed, good anchorage can be found in Hempstead Harbor.

In approaching Execution Rocks Light-house, if bound through to the westward, keep this light-house bearing from **SW.** by **W.** ¾ **W.** to **W SW.** ½ **W.** Pass to the southward of this light-house, being guided by the buoys marking the limits of Execution Rocks and by the black buoy (spar, No. 21) off Sands' Point.

To the westward of Execution Rocks Light-house, be guided by the buoys and by the directions on page 58.

THAMES RIVER AND NEW LONDON HARBOR.†

The Thames River flows into the eastern end of Long Island Sound, to the northwestward of the western end of Fisher's Island Sound. The entrance forms New London Harbor, the most important harbor of refuge in this part of Long Island Sound; vessels of the deepest draught find anchorage here in any weather. The river is buoyed to Norwich, 13 miles above its mouth, and is navigable to Norwich by vessels of 10 feet draught; vessels of the deepest draught can go up to the U. S. Naval station, 2 miles above New London. The channel below Norwich is being improved under government appropriations; it is proposed to make a channel 200 feet wide and 14 feet deep up to the wharves at Norwich.

A very large draw-bridge is to cross the river at New London, and work upon it has now begun (1888). Its western end will be at Winthrop's Point (upper part of New London). This bridge will carry a double track of the New York, Providence and Boston railroad (Shore Line route); there will be two very large draw-openings, each of which is to have a width of 225 feet.

New London, a city on the west bank of the river, 2 miles above the mouth, has considerable trade by water, principally coal, brought mostly in vessels owned elsewhere. The average draught of vessels trading to New London is about 14 feet; 8 to 17 feet can be taken alongside the wharves.

Groton, a village on the east bank, opposite New London, has several granite quarries.

The **U. S. Naval Station** is situated on the east bank, about 2 miles above New London.

Norwich, a city at the head of navigation on the Thames River, at its junction with the Shetucket and Yantic rivers, is about 11 miles above New London. Norwich has considerable trade in coal, iron, and merchandise, carried principally in transient vessels. The heaviest draught going to Norwich is 10 feet, the usual draught is not more than 9 feet; depths of 8 to 15 feet of water are found alongside the wharves. There is a daily line of steamers running between New York and Norwich when the river is not closed by ice. **Thamesville** is a suburb of Norwich, about 1 mile below the city, on the west bank. Sailing vessels bound up the river generally take a tow-boat at New London. Strangers always take a pilot or a tow-boat.

The Entrance to the Thames River, or to New London Harbor, is between Avery's Point on the east and Lighthouse Point on the west; its least width is ¼ mile, abreast Eastern Point, just inside the entrance.

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†Shown on the following Coast and Geodetic Survey charts: **359**, New London Harbor and entrance to Thames River, scale $\frac{1}{20,000}$, or 1 mile = 3.648 inches, price $0.20; **359 a**, Thames River, New London to Norwich, scale $\frac{1}{20,000}$, price $0.50. The lower part of the river, including New London Harbor, is shown on charts **114** and **114 a**. See the foot-note on page 9.

Entrance to New London Harbor from the Southward, New London Lt.Ho. bearing N. ½ E, distant 3¼ Miles.

Prominent objects seen from the southward are New London Light-house (see page 10), the monument at Fort Griswold on the east bank, and Fort Trumbull on the west bank. Above Fort Trumbull the spires and houses of New London appear. The Shore Line railroad bridge, which is to span the river at New London, will become a prominent feature as the work progresses.

The Channel, as far up as the U. S. Naval station, is straight with a least depth of 24 feet, and follows the eastern shore; it is ½ mile wide at the entrance, and contracts gradually to 200 yards abreast the Naval station; above this the channel is narrow and crooked, with several bars, and although buoyed is unfit for strangers. For a distance of three miles below Norwich the channel has been dredged, and training walls have been constructed to maintain a depth of 10 feet at low water. Further dredging is to be done, under government appropriations, to obtain a depth of 14 feet.

Pine Island Channel, at the entrance, leading in from the eastward close along shore, is often used by those who are well acquainted with its dangers, if they have come through Fisher's Island Sound in small vessels. Strangers should never use it. *An inshore Channel* also leads into the entrance from the westward; it is dangerous, is only available for very small vessels, and strangers do not attempt it.

Anchorage.—Vessels anchoring in New London harbor come to at will anywhere in the channel, from the mouth of the river up to New London; a good rule is to keep to the eastward of a line drawn from the wharf at the Pequot house (W. bank, near mouth) to Winthrop's Point (W. bank, upper part of New London), and to give the eastern shore a berth of 200 yards.

Vessels of light draught, 7 feet or less, can anchor in Green's Harbor by keeping 250 yards from the western shore when abreast the Pequot house, and following the western shore at not less than that distance.

Vessels of 12 feet draught or less will find good anchorage in 14 feet water, soft bottom, between Fort Trumbull and the city of New London, favoring the latter. Many vessels anchor off New London.

Above New London anchorage is found anywhere in the channel.

Pilots are not generally employed by strangers, but if one is desired he may be had by making signal and coming to anchor outside of the entrance until boarded. Strangers bound to Norwich take a pilot at New London, anchoring off the city with signal set until boarded.

Pilotage is compulsory for all vessels in foreign trade drawing 9 feet of water and over, if spoken. At present (1887) the pilot fees are as follows: $2 per foot draught of vessels between March 20 and September 20, and $2.40 per foot between September 20 and March 20.

Extracts from the laws of Connecticut relating to pilots and pilotage will be found in Appendix II.

Tow-boats will be found at New London, and when likely to be needed will be found near the entrance. Strangers entering do not require a tow-boat unless with a head wind and contrary tide. Vessels bound up the river to Norwich generally take a tow-boat at New London.

Quarantine regulations for New London are prescribed as necessary by the local board of health (see Appendix II). Quarantine is in force from April 1 to November 1, and during this period all vessels arriving from foreign ports and from domestic ports south of the capes of Virginia, must anchor with New London Light-house bearing to the northward of W. until boarded by the health officer.

At all seasons, vessels from infected ports or having sickness on board must anchor outside the same limit until boarded by the health officer. The foreign trade of New London being small, the health officer seldom has occasion to board vessels; his fee for this service when performed is $5.00.

The **Marine Hospital** at Staten Island, N. Y., is the nearest one. Seamen entitled to treatment are furnished transportation to it when necessary; otherwise they are treated by an acting assistant surgeon of the Marine-hospital service at New London quarters, subsistence, and nursing being provided when required. (See Appendix IV).

Harbor regulations.—No special harbor regulations are in force for New London Harbor, except that a clear passage across the river must be left for the railroad ferry between New London and Groton; this is above the usual anchorage. The harbor master has authority to berth vessels, shifting them if necessary, but occasion for doing so seldom arises.

Supplies.—Coal for steamers can be had alongside the wharves at New London and at Norwich, or in lighters in the stream at New London. Water can be obtained from water-boats at New London, or alongside the wharves at New London and at Norwich; provisions and ship-chandler's stores at New London and at Norwich.

New London is available as a coaling port for large vessels; to the eastward the nearest one for such vessels is Newport, R. I., to the westward, New York.

Repairs to vessels and to machinery of steamers can be made in New London, where there are 5 or 6 marine railways; the largest has a capacity of 500 tons (register tonnage), and can haul out a vessel of 125 feet keel. Noank is the nearest place where larger vessels can be hauled out (see page 42).

The Public landing is at the wharf below Union railroad depot, New London.

Wind-signals are displayed from a staff on the custom-house on Bank street, New London (see page 16 and Appendix III).

Buoy depot.—One of the depots of the Third Light-house District (see page 9) is at the custom-house wharf, New London; this is also the headquarters of one of the steamers used as light-house tenders.

Communication between New York and New London is by two daily lines of steamers and by the Shore Line railroad. The northern division of the Vermont Central railroad makes northern connections.

Ice does not endanger navigation; it seldom forms below the U. S. Naval station. Above the Naval station ice obstructs navigation about two months each year (see also page 43).

Freshets usually occur in the river during February and March.

Currents.—The tidal currents follow the general direction of the channel and are not usually strong. During freshets and when the river is high the resulting current sometimes has considerable strength, and vessels are often embarrassed in light winds, after getting in past the light-house, by a strong surface current setting out even on the flood.

Tides.—The mean rise and fall of tides is 2.6 feet; corrected establishment $9^h\ 29^m$. For other tidal data see page 16.

The **Variation of the compass** in New London Harbor for 1888 is **10° 15′ W.**, with an annual increase of about **3¼′**.

Consult also pages 9–17 and 40–44.

TIDAL CURRENTS OFF NEW LONDON ENTRANCE.

Locality.	Second Quarter.		Third Quarter.		Flood or Ebb.
	Set.	Drift.	Set.	Drift.	
1½ miles S. by E. ½ E. from New London Light-house	W. ½ N	1.00	W. ¾ N	1.05	Flood.
	E NE. ¾ E	1.05	NE. by E. ¾ E	1.15	Ebb.
Near Bartlett's Reef Light-vessel	W. ½ N	1.50	W NW. ½ W	2.00	Flood.
	E. ¼ S	1.80	W. Southerly	1.25	Ebb.

The observations for currents were made, as far as possible, when the influence of the wind was small. The bearings are magnetic; the drift in nautical miles per hour.

SAILING DIRECTIONS, NEW LONDON HARBOR.

I. FROM THE EASTWARD, HAVING COME THROUGH THE RACE.

Directions for approaching the Race are given on pages 20–21 and 23–24; see also page 45. Vessels may pass either to the northward or to the southward of Race Rock Light-house, giving it a berth of at least 150 yards and being careful not to be swept closer by the tidal current.

1. ***The Race to New London entrance.***—When through the Race turn to the northward, and steer for New London Light-house on any bearing from **N. ½ E.** to **N NW.**, keeping between these limits. This leads to the eastward of Sarah's Ledge buoy (spar, red and black horizontal stripes) and leads to the westward of Black Ledge beacon (stone, with red spindle and double-cone cage), and Southwest Ledge buoy (spar, red and black horizontal stripes); several other buoys are also passed to the eastward and to the westward.

Or, with Race Rock Light-house bearing **S. by E. ¼ E.** directly astern, steer **N.** by **W. ¼ W.** for New London Light-house directly ahead, keeping on this line.

The ***Tidal currents*** are strong and allowance must be made for them.

Remarks.—Standing for the entrance, with New London Light-house ahead as directed, there will be seen on the starboard bow the high granite monument at Groton, opposite New London, and Black Ledge beacon; farther to the eastward are Potter's (Sea-flower) Reef beacon and North Dumpling Light-house, at the western end of Fisher's Island Sound, and showing open to the northward of Fisher's Island. Broad off the port bow Bartlett's Reef Light-vessel (a little more than 4 miles **NW.** by **W.** from Race Rock Light-house) will be made.

When within 2 miles of New London Light-house the buoys marking the dangers on both sides of the entrance will be readily picked up by day.

Sarah's Ledge (Mercer's Rock), marked by a buoy (spar, red and black horizontal stripes), has fifteen feet of water over it, and is about 1¼ miles **S.** by **W.** from New London Light-house; the buoy is on the western side of the ledge, which is about 80 yards long **N.** and **S.** To the southwestward and to the northwestward of Sarah's Ledge buoy are other buoys marking dangers mentioned under heading II, following.

Black Ledge, to the eastward of the course, is marked by a large granite beacon (with red spindle, having double-cone cage), by a red buoy (can,* No. 2) at its southwestern end, and by a black buoy (spar, No. 1, colored and numbered as a Pine Island channel buoy) on its northern side. The ledge has 2 to 17 feet of water over it and extends ⅝ mile **N.** and **S.** and ¼ mile **E.** and **W.** The beacon is on the western part of the ledge and is nearly 1¼ miles **SE. ¼ S** from New London Light-house.

Southwest Ledge, to the eastward of the course, is marked by a buoy (spar, red and black horizontal stripes), has 7 feet of water over it, and is about 150 yards long **NE.** by **N.** and **SW.** by **S.**

*Spar-buoy in winter. See note on page V.

2. ***Entering and proceeding up the river.***—When New London Light-house is about ¾ mile distant, Black Ledge beacon and Southwest Ledge buoy (spar, red and black horizontal stripes) will come in range on the starboard hand bearing about **E.** by **S.** Now shape the course so as to pass about ¼ to ½ mile to the eastward of the light-house (or, go midway between the light-house and the eastern shore) and stand up the river, course about **N.** ½ **E.**, favoring the eastern shore but giving it a berth of 200 yards. Anchor at discretion. Consult "Anchorage" and "Quarantine regulations," page 61.

If bound to the Naval station, favor the eastern shore and be guided by the chart.

If bound to Norwich, take a pilot or a tow-boat.

Remarks.—Frank's Ledge buoy (spar, red and black horizontal stripes), to the northward of Black Ledge, is on the starbord bow, and nearly ⅝ mile beyond it is Black Rock, an islet lying off the eastern shore. When fair between New London Light-house and Black Rock, heading about **N.** ½ **E.**, the monument at Groton, opposite New London, will be a little on the starboard bow. Fort Trumbull, with the city of New London beyond, will be a little on the port bow. In the distance Winthrop's Point will be nearly ahead; at this rather low point, showing as the land's end and just beyond New London, is to be the western end of the new railroad bridge, and there is now (1888) at the extreme end of the point a wharf used by the construction party; piles are being driven in the middle of the river for a pier of the new bridge. Green's Harbor will show open to the southward and southwestward of Fort Trumbull; several small islands and rocks extend to the southward in a broken line from the fort.

Frank's Ledge, marked by a buoy (spar, red and black horizontal stripes), is small, has a least depth of 13½ feet over it, and is ⅝ mile **N NW. Northerly** from Black Ledge Beacon.

Black Rock is a high rock, out of water, lying nearly ¼ mile **S SE.** from Eastern Point.

A rock with 3 feet over it lies about 200 yards **NW.** from the western end of Black Rock; just outside the depth is 18 feet or more.

The Western shore, for ½ mile to the southward and the same distance to the northward of New London Light-house, has a number of scattered rocky heads; all of them will be avoided by giving the shore in this vicinity a berth of 400 yards.

Farther to the northward, but to the southward of Fort Trumbull and to the westward of the channel, are *Hog's Back, White Rock, Goose* and *Powder islands*, and *Melton's Ledge.*

Hog's Back, a small rocky ledge in Green's Harbor, not marked, has a least depth of ¼ foot, and lies about ⅝ mile **S.** ⅝ **W.** from the southeastern end of Fort Trumbull.

White Rock, an islet, lies about 200 yards **NE.** from Hog's Back and about 350 yards **S SW.** ¼ **W.** from Melton's Ledge buoy.

Melton's Ledge, marked by a buoy (spar, black, No. 7), has ½ foot of water over it, and is about 400 yards **S SE.** ¼ **E.** from the southeastern end of Fort Trumbull and about 150 yards to the eastward of Powder Island.

Powder Island and **Goose Island**, both small, are to the southward of Fort Trumbull and close in with the northern shore of Green's Harbor.

1a. FROM THE EASTWARD, HAVING COME THROUGH FISHER'S ISLAND SOUND.

Directions for Fisher's Island Sound are given on pages 34–36.

When Potter's (Sea-flower) Reef beacon bears **N.**, distant about ⅜ mile, steer **NW.** by **W.**, heading so as to pass about ¼ mile to the southward of Black Ledge beacon.

Leave about 250 yards on the starboard hand the buoy on southwest point of Black Ledge (can,* red, No. 2), and also Southwest Ledge buoy (spar, red and black horizontal stripes). Round Southwest Ledge buoy, giving it a good berth on the starboard hand, and stand to the northward, following the directions of paragraph 2, heading 1, foregoing.

The ***Tidal currents*** have considerable strength.

Remarks.—On the **NW.** by **W.** course Black Ledge beacon, New London Light-house, and the entrance to the harbor will be a little on the starboard bow. To the eastward, Pine Island and Groton monument will show, the latter over the land. On the port bow Bartlett's Reef Light-vessel should be made; this light-vessel bears **W.** ¾ **S.**, distant 4¼ miles from Potter's Reef beacon.

The Dangers to be considered, etc., have been described under heading I, foregoing.

II. ***From the Westward, intending to go to the Southward of outlying dangers.***—Passing about 250 yards to the southward of Bartlett's Reef Light-vessel, steer **E.** by **N.** for ½ mile, heading for Potter's (Sea-flower) Reef beacon. Then make good the course **NE.** by **E. Easterly** for about 2¼ miles, heading for Black Ledge beacon; this course leads about 250 yards to the southward of Rapid Rock buoy (spar, red and black horizontal stripes) and the same distance to the southward of Sarah's Ledge buoy (spar, red and black horizontal stripes). When the entrance is well opened out, or when New London Light-house bears to the westward of **N.**, turn to the northward and keep the light-house bearing between **N.** ½ **E.** and **N NW.** until abreast Black Ledge beacon and Southwest Ledge buoy

(spar, red and black horizontal stripes) on the starboard hand. Pass about $\frac{1}{8}$ to $\frac{3}{8}$ mile to the westward of Southwest Ledge buoy and follow the directions given in paragraph 2 of heading I, foregoing, page 63.

Or, passing about 250 yards to the southward of Bartlett's Reef Light-vessel, steer **E.** by **N.** for $\frac{1}{2}$ mile. Then steer **E NE.**, and keep Bartlett's Reef Light-vessel bearing to the westward of **W SW.** Proceed thus until New London Light-house bears to the westward of **N.** Then turn to the northward, and keep New London Light-house bearing between **N.** $\frac{1}{2}$ **E.** and **N NW.** until abreast Black Ledge beacon and Southwest Ledge buoy, both left on the starboard hand, when follow the directions given in paragraph 2 of heading I, foregoing.

The ***Tidal currents*** have considerable strength and must be allowed for.

Remarks.—When 250 yards to the southward of Bartlett's Reef Light-vessel, heading **E.** by **N.**, Potter's (Seaflower) Reef beacon will be ahead, North Dumpling Light-house a little on the starboard bow, Fisher's Island to the southward of this light-house, and Race Rock Light-house just to the southward of Fisher's Island. Black Ledge beacon will be a little on the port bow, and New London Light-house, to the northward and westward of the beacon, will be broad off the port bow. As Black Ledge beacon is approached the harbor will open out to the eastward of New London Light-house.

Extensive Shoal grounds make out from and inclose Goshen Point, to the northeastward of Bartlett's Reef Light-vessel and to the southwestward of New London Light-house, about midway between the two. Black buoys Nos. 1, 3, and 5 mark the southern edge. *Rapid Rock* and *Sarah's Ledge*, both buoyed, are outlying dangers to the southward and southeastward of these shoal grounds. The course leads to the southward of all these dangers.

Rapid Rock, marked by a buoy (spar, red and black horizontal stripes), has 13 feet of water and lies nearly $\frac{7}{8}$ mile **S SE.** from Goshen Point.

Sarah's Ledge (Mercer's Rock), marked by a buoy (spar, red and black horizontal stripes), has 15 feet of water and lies about $1\frac{1}{4}$ miles **S.** by **W.** from New London Light-house. The buoy is on the western side of the ledge, which is about 80 yards long in a **N.** and **S.** direction.

Southwest Ledge and **Black Ledge**, both left on the starboard hand, are described under heading I.

II*a*. ***From the Westward, passing North of Rapid Rock and Sarah's Ledge.***—The following directions are available by day, at any stage of the tide, for vessels drawing 15 feet or less. Pass Bartlett's Reef Light-vessel close-to, and when past this light-vessel bring it to bear **SW.** by **W.** $\frac{1}{8}$ **W.** over the stern and make good the course **NE.** by **E.** $\frac{1}{8}$ **E.**, keeping the bearing. This course continued for $1\frac{3}{4}$ miles from the light-vessel leads well to the southward of Little Goshen Reef buoy (spar, black, No. 1), and leads fair between Goshen Reef buoy (spar, black, No. 3) and Rapid Rock buoy (spar, red and black horizontal stripes); continued for $\frac{5}{8}$ mile farther, the **NE.** by **E.** $\frac{1}{8}$ **E.** course leads fair between the black buoy (spar, No. 5) marking a ledge off Cormorant Rock and the buoy (spar, red and black horizontal stripes) marking Sarah's Ledge.

When up with Sarah's Ledge turn more to the northward and leave Southwest Ledge buoy (spar, red and black horizontal stripes) on the starboard hand, following the directions given in paragraph 2 of heading I.

The ***Tidal currents*** have considerable strength and must be guarded against.

Note the descriptions of dangers, etc., under heading II. On the **NE.** by **E.** $\frac{1}{8}$ **E.** course Rapid Rock and Sarah's Ledge are left on the starboard hand. The shoal grounds off Goshen Point are left on the port hand; Little Goshen Reef, Goshen Reef, Cormorant Rock, and the ledge off it are parts of these shoal grounds.

Little Goshen Reef, marked near its southern end by a buoy (spar, black, No. 1), has a least depth of $2\frac{1}{2}$ feet; the buoy is in 15 feet of water and is $1\frac{1}{2}$ miles **NE.** $\frac{1}{4}$ **N.** from Bartlett's Reef Light-vessel.

Goshen Reef, marked at its southern end by a buoy (spar, black, No. 3), has 10 feet of water over it, and is nearly $\frac{5}{8}$ mile **S SE. Easterly** from Goshen Point.

Cormorant Rock, showing out of water, is $\frac{1}{2}$ mile **E.** $\frac{1}{4}$ **S.** from Goshen Point. A buoy (spar, black, No. 5) is placed $\frac{1}{4}$ mile **E SE.** from Cormorant Rock; the buoy is in 15 feet of water and marks the eastern end of ledge.

NIANTIC BAY AND RIVER.†

Niantic Bay, lying $4\frac{1}{2}$ miles to the westward of Thames River entrance (New London Harbor), is a good anchorage, sheltered against winds from **W.**, through **N.**, to **E.** It is important as a harbor of refuge, and is often available for vessels unable to get into New London Harbor (see also page 41). From 25 to 30 feet of water will be found just inside of Black Point (the western point of entrance to the bay), the water shoaling gradually to the northward; the 12-foot curve extends a little over $\frac{1}{4}$ mile from the shore at the head of the bay. The entrance is $1\frac{1}{4}$ miles wide, and the most dangerous shoals are marked by buoys.

Prominent objects—Points of entrance.—The chief guide in approaching is Bartlett's Reef Light-vessel (see page 10). The most prominent mark in entering is a high white tower in Niantic, at the head of the bay. *Black Point*, the western point of entrance, is high and flat, showing a steep side to the southward. *Mill-stone Point*, the eastern

† Niantic Bay is shown on Coast and Geodetic Survey charts 114 and 114a. See the foot-note on page 40.

point of entrance, is rocky and irregular in shape; a stone quarry (workings near the end of the point) will be distinguished from the southward.

Niantic, on the Shore Line Railroad, is at the head of the bay. It is of little commercial importance; stone (quarried here) and coal, brought for consumption in the vicinity, comprise the cargoes carried in vessels trading here. The depth alongside wharf at Niantic is 9 feet at mean low water.

Niantic River, shallow and unimportant, flows in to the head of the bay through a narrow gut crossed by two bridges, one the Shore Line Railroad bridge and the other carrying the county road. Above the gut the river widens, and 1½ miles from the bridge a branch makes off in a **N NE.** direction; the main river continues **N.** to the village of **East Lyme**, about 4 miles above the entrance. Vessels of 7 feet draught go up the river as far as East Lyme, crossing the bar and passing through the bridges near the time of high-water slack. The width of the draw in the county road bridge is 27 feet; the other is wider.

Pilots and tow-boats.—Strangers bound into the river take a pilot at Niantic, anchoring in the bay until one comes on board in response to signal. Tow-boats are sometimes used by vessels bound to East Lyme; they may be had from New London.

Ice closes navigation in the river during the winter.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, NIANTIC BAY.

I. ***From the Eastward, having come through Fisher's Island Sound or through the Race.***—Directions for Fisher's Island Sound are given on pages 34–36; directions for approaching the Race are given on pages 44 and 45; see also pages 50–51.

Steer for Bartlett's Reef Light-vessel and pass 200 yards to the southward of it; then steer about **NW.**, leaving Bartlett's Reef buoy (spar, red, No. 4) on the starboard hand. You can anchor at discretion on the **NW.** course.

Desiring to stand farther up the bay, continue the **NW.** course for 2¾ to 3¼ miles until the high white tower at Niantic bears between **N.** and **N.** by **E.** ¾ **E.**, then steer for the tower, keeping it between these bearings. Anchor according to draught; 16 feet of water will be found ½ mile from the northern shore of the bay; do not go farther inshore. If bound into the river take a pilot.

At night, when to the westward of Bartlett's Reef Light-vessel, keep Race Rock Light showing open to the southward of Bartlett's Reef Light-vessel (see page 10). Continue thus until Little Gull Island Light bears **S SE.**, when steer **N NW.**, keeping this bearing, and anchor as soon as the water shoals to 20 feet (low water).

The ***Tidal currents,*** until well within the bay, have considerable strength.

Remarks.—On the **NW.** course the red buoy on the southern end of Bartlett's Reef (spar, No. 4, about ¼ mile to the northwestward of the light-vessel) and Two-tree Island, will be left on the starboard hand. Three-foot Rock buoy (spar, black, No. 5), on the western side of the bay, will be directly ahead. Black Point, the western point of Niantic Bay, will be on the port bow; the white tower (high, very prominent) and the houses in Niantic on the starboard bow. There are no dangers on the port hand in approaching from the eastward while on the **NW.** course.

Bartlett's Reef, marked at its southern end by a red buoy (spar, No. 4) and at its northern end by a black buoy (spar, No. 1), is about 1⅝ miles long in a general **N.** by **W.** and **S.** by **E.** direction, and about ⅝ mile wide at its southern end. At low water it is bare in spots. Bartlett's Reef Light-vessel (see page 10) is placed about ½ mile to the southward of the southern end of the reef.

Two-tree Island is a small island 1⅝ miles **N NW.** ⅜ **W.** from the light-vessel and about ¾ mile **SE.** by **S.** from Mill-stone Point, the eastern point of entrance to Niantic Bay. Shoal water extends to the eastward and to the southward from the island, and also to the northward, where the limit is marked by a buoy (spar, black, No. 3), a guide for Two-tree Island Channel).

White Rock is an islet about ½ mile to the westward of the southern end of Mill-stone Point. A red buoy (spar, No. 4) is placed near a small rock off the southeastern end of White Rock.

Black Rock, small and bare, is about ⅜ mile to the northward of White Rock. Still farther to the northward, in the northeastern part of the bay, is Waterford Island, also small and bare.

Three-foot Rock, marked off its eastern side by a buoy (spar, black, No. 5), is about ¼ mile from the western shore and nearly 1¼ miles to the northward of the end of Black Point. About ⅞ mile **N NE.** from Three-foot Rock is **Wigwam Rock** (Indian Clump), in the northwestern part of the bay; to the southwestward of Wigwam Rock, and about 400 yards off shore, is a small rock bare at low water.

I*a*. ***From the Eastward, having come through Fisher's Island Sound, to enter through Two-tree Island Channel.***—Directions for Fisher's Island Sound are given on pages 34–36. Two-tree Island Channel into Niantic Bay has good water, but there are many dangers on either side. Strangers are not advised to use it, and should never attempt to beat through. With either tide the current sets through this channel with much greater force than outside. The channel is well buoyed and is often used to advantage by small vessels going with the tide.

Being to the westward of North Dumpling (North Hammock) Light-house, bring this light-house to bear **E.** $\frac{5}{8}$ **S.** and steer **W.** $\frac{5}{8}$ **N.** On this course Sarah's Ledge buoy and Rapid Rock buoy (both spars, red and black horizontal stripes) will be left on the starboard hand, as will other buoys near these, but farther inshore.

Of these buoys to the southwestward of New London entrance, Rapid Rock buoy is nearest the course and is about $3\frac{5}{8}$ miles **W.** $\frac{3}{4}$ **N.** from North Dumpling Light-house. Little Goshen Reef buoy (spar, black, No. 1, colored as New London entrance buoy) is $\frac{1}{2}$ mile **NW.** by **W.** $\frac{3}{4}$ **W.** from Rapid Rock buoy, and will next become a guide.

Passing 100 yards to the southward of Rapid Rock buoy, when Bartlett's Reef Light-vessel bears **SW.** by **W.** $\frac{1}{8}$ **W.**, Rapid Rock buoy should bear about **NE.** by **E.** $\frac{1}{8}$ **E.**, distant nearly 200 yards. Now steer **W NW.** for about $\frac{1}{2}$ mile until past Little Goshen Reef buoy, which is left about 300 yards on the starboard hand.

Next keep the black buoy marking the northern end of Bartlett's Reef (spar, No. 1) on the port bow, course about **NW.** $\frac{1}{2}$ **W.** Leave this last-mentioned buoy about 350 yards on the port hand, passing about midway between it and the northern shore, and turn very gradually to the westward so as to leave Two-tree Island Shoal buoy (spar, black, No. 3) 350 yards on the port hand.

Pass to the southward of the two red buoys which will be on the starboard bow (both spars, No. 2 and No. 4) and to the southward of White Rock. Then turn to the northward, keeping the high white tower near Niantic bearing between **N.** and **N.** by **E.** $\frac{3}{4}$ **E.**, and anchor in about 16 feet (low water).

Remarks.—Sarah's Ledge, Rapid Rock, and Little Goshen Reef, left on the starboard hand in carrying out the foregoing directions, are described on page 64.

Bartlett's Reef and Two-tree Island Shoal, left on the port hand, are described under heading I foregoing.

Whitestone Creek entrance is passed on the starboard hand. *Flat Rock*, bare at low water, lies in the eastern side of the entrance. *High Rock*, bare at low water, with ledges and sunken rocks about it, is about 600 yards to the westward of Flat Rock.

Mill-stone Point Reef, marked by a buoy (spar, red, No. 2), makes off about $\frac{1}{8}$ mile to the southward of Mill-stone Point.

White Rock and the red buoy (spar, No. 4) to the southeastward of it are included in the descriptions under heading I foregoing. **Consult also** the other descriptions there following that of White Rock.

II. ***From the Westward.***—Passing about $\frac{1}{2}$ mile south of Cornfield Point Light-vessel, steer **E NE.** $\frac{3}{4}$ **E.** This course made good for about $8\frac{1}{2}$ miles passes about $\frac{3}{4}$ mile to the southward of Black Point. When the high white tower at Niantic bears between **N.** by **E.** $\frac{3}{4}$ **E.** and **N.**, head in for the tower, keeping it between these bearings, and anchor as directed under heading I foregoing.

The ***Tidal currents,*** until well within the bay, have considerable strength. The flood has a tendency to set a vessel to the northward, and the ebb to the southward.

Remarks.—The **E NE.** $\frac{3}{4}$ **E.** course leads to the southward of Long Sand Shoal, Saybrook Bar, Hatchett's Reef, and Black-boy Rock, of which all but the last are described on pages 48 and 50. The light-houses at Saybrook entrance are passed on the port beam. Black Point will be made a little on the port bow, and Bartlett's Reef Light-vessel a little on the starboard bow.

Buoys.—The following buoys are passed, all left on the port hand and $\frac{1}{2}$ to $\frac{3}{4}$ mile distant: *Long Sand Shoal east-end buoy* (spar, red and black horizontal stripes); *Starboard bar buoy* (2d-class can,* red, No. 8), marking eastern side of entrance to passage leading north of Long Sand Shoal; *Entrance buoy* (spar, black and white perpendicular stripes), sometimes not readily picked up; *Hatchett's Reef* buoys, one on the northeastern end of the reef (spar, black, No. 1) and the other on the southeastern end (spar, red, No. 6), the latter left about $\frac{1}{2}$ mile distant.

Black-boy Rock, marked by a buoy (spar, red, No. 2) at its southern end, is about $\frac{3}{4}$ mile **W.** $\frac{1}{4}$ **S.** from Black Point. It is a ledge bare in places at low water. The sailing-line passes about $\frac{3}{4}$ mile to the southward of it.

Two-tree Island, White Rock, etc., are described under heading I.

CONNECTICUT RIVER.†

This river, one of the largest and most important in the New England States, empties into Long Island Sound about $11\frac{1}{2}$ miles to the westward of Thames River entrance (New London Harbor). The number of vessels trading to Saybrook, Middletown, and Hartford amounts to several thousand yearly.

The entrance to the Connecticut River is obstructed by a bar of shifting sand and gravel known as Saybrook Bar. At the western side of the entrance jetties have been built under Government appropriations, and in 1885 a channel 120 feet wide and 12 feet deep at low water had been dredged between the jetties; at present (1888) it is said that a depth of 10 feet cannot be depended upon for a width of more than 80 feet.

† Connecticut River entrance is shown on Coast and Geodetic Survey chart 369, Mouth of Connecticut River, scale $\frac{1}{20,000}$, or one mile = 3.648 inches, price $0.20. Shown also on chart 115. See the foot-note on page 40.

Off Mouth of Connecticut River, Saybrook lt.Ho.bearing NW. ¾ W.distant 2¼ Miles.

The **Channel** in the river up to Hartford has been dredged in places to remove bars formed by the freshets and ice-jams which occur in the spring; a depth of 8 feet at mean low water was reported in 1887 as being available up to Hartford, which is at the head of navigation.

The river is crossed by two **drawbridges** below Hartford, the Shore Line Railroad bridge 1½ miles above Saybrook Point (width of draw about 115 feet in the clear), and the Air Line Railroad bridge at Middletown,† 35 miles above the entrance (width of draw about 125 feet in the clear). At Hartford a covered bridge crosses the river, connecting with East Hartford.

Saybrook is a village on the western shore of the river to the westward of Saybrook Point and just inside the entrance. **Saybrook Point**, a village to the eastward of Saybrook, is about ⅝ mile to the northward of Lynde Point (the western point of entrance to the river, marked by Saybrook Light-house), and is the first landing in the river. Vessels of 13 feet draught go to Saybrook Point; there is 9 feet of water alongside the wharves at low water.

Essex, a village with several manufactories, is on the western shore, about 5 miles above the entrance.

Middletown, a city on the western bank of the river, 35 miles above the entrance, has numerous manufactories; 13 feet is the greatest draught taken up to the city, and 9 to 10 feet the usual draught. Sailing vessels very seldom go above Middletown without a tow-boat, and generally take one at or near the mouth of the river.

Hartford, 50 miles above the entrance, is an important manufacturing city and is a port of entry. The greatest draught taken up the river to Hartford is 9½ feet; the average draught is not more than 8 feet, but during freshets vessels drawing 11½ feet have sometimes gone up to the city; the depth alongside wharves is 11 feet.

Prominent objects.—Saybrook (Lynde Point) Light-house, a white tower with keeper's white dwelling, is on the southeastern end of Lynde Point, the western point of entrance to the river (see table, page 10). Saybrook Breakwater Light-house, a brown iron pier and tower, is on the southern extremity of the west jetty, ½ mile **S. ½ W.** from Saybrook (Lynde Point) Light-house.

East and West jetties.—The inner end of the E. jetty is at a stone beacon ¼ mile **E SE.** from Saybrook Light-house; this jetty extends to the southwestward and then to the southward. The inner end of the W. jetty is on the beach to the westward of Saybrook Light-house; it first extends to the southeastward and then **S. ½ W.** to the Breakwater Light-house.

Saybrook Point, 1 mile north of Saybrook Light-house and on the western shore, is distinguished by the large railroad shed and numerous houses near the eastern end of the point.

Griswold Point (Blackhall Point), the eastern point of entrance to the river, is low and level and has no prominent distinguishing features.

Shore Line Railroad bridge crosses the river 1½ miles above Saybrook Point, and can be readily distinguished when the entrance of the river is opened out.

Channels.—The only channel to enter the river for strangers of over 5 feet draught is the one dredged between the jetties. The bar to the eastward of the jetties has several channels with 6 feet of water, but they shift and are not reliable, lumps with from 4 to 5 feet of water forming sometimes in the middle of them.

Between Saybrook and Middletown the river banks are hard and in some places rocky; the channel has required no improvements in this part, having a sufficient depth for existing commerce. Between Middletown and Hartford the river flows through alluvial bottom land, and the channel changes in places after each freshet and ice-jam.

Anchorage is found inside the jetties, about 200 to 300 yards off shore, in from 20 to 30 feet of water, soft bottom, Saybrook Light-house bearing **W.** or to the southward of **W.**

Farther up, the best anchorage, with plenty of room, is found opposite and to the northward of the North Cove, about 300 yards above the coal docks at the cove entrance.

Strangers seldom enter the river merely for shelter.

Pilots and Tow-boats.—Strangers entering the river and bound above Saybrook should take a pilot or a tow-boat either outside the bar or off Saybrook Point. Pilotage is not compulsory. If a pilot or tow-boat is desired outside the bar, anchor to the southwestward of the Breakwater Light-house, weather permitting, and signal, when pilot or tow-boat, as desired, will come out from Saybrook Point. Each tow-boat carries two licensed pilots, and one may be had with or without the tug. The headquarters for pilots and tugs is at the steamboat wharf at Saybrook Point, where the steamboat wharf agent will attend to any orders given.

Tow-boats will be found at various points along the river. Sailing vessels bound in usually take a tow-boat outside the bar, and sometimes even remain outside Long Sand Shoal, lying off and on, until a tug comes out in response to signal. It would be well for a stranger, intending to wait outside Long Sand Shoal in this way for tug, to notify the steamboat agent at Saybrook Point by mail upon leaving port where loaded; a special lookout would then be kept for signal from off-shore vessel.

In severe weather do not attempt to enter, but go to New London or to New Haven until the weather improves.

Supplies.—Coal for steamers can be had in limited quantities alongside the wharves at Saybrook, and in unlimited quantity at Hartford. Water can be obtained alongside wharves at Saybrook, Middletown, and Hartford, through pipe and hose. Provisions and ship-chandler's stores can be obtained at the towns and villages along the river.

† The piers of the railroad bridge at Middletown have dangerous projecting parts below the line of low water; 12 feet in the clear should be allowed between vessel's rail and the part of pier showing above water.

Repairs to vessels and machinery can be made at Hartford, where there is one marine railway capable of hauling out vessels of 250 tons (register tonnage).

Ice closes navigation in the river above Saybrook during the winter; from December 1 to April 1 navigation is entirely closed, or unsafe.

Freshets occur in April and May, and sometimes in November and December. The spring freshets are the highest; their usual height is about 20 feet and the greatest recorded height 29 feet.

The **Currents** at the entrance are very strong at times, and always require careful attention. But they are so irregular that no definite rule can be given regarding them. That pilots and tow-boats are so generally employed for this river is due, in great measure, to the irregularity of the currents and the strength they sometimes have. The action of the currents is much affected by variations in the height of the water-level in the river. Off the southern end of the jetties and close to them the tidal current of the Sound often sets directly across, at right angles to the current setting out or in between the jetties. In the river the velocity varies from 2 to 5 miles per hour, according to the state of the river, whether high or low.

Tides.—The mean rise and fall of tides at the mouth of the river is 3.9 feet; corrected establishment $10^h\ 17^m$. For other tidal data see page 16.

Below Hartford, at low stages of water, the Connecticut River is influenced by tides; at Hartford the mean annual rise is about 1 foot, but when the water-level is raised above 5 feet by freshets the influence of the tide is not felt at Hartford.

The **Variation of the compass** at Connecticut River entrance for 1888 is 9° 50′ W., with an annual increase of about 3½′.

Additional information of a general nature will be found on pages 9–17; see also pages 40–44.

GENERAL DIRECTIONS, CONNECTICUT RIVER AND SAYBROOK HARBOR.

I. FROM THE EASTWARD.

Directions for the eastern part of Long Island Sound are given on pages 50 and 51.

1. ***Approaching the entrance.***—The directions given in this paragraph are available for any vessel that can enter the river. With Cornfield Point Light-vessel bearing **W.**, steer for the light-vessel on this bearing until Saybrook Breakwater Light-house (the outer one of the two Saybrook Light-houses) bears **NW. ½ N.** Then steer for this Breakwater Light-house, bearing **NW. ½ N.**; Plum Island Light-house will be directly astern. Pass about ¼ mile to the westward of the can-buoy* (red, No. 8) on the southern side of the shoals making out from Saybrook Bar, and give Long Sand Shoal (east end) buoy a good berth on the port hand. When past these buoys continue the course to the northwestward, with signal up for pilot or tug if intending to take one. Keep Saybrook Breakwater Light-house a little on the starboard bow in approaching; the depth should not be less than 20 feet. If necessary to wait for pilot or tow-boat, anchor to the southwestward of the Breakwater Light-house with this light-house ⅓ to ¾ mile distant.

A vessel anchored to the southward and westward of the outer light-house has better holding-ground than is found directly to the southward, and is out of the variable currents due to the flow of the river.

Remarks.—Standing to the westward, Saybrook (Lynde Point) Light-house should be made on the starboard bow soon after passing Bartlett's Reef Light-vessel, and Cornfield Point Light-vessel should be made nearly ahead or a little on the bow. Saybrook Breakwater Light-house should then be made, just a little to the southward of Saybrook Light-house. The mouth of the Connecticut River will be opened out to the eastward of these light-houses. On the **W.** course for Cornfield Point Light-vessel, as Saybrook Breakwater Light-house approaches a **NW.** bearing, the buoy (can,* red, No. 8) on the southern side of the shoal, making out from Saybrook Bar, will be seen almost in range with this light-house.

On the **NW. ½ N.** course, Saybrook Light-house, the beacon at the inner end of E. jetty, and the houses at Saybrook Point will be on the starboard bow, with Saybrook Breakwater Light-house directly ahead.

A table of light-houses is given on pages 10–13.

The **W.** course leads to the southward of Saybrook Bar, and the **NW. ½ N.** course leads to the westward of the bar and the shoals making out from it.

Hatchett's Reef, marked at its southeastern end by a red buoy (spar, No. 6), and at its northeastern end by a black buoy (spar, No. 1), lies about 3½ miles **E. ¼ S.** from Saybrook Breakwater Light-house. This reef is at the eastern end of Saybrook Bar and has from 5 to 10 feet of water over it.

Saybrook Bar, obstructing the mouth of the Connecticut River, extends easterly from the jetties as far as Hatchett's Reef buoys; the bar and the shoals making out from it also reach to the southeastward from the jetties to the buoy (can,* red, No. 8), marking the southern side of these shoals. A *channel buoy* (spar, black and white perpendicular stripes) is placed ½ mile **NE.** by **E.** from red buoy No. 8, but should not be used as a guide by strangers.

This bar has from 4 to 16 feet of water; it is of a shifting nature and the depths are constantly varying.

*Spar-buoy in winter (see page V).

Long Sand Shoal is marked at its eastern end by a buoy (spar, red and black horizontal stripes). This buoy is left on the port hand on the **NW.** ½ **N.** course. The shoal is described on page 48.

2. ***Entering the river.***—The directions given in this paragraph are available for vessels drawing less than 7 feet. If strictly followed they will carry about 10 feet of water through the dredged channel, but this is narrow, and a stranger drawing more than 7 feet had better take a pilot or a tow-boat outside.

In approaching and entering avoid the outer end of the E. jetty, as lumps tend to form about it. When the entrance between the two jetties is opened fully, stand in, favoring a little the outer end of the W. jetty, and steer about **N.** by **E.** This course draws over slightly towards the E. jetty, so that when up with the angle of this jetty the vessel should be about midway between the two jetties, or favoring slightly the angle of the eastern one. Continue the **N.** by **E.** course, edging a little to the eastward and passing 175 to 200 yards to the eastward of Saybrook Light-house. The water will deepen; when the depth is 18 to 24 feet, head up for Saybrook Point (railroad wharf, large building, very prominent) and anchor beyond the light-house, in the channel, about 250 to 300 yards from the western shore.

Above this there are sunken piers on both sides the channel; persons sufficiently familiar with the location of these piers, to avoid them find a better anchorage a little farther up the river (see "Anchorages").

Remarks.—When entering between the jetties a barn will be seen right ahead, with a tree just in front of the middle of the barn; keeping the tree in this position is a local range for passing between the jetties through the dredged channel.† Saybrook Light-house is a little on the port bow, and Saybrook beacon, at the inner end of the E. jetty, is on the starboard bow.

Dredged channel.—Through this channel, between the jetties, 10 feet can be carried at low water of ordinary tides (1888), but the depth is thought by local pilots to be decreasing somewhat and the channel is now quite narrow. The width of the dredged channel in 1885, at the completion of work upon it, was not less than 120 feet, but at present (1888) the depth of 10 feet at mean low water cannot be relied upon for a width of more than 80 feet. This channel has been encroached upon from the westward by material swept in past the inshore end of the W. jetty; the gap is now filled in with stones, but there are other causes still operative to reduce the width and depth of the dredged channel.

II. FROM THE WESTWARD.

The following directions are available for any vessels that can enter the Connecticut River.

When about 1 mile south of Hammonasset Point (see page 51) steer **E.** ½ **S.**, and as soon as Saybrook Breakwater Light-house (at outer end of W. jetty) bears **E.** by **N.**, steer for this light-house, keeping the bearing. When the Breakwater Light-house is about ½ mile distant, edge to the southward so as to pass about 300 yards south of the outer end of the W. jetty.

If intending to take a tow-boat or a pilot outside, and having signal up, anchor, if necessary, as directed in paragraph 1 of heading **I** foregoing.

Intending to stand in, keep the outer end of the W. jetty rather the best aboard in hauling up sharply between the two jetties, and proceed as directed in paragraph 2 of heading I foregoing.

Note the remarks on currents, pages 48 and 51.

Remarks.—On the **E.** ½ **S.** course, Stone Island Reef buoy (spar, red, No. 14), at the eastern side of the entrance to Clinton (Killingworth) Harbor, will be left on the port hand. Cornfield Point Light-vessel will be made a little on the starboard bow, and Saybrook Breakwater Light-house (on the W. jetty) and Saybrook Light-house a little on the port bow. When the W. jetty light-house comes on the bearing of **E.** by **N.**, the buoy (nun,* red and black horizontal stripes) on the western end of Long Sand Shoal is ⅝ mile off the starboard beam.

On the **E.** by **N.** course, Long Sand Shoal is left on the starboard hand, and Crane Reef buoy (spar, red, No. 12), the spindle on Hen and Chickens, and Cornfield Point Shoal buoy (spar, red, No. 10) will be left on the port hand.

Long Sand Shoal.—The buoy (nun,* red and black horizontal stripes) on the western end of the shoal bears **W.** ¼ **N. Northerly** from Cornfield Point Light-vessel, distant 3 miles. The shoal is described on page 48.

Crane Reef, marked by a red buoy (spar, No. 12), lies 3¾ miles **W.** ¼ **S.** from Saybrook Breakwater Light-house; it is bare at low water to the northward of the buoy, and the reef is about ¼ mile long in a **N NW.** and **S SE.** direction.

Hen and Chickens, marked near its southern side by a spindle, lies about 3 miles **W.** ¼ **S.** from Saybrook Breakwater Light-house; it is bare just to the northward of the spindle, and has 15 feet of water at its western end and 17 feet at its eastern end. This shoal extends ⅓ mile **W.** by **N.** from the spindle and ¼ mile **E.** by **S.** from the spindle, having a whole length of ⅔ mile and a width of about ¼ mile.

Cornfield Point Shoal, marked by a red buoy (spar, No. 10), lies 2 miles **W.** ¼ **S. Southerly** from Saybrook Breakwater Light-house. This shoal is a little over ¼ mile long in a **N NE.** and **S SW.** direction, and has from 3 to 16 feet of water over it. The red buoy is placed at its southeastern end.

† This was available in 1887.

WESTBROOK HARBOR.†

Westbrook Harbor is an open bight on the northern side of Long Island Sound, about 5 miles to the westward of Saybrook Breakwater Light-house and just to the eastward of Menunketesuck Point, a point formed by several low narrow islands, connected at low water and surrounded by boulders.

The village of **Westbrook**, on the north side of the harbor, is of no commercial importance. A tall gray church-spire is the most conspicuous object, and can be seen from a long distance. **Salt Island**, a small island, is connected with the main land at low water, and has on its southwestern side a wharf with 4 feet of water at the end; the island is about 1 mile east of Menunketesuck Point, abreast of the village.

Vessels of from 30 to 200 tons anchor in Westbrook Harbor, but strangers seldom do so; the anchorage to the westward of Menunketesuck Point, Duck Island Harbor, is better. During the spring and summer Westbrook Harbor is obstructed by fish-weirs, which are removed in the fall. There are also sunken rocks which are not marked.

GENERAL DIRECTIONS, WESTBROOK HARBOR.

From the Eastward, being to the Northward of Long Sand Shoal.—In approaching note the directions, page 51. When to the westward of Crane Reef buoy (spar, red, No. 12), steer **N.** by **W.**, heading for Salt Island, a low rocky islet lying close to the northern shore. Anchor in 11 or 12 feet (low water) about ¼ mile to the southward of this island.

From the Westward, do not approach Salt Island on any bearing to the eastward of **NE.** by **N.** Do not go inshore of the lines indicated, as there are sunken rocks, not marked.

DUCK ISLAND HARBOR.†

This anchorage, available for vessels of less than 12 feet draught, is protected against winds from the northward of **E.** or **W.**; it has not very good holding-ground (bottom hard sand) and it is not often used. It lies 6½ miles to the westward of Saybrook Breakwater Light-house and just to the westward of Westbrook Harbor. **Duck Island** is a small island covered with grass, has steep faces about 10 to 15 feet high, and is surrounded by boulders; it lies about $\frac{7}{10}$ mile **W SW.** from the southern end of Menunketesuck Point; the southern end of this island should be given a berth of ⅜ mile. The anchorage is to the northward and northwestward of Duck Island.

In the spring and summer nearly the whole of this harbor is taken up by fish-weirs, which are removed in the fall. The entrance to the westward of Duck Island is free from dangers.

A channel, about 250 yards wide between the 12-foot curves, leads between Menunketesuck Point and Duck Island, but strangers should not attempt it, as the anchorage is easily made from the westward of Duck Island.

U. S. Army engineers in charge of harbor improvements have recently reported in favor of making a harbor of refuge at Duck Island Harbor by building a breakwater 1,000 yards long, to extend to the westward from the western side of Duck Island; also a breakwater about 580 yards long, to extend to the eastward from the eastern side of Duck Island; and a third breakwater nearly 380 yards long, to extend to the westward from Menunketesuck Point.

GENERAL DIRECTIONS, DUCK ISLAND HARBOR.

From the Eastward.—In approaching, note the directions on page 51. Pass about ½ mile to the southward of Duck Island; when the island bears **NE.** by **N.**, stand to the northward and anchor inside a line drawn from Duck Island to Kelsey's Point in 14 to 16 feet (low water).

Remarks.—Shoal water extends for a distance of 450 yards to the southward of Duck Island, and also about the same distance in a **N.** by **E.** direction from the island. On the western side of the island the shore can be approached to within 150 yards.

Should work be in progress on the proposed breakwater to extend to the westward from Duck Island, the western shore of that island should not be approached nearer than 1,000 yards.

From the Westward.—Passing 150 yards south of Stone Island Reef buoy (spar, red, No. 14), steer **NE.** and anchor as just directed.

CLINTON HARBOR (KILLINGWORTH HARBOR) AND HAMMONASSET RIVER.‡

Clinton Harbor, or Killingworth Harbor, is on the north shore of Long Island Sound, 9 miles to the westward of Saybrook, and on the eastern side of Hammonasset Point. It is the entrance to the Hammonasset River, a stream of no commercial importance. The harbor affords protection against northerly and northwesterly winds for light-draught vessels, but is not available for strangers. There is some carrying trade by water, mostly done by vessels owned in the vicinity.

Clinton, a village on the Shore Line Division of the N. Y., N. H. and H. Railroad, is at the head of the harbor and at the mouth of the Hammonasset River; the greatest draught ever carried up to Clinton does not exceed 8 feet; the depth alongside the wharves is 6 feet at mean low water; the depth of water over the bar at mean low water, about 4 feet.

† Shown on Coast and Geodetic Survey chart 115. See the foot-note on page 40.
‡ Clinton Harbor falls within the limits of Coast and Geodetic Survey chart 115. See the foot-note on page 40.

Hammonasset Point, the western point of entrance, is described on page 51. The channel below the bar is buoyed, but strangers should not attempt to go to Clinton without a pilot. Improvements are contemplated, the object being to secure, by dredging, a channel 6 feet deep and 100 feet wide across the bar.

Pilots can be obtained by making signal outside the harbor, and vessels desiring a pilot either lie off the entrance or anchor until they are boarded by one. There are no regular pilots. **Tow-boats** are not much used; they can be obtained at Saybrook.

Ice extends to Sandy Point in the winter. There is not not much drift-ice.

GENERAL DIRECTIONS, CLINTON HARBOR.

From the Eastward.—Directions for this part of the Sound are given on pages 49 and 51. Give Stone Island Reef buoy (spar, red, No. 14) a berth of ¼ mile on the starboard hand, and stand in to the northwestward from it. Anchor in about 14 feet of water (low water). Here take a pilot.

Notes.—The following are bearings and distances from Stone Island Reef buoy: Crane Reef buoy (spar, red, No. 12) bears **E. ¼ S.**, 3⅞ miles; the buoy marking west end of Long Sand Shoal **SE.** by **E. ½ E.**, 3½ miles; Duck Island (see page 70) **E NE. ¼ E.**, 1⅝ miles; Stone Island (inshore, close in with Kelsey's Point) **N.** by **W.**, ⅝ mile; Hammonasset Point (see page 51) **W NW. ⅛ W.**, 1⅜ miles.

A 10-foot spot lies about ⅜ mile to the westward of the southern end of Stone Island.

Wheeler's Rock, with 4 feet of water, marked by a buoy (spar, red, No. 4), lies near the head of the outer harbor.

From the Westward.—Passing ¾ mile to the southward of Hammonasset Point, round the point at this distance and stand in to the northward, entering about midway between Hammonasset Point on the port hand and Stone Island Reef buoy on the starboard. Anchor in 14 feet of water, as directed above.

ANCHORAGE OFF MADISON, CONN.†

A broad bight, sometimes used as an anchorage, makes into the north shore to the westward of Hammonasset Point. This bight is about 10 miles to the westward of Saybrook (Connecticut River), and about 15 miles to the eastward of New Haven entrance. It affords shelter in northerly and northeasterly winds, in from 16 to 23 feet of water, excellent holding-ground (bottom mud and shells). Southwesterly winds, when across the flood, often cause considerable sea.

Madison, a village of no commercial importance, is on the north shore of the bight, on the Shore Line Division of the N. Y., N. H. and H. Railroad. Madison has two landings, from each of which a road leads into the village; the wharves have 3 feet of water alongside them at low water.

Tuck's Island, a small island close inshore, abreast the village of Madison, is a conspicuous mark in entering.

Fish-weirs.—During the spring and summer many fish-weirs are put down in the bight; they are removed in the autumn.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS FOR THE ANCHORAGE OFF MADISON.

I. ***From the Eastward.***—Give Hammonasset Point a berth of ¾ mile or more, and round this point, passing about ¼ to ¾ mile to the westward of Hammonasset Point Reef buoy (spar, red, No. 2) off the western side of point.

Now steer for Tuck's Island, keeping the island on any bearing from **NW.** to **N NW. ½ W.** Be careful to keep within these limits, the best course being about **NW. ½ N.**, with Tuck's Island directly ahead.

Continue thus until past Madison East Reef buoy (spar, black, No. 1), which is left on the port-hand. When past this buoy keep a little more to the westward, and anchor about ¼ mile to the southward or southeastward of Tuck's Island, in 19 to 22 feet of water (low water), to the northward of Madison Reef.

Remarks.—When rounding Hammonasset Point, Tuck's Island will be readily recognized as the only rocky island in this vicinity; the high-water mark of the island shows white, and the top of the island, which has a round appearance, is covered with trees. The houses of Madison will be seen behind Tuck's Island and open to the eastward of it.

On the northwesterly course, with Tuck's Island directly ahead, a high windmill near the beach, and about ⅞ mile to the westward of Tuck's Island, will show open of the southwest side of Tuck's Island. Do not close it in behind the island.

When well past Hammonasset Point there are two dangers to be kept especially in mind; a rocky patch (10 feet) and a rock (2 feet), whose descriptions follow below immediately after that of Madison Reef. The directions given clear these two dangers, the sailing-line passing between them.

† Shown on Coast and Geodetic Survey chart 115. See the foot-note on page 40.

Madison Reef lies about $\frac{5}{8}$ mile to the southward of Tuck's Island, extending **E.** and **W.** This reef has from $4\frac{1}{2}$ to 10 feet of water over it, and consists of several rocky patches with deeper water between them. The eastern part of the main reef is marked by a black buoy (spar, No. 1); the western end of the reef is marked by a red buoy (spar, No. 2) bearing **SW.** $\frac{1}{2}$ **W.** from Tuck's Island, distant $\frac{7}{8}$ mile.

The least depth ($4\frac{1}{2}$ feet) is found over a rock known locally as Tuck's Island Reef, about midway between the buoys.

A Rocky patch, with 10 feet of water over it, lies a little over $\frac{1}{4}$ mile **E SE.** $\frac{1}{2}$ **E.** from the present position (1888) of the black buoy (spar, No. 1) marking the eastern part of the main reef. Vessels passing to the eastward of this buoy should either give it a berth of only about 200 yards, or should pass at least $\frac{5}{8}$ mile to the eastward of it (as on the sailing-line of the directions), to clear the 10-foot spot.

A Rock, with 2 feet of water over it, lies about $\frac{5}{8}$ mile **SE.** by **E.** $\frac{3}{8}$ **E.** from Tuck's Island, and $\frac{3}{8}$ mile **S.** $\frac{3}{4}$ **W.** from Madison East wharf.

II. ***From the Westward.***—Passing about 1 mile to the southward of Sachem's Head, steer **E.**, heading for the extremity of Hammonasset Point.

When Falkner's Island Light-house bears **S.** by **E.** $\frac{3}{4}$ **E.** and Indian Reef buoy (spar, red, No. 6) is abaft the port beam, distant about $\frac{3}{4}$ mile, steer **NE.** by **E.** $\frac{3}{4}$ **E.**, heading for Tuck's Island on this bearing. Keep the bearing, leaving Charles Reef buoy (spar, red, No. 4) about $\frac{3}{8}$ mile on the starboard hand and Madison Mid-reef buoy (spar, red, No. 2) about $\frac{1}{4}$ mile on the starboard hand. When Tuck's Island is about $\frac{3}{8}$ mile distant, haul to the eastward and anchor in accordance with the directions already given for approaching from the eastward.

On the flood be careful not to be set to the northward; and *on the ebb* be careful not to be set to the southward of the sailing-line, especially while passing Charles Reef. Note that Charles Reef buoy is on the south side of the reef.

Remarks.—When off Sachem's Head, on the **E.** course, Hammonasset Point will be directly ahead, Tuck's Island on the port bow and well in towards the mainland, and Lobster Rock (locally, White Top), distinguished by a small hut upon it, will be broad off the port bow. As Sachem's Head is passed, Guilford Harbor will be opened out and the houses of Guilford will appear. The buoys of Guilford Harbor entrance will be left on the port hand.

Chimney Corner Reef and **Indian Reef** are described on page 73.

Several shoal spots, with 6 to 12 feet over them, lie a little over $\frac{1}{2}$ mile **NW.** by **W.** from Charles Reef. The sailing-line passes to the southward of these spots.

Charles Reef (6 feet) is described on page 73. The red buoy (spar, No. 4) marking it is on the southwestern side of the reef.

Tuck's Island is described on preceding page.

Fish-weirs extend out from the shore to the westward of Tuck's Island in summer, but as generally placed they do not interfere with this sailing-line.

GUILFORD HARBOR.†

Guilford Harbor, on the north shore of Long Island Sound, about midway between Saybrook and New Haven, lies due **N.** from Falkner's Island. Only small light-draught vessels of 20 to 200 tons enter the harbor. The greatest draught of vessels coming in is 9 feet.

The entrance is much obstructed by rocks and shoals, also during spring and summer by fish-weirs, and strangers going up to Guilford should always take a pilot.

Guilford, a small town on the Shore Line Division of the N. Y., N. H. and H. Railroad, is at the head of the harbor, on a stream called **West River**; 5 feet is the greatest draught carried up to Guilford at high water. Another stream, the **East River**, flows into Guilford Harbor and has the best water, the depth over the bar at its mouth being $3\frac{1}{2}$ feet; at high water 9 feet can be carried into East River for $1\frac{1}{2}$ miles above its mouth. The carrying trade by water is small, having decreased greatly; it comprises coal, iron, lumber, and produce, partly carried by strangers.

Channels.—There are two channels leading in, both buoyed, but they are unfit for strangers.

Anchorage.—There is no anchorage that can be described so as to be of use to a stranger. The anchorage off Madison is much better than any offered by Guilford Harbor.

Pilots.—Vessels from the westward, bound to Guilford, sometimes stop at New Haven and take a pilot, but pilots can be had by making signal and lying-to off the harbor until one comes out. The piloting is generally done by fishermen.

Tow-boats are not much used; they can be obtained at New Haven or at Saybrook.

Supplies.—Anthracite coal for steamers can be obtained at the lower dock in the East River. Provisions can be obtained at Guilford.

GENERAL DIRECTIONS, APPROACHING GUILFORD HARBOR.

I. ***From the Eastward.***—Passing 1 mile south of Hammonasset Point, steer **W NW.** $\frac{1}{2}$ **W.** $5\frac{1}{2}$ miles. The course leads well to the southward of the buoys marking Madison and Charles reefs.

†Shown on Coast and Geodetic Survey chart 115. See the foot-note on page 40.

Continue the **W NW. ½ W.** course until Falkner's Island Light-house bears **S. ¼ W.** and Indian Reef buoy (spar, red, No. 6) is ahead, distant ½ mile, then take a pilot, coming to if necessary.

Remarks.—Between Hammonasset Point and Sachem's Head the shore makes in to the northward, forming a broad bight (see page 51).

Approaching Guilford Harbor on the **W NW. ½ W.** course, Lobster Rock (known locally as White Top, and distinguished by a small hut or watch-house) will be made a little on the starboard bow, and the houses of Guilford will be seen to the northward of Lobster Rock.

Hammonasset Point Shoal is described on page 51. About ½ mile to the westward of the point is a buoy (spar, red, No. 2).

Madison Reef, marked by two buoys, is described on page 72.

Charles Reef, to the southwestward of Madison Reef, has 6 feet of water over it, and is marked at its southern end by a buoy (spar, red, No. 4).

Half-acre Island is a mass of bare rocks off the eastern point of entrance to Guilford Harbor. Bare rocks and sunken ledges extend to the north shore.

Guilford Shoals is the name applied to the numerous rocks and ledges, many of them bare at low water, which lie in the entrance of the harbor; *Indian reef*, marked by a buoy (spar, red, No. 6), and *Lobster Rock* form parts of the shoals.

A Spot with 6 feet of water over it lies about ⅝ mile **W SW. ¼ W.** from Indian Reef buoy. **A Spot** with 11 feet over it lies about 250 yards **NW.** from the 6-foot spot.

II. ***From the Westward.***—Passing ¼ mile south of East Reef buoy (East Ledge buoy, spar, red, No. 10), south of the Thimble Islands, steer **E.** This course should lead ⅝ mile south of Sachem's Head and ¼ mile south of Chimney Corner Reef, also passing ⅜ mile south of Indian Reef buoy (spar, red, No. 6). When Falkner's Island Light-house bears **S. ¼ W.**, steer **N. ¼ E.** until nearly up with the outermost buoys at the entrance, when take a pilot, coming to if necessary.

Remarks.—To the eastward of the Thimble Islands a bight makes in to the northward.

On the **E.** course Sachem's Head will be made a little on the port bow, and after passing Sachem's Head the houses of Guilford will be seen to the northward as the harbor opens out.

Goose Rocks, marked at their southwestern end by a buoy (spar, red, No. 8), lie to westward and southward of Sachem's Head, about ⅝ mile.

Chimney Corner Reef is about ⅝ mile south of Sachem's Head, and has a least depth of 9 feet of water over it. This reef is not marked; from it the northern Goose Rock bears **NW. ¾ W.** A rule to insure clearing the reef, in passing to the southward of it, is to keep the large lone tree on Thimble Island open to the southward of Goose Rocks buoy. To the eastward of Sachem's Head a narrow channel, marked by two red buoys (spars, No. 6 and No. 2), leads up to Guilford Harbor, but this is not available for strangers on account of the many rocks and ledges which obstruct it.

When approaching Indian Reef buoy (spar, red, No. 6), the 6-foot and 11-foot spots lying ⅝ mile **W SW. ¼ W.** from the buoy should be avoided.

Consult also the descriptive remarks under heading I foregoing.

SACHEM'S HEAD HARBOR.†

This is a very small harbor, about ¼ mile long and ⅛ mile wide, on the western side of Sachem's Head; it affords shelter for small vessels against all but southwesterly winds, which sometimes throw a heavy sea into the harbor. The depth is 6 to 12 feet at low water, soft bottom.

The directions given are available for vessels of 7 feet draught or less.

GENERAL DIRECTIONS, SACHEM'S HEAD HARBOR.

I. ***From the Eastward.***—Steer so as to pass about ½ mile south of Sachem's Head, and when the northern and largest of the Goose rocks bears **NW. ½ N.**, steer for it on that bearing. When Joshua Point bears **N.**, steer for it on that bearing until the harbor is opened out, when steer about **E NE. ½ E.**, heading midway between Joshua Point and the small island at the southern point of entrance, and anchor according to draught when inside the points. In 1887 the southern side of the entrance was marked by a large timber wedged in the rocks at the western extremity of Sachem's Head.

Chimney Corner Reef, to the southward of Sachem's Head, is described above.

Goose Rocks are described under the heading "Thimble Islands Harbor."

II. ***From the Westward.***—Pass about 300 yards south of East Reef buoy (spar, red, No. 10), south of the Thimble Islands, and steer **E. ¾ N.**; this should lead about 200 yards south of Goose Rocks buoy (spar, red, No. 8). When Goose Rocks buoy is abaft the port beam, distant about 400 yards, steer **NE.** by **E. ¼ E.**, heading for the harbor entrance, and when the harbor is opened out follow directions given above for entering.

East Reef and **Goose Rocks** are described under the heading "Thimble Islands Harbor."

†Shown on Coast and Geodetic Survey charts 361[2] and 115. See the foot-note on the next page.

THIMBLE ISLANDS HARBOR.†

About 7 miles to the eastward of New Haven entrance is a small and well-sheltered anchorage, formed by the Thimbles. It is much frequented by yachts in summer, and fishing steamers anchor here for the night when fishing in the vicinity; it is also used by tows. Vessels up to 12 feet draught can find shelter here, but as the entrance is narrow and there is no room for working when inside, it is necessary for sailing vessels to have a favorable wind entering and leaving by the only channel available for strangers. Although the harbor is open to the southwest, yet even from that direction the sea loses much of its force before reaching the anchorage. There is but one entrance available for strangers; though narrow, this is perfectly clear except for a rock (3 feet over it) off the cliffs of High (or Kidd's) Island, described below and easily avoided.

Stony Creek, a village on the Shore Line Railroad, is one mile north of Thimble Islands Harbor. It has several hotels and is a summer resort.

Tides.—The mean rise and fall of tides at the Thimbles is 5.3 feet; corrected establishment $10^h\ 49^m$. For other tidal data see page 16.

Consult also pages 9-17 and 40-44.

SAILING DIRECTIONS, THIMBLE ISLANDS HARBOR.

I. ***From the Eastward.***—Passing about ½ mile south of Sachem's Head, steer **W NW. ¾ W.**, heading for the southernmost of the Thimble Islands. Round the Outer Thimble and Two-tree Island, giving them a berth of at least 100 yards on the starboard hand; the Outer Thimble is a large bare rock just to the southeastward of Two-tree Island.

When the northern end of Two-tree Island bears **E SE.** and is distant about 150 yards, steer **NE. ¾ E.**, heading so as to have the high frame observatory on Pot Island a little on the starboard bow, thus favoring the Pot Island shore. When nearly up to the observatory, steer a little more to the northward so as to pass about midway between the islands.

Anchor when off the northern end of Pot Island in about 18 feet, soft bottom.

In following these directions the depth of water is not less than 13 feet.

Remarks.—On the **W NW. ¾ W.** course, the Thimbles will be a little on the starboard bow.

Two-tree Island, the southernmost one, has (in 1887) a very prominent tree, which is seen when past Sachem's Head.

Pot Island, the third island from the southward, will be distinguished by the tall framework observatory near the middle of the island.

Money Island, to the northeastward of Pot Island, has numerous summer houses and a hotel. To the northeastward of Money Island other islands extend almost to the mainland, with narrow passages between them; these passages are unfit for strangers, as they wind among numerous unmarked rocks and shoals.

Rounding Two-tree Island, **High Island** (long and narrow, covered with trees and showing a rocky water-line), sometimes called Kidd's Island, will be opened out to the northward. The harbor lies to the eastward of this island, between it and Pot and Money islands. The channel leads well to the eastward of the small cluster of rocks which will be seen lying about 300 yards southwest of High Island.

Chimney Corner Reef, not marked, has 9 feet over it, and lies about 600 yards south of Sachem's Head; see also page 73.

Goose Rocks, several rocks showing out of water, lie ¼ mile west of Sachem's Head. **Goose Rocks Shoal** extends to the southwestward of the Goose Rocks, and has a spot with 2 feet of water on it. A buoy (spar, red, No. 8) is placed on the southern end of the shoal and should be left on the starboard hand.

A Spot with 15½ feet over it lies ⅝ mile **SW.** by **W.** ½ **W.** from the buoy marking Goose Rock Shoal.

There are many rocks to the eastward and northward of the Thimbles, some of them showing bare at low water.

East Reef, **Wheaton's Reef**, **Brown's Reef**, and **Northwest Reef** lie in a detached cluster about ½ mile to the southwestward of Two-tree Island. In places they have only from 2 to 3 feet over them. Approaching from the eastward they are all left on the port hand, the course leading between them and Two-tree Island. *East Reef* is marked at its southeastern end by a red buoy (spar, No. 10). *Wheaton's Reef* is marked at its northwestern end by a black buoy (spar, No. 1). *Brown's Reef* is not marked; it lies about 500 yards to the southward of Wheaton's Reef buoy and is about 600 yards to the westward of East Reef buoy. *Northwest Reef* is a small detached spot with 7 feet over it, lying about 600 yards **W.** by **S.** from Wheaton's Reef buoy.

Inner Reef, marked by a buoy (spar, red, No. 2) off its eastern end, is a small cluster of rocks showing bare in places at low water, lying 700 yards to the westward of Two-tree Island. Inner Reef buoy is generally left on the port hand in entering.

A Rock with 3 feet of water over it lies **E.** from the southern end of High Island, about 80 yards from the shoreline of the island. The entire distance across from High Island to Pot Island is here about 200 yards. The rock is just abreast a noticeable vertical crevice in the cliffs of High Island, and is avoided by keeping well over to the shore of Pot Island in passing; the northwestern side of Pot Island is steep-to.

† Shown on Coast and Geodetic Survey chart **361²**, harbors of Branford, Sachem's Head, and the Thimbles, Conn.; scale $\frac{1}{10,000}$, or one mile—7.296 inches, price $0.50. Shown also on chart **115**. See the foot-note on page 40.

II. ***From the Westward.***—Steer so as to pass about ⅝ mile north of Branford Reef beacon, leaving Negro Heads buoy (spar, red, No. 4) about 200 yards on the port beam. When this buoy bears abeam, distant 200 yards, steer **E. ½ N.**, heading for the tree on Two-tree Island; this course now leaves Inner Reef buoy (spar, red, No. 2) on the port hand and Wheaton's Reef buoy (spar, black, No. 1) on the starboard hand. When Inner Reef buoy (spar, red, No. 2) bears abaft the port beam, steer **NE. ¾ E.** into the harbor and follow the directions given under heading I foregoing.

Or, with Negro Heads buoy bearing **N.**, distant 200 yards, steer **E NE. ¾ E.**, passing 150 to 200 yards north of Inner Reef buoy. When this buoy bears abaft the starboard beam, steer for the observatory on Pot Island and anchor as directed in coming from the eastward.

Remarks.—On the **E. ½ N.** course the southernmost of the Thimble Islands will be ahead. As the island is approached, Wheaton's Reef buoy (spar, black, No. 1) will be made on the starboard bow and Inner Reef buoy (spar, red, No. 2) will be made a little on the port bow; the sailing-line passes nearly midway between these two buoys. When between these buoys the harbor will be opened out, extending to the northeastward between the islands.

Dangers.—**Branford Reef** is described on page 54. **Negro Heads**, a dangerous rocky ledge partly out at low water, is about 1 mile north of Branford Reef beacon, and is marked off its southern end by a red buoy (spar, No. 4).

Gangway Rock, a small detached rock with 5 feet of water over it, lies nearly ⅝ mile **E NE. ½ E.** from Negro Heads buoy. This rock is not marked.

Northwest Reef, Wheaton's, Brown's, East, and **Inner reefs** are described under paragraph I foregoing.

A Spot with 9 feet of water over it, not marked, lies nearly ⅝ mile **NW. by W. ½ W.** from the red buoy on Inner Reef. There is a channel 500 yards wide, having a least depth of 15 feet, between this spot and Inner Reef.

A Rock with 3 feet of water over it lies in the channel off High Island; it is described under heading I foregoing.

BRANFORD HARBOR.†

Branford Harbor, on the north shore of Long Island Sound, about 4 miles to the eastward of New Haven entrance, is a shallow cove between Jeffrey's Point and Johnson's Point, affording an anchorage for vessels up to 10 feet draught. The entrance is somewhat obstructed by ledges and rocks, but all these are either buoyed or show plainly. **Branford Creek**, a narrow and crooked stream, enters at the head of the harbor. **Branford**, a town on the Shore Line Division of the N. Y., N. H. and H. Railroad, is about 1½ miles above the mouth of the creek. Branford has some trade by water, comprising cargoes of coal, lumber, iron, and grain, carried mostly by transient vessels. The deepest draught of vessels entering the harbor and going up to Branford is 8 feet; vessels of 7 feet draught can go up at mean low water; the depth alongside the wharves is 9 feet.

Anchorages.—A well-sheltered anchorage, in from 6½ to 9 feet of water, is found to the northward of the Mermaids, but it should not be attempted by strangers without a pilot.

An anchorage in 10 to 14 feet of water, protected against all but southerly winds, will be found about 400 yards north of Taunton Rock, and about midway between Bird Rock buoy (spar, red, No. 2) and Jeffrey's Point (eastern shore).

Pilots and Tow-boats.—Strangers frequently take a pilot, making signal and anchoring outside Taunton Rock until they are boarded by one. Tow-boats are sometimes used by strangers who go to Branford; they can be obtained at New Haven.

SAILING DIRECTIONS, BRANFORD HARBOR.

I. ***From the Eastward.***—Passing about ¼ mile south of East Reef buoy (spar, red, No. 10), steer **W NW.**; this course passes about 200 yards south of Negro Heads buoy (spar, red, No. 4) and leaves Branford Reef beacon nearly ¾ mile distant on the port hand.

When Negro Heads buoy bears **NE.**, distant about 250 yards, steer **NW.**, heading for Taunton Rock. Pass 200 yards to the eastward of Taunton Rock, steering **N.**, with Bird Rock buoy (spar, red, No. 2) on the port bow; continue the **N.** course, and anchor according to draught in from 10 to 15 feet of water (low water).

Give the shores a berth of ⅛ mile and keep at least this distance to the southward of the Big Mermaid (the islet seen to the northward in entering, about midway between the shores where the harbor narrows somewhat).

Remarks.—The Thimbles Islands (see page 74) will be left about ¾ mile on the starboard hand. Branford Reef beacon (see page 54) will be left about ½ to ⅝ mile on the port hand. When abreast of Negro Heads buoy (spar, red, No. 4), Branford Harbor will open out to the westward of Jeffrey's Point (low, rocky, several small rocky islands off its southern end, the southernmost known as Jeffrey's Rock). On the **NW.** course, with Taunton Rock ahead, Johnson's Point (low, covered with trees), formerly called Branford Point on chart, will show open a little to the southward of Taunton Rock. On approaching Taunton Rock the harbor will fully open out and the house and hotel on the western shore will be seen.

East, Wheaton's, Brown's, and **Northwest reefs** are described on page 74.

Branford Reef, marked by a beacon, is described on page 54.

†Shown on Coast and Geodetic Survey chart 361², harbors of Branford, Sachem's Head, and the Thimbles, Conn.; scale $\frac{1}{10,000}$, price $0.50. Shown also on chart 115. See the foot-note on page 40.

Negro Heads are described on page 75. Shoals and islands lie between the Negro Heads and Jeffrey's Point, and vessels should keep to the southward of a line drawn from Negro Heads buoy (red, No. 4) to Jeffrey's Rock.

Five-foot Rock, marked by a buoy (spar, red, No. 6) off its southern side, lies nearly ⅝ mile **SW.** from Taunton Rock. The **NW.** course for Taunton Rock leads well to the eastward of this buoy, which can be passed on either hand giving it a berth of 150 yards, thus clearing the rock and shoal water surrounding it.

Jeffrey's Rock is the southernmost rock making out from Jeffrey's Point. It is quite bold-to on its southern and western sides, and can be approached to within 75 yards from these directions.

Taunton Rock, a large bare rock at the entrance of the harbor, shows conspicuously when approaching from any direction. Coming from the eastward this rock is left on the port hand in entering. It lies a little over ¼ mile **W.** from Jeffrey's Rock. Blyn Rock is nearly ¼ mile to the northwestward of Taunton Rock.

Bird Reef, marked by a buoy (spar, red, No. 2) near its southwestern end, has a least depth of 5½ feet. It is a small detached reef about 600 yards **E.** by **N.** from the southern end of Johnson's Point. A spot with 12 feet of water over it lies about 100 yards **E.** of the buoy.

II. ***From the Westward.***—With Southwest Ledge Light-house bearing **N.**, distant about 1 mile, steer **E.** by **N.**, passing about 150 yards south of the Cow and Calf. When the Cow and Calf bear abaft the port beam, distant about 300 yards, steer **NE.** ½ **E.**, leaving Five-foot Rock buoy (spar, red, No. 6) about 250 yards on the starboard hand and passing about midway between Taunton Rock and Blyn Rock. Continue the **NE.** ½ **E.** course and anchor, according to draught, as directed in coming from the eastward.

Or, when the Cow and Calf bear **NW.**, distant 250 yards, steer **N NE.** ¾ **E.**, heading about midway between Blyn Rock and Johnson's Point. Leave Blyn Rock on the starboard hand at least 50 yards distant; then stand a little more to the eastward and anchor, according to draught, to the northward of Taunton Rock.

Remarks.—On the **E.** by **N.** course Round Rock buoy (spar, red, No. 12) will be left about ½ mile on the port hand. Branford Reef beacon will be made well on the starboard bow. The Cow and Calf will be made a little on the port bow. When nearly up to the Cow and Calf, Branford Harbor will be opened out. When off the entrance Taunton Rock will show conspicuously.

Cow and Calf is the name of two remarkable rocks lying nearly ¾ mile **SW.** by **S.** from Johnson's Point; they are close to each other, and Cow, the larger, always shows out of water. Shoal spots with 11 and 12 feet over them extend 450 yards in a northwesterly direction from these rocks. **Five-foot Rock** is described under heading I foregoing.

Blyn Rock is a small rock showing plainly about midway between Taunton Rock and Branford Point; it can be approached to within 50 yards in 16 feet of water. At high water of unusually high tides Blyn Rock is just awash.

Taunton Rock has been described under heading I foregoing.

Johnson's Point, formerly Branford Point on charts, is comparatively bold-to on its eastern side; the 12-foot curve makes out 100 yards from the shore about 200 yards north of the southern end of the point. **A Spot** with 9½ feet over it lies about 100 yards **SW.** from southern end of the point.

NEW HAVEN HARBOR.†

New Haven Harbor, the approach by water to the city of **New Haven**, is commercially the most important one in Long Island Sound. At its head is the junction of the Mill and Quinnipiac rivers. The port has a very large carrying trade, the chief item being coal, much of which is brought in barges and canal-boats, sometimes forming long tows. Many vessels enter the harbor for shelter, particularly during the spring and the autumn. The deepest draught of vessels entering or going up to the city is 20 feet.

The **Depth of water** in the channel is 13 feet at its shoalest part—a bar of sand, gravel, and mud extending across below Fort Hale and above the old light-house tower (both on the eastern shore). The present depth over this bar has been obtained by dredging. From abreast Fort Hale to the wharves there is not less than 16 feet in a channel from 400 to 600 feet wide.

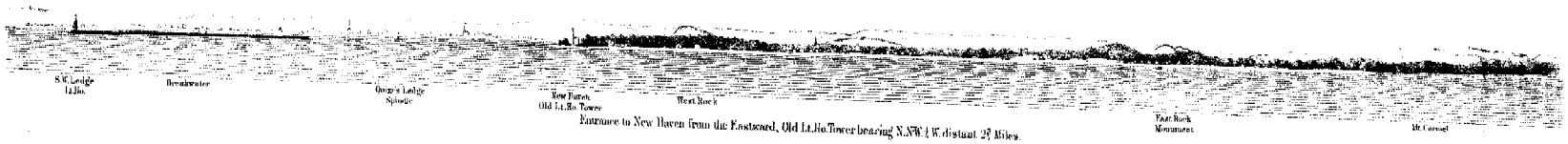
The depths to be found at some of the more important wharves are as follows: Belle dock, 14 feet; Canal wharf, 12 feet; Steamboat wharf, 14 feet; Long (or Union) wharf, 12 feet,—all at mean low water.

The **Channel** has no sharp changes in direction; its least width is 400 feet; the outer part is nearly a mile wide. Throughout its length it is bordered by mud flats and sand-spits making out well off shore.

Oyster Grounds, marked off by stakes, occupy the flats on either side of the channel, and also reach a considerable distance outside off the entrance; stake-buoys mark off the outer grounds. Below Fort Hale the stakes and buoys extend well into the channel and are a serious obstruction to navigation; above the fort the channel itself is as yet (July, 1888) clear of them.

Prominent objects.—With a favorable light the old light-house tower on the eastern point of entrance is the best defined object in approaching. Outside of this is Southwest Ledge Light-house (see page 10), from which a breakwater extends in a northeasterly direction. When well in towards the entrance the soldiers and sailors monument on the summit of East Rock is well defined in clear weather, showing above the outline of the hills to the northward of the harbor.

†Shown on Coast and Geodetic Survey chart 362, New Haven Harbor; scale $\frac{1}{20,000}$, or one mile—3.648 inches, price $0.20. Shown also on chart 115. See the foot-note on page 40.



Entrance to New Haven from the Eastward, Old Lt.Ho.Tower bearing N.NW.¼ W. distant 2¾ Miles.

Entrance to New Haven from the Westward, Old Lt.Ho.Tower bearing NE.¼ E. distant 3¼ Miles.

Pilots are not needed and are not generally taken except by vessels subject to compulsory pilotage (foreign vessels and vessels sailing under register). There are two licensed pilots, and one can be obtained, if desired, by making signal when off the entrance. If a pilot be taken the pilotage is as follows for vessels drawing more than 9 feet: Draught 9 feet to 12 feet, $0.75 per foot; 12 feet to 15 feet, $1.50 per foot; 15 feet and upwards, $2 per foot.

Extracts from laws relating to pilots and pilotage are given in Appendix II.

Tow-boats are much used, and can always be had by making signal; only a small proportion of the vessels entering merely for anchorage, take a tow-boat.

Anchorage.—Vessels seeking shelter anchor anywhere along the channel from just inside the breakwater up to Long wharf. **Morris' Cove**, though somewhat obstructed by fish-weirs, affords good anchorage, and is much used by yachts.

Many vessels, especially those bound to the city, anchor above the innermost black buoy (Shag Bank buoy, spar, No. 5), between it and Long wharf.

Above the Railroad wharf (the next large one above Long wharf) is an anchorage used by very small craft; here vessels discharging lumber often find a berth, one or two at a time. Large yachts often anchor below Long wharf.

There are no special regulations prescribing the limits within which vessels must anchor, except that a clear channel should be left. The extreme upper part of the harbor off the wharves is under the immediate supervision of the harbor-master, who gives his attention to the berthing of vessels there when necessary, in order to keep a clear channel for the steamers. **Harbor regulations** are not strictly defined except as just indicated. The harbor-master's headquarters are at the steamer wharf just below Tomlinson's bridge.

Quarantine regulations are adopted when any special necessity arises. Ordinarily vessels are not boarded; but those having sickness on board, or coming from an infected port, must not go above the innermost black buoy (Shag Bank buoy, spar, No. 5) until boarded by the health officer, to whom such vessels can be reported through any tug which may pass. See also Appendix II.

Supplies of all kinds, coal, water, etc., can be obtained. Water is taken from tugs and steam water-boats.

Marine railway.—There is a marine railway on which vessels of 400 tons or less can be taken out.

Hospitals.—The nearest U. S. Marine Hospital is at Staten Island, New York. Mariners at the port of New Haven, entitled to hospital treatment, are sent to a hospital in the city; those entitled to medical care receive the attention of an acting assistant surgeon of the Marine-Hospital service. (See Appendix IV.)

Bridges.—At the head of the harbor proper is Tomlinson's bridge, width of draw 84 feet; about ¼ mile above this, and crossing Mill River, is Chapel street bridge, width of draw 60 feet; about ⅛ mile farther up is Grand street bridge, the head of navigation on Mill River.

Quinnipiac River is crossed by two bridges: the first, about ½ mile above Tomlinson's bridge, has a draw 76 feet wide; the second, about ½ mile farther up, is the head of navigation on the Quinnipiac River.

Steamboat and railroad communication.—The boats of the N. Y. and N. H. Steamboat Company and of Starin's Steam Transportation Company run between New York and New Haven, each line making daily trips. A number of railroads converge at New Haven.

Ice generally obstructs navigation to a considerable extent from December to March, frequently extending to the mouth of the harbor. During this period it is very often necessary for sailing vessels, bound in or out, to employ tow-boats. Steamers can generally enter and depart, except in very severe weather. (See also pages 43–44.)

In New Haven Harbor northerly winds have a tendency to clear the harbor of ice if the formation is sufficiently light; southerly winds are apt to force in drift-ice from the Sound.

The **Variation of the compass** at New Haven entrance for 1888 is **9° 20′ W.**, with an annual increase of about 3¾′.

Lists of light-houses and wind-signal stations, with other general matters, will be found on pages 9–17; see also pages 43–44.

Tides.—The mean rise and fall of tides at New Haven entrance is **6.2** feet; corrected establishment **11h 04m**. For other tidal data see page 16.

The **Tidal currents** are moderately strong and must be considered in approaching and entering. Coming from the westward, when well up with the entrance, the current sets across the course and must be allowed for. Farther in the ebb is somewhat affected by the dike on the western side of the channel, and tends to set a vessel over on the flats on the eastern side of the channel.

TIDAL CURRENTS OFF NEW HAVEN ENTRANCE.

Locality.	Second Quarter.		Third Quarter.		Flood or Ebb.
	Set.	Drift.	Set.	Drift.	
2¼ miles S SW. from Southwest Ledge Light-house	NW. ⅝ W.	1.27	NW. by W.	0.95	Flood.
	E. ⅝ N.	1.20	E NE. ½ E.	0.95	Ebb.

The observations of currents were made as far as possible when the influence of the wind was small. The directions are magnetic and the drift in nautical miles per hour.

SAILING DIRECTIONS, NEW HAVEN HARBOR.

The following directions are available at low water for vessels of less than 12 feet draught, bound up to the city. They are therefore frequently available, according to the stage of the tide, for vessels of somewhat greater draught. Vessels drawing as much as 15 feet can readily stand in to an anchorage just inside the breakwater, at low water.

I. FROM THE EASTWARD.

1. ***Approaching the entrance from a position to the southward of Falkner's Island.***—With Falkner's Light-house bearing **N.**, distant 1 to 2 miles, steer **W.** for 1 mile and then shape the course **W.** by **N.** for about 8½ miles. Southwest Ledge Light-house should then be on some bearing from **NW.** to **N NW.**, distant 3 to 4 miles.

Then steer for Southwest Ledge Light-house on any bearing to the northward of **NW.** Pass about 300 to 600 yards to the westward of the light-house and proceed as directed in paragraph 2 following. The depth until past the light-house should not be less than 17 feet.

Remarks.—The courses given lead well clear of all dangers until rounding Southwest Ledge Light-house. Falkner's Island Light-house, Goose Island, Branford Reef beacon, and Townsend's Ledge buoy (spar, red and black horizontal stripes) are on the starboard hand. Luddington Rock buoy (nun,* red and black horizontal stripes) will be left on the port hand after heading up past Southwest Ledge Light-house (see the descriptive notes under paragraph 1a). On a clear day the monument on East Rock, a high hill inshore of the head of New Haven Harbor, will be seen.

1a. ***Approaching closer alongshore.***—With Branford Reef beacon bearing **N.**, distant ½ mile, steer **W NW.** ½ **W.** until Southwest Ledge Light-house bears to the northward of **NW.** Then steer so as to pass from 300 to 600 yards to the westward of the light-house, and proceed as directed in paragraph 2 following.

Remarks.—On the **W NW.** ½ **W.** course New Haven breakwater and Southwest Ledge Light-house should be on the starboard bow; the course leads about ⅝ mile north of Townsend's Ledge buoy (spar, red and black horizontal stripes) and about ⅝ mile south of Round Rock buoy (spar, red, No. 12). The course, when heading up so as to pass a little to the westward of Southwest Ledge Light-house, leads about midway between the light-house and Luddington Rock buoy (nun,* red and black horizontal stripes). The monument on East Rock should be opened out to the westward of the breakwater.

Branford Reef, marked by a beacon, is described on page 54.

Townsend's Ledge, 2½ miles **SE.** ½ **E.** from Southwest Ledge Light-house, is a small spot with 18 feet of water over it, and is marked by a buoy (spar, red and black horizontal stripes).

Round Rock, 1⅝ miles **E.** ½ **S.** from Southwest Ledge Light-house and about ½ mile from the shore, is a bare rock surrounded by sunken ledges, and marked by a spar-buoy (red, No. 12), which is placed to the southward of the rock; 17 feet of water will be found ⅜ mile to the southwestward of this buoy.

Luddington Rock, a little over ½ mile **W SW.** ¾ **W.** from Southwest Ledge Light-house, is a small patch with 15 feet over it, and is marked by a buoy (1st-class nun,* red and black horizontal stripes). Heavy-draught vessels should not pass to the northwestward of this buoy.

2. ***Entering and standing up the harbor.***—With Southwest Ledge Light-house bearing **E.**, distant about 500 yards, steer about **N.** by **E.** ¼ **E.**; the monument on East Rock should be ahead. This should lead fair up the channel, leaving Adam's Fall buoy (can,* red, No. 4) on the starboard hand, Party's Bar buoy (nun, black, No. 3) and Sandy Point dike on the port hand, and Fort Hale buoy (spar, red, No. 6) on the starboard hand. When Fort Hale buoy is on the starboard beam, distant 75 yards, steer about **N.** ½ **W.** until Shag Bank buoy (spar, black, No. 5) is about 75 yards distant on the port beam, then steer **N.** ¾ **E.**, heading for the end of Long wharf. The channel is here defined by the poles marking oyster grounds on the mud flats on either side. Anchor on the west side of the channel between Shag Bank buoy and the end of Long wharf, in 8 to 16 feet low water), soft bottom.

To anchor in Morris' Cove.—On the **N.** by **E.** ¼ **E.** course, when Adam's Fall buoy (can,* red, No. 4) is off the starboard beam, edge to the eastward, heading for Forbes' Bluff, to the eastward of Fort Hale, giving the shore of Five-mile Point a berth of 300 yards or more. Anchor, according to draught, anywhere in the cove between Five-mile Point and Fort Hale, keeping clear of the fish-weirs.

Remarks.—The **N.** by **E.** ¼ **E.** course leads about 350 yards west of Adam's Fall buoy (can,* red, No. 4), about 200 yards east of Party's Bar buoy (nun, black, No. 3), about 350 yards east of the end of the dike making out from Sandy Point, and about 100 yards west of Fort Hale buoy (spar, red, No. 6).

*Spar-buoy in winter. See note on page V.

The **N. ¼ W.** course leads through the middle of the channel and about 75 yards east of Shag Bank buoy (spar, black, No. 5). Below Fort Hale oyster stakes and oyster buoys are found in many places in the channel and on the flats. The eastern edge of the channel above Fort Hale is very clearly defined by the oyster stakes, which cover the flats and extend to the edge of the channel.

Quixe's Ledge, **E NE. ¼ E.** from the eastern end of the breakwater and on a line with it, is dry at half tide, with numerous sunken rocks to the southward and southeastward of it, and is marked by a black spindle with cask on top. The breakwater is being extended towards this ledge.

Old Head Reef, about 225 yards north of the eastern end of the breakwater and 400 yards **NW.** by **W.** from Quixe's Ledge spindle, has 7 to 9 feet over it, and is not marked.

West Haven Flats, with 6 to 8 feet of water, extend out 1 mile from the shore on the western side of the entrance. A spar-buoy (black, No. 3) is placed near the southeastern edge of the 12-foot curve.

Adam's Fall, about ½ mile **N.** by **E.** ½ **E.** from Southwest Ledge Light-house, is a rocky ledge about 120 yards in diameter, and has a least depth of 5 feet, with 20 feet all around it; a buoy (can,* red, No. 4) is placed off the western side of the ledge.

Party's (Pardee) Bar is the name given to the part of West Haven Flats extending to the eastward from Sandy Point; on its eastern edge it is marked by a buoy (nun, black, No. 3).

Black Rock lies about ⅓ mile from the northern shore of Morris' Cove; it is bare at low water. On the eastern edge of the channel, abreast of Fort Hale, is placed a spar-buoy (red, No. 6).

Shag Bank is the long spit, bare at low water, making to the northeastward from Sandy Point; off its northeastern end, on the west side of the channel, is placed a spar-buoy (black, No. 5).

II. FROM THE WESTWARD.

Pass at least 1½ miles to the southward of Stratford Point Light-house and shape the course **NE.** by **E.** ½ **E.** Vessels drawing 14 feet or more should give Stratford Point Light-house a berth of 2 miles while to the southward or southwestward of it. On the flood, guard against a northerly set when to the eastward of Stratford Point.

When Southwest Ledge Light-house is made, shape the course for it, keeping this light-house bearing to the northward of **NE.** by **E.** ½ **E.** This should lead well to the southward of Luddington Rock buoy (1st-class nun,* red and black horizontal stripes). When Southwest Ledge Light-house is about 500 to 600 yards distant, turn to the northward, course about **N.** by **E.** ¼ **E.**, passing about midway between Southwest Ledge Light-house and Luddington Rock buoy. Now follow the directions of paragraph 2.

Remarks.—The course leads well to the southward of Charles' Island (Milford Harbor), Welch's Point, and Pond Point, and the buoys placed off them (see page 80). Coming from the westward by day, the old light-house tower (white) on Five-mile Point will be the first conspicuous mark at New Haven entrance, and should be made a little on the port bow. Southwest Ledge Light-house (see page 10) will be made to the southward of the old tower. The **NE.** by **E.** ½ **E.** course leads about 1¼ miles south of Pond Point and about 300 yards south of Luddington Rock buoy (1st-class nun,* red and black horizontal stripes), and directly for Southwest Ledge Light-house.

Luddington Rock and West Haven Flats are described under heading I.

GENERAL REMARKS ON APPROACHING NEW HAVEN HARBOR AT NIGHT.

When Southwest Ledge Light-house is made it may be safely approached at night by keeping it bearing between **NE.** and **NW.** by **N.** (through **N.**) until nearly up with it. Pass 300 to 600 yards to the westward of this light-house, thus passing to the eastward of Luddington Rock buoy (1st-class nun,* red and black horizontal stripes), and steer about **N.**, keeping a good lookout for Adam's Fall buoy (can,* red, No. 4) on the starboard bow, and come to in about 3 fathoms (low water). If Adam's Fall buoy can be seen, vessels drawing 12 feet or less can pass to the westward of it, and when past it can steer **N NE.** ½ **E.** for about ¾ mile, coming to at the mouth of Morris' Cove in 13 to 16 feet (low water).

Strangers should not attempt to proceed farther in at night.

MILFORD HARBOR.†

This is a bight on the north side of Long Island Sound, about 6½ miles to the westward of Southwest Ledge Light-house (New Haven entrance) and about 3½ miles to the northeastward of Stratford Point Light-house. The harbor affords anchorage in from 6 to 14 feet, sheltered from all but southerly and southeasterly winds. *Welch's*, or *Cedar Point*, the eastern point of entrance, is marked by the very high brick chimney of a fish-oil factory on the southwestern side of the point. *Charles' Island*, on the western side of the entrance, is low, irregular in shape, covered with scrubby trees near its northern end, and has two poplars near its southwestern side; near the middle of the island is a large house.

† Shown in part on Coast and Geodetic Survey chart 115 and in part on chart 116. See the foot-note on page 40.

Milford River, a narrow and shallow stream, empties into the head of the harbor. On the eastern side of the mouth of the river a jetty has been constructed and improvements made under government appropriations. At the entrance to the river a channel buoy, painted black and white in perpendicular stripes, has been placed.

The least water found in entering the river is at the end of the jetty, 3 feet at low water, and this is said to be decreasing. The deepest draught of vessels entering the river at high water is 9 feet, and the usual draught not more than 8 feet. There is 10 feet at low water alongside Merwin's wharf, where water, through hose, can be obtained, and coal for small steamers can also be procured.

Milford, a village on the Milford River, is about ⅝ mile above the mouth. It is of little commercial importance. The principal trade is in coal and oysters. Vessels of 7 feet draught can go as far as Milford at high water; there is 3 feet of water at the town wharf at low water.

Tow-boats.—Strangers and vessels bringing cargoes usually take a tow-boat. Tugs can be had at New Haven, at Bridgeport, or at Milford. Vessels desiring a tow-boat or a pilot anchor in the harbor and signal, when one will come out from Merwin's wharf.

Tides.—The mean rise and fall of tides is 6.6 feet.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, MILFORD HARBOR.

These directions are available for vessels drawing 11 feet or less. Vessels drawing 13 feet or more should give Stratford Point more of a berth than is here indicated by the directions for approaching from the westward; but such vessels would not enter Milford Harbor.

I. ***From the Eastward.***—With Southwest Ledge Light-house bearing **N.**, distant about 1 mile, steer **W.** ½ **S.** for about 6 miles, and when the high chimney on Welch's Point bears **N.** by **E.** steer **N NW.** When inside Welch's Point anchor, according to draught, about midway between Charles' Island and the eastern shore.

Or, being 1 mile to the westward of Goose Island (see page 49), with Falkner's Island Light-house bearing **E.** ⅜ **S.**, make good the course **W.** ⅜ **N.** for about 15½ miles, and when the high chimney on Welch's Point bears **N.** by **E.** stand in, course about **N NW.**

Remarks.—New Haven entrance is passed on the starboard hand. Pond Point, a high hilly headland to the westward of New Haven entrance, will be made on the starboard bow, and as it is approached Welch's Point and the high chimney will be seen to the westward. Charles' Island will be made a little on the starboard bow. As Welch's Point is approached, a long wharf will be seen making out to the westward from the oil-works and the harbor will be opened out. The buoy off Pond Point and the buoy off Welch's Point will be left on the starboard hand.

On the **N NW.** course the jetty at the head of the harbor will be on the starboard bow, and the course leads about midway between the buoy (spar, red, No. 16) off Welch's Point and the buoy (spar, black, No. 3) east of Charles' Island.

Pond Point Reef extends about ⅝ mile to the southward from Pond Point, and is marked at its southern end by a buoy (spar, red, No. 14).

Welch's Point (Cedar Point) **Reef** extends ⅝ mile south from Welch's Point, and is marked at its southern end by a buoy (spar, red, No. 16).

Charles' Island Rocks is the name given to the rocky shoal extending to the southward for ⅝ mile from Charles' Island; the southeastern side of these rocks is marked by a buoy (spar, black, No. 1).

About 600 yards to the northeastward of Charles' Island, a buoy (spar, black, No. 3) is placed on the eastern end of the shoal which makes out to the eastward from Charles' Island.

II. ***From the Westward.***—Pass about 1½ miles south of Stratford Point. When Stratford Point Light-house bears **N.**, distant 1½ miles, steer **NE.**, passing ½ mile to the southward of Charles' Island. When midway between the buoy (spar, black, No. 1) off the southern end of Charles' Island and the buoy (spar, red, No. 16) off Welch's Point, steer **N.** and anchor, according to draught, as above directed.

Remarks.—On the **NE.** course Charles' Island will be made on the port bow, and the tall chimney on Welch's Point will be seen open to the southward of the island and on the port bow. As Charles' Island is approached, the harbor will be opened out and the jetty at the head of the harbor will show distinctly.

Dangers.—**Stratford Point Shoal** is described on page 53. **A Ledge** makes out to the southward of Charles' Island; its southern end is marked by a buoy (spar, black, No. 1). **Other dangers** to be considered are mentioned under heading I foregoing.

HOUSATONIC RIVER.†

The mouth of this river is about 4 miles to the eastward of Bridgeport entrance and is on the eastern side of Stratford Point. The entrance is obstructed by a bar formed by freshets; dredging has been done to increase the depth over the bar, but the improvement has not been permanent. In 1887 a depth of 7 feet in the channel was

†The lower part of the Housatonic River falls within the limits of Coast and Geodetic Survey chart 114. See the foot-note on page 40.

reported, but pilots claim that only 5 feet can be carried over the bar at low water; 9 feet is the deepest draught of vessels entering at high water. The river is navigable for a distance of 13 miles above the entrance, to the villages of Derby and Shelton, but the channel is so narrow and crooked and the currents so strong and so irregular, that sailing-vessels are obliged to take a tow-boat to pass above Stratford.

About 2½ miles above its entrance the river is crossed by a foot-bridge (width of draw 50 feet); ¼ mile above the foot-bridge a railroad bridge crosses the river (width of draw 70 feet).

Stratford, a village of little commercial importance, is on the western bank, a little over a mile above the entrance. It has some trade in coal, lumber, and oysters; 9 feet is the deepest draught of vessels that trade here.

Derby, a village on the eastern bank of the river, 13 miles above the entrance, is of little importance.

Shelton, a village on the western bank of the river, and connected with Derby by two bridges, has many important manufactories. Coal and lumber are brought here in sailing vessels, and a daily line of steamers runs to New York in the summer. Vessels of 9 feet draught can go up as far as Derby and Shelton at high water, and there is 6 feet of water alongside the wharves at low water.

Prominent objects.—Stratford Point Light-house (round white tower, with detached white dwelling, see table of lights, page 10) is a guide up to the entrance. A large granite day beacon, with shaft and ball, is located nearly ¾ mile N. ¼ E. from the light-house.

The **Anchorage** outside the bar affords no protection against storms; vessels only anchor here to wait for the tid to cross the bar.

Pilots and tow-boats.—All strangers, if bound to Stratford, take either a pilot or a tow-boat. If bound to Derby or to Shelton they take a tow-boat, generally anchoring outside of Bridgeport, and there taking a tug, as it is the nearest place from which one can be obtained. Vessels desiring a pilot anchor outside the bar and signal, when one will come out from Stratford.

The **Currents** in the river and at the entrance are very strong, making local knowledge necessary. **Freshets** occur in the river in March and April. **Ice** obstructs navigation during the winter, usually above Stratford, but sometimes to the entrance.

GENERAL DIRECTIONS, HOUSATONIC RIVER.

From the Eastward.—Steer for Stratford Point Light-house on any bearing from **W SW.** to **N.** by **W.** Keep at least ½ mile distant from the light-house, and anchor in 20 to 25 feet water (low water) outside the buoys, with the light-house bearing about **W SW.**, distant ½ to ¾ mile.

From the Westward.—Pass at least 1½ miles south of Stratford Point, and when to the eastward of the line of Stratford Point Light-house and Stratford Shoal (Middle Ground) Light-house turn to the northward. Give Stratford Point Light-house a berth of at least ½ mile, and anchor as directed in coming from the eastward.

Vessels drawing 13 feet or more should give Stratford Point a much wider berth than is here indicated, but vessels of such draught do not enter the Housatonic River.

PORT JEFFERSON HARBOR.†

This harbor, on the south shore of Long Island Sound, opposite Bridgeport, Conn., and just to the eastward of Old Field Point, is one of the best protected in the Sound, but is seldom used by vessels seeking shelter merely, as the narrow entrance, between jetties, requires local knowledge and a favorable state of wind or current; the tidal current runs with very great strength at the entrance.

Inside the entrance the harbor is 1¼ miles long and about ¾ mile wide at its widest part, and is surrounded by high hills on three sides, the northern side being protected by two low points of land, between which is the narrow opening affording a passage from the sound into the harbor.

The deepest draught of vessels entering the harbor is 13 feet; at low water 7 feet is the greatest depth that can be carried through the channel, between the jetties; 7 feet can be taken alongside Darling's dock, Port Jefferson, at low water.

Port Jefferson, at the southern end of the harbor, is the terminus of a branch of the Long Island railroad, and has direct communication with New York city. The principal industry is ship-building and repairing, for which there are excellent facilities. Many vessels come here for repairs, and yacht owners find it a desirable place to lay up their vessels in the winter and to refit in the spring. Port Jefferson has some trade in coal, wood, lumber, and general merchandise, carried both by strangers and by vessels owned in the vicinity, the size of vessels ranging from 50 to 600 tons; a steamer carrying freight and passengers runs daily during the summer to Bridgeport, Conn., and makes occasional trips in winter.

Adjacent waters.—**Conscience Bay**, a shallow tidal basin off the northwestern part of Port Jefferson Harbor, is of no importance, and can only be entered by small boats. **Setauket Harbor** is a shallow inlet making into the western

† Shown on Coast and Geodetic Survey chart 361[4], Port Jefferson Harbor; scale $\frac{1}{10,000}$, price $0.30. Shown also on chart 116. See the foot-note on page 40.

part of Port Jefferson Harbor; a narrow crooked channel, with about 2 feet at low water in its shoalest part, leads from Port Jefferson Harbor to the village of **Setauket**, on the south shore of Setauket Harbor, about 1 mile above the entrance.

Prominent objects.—Old Field Point Light-house marks the western approach to the harbor and Mount Misery the eastern; the latter is a hill 180 feet high, sloping gradually toward the Sound and breaking off abruptly at the water edge, leaving a bare bluff about 40 feet high with a very large boulder near high-water mark.

Two jetties of rip rap, the eastern about 300 yards long, the western 250 yards long, extend out in a northerly direction from the entrance. Two beacons, maintained by private enterprise (lighted at night, one showing a red, the other a white light), lead up to the entrance between the jetties, but not through the channel.

The **Channel** into Port Jefferson Harbor, between the two jetties, is very narrow, and requires local knowledge to carry the best water through. The deepest draught carried through at high water is 13 feet, at low water 7 feet. A channel buoy (spar, black and white perpendicular stripes) is placed outside the jetties.

Anchorage in 9 to 10 feet of water, soft bottom, will be found close up to the town; 21 to 27 feet of water, soft bottom, will be found ¾ mile from the head of the harbor and **E NE.** from the pavilion on the western shore.

Pilots.—Strangers should always take a pilot or tow-boat. Vessels desiring a pilot, if the weather is fair, anchor outside to the northward of the jetties and make the usual signal, when a pilot will come out to them; one can always be had in the daytime. There are no regular pilots.

Tow-boats.—There are no regular tow-boats, but the steamer running to Bridgeport frequently tows vessels in and out.

Supplies.—Coal in small quantities, water through pipe and hose, and provisions can be obtained at Darling's dock, at the head of the harbor.

Repairs.—There are 7 marine railways, the largest capable of hauling out a vessel of 1,200 tons; some of the others are available for vessels of 300 to 400 tons. There are no facilities for repairing machinery of steamers nearer than New Haven or Bridgeport.

Ice.—In very cold weather the entire harbor is frozen over, but the ice does not endanger shipping in the harbor.

Tides.—The mean rise and fall of tides is 6.1 feet; corrected establishment $11^h\ 38^m$. For other tidal data see page 16.

The **Tidal currents** set with great velocity through the entrance between the jetties, keeping the general direction of the channel. In the harbor the force of the currents is not great.

Consult also pages 9–17 and 40–44.

Sailing directions for entering cannot be relied upon, as they depend too much upon local guides liable to be misplaced or difficult to distinguish. The approach is safe, vessels keeping clear of Mount Misery Shoal and a 17-foot spot about ½ mile to the northeastward of Old Field Point Light-house. Signal for a pilot, and anchor to the northward and westward of the entrance.

The following directions were tested in June, 1887, and could then be depended upon. But some of the marks are liable to be changed at any time without notice.†

Directions for entering Port Jefferson Harbor.—The channel, midway between the jetties, is narrow and the currents are here very strong. A channel buoy (spar, white and black perpendicular stripes) marks the entrance. The two beacons on the eastern point of entrance, near the line of the eastern jetty, brought in range, lead up to the entrance to the channel but not through it.

On the western point of entrance, inside the jetties, close to high-water mark, is a stake surmounted by a small barrel; this in range with an indistinct rock on a cliff leads through the dredged channel between the jetties. The rock is about half way up the cliff and about one-third way from its right hand (western) end. The cliff shows to the right of a large octagonal skating pavilion. If the stake and barrel are down, the high-water mark can be taken for the range.

Bring the channel buoy (spar, white and black perpendicular stripes) in range with the stake and barrel, or with high-water mark on the western point of entrance, seen between the jetties; note the range of the stake on the sand cliff across the bay. This line should pass midway between the outer end of the jetties. If the buoy should be misplaced, get midway between the end of the jetties and note the range of the stake and the cliff.

Stand in, keeping the range, until close to the western point of entrance, and then head through and up for the town. When inside there is perfectly safe anchorage any where not too close to the beach.

BRIDGEPORT HARBOR.‡

Bridgeport Harbor, on the north shore of Long Island Sound, at the mouth of the Pequannock River, is nearly 15 miles to the westward of New Haven. It is chiefly important as the approach to the large manufacturing city of **Bridgeport**, but also, particularly during the fall and winter, affords shelter to many vessels whose masters know the channel. The carrying trade by water is large; vessels owned in the vicinity and transient vessels are engaged in it; the principal cargoes are coal, lumber, and iron; most of the coal is brought in canal-boats and coal boxes.

† The directions here given are based upon a report by Lieut. F. H. Crosby, U. S. N., Assistant, Coast and Geodetic Survey, commanding steamer Gedney, 1886.

‡ Shown on Coast and Geodetic Survey chart 116. See the foot-note on page 40.

The **Depth of water** in the channel up to Bridgeport is 11½ feet at mean low water; this depth, the result of dredging and harbor improvements under the charge of the U. S. Army engineers, can be carried up to the first (lower) bridge. The deepest draught, loaded, of the vessels entering is 18 feet; average draught about 12 feet. At high water, vessels drawing as much as 8 feet go as far up as Berkshire Mills, the head of navigation, 2 miles above Bridgeport proper, on the Pequannock River. At mean low water the depth alongside the Naugatuck railroad wharf is 12½ feet; alongside the City dock, 9 feet; and alongside the wharves above the first bridge, 8 and 9 feet.

Prominent objects.—The chief guides in approaching are Stratford Point Light-house, to the eastward, and Penfield's Reef Light-house, to the westward; the chief guide to the immediate entrance is Bridgeport Harbor Light-house (see page 12). The latter and the two beacons marking the channel inside are left on the port hand in entering. On the eastern side of the entrance a stone breakwater extends in a westerly direction from Long Beach Point.

The **Channel** across the Outer bar (marked by the light-house) has a depth of 11½ feet for a width of only 75 feet, but for 200 feet width there is a depth of 10½ feet. Thence across the Inner bar (marked by the Outer beacon) and to the Inner beacon the 11½-foot channel is 300 feet wide or more. From the Inner beacon to the Naugatuck railroad wharf the width of the 11½-foot channel is not less than 600 feet; thence to the first bridge, 325 to 400 feet. There are two turns, one just below the Outer beacon (marking the Inner bar), the other in rounding the Inner beacon. A mid-channel course gives both beacons a berth of about 100 yards.

Pilots are necessary for vessels of more than 6 feet draught, unless a tow-boat be taken. Vessels desiring a pilot should make signal and anchor to the southward of the light-house, outside the bar, until one comes on board. There are two branch pilots. Pilotage is compulsory only for foreign vessels and vessels sailing under register.

Tow-boats are always taken by large vessels, and will come out if signal be made. They can be found alongside the wharves.

Anchorage.—The usual and best anchorage is on the western side of the channel, between the Inner beacon and the Naugatuck railroad wharf. Small vessels (sloops, etc.) can anchor above the Naugatuck railroad wharf, taking a berth on the eastern side of the channel, opposite the city.

There is practically no anchorage above Bridgeport Harbor Light-house except along the edge of the dredged channel. Vessels sometimes come to outside the Outer bar (marked by the light-house) for shelter in strong northerly winds; good holding-ground will be found in 14 to 20 feet of water, with the light-house bearing about N., distant ½ to ¾ mile.

Harbor regulations prescribe the anchorage limits as follows: Vessels of any kind anchoring to the southward of the Naugatuck railroad wharf must anchor on the western side of the channel, leaving sufficient room for vessels to pass in and out of the harbor. Any and all vessels anchoring above the Naugatuck railroad wharf must anchor close to the east bank, leaving room to get underway when the wind is to the westward.

Quarantine regulations are issued, when necessary, by the board of health (see Appendix II). There is no regular boarding-station. Only vessels having sickness on board, or coming from infected ports, are boarded by the health officer; such vessels must come to about 200 feet to the northwestward of the Inner beacon and there await the health officer.

Supplies, provisions, and ship-chandler's stores can be procured at Bridgeport. Coal can be obtained in unlimited quantities for steamers; if of less than 15 feet draught they can take it directly from the coal yards above the first (lower) bridge. Water can be taken in through hose at the elevator dock or from a water-boat.

Repairs to machinery can be made in Bridgeport. For repairs to hull, small vessels can go to Black Rock (West Bridgeport), where there are two small marine railways (see also "Repairs" under heading "Port Jefferson Harbor").

Hospitals.—Bridgeport has a public hospital with a capacity for 150 patients; subsistence, nursing, and medicines are furnished at $1 per diem.

At Bridgeport there is also a relief station of the U. S. Marine-Hospital Service, and seamen entitled to treatment receive it. (See Appendix IV.)

Bridges.—Four draw-bridges cross the Pequannock River at Bridgeport. The first (lower) one is a city bridge; the second is a railroad bridge; the others are city bridges. The width of draw, in the clear, is for the first (lower) bridge about 60 feet; for the second (railroad) bridge about 42 feet; for each of the others about 60 feet.

Steamboat and railroad communication.—Two steamers carrying passengers and freight run daily to New York. Two freight steamers run tri-weekly to New York. One steamer, passengers and freight, makes daily trips from Port Jefferson, Long Island, during the summer, and runs occasionally during the winter. Bridgeport is the terminus of the Naugatuck and the Housatonic railroads, and is on the line of the New York, New Haven, and Hartford railroad.

Ice does not, as a rule, interfere seriously with navigation; the steamers keep the channel open. (See also page 44.)

The Variation of the compass at Bridgeport Harbor entrance for 1888 is 9° 10′ W., with an annual increase of about 3¾′.

Tides.—The mean rise and fall of tides is 6.5 feet; corrected establishment $11^h\ 11^m$. For other tidal data see page 16.

Tidal currents.—The strength of the tidal currents is not great. Vessels passing in or out on the last of the flood are liable, when between the two beacons, to be set to the northeastward on Stony Bar (the inner bar, marked by the Outer beacon).

Information concerning light-houses, wind-signal stations, tides, fogs, etc., will be found on pages 9–17; see also pages 40–44.

SAILING DIRECTIONS, BRIDGEPORT HARBOR.

The following directions are available for vessels drawing 8 feet or less, but it is advisable for vessels drawing more than 6 feet to have a tow-boat or a pilot.

These directions lead through the middle of the dredged channel and if followed exactly are good for a depth of 11½ feet at mean low water, but the channel with this depth is narrow, especially in passing Bridgeport Harbor Light-house, and the lead should be used.

I. ***From the Eastward.***—Pass about 2½ miles to the southward of Stratford Point Light-house, and when Black Rock Light-house bears **NW.**, steer for it on that bearing until Bridgeport Harbor Light-house bears **N.**

Steer for Bridgeport Harbor Light-house bearing **N.** until it is about ½ mile distant. Then steer about **N.** ¾ **E.**, keeping the Outer or Southwest beacon (wooden pyramid with spar and cask, black) nearly ahead or a very little on the port bow, passing about 100 yards to the eastward of the light-house, and leaving East Flats buoy (spar, red, No. 2) and Southwest buoy (spar, red, No. 4) on the starboard hand.

When about 125 yards distant from the Outer beacon steer about **NE.** ⅛ **N.**, leaving Southwest buoy (spar, red, No. 4) on the starboard hand, as already directed, and leaving the Outer beacon about 100 yards distant on the port hand. Head so as to pass about 100 yards to the southeastward of the Inner beacon, and when past this beacon round it gradually, leaving it 100 yards on the port hand. Then steer about **N NW.** ¾ **W.**, with the end of the Naugatuck railroad wharf ahead or a little on the port bow. Anchor on the western side of the channel between the Inner beacon and the railroad wharf. Mud flats rise abruptly on either side of the channel.

In approaching and rounding the Inner beacon the Naugatuck railroad wharf is readily distinguished, being long and unmistakable. Beyond it can be seen the high elevator at elevator dock; the base of the elevator will here be shut out by the long shed on the Naugatuck railroad wharf.

Remarks.—Standing to the westward and passing to the southward of Stratford Point Light-house, as directed, Penfield's Reef Light-house should be made on the starboard bow, and to the northward of it will appear Black Rock Light-house. Bridgeport Harbor Light-house and the spires and tall chimneys in Bridgeport will be seen farther to the northward and eastward.

Stratford Point Shoal, marked near its southern edge by a buoy (spar, red, No. 16½), is described on page 53.

Other dangers and their marks have been sufficiently indicated already, and need not be described further. Most of the area between the chops is occupied by flats and shoals, leaving the channel already described.

II. ***From the Westward.***—Approaching from the westward, keep Penfield's Reef Light-house open a little on the port bow and pass about ½ mile or more to the southward of it. When Bridgeport Harbor Light-house bears **NE.** ¾ **N.** steer **NE.**, and when Bridgeport Harbor Light-house bears **N.** proceed as already directed.

Remarks.—Approaching Penfield's Reef Light-house, Black Rock Light-house will be made well to the northward of it. About ⅝ mile to the northeastward of Penfield's Reef Light-house is Black or Huncher's Rock beacon, the light-house and beacon marking dangers near the extremity of Fairfield Bar, which extends from them to the shore to the westward. These dangers are described under the heading "Black Rock Harbor" (see page 85). In the bight to the northeastward of these objects is Bridgeport Harbor Light-house.

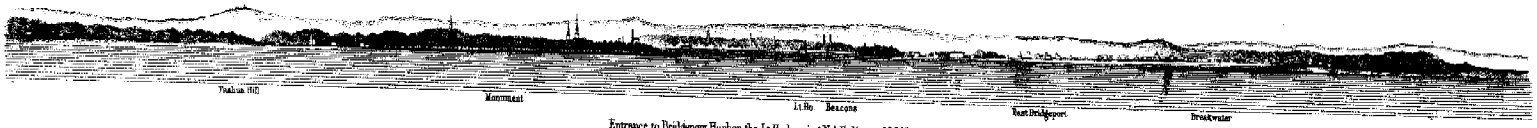
BLACK ROCK HARBOR.†

This harbor, on the Connecticut shore, is the next to the westward of Bridgeport Harbor. Vessels of from 50 to 500 tons frequently use it for shelter, especially during the spring and fall. Yachts often use this anchorage in summer. It is exposed to easterly and southeasterly winds. The harbor also forms the approach to **Black Rock** village (West Bridgeport). There is considerable trade by water, all carried by transient vessels.

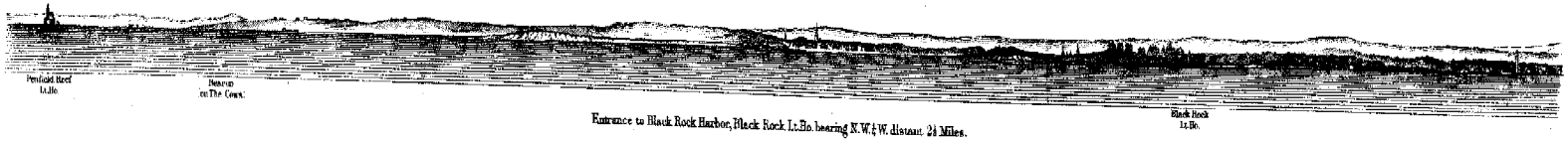
The **Depth of water** at the entrance is from 22 to 24 feet, decreasing gradually inside up to *Cedar Creek*, on which the Bridgeport Forge Company's wharf is at present the head of navigation; this wharf is about 1¼ miles above Black Rock wharf (the upper one in Black Rock Harbor). Improvement of the channel of Cedar Creek is contemplated, which will extend the head of navigation about 1 mile farther up. The deepest draught, laden, of the vessels entering is 11½ feet; average draught 7 or 8 feet; vessels drawing 11 feet can go up to the forge company's wharf. The depth at mean low water alongside wharves is in one case 9 feet; another has 3 feet; the next are dry.

†Shown on the following Coast and Geodetic Survey charts: **363**, Black Rock Harbor, scale $\frac{1}{10,000}$, price $0.25; **116**, Long Island Sound, western sheet, scale $\frac{1}{80,000}$, price $0.40. See also foot-note on page 40.

View off Stratford Point, the Lt.Ho.bearing N.W. by W.distant 24 Miles.



Entrance to Bridgeport Harbor, the Lt.Ho.bearing N.& E.distant 1¾ Miles.



Entrance to Black Rock Harbor, Black Rock Lt.Ho.bearing N.W.¼ W. distant 2¾ Miles.

Prominent objects.—On Fairweather Island, on the northern side of the entrance, is Black Rock Light-house. On the southern side of the entrance is Penfield's Reef Light-house, built a little to the southward of the eastern end of Fairfield Bar; there is no passage between this light-house and the western shore. (See also "Bridgeport Harbor," page 83.)

Pilots and tow-boats.—Pilots are not needed. Vessels bound in beyond the anchorage (as those going to the Fairfield chemical works or to the forge company's wharf) require a tow-boat, and nearly always take one; the usual custom in such cases is to anchor in Black Rock Harbor and telephone to Bridgeport for a tow-boat, or one may be obtained before entering by standing well in towards Bridgeport entrance and making signal (see page 83).

Good anchorage for small vessels is found in mid-harbor, with Black Rock Light-house bearing about **E NE.**; the depth here is about 10 to 14 feet (low water), bottom mud and sand. Larger vessels anchor farther out.

Supplies can be obtained from Bridgeport. Coal can be obtained in Black Rock Harbor, at the upper wharf, if it be clear. Fresh water would have to be gotten from wells on shore. Vessels in need of coal or water had better go to Bridgeport.

Marine railways.—There are two small marine railways; they are only capable of hauling out vessels of ordinary size (see heading "Port Jefferson Harbor").

Tides.—The mean rise and fall of tides is 6.5 feet; corrected establishment $11^h\ 11^m$. For other tidal data see page 16.

Ice does not form to any great extent as a rule; ordinarily there is none in the outer part of the harbor in winter.

Lists of light-houses and signal-service display stations, with other general matters, will be found on pages 9–17; see also pages 40–44.

SAILING DIRECTIONS, BLACK ROCK HARBOR.

I. ***From the Eastward.***—Passing about 2 miles south of Stratford Point Light-house, steer **W.** ¼ **N.**, heading for Penfield's Reef Light-house. Keep this course until Bridgeport Harbor Light-house bears **N NE.**, when the course should be changed to **NW.** Anchor in 18 to 20 feet of water, soft bottom, when Penfield's Reef Light-house bears **S.**

These directions will answer for both day and night.

Vessels of 7 feet draught or less, when on the **NW.** course, can stand in until Penfield's Reef Light-house bears **S.** by **W.**, and then steer **N.** by **E.**, keeping Penfield's Reef Light-house over the stern. Anchor in 8 to 11 feet of water, soft bottom, abreast the long wharf on the western shore of the harbor.

Remarks.—Heading for Penfield's Reef Light-house, Bridgeport Harbor Light-house and Bridgeport Harbor will be left on the starboard hand. Black Rock Light-house (white tower, see table of lights, page 12) will be on the starboard bow, and should be left at least 900 yards to the northward in entering the harbor; the large hotels at Black Rock, on the western shore of the harbor, will be seen back of this light-house (see view).

With Penfield's Reef Light-house over the stern, heading **N.** by **E.**, the village of Black Rock will be ahead and the harbor will be fully opened out; this course leads about 350 yards west of Point Rock Shoal buoy (spar, red, No. 2) and the same distance west of Black Rock Light-house.

Point Rock Shoal extends 800 yards south from Black Rock Light-house, and has 16 feet on its southern end, where it is marked by a buoy (spar, red, No. 2).

Fairfield Bar is bare at low water; it extends about 1 mile in a southeasterly direction from the west shore, forming a natural breakwater against southwesterly winds.

Penfield's Reef is about 700 yards south of the eastern end of Fairfield Bar; it is marked by a light-house (see table of lights, page 12).

Black Rock lies 600 yards **NE.** by **E.** from Penfield's Reef Light-house, and is marked by a beacon (iron piles with large cage, red).

The Cows are a cluster of rocks lying off the end of Fairfield Bar.

The Little Cows are a cluster of rocks, some bare at low water, lying about 300 yards north of Black Rock beacon.

A Rock with 6 feet over it lies about 270 yards **S.** by **W.** from the end of the long wharf in Black Rock Harbor; it is about 80 yards outside the western edge of the channel.

II. ***From the Westward.***—Keep Penfield's Reef Light-house a little on the port bow, steering about **E NE.** Pass about ½ mile south of this light-house, and continue to the eastward until Bridgeport Harbor Light-house bears **NE.** ¾ **N.**; then steer for Bridgeport Harbor Light-house on this bearing until Black Rock Light-house bears **N NW.** ¼ **W.**; then steer **NW.** by **W.**, and anchor in 18 to 20 feet of water, soft bottom, when Penfield's Reef Light-house bears **S.** These directions will answer for both day and night.

Vessels of 7 feet draught or less can follow the above directions until Penfield's Reef Light-house bears **S.** by **W.**, and then follow directions under heading I.

Remarks.—Approaching Penfield's Reef Light-house, Black Rock Harbor and Light-house will be seen over Fairfield Bar. Black Rock beacon (iron piles with large cage on top, red) will be seen to the northeastward of Penfield's Reef Light-house.

Shoal water makes off ¾ mile to the southwestward all along Fairfield Bar.

Other dangers have been described under heading I.

SMITHTOWN BAY.†

This bight, on the south side of Long Island Sound, makes into the Long Island shore to the westward of Crane Neck Point. The bay is about 7 miles long in an **E.** and **W.** direction, and 1½ to 2 miles **N.** and **S.**; the southern shore has shoals making out to a distance of 1 mile in several places, the water shoaling abruptly from 7 fathoms to 18 feet.

A good summer anchorage in 5 to 8 fathoms of water, sheltered from easterly winds, is found about 1 mile south of Crane Neck Point; in strong westerly or northwesterly winds it is unsafe, and vessels anchored here get underway on the first indication of such winds.

Stony Brook Harbor is a shallow bay in the southeastern part of Smithtown Bay. The entrance is narrow and obstructed by a shifting sand bar, having 2½ feet of water at low water. The channel inside the bar is narrow and crooked, and the tidal currents tend to set a vessel on the shoals. Strangers bound into the harbor take a pilot, anchoring, with the pilot signal flying, 1 mile from the shore in 6½ to 8 fathoms water, with Stony Brook church spire bearing **S SE.** A short distance inshore from this position the water shoals abruptly from 6½ fathoms to 6 feet. A pilot will come out from Stony Brook to a vessel making signal.

The village of **Stony Brook,** ½ mile above the entrance, is of little importance; it has some trade in firewood. The greatest draught that can be taken in at high water does not exceed 9 feet; the usual draught entering is not more than 7 feet; there is from 2 to 6 feet of water alongside the wharves.

Nissequague River is a shallow crooked stream, the mouth of which is about 4 miles to the westward of Stony Brook. This river can only be entered at high water, on account of the shoals which extend 1 mile to the northward from the entrance, with only 1 foot of water over them at low water. About 1 mile to the northward of the entrance the water shoals abruptly from 6 fathoms to 6 feet. **Nissequague,** a village about ½ mile above the entrance, is of little importance; only small craft trade there. Strangers bound in must take a pilot.

Information concerning light-houses, tides, fog, variation of the compass, etc., will be found on pages 9–17; see also pages 40–44.

SOUTHPORT HARBOR.†

This is a shallow bight on the north side of Long Island Sound, about 3 miles to the westward of Penfield's Reef Light-house, between Kensie's Point on the east and Farms Point on the west. It is at the entrance of Mill River, a narrow, shallow, and unimportant stream which empties into its northern part. A breakwater has been built, under Government appropriations, from the eastern shore at the entrance of the river, extending in a southwesterly direction nearly to the Inner beacon. The channel up to the principal landing at Southport has been improved by dredging, but the depth is said to be decreasing, and in 1886 there was said to be but 3 feet at mean low water in the channel.

Southport, a village inside the entrance to the river, has some trade in merchandise and produce; provisions can be obtained here. The deepest draught of vessels going to Southport is 8 feet; the depth alongside the wharves at low water is 1½ to 2 feet.

Beacons.—The dredged channel is marked by two large granite beacons, the outer one with iron shaft and ball, the inner one with iron shaft and cage; the channel leads to the westward of the beacons.

The **Anchorage** outside the breakwater for vessels bound to Southport is to the southward of the Outer beacon. This anchorage is sheltered only from northerly winds and is not much frequented; Black Rock Harbor and Bridgeport Harbor, both to the eastward, afford much better shelter.

Pilots and tow-boats.—Strangers entering the river bound to Southport generally take a pilot or a tow-boat. Pilots can be obtained off the entrance, vessels anchoring outside the beacons with signal set until boarded by one. Tow-boats can be obtained at Bridgeport.

Ice closes the river to the entrance, during the winter, in very cold weather.

GENERAL DIRECTIONS, SOUTHPORT HARBOR.

I. ***From the Eastward.***—Pass about ¾ mile south of Penfield's Reef Light-house and about ½ mile south of Pine Creek Point Shoal buoy (spar, red, No. 18); this buoy is about 1¾ miles to the westward of Penfield's Reef Light-house. When the buoy is cleared, steer **NW. by W.** until the two beacons, which will be seen on the starboard bow, are in range. Then anchor to the southward of the Outer beacon, in 12 to 18 feet of water (low water), and if bound in take a pilot. The water shoals abruptly inside of 10 feet.

† Shown on Coast and Geodetic Survey chart 116. See the foot-note on page 40.

Pine Creek Point Shoal extends about ⅝ mile to the southward of Pine Creek Point, and is marked at its southern end by a buoy (spar, red, No. 18); this rocky shoal is bare in places at low water. The water shoals rapidly from 12 to 6 feet off the western side of Pine Creek Point.

II. ***From the Westward.***—Passing about ¾ mile to the southward of Norwalk Island Light-house, make good the course **E NE. ¾ E.** for 3 miles; then change course to **E NE.** for 1¾ miles, when Cockenoe's Island Shoal buoy (can,* red, No. 20) should be on the port beam, distant a little over ½ mile.

When past this buoy, head for the Outer beacon at Southport entrance, course about **NE.** by **N.**; this course leads about ¾ mile to the southeastward of Farm's Point, off which rocky heads, bare at low water, extend for ¼ mile. Anchor in 12 to 18 feet of water as directed under heading I foregoing.

The Shoals and dangers extending to the eastward and to the southward from Norwalk Islands are described on page 55.

WESTPORT HARBOR.†

This harbor, at the entrance to the Saugatuck River, on the north shore of Long Island Sound, is about 6 miles to the westward of Penfield's Reef Light-house and 4½ miles to the eastward of Norwalk Island Light-house. The harbor is exposed to southeasterly winds. The entrance to the Saugatuck River is between two low and marshy points, fringed with a sand beach, the eastern one (Cedar Point) being rocky off its extreme southern end.

Saugatuck is a village at the mouth of the river, on the line of the N. Y., N. H. and H. Railroad.

Westport, a town at the head of navigation, about 2½ miles above the mouth of the river, has several manufactories and has some trade by water. A steamer makes a trip to New York and return once a week in summer. The greatest depth on the bar at the entrance to the river, at mean low water, is 6 feet. The deepest draught of vessels entering the harbor is 10 feet; going up to Westport, 7 feet.

Pilots, etc.—Strangers generally take a pilot outside of the harbor; oystermen, who usually pilot vessels in, can almost always be found outside. If a pilot is not found outside, an anchorage is made to the southeastward of Cedar Point. Pilotage is not compulsory. The harbor and river are not buoyed, and there are no artificial aids to assist strangers in entering. The channel in the river is narrow and crooked.

Tow-boats can be had at Bridgeport and sometimes at Norwalk, but are seldom used except by canal-boats.

Supplies.—Limited quantities of anthracite coal can be obtained alongside the dock at Saugatuck. Provisions, etc., can be obtained at Saugatuck and Westport.

Freshets sometimes occur in February, when the mill-ponds break up. **Ice** forms in winter the whole length of the river to its mouth.

GENERAL DIRECTIONS, WESTPORT HARBOR.

These directions are available for vessels drawing 9 feet or less. Vessels drawing 13 feet or more should give Stratford Point more of a berth than is here indicated by the directions for approaching from the eastward.

I. ***From the Eastward.***—Passing 1½ miles south of Stratford Point, steer **W.** and leave Penfield's Reef Light-house ½ mile on the starboard hand. Pass 200 yards south of Pine Creek Point Shoal buoy (spar, red, No. 18) and continue the **W.** course for about 4 miles farther, until nearly on a line between the eastern end of Cockenoe's Island and Cedar Point; then, being a little over ¼ mile distant from the rock off Cedar Point, anchor in 15 to 20 feet water (low water).

Remarks.—On the **W.** course, when past Penfield's Reef Light-house, Pine Creek Point Shoal buoy (spar, red, No. 18) will be made a little on the starboard bow. As this buoy is approached the beacons in the head of Southport Harbor will be opened out to the northward. Passing Southport Harbor the entrance to the Saugatuck River will be made ahead, and Cedar Point (low and marshy, with a large pile of rocks off its southern end) will be on the starboard bow. Cockenoe's Island (one of the largest of the Norwalk islands) will be on the port bow. Penfield's Reef and Pine Creek Point Shoal are described on page 55.

The Points along the north shore to the westward of Southport should receive a berth of at least ⅝ mile, as shoals and rocks extend out to that distance. **A Spot** with 12 feet of water over it lies about ⅝ mile **S.** by **E.** from Sherwood's Point (the first prominent point about 1¼ miles to the eastward of Cedar Point). To avoid this spot keep about ½ mile to the southward of Sherwood's Point.

II. ***From the Westward.***—When Norwalk Island Light-house bears **N.**, distant about ¾ mile, steer **E NE. ¾ E.** for 3 miles; then change course to **E NE.** for 1¾ miles, when Cockenoe's Island Shoal buoy (can,* red, No. 20) should be on the port beam, distant a little over ½ mile. When well past this buoy, steer **N.** for ⅞ mile, giving the buoy and George's Rock (about ¼ mile to the northward of it) a

†The entrance to the Saugatuck River is shown on Coast and Geodetic Survey chart **361**[3], entrances to the Norwalk and Saugatuck rivers, etc.; scale $\frac{1}{10,000}$, price $0.50. Shown also on chart **116**. See the foot-note on page 40.

berth of at least ¼ mile on the port hand. When the rocks on Cedar Point bear **NW.** by **W.**, steer for the rocks, making good a **NW.** by **W.** course, and when the western end of Cockenoe's Island bears **SW.** steer **W.**, and anchor as directed under heading I foregoing.

Remarks.—The Norwalk Islands will be left well to the northward. Cockenoe's Island Shoal buoy (can,* red, No. 20) will be made on the port bow, and on the **E NE.** course Penfield's Reef Light-house should be made ahead, or a little on the port bow. On the **N.** course Sherwood's Point will be a little on the port bow and the entrance of the Saugatuck River will be open to the westward of Cedar Point. The **NW.** by **W.** course leads about midway between the northeastern end of Cockenoe's Island Shoal and the 12-foot spot lying ⅜ mile **S.** by **E.** from Sherwood's Point.

Cockenoe's Island Shoal.—This is an extensive and dangerous shoal lying to the eastward and southward of Cockenoe's Island. It has numerous rocks scattered over it, some of them showing at low water. George's Rock, awash at high water, lies about 1¼ miles **E SE.** ½ **E.** from the northeastern end of Cockenoe's Island, near the eastern end of the shoal. A red buoy (can,* No. 20) is placed a little over ¼ mile to the southward of George's Rock and marks the southeastern end of the shoal. The northeastern end of this shoal bears **E.**, distant 1⅛ miles from the northeastern end of Cockenoe's Island, and has from 8 to 18 feet of water over it. To the southward of Cockenoe's Island the shoal extends for a distance of nearly 1 mile.

To the westward of Cockenoe's Island is Cockenoe's Island Harbor (see heading).

COCKENOE'S ISLAND HARBOR.†

This is a small harbor lying to the westward of Cockenoe's Island; it has anchorage for vessels of less than 9 feet draught, but is not used by strangers seeking shelter. It is also an *eastern passage* into Norwalk River, but this passage requires local knowledge, as the channel is narrow and crooked and is not buoyed. With an easterly wind, vessels bound up the Norwalk River sometimes take a pilot while to the southward of Cockenoe's Island, and are taken into the river through the eastern passage. The *western passage* into Norwalk River is through Sheffield Island Harbor, see page 89. There is also a *middle passage*, which leads in to the eastward of Sheffield and Ram islands; it is only used by those thoroughly acquainted with the locality.

The Channel to Cockenoe's Island Harbor leads across the shoal ground extending to the southward from Cockenoe's Island; at mean low water 13 feet can be taken in as far as the black buoy to the westward of Cockenoe's Island (Peck's Ledge buoy, spar, No. 1).

The Depth of water at the anchorage is 7 to 10 feet at low water. Vessels of 12 feet draught have been taken through the eastern passage at high water.

Pilots can be had by making signal, when to the southward of Cockenoe's Island, and standing off and on until one comes from Tavern Island or from the river.

SAILING DIRECTIONS, COCKENOE'S ISLAND HARBOR.

The following directions are available for vessels drawing 8 feet or less. Vessels of 8 to 12 feet draught, bound in this passage, can anchor about 1 mile to the southward or southeastward of Peck's Ledge (buoyed).

I. ***From the Eastward.***—After passing Penfield's Reef Light-house, bring it to bear **E NE.** ¼ **E.** over the stern, and steer **W SW.** ¼ **W.** As soon as you make the red buoy on the eastern end of the Norwalk Islands reefs (Cockenoe's Island Shoal buoy, can,* No. 20), steer so as to pass about 400 yards to the southward of this buoy, and continue the **W SW.** ¼ **W.** course. As soon as the black buoy (spar, No. 1) on the northern end of Peck's Ledge (to the westward of Cockenoe's Island) bears between **NW.** by **W.** ½ **W.** and **N NW.** ¾ **W.**, head for the buoy on any course between these bearings and edge a little to the eastward so as to pass about 100 yards to the eastward of it. Stand in past the buoy and come to anchor in about 10 feet water (low water) when the northeasternmost of the two hillocks on Cockenoe's Island bears about **E.**

Remarks.—After passing Penfield's Reef Light-house and the red buoy off Pine Creek Point (spar, No. 18), Cockenoe's Island and the red buoy on the eastern end of Cockenoe's Island Shoal (can,* No. 20) will be seen. Cockenoe's Island has two small hillocks on its southeastern side which serve to distinguish it, the rest of the island being low and level. After passing red buoy, No. 20, the black buoy marking Peck's Ledge (spar, No. 1) will be seen just to the westward of Cockenoe's Island. When approaching this buoy, the rock to be guarded against on the north side of the channel is Channel Rock (awash at low water), which lies nearly 500 yards **S SW.** from the westernmost hillock on Cockenoe's Island; the depth between this rock and the island is less than 6 feet. On the south side of the channel Peck's Ledge, with 4 feet of water upon it, lies about 200 yards **SW.** from the black buoy marking it. After passing this black buoy the water shoals gradually and the lead is the best guide.

II. ***From the Westward.***—Passing ⅜ mile south of Norwalk Island Light-house, steer **E NE.** ¼ **E.** When the northeastern hillock on Cockenoe's Island bears **N NE.**, head for it on this bearing. As soon as the black buoy (spar, No. 1) to the westward of Cockenoe's Island bears **N NW.** ¾ **W.**, steer as directed above and follow the directions already given for coming to anchor.

† Shown on Coast and Geodetic Survey charts 361[2] and 116. See the foot-note on page 40.

Remarks.—After passing Norwalk Island Light-house and Great Reef Spindle the islands should not be approached nearer than in 24 feet of water, as the shoals rise abruptly in places inside this depth. Peck's Ledge buoy (spar, black, No. 1), to the westward of Cockenoe's Island, will be made after passing Copp's Island, and will be nearly in range with Goose Island and the northwestern point of Cockenoe's Island. See also the remarks under directions for approaching and entering from the eastward.

SHEFFIELD ISLAND HARBOR (NORWALK HARBOR) AND NORWALK RIVER.†

Sheffield Island Harbor, now more generally known as Norwalk Harbor, is about 13½ miles to the westward of Bridgeport Harbor and 17¾ miles to the eastward of Execution Rocks Light-house. It is formed by the mainland of the north shore and by the western Norwalk Islands; on the southern side of the western part of the harbor is the reef which extends to the westward from these islands. This harbor affords shelter to vessels drawing less than 17 feet; tows frequently seek refuge here, and the harbor is much used, especially in the fall and winter.

Norwalk River is generally approached from Long Island Sound through Sheffield Island Harbor; there is also an eastern passage through Cockenoe's Island Harbor; and a middle passage is sometimes used by those acquainted with the locality (see page 88). This river has a very narrow and crooked channel which, under Government appropriations, has been improved by dredging a channel to the town of Norwalk, a little over 2½ miles above its mouth. Above South Norwalk the river is crossed by two bridges (least width of draws 60 feet).‡

Wilson's Point, a settlement on the north shore, inside of Sheffield Island Harbor, is the terminus of the Danbury and Norwalk branch of the Housatonic Railroad. A railroad depot and large steamboat wharf are its noticeable features. There is a depth of 6 feet at low water alongside the steamboat wharf. Coal in large quantities is brought here in barges and discharged into railroad cars.

South Norwalk, a city about 1½ miles above the mouth and on the western bank of the river, has manufactories and is of some commercial importance. During the summer there is a daily and tri-weekly line of steamers to New York. The deepest draught of vessels going to South Norwalk is 13 feet, the usual draught is about 10 feet (at high water); the depth alongside the wharves is 2 to 7 feet at low water. *East Norwalk* is on the opposite side of the river from South Norwalk.

Norwalk, a small town on both banks of the river, about 1¼ miles above South Norwalk, has some trade, principally coal, lumber, iron, and general merchandise. The deepest draught of vessels going up to Norwalk is 11 feet at high water; there is 5 feet of water alongside the wharves at low water.

Prominent features.—Norwalk Island Light-house, a gray octagonal tower on the gable end of a granite dwelling (see table, page 12), is situated near the western end of Sheffield Island, the largest and westernmost of the Norwalk Islands. **Norwalk Islands** is the name of an irregular group of islands, surrounded by shoals, lying off the mouth of the Norwalk River. These islands and shoals extend about 5 miles in an **E NE.** direction from Norwalk Island Light-house.

Tavern Island, a small island in Sheffield Island Harbor, is to the northward of Norwalk Island Light-house and to the southeastward of Wilson's Point. It has small summer houses on each end, and there is a flag-staff near the house of a pilot who lives on the island (1887). Strangers should not attempt to go above Tavern Island without a pilot or a tow-boat.

The **Channel** up to Tavern Island is good for 10 feet at low water; above the island 7 to 8 feet can be taken into the river at low water and 12 to 13 feet at high water. The channel into the river is marked by a beacon and buoys, but a stranger cannot attempt it without risk on account of the numerous rocks on both sides of the channel. Under Government appropriations a channel has been dredged 100 feet wide and 8 feet deep from Gregory's Point to the railroad bridge at South Norwalk, and from 60 to 100 feet wide and 6 feet deep up to the town of Norwalk. In 1887 filling in had occurred, narrowing the channel somewhat, and the depth is said to be decreasing. Further dredging is contemplated to restore the dimensions here given.

Anchorages.—The anchorage for vessels bound into the Norwalk River, or seeking shelter, is in Sheffield Island Harbor, to the northward of Sheffield Island. Vessels of 10 feet draught or less can anchor as far up the harbor as to a line drawn from Tavern Island to the large yellow house on Sheffield Island (Smith's house), and giving the shore of Sheffield Island a berth of about 300 yards. Vessels of 12 to 13 feet draught should not anchor inside a line drawn from Norwalk Island Light-house to Norroatan Rock buoy (spar, red and black horizontal stripes, off Norroaton Point). Anchorage in 17 feet water will be found 700 yards **S.** of Norroaton Point. Between Norroaton Point and Wilson's Point is an anchorage for vessels of light draught, much used by oyster steamers and sloops.

Pilots.—Strangers generally take a pilot or a tow-boat when bound up the river. Standing into the harbor with signal set, a pilot will generally come on board before the vessel reaches Tavern Island. If not boarded by a pilot, anchor in the channel according to draught.

Extracts from the laws of Connecticut relative to pilots and pilotage will be found in Appendix II.

†Sheffield Island Harbor, or Norwalk Harbor, is shown on Coast and Geodetic Survey chart 361[2], entrances to the Norwalk and Saugatuck rivers and the Norwalk Islands, scale $\frac{1}{10,000}$, or one mile = 7.296 inches, price $0.50; also on chart 116. See the foot-note on page 40.

‡During a period of 10 minutes before a train is expected, the draw of the railroad bridge will not be opened.

Tow-boats.—Sailing vessels frequently take a tow-boat. The channel is too narrow for anything but very small vessels, except with a favorable wind. Oyster steamers do the towing, but cannot be depended upon to tow whenever required; in case of emergency a tow-boat can be obtained from Bridgeport by telegraphing. Oyster steamers will usually be found at the entrance, or off Five-mile River, or at South Norwalk.

Supplies.—Coal for steamers, either anthracite or bituminous, in quantities, and fresh water through pipe and hose, can be had at the wharves of South Norwalk and Norwalk. Provisions and ship-chandler's stores can be obtained at both places.

Repairs.—Repairs to the machinery of small steamers can be made at South Norwalk; for extensive repairs vessels generally proceed to New York.

Ice forms in the river and usually obstructs navigation for about six weeks in winter.

The **Variation of the compass** off Norwalk Island Light-house for 1888 is 9° 05′ W., with an annual increase of about 3½′.

Tides.—The mean rise and fall of tides in Sheffield Island Harbor is 7.4 feet; corrected establishment $10^h\ 58^m$. For other tidal data see page 16.

Descriptions of light-houses, with other general matters, will be found on pages 9–17; see also pages 40–44.

SAILING DIRECTIONS, SHEFFIELD ISLAND HARBOR.

I. ***From the Eastward.***—In approaching, note the directions on page 55. When Norwalk Island Light-house is made, shape the course so as to pass about ¾ mile to the southward of this light-house. With Norwalk Island Light-house bearing N., distant about ¾ mile, steer W. ¼ N. Pass ¼ mile south of Green's Ledge buoy (can,* red, No. 22), nearly 1¼ miles to the westward of Norwalk Island Light-house. Round the buoy, keeping it on the starboard hand and giving it a berth of ¼ mile. When this buoy (No. 22) bears S., distant about ¼ mile, steer about E NE. ¼ E., passing about 300 yards south of Norroaton Rock buoy (spar, red and black horizontal stripes, off Norroaton Point). Anchor according to draught (see "Anchorages").

If bound up the Norwalk River take a pilot or a tow-boat.

Remarks.—The course leads to the southward of Penfield's Reef Light-house and to the southward of Cockenoe's Island, the easternmost of the Norwalk Islands. Cockenoe's Island will be distinguished by two small hillocks on its southeastern end; the other parts of the island are low, flat, and grassy. Norwalk Island Light-house will be made on the starboard bow, and as the light-house is approached the spindle on Great Reef, about ⅜ mile to the southwestward of the light-house, will be seen on the starboard bow.

On the W. ¼ N. course, Long Neck Point (long, low, with a pile of rocks off its southern end) will be made on the starboard bow, or nearly ahead. To the northward Five-mile River will be seen about ¾ mile to the westward of Norroaton Point. Norroaton ("Roton.") Point has several large buildings near its southern end. Tavern Island will be seen to the eastward of Norroaton Point, and between them Wilson's Point will be distinguished by the large railroad buildings. Green's Ledge buoy (can,* red, No. 22) will be made on the starboard bow, and when rounding this buoy Norroaton Point will shut out Wilson's Point.

On the E NE. ¼ E. course, Norroaton Rock buoy (spar, red and black horizontal stripes) will be on the port bow, off Norroaton Point; as it is approached, Tavern Island Flats buoy (spar, black, No. 1) will be seen on a line between it and Tavern Island.

Cockenoe's Island Shoal has been described on page 88.

Norwalk Islands.—About ¾ mile SW. from *Cockenoe's Island* is *Goose Island*, a low, rocky islet at high water; it uncovers at low water, showing an increased area; passing this island it should be given a berth of ⅜ mile. *Copp's Island* (small, hilly, covered with grass, loose boulders around the shore) lies ⅝ mile SW. from Goose Island and ¾ mile E NE. from the eastern end of Sheffield Island; this island should be given a berth of at least ⅜ mile when passing to the southward of it. *Sheffield Island* is distinguished by the light-house near its western end; the southern shore of the island, to the eastward of the light-house, can be approached to within ¼ mile.

Great Reef, marked on its eastern side by a spindle, makes out to the southward ⅜ mile from the western end of Sheffield Island.

Green's Ledge extends nearly 1¼ miles W. by S. from the western end of Sheffield Island. It has 8 feet of water near its western end, and is marked by a buoy (can,* red, No. 22) placed near the 8-foot spot.

Norroaton Point Shoal.—Shoals make out to the southward from Norroaton Point; a ledge with 7 feet over it lies ⅜ mile SW. by W. from the extremity of the point; 300 yards SE. ¼ E. from Norroaton Point is a spar-buoy (red and black horizontal stripes), placed to mark a rock with 4 feet over it.

A Ledge makes out to the southwestward from Tavern Island and is marked off its western end by Tavern Island Flats buoy (spar, black, No. 1).

II. ***From the Westward.***—Passing about ¼ mile south of the red buoy (can,* No. 26) off the Cows, make good the course NE. by E. ¾ E. for about 4 miles. Leave Green's Ledge buoy (can,* red, No. 22) on the starboard hand, giving it a berth of ¼ mile, and stand in, course about E NE. ¼ E., proceeding as directed under heading I foregoing.

*Spar-buoy in winter. See the note on page V.

Remarks.—After passing the Cow's buoy (can,* red, No. 26, off Shippan Point), Smith's Rock buoy (spar, red, No. 24) will be made on the port bow, and should be left about ¼ mile on the port hand; Norwalk Island Light-house will be made on the starboard bow; Long Neck Point will be passed, and should be given a berth of ½ mile on the port hand. After passing Long Neck Point, Green's Ledge buoy (can,* red, No. 22) will be made on the starboard bow; passing this buoy, leave it ¼ mile on the starboard hand. Tavern Island will show conspicuously on the port bow, and after passing Green's Ledge buoy Wilson's Point will be gradually opened out from behind Norroaton Point.

The Cows are a cluster of detached rocks, bare at low water, lying about 1 mile **SE.** by **E.** from Stamford Light-house; off their southern end is a buoy (can, red, No. 26).

Smith's Rock is a cluster of rocks ⅝ mile long in a **N.** and **S.** direction and 200 yards wide, showing bare in places at low water. This danger lies about 2¼ miles **E.** ¾ **N.** from Stamford Harbor Light-house and mile **SW.** ½ **W.** from Long Neck Point. A buoy (spar, red, No. 24) is placed on the southern end of the rock.

Shoal water extends 400 yards to the southward of Long Neck Point.

Other dangers are described under heading I foregoing.

HUNTINGTON BAY.†

This large bay, on the south shore of Long Island Sound, just to the westward of Eaton's Neck, is an excellent anchorage, with 18 feet to 6 fathoms of water. The entrance to the bay is between *Eaton's Point* (marked by Eaton's Neck Light-house, see table on page 12) on the east and *Lloyd's Point* on the west. The bay is about 2½ miles long in a **N.** and **S.** direction, and is about 1 mile wide abreast West Beach (now called Port Eaton). Vessels of the largest size anchor in Huntington Bay for shelter, the bay being protected against all but northerly winds; in bad weather it is frequently used by the large Sound steamers, both in summer and winter.

Port Eaton (West Beach), on the east side of the bay, about 2 miles to the southward of Eaton's Point, is a place from which gravel is shipped. Deep cuts are made in the beach by the gravel dredges, and vessels of 7 to 10 feet draught load in these cuts or at their entrance. Large piles of gravel, and houses for the workmen employed on the dredges and in loading vessels, are the distinguishing features of Port Eaton.

Lloyd's Harbor is a shallow body of water, full of oyster beds, on the west side of Huntington Bay; a long narrow arm extends to the westward from Lloyd's Harbor nearly to Oyster Bay. Lloyd's Harbor Light-house (see table, page 12) is on the northern side of the entrance to the harbor, and is also one of the guides into Huntington Bay. Vessels during northerly gales anchor to the eastward of the light-house, as close in as their draught will allow, and those of light draught (less than 7 feet) anchor to the southwestward of the light-house. The harbor is of no commercial importance.

Huntington Harbor is a long irregular cove, the entrance to which is ⅝ mile to the southward of Lloyd's Harbor Light-house. The entrance is buoyed, but the channel is crooked and full of dangers and strangers should not attempt it. Only small vessels well acquainted with the locality enter this harbor, going up to the village of **Huntington** at its head.

The **Variation of the compass** in Huntington Bay for 1888 is **9° 00′ W.**, with an annual increase of about 3½′.

Descriptions of light-houses, tidal data, and other general matters will be found on pages 9–17; see also pages 40–44.

NORTHPORT BAY AND HARBOR.

Northport Bay is a large bay opening from the southeastern end of Huntington Bay. The western part of Northport Bay has good anchorage in 24 feet to 6½ fathoms of water; the eastern end is shoal, having a depth of 8 to 10 feet. The entrance to Northport Bay from Huntington Bay is through a narrow buoyed channel having a least depth of 18 feet.

Centreport Harbor is a shoal bight in the south shore of Northport Bay, just to the eastward of the entrance. Little Neck (a hilly point, covered with trees) is on the eastern side of the harbor. The village of **Centreport**, at the head of the harbor, is of no commercial importance.

Duck Island Harbor is a small shallow cove in the northern part of Northport Bay, opposite Centreport Harbor. A channel with 9 feet of water leads into this cove between Duck Island bluff on the east and Winkle Point on the west, but it is only used by very small craft as the cove itself is very shallow.

Northport Harbor is a cove in the southeastern part of Northport Bay, with numerous oyster beds, and has from 7 to 10 feet of water, shoaling gradually towards its head to 1 foot.

Northport is a village on the eastern shore near the head of Northport Harbor. It has considerable water-borne trade, consisting of coal, lumber, oysters, sand, gravel, fire-clay, and produce, carried partly by strangers. The greatest draught taken to Northport is 14 feet, the usual draught 8 to 12 feet, and 6 feet can be taken alongside the wharves at low water. Northport is on the line of the Long Island Railroad, and has a daily steamer to New York in summer.

Vessels anchor anywhere in the harbor in 9 to 10 feet at low water; the bottom is soft mud.

Strangers sometimes take a pilot; making signal while in Huntington Bay will bring a pilot from the shore, or from one of the oyster boats in the vicinity.

†Shown on Coast and Geodetic Survey chart 368, Huntington Bay. Shown also on chart 116. See the foot-note on page 40.

Repairs to vessels can be made at Northport; there are three ship-yards with marine railways, the largest of which is capable of hauling out vessels of 800 tons.

Anthracite coal in limited quantities and water through pipe and hose can be had at Northport alongside the wharves. Provisions and ship-chandler's stores can be obtained.

Ice closes Northport Harbor about two months each winter; there is no danger from drift-ice.

SAILING DIRECTIONS, HUNTINGTON BAY.

I. ***From the Eastward.***—Pass a little over 1 mile north of Eaton's Neck Light-house, steering about **W. ½ S.**, and leaving Eaton's Point Shoal buoy (spar, black, No. 13) about ¼ mile on the port hand. When ¼ mile to the westward of this buoy, steer **SW.** until the bay is fully opened out, when the course should be changed to about **S. by W.**, keeping the eastern shore a little the best aboard, but giving it a berth of not less than ⅜ mile.

Anchor according to draught and the direction of the wind. Vessels drawing less than 18 feet can anchor with Lloyd's Harbor Light-house bearing **W.**, distant from ⅜ to 1⅛ miles; if of heavier draught, anchor before Lloyd's Harbor Light-house bears **W.** Vessels sometimes anchor with Eaton's Point Light-house bearing from **E NE.** to **NE.**, coming to in 5 to 6 fathoms of water.

If bound to Northport, see heading III following.

At Night.—*Vessels drawing less than* 14 *feet* can bring Old Field Point Light (see table, page 12) to bear **E. ¾ S.** over the stern, and steer **W. ¾ N.**, passing about 1¼ miles north of Eaton's Neck Light. When Norwalk Island Light bears **N. ½ E. Easterly**, steer **S. ½ W. Westerly**, keeping Norwalk Island Light on the bearing. Anchor as already directed.

Or, such vessels can bring Stratford Shoal (Middle Ground) Light to bear **E NE. ⅞ E.**, and steer **W SW. ⅞ W.**, keeping the bearing. This leads nearly 1¼ miles to the northward of Eaton's Neck Light. When Norwalk Island Light bears **N. ½ E. Easterly**, steer **S. ½ W. Westerly**, keeping the bearing. Anchor as already directed.

Vessels drawing 14 *feet or more* should keep a mid-sound course, steering about **W. ½ S.**, with Stratford Shoal (Middle Ground) Light bearing **E. ½ N.** until Norwalk Island Light bears **N. ½ E. Easterly**, and then steer **S. ½ W. Westerly**, keeping the bearing as before.

Remarks.—When passing Eaton's Point in the day-time, Huntington Bay will be opened out and Lloyd's Harbor Light-house (square white tower with attached white dwelling, see page 12) will be made on the western shore near the head of the bay; several large boulders near the western shore to the northward of this light-house will show conspicuously. Entering the bay, steering **S. by W.**, the houses and gravel dredges at Port Eaton (on the eastern shore, nearly 2 miles to the southward of Eaton's Point) will be conspicuous; to the southward of Port Eaton the entrance to Northport Bay will be opened out.

Dangers.—**To the northward of Eaton's Point** there are outlying shoal spots with 16 to 21 feet over them, lying to the northward of the sailing-line. They are described on page 56, with directions to avoid them.

Eaton's Point Shoal makes out to the northward and northeastward of Eaton's Neck Light-house. A depth of 2 feet is found nearly ½ mile to the northeastward of the light-house. The northern end of the shoal is marked by a buoy (spar, black, No. 13). Just inside the buoy the depth is 16 feet.

The middle of Huntington Bay is free from dangers, but the 18-foot curve extends ¼ mile from the eastern shore and about ⅝ mile from the western shore to the northward of Lloyd's Harbor Light-house. A long narrow spit with 16 to 18 feet of water makes ¾ mile to the northward from the south shore, about midway between the eastern shore and Lloyd's Harbor Light-house.

II. ***From the Westward.***—Pass about 1 mile north of Lloyd's Point, leaving Lloyd's Point Shoal buoy (spar, black, No. 15) ⅜ mile on the starboard hand, and steer **SE. by E. ¾ E.**, heading about midway between Eaton's Neck Light-house and the houses of Port Eaton. When Lloyd's Harbor Light-house bears **SW. by S.**, steer **S.**, and anchor according to draught and direction of wind (see heading I foregoing).

If bound to Northport, see heading III following.

At Night.—Pass Lloyd's Point, keeping Eaton's Neck Light bearing to the southward of **E. by S.** When Stamford Harbor Light (see table, page 12) bears **NW. ¼ N.**, steer **SE. ¼ S.**, keeping the light on the bearing until Lloyd's Harbor Light bears **SW. ¼ W.** (abeam), then steer **S. ½ W.**, and anchor as already directed.

Remarks.—By day, on the **SE. by E. ¾ E.** course, the north shore of Lloyd's Neck will be left about ¼ mile on the starboard hand. Two tall poplar trees (standing alone on the top of a bare hill) will be made a little on the port bow. Lloyd's Harbor Light-house will be opened out a little abaft the starboard beam. Steering **S.**, give the eastern shore a berth of not less than ⅜ mile.

Lloyd's Point Shoal is described on page 57; for reference to other dangers see heading I foregoing.

III. ***Having entered Huntington Bay, bound into Lloyd's Harbor or into Northport Harbor.***—Light-draught vessels bound into Lloyd's Harbor can steer for Lloyd's Harbor Light-house, bearing **W.**, and pass about 250 yards to the southward of the light-house, anchoring when the light-house bears **NE.**, distant ¼ mile.

If bound to Northport Harbor, continue to the southward as directed under headings I and II foregoing, until Lloyd's Harbor Light-house bears **W NW. Westerly**, when shape course about **ESE. Easterly**, and keep on a line from the light-house to a large brick-yard shed on the southern point of entrance to Northport Bay.

Pass close to West Beach Flats buoy, south end (spar, black, No. 1), leaving it on the port hand, and steer about **E.** ½ **N.**, heading fair between West Beach Flats buoy, east end (spar, black, No. 3), and Great Neck Flats buoy (spar, red, No. 2). When on a line between the two latter buoys, steer about **NE.** by **E.**, with the brick-yard shed over the stern, and pass between Little Neck Point and Duck Island Bluff, keeping the latter a little the best aboard; the depth should not be less than 15 feet. When on a line between Little Neck Point and Duck Island Bluff, steer about **SE.** by **S.**, and give the western shore a berth of about 350 yards. Anchor according to draught off the wharves of Northport. The channel into Northport Bay is too narrow for a sailing vessel to beat through.

Remarks.—Standing for the brick-yard shed, West Beach Flats, south end, buoy (spar, black, No. 1) will be made nearly ahead. The channel runs close to the south shore abreast the brick-yard. When abreast the brick-yard, heading between West Beach Flats, east end, buoy (spar, black, No. 3) and Great Neck Flats buoy (spar, red, No. 2), the northern point of Little Neck should be about a point on the starboard bow. Duck Island Bluff (high, steep on its southern side, with trees on the top) will be broad off the port bow.

When on a line between the northern end of Little Neck and Duck Island Bluff, and heading **SE.** by **S.**, the village of Northport will be right ahead.

West Beach Flats make to the southward from West Beach for over ¼ mile; this shoal ground has from 1 to 11 feet of water, and shoals abruptly on its southern side. The shoal is marked by a buoy at its southwestern end (spar, black, No. 1) and by a buoy on its southeastern end (spar, black, No. 3).

Great Neck Flats make ⅜ mile to the eastward from the brick-yard and shoal abruptly on the northern side; at the northeastern end is placed Great Neck Flats buoy (spar, red, No. 2).

Little Neck Point Shoal makes ⅜ mile to the northward from Little Neck Point; it has from 5 to 14 feet of water, and is not marked.

Duck Island Shoal extends 600 yards to the southward of Duck Island Bluff; it has from 2 to 16 feet of water, and is not marked.

The eastern shore of Little Neck should not be approached nearer than 350 yards.

DARIEN RIVER.†

This is a small shallow stream, 3 miles to the westward of Norwalk Island Light-house, entering Long Island Sound between Long Neck Point on the east and Norroaton Neck on the west. At low water about 2¼ feet can be carried into the river, and 7 feet is the greatest draught that can enter at high water.

Darien, a village on the N. Y., N. H. and H. Railroad, is situated just above the entrance. Vessels of 6 feet draught or less, partly strangers, are engaged in the carrying trade, which consists of cargoes of coal and oysters.

Ring's End, a small settlement about 1 mile above the mouth of the river, is at the head of navigation; to it 6 feet can be taken at high water.

Strangers take a pilot; if one is not found outside, they anchor between Long Neck Point and Smith's Rock, and get one from Darien.

In winter ice forms to Long Neck Point.

GENERAL DIRECTIONS, DARIEN RIVER.

I. ***From the Eastward.***—Passing ¾ mile south of Norwalk Island Light-house, steer **W.** ¼ **S.** for about 2¾ miles, until to the southward of Long Neck Point and about ⅝ mile to the eastward of Smith's Rock buoy (red, No. 24). Then a **NW.** by **N.** course will lead fair between Smith's Rock buoy and Long Neck Point; steer that course for a little over ¼ mile, and anchor in 20 to 24 feet of water, soft bottom, with Long Neck Point bearing about **NE.** by **E.**, distant ⅜ mile.

Remarks.—In approaching from the eastward, Great Reef Spindle and Green's Ledge buoy (see page 90) will be left on the starboard hand. Long Neck Point will be made on the starboard bow; shoal water extends in a southerly direction for 400 yards from Long Neck Point. Smith's Rock buoy (spar, red, No. 24) will be made almost directly ahead, and Stamford Harbor Light-house will be a little on the port bow.

II. ***From the Westward.***—Passing south of the red buoy on the Cows (can, No. 26), steer **NE.** by **E.** ½ **E.**, with Norwalk Island Light-house a little on the starboard bow. When the red buoy on

† Shown on Coast and Geodetic Survey chart 116. See the foot-note on page 40.

Smith's Rock (spar, No. 24) bears well abaft the port beam, turn to the northward and anchor as directed above, between Long Neck Point and Smith's Rock buoy.

Remarks.—The Cows (see page 57), about 1 mile **SE.** by **E.** from Stamford Harbor Light-house, and marked by a red buoy (can, No. 26), should be left on the port hand. Smith's Rock, marked off its southern end by a red buoy (spar, No. 24), lies about ⅞ mile **SW.** ½ **W.** from Long Neck Point. This cluster of rocks extends ⅝ mile in a northerly direction from the buoy.

III. ***From off Huntington Bay.***—When Eaton's Neck Light-house bears **SE.** by **S.**, a **NW.** by **N.** course will lead to the entrance. When nearly up with the red buoy on the Cows (can, No. 26), turn a little more to the northward, leaving this buoy on the port hand, and anchor as already directed.

STAMFORD HARBOR.†

This small harbor, on the north shore of Long Island Sound, is about 5½ miles to the westward of Sheffield Island Harbor. It is shoal and much obstructed by ledges and sunken rocks, and is of no importance as an anchorage. At the head of the harbor is the mouth of Mill River, a shallow stream. A little to the eastward of the river channel is the "canal," a private channel also leading to Stamford, and having a depth of 5 to 6 feet at low water.

Stamford, a town on the N. Y., N. H. and H. Railroad, is near the mouth of Mill River, and has some trade by water, the greater part of which is carried on by way of the canal. The deepest draught of the vessels which go to Stamford by river (Waterside landing) is 9 feet; by canal, 12 feet; at high water in both cases. The principal cargo is coal, brought from New York in tows. The depth alongside wharves at low water (coming by canal) is about 5 feet. A steamer makes daily trips to New York in summer.

Mill River has a general course about **N.** from the upper part of the bay, but the channel is crooked, and before improvements were begun the depth at low water was 1 to 3 feet. About a mile above its mouth the river is dammed, at Oliver street bridge. Recently improvements have been made, the purpose being to dredge a channel 80 feet wide and 5 feet deep from the bridge to the deeper water of the bay. The depth of 5 feet has been secured for a considerable part of the distance and work is still in progress (1887).

Prominent objects.—Stamford Harbor Light-house is in the middle of the entrance. **Shippan Point**, the eastern point of entrance, is distinguished by a large and prominent structure—a bathing establishment, painted yellow (in 1887)—on the western shore of the point.

Pilots are necessary for strangers, who should make signal and anchor well to the southward of the light-house. **Tow-boats** cannot be obtained ordinarily. Sometimes a small oyster steamer can be employed.

Repairs.—Minor repairs to the machinery of small steamers—light work only—can be made at Stamford. South Norwalk has better facilities for such work (see heading "Sheffield Island Harbor").

Tides.—The mean rise and fall of tides is about 8 feet. The tidal currents are not very strong.

Ice generally obstructs navigation from January to March, frequently extending down to the light-house, and sometimes beyond.

GENERAL DIRECTIONS, STAMFORD HARBOR.

I. ***From the Eastward.***—Passing ½ mile to the southward of Norwalk Island Light-house, steer **W SW.** ¼ **W.** for about 5¼ miles, passing about 400 yards to the southward of the red buoy (can, No. 26) on the southern end of the Cows. When Stamford Harbor Light-house bears **N NW.** ¾ **W.** steer for it, and anchor in 20 feet water about 300 yards **S SE.** of the black buoy (nun, No. 1) on Harbor Ledge. Make signal and wait for a pilot if bound to Stamford.

Remarks.—On the **W SW.** ¼ **W.** course, Stamford Harbor Light-house will be made well on the starboard bow, and the red buoy on the Cows (can, red, No. 26) will be a little on the starboard bow. Shippan Point (eastern side of entrance to Stamford Harbor) will be distinguished by a large bathing establishment near its southwestern end.

The Cows are described on page 91.

Harbor Ledge is marked by Stamford Harbor Light-house; black buoy No. 1 is on the southeastern end of the ledge.

II. ***From the Westward.***—Passing ½ mile to the southward of Great Captain's Island Light-house, steer **E NE.** ½ **E.**, passing ½ mile to the southward of Greenwich Point. When Stamford Harbor Light-house bears **NE.** ½ **E.** steer for it, edging gradually to the southward so as to pass to the southward of the black buoy (nun, No. 1) on Harbor Ledge. Anchor as directed above.

Remarks.—On the **E NE.** ½ **E.** course, Captain's Harbor will be passed. Greenwich Point will be on the port bow, and Stamford Harbor Light-house will be opened out to the southward of Greenwich Point. The large bathing establishment near the southwestern end of Shippan Point will be conspicuous to the eastward of the light-house.

Shoals and rocks make out from the southeastern end of Greenwich Point for ⅝ mile, the shoals extending all along the south shore of the point to that distance. The bight between Stamford Harbor Light-house and Greenwich Point is comparatively free from dangers while keeping the light-house bearing to the northward of **E.**, giving it a berth of over 300 yards.

† Shown on Coast and Geodetic Survey chart 116. See the foot-note on page 40.

OYSTER BAY.†

This bay, on the south side of Long Island Sound, about 5 miles to the westward of Eaton's Neck Light-house, is separated from Huntington Bay by Lloyd's Neck; the entrance is between Lloyd's Point on the east and Centre Island Point on the west, and is about 1¼ miles wide at its narrowest part. From the middle of the entrance Stamford Harbor Light-house bears N. by W., distant nearly 5 miles. A rocky shoal with 5½ to 9 feet of water makes out to the eastward from the northern end of Centre Island to within 400 yards of the eastern shore, leaving a channel 300 yards wide, with a least depth of 24 feet, close to the eastern shore. Vessels of 7 feet draught acquainted with the locality cross this shoal near high water.

Oyster Bay and the adjacent waters afford excellent anchorage, but the channel being narrowed by Centre Island Shoal, causes difficulty in entering or passing out without a leading wind. Vessels from 300 tons down to small sloops anchor in the bay, mostly during the summer.

Adjacent waters—Settlements.—Oyster Bay Harbor is a long crooked arm on the western side of Oyster Bay, running to the westward between Centre Island and Cove Neck. Good anchorage, sheltered from all winds, in from 10 feet to 6 fathoms of water, is found in this harbor. The village of **Oyster Bay**, on the south shore of Oyster Bay Harbor, has some trade in oysters; several brick-yards farther up the harbor ship bricks in coasting vessels. During the summer a steamer running to New York and intermediate places stops at the village.

Cold Spring Harbor is the southern end of Oyster Bay, and extends about 2¾ miles south of Cooper's Bluff. This harbor is free from dangers, and the depth is regular, 15 to 18 feet, to near its head. **Cold Spring**, a village on the eastern shore near the head of the harbor, has some trade in oysters, produce, and bricks, carried both by vessels owned in the vicinity and by strangers. Vessels of 12 to 15 feet draught can go up as far as Cold Spring at low water; there is a depth of 6 to 8 feet alongside the wharves. A depot of the Port Jefferson branch of the Long Island Railroad is 2 miles above the head of the harbor. During summer a steamer running to New York and intermediate places stops at Cold Spring.

Prominent features.—Northwest Bluff (high and covered with trees) is about 1⅛ miles to the southward of Lloyd's Point, on the eastern shore. **Cooper's Bluff** (the northeastern point of Cove Neck, and showing a high bare-faced sand bluff) is the most prominent feature seen when entering; it is about 1⅞ miles S. ¾ W. from Northwest Bluff. **There are two wharves** on the eastern shore, about ⅞ mile to the southward of Northwest Bluff, which are readily distinguished when entering. The **Brick-yards** is a cluster of houses and long sheds on the eastern shore, east of Cooper's Bluff.

Channel.—The channel is about 300 yards wide at its narrowest part, and its limit is here marked by a buoy (spar, red, No. 2). A stranger should not attempt to enter at night.

Anchorages.—Anchorage in 18 feet to 7 fathoms of water, sheltered against easterly winds, will be found between Lloyd's Point and Northwest Bluff, about ¼ to ⅜ mile off the shore. Good anchorage in 15 to 24 feet of water, sheltered against all but northerly winds, will be found anywhere in Cold Spring Harbor, south of the second wharf on the eastern shore, by keeping 250 yards from the shore and giving the north shore of Cove Neck a berth of 550 yards. An excellent anchorage in 10 feet to 6 fathoms of water will be found in the channel in Oyster Bay Harbor, but vessels seldom enter it on account of the difficulty in leaving, unless with a favorable wind.

Pilots and Tow-boats.—Pilots are sometimes employed by strangers; by making signal for a pilot off Lloyd's Point the vessel will be boarded before she gets to the Brick-yards. Tow-boats are seldom used; they may be had from New York by telegraph in case of necessity.

Ice.—During two months in the winter ice usually extends the whole length of the bay, and in exceptionally severe winters it extends out into the Sound.

Tides.—The mean rise and fall of tides in Oyster Bay is 7.3 feet; corrected establishment $11^h\ 7^m$. For other tidal data see page 16.

The **Tidal currents** are moderately strong, but dangerous to vessels only when near Centre Island Shoal; they set across this shoal with considerable velocity during both ebb and flood.

Descriptions of light-houses, with other general matters, will be found on pages 9–17; see also pages 40–44.

SAILING DIRECTIONS, OYSTER BAY.

The following directions, if strictly followed, are available for vessels of 15 feet draught. But it is not advisable for vessels drawing more than 10 feet to go inside the line of Northwest Bluff and Center Island Point without a pilot.

I. FROM THE EASTWARD.

1. ***Approaching from the Eastward.***—Pass Lloyd's Point, leaving it ¾ mile on the port hand, passing ¼ mile north of Lloyd's Point Shoal buoy (spar, black, No. 15). When well past this buoy edge to the southward, keeping at least 500 yards from the eastern shore, until the northern end of Centre Island (Centre Island Point) bears W. Now gradually edge toward the eastern

† Shown on Coast and Geodetic Survey chart 367, Oyster or Syosset Harbor. Shown also on chart 116. See the foot-note on page 40.

shore so as to pass about 200 yards from the end of the first wharf and about midway between it and Centre Island Shoal buoy (spar, red, No. 2). Then follow the directions in paragraph 2 following.

Remarks.—Rounding Lloyd's Point, Cooper's Bluff (high, sandy, and of a bright yellow color) will be opened out to the westward of Northwest Bluff. After passing Northwest Bluff and approaching the **W.** bearing of Centre Island Point, Centre Island Shoal buoy (spar, red, No. 2) should be seen to the southeastward, with the first wharf just to the eastward of the buoy.

Lloyd's Point Shoal is described on page 57. Shoal water makes out for a distance of nearly 500 yards from the eastern shore, from Lloyd's Point to ¼ mile south of Northwest Bluff; to the southward of this the edge of the channel gradually draws nearer the shore, the 18-foot curve being 125 yards from the shore at the first wharf.

Centre Island Reef makes out nearly 1 mile to the northward from Centre Island; it has from 3 to 18 feet of water over it, and is marked by a buoy (spar, black, No. 17) placed a little over ⅝ mile to the northward of Centre Island and near the extremity of the reef.

Centre Island Shoal extends 1⅝ miles to the eastward from the northern end of Centre Island, and has from 5½ to 9 feet over it near its eastern end; the extreme eastern end is marked by a buoy (spar, red, No. 2). At or near high water, vessels drawing 7 feet or less are often taken across the shoal by those acquainted with the locality.

2. ***From Centre Island Shoal buoy.***—*If bound to Cold Spring Harbor*, steer about **S.** and anchor according to draught, giving the shore a berth of 300 yards.

If bound to Oyster Bay Harbor, stand to the southward until the second wharf on the eastern shore bears **E NE.**, and then steer **W SW.**, heading for the southern end of Plum Point.

On the ebb, guard here against the set to the northward.

Pass 150 yards south of Plum Point and follow the northern shore, keeping about 350 yards from the beach. Anchor according to draught when abreast of the wharves at Oyster Bay.

Remarks.—Entering Oyster Bay Harbor, the channel leads close to Plum Point, the southeastern point of Centre Island, and follows the trend of the northern shore. Shoals extend 500 yards to the northward of Cove Neck (the neck of land separating Cold Spring Harbor and Oyster Bay Harbor), leaving the channel about 350 yards wide and favoring the Plum Point shore. The cove in the south shore, west of Cove Neck, is an extensive flat, with 6 to 10 feet of water; this flat extends to the westward along the south shore, and the channel runs about 175 yards from the north shore until up to the brick-yard on Centre Island. Above this a stranger should not go without a pilot.

II. ***From the Westward.***—Passing ½ mile north of Centre Island Reef buoy (spar, black, No. 17), steer **E. ½ S.**, heading for the northern end of the high land on Lloyd's Point. When Cooper's Bluff bears **S.** by **E. ½ E.** steer **SE.**, heading a little to the southward of Northwest Bluff, and when the shore is about 600 yards distant ahead edge to the southward, following the shore, and drawing in gradually so as to pass about 200 yards to the westward of the first wharf and about the same distance to the eastward of Centre Island Shoal buoy (spar, red, No. 2); from this buoy follow the directions under paragraph 2 preceding.

Remarks.—The northern end of Centre Island (Centre Island Point) appears as a high sand bluff, but has no distinguishing feature. Approaching the shore to the southward of Northwest Bluff, Centre Island Shoal buoy (spar, red, No. 2) and the wharves on the eastern shore should be made on the starboard bow.

Dangers have been described under heading I foregoing.

CAPTAIN'S HARBOR (GREENWICH HARBOR).†

This harbor, on the north shore of Long Island Sound, 10 miles to the eastward of Execution Rocks Light-house, lies to the northward of Great and Little Captain's islands, and affords shelter against all winds. The harbor is entered for shelter by vessels drawing 12 feet or less, and by barges being towed through the Sound. A depth of 15 to 25 feet is found to the northward of Little Captain's Island, and from 7 to 15 feet on the flats; the bottom is soft mud.

Greenwich Cove opens into Captain's Harbor from the eastward, just north of Greenwich Point; it is of no commercial importance, and is frequented only by small craft. The village of **Sound Beach** (formerly Old Greenwich) is on Greenwich Cove.

Coscob Harbor opens into the northeastern part of Captain's Harbor; 8 feet is the greatest draught of vessels entering. The village of **Coscob** (post-office name Bayport) is about 1½ miles above the entrance of Coscob Harbor. A railroad bridge crosses at Coscob (width of eastern draw 50 feet, western 40 feet). The village of **Mianus**, on the Mianus River, is a little over ½ mile above Coscob. The greatest draught carried to Mianus, the head of navigation, is 7 feet.

Rocky Neck Creek (Bush's Harbor), making in from the northern part of Captain's Harbor, to the eastward of Horse Neck Point (also known locally as Field Point), has some trade by water; there are coal and lumber yards near the head of the harbor; 8 feet is the greatest draught of vessels trading here. The town of **Greenwich**, on the

†Shown on the following Coast and Geodetic Survey charts: **365**, Harbors of Little Captain's Island and Great Captain's Island, scale $\frac{1}{20,000}$ or one mile = 3.648 inches, price $0.20; **116**, scale $\frac{1}{80,000}$, price $0.40. See also the foot-note on page 40.

Shore Line Railroad, is about 1 mile inland from the head of the harbor. On the eastern side of the entrance to Rocky Neck Creek is the **Chimney Corner**, a shallow cove, now sometimes called Indian Harbor.

Prominent objects seen in entering are Great Captain's Island Light-house, the large Indian Harbor hotel (white, with red roof and three cupolas) to the eastward of Rocky Neck Creek, and a high church-spire of Greenwich, which from off shore shows conspicuously above the outline of the hills in the distance. Little Captain's Island is a small hillock with boulders around the base.

Two Channels lead into Captain's Harbor. *The eastern one*, between Greenwich Point and Little Captain's Island, is buoyed and easy of access. *The western channel* leads between Great Captain's Island and Manursing Island, and south of Calves Island; this channel is buoyed, but should not be used by strangers, as it is much obstructed, and the many oyster buoys of this locality are liable to cause uncertainty in picking up the buoys placed to mark the channel.

Anchorage for vessels of 8 feet draught or over is found about ½ mile to the northward and northeastward of Little Captain's Island. Vessels of less than 7 feet draught anchor on the flats, either under Horse Neck Point (Field Point) or under the eastern shore, according to the direction of the wind.

Pilots are not needed for vessels entering Captain's Harbor from the eastward. A stranger bound into any of the adjacent harbors or coves should always take a pilot, setting signal off the entrance and standing off and on, or anchoring in Captain's Harbor. There are no regular pilots; sometimes one is obtained from the light-house; frequently one of the oystermen of the vicinity is employed.

Tow-boats are not to be had here. Vessels are sometimes towed here from other places, and engage tugs from elsewhere to take them out again.

Fresh water can be obtained at the steamboat dock on Rocky Neck Point (the eastern point of entrance to Rocky Neck Creek). It is supplied through pipe and hose; there is only 4 feet of water at the end of the dock at low water.

Repairs.—There are 3 small marine railways at Coscob, capable of hauling out small craft only. The nearest place where repairs to machinery can be made is Stamford, Conn., and the facilities there are limited.

There is direct **steamboat communication** with New York from Rocky Neck Point.

Dangerous freshets sometimes occur in the Mianus River in March and April.

Tides.—The mean rise and fall of tides is **7.4** feet; corrected establishment **11h 1m**. For other tidal data see page 16. The **Tidal currents** are not strong and do not affect navigation.

Ice forms in winter in all the coves and over the greater part of Captain's Harbor; it sometimes extends out to the line of Little Captain's and Great Captain's islands.

The **Variation of the compass** off Great Captain's Island Light-house for 1888 is **8° 50′ W.**, with an annual increase of about 3½′.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, CAPTAIN'S HARBOR.

The following directions are available for vessels drawing 12 feet or less, approaching and entering through the eastern passage.

I. ***From the Eastward.***—Passing south of the buoy on the Cows (can,* red, No. 26) and south of Stamford Harbor Light-house, bring Great Captain's Island Light-house to bear **W. ½ S.**, and run for it on this bearing.

When Indian Harbor hotel bears between **NW. ¼ W.** and **NW.** by **N.**, steer for the hotel, bearing about **NW. ½ N.**, and when Great Captain's Island Light-house bears **SW.** by **W.**, steer **W. ½ S.**, heading for Calves Island. Anchor in 15 to 25 feet of water, soft bottom, when to the northward of Little Captain's Island.

At Night.—Steer for Great Captain's Island Light, bearing **W. ½ S.** until Stamford Harbor Light bears **NE.** by **E. ½ E.**, then steer **NW. ½ N.**, passing between Little Captain's Island East Reef buoy and Flat Neck Point Shoal buoy. When Great Captain's Island Light bears **SW.** by **W.**, steer **W. ½ S.**, and anchor as directed above.

Remarks.—Stamford Harbor Light-house should be left at least 1 mile on the starboard hand. As Indian Harbor hotel comes on a bearing of **NW. ¼ W.**, Flat Neck Point Shoal buoy (spar, red, No. 2) will be about in range with the hotel. Little Captain's Island (small hillock surrounded by boulders) will be a little on the starboard bow while heading for Great Captain's Island Light-house. The shore of Greenwich Point should receive a berth of at least ¼ mile.

Standing in for Indian Harbor hotel on the **NW. ½ N.** course, Greenwich Cove will be opened on the starboard beam, Coscob Harbor broad off the starboard bow, and Horse Neck Point (Field Point) will be on the port bow. Calves Island will be seen to the southwestward of Horse Neck Point. Rocky Neck Creek will be opened between Indian Harbor hotel and Horse Neck Point.

Dangers.—**The Cows** are described on page 57.

Shoal water makes to the eastward and southward from Greenwich Point for a distance of nearly ½ mile, and the shore should be given a berth of at least ⅜ mile while passing to the southward of it.

Flat Neck Point Shoal makes out to the westward from Flat Neck Point (the western extremity of Greenwich Point); it is marked at its western end by a buoy (spar, red, No. 2), and has sunken rocks with 1 to 6 feet over them.

Little Captain's Island East Reef extends to the eastward from Little Captain's Island; it has many bare rocks and boulders bare at low water, and is marked at its eastern end by a buoy (spar, black, No. 1).

Tweed's, or Finch's Island Rocks lie about ⅜ mile **SE. ¼ S.** from Indian Harbor hotel, and about 500 yards from the shore of Finch's Island; these rocks show bare at half tide and are surrounded by shoal water; they are not marked.

II. ***From the Westward.***—Bring Stamford Harbor Light-house to bear **NE. by E. ½ E.** and steer for it it on this bearing. When Indian Harbor hotel bears **NW. ½ N.**, steer for the hotel and follow directions under heading I foregoing.

Remarks.—Great Captain's Island Light-house should be left ¼ mile on the port hand. The prominent features and dangers have been described under heading I.

PORT CHESTER HARBOR AND BYRAM RIVER.†

Port Chester Harbor, on the north shore of Long Island Sound, is the anchorage for vessels bound up the Byram River to Port Chester. The harbor lies between Great Captain's Island and the northern end of Manursing Island; it is obstructed by sunken rocks, and is not used by strangers for shelter.

Byram River is a narrow and shallow stream; it is navigable up to Port Chester bridge. The entrance, about 600 yards wide, is between Byram Point on the north and the northern end of Manursing Island on the south, and is about 1½ miles **W. by N.** from Great Captain's Island Light-house. The river is obstructed by dangerous rocks and is bare in places at low water, the depth in the channel being about 2 feet. Under Government appropriations improvements have been made giving (in 1887) an available channel 2½ feet deep at mean low water (or nearly 10 feet at high water), and from 60 to 100 feet wide to a point 50 yards below the bridge, and 25 feet wide to the bridge.

Port Chester, at the head of navigation, about ¾ mile above the entrance, is on the line of the N. Y., N. H. and H. Railroad. Several hundred vessels, partly strangers, are annually employed in the carrying trade, which comprises cargoes of coal, iron, lumber, and general merchandise. There is a daily line of steamers to New York.

The deepest draught of vessels entering and bound up to Port Chester is 8 feet, and the usual draught does not exceed 7 feet. There is 8 feet of water at low water 10 feet from the wharves.

Pilots.—Strangers cannot enter the river without a pilot, and should anchor outside if not boarded by one promptly in response to signal. The piloting is done by oystermen, etc. **Tow-boats** are not used except by barges and canal-boats towed from New York.

Anchorage.—The usual anchorage for those acquainted with the locality is between the southern end of Byram Point and the southern end of Calves' Island, but strangers should not stand in so far without a pilot.

Supplies.—Coal can be supplied to small steamers and tow-boats in limited quantity. Water can be obtained at the propeller dock, and provisions and ship-chandler's stores at Port Chester.

Ice forms the whole length of the river to Byram Point in winter.

Consult also pages 9–17 and 40–44.

GENERAL DIRECTIONS, PORT CHESTER HARBOR.

The following directions are available for vessels drawing 9 feet or less. Vessels drawing more than 8 feet do not go as far up as Port Chester.

I. ***From the Eastward.***—Pass at least ¼ mile south of Great Captain's Island Light-house, and when this light-house bears **N.**, steer **W. ¼ S.** for about ½ mile until abreast the red buoy (spar, No. 2) marking Great Captain's Island West Reef. Round this buoy, leaving it 200 yards on the starboard hand, and steer **N NW.** past Four-foot Rocks buoy (spar, red and black horizontal stripes). Anchor to the southwestward of Calves Island, in 11 to 14 feet (low water), soft bottom.

If bound to Port Chester, take a pilot.

Remarks.—On the **W.** course Manursing Island will be ahead, and just to the northward of the island the entrance to Byram River will be opened out.

Great Captain's Island West Reef, marked at its western end by a red buoy (spar, No. 2), extends to the westward from Great Captain's Island for about 600 yards.

Four-foot Rocks, marked by a buoy (spar, red and black horizontal stripes), lie about ¾ mile **W.** of Great Captain's Island Light-house. This buoy can be left on either hand in entering, giving it a berth of 60 yards.

Bluefish Reef Shoal buoy (spar, red, No. 28) lies on the western side of the entrance to Port Chester Harbor, a little over ¼ mile **E.** of the southern end of Manursing Island. It marks a 15-foot spot, and is left on the port hand in entering, being colored and numbered as a through-sound buoy.

II. ***From the Westward.***—Bring Great Captain's Island Light-house to bear **NE. ¼ E.** and steer for it on that bearing. Execution Rocks Light-house will be directly astern, bearing **SW. ¼ W.** Con-

† See the foot-note on page 96.

tinue this **NE.** $\frac{1}{4}$ **E.** course until past the red buoy (spar, No. 28) off the eastern side of Manursing Island. Then steer about **N.** by **E.** $\frac{1}{2}$ **E.**, and pass midway between the buoy marking Great Captain's Island West Reef (spar, red, No. 2) and the buoy marking Four-foot Rocks (spar, red and black horizontal stripes).

When past these buoys steer more northerly and westerly, and anchor as before directed.

Remarks.—On the **NE.** $\frac{1}{4}$ **E.** course, the large hotel (Indian Harbor Hotel) will be prominent to the northward of Great Captain's Island Light-house. To the northward of the hotel, Greenwich church-spire will be seen showing conspicuously above the outline of the trees.

When up to Bluefish Reef Shoal buoy, Calves Island will be seen bearing **N NE.** from the buoy.

The Bight between Rye Neck and Manursing Island is full of rocks and should be given a berth of at least $\frac{5}{8}$ mile. A good rule to follow coming from the westward is to keep Great Captain's Island Light-house bearing to the northward of **NE.** $\frac{3}{4}$ **E.** until nearly up to Bluefish Reef Shoal buoy (spar, red, No. 28); this buoy is a little more than $1\frac{1}{4}$ miles **SW.** by **W.** $\frac{3}{4}$ **W. Westerly** from Great Captain's Island Light-house.

Other dangers are described under heading I foregoing.

HEMPSTEAD HARBOR.†

This harbor, on the south side of Long Island Sound, about $1\frac{1}{2}$ miles to the eastward of Sands' Point Light-house, makes in for about $4\frac{1}{2}$ miles and is 4 miles wide at its entrance, decreasing in width to its head. It is free from dangers, the shores being given a berth, and is much used by vessels seeking shelter in any but strong northerly winds, affording excellent anchorage with good holding-ground.

Glen Cove is a village about 2 miles back from the eastern shore of the bay, and can be reached by small boats going up **Mosquito Cove** (a narrow shallow creek about $1\frac{1}{4}$ miles south of Red Spring Point). Glen Cove steamboat wharf is about $\frac{7}{8}$ mile south of Red Spring Point and **E NE.** $\frac{1}{2}$ **E.** from Mott's Point. There is communication by telephone between the steamboat wharf and Glen Cove.

Sea Cliff is a settlement on the top of a steep hill on the eastern shore, about $\frac{3}{4}$ mile south of Glen Cove steamboat wharf, and on the south side of the entrance to Mosquito Cove. A steamboat wharf and the inclined railway from the steamboat wharf to Sea Cliff, by which, in the summer, passengers ascend the hill, are prominent features in this part of the harbor.

Glen Cove and Sea Cliff have each a post office; provisions can be obtained at either place.

Hempstead, or Roslyn, on the line of the Long Island Railroad, is a village at the head of the harbor; it is of no commercial importance. A narrow channel leads up to a wharf on the eastern shore, about 1 mile above **Harbor Beach** (a narrow sandy strip extending 600 yards to the eastward from the western shore of the harbor, about 2 miles to southward of Mott's Point). The harbor above Harbor Beach can be navigated only by those perfectly acquainted with the locality.

Prominent features.—Matinicock Point is the eastern point of entrance, and Pulpit (Prospect) Point, about $\frac{7}{8}$ mile to the eastward of Sands' Point Light-house, is the western. Mott's Point is about 2 miles **SE.** by **E.** from Pulpit, or Prospect Point. Between Pulpit Point and Mott's Point, on the western shore, is a long line of bluffs showing bare faces; the upper outline presents four rounded sweeps and is unmistakable when seen from the northward or eastward. Red Spring Point, on the eastern shore, is about $1\frac{3}{4}$ miles southwest from Matinicock Point and $2\frac{3}{8}$ miles east of Pulpit Point. The eastern shore south of Red Spring Point is high as far as Mosquito Cove.

Anchorage.—Vessels can anchor in any part of the harbor according to draught and direction of the wind. A good anchorage for vessels drawing 20 feet or less is just inside of a line from Mott's Point to Glen Cove steamboat wharf. It is well not to anchor more than $\frac{1}{4}$ mile to the southward of this line, in order to avoid the foul odors coming from Mosquito Cove, the headquarters of the Glen Cove starch-works. A good depth will be found, however, by favoring the western shore for $1\frac{3}{4}$ miles above Mott's Point.

Tides.—The mean rise and fall of tides in Hempstead Harbor is **7.2** feet; corrected establishment **11^h 03^m**. For other tidal data see page 16.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, HEMPSTEAD HARBOR.

No detailed sailing directions are needed for entering in the daytime. When within the entrance stand to the southward, keeping about 600 yards from the shore on either side of the harbor, and anchor at discretion.

Remarks.—Coming from the eastward or from the northward, the high bare-faced bluff between Pulpit and Mott's points will show conspicuously, and when up to Red Spring Point the high hill and inclined railway and steamboat wharf at Sea Cliff will be made on the eastern shore; farther to the northward is Glen Cove steamboat wharf.

†Shown on Coast and Geodetic Survey chart **36C**, Hempstead Harbor, scale $\frac{1}{20,000}$, or one mile = 3.648 inches, price $0.20. Shown also on chart **116**. See the foot-note, page 40.

Matinicock Point Shoal makes out ¼ mile to the northward from the point and is marked by a buoy, (spar, black, No. 19).

Pulpit, or Prospect Point Shoal is described on page 57. **Shoals** make out from the shores of the harbor from 200 to 600 yards. By giving the shores a berth of 600 yards all dangers will be cleared.

Picket Rock, awash at low water, ¼ mile (500 yards) to the northward of Mott's Point, should be especially avoided.

At Night.—*Coming from the Eastward.*—Standing through the Sound, when Great Captain's Island Light bears **N NE. ¼ E.**, steer **S SW. ¼ W.** until Execution Rocks Light bears **W. ¾ N.** Now steer **S. ¼ W.**, and anchor according to draught.

From the Westward.—Passing south of Execution Rocks, bring Execution Rocks Light to bear **W.**, and steer **E.** until on a line between Sand's Point Light and Great Captain's Island Light.

Now make good a **SE.** by **E. ¼ E.** course until Great Captain's Island Light bears **N NE. ¼ E.**, when change course to **S.** by **E. ¼ E.**, and anchor according to draught.

Caution.—When north of Pulpit Point give the point a berth of ½ mile, and when inside a line from Pulpit to Matinicock points do not approach the shores nearer than 600 yards.

MILL CREEK.†

Mill Creek is a small and unimportant stream on the north shore of Long Island Sound, between Port Chester Harbor (Byram River) and Mamaroneck Harbor. The entrance lies 3⅝ miles **NE.** by **N.** from Execution Rocks Light-house, and is marked by Rye Point and the Scotch Caps on the east and Hen Island on the west. The creek is very shallow and is only navigable for small vessels at high water.

Milton, a small village, is about 1 mile above the entrance and has a small trade by water. The deepest draught of vessels bound to Milton is 7 feet, the average draught is not more than 6 feet; the depth alongside the wharves at mean low water is 1 foot.

Strangers should take a pilot, anchoring off the mouth of the creek with signal up until one comes out from Milton, or proceeding to City Island and obtaining a pilot there.

Ice extends out to the Scotch Caps in winter.

GENERAL DIRECTIONS, MILL CREEK.

Approaching from the Eastward.—Follow the directions for approaching Mamaroneck Harbor, and when Mill Creek opens between the buoy off the Scotch Caps (spar, red, No. 2) and the buoy on Ship Rock (spar, red and black horizontal stripes), come to anchor outside the buoys and wait for a pilot.

From the Westward.—Bring Execution Rocks Light-house to bear **SW.** by **S.** and steer **NE.** by **N.** Come to anchor as directed above.

For dangers, see heading "Mamaroneck Harbor and River."

MAMARONECK HARBOR AND RIVER.†

Mamaroneck Harbor, on the north shore of Long Island Sound, about 5 miles to the westward of the boundary line between the States of Connecticut and New York, is a shallow bight between Hen Island on the east and Delancey's Point on the west. It is open to southerly winds, but affords shelter against northerly winds for vessels drawing less than 10 feet; the important dangers are buoyed, enabling an anchorage to be made with safety. The depth in the outer harbor is from 7 to 12 feet at low water. **Mamaroneck River** is a shallow and unimportant stream or tidal inlet.

Mamaroneck, a village on the N. Y., N. H. and H. Railroad, is about ½ mile above the mouth; at low water the village can only be reached by boats. The channel to the old steamboat wharf (about half-way up the inlet) has a depth of 5 feet at mean low water; from there to the upper wharves the depth gradually decreases to 1 foot.

It is proposed to dredge a channel 7 feet deep and 100 feet wide from the Sound to the old steamboat wharf, and thence 4 feet deep and 80 feet wide to the upper wharves. Strangers cannot enter the river without a pilot; one can be obtained off the entrance or at City Island.

Tides.—The mean rise and fall of tides is about 8 feet. For other tidal data see page 16.

GENERAL DIRECTIONS, MAMARONECK HARBOR.

The following directions are available for vessels drawing 10 feet or less.

I. ***From the Eastward.***—With Great Captain's Island Light-house bearing **N.**, distant about ¾ mile (Stamford Harbor Light-house bearing **NE.** by **E. ½ E.**), make good the course **SW.** by **W ½ W.** for a little over 4 miles. Pass ½ mile south of the Scotch Caps and steer **W.**, leaving Scotch Caps buoy (spar, red, No. 2) and Ship Rock buoy (spar, red and black horizontal stripes) on the starboard hand. When Ship Rock buoy bears abaft the starboard beam steer **N.**, and anchor according to draught. *If bound into the river* take a pilot.

†Shown on Coast and Geodetic Survey chart **116**. See the foot-note on page 40.

Remarks.—On the **SW.** by **W.** ½ **W.** course, Rye Neck and the Scotch Caps will be made on the starboard bow. The tall brick tower on David's (Davenport's) Island should be made nearly ahead, or a little on the port bow. Passing the Scotch Caps, Mamaroneck Harbor will be opened out on the starboard beam and Mill Creek entrance will show just to the westward of the Scotch Caps, stretching in a northeasterly direction on the west side of Rye Neck. Scotch Caps buoy and Ship Rock buoy should be given a good berth on the starboard hand.

Rye Neck.—The eastern shore along Rye Neck should receive a berth of over ½ mile on account of the numerous rocks and ledges that lie scattered along from the Scotch Caps to Manursing Island.

Scotch Caps are a group of rocky islets extending ½ mile in a southwesterly direction from Rye Neck. A buoy (spar, red, No. 2) is placed to the southward of the islands and marks the entrance to Mill Creek.

Ship Rock, ⅝ mile **S SW.** from Hen Island, has 1 foot of water over it and is marked by a buoy (spar, red and black horizontal stripes); this buoy is about ⅜ mile to the westward of Scotch Caps buoy. Between Ship Rock and Hen Island are several detached rocks with 6 to 8 feet over them.

Delancey's Point Ledge is the shoal making to the southward and eastward from Delancey's Point; it is bare in places at low water and is marked off its southeastern end by a buoy (spar, black, No, 1).

The western shore of the harbor is foul and should receive a berth of about 500 yards.

Other important dangers are marked by buoys.

II. ***From the Westward.***—Bring Execution Rocks Light-house to bear **S SW.** ½ **W.** and steer **N NE.** ½ **E.**, keeping the light-house on the bearing. Anchor as directed under heading I foregoing.

Remarks.—On the **N NE.** ½ **E.** course, Long Beach Point Reef will be left on the port hand and the harbor should be open ahead.

Long Beach Point Reef is described under the heading "Larchmont Harbor."

Other dangers are described under heading I foregoing.

LARCHMONT HARBOR, (DELANCEY COVE).†

This is a deep cove making into the north shore of Long Island Sound, the middle of the entrance bearing **N.** ¾ **E.** from Execution Rocks Light-house. This bearing leads directly across Long Beach Point Reef, which has bare rocks and rocks awash, and obstructs the approach. There is a good channel on either side of the reef.

The harbor affords anchorage for light-draught vessels and is the headquarters of the Larchmont yacht club. It is not used by coasters.

The **Depth of water** just outside the line of the points of entrance is 15 feet, fair in the entrance 12 feet, and only a short distance farther in 6 feet is found; the best water inside is towards the western shore. The **Anchorage** has soft and sandy bottom; farther in the cove are ledges and rocks, some of which are marked by spindles placed by the yacht club.

During the summer horse-cars make frequent trips to **Larchmont** railroad station and post office, 1½ miles from the club-house.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, LARCHMONT HARBOR.

I. ***From the Eastward.***—With Great Captain's Island Light-house bearing **N.**, distant about ¾ mile, steer **SW.** by **W.** ¾ **W.** Pass ½ mile south of Rye Neck, and when Scotch Caps buoy (spar, red, No. 2) bears **N.**, distant about ¼ mile, steer **W.** by **S.** Round Long Beach Point, leaving it 200 to 300 yards on the starboard hand, and anchor in 10 feet of water to the southward of a line drawn from the first wharf, on the western side of Long Beach Point, to the club-house, on the west side of the harbor.

Remarks.—On the **SW.** by **W.** ¾ **W.** course, Rye Neck (a rocky point with several small islands and detached rocks extending to the southward) should be made on the starboard bow. The high, square brick tower on David's (Davenport's) Island should be made nearly ahead, or a little on the port bow. Scotch Caps buoy (spar, red, No. 2) will be left about ¼ mile on the starboard hand.

On the **W.** by **S.** course, Long Beach Point (large summer residence and well-kept lawn at its southern end) will be made on the starboard bow; Mamaroneck Harbor and the buoys marking its entrance will be left on the starboard hand, and the buoys marking Long Beach Point Reef will be made on the port bow and left on the port hand. Rounding Long Beach Point, the buoy marking Umbrella Rock should be left on the port hand.

The **North Shore,** to the eastward of Rye Neck, is foul and should be given a berth of over ½ mile. Scotch Caps and Delancey's Point Ledge are described on this page.

Long Beach Point Reef lies off the entrance to the harbor, 1⅜ miles **N.** by **E.** from Execution Rocks Light-house. It is about ⅝ mile long in a **N.** and **S.** direction, 600 yards wide, and bare in places at low water. The part having less than 12 feet over it is about 700 yards long and 550 yards wide. This ledge is marked by buoys. Black spar-buoy, No. 1, is placed near its northeastern end, and red spar-buoy, No. 2, is near its southern end; these buoys are shown on the chart. Additional buoys are placed, in summer, by the yacht club to mark this reef, but they are removed in the winter.

† Shown on Coast and Geodetic Survey chart **116.** See the foot-note on page 40.

Umbrella Rock lies about 275 yards to the eastward of the western point of entrance; it is a small rock and has 4 feet of water over it at low water. During the summer it is marked by a spar-buoy (red and black horizontal stripes), placed by the yacht club; this buoy is removed in the fall. There is good water between the rock and the western shore.

II. ***From the Westward.***—Bring Execution Rocks Light-house to bear **E.**, distant about ⅜ mile, and steer **N.** by **E. Easterly,** heading a little to the westward of the entrance to the harbor; when on a line between the northern end of Whortleberry Island and the western point of entrance to the harbor, steer to the eastward, keeping on this line until nearly up to the point. Pass Umbrella Rock on either hand and anchor as directed under heading I.

Remarks.—On the **N.** by **E. Easterly** course, Whortleberry Island will be left about 700 yards on the port hand. The buoys on Long Beach Point Reef should be left well on the starboard hand. When heading to the eastward, passing north of Long Beach Point Reef, the southern end of Long Beach Point should be a little on the starboard bow.

A **Rocky Ledge** makes out from the shore for a distance of 300 yards, about ⅝ mile to the westward of the western point of entrance. The shore at this point should be given a berth of ⅝ mile. To the eastward of this the shore can be approached much closer, and good water will be found 80 yards off the western point of entrance.

Long Beach Point Reef and **Umbrella Rock** are described under heading I.

ECHO HARBOR (UPPER NEW ROCHELLE HARBOR, KELLOGG'S COVE).†

Echo Bay or Harbor, also known as Upper New Rochelle Harbor and sometimes called Kellogg's Cove, is a small shallow cove lying **N NW. ½ W.** from Execution Rocks Light-house. This cove has anchorage in 5½ to 13 feet of water, and is sheltered from all but southeasterly winds. It is the headquarters of the New Rochelle yacht club. Vessels of 12 feet draught have been taken into the cove at high water, lying aground at low water; the anchorage is not a good one for vessels drawing more than 6 feet.

New Rochelle, a village on the N. Y., N. H. and H. Railroad, is on the northwestern and western shores of the cove.

Pilots.—Strangers generally take a pilot when bound into Echo Harbor. Pilots will be found at City Island; generally one can also be obtained from the oyster boats of the vicinity.

Tides.—The mean rise and fall of tides is about 7.3 feet.

Consult also pages 9–17 and 40–44.

GENERAL DIRECTIONS, ECHO HARBOR.

The following directions are available for vessels drawing 7 feet or less.

I. ***From the Eastward.***—Pass about 1 mile south of Rye Neck and steer **W SW.** When the red buoy (spar, red, No. 2) off the southern end of Long Beach Point Reef bears a little abaft the starboard beam, distant over ¼ mile, steer **W NW. Westerly,** heading into the cove. Pass about 200 yards to the southward of Gut Island and the small island to the northwestward of Gut Island. Anchor in 14 feet (low water) midway between the islands and the western shore.

Remarks.—On the **W SW.** course, a high red brick tower on David's (Davenport's) Island will be a little on the port bow and Execution Rocks Light-house and Sand's Point Light-house will be broad off the port bow. Long Beach Point Reef will be on the starboard bow.

On the **W NW. Westerly** course, a tall white church-spire in New Rochelle will be made ahead, and Gut Island will be a little on the starboard bow.

Long Beach Point Reef, lying 1⅝ miles **N.** by **E.** from Execution Rocks Light-house, is marked by buoys. This reef, which shows bare in places at low water, is described on page 101.

Middle Shoal lies 1¼ miles **N NW. ⅞ W.** from Execution Rocks Light-house, and is north of Whortleberry Island. It is about 450 yards long in a **N.** and **S.** direction, 350 yards wide, and shows bare at low water. It is not always marked.‡

Gut Island has a ledge, bare at low water, extending 130 yards to the westward from its western side.

The northeastern point of Davenport's Neck, on the southern side of the entrance to the harbor, has a rocky shoal, bare in places at low water, extending out 180 yards to the eastward.

II. ***From the Westward.***—Passing to the northward of Execution Rocks Light-house, bring the light-house to bear **S.** by **E.** ¾ **E.** and steer **N.** by **W.** ¾ **W.**, keeping Execution Rocks Light-house and Sand's Point Light-house in range, or keep Sand's Point Light-house showing a little open to the eastward of Execution Rocks Light-house. When the tall white church-spire in New Rochelle bears **W NW.**, steer for it and proceed as before directed.§

Remarks.—In passing to the northward of Execution Rocks Light-house give the light-house a berth of over ¼ mile. On the **N.** by **W.** ¾ **W.** course, Gut Island will be made right ahead and Whortleberry Island and Middle Shoal will be left well on the port hand.

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† Shown on Coast and Geodetic Survey chart **116.** See the foot-note on page 40.

‡ Buoys placed by private parties marked the eastern edge of the shoal in 1886.

§ There is another channel from the westward leading between Hart and City Islands and between David's (Davenport's) Island and Glen (Locust) Island, but this channel can only be used by those thoroughly acquainted with the locality.

The islands to the northwestward of Execution Rocks Light-house should not be approached closer than 400 yards. *Whortleberry Island* lies ⅞ mile **NW. ¼ W.** from Execution Rocks Light-house. A shoal, bare at low water, extends about 225 yards to the eastward from the eastern part of the island. Other dangers are noted under heading I.

NEW ROCHELLE HARBOR.†

This is a small and narrow body of water between Davenport's Neck, David's (Davenport's) Island, Glen (Locust) Island, and the mainland. It lies off the southerly part of the town of New Rochelle. A few vessels enter this harbor yearly with coal and building material. The draught of vessels trading at New Rochelle Harbor ranges from 5 to 9 feet.

The channels leading to the harbor are narrow and full of dangers, and a stranger should not attempt to enter without a pilot; one can be had at City Island, or from some of the oyster boats in this vicinity.

Sailing directions for this harbor would not be of practical use.

MANHASSET BAY (COW BAY).†

Manhasset Bay, often called Cow Bay, makes into the north shore of Long Island at the western end of the Sound. The entrance is about 1¼ miles to the westward of Sand's Point Light-house, and lies between Barker's Point on the east and King's (Hewlett's) Point on the west. It affords shelter for light-draught vessels, but is of little commercial importance; oysters cultivated in the bay, and sand taken from the bluffs and towed to New York in barges, comprise the cargoes carried. Many old vessels are broken up here; there are three places in the bay where this business is carried on.

Vessels of less than 14 feet draught can pass 1¾ miles up the bay at mean low water, but vessels drawing more than 9 or 10 feet seldom anchor farther in than just inside Barker's Point, in from 18 to 24 feet of water; a bar with 13 to 15 feet over it extends entirely across the bay, a short distance inside the entrance.

Oyster beds, marked by the light poles stuck in the mud, occupy the entire bay; vessels pass over the beds and anchor without regard to them.

Port Washington is a village at the head of the bight in the eastern part of the bay.

Manhasset is a village at the head of the bay; vessels of less than 6 feet draught can go there at high water; at low water this part of the bay is bare for ½ mile from its head.

Anchorage in from 18 to 24 feet of water, sheltered against easterly winds, is found just inside and to the westward of Barker's Point; the depth in the western half of the entrance is 10 to 18 feet. Vessels will find 13 to 15 feet water ½ mile to the southward of Barker's Point, with shoaler water nearer the eastern shore. *Vessels of 8 feet draught or less* will find shelter from all winds ½ mile **S SE.** from Plum Beach; a little farther to the eastward are flats over which the depth is but 6 feet. Vessels drawing less than 8 feet can also anchor in 10 to 12 feet of water between Mott's Point and Mitchell's Bluff. The bottom is soft mud in all parts of the bay.

Tides.—The mean rise and fall of tides is **7.7** feet; corrected establishment **11h 13m**. For other tidal data see page 16.

The **Tidal currents** are not of sufficient strength to affect navigation. **Ice** closes the bay about two months each winter.

Consult also pages 9–17 and 40–44.

SAILING DIRECTIONS, MANHASSET BAY.

The following directions are available for vessels drawing 10 feet or less, except as specially noted:

I. ***From the Eastward.***—Follow the directions for Long Island Sound, Execution Rocks to Throg's Neck, page 58, until past Gangway Rock buoy (spar, black, No. 23), and when the high brick tower on David's (Davenport's) Island bears **N NW.** steer **S SE.**, and when past Barker's Point anchor at discretion, according to draught. *If drawing 8 feet or less*, desiring to stand well in, continue the **S SE.** course past Plum Beach, and when approaching Mott's Point give the western shore a berth of ¼ mile, and when nearly up to the point stand to the eastward and anchor in 10 to 14 feet water.

Remarks.—On the **S SE.** course Mott's Point (low, wooded, the farthest land seen on the western shore of the bay) will be made right ahead. Plum Beach (a low sand spit extending to the southward, about 1 mile south of Barker's Point) should be left about 200 yards on the port hand. On the south shore of the bight, to the eastward of Plum Beach, is the village of Port Washington.

Gangway Rock, marked by a buoy (spar, black, No. 23), is at the northern extremity of a broken line of rocks and shoal water extending over ⅞ mile in a **N NW. ½ W.** direction from Barker's Point. **Success Rock**, marked by a red spindle, is one of this broken line of rocks, and lies 500 yards **SE. ½ S.** from Gangway Rock. These dangers

† Shown on Coast and Geodetic Survey chart **116**, scale $\frac{1}{80,000}$, price $0.40. See the foot-note on page 40. Manhasset Bay entrance and New Rochelle Harbor are shown on chart **361**[5], Long Island Sound, Throg's Neck to New Rochelle, scale $\frac{1}{10,000}$, price $0.50.

are left on the port hand in entering. After passing to the northward and westward of Gangway Rock buoy, give Barker's Point a berth of at least 250 yards in entering.

The eastern part of the bay has the best water from Barker's Point until below Plum Beach.

Towards the northern shore of the bight, east of Plum Beach, the water is shoal. From 10 to 14 feet will be found 300 to 1,200 yards east of Mott's Point.

II. ***From the Westward.***—Leave Stepping Stones Light-house 300 yards on the starboard hand and steer **NE. ¼ E.**, passing about ⅜ mile to the northward of King's (Hewlett's) Point. When abreast the middle of the entrance stand into the bay, keeping the eastern shore the best aboard, and anchor as directed in entering from the eastward.

Remarks.—On the **NE. ¼ E.** course, Sand's Point Light-house will be made nearly ahead, and the spindle on Success Rock should be about in range with it. King's Point (steep, moderately high, and backed by woods) will be on the starboard bow.

Shoal water makes out about 350 yards to the northward from King's Point; the point should receive a berth of not less than 400 yards, and in entering the bay leave this point at least ⅜ mile on the starboard hand.

Other dangers have been mentioned under heading I.

CITY ISLAND HARBOR (HART ISLAND ROADS).†

Hart Island Roads, as it is generally called, lies in the western end of Long Island Sound, about 2¾ miles southwest from Execution Rocks Light-house. This anchorage, between Hart Island on the east and City Island on the west, is approached from the southward. It is well sheltered against easterly and westerly gales.

This is a most important anchorage, and is a great resort for coasters. Besides serving as a harbor of refuge, it is often used by vessels desiring pilots or tow-boats, or delayed by unfavorable winds or other causes, or waiting for orders.

Hart Island, on the eastern side of the harbor, is of no commercial importance; on it are a number of wooden buildings resembling barracks, stretching from its southern to its northern end.

City Island is nearly 1½ miles long in a **N.** and **S.** direction, and at its northern end is connected with the mainland by a drawbridge. It has a population of 1,500, engaged principally in ship-building and dredging for oysters; there is very little commerce.

Anchorage.—The usual anchorage for vessels of heavy draught, and those waiting for orders, is to the southeastward of City Island, to the southward of a line drawn from the south end of Hart Island to the south end of City Island.

Vessels of 12 to 16 feet draught anchor to the southward of a line drawn from the southern end of the houses on Hart Island to Piepgrass' dock (the most southern one on the eastern side of City Island). Vessels of light draught, 8 to 12 feet, can anchor anywhere to the southward of a line drawn from the northernmost dock on Hart Island to Town dock (the second dock from the southward) on City Island.

The limits here indicated are not fixed by regulation, but are based upon the depth of water in different parts of the Roads, and are used locally as a convenient guide.

The western shore of Hart Island should not be approached closer than 120 yards. The southern shore of City Island can be approached to within 120 yards; the eastern side of City Island, south of Piepgrass' dock, should be given a berth of 150 yards; above Piepgrass' dock keep well to the eastward of a line running through the ends of the wharves. The bottom is soft.

Pilots.—City Island is one of the headquarters for East River and Sound pilots. Pilots for small harbors on the Connecticut and Long Island shores, as far east as Great Captain's Island, can also be found here.

Tow-boats.—Vessels desiring a tow-boat, and not having met with one before reaching City Island, can telegraph to New York from the Signal-service station, should any unusual conditions make it necessary, and get a tow-boat in 1½ hours. Ordinarily there is no difficulty in getting a tow-boat in this part of the Sound, or in East River.

U. S. Signal-service station.—Wind-signals are displayed from a staff on the cupola of a brown house near the southern end of City Island. Vessels passing City Island are reported, by direct wire, at the Maritime Exchange, New York city, and to the Associated press. Foreign vessels, if their signal letters are flying while between Sand's Point and the Stepping Stones, will be reported at the Maritime Exchange as soon as their letters are made out. Foreign steamers expected to arrive, passing City Island in the night, will be reported if they give 4 blasts on the steam-whistle as they pass the island. Masters of vessels coming to the Roads for orders can communicate with their consignees or owners by telegraph from the signal station. (See also "Whitestone," under heading "East River.")

Supplies.—Provisions and ship-chandler's stores can be had at City Island.

Repairs.—Repairs to vessels and to the machinery of steamers can be made at City Island. There are 7 marine railways; the largest railway is capable of hauling out a vessel of 800 tons.

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† Shown on the following Coast and Geodetic Survey charts: **361**, City Island Harbor, scale $\frac{1}{15,000}$, price $0.15; **361**[1], Long Island Sound, Throg's Neck to New Rochelle, scale $\frac{1}{10,000}$, or 1 mile = 7.296 inches, price $0.50; **116**, scale $\frac{1}{80,000}$, price $0.40. See the foot-note on page 40.

Quarantine.—The quarantine regulations are the same as for the port of New York. The headquarters of the health officer for the port of New York is at Clifton, Staten Island. (See "Quarantine," page 42, and consult Appendix II.)

Tides.—The mean rise and fall of tides is **7.5** feet; corrected establishment **11h 14m**. For other tidal data see page 16.

Ice.—In the winter drift-ice sometimes interferes with navigation to the extent that sailing vessels are obliged to take a tow-boat.

Descriptions of light-houses and other general matters will be found on pages 9–17; see also pages 40–44.

SAILING DIRECTIONS, CITY ISLAND HARBOR.

I. ***From the Eastward.***—In approaching, follow the directions given for Long Island Sound, page 58. When the harbor is opened out, head to the northward and anchor, according to draught, between Hart and City islands (see "Anchorage" on the preceding page).

Remarks.—The southern end of Hart Island should receive a berth of 200 yards when to the eastward of it and 150 yards when to the southward. On passing the southern point of Hart Island a small, dark, rocky islet (**Rat Island**) will be seen lying nearly midway between Hart and City islands, in the northern part of the harbor. **High Island** is a small island, the highest part of which, near its eastern end, has a small hut near the top; this island is backed by a few trees and lies about 350 yards **NE.** of the northern end of City Island. The hut on High Island in range with Rat Island leads through a channel with 21 feet of water to an excellent anchorage in 20 to 30 feet water, about 450 yards **E.** by **N.** from the upper wharf on City Island.

II. ***From the Westward.***—Round Throg's Neck and steer **N.** by **E.** ¾ **E.**, heading fair between Hart and City islands. Anchor, according to draught, between the islands (see "Anchorage" on the preceding page).

Remarks.—Stepping Stones Light-house should be left 200 yards on the starboard hand.

Big Tom, a rock lying 600 yards **W SW.** ½ **W.** from the southern point of City Island, is marked near its southern end by a red buoy (spar, No. 30); this buoy should be left 500 yards on the port hand.

Caution.—Large vessels frequently anchor to the southeastward of City Island. Such vessels should keep clear of *Deep Reef*. This is a small rocky patch with about 5 fathoms of water over it and 9 to 13 fathoms all around it. The marks for this spot are the northern wharf on the east side of City Island in range with the little hut on High Island, and the sea wall on the southern end of City Island in range with a dark church-spire in Westchester. A vessel at anchor with her cable across this reef is apt to lose her anchor if caught in a gale.

EAST CHESTER BAY.†

East Chester Bay is a shallow bay, full of oyster beds, the entrance to which lies between City Island and Throg's Neck. Only vessels of light draught (less than 8 feet) can lie afloat at low water. **East Chester Creek,** or Hutchinson's River, is a shallow stream emptying into the head of the bay. Under government appropriations a channel has been dredged from the entrance of the river up to Lockwood's with a depth of 9 feet at mean high water. Vessels of 8 feet draught, carrying coal and lumber, go up as far as Lockwood's, lying in the mud at low water while unloading. Strangers generally take a pilot; one can be had at City Island. The usual anchorage for vessels waiting for a tide or a fair wind is to the southwestward of City Island, south of Big Tom buoy (spar, red, No. 30).

Sailing directions would not be of practical use; the dredged channel is only 45 feet wide in some places.

LITTLE NECK BAY.†

Little Neck Bay makes into the north shore of Long Island Sound at the eastern end of the East River, where the latter joins Long Island Sound. The bay is about 2 miles long, with an average width of about ¾ mile. Its eastern point of entrance is Elm Point, which is about ¾ mile southeast of the Stepping Stones Light-house, and on the western side of the entrance is Willet's Point, marked by a fortification and barracks (see "Caution," page 106). The depth of water decreases from 9 feet abreast of Willet's Point, leaving the upper part of the bay bare at low water. Vessels bound up to the village of **Little Neck** can only go up at high water; 5 feet is their greatest draught.

Strangers bound up to the wharf at the head of the creek require some one acquainted with the locality to pilot them. Pilots will be found at City Island. The entire bay is closed by ice during the winter.

† Shown on Coast and Geodetic Survey chart **116**, scale $\frac{1}{80,000}$, price $0.40; East Chester Bay and the entrance to Little Neck Bay are shown on chart **361[5]**, scale $\frac{1}{10,000}$, price $0.50.

EAST RIVER.†

Is the name given to the narrow strait which connects Long Island Sound with New York Bay and separates Long Island from Manhattan Island, on which is built the city of New York. At its eastern end the river is about ⅝ mile wide between Throg's Neck and Willet's Point, and thence its course is to the westward and southwestward for about 14 miles,—being in many places extremely narrow, and in no place more than a mile wide. Its channel is much obstructed by rocks and islands and the current runs with great velocity, especially in the narrow passage between Ward's Island and Hallet's Point, commonly known as Hell Gate. Strangers should not attempt to pass through Hell Gate without a pilot or a tow-boat.

Descriptions of Light-houses, with other general matters, will be found on pages 10–13; consult also pages 9–17. The **quarantine regulations** for East River are the same as for the port of New York. The headquarters of the health officer for the port of New York is at Clifton, Staten Island (see Appendix II).

Throg's Neck, on the north shore, at the eastern entrance to the East River, is opposite Willet's Point (large granite fort near water's edge). At the southern end of the Neck is Throg's Neck Light-house (see table of lights, page 12), and back of it is a granite fort. During thick weather vessels bound into the East River frequently anchor to the eastward and northeastward of the light-house, within hearing distance of the fog-bell (1 blow every 15 seconds), or they round the Neck and anchor on Hammond's Flats (see "Anchorages," East River). In winter there is much drift-ice off Throg's Neck at times, but it seldom prevents vessels from being towed through the East River.

Caution.—On the walls of Fort Schuyler, at Willet's Point, is the following notice: *Torpedoes: don't anchor.*

Whitestone is on the south shore, 1 mile to the westward of Throg's Neck. The N. Y. Herald has a telegraph and boarding station at the landing. Vessels passing through the river are spoken by a boat and reported; square-rigged vessels are boarded and reported. At the railway depot is a telegraph office and also a telephone station.

Pilots for the East River and Long Island Sound can be found at Whitestone, and tow-boats can be had from New York by telegraphing. (See also "Anchorages.")

College Point, formerly Strattonport, is on the south shore, 1⅝ miles to the westward of Whitestone. A ferry runs from here to 99th street, New York. Two other steamers make daily trips to New York. There is 11 feet of water at the end of the wharf, where coal and water for tugs or other small steamers can be obtained. College Point has some trade; 8 to 10 feet of water can be carried in at low water; 9 feet is found alongside the principal wharves; 12 feet is deepest draught entering.

Strangers bound to College Point from the eastward generally take a pilot or a tow-boat at City Island or at Whitestone; if from the westward, a tow-boat is generally taken at New York.

A reef just covered at low water makes out to the northward and about 200 feet distant from Stoiber's dock (the one at which water is taken at College Point). The end of the wharf should be approached from the westward.

Flushing Bay, on the south shore, between College Point on the east and Bowery Bay (Sandford's) Point on the west, is a shallow bay 1¾ miles long in a **N NW.** and **S SE.** direction, and 1 mile wide between the points of entrance, narrowing gradually to ½ mile at its head.

Under the supervision of the U. S. Army Engineers, a channel 170 feet wide and 6 feet deep has been dredged across the flats to the entrance of Flushing Creek; a dike built of piles driven in the mud runs along the western side of the dredged channel for a distance of 3,057 feet. A fixed red light is shown from a lantern suspended from a mast on the north end of the dike. The depth in the dredged channel is said to be decreasing.

Flushing Creek, a narrow, crooked stream, empties into the head of the bay. *Flushing*, a village having some trade in coal, lumber, and building material, is about ½ mile above the entrance on the east bank of Flushing Creek. There is a daily line of steamers running from Flushing to New York.

The average draught of vessels bound to Flushing is 8 feet; draught that enter at low water 5 feet; there is from 3 to 10 feet of water alongside the wharves.

White Pot Landing is at the head of navigation on Flushing Creek; only small light-draught vessels go up to the landing. Strong's road bridge crosses the creek at Flushing; about ½ mile farther up the railroad bridge crosses, and 1 mile above the railroad bridge is a narrow road bridge; the estimated width of draws in these bridges is about 30 feet.

Strangers bound to Flushing take a pilot or a tow-boat—if over 50 tons they take a tow-boat. Pilots can be had at City Island, at Whitestone, or at New York city. Tow-boats can be found in the East River or at Flushing.

In the winter ice obstructs navigation, generally during January and February, and sometimes Flushing Bay is frozen over from its head to College Point.

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†Shown on the following Coast and Geodetic Survey charts: **369⁴**, Hudson and East rivers, W. 67th street to Blackwell's Island, scale $\frac{1}{10,000}$, or one mile = 7.296 inches, price $0.50; **369⁵**, Hell Gate and East River from south end Blackwell's Island to Lawrence's Point, scale $\frac{1}{5,000}$, price $0.50; **369⁶**, East River, Lawrence's Point to Throg's Neck, scale $\frac{1}{10,000}$, price $0.50. Shown also, in whole or in part, on charts **369**, New York Bay and Harbor, scale $\frac{1}{40,000}$, price $0.75; **116**, Long Island Sound, western sheet, scale $\frac{1}{80,000}$, price $0.40; **120**, New York Bay and Harbor, scale $\frac{1}{80,000}$, price $0.50; **370**, Hudson River, lower sheet, scale $\frac{1}{80,000}$, price $0.40.

Riker's Island lies 1⅝ miles to the westward of College Point. The main channel passes to the northward of this island. A channel leads across the entrance of Flushing Bay south of Riker's Island and south of South Brother Island, joining the main channel of East River between South Brother Island and Lawrence's Point, where it is marked by several buoys. This channel has a depth of 18 feet, but there are several spots with only 8 and 9 feet over them and others with 11 to 16 feet. Strangers should not attempt to pass through south of Riker's Island.

North Brother Island lies NW. by W. ½ W. from the northern end of Riker's Island, distant ½ mile; North Brother Light-house (see table, page 12) is on its southwestern end. The channel with best water leads north of this island. A channel with 17 feet at low water leads south of the island, between it and South Brother Island. This latter channel is the one most used by vessels, as it is the more direct.

Port Morris lies west of North and South Brother islands.

Randall's Island is the island to the southwestward of Port Morris, *Bronx Kills*, a narrow, shallow body of water separating them. The house of refuge and other municipal buildings are scattered over the island. *Sunken Meadow*, marked on its eastern side by a spindle (1 red light at night), lies to the eastward of the island, and is separated from it by a channel about 120 yards wide.

Lawrence Point lies on the eastern side of the channel, opposite Randall's Island.

Ward's Island lies to the southward of Randall's Island and Sunken Meadow, and is separated from them by Little Hell Gate, a narrow and shoal channel leading into Harlem River. The insane asylum and emigrants' and homeopathic hospitals are located on this island.

Hallet's Point is to the southward of Ward's Island, and is recognized by the skeleton electric-light tower (a white light is now shown from a pyramidal wooden tower just to the westward of the skeleton electric-light tower). The main channel leads close past the northern end of Hallet's Point. Pot Cove is the bight to the eastward of Hallet's Point.

Hell Gate is the name of the part of East River south of Ward's Island and north of the northern end of Blackwell's Island. The strong tidal currents and the irregularity of their direction make this part of the river dangerous to navigate. Under the supervision of the U. S. Army Engineers, the most dangerous rocks in the channel have been removed or cut down so as to have from 18 to 23½ feet over them at low water.

A new channel, about 100 yards wide, with a depth of 18 feet, has been made between Flood Rock and Mill Rocks. Work is in progress removing the broken part of Flood Rock. This channel was buoyed for awhile in 1887–88, but the buoys towed under so much of the time that they have been removed.

Flood Rock, marked by a white stake (2 red lights at night), lies about 250 yards west of Hallet's Point, its highest part showing out of water. The main channel with a least width of 150 yards leads between Hallet's Point and Flood Rock.

Mill Rock lies to the westward of Flood Rock and is protected by a sea-wall. The shore of Astoria, to the southward of Hallet's Point, is rocky and has deep water 30 yards outside the wharf-line.

Harlem River † enters Hell Gate on the western side of Ward's Island. From the mouth it extends in a northerly direction, joining Spuyten Duyvil Creek; the latter connects with Hudson River. The channel of Harlem River is narrow and crooked, and navigable only for steamers or vessels towing. This river is of considerable commercial importance. Vessels of 12 feet draught can go at high water as far as Morris dock, about 4½ miles above the entrance and ½ mile above High bridge. Vessels of 15 feet draught can go at high water, and those of 10 feet draught at low water, to the wharves as far as 4th avenue bridge, 1¾ miles above the entrance. Between High bridge and the entrance the river is crossed by 6 bridges with draws ranging from 62 feet to 122 feet in width. The center of the arches of High bridge are 100 feet above mean high water and the span of the arches is 80 feet in the clear. Sailing vessels entering the river take a tow-boat, the master of the tow-boat being the pilot. If coming from the eastward, a tow-boat is taken in the East River to the eastward of Riker's Island. If from the westward, a tow-boat is taken below Blackwell's Island. Tow-boats will also be found at the wharves in the river to tow vessels out.

Under government appropriations a cut is being made through Dyckman's Meadow to join Spuyten Duyvil Creek, and there make a navigable channel from the East River to the Hudson River with a depth of 15 feet at mean low water.

Blackwell's Island divides the East River, forming two channels, one on the east side of the island and one on the west; the western channel is the widest and has the best water. The northern end of the island is marked by a light-house (see table, page 12); a sea-wall is built along on both sides to its southern end. Off the southern end is Man o' War Rock (spindle, red lantern at night).

Opposite the eastern side of Blackwell's Island are the villages of Astoria and Ravenswood, and opposite the western side is the city of New York. The insane asylum for women, work-house, alms-house, penitentiary, and charity hospital buildings are located on this island.

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† Shown on Coast and Geodetic Survey chart 369[7], Harlem River and Spuyten Duyvil Creek, scale $\frac{1}{5,000}$, or one mile = 14.593 inches, price $0.50. See also the foot-note on page 106.

Newtown Creek empties into the East River on the eastern shore, about ⅝ mile to the southward of the southern end of Blackwell's Island. Improvements are in progress under the supervision of the U. S. Engineers. In 1887 a channel with a depth of 18 feet had been dredged to Vernon avenue bridge, and 8½ feet could be taken to the head of the creek. The city of Brooklyn commences south of Newtown Creek.

The **U. S. Navy Yard**, on Wallabout Bay, is on the south shore below Newtown Creek, where the East River makes a bend to the westward.

Suspension bridge crosses the East River 1 mile below the navy-yard. The height of this bridge above mean high water is 135 feet at the center and 119 feet at the piers.

The **Battery** is the southernmost point of New York city. It is a small grassy park with tall trees, and faced on the water side by a sea-wall. The barge office and custom-house landing are to the eastward of the park on the East River, and Castle Garden and the building of the New York Department of Docks to the westward of the park on the North River (Hudson River).

Governor's Island lies in the middle of the East River where it joins the Upper bay. Fort Columbus and the fortifications and buildings belonging to it cover the entire island. A stake light (2 red lights at night) and fog-signal (see table, page 12) are located on the northwestern point of the island. The main channel leads north of the island. *Buttermilk Channel*, with a least depth of 23 feet in spots, leads along the wharves of Brooklyn south of the island. This channel is buoyed. Under the supervision of the U. S. Engineers the shoal at the eastern end of Buttermilk Channel is being removed by dredging.

Pier numbers.—The New York city piers are numbered. Pier No. 1 of the East River system is near the Battery, the numbering being continued from it to the northward. Many of the piers have their numbers painted on the pier-head, showing plainly from the river. This plan is followed up to pier 62, East River; to the northward of this the number of the street from the foot of which the pier extends is painted on the pier-head.

ANCHORAGES IN EAST RIVER.

Vessels find good anchorage on either shore from Throg's Neck to Riker's Island. The north shore is most used in winter, the south shore in summer.

Hammond's Flats, just to the westward of Throg's Neck, on the north shore, is an excellent anchorage for all classes of vessels, in about 5 fathoms, with good holding-ground. Towards Old Ferry Point (the next point to the westward of Throg's Neck, on the north shore) the water deepens abruptly to 16 and 18 fathoms. Vessels anchoring here should come-to in the eastern half of the bight. There are no dangers, but the water shoals suddenly, close in-shore, from 18 feet to 4 or 5 feet.

Off Whitestone good anchorage, in 18 feet to 8 fathoms, is found to the eastward of the point. There are no dangers, but the water shoals abruptly close in-shore. Avoid Whitestone Point, which makes off rocky to the northward for about 300 yards and is shoal on its western side.

The Stretch between Whitestone Point and College Point is not used as an anchorage, as the channel is here only 500 yards wide in its narrowest part.

Flushing Bay is available for light-draught vessels. Heavy-draught vessels may anchor in the deep channel off the entrance to Flushing Bay, between College Point and Riker's Island, in 5 to 7 fathoms of water. The flats in Flushing Bay are soft mud and afford excellent anchorage for vessels of light draught.

To the westward of Riker's Island the channel is narrow, the water deep, with poor holding-ground, and the tidal currents are very strong, making it unsafe for vessels to anchor before reaching the wharf at the foot of East 31st street, New York city.

A Good anchorage in 4 to 10 fathoms of water is found between East 31st street and East 21st street wharves, on the New York side of the river, about 200 yards from the ends of the wharves.

Rules and regulations, with a map showing the prescribed anchorage limits in the East River and New York Bay and Harbor, are given in Appendix II.

TIDES IN EAST RIVER.

The table on page 109 gives tidal data for East River. The tidal system of New York Bay and that of Long Island Sound meet near Throg's Neck, or somewhat to the westward of Throg's Neck, between it and Riker's Island. The point at which the New York Bay and Long Island Sound tides meet varies somewhat with different conditions.

TIDAL CURRENTS IN EAST RIVER.

The following table, prepared by Professor Henry Mitchell, Assistant, Coast Survey, gives in a concise form such information as to the set and velocity of the current, and the time of its greatest strength, as is at present available.

Long continued freshets in the Hudson increase the velocities of ebb and diminish those of flood, with large changes in periods of slack water; but they do not affect the *time of strength*, which is therefore the most reliable element in this table.

TABLE.

THE TIMES OF THE CURRENT ARE GIVEN IN HOURS AND MINUTES AFTER THE MOON'S TRANSIT (SOUTHING).

No.	Stations—Locality.	*Strength* of Flood Current.			*Strength* of Ebb Current.			Slack Water.	
		Set.	Drift.	Time.	Set.	Drift.	Time.	Between Flood and Ebb.	Between Ebb and Flood.
			Knots.	h. m.		Knots.	h. m.	h. m.	h. m.
1	Off Throg's Neck { Neaps	----------	0.8	6 33	----------	0.7	0 20	9 40	3 10
	Off Throg's Neck { Springs	----------	1.5	4 15	----------	0.8	—1 0	7 22	0 50
2	Off Old Ferry Point	Easterly	1.6	5 56	Westerly	1.5	0 05	9 33	2 40
3	Between Polhemus' Dock and Negro Point Bluff.	Northeasterly.	3.1	7 6	Southwesterly.	2.3	0 48	10 0	4 0
4	Between Hallet's Point and The Hog's Back.	Easterly	8.5	--------	Westerly	4.4	--------	9 08	3 07
5	Northern end of Blackwell's Island western channel.	Northeasterly.	4.2	6 3	Southwesterly.	4.2	0 14	9 08	3 07
6	Northern end of Blackwell's Island eastern channel.	"	4.2	6 3	"	4.2	0 14	9 08	3 07
7	Southern end of Blackwell's Island western channel.	"	2.7	--------	"	3.2	--------	9 08	3 07
8	Southern end of Blackwell's Island eastern channel.	"	2.1	--------	"	2.7	--------	9 08	3 07
9	Off Twenty-third street	"	1.8	6 40	"	2.0	0 18	9 08	3 07
10	Just to the eastward of Wall street Ferry.	"	3.1	6 39	"	3.6	0 8	9 08	3 07

Remarks.—The tidal currents at different points along the East River turn at nearly the same time. The current running westerly, toward New York Harbor, is called the "ebb" and reaches its greatest strength soon after the southing of the moon, while the current running easterly, toward the Sound, is called the "flood" and reaches its greatest strength six and a half hours later.

The highest velocity is reached by the current between Hallet's Point and the Hog's Back, where eight knots per hour have been measured on the flood; but elsewhere between Lawrence's Point and Blackwell's Island three and four knots at strength of ebb and flood are characteristic.

Between Pot Cove and Negro Point the current of ebb runs close to Pot Rock; but this is of little importance, as the rock has been blasted away to a depth of 21 feet at low water.

Between Hallet's Point and Middle Reef the most rapid current on the ebb is very close to Flood Rock,—too near for a vessel to lie with safety. The force of the whirls which formerly existed here has been very much diminished by the destruction of Hallet's Point Reef, and it is now comparatively safe for vessels to pass through the Eastern Channel from either the eastward or the westward.

Between Great Mill Rock and Ward's Island the current of flood has numerous though not violent eddies. The direction of the current of ebb is from Pot Rock toward The Gridiron. The slack water is of only a few minutes' duration; the main stream passes to the southward of Flood Rock. Between Flood Rock and the Hallet's Point shore the currents are direct and strong, with comparatively few eddies.

The flood current (setting to the eastward) sweeps close around Hallet's Point and makes less eddy in the cove to the eastward than is found there on the ebb.

In the Main Channel, off Rylander's Reef, the slack water lasts not more than twenty minutes. The current of flood is weak but that of ebb is direct and strong in mid-channel; there are eddies from Great Mill Rock to Little Mill Rock.

In the Middle Channel the current of ebb is broad and rapid.

Between Ward's Island and **Ringgold's Dock** the slack water lasts twenty-five minutes. The main body of the current passes on the southeastern side of the island.

At Station No. 3 (see table) the change from flood to ebb takes place suddenly.

At Stations Nos. 5 and 6 the currents of both flood and ebb are strong and direct and nearly in the direction of the channel.

In the table the directions are *magnetic* and the drift in *nautical* miles per hour.

GENERAL RULE

(covering the whole scheme of tidal circulation, New York Harbor and East River.)

The "*ebb*" flows into New York Harbor from Long Island Sound during nearly the same period that it flows out over the Bar into the ocean; and at the *southing of the moon* this continuous stream reaches its *strength* in the East River and in the East Channel over the Bar, while in the Swash, Main, and Gedney's Channels it is about 40 minutes earlier. About six hours later the continuous "*flood*" stream reaches its *strength* on a reverse course in the East River. In the Swash, Main, and Gedney's Channels its *strength* occurs about five hours, and in the East Channel about six hours, and in the Narrows about seven hours, after the *southing of the moon*.

VARIATION OF THE COMPASS.

The variation of the compass at different points for 1888 is given on page 17.

GENERAL DIRECTIONS, EAST RIVER.

General directions for the East River are here given, but, owing to the strong currents through Hell Gate and the number of vessels passing through, strangers should take a tow-boat or a pilot.

Coming from the eastward, round Throg's Neck, leaving Throg's Neck Light-house about ¼ mile on the starboard hand. When Throg's Neck Light-house bears about **N.**, ¼ mile distant, steer about **W.** by **N.**, heading so as to pass about 250 yards to the northward of Whitestone Point (the first prominent point on the south shore). Old Ferry Point (on the north shore, 2 miles **W.** by **N.** from Throg's Neck) should not be approached nearer than 150 yards. When the wharf on the south side of Old Ferry Point bears **N.** steer about **W.**, heading for a point on Riker's Island about 200 yards from its northern end. Clauson's Point (the next point to the westward of Old Ferry Point) will be left about ¼ mile on the starboard hand. College Point (about **S SW.** from Clauson's Point) has a black buoy (spar, No. 1) placed on the northern end of the shoal making out from the point; this buoy will be left on the port hand. Flushing Bay lies to the westward of College Point. Riker's Island lies 1½ miles to the westward of College Point, and has a shoal, with 5 to 9 feet on it, extending 1 mile **E SE.** ½ **E.** from its eastern side (a channel with a least depth of 18 feet leads to the southward of Riker's Island). Hunt's Point (the next point to the westward of Clauson's Point, on the north shore) should be given a berth of at least 200 yards. A sunken pier lies 125 yards off this point, which will be left on the starboard hand. When Riker's Island is about 350 yards distant edge to the northward, giving the north shore of the island a berth of 175 to 300 yards, and steer so as to pass from 135 to 350 yards north of North Brother Island (the island with a light-house on its southwestern end). There is a small spot with 17 feet over it lying 280 yards south of Barretto's Point and 350 yards northeast from the northern end of Riker's Island. The directions lead to the southward of this spot. Round North Brother Island, keeping it 125 to 350 yards on the port hand.† The distance across from the northern end of North Brother Island to Oak Bluff, on the opposite shore to the northward, is about 400 yards.

When the northern end of North Brother Island bears **E.**, distant about 225 yards, steer about **SW.** ½ **W.**, heading for the large hospital on the southeastern side of Ward's Island. Black buoys No. 5 and No. 7 (both spars) to the northward of Lawrence's Point, and the buoys marking the channel south of South Brother Island, will be left on the port hand as the spindle on Sunken Meadow is approached. Pass between the spindle on Sunken Meadow and the black buoy to the eastward of the spindle and keep in the middle of the channel. The buoys often tow under when the current is at its strength. The tall skeleton tower on Hallet's Point will be noticed while passing to the eastward of Ward's Island.

Round Hallet's Point, giving it a berth of 50 to 175 yards, passing about midway between the point and Flood Rock (white pole, 2 red lights at night). The *tidal currents* between Hallet's Point and the opposite shore to the northeastward, and from this to the northern end of Blackwell's Island, set with great velocity, forming swirls and eddies, thus making this part of the passage dangerous.

Steer so as to pass 100 yards to the westward of the light-house on the northern end of Blackwell's Island and follow a mid-channel course, or favor the New York city shore.‡

When nearing the southern end of Blackwell's Island, Blackwell's Island Reef will show several bare rocks extending to the southward. The spindle on Man-o'-War Rock (one red lantern at night), about ½ mile southwest from the southern end of Blackwell's Island, will be left on the port hand. A black buoy (spar, No. 1) marking a 10-foot spot, with deep water all around it, lies 400 yards **SW.** by **S.** from the spindle on Man-o'-War Rock. Pass either side of black buoy No. 1, giving it a berth of 50 to 60 yards, and follow a mid-channel course, or rather favoring the Long Island shore.

Beyond this specific directions are not of much service; the great number of passing vessels render frequent changes of course necessary. If intending to anchor, note the remarks on page 108, and conform to the authorized anchorage limits (see Appendix II). Vessels intending to anchor for more than a few hours generally stand on through East River and come-to below Governor's Island, out of the channel, on either the eastern or western side of the main channel of New York Upper Bay.

† This route, passing to the northward of North Brother Island, carries the best water. Most vessels use the channel (good for 15 feet of water) to the southward of the island; their draught enables them to do so and it is more direct.

‡ This channel, to the westward of Blackwell's Island, is the widest and has the best water; there is another channel, leading to the eastward of Blackwell's Island, in which the best water is nearest the Blackwell's Island shore.

Off 19th street a red and black horizontal-striped spar-buoy will be left on the starboard hand. Off 10th street, 400 yards from the end of the wharf, a red buoy (spar, No. 2) marks the eastern edge of Shell Reef; this buoy will be left on the starboard hand. After passing red buoy, No. 2, it is well to keep within 300 yards of the Brooklyn shore until past Houston street ferry-slips, then following a mid-channel course past the Brooklyn Navy Yard and under the Suspension bridge.

When under the Suspension bridge the course is about **SW.** by **W.** ½ **W.** for the round castle on the western end of Governor's Island, which will lead about 150 yards to the northward of the red and black horizontal-striped buoy marking Dimond Reef. The Staten Island ferry-slip should be given a berth of about 200 yards on the starboard hand, and the sea-wall of the southwest face of the Battery should be given a berth of 350 to 400 yards.

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APPENDIX I.

COAST CURRENTS, APPROACHING SANDY HOOK.†

The preliminary investigation of the currents in the approaches to Sandy Hook by Lieutenant J. E. Pillsbury, U. S. Navy, commanding the U. S. Coast and Geodetic Survey steamer *Blake*, shows the following results:

Off the entrance to Vineyard, Block Island, and Long Island Sounds, there is a tidal current setting on shore with the flood and off shore with the ebb, the direction changing from one to four hours after high and low waters at Newport, R. I. Close to the openings the velocity of this tidal current is greatest, and it is stronger at the time of spring tides than at that of neaps. Both its direction and velocity are interfered with, probably by a counter-current which sets to the westward, and which is strongest about three days after the highest declination of the moon.

In the track of the European steamers bound to Sandy Hook, the tidal influence is interfered with by the counter-current more than is the case farther inshore. The greatest velocity of current observed in this steamer track was about 1 knot an hour.

Inshore near the openings the greatest velocity was $1\frac{4}{10}$ knots, and the least was $\frac{2}{10}$ of a knot.

In allowing for the currents, the state of the tide and the position of the moon should be taken into account.

Between Fire Island and Barnegat only a feeble current was found, generally but two-tenths or three-tenths of a knot. At the time of spring tides it increases to about $\frac{1}{2}$ knot.

Although a number of stations were occupied, yet a much longer series of observations will be required to develop such full and conclusive results as will enable more specific rules regarding these currents to be formulated for the guidance of navigators under the many varying conditions which arise in practice.

The results of the preliminary examination are given to show their general bearing on the question.

† This information is reprinted from Coast and Geodetic Survey Notice to Mariners, No. 97, issued January 9, 1888.

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APPENDIX II.

PILOTS AND PILOTAGE, HARBOR CONTROL, QUARANTINE, ETC.

CONNECTICUT.

Extracts from Revision of 1875, General Statutes of the State of Connecticut.

TITLE XVI, CHAPTER VIII.

1859, 1871, 1874. Harbor-masters, how appointed, and tenure of office.

Section 1. The Governor shall appoint a harbor-master, and may appoint a deputy harbor-master, for each of the harbors of New Haven, Norwich, Bridgeport, Stamford, Norwalk, Stonington, and New London, who shall severally hold office for three years from the time of their appointment, and until others shall be appointed in their places.

Powers.

Sec. 3. Each harbor-master may station all vessels riding at anchor in the channel of the harbor under his care, and remove, from time to time, such vessels within said channels as are not employed in receiving or discharging their cargoes, to make room for the passage of other vessels up or down said channels, and shall be the sole judge of the fact, whether any vessel so at anchor shall be so in the channel as to obstruct or hinder the passage of any other vessel; and may determine how far within such harbor, and in what instances, masters or others having charge of vessels at anchor within said channel, shall remove the same; and upon the application of the owner or lessee of any wharf, dock, or pier in such harbor, shall station any vessel lying at or adjacent to such wharf, dock, or pier, or remove it therefrom to make room for the dockage or passage of any other vessel, when in the judgment of said harbor-master the interest and convenience of commerce or navigation shall require, and may exercise all the powers and duties with reference to vessels at anchor in said harbor. * * * * *

1873.

1870. Jurisdiction of harbor-master of New Haven.

Sec. 5. The harbor-master of New Haven harbor shall have, in relation to all vessels lying at any of the wharves, docks, or piers between Tomlinson's bridge and Heaton's wharf, the same powers and duties as in relation to vessels lying in the channel of said harbor.

1874. Powers of deputy harbor-masters.

Sec. 6. Deputy harbor-masters shall have all the powers and perform all the duties of harbor-masters in the respective harbors for which they are appointed, subject to the control and direction of the harbor-master. * * * * *

1854. Mooring near basin-wharf in New Haven harbor.

Sec. 7. If any vessel shall be unnecessarily moored in the channel in New Haven harbor, which extends from the sluice in and through the wharf of the New Haven and Northampton Company to the main channel, so as to obstruct the free passage of vessels through said channel, the master, or person in command of such vessel at the time she is so moored, shall, for every such offense, be fined ten dollars, and also one dollar an hour for each hour above twelve that said vessel shall be so moored, * * *

1858. Pilots, how licensed.

Sec. 8. The Superior Court, or any judge thereof in vacation, may, in any county adjoining navigable waters, license so many persons as said court or judge may deem necessary, and find qualified, to act as pilots for three years from the date of such license, in any of the waters of this state. * * * * * Every pilot shall, upon the granting of his license, give a bond of five hundred dollars, * * * upon which bond suit may be brought * * * for the benefit of any person who may suffer loss or damage, by the ignorance, neglect, or misconduct of such pilot in the discharge of his duties. * * * * *

Bond.

Rates of pilotage.

Sec. 9. The Superior Court in any county shall, on the application of any person, fix the rates of pilotage in the waters within such county, except that the Superior Court of Middlesex county shall fix such rates for that part of Connecticut river between Middlesex and New London counties, and the Superior Court for New Haven county, for that part of Housatonic river between New Haven and Fairfield counties.

1867. Vessels subject to payment of pilotage.

Vessels exempt.

Sec. 10. All inward and outward-bound vessels of foreign bottom entering any port in this State, for the purpose of loading or unloading, and drawing nine feet of water or over, shall be subject to the payment of pilotage, if spoken by a pilot before entering such port; but vessels engaged in the coasting trade, and coming by the way of New York, fishing-smacks, vessels engaged in the oyster trade, canal-boats, barges, and tug-boats shall not be so subject.

1865. Vessels arriving at Hartford to pay tolls to the port-wardens.

Sec. 11. The person in charge of every vessel of a draught of more than six feet, and of over fifty tons burden, carrying cargoes to the city of Hartford from any port or place beyond the mouth of Connecticut river, and of every steamer engaged in towing on said river, shall report to the port-warden of the city of Hartford within twenty-four hours after every arrival at said city, stating the name and registered tonnage of the same, and pay to him for every vessel carrying cargoes, and for every steamer engaged in towing, a toll of two cents a ton upon its registered tonnage, except that where the actual weight of cargo can be determined by its bills of lading, said toll shall be imposed on said actual tonnage, at the rate of one cent a ton; and the Hartford and New York Steamboat Company shall, on the first day of June in each year, pay to said port-warden one thousand dollars, in lieu of all tolls imposed by this section.

Person in charge liable for toll.

Sec. 12. The person in charge of any such vessel, and the owner, shall be jointly and severally liable for such toll; * * * * *

1848. Refuse not to be deposited in the waters of this State.

Sec. 18. Every proprietor or charterer of any steamboat, or vessel, from the furnace of which any refuse shall be thrown into the waters of any harbor, or river, in this State, shall forfeit for the first offense one hundred dollars, and for every subsequent offense two hundred dollars, * * * * *

1869. Dumping in New Haven or Bridgeport harbors.

Sec. 19. Every person who shall deposit or assist in depositing any substance in New Haven harbor or off its mouth inside Southwest ledge, or in Bridgeport harbor or off its mouth within three hundred feet outside of the outer bar so-called, or in the waters adjacent to said harbor below Yellow and Old Mill bridges, or any substance except oyster shells in Stamford harbor, or off its mouth inside of a direct line drawn from Captain's Island Light, off Greenwich, to the buoy on Old Cow Reef off Shippan Point, shall be fined * * * or imprisoned, or both; * * * * *

1870. In Stamford Harbor.

TITLE XIII, CHAPTER XXVII.

Harbor-masters.

Harbor-masters shall receive one dollar for services on each application to them.

Extract from the Special Laws of the State of Connecticut.

VOL. VI, 1866-1870 INCLUSIVE.

AMENDING THE CHARTER OF THE CONTRACTORS TO REBUILD AND SUPPORT UNION WHARF AND PIER IN NEW HAVEN.

Resolved by this Assembly, that the rate of wharfage on all goods landed from or shipped on board of sea-going vessels at said wharf, is hereby established at the same rate as if landed from or shipped on board of coasting vessels, and the rates of wharfage on vessels using the wharf is hereby established at the rate of thirty-one and one-quarter cents per ton on the register or license tonnage, when paid by the year, and at the rate of one and one-quarter cents per ton register or license tonnage per day, when paid by the day, in lieu of the present rates. This act to take effect on and after the first day of July, 1866, and the said rate or rates of wharfage shall not be subject to be increased without the sanction of this Assembly. * * * * *

Approved, May 25, 1866.

Extracts from Revision of 1875, *General Statutes of the State of Connecticut.*

TITLE XVI. CHAPTER VI.

PUBLIC HEALTH AND SAFETY.

1805. Board of health, how constituted.

Sec. 1. The justices of the peace and selectmen in each town shall constitute a board of health, * * * * *

1874. Notices.

Sec. 3. It shall be sufficient notice to all persons of any regulation of such board, if it be published in a newspaper published in the town, or posted for three days on each sign-post in said town; * * * * *

1805. Quarantine, what vessels are subject to, and how enforced.

Sec. 4. The board of health in any town, contiguous to navigable waters, may assign within the town, or the waters contiguous thereto, the port or place in any harbor, road, river or bay, where vessels coming into the limits of such town or into

such contiguous waters, shall, if need be, perform quarantine; and every vessel which shall, between the first day of June and the first day of November, come from any foreign port or place, or from any port or place in the United States south of the capes of the Delaware, and come to anchor in any such harbor, road, bay, river, or contiguous waters, if any place of quarantine shall have been assigned as aforesaid, shall come to anchor and lie at such place so assigned, and at no other place, until discharged in manner as is hereinafter provided; and the master of every vessel coming to anchor as aforesaid shall forthwith make signal for a health officer by hoisting colors in the shrouds, or, if need be, may send a person on shore, who shall notify the health officer of the port, or, if there be no health officer, a member of the board of health, of the arrival of such vessel, and forthwith return on board; but the provisions of this section shall not apply to any such vessel which shall have entered any port or place in the United States north of said capes, where there are quarantine regulations, and been visited by a health officer, received a clean bill of health, and been permitted to go to the wharves and unload thereat; and such clean bill of health, or a certified copy thereof, shall be left with the collector of the port within twenty-four hours after the arrival of such vessel.

What vessels are not subject to quarantine.

Sec. 5. When the board of health of any town shall deem it expedient that vessels arriving in its town or in the waters contiguous thereto, from any port or place in the United States, north of the capes of the Delaware, should perform quarantine, such board may by an order, published or posted * * * subject such vessels to quarantine in the same manner as if they arrived from any foreign port or place.

Vessels from northern home ports.

Sec. 6. Any vessel subject to quarantine, arriving in the harbor of New Haven, on board of which there shall be no sickness at the time of such arrival, or on board of which, during the passage, there shall have been no case of malignant or contagious disease, may come to and make fast at the end of any public wharf in said harbor, without incurring any penalty for violation of the quarantine laws; but no person shall be allowed to leave said vessel, except to make fast to the wharf, until said vessel shall have been visited by a health officer, and by him discharged from quarantine; and if the health officer, on visiting any such vessel, shall find any such sickness on board as, in his opinion, shall make it proper for him to cause such vessel to continue subject to quarantine, he shall order it to be removed to such place as shall be assigned as a place of quarantine.

1848, 1850. Vessels arriving at New Haven.

When health officer may order such vessel removed.

Sec. 7. * * * and every vessel so subjected to quarantine shall perform quarantine under the regulations of such board of health.

Sec. 8. The board of health may establish the fees, not exceeding five dollars, which the health officer shall be entitled to receive for visiting a vessel as aforesaid, and the master or owner of such vessel shall pay the same to such health officer.

Fees of health officers.

Sec. 9. No master of any vessel, liable to perform quarantine as aforesaid, shall fraudulently attempt to elude a quarantine by false declarations of the port or place from whence he came, or land, or suffer to be landed from his vessel, any person or anything except in the manner hereinbefore provided, nor permit any person to board such vessel, before it shall have been visited as aforesaid.

Penalty for attempting to elude quarantine.

Sec. 10. When a health officer or member of the board of health shall, on visiting any vessel as aforesaid, think it necessary that it should be cleansed or purified, he shall direct its master to hoist a white flag on the head of the mainmast, there to be kept during the daytime; and shall apply without delay to the board of health to direct the time and manner in which the cargo on board such vessel shall be, in part or in whole, cleansed or purified; and such vessel, or such part thereof as may be infected, shall be cleansed in such method as such board shall direct. And when such vessel shall contain any person ill of a contagious or infectious disease, he shall be removed on shore to such place as said board may direct, and nursed and provided for, in the manner prescribed by law. And such board may also cause any passenger on board, and such of the mariners as the master shall not require to continue on board, to be removed on shore and secluded for fourteen days, in such place as the board shall direct; and if any person shall, without such permission, visit any person so confined, he shall be deemed to be contaminated with infection, and be liable to the same confinement and penalty as are imposed upon the person visited.

Health officers may order vessels to be cleansed, etc.

Persons diseased to be removed and secluded.

Penalty for escaping, or associating with those who escape.

Sec. 11. If the board of health shall find that any certificate of health granted by them was obtained by fraud or false representation, or be of opinion that any vessel, person, or cargo, should perform further quarantine for the purpose of being cleansed or purified, on notice thereof being given by the board to such person, or the owner, master, supercargo, or consignee, of such vessel or cargo, as the case may be, the same shall in all respects be liable to be proceeded with in the same manner as if no certificate of health had been given.

Certificates obtained by fraud or mistake, void.

Board may interdict communication with infected places.

Sec. 12. The board of health of any town may interdict communication between it and any other town or place in which any contagious or malignant disease is prevalent.

NEW YORK.

PILOT LAWS IN REFERENCE TO EAST RIVER.

Extracts from the New York City Consolidation Act of 1882.

Sec. 2129. It shall be lawful for any [of the duly authorized Hell Gate pilots] to demand and receive from any person who shall employ any of them to pilot any vessel of the burden of ninety-five tons and upwards, or from the consignee or owner of said vessel, from the eastward of Sands' Point or Execution Rocks, or to take charge of any such vessel at or to the eastward of Sands' Point or Execution Rocks, and pilot her to the port of New York, or to pilot her from the port of New York to Sands' Point or Execution Rocks,—for every vessel, one dollar and fifty cents for each and every foot of water such vessel may draw; and from the eastward of Hell Gate to the port of New York, one dollar for each and every foot of water such vessel may draw; and for pilotage from the port of New York to the eastward of either of the before-mentioned points or places, they shall be entitled to receive the same compensation as is above provided when the said vessel is bound to the port of New York. And every pilot shall, for such services, be entitled, in addition to the above-mentioned rates of compensation, to demand and receive the further sum of twenty-five cents for each and every foot of water which any square-rigged vessel may draw, which they shall pilot to or from the port of New York; and every such pilot who shall have piloted any ship or vessel into the port of New York by the way of Hell Gate shall be entitled to a preference in piloting the said ship or vessel out of the said port on the next outward voyage of the said ship or vessel, if the said voyage be by the way of Hell Gate. And further, from the first day of November to the first day of April in every year, every such Hell Gate pilot shall be entitled to demand and receive for every ship, bark, or brig the sum of two dollars, and for every schooner or sloop the sum of one dollar, in addition to the rates of compensation for pilotage hereby established. But no pilotage shall be charged to any vessel under a coastwise license unless such vessel actually employs a pilot. And every master or commander of any vessel who shall give to such Hell Gate pilot an untrue account of the draught of water or tonnage of his vessel, shall forfeit and pay the sum of twenty-five dollars, to be sued for and recovered by the Board of Wardens [of the port of New York].

Sec. 2130. A person other than a lawfully authorized branch Hell Gate pilot, who pilots, or offers to pilot, or tows or offers to tow, any boat or vessel (except barges, vessels under fifty-five tons burden, and canal-boats actually used in navigating the canals) through that part of the East River commonly called Hell Gate, is guilty of a misdemeanor. This section does not apply to vessels propelled wholly or partly by steam, owned or belonging to citizens of the United States, and licensed and engaged in the coasting trade.

Sec. 2131. Any of said Hell Gate pilots, who shall first tender his services, may demand and receive from the master, owner, or consignee of any vessel of the burden of one hundred tons and upwards, navigating the said channel of Hell Gate, to whom he shall have tendered his services as a pilot, and by whom the same shall have been refused, whether outward or inward bound, one-half pilotage for every foot of water such vessel may draw; which half pilotage shall be the one-half of the rates of compensation established by the preceding section. But such half pilotage shall not be chargeable to any vessel under one hundred tons burden sailing under coastwise license, and shall not be chargeable more than once for the same passage to any vessel; and in case any such vessel under one hundred tons burden, navigating the said channel to or from the port of New York, shall make the usual signal for a pilot, and shall refuse to receive on board or employ such pilot when he shall have tendered his services, then the master, owner, or consignee of such vessel shall pay to such Hell Gate pilot such half pilotage from the place at which such pilot shall have so offered his services. Any pilot who shall pilot any government vessel through the said channel shall be entitled to receive the same compensation therefor as is provided by law for like services in piloting such vessel to or from the port of New York by the way of Sandy Hook.

N. B.—Any provision authorizing extra compensation for piloting a government vessel conflicts with and is therefore annulled by section 4237 of the Revised Statutes of the United States, which is as follows:

No regulations or provisions shall be adopted by any State which shall make any discrimination in the rate of pilotage or half-pilotage between vessels sailing between the ports of one State and vessels sailing between the ports of different States, or any discrimination against vessels propelled in whole or in part by steam, *or against national vessels of the United States;* and all existing regulations or provisions making any such discrimination are annulled and abrogated.

Sec. 2132. The master, owner, or consignee of any ship or vessel, to whom any Hell Gate pilot shall have rendered, upon the request of the master of said ship or vessel, any extra service for the preser-

vation of said ship or vessel while in distress, shall pay to said pilot, in addition to the compensation set forth in the last section but one [2129?], such amount for extra services as the Board of Wardens shall determine to be a reasonable reward; and for every day which any Hell Gate pilot shall be detained on board any ship or vessel over and above twenty-four hours, he may demand and receive from the master, owner, or consignee of said vessel, two dollars a day for each and every day he shall be so detained.

Sec. 2133. This title shall not be construed to apply to the passenger steamboats plying on regular passenger routes this side or to the westward of Cape Cod. And all foreign vessels, and vessels under register navigating the channel of Hell Gate, who shall be spoken, shall be subject to the pilotage fees, as provided in section twenty-one hundred and thirty, to the first pilot who tenders his services.

Sec. 2139. The said Board of Wardens shall furnish every pilot aforesaid with printed instructions, to be shown by such pilot to the master or commander of every vessel as soon as he shall go on board to take charge of such vessel to pilot her into the said port, under the penalty of ten dollars for each and every neglect or refusal.

RULES AND REGULATIONS OF THE HELL GATE PILOTS.†

The Board of Port Wardens of the Port of New York have adopted the following regulations for the government of Hell Gate pilots, October, 1874; amended Nov. 13, 1877, Sept. 20, 1878, and Sept. 23, 1878:

ARTICLE 1. The pilot who shall first board any vessel on the North River, coming from above Spuytendevil Creek, after leaving her place of loading, shall be entitled to the fees of pilotage, provided said vessel takes a pilot.

ART. 2. All vessels from Elizabethport, Newark, Amboy, Port Johnson, Jersey City, Weehawken, and Manhattanville to be governed by the same regulations as in Articles 1 and 5.

ART. 3. The pilot first speaking any vessel coming into port, and tendering his services as pilot, shall be entitled to the fees of pilotage; provided such pilot shall not at the time have another vessel actually in charge.

ART. 4. In no case shall any one pilot take charge of or pilot more than one vessel at the same time; and in all cases shall remain on board the vessel under his charge.

ART. 5. Any pilot having a vessel in charge, and speaking one down the North River, shall give one of the two to the next pilot speaking her, provided both vessels go the same tide.

ART. 6. All vessels bound west in Long Island Sound, whether spoken by a pilot or not, shall not be subject to pilotage or half-pilotage until they arrive at Sands' Point or Execution Light-houses; and no pilot shall settle with any vessel until she arrives at the points above designated.

ART. 9. Any pilot having a vessel engaged, and not reporting on board of her, or to the captain or mate of said vessel, within twenty-four hours, and not less than six hours before the time of sailing, shall forfeit all claims to said vessel.

ART. 10. No pilot shall leave an incoming vessel under his charge until her arrival off the Battery, or place of her destination; nor an outgoing vessel until she arrives at the place designated by law, without the consent of the master.

ART. 11. No pilot shall by any unfair means, or by a reduced price, take any vessel from another pilot; and in case of his so doing, shall forfeit to the pilot displaced the full amount of the pilotage.

ART. 12. Pilots are required to board the nearest vessel having a signal flying for a pilot, except in case there should be a vessel in sight with a signal of distress flying.

ART. 15. A pilot in charge of a vessel must remain on board until notified by the master that his services are no longer wanted, under a penalty of forfeiting the pilotage. The omission of the master to inform the pilot that his services are no longer wanted will entitle him to detention money, unless such detention is momentary, for the landing of passengers.

ART. 17. The pilot first speaking any vessel, that loads with anything except coal, at Weehawken or Hoboken, shall be entitled to her, provided he is on board when she leaves the wharf.

ART. 18. Any pilot violating any of the foregoing rules shall be liable to fine or suspension, or both, at the discretion of the Board of Port Wardens. [Office of Board, No. 17 South street, New York City.]

HARBOR CONTROL, ETC., PORT OF NEW YORK.

Act passed by the Congress of the United States.

An Act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the placing, discharging, or depositing, by any process or in any manner, of refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind, other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the tidal waters of the harbor

†Hell Gate pilots are under the control of the Board of Port Wardens of the port of New York. This pilot service is entirely distinct from that by way of Sandy Hook, the latter being under the control of the Board of Pilot Commissioners.

of New York, or its adjacent or tributary waters, or in those of Long Island Sound, within the limits which shall be prescribed by the supervisor of the harbor, is hereby strictly forbidden, and every such act is made a misdemeanor, and every person engaged in or who shall aid, abet, authorize, or instigate a violation of this section, shall, upon conviction, be punishable by fine or imprisonment, or both, such fine to be not less than two hundred and fifty dollars nor more than two thousand five hundred dollars, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

Sec. 2. That any and every master and engineer, or person or persons acting in such capacity, respectively, on board of any boat or vessel, who shall knowingly engage in towing any scow, boat, or vessel loaded with any such prohibited matter to any point or place of deposit, or discharge in the waters of the harbor of New York, or in its adjacent, or tributary waters, or in those of Long Island Sound, or to any point or place elsewhere than within the limits defined and permitted by the supervisor of the harbor hereinafter mentioned, shall be deemed guilty of a violation of this act, and shall, upon conviction, be punishable as hereinbefore provided for offenses in violation of section one of this act, and shall also have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

Sec. 3. That in all cases of receiving on board of any scows or boats such forbidden matter or substance as herein described, it shall be the duty of the owner or master, or person acting in such capacity, on board of such scows or boats, before proceeding to take or tow the same to the place of deposit, to apply for and obtain from the supervisor of the harbor appointed hereunder a permit defining the precise limits within which the discharge of such scows or boats may be made; and any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor within the meaning of this act; and the master and engineer, or person or persons acting in such capacity, on board of any tow-boat towing such scows or boats, shall be equally guilty of such offense with the master or person acting in the capacity of master of the scow, and be liable to equal punishment.

Sec. 4. That all mud, dirt, sand, dredgings, and material of every kind and description whatever taken, dredged, or excavated from any slip, basin, or shoal in the harbor of New York, or the waters adjacent or tributary thereto, and placed on any boat, scow, or vessel for the purpose of being taken or towed upon the waters of the harbor of New York to a place of deposit, shall be deposited and discharged at such place or within such limits as shall be defined and specified by the supervisor of the harbor, as in the third section of this act prescribed, and not otherwise. Every person, firm, or corporation being the owner of any slip, basin, or shoal, from which such mud, dirt, sand, dredgings, and material shall be taken, dredged, or excavated, and every person, firm, or corporation in any manner engaged in the work of dredging or excavating any such slip, basin, or shoal, or of removing such mud, dirt, sand, or dredgings therefrom, shall severally be responsible for the deposit and discharge of all such mud, dirt, sand, or dredgings at such place or within such limits so defined and prescribed by said supervisor of the harbor; and for every violation of the provisions of this section the person offending shall be guilty of an offense against this act, and shall be punished by a fine equal to the sum of five dollars for every cubic yard of mud, dirt, sand, dredgings, or material not deposited or discharged as required by this section. Any boat or vessel used or employed in violating any provision of this act, shall be liable to the pecuniary penalties imposed thereby, and may be proceeded against summarily by way of libel in any district court of the United States having jurisdiction thereof.

Sec. 5. That a line officer of the Navy shall be designated by the President of the United States as supervisor of the harbor, to act under the direction of the Secretary of War in enforcing the provisions of this act, and in detecting offenders against the same. This officer shall receive the sea-pay of his grade, and shall have personal charge and supervision under the Secretary of War, and shall direct the patrol boats and other means to detect and bring to punishment offenders against the provisions of this act.

Sec. 6. That the sum of thirty thousand dollars, or so much thereof as may be necessary, is hereby appropriated to carry out the provisions of this act; and the Secretary of the Treasury is hereby authorized to pay that sum from moneys in the Treasury not otherwise appropriated.

Approved, June 29, 1888.

The following places are designated, by the Supervisor of the Port,† for the deposit of materials provided for in the foregoing act:

CLASS A.—The deposit of all dredgings, stone, earth, sand, mud, cellar dirt, and other substances, not garbage or mixed with garbage or other offensive material of any description, shall take place south of, and as near as practicable to, what is known as the "Mud Buoy," which is a white can buoy, three miles south of Coney Island, and located as follows:

Stone Beacon Light bearing **W. ¾ S.**, distant 4½ miles.
West Brighton Observatory bearing **N NW. ½ W.**, distant 3½ miles.
Sandy Hook Light-house bearing **SW.**, distant 6 miles.
Scotland Light-ship bearing **S. ½ W.**, distant 6¼ miles.
Sandy Hook Light-ship bearing **S SE.**, distant 7¾ miles.

† Permits for dumping refuse of classes A and B must be obtained from the Supervisor of the Port, Room 4 United States Barge Office New York City.

CLASS B.—The deposit of all garbage, offal, acids, street sweepings, and any other offensive substances of every description, or any material of which any of the above mentioned articles form any part, shall take place south of, and as near as practicable to, what is known as the "Refuse Buoy," a white can buoy, located as follows:

Stone Beacon Light, W. ¼ N., 5 miles.
West Brighton Observatory, N NW. ¾ W., 5 miles.
Sandy Hook Light-house, SW. by W., 5¾ miles.
Scotland Light-vessel, S. by W. ¼ W., 5¼ miles.
Sandy Hook Light-vessel, S SE., 6½ miles.

This "Refuse Buoy" is one and a quarter (1¼) statute miles south southeast of the "Mud Buoy" mentioned in Class A.

To carry out the provisions of Section 3 of the act application in writing for permits must be made to the office,† where blanks can be procured and information obtained.

In cases where filling inside of bulkheads is to be undertaken, where land is to be reclaimed, or where dredgings, stone, earth, mud, sand, cellar dirt, and ashes can be disposed of without being towed to sea, or where it is desired to deposit them in Long Island Sound, special permits may be granted when they will not interfere with the laws of the United States relating to harbor lines, or the State and municipal sanitary or other laws.

Extract from the New York City Consolidation Act of 1882.

Board of Port Wardens.—Sec. 2089. It shall be the duty of said Board, or some one of the members thereof, to attend personally all sales of vessels when condemned, vessels' materials, and goods in a damaged state, which shall be sold at public auction in the port of New York by reason of such damage, for the benefit of owners or underwriters, or for account of whom it may concern; and it shall be the duty of auctioneers making such sales to give due notice thereof to said Board before the sale, and all such sales shall be made by auctioneers under the direction and by order of the wardens, for which service they shall be entitled to receive a commission of one-half of one per cent. on the gross amount of sales thereof, to be paid to said Board of Wardens on demand, by the auctioneer making such sale; and such property shall be exempt from the payment of auction duty to the State; and it shall be the duty of auctioneers to make monthly statements to said Board, specifying the total amount of each day's sale made by them under this section, which statement shall be filed in said wardens' office; and the wardens, when required by the owner or consignee thereof, shall certify the cause of such damage, the amount of such sale, and the charges on the same, all of which shall be recorded in the books of said office; and the said Board of Wardens shall be allowed for each and every survey held on board of any vessel, on hatches, stowage, or cargo, or damaged goods, or at any warehouse, store, or dwelling, or in the public street, or on the wharf, within the limits of the port of New York, on goods said to be damaged, the sum of two dollars; and for each and every certificate given in consequence thereof, the sum of one dollar; and for each and every survey on the hull, sails, spars, or rigging of any vessel damaged, or arriving at said port in distress, the sum of five dollars; and for each and every certificate given in consequence thereof, the sum of two dollars and fifty cents; and for each valuation or measurement of any vessel, the sum of ten dollars; and the compensation and emoluments of said office shall be divided equally between the said nine wardens composing the Board under this chapter.

RULES AND REGULATIONS ESTABLISHED BY THE BOARD OF THE DEPARTMENT OF DOCKS, AND PUBLISHED MAY 1, 1882.

[Extracts.]

No. 3. No cargo shall be discharged from any vessel upon any bulkhead or wharf structure, at which such vessel is being unladen, after service by the Corporation Wharfinger for the District, upon the owner, consignee, master, or other officer or stevedore, of such vessel, of a notice that such bulkhead or structure will be endangered by the placing of additional cargo thereon, under a penalty of two hundred and fifty dollars for every such offense, and a further penalty equal in amount to the damages of every description which shall be caused by the further discharging of cargo upon such bulkhead or wharf structure, after the service of the said notice, both of such penalties to be recovered from such owner, consignee, master, or other officer, or stevedore, severally and respectively.

No. 4. All goods, merchandise, and materials of every kind, landed or placed on any pier, bulkhead, or other wharf structure, or upon reclaimed land, must be removed therefrom without unnecessary delay, and within twenty-four hours after the Corporation Wharfinger for the District shall have served upon the owner, shipper, or consignee, of such cargo, a notice to remove the same, under a penalty of fifty dollars per day for each and every day, during which any part of said cargo shall remain upon such pier, bulkhead, structure, or land, after the expiration of the said twenty-four hours, to be recovered from such owner, shipper, or consignee, severally and respectively.

† Room 4, United States Barge Office, New York City.

No. 7. No vessel of any kind shall be loaded or discharged by horse-power, nor shall stones or similar cargo be discharged from any vessel, upon any pier, bulkhead, or other wharf structure, unless proper planking be provided to protect the surface of such pier, bulkhead, or other wharf structure from injury consequent upon the travel of the horse, or the throwing of the stones or similar cargo thereupon, under a penalty of five dollars a day for each horse so employed, and of twenty-five dollars for each offense of discharging such stones or like cargo, upon such pier, bulkhead, or other wharf structure, to be recovered from the owner, consignee, master, or stevedore of any such vessel, severally and respectively; and if such penalty be recovered for using horses, or discharging stones or similar cargo, upon wharf property belonging to the Corporation, under lease, it shall be paid to the lessee thereof, but if such penalty be recovered for using horses, or discharging stones or similar cargo, upon wharf property, not owned by the Corporation, it shall be paid to the owner thereof.

No. 8. No sand shall be discharged from any vessel unless canvas or similar material be extended from the vessel's side to the bulkhead or wharf structure at which such vessel is being unladened, to prevent the falling of the sand into the water, and if the surface of any such wharf structure is not sufficiently tight to prevent the sand dumped thereon from going through into the water, then no sand shall be discharged thereon from any vessel, unless canvas or similar material be first laid thereon to receive the sand, under a penalty of twenty-five dollars for each offense, to be recovered from the owner, consignee, master, or stevedore of any such vessel, severally and respectively; and if such penalty be recovered on account of sand discharged upon wharf property belonging to the Corporation, under lease, it shall be paid to the lessee thereof, but if such penalty be recovered on account of sand discharged upon wharf property not owned by the Corporation, it shall be paid to the owner thereof.

No. 10. No ashes, refuse, offal, fruit, vegetables, or any other substances shall be thrown into the waters surrounding or adjacent to any pier or bulkhead, or any other part of the water front of the city, under a penalty of twenty-five dollars for every such offense, * * * * *

No. 12. All lumber, brick, or other material in bulk, discharged on any bulkhead not shedded, shall be at once removed, or, if not so removed shall be placed at least twenty feet from the edge of the bulkhead, pending removal, under a penalty of fifty dollars per day, for each and every day such lumber, brick, or other material shall remain on the bulkhead, * * * * *

Rates of Wharfage for the City of New York. In force May 1, 1882.—For vessels of 200 tons or under, 2 cents per ton; over 200 tons, $4.00 for first 200 tons and ½ cent for each additional ton.†

For outside berth, when not receiving or discharging cargo or ballast, 200 tons or under, 1 cent per ton; over 200 tons, $2.00 for first 200 tons and ¼ cent for each additional ton.

For Lighters and Floating Grain Elevators, 200 tons or under, 1 cent per ton; over 200 tons, $2.00 for first 200 tons and ¼ cent for each additional ton.

For North River Barges, Market Boats, Barges, Sloops, employed in waters of this State, and Schooners, exclusively employed in waters of this State: under 50 tons, 50 cents; 50 tons and less than 100 tons, 62½ cents; and 12½ cents additional for each additional 50 tons or any part thereof. *But no Boat or Vessel over 50 tons shall pay less than 50 cents.*

For other vessels or floating structures, not used for freight or passage transportation: 200 tons or under, 4 cents per ton; over 200 tons, $8.00 for first 200 tons and 1 cent for each additional ton.

For vessels actually in clam and oyster trade: 200 tons or under, inside berth, 1½ cents per ton; outside berth, 1 cent per ton. But no vessel shall pay less than 25 cents, nor less than for one day.

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†DEDUCTIONS FROM GROSS TONNAGE.—Act of August 5th, 1882.—An Act to provide for deductions from the gross tonnage of vessels of the United States. *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That section forty-one hundred and fifty-three of the Revised Statutes of the United States be amended by inserting before the last paragraph thereof the following words:

"That from the gross tonnage of every vessel of the United States there shall be deducted the tonnage of the spaces or compartments occupied by or appropriated to the use of the crew of the vessel, but the deduction for crew-space shall not, in any case, exceed five per centum of the gross tonnage. And in every such vessel propelled by steam or other power requiring engine-room there shall also be deducted from the gross tonnage of the vessel the tonnage of the space or spaces actually occupied by or required to be inclosed for the proper working of the boilers and machinery, including the shaft trunk or alley in screw steamers, with the addition in the case of vessels propelled with paddle-wheels of fifty per centum, and in the case of vessels propelled by screws of seventy-five per centum of the tonnage of such space, but in no case shall the deductions from the gross tonnage exceed fifty per centum of such tonnage; and the proper deductions from the gross tonnage having been made, the remainder shall be deemed the net or register tonnage of such vessels.

"That the register or other official certificate of the tonnage or nationality of a vessel of the United States in addition to what is now required by law to be expressed therein, shall state separately the deductions made from the gross tonnage, and shall also state the net or register tonnage of the vessel. But the outstanding registers or enrollments of vessels of the United States shall not be rendered void by the addition of such new statement of her tonnage, unless voluntarily surrendered, but the same may be added to the outstanding document, or by an appendix thereto, with a certificate of a collector of customs that the original estimate of tonnage is amended."

"SEC. 2. That section forty-one hundred and fifty-four of the Revised Statues be, and hereby is, repealed, and instead thereof the following is substituted, to wit:

'SEC. 4154. Whenever it is made to appear to the Secretary of the Treasury that the rules concerning the measurement for tonnage of vessels of the United States have been substantially adopted by the government of any foreign country, he may direct that the vessels of such foreign country be deemed to be of the tonnage denoted in their certificates of register or other national papers, and thereupon it shall not be necessary for such vessels to be remeasured at any port in the United States; and when it shall be necessary to ascertain the tonnage of any vessel not a vessel of the United States, the said tonnage shall be ascertained in a manner provided by law for the measurement of vessels of the United States.'"

"SEC. 3. That the Secretary of the Treasury is authorized and directed to make all needful regulations to carry into effect the provisions of this act, and he shall establish and promulgate a proper scale of fees to be paid for the readmeasurement of the spaces to be deducted from the gross tonnage of a vessel, on the basis of the last sentence of section forty-one hundred and eighty-six of the Revised Statutes, beginning with the words 'But the charge for measurement.'"

NOTE.—In all cases where deduction from gross tonnage shall be claimed, wharfingers will examine the register of the vessel and charge wharfage on the net tonnage expressed therein.

For vessels freighting brick on Hudson River, and canal boats while loading or discharging, 50 cents; while unloaded, 30 cents. But if berth is changed between two piers during any one day, one-half only of these rates for each berth.

For goods, merchandise, and materials on any pier, wharf, or bulkhead, 5 cents per ton after remaining thereon for twenty-four hours.

For leaving berth without paying wharfage after demand thereof has been made, double the established rates.

No bill for wharfage is required to be paid unless Chapter 315 of the Laws of 1877, of the State of New York, are printed thereon; and any wharfage received in excess of the rates thereby authorized creates a liability to a claim for damages in treble the amount charged.

Each rate in the foregoing, is for a day of twenty-four hours or any part thereof.

Dock Masters.—The following are extracts from the rules and regulations established for the guidance of the Dock Masters appointed by the Board governing the Department of Docks:

Resolved, For the proper supervision of the water-front of the city, the care of the wharf property located thereon placed in the charge of this Department, the rendering of necessary facilities for the prompt berthing of vessels thereat, and the collection of the wharfage accruing therefrom, that the water-front of the city of New York be and hereby is arranged and divided into [eleven] districts, and that for each of the said districts there shall be appointed, designated, or assigned, from time to time, at the pleasure of the Board, a suitable and competent person to be known and entitled as "Dock Master," who shall perform such duties and render such services in relation to the supervision, regulation, and occupation of the wharf property and water-front in their respective districts as the laws of the United States and of the State of New York, the ordinances of the city of New York, and the by-laws of this Board, and its rules, or orders, shall or may require, prescribe, or direct.

The several districts so made and created, and the location of the offices of the several Dock Masters assigned thereto, are [in September, 1886] as follows:

District No. 1.—Embraces all that portion of the East River extending from Castle Garden, on the Battery, to and including Pier 16, East River. Office, 33 Coenties Slip.

District No. 2.—All that portion of the North River extending from Castle Garden, to and including Desbrosses street Ferry, North River. Office, foot of Duane street, N. R.

District No. 3.—From and including east side of Pier 16, East River, to and including Pier 45, East River. Office, 262 South street.

District No. 4.—From north side Desbrosses street, North River, to and including West Thirteenth street, North River. Office, Pier (new) 43, N. R., foot of Barrow street.

District No. 5.—From Pier 45, East River, to and including Pier 69, foot of Tenth street, East River. Office, 276 South street.

District No. 6.—From north side Thirteenth street, to and including Thirty-fourth street, North River. Office, foot of West Twenty-seventh street.

District No. 7.—From Pier 69, East River, foot of Tenth street, to south side of Fifty-fourth street, East River. Office, foot of East Sixteenth street.

District No. 8.—From north side Thirty-fourth street, to and including Fifty-seventh street, North River. Office, foot of West Fifty-seventh street.

District No. 9.—From south side Fifty-fourth street, East River, to Ninety-second street, East River. Office, foot of East Sixtieth street.

District No. 10.—From south side Fifty-seventh street, North River, to Yonkers, and Spuyten Duyvil Creek from North River to Kingsbridge. Office, foot of West Seventy-ninth street.

District No. 11.—From north side Ninety-second street, Bronx River inclusive and Harlem River from East River to Kingsbridge, East River. Office, foot of East One Hundred and Fourth street.

Resolved, That until otherwise ordered by this Board the following rules and instructions are issued for the guidance and observance of the several Dock Masters of the Department:

* * * * * * * * *

Each Dock Master shall promptly designate and assign, in the order in which application is made, suitable and convenient berths so far as practicable, within the limits of his district, for the use of such vessels and water craft as may require the same for the reception or discharge of passengers, merchandise, etc., therefrom, or for the necessary repair or the safety of any vessel or water craft.

It shall be the duty of each Dock Master to require and enforce the due observance of and compliance with such of the National and State laws, City ordinances, and the rules, regulations, and orders of the Department of Docks as appertain to the use, care, and custody of the wharf property of and about the City of New York, promptly reporting to the Board all violations and evasions of such laws, ordinances, rules, regulations, and orders.

* * * * * * * * *

Each Dock Master is expressly prohibited, under penalty of immediate dismissal from his position, from receiving or demanding directly or indirectly any fee, gratuity, compensation, or article of value of any nature or kind, for the assignment of a berth to a vessel at any pier, slip, or wharf property

whatsoever, or for the performance of or omission to perform any of the duties required of or appertaining to the position of Dock Master of this Department.

Any person or persons having any cause of complaint against Dock Masters for any failure or omission in the performance of the duties as required by the above rules, are requested to promptly communicate the same to the Board, at their offices, Nos. 117 and 119 Duane street, New York City.†

ANCHORAGE LIMITS, PORT OF NEW YORK.

Act passed by the Congress of the United States.

An Act relating to the anchorage of vessels in the Port of New York.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury is authorized, empowered, and directed to define and establish an anchorage ground for vessels in the bay and harbor of New York, and in the Hudson and East Rivers, to adopt suitable rules and regulations in relation thereto, and to take all necessary measures for the proper enforcement of such rules and regulations.

SEC. 2. That in the event of the violation of any such rules or regulations by the owner, master, or person in charge of any vessel, such owner, master, or person in charge of such vessel shall be liable to a penalty of one hundred dollars, and the said vessel may be holden for the payment of such penalty, and may be seized and proceeded against summarily by libel for the recovery of the same in any United States district court for the district within which such vessel may be, and in the name of the officer designated by the Secretary of the Treasury.

SEC. 3. That this act shall take effect immediately.

Approved, May 16, 1888.

The following are the rules, regulations, and the anchorage limits prescribed by the Secretary of the Treasury, in compliance with the above act:

EAST RIVER ANCHORAGES.

Vessels shall anchor within the following specified limits:

1. On Hammond Flats, to the northward of a line from Throg's Neck to Old Ferry Point.
2. To the southward of a line from Willet's Point to Whitestone Point.
3. On the north side of the channel, north of a line between Old Ferry Point and Hunt's Point.
4. On the south side of the channel, south of a line between Whitestone Point and buoy (No. 1) off College Point, and to the eastward of a line running from said buoy to College Point.
5. In Flushing Bay, to the southward of a line from College Point to the north end of Riker's Island.
6. To the southward of a line from the north end of Riker's Island to the north end of South Brother Island, thence to Lawrence's Point.
7. To the westward of a line from Stony Point to northeast end of Ward's Island; and between Ward's Island and Randall's Island; and between Randall's Island and Port Morris.
8. To the westward of a line from the foot of One hundred and first Street, New York, to the north end of Avenue B, New York.
9. To the eastward of a line from Hatter's Dock to Gibb's Point (Hallet's Cove, Astoria).
10. To the southward of Thirty-first Street and northward of Twenty-first Street piers, and to the westward of a line passing through Buoy No. 1, off Thirty-fourth Street, and Danger Buoy, off Twentieth Street.

No vessel shall be anchored in the East River other than in the places hereinbefore designated, excepting in cases of distress, and then not longer than the turn of the tide, provided that in no case shall a vessel anchor within one hundred yards of either shore, or in such a position as to impede the movements of a ferry, or obstruct vessels in getting to and from the piers.

HUDSON RIVER ANCHORAGE, EAST.

11. Vessels may anchor in Hudson River east of the center of said river and north of Thirty-fifth Street, provided that no vessel shall anchor within two hundred yards of any pier between Thirty-fifth and Seventy-fifth Streets.

HUDSON RIVER ANCHORAGE, WEST.

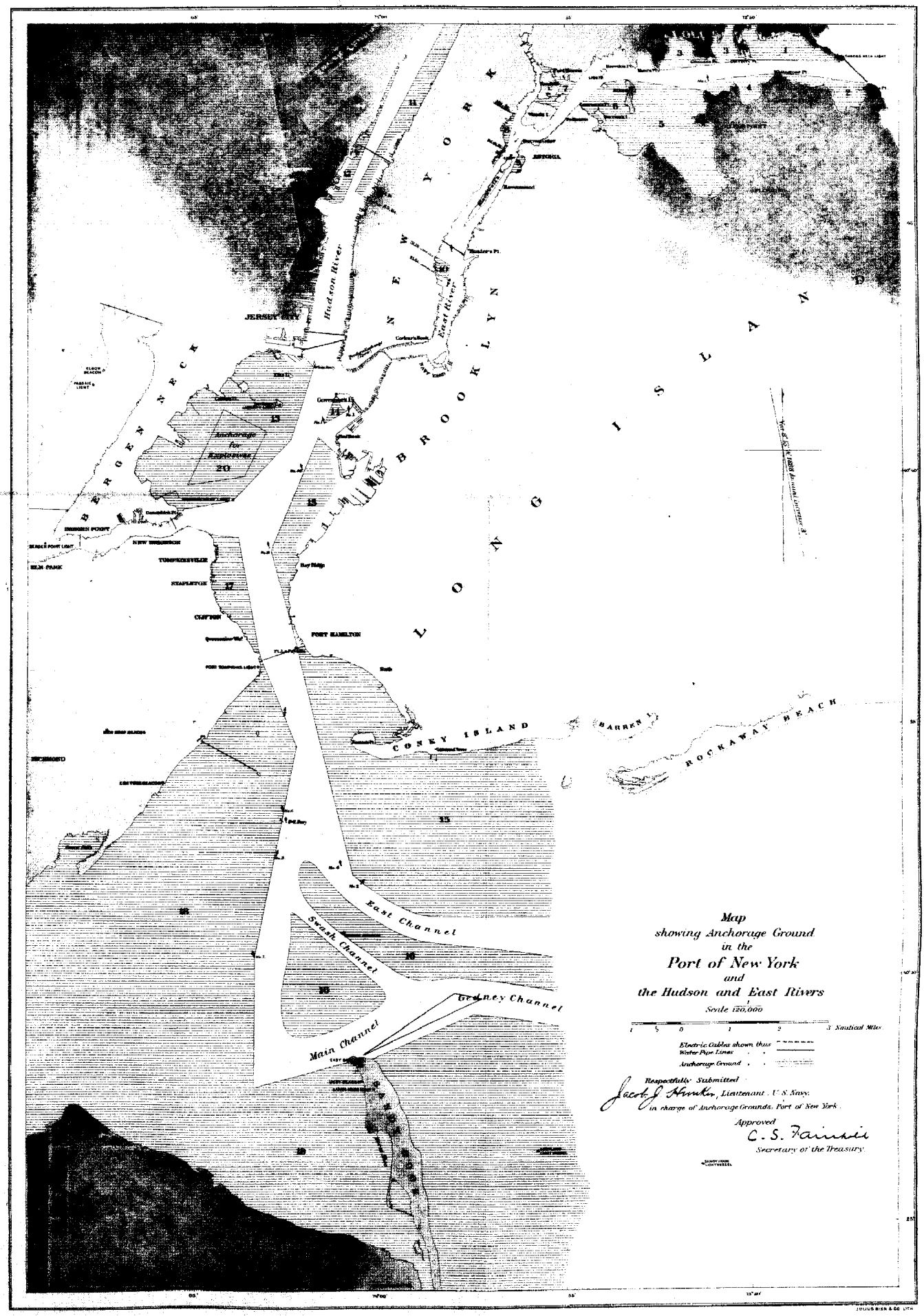
12. Vessels may anchor to the westward of a line from Castle Point to Bull's Ferry, and north of Fourteenth Street, Hoboken Ferry Landing, provided that in no case shall a vessel anchor within two hundred yards of the shore, or in such a position as to impede the movements of a ferry, or to prevent ready access to and from the piers.

WESTERN ANCHORAGE, UPPER BAY.

Vessels may anchor in the Upper Bay within the following limits:

13. To the southward of the range passing through Castle William, the White Spar Buoy, to the north and east of Ellis' Island and the Communipaw Ferry Landing; to the westward of a line

† The Department of Docks now (1888) has an office at Pier A, North River, Battery Place.



Map
showing Anchorage Ground
in the
Port of New York
and
the Hudson and East Rivers
Scale 1/120,000
1 ½ 0 1 2 3 Nautical Miles
Electric Cables shown thus
Water Pipe Lines
Anchorage Ground
Respectfully Submitted
Jacob J. Hunker, Lieutenant, U. S. Navy,
in charge of Anchorage Grounds, Port of New York.
Approved
C. S. Fairchild
Secretary of the Treasury.
NEW YORK
BROOKLYN
LONG ISLAND
BERGEN NECK
Hudson River
East River
JERSEY CITY
Anchorage for Explosives
FORT HAMILTON
CONEY ISLAND
BARREN I.
ROCKAWAY BEACH
East Channel
Swash Channel
Gedney Channel
Main Channel

running south-southwest from the said White Buoy, and to the westward of a line from Castle William to Robbins' Reef, and to the northward of a line from Constable's Point to Robbins' Reef, provided that no vessel anchors so as to obstruct the approaches to any pier within these limtts.

GOVERNOR'S ISLAND ANCHORAGE.

14. Vessels may anchor to the southward of Governor's Island, within the triangular space included in lines running from Castle William to Buoy No. 1, thence to Buoy No. 3, in Buttermilk Channel.

EASTERN ANCHORAGES, UPPER AND LOWER BAYS.

Vessels may anchor within the following limits:

15. To the southward of a line passing through the Statue of Liberty on Bedloe's Island and the north entrance to the Erie Basin; to the eastward of a range passing through Produce Exchange Tower, the east edge of Castle William, and buoys 20 and 18, as now planted; and to the eastward of a range passing through Buoy 18, off Owl's Head, the western edge of Long Island in the Narrows, and eastern side of Fort Lafayette as far south as the East Channel, between Buoys 4 and 2; provided that no vessel shall anchor within three hundred yards of any dock within these limits as defined.

16. Vessels may anchor on Dry Romer Shoal and Flynn's Knoll.

STATEN ISLAND ANCHORAGE.

17. Vessels may anchor to the westward of a line passing through Robbins' Reef and Fort Tompkins, and to the southward of a line passing through Tompkinsville Ferry Landing and the railroad terminal docks at Bay Ridge, Long Island.

WESTERN ANCHORAGE, LOWER BAY.

18. Vessels may anchor to the westward of a range passing through northeast edge of Staten Island at Tompkinsville, and Fort Tompkins in the Narrows, and Craven's Shoal; to the westward of a line passing through Buoys 11, 9, and 7, as far south as a line passing through East Beacon and Bay Side Beacon.

SANDY HOOK BAY ANCHORAGE.

19. Vessels may anchor to the southward of a line extending from East Beacon to Bay Side Beacon (Point Comfort), provided they do not impede the movements of vessels in getting to and from the piers.

In order to prevent injury to the submarine cables which will be used for the lighting of Gedney's Channel buoys, vessels are forbidden to anchor when the East Beacon Light-house bears anywhere between the compass-bearings of **W SW.** $\frac{1}{2}$ **W.** and **SW.** by **W.** $\frac{3}{4}$ **W.** from the vessel, unless the said vessel is to the northward of the northern line of buoys of Gedney's Channel.

No vessel shall anchor in any of the following channels: Gedney's Channel, Main Channel, Swash Channel, and East Channel, excepting in cases of great emergency, and then outside of the channels as marked by the buoys, and only until such time as they can procure assistance.

20. Vessels carrying gunpowder or other explosives will anchor on the flats to the south of a line drawn from Bedloe's Island to Caven's Point, New Jersey, and to the westward of a line from Bedloe's Island to Robbins' Reef, provided that they do not anchor within one thousand yards of either Bedloe's Island or Robbins' Reef, or within five hundred yards of any pier. Vessels carrying explosives of too great draught to use this anchorage will anchor in Gravesend Bay until assigned another berth, but not within one thousand yards of the shore.

All vessels laden with explosives while within the port will display at all times a red flag, of at least sixteen square feet surface, at the mast-head. Vessels so laden, and without masts, will display the flag at least ten feet above the uppermost deck.

Points where cables and water-pipes cross are clearly marked in red on the accompanying map, and all vessels are cautioned not to anchor so as to interfere with them.

Ash-scows, the property of the municipalities bordering on the waters of the port, may be anchored in such places as the officer appointed to enforce the foregoing law and rules may designate, with the approval of the Treasury Department.

The white mooring buoys off the Upper Quarantine Station, in the Narrows, are exclusively for the use of vessels awaiting the first visit of the Health Officer, and are not to be occupied at any other time.

QUARANTINE LAWS OF THE PORT OF NEW YORK.

N. B.—The Quarantine Headquarters are at Clifton, Staten Island, just above the Narrows. Here there is a boarding station, used throughout the year. During the warm season a boarding station is also established in the Lower Bay, about four miles from the station at the Narrows; for this purpose a ship, known as the "Quarantine Ship," is anchored on the western side of the channel up the bay, her station being nearly two and one-half miles to the southeastward of Elm Tree Beacon. To this vessel is assigned a force in charge of a Deputy Health Officer, whose duty

it is to board and ascertain the condition of vessels arriving, during the warm season, from the West coast of Africa, East coast of South America, Mexican gulf ports, the West Indies, and Windward Islands. Vessels from other foreign ports are boarded at the station at the Narrows, and all vessels from domestic ports south of Cape Henlopen arriving from April 1st to November 1st. When the Quarantine Ship is not anchored in the Lower Bay, the only boarding station is at the Narrows. All vessels from foreign ports, at all seasons, are subject to visitation, and have to get *pratique* before they pass the boarding station. They must not proceed farther until visited by the Health Officer or one of his deputies.

The Health Officer of the port resides at the Quarantine Headquarters, Clifton. Hoffman Island, below the Narrows, is used for the detention of passengers who have been exposed to contagion. Dix Island, also below the Narrows, is now known officially as Swinburne Hospital Island; on it is a hospital for patients actually diseased.

The Quarantine anchorage in the Lower Bay is to the southwestward of the Quarantine Ship. If contagious or infectious disease is found on board a vessel, it is customary to remove the sick to the hospital on Dix or Swinburne Hospital Island, and to send the vessel to Robbin's Reef in the Upper Bay to discharge cargo and to be cleansed and disinfected.

"Upper Quarantine" is considered to be at the boarding station, Clifton, while the term "Lower Quarantine," or sometimes simply "Quarantine," is applied in a general way to the quarantine grounds in the Lower Bay.

[Extracts.]

ANCHORAGE.

Act of April 29, 1863.

Sec. 6. The anchorage for vessels under quarantine shall be in the Lower Bay, distant not less than two miles from the nearest shore, and within an area to be designated by buoys by the Quarantine Commissioners and Health Officer.

BOARDING STATION.

Sec. 8. The boarding station for vessels from any place where disease subject to quarantine existed at the time of their departure, or which shall have stopped at any such place on their voyage, or on board of which during the voyage any case of such disease shall have occurred, arriving between the first day of April and the first day of November, shall be in the Lower Bay, below the Narrows, * * * said boarding station shall be provided with all necessary appurtenances for personal cleanliness and the purification of personal baggage; and all such vessels immediately upon their arrival shall anchor near the boarding station within the "quarantine anchorage" mentioned above, and there remain with all persons arriving thereon, subject to the provisions of this Act and of the act hereby amended.†

WHAT VESSELS SUBJECT TO QUARANTINE.

Sec. 9. Vessels arriving at the port of New York shall be subject to quarantine as follows:

1. All vessels from any place where disease subject to quarantine existed at the time of their departure, or which shall have arrived at any such place and proceeded thence to New York, or on board of which during the voyage any case of such disease shall have occurred, arriving between the first day of April and the first day of November, shall remain at quarantine for at least thirty days after their arrival, and at least twenty days after their cargo shall have been discharged; and shall perform such and further quarantine as the Quarantine Commissioners may prescribe, unless the Health Officer, with the approval of the Quarantine Commissioner, shall sooner grant a permit for said vessel, or cargo, or both, to proceed.

2. From any place (including islands) in Asia, Africa, or the Mediterranean, or from any of the West Indies, Bahama, Bermuda, or Western Islands, or from any place in America, in the ordinary passage from which they pass south of Cape Henlopen, and all vessels on board of which, during the voyage, or while at the port of their departure, any person shall have been sick, arriving between the first day of April and the first day of November, and all vessels from a foreign port not embraced in the first subdivision of this section, shall, on their arrival at the quarantine ground, be subject to visitation by the Health Officer, but shall not be detained beyond the time requisite for due examination and observation, unless they shall have had on board, during the voyage, some case of quarantinable disease; in which case they shall be subject to such quarantine and regulations as the Health Officer and the Quarantine Commissioners may prescribe.

3. All vessels embraced in the foregoing provisions, which are navigated by steam, shall be subject only to such length of quarantine and regulations as the Health Officer shall enjoin, unless they shall have had on board during the voyage some case of quarantinable disease, in which case they shall be subject to such quarantine as the Health Officer and Quarantine Commissioners shall prescribe.

VACCINATION.

Sec. 10. Persons with insufficient evidence of effective vaccination, and known to have been recently exposed to small-pox, shall be vaccinated as soon as practicable, and detained until the vaccinia shall have taken effect. No other well persons shall be detained in quarantine any longer than necessary to secure cleanliness. Such vaccination and disposal of persons vaccinated shall be made under regulations to be fixed by the Quarantine Commissioners and Health Officer.

† Amended by Sec. 1 of Chap. 592 of the Laws of 1865.

WHAT DISEASES ARE QUARANTINABLE.

Sec. 11. The only diseases against which quarantine shall apply are yellow fever, cholera, typhus or ship fever, and small-pox, and any new diseases not now known, of a contagious, infectious or pestilential nature, at the discretion of the Quarantine Commissioners and Health Officer.†

CLASSES OF MERCHANDISE SUBJECT TO QUARANTINE.

Sec. 12. For the purpose of sanitary measures, merchandise shall be arranged in three classes:

1. Merchandise to be submitted to an obligatory quarantine and to purification;
2. Merchandise subject to an optional quarantine; and,
3. Merchandise exempt from quarantine.

The first class comprises clothing, personal baggage and dunnage, rags, paper rags, hides, skins, feathers, hair, and all other remains of animals, cotton, hemp, and woolens. The second class comprehends sugar, silks, and linen and cattle. The third class comprehends all merchandise not enumerated in the other two classes.

MERCHANDISE—HOW DISPOSED OF.

Sec. 13. With existing quarantinable disease on board, or if there have been any such disease on board within the ten days last preceding, merchandise of the first class shall be landed at the quarantine warehouse. Merchandise of the second class may be admitted to pratique immediately, or transferred to the warehouses, according to circumstances, at the option of the Health Officer, * * * . Merchandise of the third class shall be declared free and admitted without unnecessary delay.

LETTERS AND PAPERS—PURIFICATION OF.

Sec. 14. In all cases where there has been quarantinable disease on board during the voyage, letters and papers shall be submitted to the usual purifications; but with such precautions as not to affect their legibility; articles of merchandise, or other things not subject to purifying measures, in an envelope officially sealed, shall be immediately admitted to pratique, whatever may be the condition of the vessel; and if the envelope is of a substance considered as optional, its admission shall be equally optional.

DETENTION OF VESSELS AND CARGOES.

Sec. 15. If a vessel, though not having had during the voyage any case of quarantinable disease, yet be found in a condition which the Health Officer shall deem dangerous to the public health, the vessel and cargo shall be detained until the case shall have been considered; the decision of the Health Officer, however, in all such cases shall be rendered within twenty-four hours. Vessels in an unhealthy state, whether there has been sickness on board or not, shall not be allowed pratique until they shall have been broken out, duly cleansed, and ventilated.

SANITARY MEASURES—WHAT KIND MAY BE RESORTED TO.

Sec. 16. If, in the judgment of the Health Officer, a vessel require it, he may order the following sanitary measures: Baths and other bodily care for the person; washing or other disinfecting means for clothing; displacement of merchandise on board, or complete breaking out; subjection to high steam, incineration, or submersion at a distance below the surface of the water, for infected articles; the destruction of tainted or spoiled food or beverages; complete ejection of water; thorough cleansing of the hold, and the disinfection of the well. In short, the complete purification of the vessel in all her parts, by the use of steam, fumigation, force-pumps, rubbing or scraping, and finally sending to quarantine anchorage until disinfection be perfected. Whenever these divers operations are necessary, they shall always be executed before admission to pratique.

RESTRICTION ON PUTTING VESSELS IN QUARANTINE.

Sec. 18. No vessel shall be put in quarantine without a stated decision of the Health Officer, and the captain or master of the vessel shall be informed thereof immediately after his decision; and no vessel subject to quarantine shall depart therefrom without the written permission of the Health Officer, and such permit shall be delivered by the master of the vessel to the mayor of the city of New York, or the mayor of the city of Brooklyn, according to the destination of such vessel, within twenty-four hours after said permit shall be received by said master.‡

VESSELS MAY PUT TO SEA—WHEN.

Sec. 19. A vessel shall have a right, before breaking bulk, of putting to sea in preference to being quarantined; in the exercise of this right, if the vessel have not arrived at her port of destination, the bill of health shall be returned; the Health Officer, however, shall mention upon said bill the length and circumstances of the detention, and the condition of the vessel upon re-putting to sea; but before the exercise of this right, the Health Officer must satisfy himself that the sick of such vessel will be taken care of for the remainder of the voyage, and take care of such sick as prefer to remain.

† See also, forward, Sec. 6 of the Act of June 13, 1885.

‡ As amended by Sec. 2 of Chap. 592 of the Laws of 1865.

INFECTED VESSELS—MEASURES TO BE ADOPTED ON THEIR ARRIVAL.

Sec. 20. On arrival of infected vessels, all well persons shall have their freedom as soon as possible, consistently with the foregoing regulations; sick persons shall be immediately transferred to the floating hospital, or other hospitals appropriated for their reception, and the vessel unladen, purified, and admitted to pratique as soon as possible. All merchandise shall be placed in the warehouses, and there freely exposed to the air, and moved from time to time to insure its perfect ventilation. In no case shall persons sick with different diseases be put in the same hospital.

DISPOSITION OF MERCHANDISE.

Sec. 21. Merchandise coming from different vessels and places, and at different times in quarantine, shall be kept separate and placed as much as practicable in different warehouses.

PURIFICATION OF MERCHANDISE.

Sec. 22. Merchandise shall be submitted to such measures of purification as the Health Officer shall judge necessary; * * * * * .

HEALTH OFFICER—HOW APPOINTED.

Sec. 25. A Health Officer for the port of New York shall be nominated by the Governor, and appointed by him, with the consent of the Senate; and shall hold his office for the term of two years, and until a successor in such office shall be duly qualified * * * * * .

DUTIES OF HEALTH OFFICER.

Sec. 26. It shall be the duty of the Health Officer to reside at such convenient place for the boarding of vessels as the Commissioners of Quarantine may determine, and to have the general superintendence and control of the quarantine establishment, and the care and treatment of the sick, and to carry out all the provisions of this act * * * * * .

DUTIES AND LIABILITIES OF MASTERS OF VESSELS.

Sec. 32. Every master of a vessel subject to visitation by the Health Officer, who shall refuse or neglect either:

1. To proceed with and anchor his vessel at the place assigned at the time of his arrival; or,

2. To submit his vessel, cargo, crew, and passengers to the examination of the Health Officer, and to furnish all necessary information to enable that officer to determine to what measures they ought respectively to be subject; or,

3. To remain with his vessel at quarantine during the period assigned by the Health Officer, and, while at quarantine, to comply with the directions and regulations prescribed by law, and with such as any of the officers of health, by virtue of the authority given to them by law, shall prescribe in relation to his vessel, his cargo, himself, his crew or passengers;—shall be guilty of a misdemeanor, and be punished by a fine not exceeding two thousand dollars, or by imprisonment not exceeding twelve months, or both by such fine and imprisonment.

Sec. 33. Every master of a vessel hailed by a pilot, who shall either:

1. Give false information to such pilot relative to the condition of his vessel, crew, or passengers, or the health of the place or places from whence he came, or refuse to give such information as shall be lawfully required;

2. Or land any person from his vessel, or permit any person, except a pilot, to come on board of his vessel, or unlade or tranship any portion of his cargo before his vessel shall have been visited and examined by the Health Officer;

3. Or shall approach with his vessel nearer to the city of New York or Brooklyn than the place of boarding or anchorage to which he may be directed; shall be guilty of a like offense and be subject to the like punishment; and any person who shall land from any vessel, or unlade or tranship any portion of her cargo under like circumstances, shall be guilty of the like offense and subject to the like punishment.

OF THE DUTIES OF PILOTS IN RELATION TO VESSELS SUBJECT TO QUARANTINE.

Sec. 34. It shall be the duty of each Branch and Deputy Pilot belonging to the port to use his utmost endeavors to hail every vessel he shall discover entering the port, and to interrogate the master of such vessel in reference to all matters necessary to enable such pilot to determine whether, according to the provisions of the preceding sections, such vessel is subject to quarantine.

Sec. 35. If from the answers obtained from such inquiries it shall appear that such vessel came from a port where any quarantinable disease existed at the time of her departure, or that any case of such disease shall have occurred on board of her during the passage, the pilot shall immediately direct the master of the vessel to proceed and anchor such vessel at the quarantine anchorage in the Lower Bay. In other cases of vessels liable to quarantine, he shall direct their masters to proceed and anchor such vessels at such point as shall be assigned by the Quarantine Commissioners; provided that the anchorage for such vessels shall be at least one-half mile distant from the shores of Long Island and Staten Island.

PASSENGERS UNDER QUARANTINE—HOW TO BE MAINTAINED.

Sec. 47. All passengers being on board of vessels under quarantine shall be provided for by the master of the vessel in which they shall have arrived; and if the master shall omit or refuse to provide for them, or they shall have been sent on shore by the Health Officer, they shall be maintained by the Commissioners of Quarantine at the expense of such vessel, her owners, consignees, and each and every one of them; and the Health Officer shall not permit such vessel to leave quarantine until such expense shall have been repaid or secured; and the said Commissioners of Quarantine shall have an action against such vessel, her owners, consignees, and each and every one of them, for such expenses, which shall be a lien on such vessel, and may be enforced as other liens on vessels are enforced, by said Commissioners of Quarantine.

CONFINEMENT OF PERSONS CHARGED WITH OFFENSES.

Sec. 48. The Health Officer, upon the application of the master of any vessel under quarantine, may confine in any suitable place on shore any person on board of such vessel charged with having committed an offense punishable by the laws of this State or of the United States, and who cannot be secured on board of such vessel; and such confinement may continue during the quarantine of such person, or until he shall be proceeded against in due course of law; and the expenses thereof shall be charged and collected as in the last preceding section.

ALIEN PASSENGERS—HOW PROVIDED FOR.

Sec. 50. The Commissioners of Emigration shall receive into their hospitals all alien passengers for whom bonds shall have been given or commutation paid, under the several acts of this State relating to alien passengers arriving at the port of New York, who shall be affected with any contagious or infectious disease other than yellow fever, and sent to such hospital by the authority of the Health Officer * * * * * .

PUNISHMENT FOR OPPOSING OR OBSTRUCTING THE HEALTH OFFICER, OR INVADING THE QUARANTINE ESTABLISHMENT, ETC.

Sec. 56. Every person who shall oppose or obstruct the Health Officer or his deputies in performing the duties required of him by law, and every person who shall go on board of, or have any communication, intercourse, or dealing with, any vessel under quarantine, or with any of her crew or passengers, without the permission of the Health Officer, or who shall, without such permission, invade any portion of the quarantine establishment, shall be guilty of the like offense and subject to the like punishment prescribed by the preceding ninth section of this act; and such offender shall be detained at quarantine so long as the Health Officer shall direct, not exceeding twenty days. In case such person shall be taken sick of any contagious or infectious disease during such twenty days, he shall be detained at quarantine for such further time as the Health Officer shall direct. Exclusive jurisdiction of the offenses specified in this section is hereby conferred upon the courts specified in the forty-ninth section of the act which is hereby amended, and all the provisions of said last-mentioned section shall apply to said offenses.†

CARE OF PASSENGERS WHO HAVE BEEN EXPOSED TO SMALL-POX OR SHIP FEVER.

Sec. 58. The Commissioners of Emigration shall, by the order and direction of the Health Officer, receive and take charge of all passengers arriving at the port of New York who shall have been exposed to the infection or contagion of small-pox or ship fever, to be kept elsewhere than on Staten Island; and the said Commissioners of Emigration, for the purpose of defraying the expenses therefor, shall be entitled to receive from the owners, masters, consignees, or agents of the vessels arriving at the port of New York, the sum of twenty-five cents for each passenger so arriving, to be collected in the same manner that commutation moneys are collected by said Commissioners of Emigration.‡

BILLS OF HEALTH, ETC.

Act of June 13, 1885. *Sec. 1.* It shall be the duty of the Health Officers at the several ports of entry within the State of New York to require the masters of all merchant ships and vessels arriving at said ports from any foreign port, to present a bill of health, duly executed by the consul, vice-consul, or other consular officer of the United States, or by the medical officer attached to the United States consulate by appointment of the United States Government resident at said port of departure, which shall set forth the sanitary condition and history of said vessel; also the sanitary condition of the cargo, and of the crew and passengers; also the sanitary condition of the food, water, and ventilation of said vessel; the number of cases at such port of yellow fever, cholera, small-pox, typhus fever, relapsing fever, scarlatina, measles, and diphtheria, the total number of deaths from each of these diseases from all causes, the week preceding the date of said bill of health, as far as can be ascertained by the said consul, vice-consul, or other consular officers of the United States, or the medical officer attached to such consulate.

†Sec. 11 of Chap. 592 of the Laws of 1865. ‡Sec. 8 of Chap. 613 of the Laws of 1865.

Sec. 2. Said bill of health shall contain, in addition to the requirements of section one of this act, a statement of any circumstances affecting the public health in relation to infectious or contagious diseases at the port of departure, or the community adjacent thereto.

Sec. 3. Vessels that touch at other ports on the passage shall bring a bill of health from each and every port, or shall have indorsed upon the original bill of health by the consul, vice-consul, consular officer or medical officer of the consulate, the facts and conditions of those ports as to the existence and prevalence of the infectious and contagious diseases mentioned in the first section of this act.

Sec. 4. All persons coming from or through any foreign port or place who, after the passage of this act, may arrive at the port of New York, shall be liable to an examination by the Health Officer or his deputies, as regards their protection from small-pox.

Sec. 6. The diseases against which maritime sanitary regulations at the port of New York shall apply are yellow fever, measles, cholera, typhus or ship fever, small-pox, scarlatina, diphtheria, relapsing fever, and any disease of a contagious, infectious, or pestilential character which shall be considered by the Health Officer dangerous to the public health. All such quarantinable diseases except yellow fever, cholera, typhus fever, and small-pox shall be removed to the emigration hospital, Castle Garden, or Ward's Island.

SANITARY CODE OF THE BOARD OF HEALTH.

Extracts from pamphlet edition of the code, issued November, 1885.

Sec. 1. That the terms "Board," "this Board," and "said Board" shall be held to mean the "Board of Health of the Health Department of the City of New York;" that the word "Department," wherever used herein, shall be held to mean the Health Department of the City of New York.

BILLS OF HEALTH.

Sec. 13. That no person, officer, or board within said city (except this Board or its proper officers, or proper officers of any bureau of this Department, and as the regulations prescribed by this Board shall provide), shall grant, sign, or deliver any certificate or "Bill of Health."

REPORTS AS TO CONTAGIOUS AND INFECTIOUS DISEASES.

Sec. 135. That the master, chief officer, and consignee, or one of them, of every vessel not being in quarantine, or within quarantine limits, but being within one-fourth of a mile of any dock, wharf, pier, or building of said city, shall daily report to the Sanitary Bureau, or cause to be reported, in writing, the particulars, and shall therein state the name, disease, and condition of any person being in or on such vessel, and sick of any contagious disease.†

Sec. 138. That every master and chief officer of any vessel, and every physician of, or who practiced on, any vessel which shall arrive in the port of New York from any other port, shall at once report to this Department any facts connected with any person or thing on said vessel, or that came thereon, which he has reason to think may endanger the public health of this city; and he shall report the facts to any person being or having been sick thereon, of a contagious disease, and as to there being or having been, during the voyage or since her arrival, any infected persons or articles thereon.

Sec. 139. That every master, charterer, owner, part owner, and consignee of any vessel, or of the cargo thereof which shall be in the water of said city, unless detained in quarantine, shall at once give or cause to be given, to the Sanitary Superintendent, written notice of any infected article or person, and of every person sick of a contagious disease, being or having within ten days been on board said vessel; and also of each and every fact and thing relative to said vessel, sick person, or cargo, or to the crew of such vessel, which any of the first-mentioned persons shall have reason to think may be useful for this Department to know, or be or become dangerous or prejudicial to life or health in said city.

REMOVALS FROM, AND UNLOADING OF VESSELS.

Sec. 140. That every master, owner, part owner, charterer, or consignee of any vessel, that shall bring any cotton into the port of New York, between the first day of May and the first day of November of each year, shall at once report to this Department, or cause to be made, in writing, a report to this Department of the fact of any such cotton being in a dangerous, infected, or unsound condition, or having been exposed to any infection.

Sec. 141. That no master, charterer, owner, part owner, or consignee of any vessel, or any other person, shall bring to any dock, pier, wharf, or building within one thousand feet thereof, in said city, or unload at any dock, building, or pier therein, or have on storage in the built-up portions of said city, any skins, hides, rags, or similar articles or materials, having been brought from any foreign country, or any infected place, or from any points south of Norfolk, Virginia, without or otherwise than according to written permit so to do from this Department; and no person shall sell, exchange, or in any way make exposure of straw, bedding, or other articles that have been exposed to the contagion or

† The Sanitary Bureau is at No. 301 Mott street, New York city; many of its routine duties are under the charge of the Sanitary Superintendent. This Department should not be confused with the Quarantine service, the headquarters of which are at Clifton, Staten Island, just above the Narrows. The official who has immediate charge of the Quarantine inspection is the Health Officer of the port. See the notice on pages 125 and 126, this Appendix.

infection of any contagious disease, or have been or are liable to communicate such disease, or have lately been on any emigrant vessel, until after the same have been adequately cleansed or disinfected.

Sec. 142. That no owner, agent, or consignee of any vessel, or cargo, and no officer of any vessel (in respect of either of which vessel or cargo a permit, according to any law, ordinance, or regulation shall or should have been obtained to pass quarantine, or to come up to the water front of the city of New York) shall unlade, or land, or cause to be unladen or landed such cargo, or any part thereof, in said city, without having first received the written permit of this Department so to do.

Sec. 143. That no captain, officer, consignee, owner, or other person in charge of any vessel (or having right and authority to prevent the same) shall remove or aid in removing from any vessel to the shore (save as legally authorized by the Health Officer of the port of New York, and into quarantine grounds and buildings only) any person sick of, or person that has been exposed to, and is liable very soon to develop any contagious disease, nor so remove or aid in removing any articles that may have been exposed to the contagion of any such disease, except in accordance with a permit of this Department, or with its special regulations.

Sec. 144. That no master, charterer, consignee, or other person shall order, bring, or allow (having power and authority to prevent) any vessel or person, or article therefrom, from any infected port, nor any vessel or person, or article therefrom, liable to quarantine, according to the ninth section of the three hundred and fifty-eighth chapter of the Laws of 1863 (or under any other laws, and whether such quarantine has been made or suffered or not), to come or to be brought to any point nearer than three hundred yards of any dock or pier, or to any building in said city without or otherwise than according to a permit of this Department. Nor shall any vessel, or person or thing therein or therefrom, having been in quarantine, come or be brought within the last-named distance of any last-named place, without the permit or assent of this Department.

Sec. 145. That no person shall bring into this city from any infected place, or land or take therein, from any vessel lately from an infected port, or from any vessel or building in which had lately been any person sick of a contagious disease, any article or person whatsoever, nor shall any such person land or come into said city without a permit of this Department; and it shall be no excuse that such person or article so offending, or the occasion of offense, has passed through quarantine, or has a permit from any other source than this Department.

Sec. 146. That no owner, part-owner, charterer, agent, or consignee of any vessel, nor any officer or person having charge or control of the same, shall allow to be cast therefrom, and no person shall cast therefrom, into any public waters of the city of New York, any straw, bedding, clothing, or other substance, from any incoming vessel, from any foreign port, or port south of Cape Henlopen, without a permit from this Board, except as allowed by the quarantine authorities.

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APPENDIX III.

WIND AND WEATHER SIGNALS OF THE U. S. SIGNAL SERVICE.

WIND SIGNALS.†

THE DAY SIGNALS now adopted by this service for announcing the approach and probable force of wind storms at display stations along the Atlantic and Gulf coasts, and on the Great Lakes, are of two kinds, viz:

1st. *A Cautionary signal*, a yellow flag with a white center, which indicates that the winds expected are not so severe but well-found and seaworthy vessels can meet them without great danger.

2d. *A Storm signal*, a red flag with a black center, which indicates that the storm is expected to be of more marked violence, and dangerous to all classes of vessels.

In order to afford the public as exact information as possible regarding the relative position of the storm and the winds expected, two pennants are used. The red pennant indicates that the winds are to be easterly, that is, from northeast to *south*, inclusive, and that the storm-center is approaching. The white pennant indicates westerly winds, that is, from *north* to southwest, inclusive, and that the storm-center has passed. While the pennants indicate positively only whether the winds will be easterly or westerly, yet, in order to give still more definite information, the red or easterly pennant is displayed above the cautionary or storm signal for winds from the northeast quadrant and below for winds from the southeast quadrant. In like manner, the white pennant, while indicating westerly winds alone, will show by its position above the cautionary or storm signal that northwesterly winds are probable, or by being below that they will be from the southwest quadrant.

THE NIGHT SIGNALS indicate the wind-direction only; a red light for easterly winds, and a red and white light for westerly winds.

STORM SIGNALS.

Northwesterly winds. Southwesterly winds. Northeasterly winds. Southeasterly winds.

THE **Cautionary Signals** are the same as the above, except that a yellow flag with a white center takes the place of the red flag with black center.

† The wind signals here described are those adopted for use from September 1, 1887, to be displayed along the Atlantic and Gulf coasts, and on the Great Lakes, as storm conditions may demand.

This system of signals is devised with a view to distinguish between light and severe storms, and with the intention of showing whether the storm-center has reached or passed the display station, as well as the probable direction from which severe winds are expected.

The system also takes into consideration the fact that westerly winds of high velocity with clearing weather are less dangerous than those from easterly quarters with freezing weather.

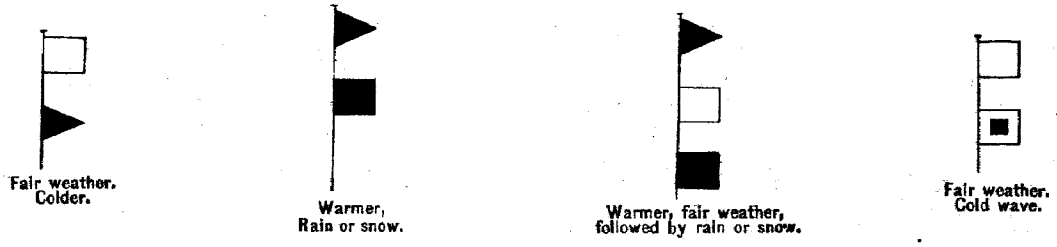
WEATHER, TEMPERATURE, AND COLD-WAVE SIGNALS.

[Adopted by the Signal Service for general use on and after March 1, 1887.]

Number 1, white flag, indicates clear or fair weather. Number 2, blue flag, indicates rain or snow. Number 3, black, triangular flag, always refers to temperature. When placed above numbers 1 or 2 it indicates warmer weather; when placed below numbers 1 or 2 it indicates colder weather; when not displayed, the indications are that the temperature will remain stationary, or that the change in temperature will not vary five degrees from the temperature of the same hour of the preceding day. Number 4, white flag, with black square in center, indicates the approach of a sudden and decided fall in temperature. The weather forecasts indicated by the flags are issued for the twenty-four hours commencing at seven A. M. each day.

When displayed on poles the signals should be arranged to read downward; when displayed from horizontal supports a small streamer should be attached to indicate the point from which the signals are to be read.

INTERPRETATION OF DISPLAYS.



NOTE.—The wind signals are shown at certain points on the coast, as indicated in the list of stations given in another part of this volume.

The weather signals are shown more generally, being displayed in almost every town of importance.

APPENDIX IV.

REGULATIONS U. S. MARINE-HOSPITAL SERVICE.†

APPROVED APRIL 24, 1885.

(EXTRACT.)

GENERAL DUTIES OF MEDICAL OFFICERS.

76. The duties of officers of the medical corps are professional, sanitary, and executive. General duties.

77. The professional duties of a medical officer are to examine all applicants for relief, to prescribe and furnish medicine or hospital treatment as may be required, and to make physical examinations of seamen of the several Government services and merchant marine, under such regulations as shall hereinafter appear. Professional duties.

PROFESSIONAL DUTIES.

80. Medical officers will, upon the application of any United States shipping commissioner, or the master or owner of any United States vessel engaged in the foreign trade, or of any passenger-steamer engaged in the coasting or inland navigation trade, examine as to his physical condition any seaman brought to them for that purpose, and will give a certificate (Form 1928) as to his fitness or unfitness for service. They will physically examine, in accordance with existing regulations governing the physical examination of American seamen, any foreign seamen sent them for that purpose by the duly authorized agent of a foreign line or the consul representing the nation to which the vessel belongs. A fee of fifty cents will be charged for such examinations, * * * * *. Medical officers will also, upon the application of the proper officers, examine enlisted men and persons desiring to enlist in the Revenue-Marine, Life-Saving, Coast Survey, and Light-House Services, or to instruct them in the mode of resuscitating persons apparently drowned. To examine applicants for relief, and certain other persons as to physical qualifications for enlistment in Government service.

81. Medical inspections of seamen, with reference to their fitness for service, will be made only at the respective marine-hospital offices, except at certain stations * * * * * in special cases. Examinations to be made at offices.

82. No fee will be charged by any medical officer of the Marine-Hospital Service for the medical inspection of any American seaman or for making a certificate as to his physical condition. No fee to be charged.

83. When requested by the local inspectors of steam-vessels or other proper officers, medical officers and acting assistant surgeons will examine applicants for pilots' license as to color-blindness and general visual capacity, and will give a certificate accordingly. Color-blindness and visual tests.

SANITARY DUTIES.

87. Upon the outbreak of epidemic small-pox at or near a relief station, medical officers and acting assistant surgeons will vaccinate such seamen as may come to the marine-hospital office for the purpose; and officers are authorized, at all times, to visit vessels to examine and vaccinate crews. * * * * * To vaccinate seamen.

RELIEF STATIONS.

125. A relief station of the Marine-Hospital Service is a port situated on any navigable water of the United States where an officer of the customs or Marine-Hospital Service is on duty. Definition.

126. All relief stations, where the service is under the charge of a medical officer of the Marine-Hospital Service, shall be known as relief stations of Class 1. Relief stations where specific arrangements have been made for the care and treatment of sick or disabled seamen at rates fixed by the Treasury Department, but where collectors of customs, on account of the absence of a medical officer of the service, are authorized and required to issue permits and to supervise the relief furnished, shall be known as relief stations of Class 2. All other ports where there are officers of the customs-revenue, but where, on account of the infrequency of application for relief, the absence of any hospital, or from other causes, sick or disabled seamen are cared for only in cases of emergency, shall be known as relief stations of Class 3. Classes.

† The Marine-Hospital Service is the medical department for the mercantile marine of the United States. It was established in 1798, and is charged with preserving the health interests of the officers and seamen employed on American vessels engaged in the foreign, coastwise, and inland commerce.

Districts.

127. The relief stations of the Marine-Hospital Service are grouped into eight districts, as follows: The District of the North Atlantic, the District of the Middle Atlantic, the District of the South Atlantic, the District of the Gulf, the District of the Ohio, the District of the Mississippi, the District of the Great Lakes, and the District of the Pacific.

Middle Atlantic.

129. The District of the Middle Atlantic embraces the following-named relief stations, viz: Albany, N. Y.; Bridgeport, Conn.; Bridgeton, N. J.; Greenport, N.Y.; Lamberton, N. J.; Middletown, Conn.; Newark, N. J.; New Haven, Conn.; New London, Conn.; New York, N. Y.; Patchogue, N. Y.; Perth Amboy, N. J.; Philadelphia, Pa.; Sag Harbor, N. Y.; Somers' Point, N. J.; Stonington, Conn.; Troy, N. Y.; Tuckerton, N. J.; and Wilmington, Del.; together with all other relief stations situated in the same customs districts.

Offices and dispensaries.

139. The marine-hospital dispensary shall be located at the custom-house whenever practicable, and suitable office room for that purpose will be set apart, * * * * * subject to the approval of the Secretary of the Treasury.

BENEFICIARIES OF THE SERVICE, AND THE MANNER IN WHICH RELIEF IS EXTENDED TO THEM.

List of persons entitled to relief.

141. The persons entitled to the benefits of the Marine-Hospital Service are those employed on board in the care, preservation, or navigation of any vessel, or in the service, on board, of those engaged in such care, preservation, or navigation, excepting persons employed in or connected with the navigation, management, or use of canal-boats engaged in the coasting trade.

Wrecked seamen entitled.

142. Seamen taken from wrecked vessels of the United States, if sick or disabled, are entitled to the benefits of the Marine-Hospital Service and will be furnished care and treatment without reference to the length of time for which they have been employed.

Seamen sent by consular officers entitled.

143. Destitute American seamen returned to the United States from foreign ports by United States consular officers, if sick or disabled at the time of their arrival in a port of the United States, shall be entitled to the benefits of the Marine-Hospital Service.

Officers authorized to examine applicants.

144. At relief stations of the first class, the medical officer of the Service in charge, and at relief stations of the second or third class, the proper customs officer, * * * * * will receive the applications of persons claiming the benefits of the marine-hospital fund for care and treatment while sick or disabled.

Seamen must make application for relief.

145. A sick or disabled seaman, in order to obtain the benefits of the Marine-Hospital Service, must apply to a medical officer of that service, or, in the absence of such officer, then to the proper customs officer, * * * * * and must furnish satisfactory evidence that he is entitled to relief under the regulations.

Evidence to be presented by applicant. Form 1914.

146. Masters' certificates and discharge papers from United States shipping commissioners, properly made out and signed, showing that the applicant has been employed on a documented vessel or vessels of the United States for at least sixty days immediately preceding his application for relief, shall, in general, be held to constitute the "satisfactory evidence" required.

Certificates from owners or agents as evidence.

147. The certificate of the owner or accredited commercial agent of a vessel as to the facts of the employment of any seaman on said vessel may be accepted as evidence in lieu of the master's certificate in cases where the latter is not procurable.

Masters enjoined to furnish certificate of service.

148. Masters of vessels of the United States shall, on demand, furnish any seaman who has been employed on such vessel a certificate (Form 1914) of the length of time said seaman has been so employed, giving the date of his last employment and the date of his discharge. This certificate will be filed in the marine-hospital office, or office of the customs officer, upon application being made for relief, whether the relief is furnished or the claim rejected.

Masters refusing to give certificate.

149. In case the master of any vessel shall fail or refuse to furnish a master's certificate to any seaman that may have been employed on board said vessel within thirty days preceding the seaman's application for relief, the collector of customs shall cause said master, if he be in port, to appear at the marine-hospital office and produce the ship's books.

Seamen to sign certificate.

150. Any seaman who is able to write will be expected to sign his name upon the face of the master's certificate issued to him before said certificate is signed by the master of the vessel.

Requirements as to service.

151. During the season when navigation is open at any port, seamen at that port are not entitled to relief from the Marine-Hospital Service, who, from any cause other than disease or injury, have not, within the sixty days immediately preceding the application for relief, been employed on any American vessel.

152. When an interval has occurred in the applicant's seafaring service by reason of the closure of navigation, it shall not be considered as excluding him from relief, except the sickness or injury for which he applies for relief be the result of employment on shore, nor shall the phrase "immediately preceding the application" be held as excluding from relief a seaman who has been but a few days away from his vessel, provided he has not abandoned his vocation as seaman for any other employment, nor as excluding a seaman who may have been not more than three months away from his vessel, provided it be satisfactorily shown that such absence was due to sickness. Exceptions.

153. During the season when navigation is closed at any port, seamen at that port are not entitled to relief from the Marine-Hospital Service, who, from any cause other than disease or injury, have not been employed on board an American vessel within a period exceeding thirty days prior to the closure of navigation. Closure of navigation.

154. A seaman who has abandoned his vocation for any employment on shore for a period of two months or more, unless debarred from shipping by reason of sickness, disability, or closure of navigation, has thereby forfeited his claim to the benefits of the Marine-Hospital Service. Forfeiture of claims for abandoning vocation.

155. Whenever an applicant for relief presents himself at the marine-hospital office or the custom-house without a master's certificate or shipping commissioner's discharge, and it is impracticable to obtain a master's certificate on account of the absence of the vessel or its master from the port, the affidavit of the applicant as to the facts of his last employment may be accepted as evidence in support of his claim for the benefits of the Marine-Hospital Service. The applicant's affidavit may also be accepted as evidence in cases where the period of his last service, as shown by his papers, is less than sixty days. Affidavits may be accepted as evidence.

156. When the period of the seaman's service on last vessel is less than two months, his statement as to previous service may be accepted if supported by satisfactory evidence. Brief service on last vessel not a bar to relief.

160. In every case where a doubt exists, whether the applicant is entitled to relief under the regulations, the application, accompanied by a statement of the facts, must be immediately referred to the Supervising Surgeon-General for decision; and, when the seaman is in such condition that immediate medical or surgical attendance is necessary, he will be placed under treatment pending the decision, and the action in the case taken by the officer reporting it will be stated in the letter. Certain cases to be submitted to Surgeon-General for decision.

162. The expenses of caring for sick and disabled seamen incurred during a voyage will not be paid from the marine-hospital fund. Expenses for sickness during voyage.

163. No relief will be furnished at the expense of the marine-hospital fund, except upon the certificate and recommendation of a medical officer of the Marine-Hospital Service, or of a competent physician, showing that the applicant requires medical treatment. Relief only upon certificate of officers.

164. In no case will money be paid to a seaman himself, or to his family or friends, out of the marine-hospital fund, as reimbursement for expenses incurred during sickness or disability, whose care and treatment was unauthorized by this Department. Money not to be paid to seamen for expenses of sickness.

165. The expenses for the care and treatment of seamen entitled to the benefits of the Marine-Hospital Service who, in accordance with the State or municipal health laws and regulations, are taken to quarantine or other hospitals under charge of the local health authorities, will not be paid from the marine-hospital fund. Seamen admitted to quarantine hospitals.

DISPENSARY RELIEF.

166. Sick and disabled seamen entitled under these regulations to the benefits of the Marine-Hospital Service, whose diseases or injuries are of such a nature that they can properly be relieved by medicine, or dressing, or advice, without admission to hospital, will be treated as out-patients, and furnished medicines, dressings, surgical appliances, or advice, as the case may require. Cases to be treated at dispensary as out-patients.

167. Seamen will not be furnished relief at their own homes, except by special authority from the Supervising Surgeon-General of the Marine-Hospital Service, and then an allowance for medical attendance and medicines only will be made at rates fixed by the Treasury Department. No relief furnished at homes of patients.

STATIONS OF THE THIRD CLASS.

171. Whenever, at a third-class relief station, an application for relief is presented, the customs officers for the port are authorized and directed to cause out-door or office relief (medicines, surgical appliances, etc.) to be furnished in accordance with paragraph 166, or to furnish transportation to a relief station of the first or second class, as the case may be. But when the amount of the appropriation is insufficient, any relief station of the third class may be discontinued. Provisions for relief.

Temporary arrangements to be made.

172. Whenever, in the opinion of the examining physician, the patient is unable to bear transportation without prejudice to his recovery, the facts will be at once reported to the Supervising Surgeon-General for instructions, and in case medical or surgical attendance is immediately necessary, the customs officer will, pending action upon the case, provide it if possible, at reasonable and just rates. The customs officer will in such cases employ a competent physician to take professional charge of the patient, and will arrange for suitable quarters, nursing, and diet for the patient, and the arrangements made by him will be reported, together with the rates of charges therefor.

Foreign seamen *et al.* not treated.

175. Foreign seamen, or employés of the various Government services, will not be treated at stations of the third class.

HOSPITAL RELIEF.

Cases for hospital treatment.

178. A sick or disabled seaman entitled to the benefits of the Marine-Hospital Service shall be admitted to hospital only in cases where the gravity of the disease or injury from which he suffers is such as to require hospital treatment in the opinion of a medical officer or acting assistant surgeon of the service, or of a reputable physician designated by the Department to act at a place where no medical officer is stationed.

STATIONS OF THE FIRST CLASS.

Bed-tickets to be issued. Form 1917.

179. At relief stations where United States marine hospitals are located, the bed-ticket will be prepared at the marine-hospital office, and given to the patient, and the patient will be admitted on presentation of said bed-ticket inclosed in a sealed envelope.

To be valid only for day of issue.

180. The bed-ticket, * * * * * unless presented on the day it is issued, * * * * * will be forfeited.

STATIONS OF THE SECOND CLASS.

Relief to be furnished on recommendation of physician.

188. Hospital relief will not be furnished at the expense of the marine-hospital fund, except upon the certificate and recommendation of an acting assistant surgeon or of a competent and reputable physician, showing that the applicant requires medical treatment.

Permits for hospital relief. Form 1916.

191. Customs officers or acting assistant surgeons will issue permits for the care and treatment of such applicants as may be found to be entitled to the benefits of the service and require hospital treatment. * * * * *

Permits valid only on day of issue.

193. The hospital permit, before being delivered to the applicant for relief, must be inclosed in an envelope, sealed, and addressed to the medical officer or other person authorized to receive the patient. The seaman should at the same time be informed that unless presented on the day it is issued the permit will be forfeited.

Applications for relief after office hours.

194. When, at a second-class station, a seaman entitled to the benefits of the service makes application for admission to hospital after the custom-house or dispensary is closed for the day, the surgeon in charge of the hospital in which the patients of the Marine-Hospital Service are treated may receive the patient, should the case be urgent. * * * * *

Relief not to be given on antedated permits.

196. Sick and disabled seamen presenting themselves at any hospital where patients of the Marine-Hospital Service are cared for, with hospital permits dated prior to the day when presented, will not be treated at the expense of the marine-hospital fund, except under such provisions as are prescribed by these regulations.

Relief not to exceed sixty days.

197. Continuous relief for periods exceeding sixty days will in no case be granted, except by special authority from the Department.

STATIONS OF THE THIRD CLASS.

Emergency cases only treated in hospital.

204. Hospital relief at stations of the third class will not be furnished except in cases of emergency and for a temporary period.

INSANE SEAMEN.

Relief for insane seamen. March 3, 1875, s. 5.

209. Insane seamen entitled to the benefits of the Marine-Hospital Service may be admitted to the Government hospital for the insane upon the order of the Secretary of the Treasury, and the officers in charge of relief-stations will report to the Supervising Surgeon-General any application for admission to hospital made in behalf of such seamen, and any cases of insanity that may occur among them. * * * * *

DECEASED SEAMEN.

Relatives to be notified.

210. On the death of a patient while under the charge of the Marine-Hospital Service, notice to receive his effects shall be given by letter, or otherwise, to his nearest known relative. * * * * *

213. The necessary expenses of a plain burial for deceased patients of the Service will be paid, but no part of the expenses of the burial of any deceased seaman will be paid for at the expense of the marine-hospital fund unless said seaman was at the time of his death a patient of the Service. Burial expenses.

FOREIGN SEAMEN AND EMPLOYÉS OF GOVERNMENT SERVICES.

214. The accommodations provided for the care and treatment of the patients of the Marine-Hospital Service are also available to foreign seamen only at relief-stations where medical officers or acting assistant surgeons are on duty, upon the application of the consular officers of their respective nationalities, or upon the application of the masters of the vessels upon which said seamen serve, provided satisfactory security is given for the payment of the expenses of such care and treatment. * * * * * Foreign seamen may be treated.

215. Seamen employed on vessels of the Navy, vessels of the Coast Survey, Light-House Service, Engineer Corps of the Army, and Mississippi River Commission may be admitted for care and treatment as patients of the Marine-Hospital Service only upon the written request of their respective commanding officers. * * * * * Seamen of various Government service may be admitted.

219. Customs officers acting as agents of the Marine-Hospital Service will collect all bills for the care and treatment of foreign seamen by the Marine-Hospital Service. * * * * * * * * accounts * * * * *.

TONNAGE DUES.

301. Customs officers will collect from vessels arriving in the United States from any foreign port of North America north of the southern terminus of the Isthmus of Darien, or any port in Newfoundland, the West Indian, Bahama, Bermuda, or Sandwich Islands, a duty of three cents per ton on every entry; but the total tax in any one year on entries from the ports specified is not to exceed fifteen cents. The tax to be collected on vessels making entry on arrival from other foreign ports is six cents per ton on every entry; but the total tax collected at six cents per ton is not to exceed thirty cents per ton in any one year. Rates for assessment. U. S. Stat., c. 121, 1884. Act June 26.

302. Any vessel making such voyages as to become liable in any one year under both rates—that is, at three cents per ton and six cents per ton—shall not be held liable to an aggregate tax of more than thirty cents per ton for any one year, reckoned from the date of the entry and payment of her first tax at either rate; but the three-cent tax per ton shall not be collected on more than five entries in any one year. Number of times tax may be assessed.

303. For half a ton or more than half a ton of the measurement of a vessel, collection will be made at the full rates of three or six cents per ton; for less than half a ton, no collection will be made. Small craft exempt.

304. As provided by the Act of June 26, 1884, "that the President of the United States shall suspend the collection of so much of the duty herein imposed on vessels entered from any port in the Dominion of Canada, Newfoundland, the Bahama Islands, the Bermuda Islands, the West India Islands, Mexico, and Central America, down to and including Aspinwall and Panama, as may be in excess of the tonnage and light-house dues, or other equivalent tax or taxes, imposed on American vessels by the government of the foreign country in which such port is situated, and shall upon the passage of this act, and from time to time thereafter as often as it may become necessary by reason of changes in the laws of the foreign countries above mentioned, indicate by proclamation the ports to which such suspension shall apply, and the rate or rates of tonnage duty, if any, to be collected under such suspension," but customs officers will take no action by way of suspension of collection of tax till they have been informed that such suspension has been authorized by a proclamation of the President. Dues suspended reciprocally.

MISCELLANEOUS.

306. No medical officer shall receive, have charge of, or pay any money on account of the Marine-Hospital Service, except the money belonging to patients of the Service, as prescribed in these regulations. Officers not to pay money.

GOVERNMENT OF NATIONAL QUARANTINES.

322. At ports where quarantine may be established by the Secretary of the Treasury, every vessel, before being permitted to enter, shall present to the collector of customs satisfactory evidence either that said vessel had not, at any time during a period of thirty days immediately preceding its arrival, touched at or communicated with any foreign port where cholera, yellow fever, or small-pox was known to exist in an epidemic form; that there had not been at any time during that period any case of contagious disease on board; and that said vessel does not convey any person Vessels required to present evidence of being free from contagious diseases before entry. Section 5, Act April 29, 1878, R. S., s. 4792.

or persons, merchandise, or animals afflicted with any infectious or contagious disease, or that the said vessel has been thoroughly cleaned and disinfected by the quarantine officer, and is free from infection at the time of entry. The certificate to that effect, of the medical officer of the Marine-Hospital Service, or other agent of the Treasury Department designated by the Secretary of the Treasury to act as quarantine officer for the United States at the port, shall be accepted by the collector of customs as satisfactory evidence, and the medical officer or agent referred to shall, before granting such certificate, satisfy himself that the matters and things therein stated are true.

Vessels from infected ports not allowed to enter until certificate of free pratique is furnished.

323. Vessels coming from a foreign port or country where cholera, yellow fever, or small-pox is known to have existed in an epidemic form within thirty days preceding their arrival, and vessels or vehicles conveying any person or persons, merchandise, or animals affected with any contagious disease, or having had on board at any time during the thirty days preceding their arrival any case of contagious disease, shall not enter any port of the United States until such disinfection or other precautionary measures shall have been performed as prescribed by these regulations, and the certificate of the medical officer of the Marine-Hospital Service, or other designated agent of the Treasury Department, shall, in such cases, as in the cases referred to in the preceding paragraph, be accepted by the collector of customs as satisfactory evidence of compliance with said regulations.

Infected vessels required to anchor at quarantine station.

324. For purposes of necessary disinfection of a vessel and its cargo, and of the clothing and baggage of persons on board, the said vessel shall be required to repair to and cast anchor at such place as may be designated by the Secretary of the Treasury, at each port respectively, to be known as the United States Quarantine Station.

Methods of disinfection.

325. The disinfection and other precautionary measures referred to in paragraph 323 shall be carried out under the direction and supervision of the United States quarantine officer at each port respectively, and shall consist of, first, the isolation and treatment of the sick; second, the disinfection of all clothing and baggage liable to be infected; third, the removal of the cargo from the vessel to open lighters, and its thorough disinfection by chemical agents, by exposure to free currents of air, or by burning, as the case may require; and fourth, the cleansing and fumigation of the vessel, or such other methods of disinfection as may from time to time be adopted by the Department.

APPENDIX V.

REGULATIONS FOR PREVENTING COLLISIONS.

RULES OF THE ROAD AT SEA, ADOPTED BY ALL IMPORTANT MARITIME NATIONS.

The following act of Congress to adopt the "Revised International Regulations for Preventing Collisions at Sea" was approved March 3, 1885. Some foreign governments have not adopted paragraphs "*a*" and "*c*" of Article 10, in the form here given. But these paragraphs apply only to "fishing-vessels and boats when in the sea off the coast of Europe lying north of Cape Finisterre."

AN ACT to adopt the "Revised International Regulations for Preventing Collisions at Sea."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following "Revised International Rules and Regulations for Preventing Collisions at Sea" shall be followed in the navigation of all public and private vessels of the United States upon the high seas and in all coast waters of the United States, except such as are otherwise provided for, namely:

"ARTICLE 1. In the following rules every steamship which is under sail and not under steam is to be considered a sailing-ship, and every steamship which is under steam, whether under sail or not, is to be considered a ship under steam.

RULES CONCERNING LIGHTS.

"ART. 2. The lights mentioned in the following articles numbered three, four, five, six, seven, eight, nine, ten, and eleven, and no others, shall be carried in all weathers, from sunset to sunrise.

"ART. 3. A sea-going steamship, when under way, shall carry—

"(*a*) On or in front of the foremast, at a height above the hull of not less than twenty feet, and if the breadth of the ship exceeds twenty feet, then at a height above the hull not less than such breadth, a bright white light, so constructed as to show a uniform and unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the ship, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least five miles.

"(*b*) On the starboard side a green light, so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

"(*c*) On the port side a red light, so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

"(*d*) The said green and red side-lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

"ART. 4. A steamship when towing another ship shall, in addition to her side-lights, carry two bright white lights in a vertical line, one over the other, not less than three feet apart, so as to distinguish her from other steamships. Each of these lights shall be of the same construction and character, and shall be carried in the same position, as the white light which other steamships are required to carry.

"ART. 5. (*a*) A ship, whether a steamship or a sailing-ship, which from any accident is not under command, shall at night carry, in the same position as the white light which steamships are required to carry, and if a steamship, in place of that light, three red lights in globular lanterns, each not less than ten inches in diameter, in a vertical line, one over the other, not less than three feet apart, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles, and shall by day carry in a vertical line, one over the other, not less than three feet apart, in front of but not lower than her foremast-head, three black balls or shapes, each two feet in diameter.

"(*b*) A ship, whether a steamship or a sailing-ship, employed in laying or in picking up a telegraph cable, shall at night carry, in the same position as the white light which steamships are required to carry, and if a steamship, in place of that light, three lights in globular lanterns, each not less than ten inches in diameter, in a vertical line, over one another, not less than six feet apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character that the red lights shall be visible at the same distance as the white light. By day she shall carry in a vertical line, one over the other, not less than six feet apart, in front of but not lower than her foremast-head, three shapes not less than two feet in diameter, of which the top and bottom shall be globular in shape and red in color, and the middle one diamond in shape and white.

"(c) The ships referred to in this article when not making any way through the water shall not carry the side-lights, but when making way shall carry them.

"(d) The lights and shapes required to be shown by this article are to be taken by other ships as signals that the ship showing them is not under command, and cannot therefore get out of the way. The signals to be made by ships in distress and requiring assistance are contained in article twenty-seven.

"ART. 6. A sailing-ship under way or being towed shall carry the same lights as are provided by article three for a steamship under way, with the exception of the white light, which she shall never carry.

"ART. 7. Whenever, as in the case of small vessels during bad weather, the green and red side-lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for use, and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent a collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

"ART. 8. A ship, whether a steamship or a sailing-ship, when at anchor, shall carry, where it can best be seen, but at a height not exceeding twenty feet above the hull, a white light, in a globular lantern of not less than eight inches in diameter, and so constructed as to show a clear, uniform, and unbroken light, visible all around the horizon at a distance of at least one mile.

"ART. 9. A pilot vessel, when engaged on her station on pilotage duty, shall not carry the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes. A pilot vessel, when not engaged on her station on pilotage duty, shall carry lights similar to those of other ships.

"ART. 10. Open boats and fishing-vessels of less than twenty tons net registered tonnage, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side-lights; but every such boat and vessel shall in lieu thereof have ready at hand a lantern with a green glass on the one side and a red glass on the other side, and on approaching to or being approached by another vessel such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

"The following portion of this article applies only to fishing-vessels and boats when in the sea off the coast of Europe lying north of Cape Finisterre:

"(a) All fishing-vessels and fishing-boats of twenty tons net registered tonnage or upward, when under way and when not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

"(b) All vessels when engaged in fishing with drift-nets shall exhibit two white lights from any part of the vessel where they can be best seen. Such lights shall be placed so that the vertical distance between them shall be not less than six feet and not more than ten feet, and so that the horizontal distance between them, measured in a line with the keel of the vessel, shall be not less than five feet and not more than ten feet. The lower of these two lights shall be the more forward, and both of them shall be of such a character and contained in lanterns of such construction as to show all round the horizon, on a dark night, with a clear atmosphere, for a distance of not less than three miles.

"(c) All vessels when trawling, dredging, or fishing with any kind of drag-nets shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white. The red light shall be above the white light, and shall be at a vertical distance from it of not less than six feet and not more than twelve feet; and the horizontal distance between them, if any, shall not be more than ten feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all round the horizon, on a dark night, with a clear atmosphere, the white light to a distance of not less than three miles and the red light of not less than two miles.

"(d) A vessel employed in line-fishing, with her lines out, shall carry the same lights as a vessel when engaged in fishing with drift-nets.

"(e) If a vessel, when fishing with a trawl, dredge, or any kind of drag-net, becomes stationary in consequence of her gear getting fast to a rock or other obstruction, she shall show the light and make the fog-signal for a vessel at anchor.

"(f) Fishing-vessels and open boats may at any time use a flare-up in addition to the lights which they are by this article required to carry and show. All flare-up lights exhibited by a vessel when trawling, dredging, or fishing with any kind of drag-net, shall be shown at the after-part of the vessel, excepting that if the vessel is hanging by the stern to her trawl, dredge, or drag-net, they shall be exhibited from the bow.

"(g) Every fishing-vessel and every open boat when at anchor between sunset and sunrise shall exhibit a white light, visible all round the horizon at a distance of at least one mile.

"(h) In a fog a drift-net vessel attached to her nets, and a vessel when trawling, dredging, or fishing with any kind of drag-net, and a vessel employed in line-fishing with her lines out, shall, at intervals of not more than two minutes, make a blast with her fog-horn and ring her bell alternately.

"ART. 11. A ship which is being overtaken by another shall show from her stern to such last-mentioned ship a white light or a flare-up light.

SOUND SIGNALS FOR FOG, AND SO FORTH.

"ART. 12. A steamship shall be provided with a steam-whistle, or other efficient steam sound signals, so placed that the sound may not be intercepted by any obstructions, and with an efficient fog-horn, to be sounded by a bellows or other mechanical means, and also with an efficient bell. (In all cases where the regulations require a bell to be used, a drum will be substituted on board Turkish vessels.) A sailing-ship shall be provided with a similar fog-horn and bell.

"In fog, mist, or falling snow, whether by day or night, the signals described in this article shall be used as follows, that is to say:

"(*a*) A steamship under way shall make with her steam-whistle, or other steam sound signal, at intervals of not more than two minutes, a prolonged blast.

"(*b*) A sailing-ship under way shall make with her fog-horn, at intervals of not more than two minutes, when on the starboard tack one blast, when on the port tack two blasts in succession, and when with the wind abaft the beam three blasts in succession.

"(*c*) A steamship and a sailing-ship when not under way shall, at intervals of not more than two minutes, ring the bell.

SPEED OF SHIPS TO BE MODERATE IN FOG, AND SO FORTH.

"ART. 13. Every ship, whether a sailing-ship or a steamship, shall in a fog, mist, or falling snow go at a moderate speed.

STEERING AND SAILING RULES.

"ART. 14. When two sailing-ships are approaching one another so as to involve risk of collision, one of them shall keep out of the way of the other as follows, namely:

"(*a*) A ship which is running free shall keep out of the way of a ship which is close-hauled.

"(*b*) A ship which is close-hauled on the port tack shall keep out of the way of a ship which is close-hauled on the starboard tack.

"(*c*) When both are running free, with the wind on different sides, the ship which has the wind on the port side shall keep out of the way of the other.

"(*d*) When both are running free, with the wind on the same side, the ship which is to windward shall keep out of the way of the ship which is to leeward.

"(*e*) A ship which has the wind aft shall keep out of the way of the other ship.

"ART. 15. If two ships under steam are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other. This article only applies to cases where ships are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two ships which must, if both keep on their respective courses, pass clear of each other. The only cases to which it does apply are when each of the two ships is end on, or nearly end on, to the other; in other words, to cases in which by day each ship sees the masts of the other in a line, or nearly in a line, with her own, and by night to cases in which each ship is in such a position as to see both the side-lights of the other. It does not apply by day to cases in which a ship sees another ahead crossing her own course, or by night to cases where the red light of one ship is opposed to the red light of the other, or where the green light of one ship is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

"ART. 16. If two ships under steam are crossing so as to involve risk of collision, the ship which has the other on her own starboard side shall keep out of the way of the other.

"ART. 17. If two ships, one of which is a sailing-ship and the other a steamship, are proceeding in such directions as to involve risk of collision, the steamship shall keep out of the way of the sailing-ship.

"ART. 18. Every steamship, when approaching another ship so as to involve risk of collision, shall slacken her speed, or stop and reverse, if necessary.

"ART. 19. In taking any course authorized or required by these regulations, a steamship under way may indicate that course to any other ship which she has in sight by the following signals on her steam-whistle, namely:

"One short blast to mean 'I am directing my course to starboard.'

"Two short blasts to mean 'I am directing my course to port.'

"Three short blasts to mean 'I am going full speed astern.'

"The use of these signals is optional, but if they are used the course of the ship must be in accordance with the signal made.

"ART. 20. Notwithstanding anything contained in any preceding article, every ship, whether a sailing-ship or a steamship, overtaking any other shall keep out of the way of the overtaken ship.

"ART. 21 In narrow channels every steamship shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such ship.

"ART. 22. Where by the above rules one of two ships is to keep out of the way, the other shall keep her course.

"ART. 23. In obeying and construing these rules due regard shall be had to all dangers of navigation, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

NO SHIP, UNDER ANY CIRCUMSTANCES, TO NEGLECT PROPER PRECAUTIONS.

"ART. 24. Nothing in these rules shall exonerate any ship, or the owner, or master, or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen or by the special circumstances of the case.

RESERVATION OF RULES FOR HARBOR AND INLAND NAVIGATION.

"ART. 25. Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbor, river, or inland navigation.

SPECIAL LIGHTS FOR SQUADRONS AND CONVOYS.

"ART. 26. Nothing in these rules shall interfere with the operation of any special rules made by the Government of any nation with respect to additional station and signal lights for two or more ships of war or for ships sailing under convoy.

"ART. 27. When a ship is in distress and requires assistance from other ships or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, that is to say:

"In the daytime—

"First. A gun fired at intervals of about a minute.

"Second. The international code signal of distress indicated by N C.

"Third. The distant signal, consisting of a square flag, having either above or below it a ball, or anything resembling a ball.

"At night—

"First. A gun fired at intervals of about a minute.

"Second. Flames on the ship (as from a burning tar-barrel, oil-barrel, and so forth).

"Third. Rockets or shells, throwing stars of any color or description, fired one at a time, at short intervals."

SEC. 2. That all laws and parts of laws inconsistent with the foregoing "Revised International Rules and Regulations" for the navigation of all public and private vessels of the United States upon the high seas, and in all coast waters of the United States, are hereby repealed, except as to the navigation of such vessels within the harbors, lakes, and inland waters of the United States; and that this act shall take effect and be in force from and after the first day of September, anno Domini eighteen hundred and eighty-four.

Approved March 3, 1885.

RULES FOR THE HARBORS, LAKES, AND INLAND WATERS OF THE UNITED STATES.

To be observed by vessels of the Navy and mercantile marine of the United States navigating the *harbors, lakes*, and *inland waters* of the United States.†

PRELIMINARY.

The instructions herein contained will be observed in the navigation of vessels of the mercantile marine of the United States; and, by the provisions of the Revised Statutes, the following rules, from one to twenty-four, inclusive, are made applicable to the navigation of vessels of the Navy.

Every sail-vessel of the mercantile marine navigated without complying with the instructions of this circular will be liable to a penalty of two hundred dollars, for which sum the vessel may be seized and proceeded against.

STEAM AND SAIL-VESSELS.

RULE 1. Every steam-vessel which is under sail and not under steam shall be considered a sail-vessel; and every steam-vessel which is under steam, whether under sail or not, shall be considered a steam-vessel.

LIGHTS.

RULE 2. The lights mentioned in the following rules, and no others, shall be carried in all weathers between sunset and sunrise:

† The Regulations given under this heading include those which were formerly in force in all waters, and which still obtain in *harbors, lakes*, and *inland waters* of the United States.

The New Regulations now followed in the navigation of public and private vessels of the United States upon the *high seas* and in all *coast waters*, are printed in this Appendix, pages 141–144.

In many cases the corresponding old rules (now local only) and new rules (high seas and coast waters) differ in form but remain the same in substance.

An official circular issued by the Bureau of Navigation of the Treasury Department, September 1, 1887, and approved by the Secretary of the Treasury, contains the Rules, Additional Rules, etc., here given.

LIGHTS FOR OCEAN-GOING STEAMERS AND STEAMERS CARRYING SAIL.

RULE 3. All ocean-going steamers, and steamers carrying sail, shall, when under way, carry—

(*a*) At the foremast-head, a bright white light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least five miles, and so constructed as to show a uniform an unbroken light over an arc of the horizon of twenty points of the compass, and so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side.

(*b*) On the starboard side, a green light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, and so fixed as to throw the light from right ahead to two points abaft the beam on starboard side.

(*c*) On the port side, a red light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, and so fixed as to throw the light from right ahead to two points abaft the beam on her port side.

The green and red light shall be fitted with inboard screens, projecting at least three feet forward from the lights, so as to prevent them from being seen across the bow.

LIGHTS FOR TOWING-STEAMERS.

RULE 4. Steam-vessels, when towing other vessels, shall carry two bright white mast-head lights vertically, in addition to their side-lights, so as to distinguish them from other steam-vessels. Each of these mast-head lights shall be of the same character and construction as the mast-head lights prescribed by Rule 3.

LIGHTS FOR STEAMERS NOT OCEAN-GOING NOR CARRYING SAIL.

RULE 5. All steam-vessels other than ocean-going steamers and steamers carrying sail shall, when under way, carry on the starboard and port sides lights of the same character and construction and in the same position as are prescribed for side-lights by Rule 3, except in the case provided in Rule 6.

LIGHTS FOR STEAMERS ON THE MISSISSIPPI RIVER.

RULE 6. River-steamers, navigating waters flowing in the Gulf of Mexico and their tributaries, shall carry the following lights, namely: One red light on the outboard side of the port smoke-pipe, and one green light on the outboard side of the starboard smoke-pipe. Such lights shall show both forward and abeam on their respective sides.

LIGHTS FOR COASTING STEAM-VESSELS AND STEAM-VESSELS NAVIGATING BAYS, LAKES, AND RIVERS.

RULE 7. All coasting steam-vessels and steam-vessels other than ferry-boats, and vessels otherwise expressly provided for navigating the bays, lakes, rivers, or other inland waters of the United States, except those mentioned in Rule 6, shall carry the red and green lights as prescribed for ocean-going steamers, and in addition thereto a central range of two white lights; the after-light being carried at an elevation of at least fifteen feet above the light at the head of the vessel. The head-light shall be so constructed as to show a good light through twenty points of the compass, namely, from right ahead to two points abaft the beams, on either side of the vessel, and the after-lights so as to show all around the horizon.

LIGHTS FOR FERRY-BOATS

shall be regulated by such rules as the Board of Supervising Inspectors of Steam-Vessels shall prescribe. (See additional rules below.)

LIGHTS FOR SAILING-VESSELS.

RULE 8. Sail-vessels under way or being towed shall carry the same lights as steam-vessels under way, with the exception of the white mast-head light, which they shall never carry. (See Rule 3, *b* and *c*.)

EXCEPTIONAL LIGHTS FOR SMALL SAILING-VESSELS.

RULE 9. Whenever, as in case of small vessels during bad weather, the green and red lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for instant exhibition, and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such a manner as to make them visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side. To make the use of these portable lights more certain and easy, they shall each be painted outside with the color of the light they respectively contain, and shall be provided with suitable screens.

LIGHTS FOR STEAM-VESSELS AND SAILING-VESSELS AT ANCHOR.

RULE 10. All vessels, whether steam-vessels or sail-vessels, when at anchor or in roadsteads or fair-ways, shall, between sunset and sunrise, exhibit where it can best be seen, but at a height not

exceeding twenty feet above the hull, a white light in a globular lantern of eight inches in diameter, and so constructed as to show a clear, uniform, and unbroken light, visible all around the horizon, and at a distance of at least one mile.

LIGHTS FOR PILOT-VESSELS.

RULE 11. Sailing pilot-vessels shall not carry the lights required for other sailing-vessels, but shall carry a white light at the mast-head, visible all around the horizon, and shall also exhibit a flare-up light every fifteen minutes.

LIGHTS FOR COAL-BOATS, TRADING-BOATS, RAFTS, AND OTHER LIKE CRAFT.

RULE 12. Coal-boats, trading-boats, produce-boats, canal-boats, oyster-boats, fishing-boats, rafts, or other water-craft, navigating any bay, harbor, or river, by hand-power, horse-power, sail, or by the current of the river, or which shall be anchored or moored in or near the channel or fair-way of any bay, harbor, or river, shall carry one or more good white lights, which shall be placed in such a manner as shall be prescribed by the Board of Supervising Inspectors of Steam-vessels.†

Rule 12 shall be so construed as not to require row-boats and skiffs upon the river St. Lawrence to carry lights. (Act June 19, 1886.)

LIGHTS FOR OPEN BOATS.

RULE 13. Open boats shall not be required to carry the side-lights required for other vessels, but shall, if they do not carry such lights, carry a lantern having a green slide on one side and a red slide on the other side, and, on the approach of or to other vessels, such lantern shall be exhibited in sufficient time to prevent collision, and in such a manner that the green light shall not be seen on the port side nor the red light on the starboard side. Open boats, when at anchor or stationary, shall exhibit a bright white light. They shall not, however, be prevented from using a flare-up, in addition, if considered expedient.

LIGHTS ON VESSELS OF THE UNITED STATES NAVY.

RULE 14. The exhibition of any light on board of a vessel of war of the United States may be suspended whenever, in the opinion of the Secretary of the Navy, the commander-in-chief of a squadron, or the commander of a vessel acting singly, the special character of the service may require it.

FOG-SIGNALS.

RULE 15. Whenever there is a fog or thick weather, whether by day or night, the fog-signals shall be used as follows:

(*a*) Steam vessels under way shall sound a steam-whistle, placed before the funnel not less than eight feet from the deck, at intervals of not more than one minute.

(*b*) Sail-vessels under way shall sound a fog-horn at intervals of not more than five minutes.

(*c*) Steam-vessels and sail-vessels, when not under way, shall sound a bell at intervals of not more than five minutes.

(*d*) Coal-boats, trading-boats, produce-boats, canal-boats, oyster-boats, fishing-boats, rafts, or other water-craft, navigating any bay, harbor, or river, by hand-power, horse-power, sail, or by the current of the river, or anchored or moored in or near the channel or fair-way of any bay, harbor, or river, and not in any port, shall sound a fog-horn or equivalent signal, which shall make a sound equal to a steam-whistle, at intervals of not more than two minutes.

STEERING AND SAILING RULES.

SAILING-VESSELS.

RULE 16. If two sail-vessels are meeting end on, or nearly end on, so as to involve risk of collision, the helms of both shall be put to port, so that each may pass on the port side of the other.

RULE 17. When two sail-vessels are crossing, so as to involve risk of collision, then, if they have the wind on different sides, the vessel with the wind on the port side shall keep out of the way of the vessel with the wind on the starboard side, except in the case in which the vessel with the wind on the port side is close-hauled and the other vessel free, in which case the latter vessel shall keep out of the way. But if they have the wind on the same side, or if one of them has the wind aft, the vessel which is to windward shall keep out of the way of the vessel which is to leeward.

STEAM-VESSELS MEETING.

RULE 18. If two vessels under steam are meeting end on, or nearly end on, so as to involve risk of collision, the helms of both shall be put to port, so that each may pass on the port side of the other.

TWO STEAMERS CROSSING.

RULE 19. If two vessels under steam are crossing so as to involve risk of collision, the vessel which has the other on her starboard side shall keep out of the way of the other.

† See Additional Rules, pages 147–148.

SAIL AND STEAM-VESSELS MEETING.

RULE 20. If two vessels, one of which is a sail-vessel and the other a steam-vessel, are proceeding in such directions as to involve risk of collision, the steam-vessel shall keep out of the way of the sail-vessel.

STEAM-VESSEL APPROACHING ANOTHER VESSEL, OR IN A FOG.

RULE 21. Every steam-vessel when approaching another vessel, so as to involve risk of collision, shall slacken her speed, or, if necessary, stop and reverse, and every steam-vessel shall, when in a fog, go at a moderate speed.

VESSEL OVERTAKING ANOTHER.

RULE 22. Every vessel overtaking another vessel shall keep out of the way of the last-mentioned vessel.

RIGHT OF WAY.

RULE 23. When, by Rules 17, 19, 20, and 22, one of two vessels shall keep out of the way, the other shall keep her course, subject to the qualifications of Rule 24.

SPECIAL INSTRUCTIONS.

RULE 24. In construing and obeying these rules, due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case, rendering a departure from them necessary, in order to avoid immediate danger.

SAILING-VESSELS TO BE FURNISHED WITH SIGNAL-LIGHTS AND TO SHOW TORCHES.

RULE 25. Collectors or other chief officers of the customs shall require all sail-vessels to be furnished with proper signal-lights; and every such vessel shall, on the approach of any steam-vessel during the night-time, *show a lighted torch* upon that point or quarter to which such steam-vessel shall be approaching.

ADDITIONAL RULES.

These additional rules (found in the proceedings of the Board of Supervising Inspectors of Steam-Vessels and Decisions of Treasury Department) are published for the information of all concerned:

LIGHTS FOR FERRY-BOATS.

RULE 65. All double-ended ferry-boats on lakes and seaboard† shall carry a central range of clear, bright, white lights, showing all around the horizon, placed at equal altitudes forward and aft; also such side-lights as specified in section 4233 of the Revised Statutes, Rule 3, paragraphs *b* and *c*. Local inspectors, in districts having ferry-boats, shall, whenever the safety of navigation may require, designate for each line of such boats a certain light, white or colored, which shall show all around the horizon, to designate and distinguish such lines from each other, which lights shall be carried on a flag-staff amidships, fifteen feet above the white range lights. * * * The signal-lights on ferry-boats, on waters flowing into the Gulf of Mexico and their tributaries, shall be the same as those on all other steamboats on the same waters, except double-ended ferry-boats, which shall be governed by the rule governing double-ended ferry-boats on lakes and sea-board.

LIGHTS ON SMALL CRAFT.

RULE supplemental to RULE 12, and by virtue thereof:

All coal-boats, trading-boats, produce-boats, canal-boats, oyster-boats, fishing-boats, and other water-craft, navigating any bay, harbor, or river, propelled by hand-power, horse-power, sail, or by the current of the river, or which shall be moored in or near the channel or fair-way of any bay, harbor, or river, shall carry one bright white light forward, not less than six feet above the rail or deck.

Rafts of one crib, and not more than two in length, shall carry one bright white light on a pole not less than six feet high; three or more cribs in length, shall carry one white light at each end of the raft at the same height.

Rafts of more than one crib abreast shall carry one white light on each outside corner of the raft, making four lights in all.

Row-boats shall carry one white light two feet above the stem.

It is *recommended* by the Board of Supervising Inspectors of Steam-Vessels that, whenever there is a fog by day or night, sailing-vessels and every craft propelled by sails, upon the ocean, lakes, and rivers, when on the starboard tack, shall sound, with intervals of not more than two minutes, one blast of the fog-horn; when on the port tack, two blasts; when with the wind free or running large, three blasts; and that, when lying-to or at anchor, they shall sound the bell with the same intervals.

†This rule is intended to apply to all ferry-boats subject to the pilot-rules for seas, gulfs, lakes, bays, sounds, or rivers, except the Red River of the North, or rivers whose waters flow into the Gulf of Mexico.

FOG-HORNS.

The selection of an instrument to be employed in making the fog-signals required by law must in all cases be left to the master or owner of the vessel, it being only necessary that this Deparment shall so far regulate such selection that instruments not effective for the purpose shall be excluded.

Any instrument or device for this purpose, which produces a sound equivalent to that of a steam-whistle, will be considered sufficient for the purposes of the law.

CONFLICTING RULES.

Any directions heretofore given by this Department conflicting with the above instructions are hereby revoked.

STEAM-VESSELS TOWING.

"The following rule, adopted by the Board of Supervising Inspectors of Steam-Vessels (see Circular 29, February 25, 1885), has been approved by the Secretary of the Treasury:

"SECTION 8. All steam-vessels (*except upon the Red River of the North and rivers whose waters flow into the Gulf of Mexico*), when engaged in towing during fog or thick weather, shall sound three distinct blasts of their steam-whistles in quick succession, repeating at intervals not exceeding one minute."

The following section, adopted by the Board of Supervising Inspectors (Circular, February 11, 1887), has been approved by the Secretary of the Treasury:

"RULE IX.

"SECTION 2. It shall be the duty of the inspectors jointly, before granting a certificate of inspection, to thoroughly test the fire-apparatus of steamers, and to examine carefully all pumps, hose, life-boats, and other equipments required by law, *and to see that the* [glass globes of] *colored signal-lights are in no case less than six inches diameter and six inches high.*"

PILOT RULES FOR LAKES AND SEABOARD.

Rules and regulations for the government of pilots navigating seas, gulfs, lakes, bays, sounds, or rivers, except rivers flowing into the Gulf of Mexico, and their tributaries. Revised and adopted by the Board of Supervising Inspectors June 10, 1871, as authorized by act of Congress "to provide for the better security of life on board of vessels propelled in whole or in part by steam, and for other purposes;" approved February 28, 1871, to take effect January 1, 1872. Amended January, 1875, 1881, and 1882.†

RULE 1.—When steamers are approaching each other "head and head," or nearly so, it shall be the duty of each steamer to pass to the right, or port side of the other; and the pilot of either steamer may be first in determining to pursue this course, and thereupon shall give, as a signal of his intention, one short and distinct blast of his steam-whistle, which the pilot of the other steamer shall answer promptly by a similar blast of his steam-whistle, and thereupon such steamers shall pass to the right or port side of each other. But if the course of such steamers is so far on the starboard of each other as not to be considered by pilots as meeting "head and head," or nearly so, the pilot so first deciding shall immediately give two short and distinct blasts of his steam-whistle, which the pilot of the other steamer shall answer promptly by two similar blasts of his steam-whistle, and they shall pass to the left, or on the starboard side, of each other.

NOTE.—In the night, steamers will be considered as meeting "head and head" so long as both the colored lights of each are in view of the other.

RULE 2.—When steamers are approaching each other in an oblique direction they shall pass to the right of each other, as if meeting "head and head," or nearly so, and the signals by whistle shall be given and answered promptly as in that case specified.

RULE 3.—If, when steamers are approaching each other, the pilot of either vessel fails to understand the course or intention of the other, whether from signals being given or answered erroneously, or from other causes, the pilot so in doubt shall immediately signify the same by giving several short and rapid blasts of the steam-whistle; and if the vessels shall have approached within half a mile of each other, both shall immediately be slowed to a speed barely sufficient for steerage-way until the proper signals are given, answered, and understood, or until the vessels shall have passed each other.

RULE 4.—When steamers are running in a fog or thick weather, it shall be the duty of the pilot to cause a long blast of the steam-whistle to be sounded at intervals not exceeding one minute.

Steamers, when drifting or at anchor in the fair-way of other vessels, in a fog or thick weather, shall ring their bells at intervals of not more than two minutes.

RULE 5.—Whenever a steamer is nearing a short bend or curve in the channel, where, from the height of the banks or other cause, a steamer approaching from the opposite direction cannot be seen for a distance of half a mile, the pilot of such steamer, when he shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam-whistle, which signal shall be answered by a similar blast, given by the pilot of any approaching steamer that may be within hearing. Should such signal be so answered by a steamer upon the farther side of such bend, then the usual

† These rules for steamers are reprinted from "General Rules and Regulations prescribed by the Board of Supervising Inspectors of Steam-Vessels," edition of 1888.

signals for meeting and passing shall immediately be given and answered; but if the first alarm-signal of such pilot be not answered, he is to consider the channel clear and govern himself accordingly.

RULE 6.—The signals by the blowing of the steam-whistle shall be given and answered by pilots, in compliance with these rules, not only when meeting "head and head," or nearly so, but at all times when passing or meeting at a distance within half a mile of each other, and whether passing to the starboard or port.

RULE 7.—When two steamers are approaching the narrows known as "Hell Gate," on the East River, at New York, side by side or nearly so, running in the same direction, the steamer on the right or starboard hand of the other (when approaching from the west), when they shall have arrived abreast of the north end of Blackwell's Island, shall have the right of way, and the steamer on the left or port side shall check her way and drop astern. In like case when two steamers are approaching from the east and are abreast at Negro Point, the steamer on the right or starboard hand of the other shall have the right of way, and shall proceed on her course without interference, and the steamer on the port side of the other shall keep at a safe distance astern (not less than three lengths) until both steamers have passed through the difficult channel.

RULE 8.—When steamers are running in the same direction, and the pilot of the steamer which is astern shall desire to pass on the right or starboard hand of the steamer ahead, he shall give one short blast of the steam-whistle as a signal of such desire and intention, and shall put his helm to port; and the pilot of the steamer ahead shall answer by the same signal; or if he prefer to keep on his course, he shall give two short and distinct blasts of the steam-whistle, and the boat wishing to pass must govern herself accordingly, but the boat ahead shall in no case attempt to cross her bow or crowd upon her course.

N. B.—The foregoing rules are to be complied with in all cases except when steamers are navigating in a crowded channel, or in the vicinity of wharves; under such circumstances steamers must be run and managed with great caution, sounding the whistle as may be necessary to guard against collision or other accidents.

SECTION 4233, REVISED STATUTES—RULE TWENTY-FOUR.—In construing and obeying these rules due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case rendering a departure from them necessary in order to avoid immediate danger.

RULE 9.—All double-ended ferry-boats on lakes and sea-board shall carry a central range of clear, bright, white lights, showing all around the horizon, placed at equal altitudes forward and aft, also such side-lights as specified in section 4233, Revised Statutes, Rule Three, paragraphs *b* and *c*.†

Local inspectors in districts having ferry-boats shall, whenever the safety of navigation may require, designate for each line of such boats a certain light, white or colored, which shall show all around the horizon, to designate and distinguish such lines from each other, which light shall be carried on a flag-staff amidship, fifteen feet above the white range-lights.

The line dividing jurisdiction between Pilot Rules on Western Rivers and Lakes and Seaboard at New Orleans shall be the lower limits of the city.

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†See Rule Three, paragraphs *b* and *c*, page 141.

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