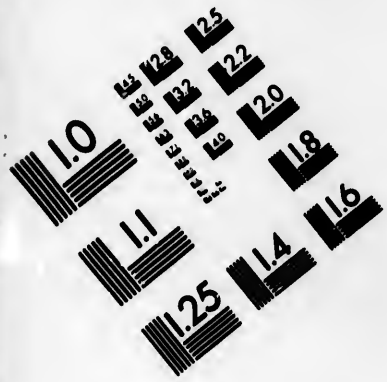

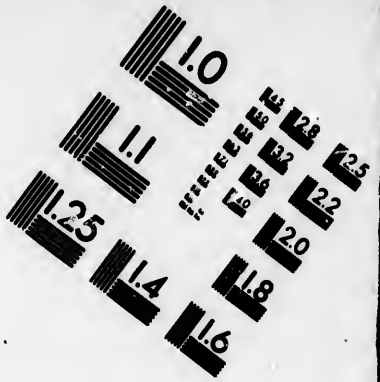

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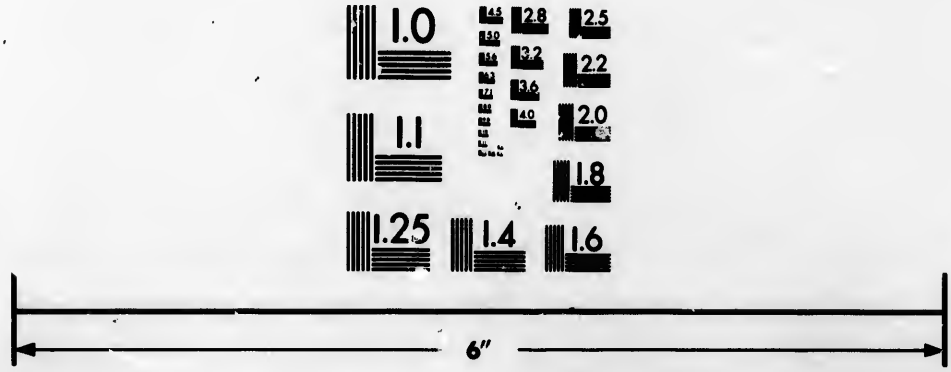

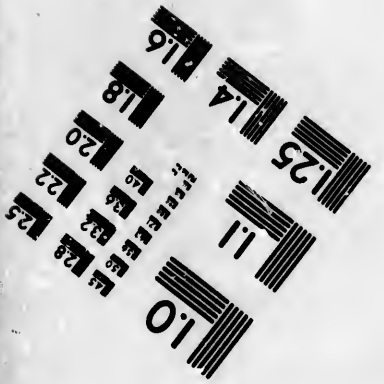

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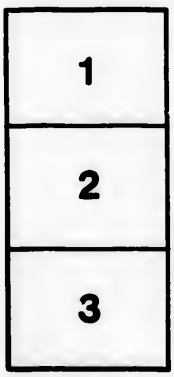
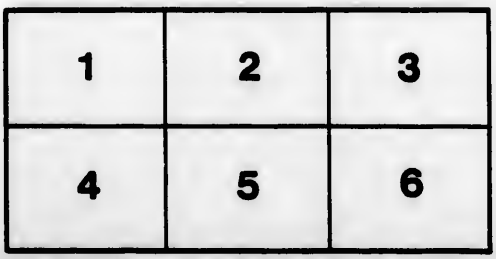




THOMPSON'S

COAST PILOT

FOR THE

UPPER LAKES, ON BOTH SHORES,

FROM

Chicago to Buffalo, Green Bay, Georgian Bay and Lake Superior,

INCLUDING

THE RIVERS DETROIT, ST. CLAIR AND STE. MARIE; WITH THE COURSES AND DISTANCES ON LAKE ONTARIO, AND OTHER INFORMATION RELATIVE THERETO.

ALSO, A DESCRIPTION OF ALL THE

LIGHTS AND LIGHTHOUSES

ON BOTH SHORES, FROM OGDENSBURG TO SUPERIOR CITY.

James. Thompson
2nd Lodies
Maid

DETROIT:
FREE PRESS BOOK AND JOB PRINTING HOUSE.
1869.

NOTICE TO MARINERS.

The subscriber begs to state to those navigating the Lakes, that Thompson's Coast Pilot is the original one, prepared by him in 1858, and has gone through four editions, with all the corrections suitable to the march of the times and the improvements on the great chain of Lakes, or Inland Seas. The increased demand for the work induces me to bring forward a fifth edition, materially amended for 1869.

I beg further to state, that the Coast Pilot issued by Barnet, in Chicago, is a spurious copy of my first edition, printed in Chicago in 1859. The object of this notice is to advise my friends, and the Lake Navigator, who wish to purchase a useful book for Lake purposes, to call for Thompson's Coast Pilot, and not the Coast Pilot of Barnet.

Since the last edition was printed I am happy to state that there are a great many improvements going on, such as opening new cuts for channels, building piers, lighthouses, beacons, placing ranges for harbors and laying down buoys, etc., many of which are finished, and others to be pushed forward as fast as possible.

The first improvement in point of utility is the St. Clair Flats, where a new straight cut is being made, of a depth of water sufficient for the largest class of vessels. This cut or channel, when finished, will be of the greatest importance to the merchant, as well as to the sailing community. Next in importance is the ranges for Maumee Bay and River. These ranges are so well placed and constructed that there is nothing wanting for the safe navigation of that Bay and River. The new light on the pier-head at Cleveland, Ohio, will be of great service to those making that port. Buffalo Harbor has been improved by dredging, and repairing the piers. The extension of the Lighthouse pier, which will be 300 feet, will prove a great protection to the harbor, and the Erie Basin breakwater—the extension above spoken of—will be commenced in a short time. On Lake Huron and Saginaw Bay and River, also Sauble River, and Thunder Bay River, improvements are being pushed forward with rapidity. Dredging in Saginaw River, at the entrance and up the river. I have no doubt that this season vessels of the largest class will be able to go up river as far as Saginaw City and Salina. At Sauble River, piers are being built, and when completed will make a good harbor of refuge, as well as a good lumber region. Saw mills and fishing are the principal features of this place. A Light-

house is to be built at Sturgeon Point, a few miles above Harrisville, and will be a leading coast light for Thunder Bay, and along shore. The town of Alpena, Thunder Bay River, is growing rapidly. A Lighthouse will be built at this place as soon as the piers are permanently finished, and will probably be placed on the end of the south pier. Alpena promises to become a thriving town, and will eventually become an excellent harbor; good fishing all around this coast and the islands. The Alpena Harbor Improvement Company have let contracts for building a crib pier, to be loaded with stone, extending from the one on the south side of the river, into the bay eight hundred and fifty feet, and four hundred feet is now nearly completed. The bar will be dredged as soon as the ice leaves, so that there will be thirteen feet water. After passing Thunder Bay Island, the next place of importance for a harbor is Presqu'ile, where new improvements are going on. The old light is to be discontinued, and ranges placed to enter the harbor. A new Lighthouse will be erected on the extreme north end of the peninsula, which will make a good leading light, up or down the Lake. It is well known to all our old navigators that Presqu'ile Light could not be seen coming down lake, until you were nearly abreast of it. After leaving Presqu'ile, the next dangerous place is Spectacle Reef, nearly opposite the entrance to the Straits of Michilimackinac and to Sheboygan River, south channel. It is proposed to erect a Lighthouse on this reef, which would be of great advantage to vessels navigating that channel, and also the Straits of Mackinaw (proper). A Lighthouse will be built on Mackinaw Island, and the new light on McGulpin's Point (Old Mackinaw) will save many a weary hour to the master and his officers. A Lighthouse will be erected on St. Helena Island. This will be of great advantage to those running back in the fall of the year for a harbor. The new Lighthouse at Skillegolee has a prominent tower, and can be seen 16 to 18 miles, and is a good mark for hauling round Point Waugoshance. In going round, as soon as the light at Skillegolee (which is red) makes out to the westward of Waugoshance Light, you can commence to haul round the point, and as you can approach the pier work within half a mile with safety, there is no necessity of giving it so wide a berth as many captains do. A Lighthouse will be built on the extreme north end of the peninsula at Grand Traverse. The light on the South Fox is another great improvement in passing through between the South Fox and the North Manitou Islands. A Lighthouse will be built on Poverty Island, to lead through that channel to Little Bay De Noc. A Lighthouse has been erected on Eagle Bluff, and one on the north end of Chamber's Island. These are both prominent lights. The new cut across Grassy Island into the channel at Fox River is another great improvement. It makes a straight line from the black buoy off Sauble Bank Point to the second stake at the mouth of the river, and runs about NNE and SSW. It saves

about four miles distance through a shallow, crooked channel, and when the range lights are fixed there will be no difficulty in entering this channel in the night. Another great improvement, when completed, will be Sturgeon Bay Canal, a cut about two miles long from the Bay to the Lake. It will not only save a distance of over eighty miles run to Green Bay City, but would make a good harbor of refuge for vessels, and it is hoped that this improvement will be carried out to completion. Large can buoys will be placed on the Whale's Back Shoal, in Green Bay. A new Lighthouse will be built this season on Cana Island, between Mud Bay and North Bay. This light will make a good coast light, and will be of great benefit to those bound through Death's Door to Green Bay. Ranges will be placed in North Bay and Bayley's Harbor, and the old light discontinued. A Lighthouse is to be erected at South Haven, and another at Manistee, on the east shore of Lake Michigan. It is proposed to erect a Lighthouse or a beacon on the middle ground off Racine. These improvements will add materially to the safety of vessels cruising on this Lake and Green Bay. The pier at Devil River will be extended into 12 feet water, so that vessels can load alongside.

Lake Superior—The new lights and improvements on Lake Superior are a prominent feature. A new Lighthouse will be built on Grand Point au Sauble. This will be a good leading light for Grand Island Harbor, and also as a coast light. The new light at the east entrance to Grand Island Harbor is finished and in good running order, which, together with this light, and the ranges, make this harbor easy of access. Granite Island light, 12 miles from Marquette. The West Huron Island light, and the ranges for entering Portage River and Lake, are alike of importance. A Lighthouse is to be built at Lac La Belle; they are cutting a channel through a narrow neck of land, and making piers, which will form a good harbor for vessels loading copper, or for a harbor of refuge. Gull Island, between Manitou Island and Point Keweenaw, has a Lighthouse erected thereon, and is of great assistance in passing through this channel. The beacon on Stanard's Rock will be another great satisfaction to the weary mariner.

The new cut through Portage River, into Lake Superior, when completed, will eclipse all other improvements on this lake or on any other, of the kind. It will save over one hundred miles in distance to vessels and steamers bound to Ontonagon and Superior City, and will make a good harbor in bad weather. The harbor of Ontonagon is under improvement, and it is hoped that steamers will be able to reach the docks inside the river this season. Passage Island light is to be re-lighted this year. This passage, and also all the passages through the Apostle Islands, are of the most picturesque appearance. At Superior Harbor (River St. Louis), they are building a pier of protection and other improvements, with deep water through the passage. Great benefits will be derived from all the improve-

ments along the borders of our upper lakes. It is, indeed, a matter of surprise that so many valuable improvements in the harbors and docks of this section of the great lakes could be so thoroughly and successfully accomplished in a time so short. In no section of our country has the energy and enterprise of our people so manifested itself as in the improving of the harbors and rivers of the Northwest.

THOS. S. THOMPSON.

FLOW OF WATER IN RIVERS.

During the past two years observations have been made under the direction of the Superintendent of the Lake Survey, Gen. W. F. Reynolds, upon the flow of waters in the several rivers which connect the several lakes. The following are the results of last year's work:

Rivers.	Maximum velocity. Miles per hour.	Mean velocity. Miles per hour.	Discharge cubic feet. per second.
Ste. Marie	1.30	0.66	90,783
St. Clair	3.09	2.39	233,726
Detroit	2.71	2.04	236,000
Niagara	2.32	1.54	242,494
St. Lawrence	1.00	0.65	319,943

The river gauging is under charge of D. Farrand Henry, Assistant Engineer of the Lake Survey Department, who, the *Journal of the Franklin Institute*, from which we copy, says, "has conducted the work with much care and skill. He devised a 'telegraph current meter,' which is said to be more delicate and perfect than anything of the kind heretofore used, and hence the results will be of much value."

Mr. Henry is a native of Detroit and a son of one of the early eminent medical practioners in this city. He entered this branch of the public service many years ago and devoted himself entirely to its interests.

CUSTOM FEES OF VESSELS.

The Treasury Department has recently promulgated the following as the fees to be charged vessels by the Custom House officers, on the opening of navigation:

1. That when a vessel enters light from the same or another district, she pays a fee of 25 cents for an official certificate to the master's oath on making report, under 10th paragraph of the act.

2. That when a vessel enters with a cargo from a port or place in the same district, she pays a fee of 25 cents for a permit to land or deliver goods, under the 14th paragraph of the act.

3. That when a vessel clears, with or without cargo, for a port or place in the same district, she pays a fee of 25 cents for a clearance and Collector's certificate, under the 16th paragraph of the act.

4. That when a vessel clears light to another district, she pays the same fees that she would if laden, under the 7th paragraph of the act.

5. That vessels trading on Lake Michigan, exclusively, laden exclusively with American products, pay the same fees on entry and clearances as other vessels.

6. That Collectors are authorized to charge a fee of 25 cents for certifying triplicate manifests of goods transported in bond from eastern to western ports (or *vice versa*) through Canada.

IMPORTANT TO MARINERS AND OTHERS---OFFICIAL NOTICES.

VESSELS ARRIVING FROM FOREIGN PORTS.

The attention of owners, agents, consignees, masters, and commanders of vessels arriving from foreign ports is called to the provision of September 18, act of Congress dated and approved August 18, 1856:

"All owners, agents, consignees, masters and commanders of vessels shall deliver to the collector of the district, in which the vessel shall first arrive on her return to the United States, copies of any receipts for any papers given to them by any consular officer, and it shall be the duty of every collector of customs to forward to the Secretary of the Treasury:

"1. All such copies of receipts as shall have been so furnished to him.

"2. A statement of all certified invoices which shall have come to his office."

ONE STORY IS GOOD TILL ANOTHER IS TOLD.

There's a maxim that all should be willing to mind;
'Tis an old one, a kind one, as true as 'tis kind;
'Tis worthy of notice wherever you roam,
And no worse for the heart if remembered at home.
If scandal or censure be raised 'gainst a friend,
Be the last to believe it, the first to defend;
Say, to-morrow will come, and time will unfold
That "one story is good till another is told."

A friend, like a ship, when with music and song
The tide of good fortune still speeds him along;
But see him when tempest hath left him a wreck,
And any mean billow can batter his deck;
But give me the heart that true sympathy shows,
And clings to a messmate whatever wind blows;
And says, when aspersion, unanswered, grows bold,
Wait, "one story's good till another is told."

T. S. T.

PREFACE.

In presenting the fifth edition of the Coast Pilot to the Lake Navigator, the subscriber would respectfully say that, by the assistance of the lake surveys, and his own observations on his usual tour round the Lakes, he has been enabled to amend the work very materially. At the same time, he would tender to the fraternity his hearty thanks for the appreciation of his efforts which has rendered a fifth edition necessary, and would further recommend it to the young navigator as well as to those who are from the Seaboard, or otherwise unacquainted.

All the late improvements, new lighthouses, buoys, beacons, docks, etc., will be given; also, custom house regulations, and other information relative to Lake Navigation. which will render it a necessary companion for all Pilots on the great chain of Lakes.

THOS. S. THOMPSON,
Late Pilot U. S. Revenue Steamer W. P. Fessenden.

Detroit, 1869.

REMARKS ON THE MARINER'S COMPASS.

By frequent experiments, it has been found that compasses should not be nearer together than 4 feet 6 inches, to avoid the disturbance known to exist when two needles are placed near each other. The error from this source has, in many cases, been eight degrees. Where it is convenient, one compass to steer by is particularly recommended, and a standard compass for reference placed on the centre line of the vessel, and as far from iron work as possible—say 7 feet. Vertical iron stanchions should be at least 14 feet from the compasses. In steamboats, the compass is materially affected by the telescopic funnels, or smoke stacks, especially when hot; and when taken down, can be sensibly observed. The standard compass should be raised much higher from the decks of iron vessels than wooden ones.

I have found great difference in compasses on these lakes—hardly two will agree. In going from a vessel into a propeller or steamboat, the difference is seen immediately. No doubt that many accidents to boats and vessels have happened from this cause—not knowing how your compasses will lead you. There is no remedy for this difference, except by constant running on a route, when you will find out how your compasses will lead you; and by strict observation, the use of the LEAD, and a good look-out, you may run with safety in all pilotable waters.

T. S. T.

NOTE.—The action of the compass on Lake Michigan, through the Straits and Lake Huron, etc.—In running down the Lake from Chicago to the Manitou Islands, your compasses will lead you to the Eastward, increasing gradually from 3 to 6 degrees, as you approach the islands; but in running due north, the compass will show more correct. On the return courses from the islands to the West shore, the compass is still more affected. (See explanation, page 24.)

In passing through the Straits, between the Manitous, Foxes and Beaver Islands, the compass will lead you about 2 to 3 degrees to the Eastward, and here it is necessary to keep a sharp look-out; but as you can generally see Skillegolee and Point Waugoshance Lights at the same time, they being only 8½ miles apart, there is no excuse for making a mistake in clear weather. After passing Point Waugoshance, the courses are pretty true till you get down as far as Thunder Bay Island, when your compass will begin to lead you to the Eastward about 4 degrees. The course being from Thunder Bay Island Lighthouse, SbyE½E, to Point aux Barques, close to. On Lake Superior there is very little difference in return course, although the variation is greater in short distances.

THOMPSON'S

COAST PILOT FOR THE UPPER LAKES.

MAGNITUDE OF THE LAKES OR "INLAND SEAS."

Nothing but a voyage over all of the great bodies of water forming the "Inland Seas," can furnish the tourist or scientific explorer a just idea of the extent, depth, and clearness of the waters of the Great Lakes of America, together with the healthy influence, fertility, and romantic beauty of the numerous islands, and surrounding shores, forming a circuit of about 4,000 miles, with an area of 90,000 square miles, or about twice the extent of the State of New York—extending through eight degrees of latitude, and sixteen degrees of longitude—this region, embracing the entire north half of the temperate zone, where the purity of the atmosphere vies with the purity of these extensive waters, or "Inland Seas," being connected by navigable rivers or straits.

The States washed by the Great Lakes, are New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, and Ontario—the boundary line between the United States and the British Possessions running through the center of Lakes Superior, Huron, St. Clair, Erie and Ontario, together with the connecting rivers or straits, and down the St. Lawrence River to the 45th parallel of latitude. From thence the St. Lawrence flows in a northeast direction through Canada into the Gulf of St. Lawrence. The romantic beauty of the rapids of this noble stream, and its majestic flow through a healthy and rich section of country, is unsurpassed for grand lake and river scenery.

Lake Superior, the largest of the Inland Seas, lying between 46° 30′ and 49° north latitude, and between 83° 30′ and 92° 30′ west longitude from Greenwich, is situated at a height of 600 feet above the Gulf of St. Lawrence, from which it is distant about 1,500 miles, by the course of its outlet and the St. Lawrence River. It is 460 miles long from east to west, and 170 miles broad in its widest part, with an average breadth of 85 miles; the entire circuit being about 1,200 miles. It is 800 feet in greatest depth, extending 200 feet below the level of the ocean. Estimated area, 31,500 square miles, being by far the largest body of fresh water on the face of the globe—celebrated alike for its sparkling purity, romantic scenery, and the healthy influence of its surrounding climate. About one hundred rivers and creeks are said to flow into the lake, the greatest part being small streams, and but few navigable except for canoes, owing to numerous falls and rapids. It discharges its waters eastward, by the straits, or River *St. Mary*, 60 miles long, into Lake Huron, which lies 26 feet below, there being about 20 feet descent at the Sault Ste. Marie, which is overcome by means of two locks and a ship canal. Its outlet is a most lovely and romantic stream, embosoming a number of large and fertile islands, covered with a rich foliage.

Lake Michigan, lying about 576 feet above the sea, is 320 miles long, 84 miles broad, and 700 feet deep; area, 22,000 square miles. This lake lies wholly within the confines of the United States. It presents a large expanse of water, with but few islands, except near its entrance into the straits of Mackinac, through which it discharges its surplus waters. The strait is 30 or 40 miles in length, and discharges its accumulated waters into Lake Huron, on nearly a level with Lake Michigan. At the north end of the lake, and in the straits, are several large and romantic islands, affording delightful resorts.

Green Bay, a most beautiful expanse of water, containing several small islands, lies at about the same elevation as Lake Michigan; it is 100 miles long, 20 miles broad, and 60 feet deep; area, 2,000 square miles. This is a remarkably pure body of water, presenting lovely shores, surrounded by a fruitful and healthy section of country.

LAKE HURON, lying at a height of 574 feet above the sea, is 250 miles long, 100 miles broad, and 750 feet greatest depth; area, 21,000 square miles. This lake is almost entirely free of islands, presenting a large expanse of pure water. Its most remarkable feature is Saginaw Bay, lying on its western border. The waters of this lake are now whitened by the sails of commerce, it being the great thoroughfare to and from Lakes Michigan and Superior.

GEORGIAN BAY, lying northeast of Lake Huron, and of the same altitude, being separated by islands and headlands, lies wholly within the confines of Canada. It is 140 miles long, 55 miles broad, and 500 feet in depth; area, 5,000 square miles. In the *North Channel*, which communicates with St. Mary's River, and in Georgian Bay, are innumerable islands and inlets, forming an interesting and romantic feature to this pure body of water. All the above bodies of water, into which are discharged a great number of streams, find an outlet by the River *St. Clair*, commencing at the foot of Lake Huron, where it has only a width of 1,000 feet, and a depth of from 20 to 60 feet, flowing with a rapid current downward, 38 miles, into

LAKE ST. CLAIR, which is 25 miles long and about as many broad, with a small depth of water; the most difficult navigation being encountered in passing over "*St. Clair Flats*," where only about 12 feet of water is afforded. *Detroit River*, 27 miles in length, is the recipient of all the above waters, flowing southward through a fine section of country into

LAKE ERIE, the *fourth* great lake of this immense chain. This latter lake again, at an elevation above the sea of 564 feet, 250 miles long, 60 miles broad, and 204 feet at its greatest depth, but, on an average, considerably less than 100 feet deep, discharges its surplus waters by the Niagara River and Falls, into Lake Ontario, 330 feet below; 51 feet of this descent being in the Rapids immediately above the Falls, 160 feet at the Falls themselves, and the rest chiefly in the Rapids between the Falls and the mouth of the river, 22 miles below Lake Erie. This is comparatively a shallow body of water; and the relative depths of the great series of lakes may be illustrated by saying, that

the surplus waters poured from the vast *basins* of Superior, Michigan and Huron, flow across the *plate* of Erie into the deep *bowl* of Ontario. Lake Erie is reputed to be the only one of the series in which any current is perceptible. The fact, if it is one, is usually ascribed to its shallowness; but the vast volume of its outlet—the Niagara River—with its strong current, is a much more favorable cause than the small depth of its water, which may be far more appropriately adduced as the reason why the navigation is obstructed by *ice* much more than either of the other great lakes.

The ascertained temperature in the middle of Lake Erie, August, 1845, was temperature of air 76° Fahrenheit, at noon; water at surface 73°—at bottom 53°.

Lake Ontario, the *fifth* and last of the Great Lakes of America, is elevated 234 feet above tide-water at Three Rivers, on the St. Lawrence; it is 180 miles long, 60 miles broad, 600 feet deep.

Thus *basin* succeeds *basin*, like the locks of a great canal, the whole length of waters from Lake Superior to the Gulf of St. Lawrence being rendered navigable for vessels of a large class by means of the Welland and St. Lawrence Canals—thus enabling a loaded vessel to ascend or descend 600 feet above the level of the ocean, or tide-water. Of these five great lakes, Lake Superior has by far the largest area, and Lake Ontario has the least, having a surface only of about one-fifth of that of Lake Superior, and being somewhat less in area than Lake Erie, although not much less, if any, in the circuit of its shores. Lake Ontario is the safest body of water for navigation, and Lake Erie the most dangerous. The lakes of greatest interest to the tourist or scientific traveler are Ontario, Huron, together with Georgian Bay and North Channel, and Lake Superior. The many picturesque islands and headlands, together with the pure, dark green waters of the Upper Lakes, form a most lovely contrast during the summer and autumn months.

The altitude of the land which forms the water-shed of the *Upper Lakes* does not exceed from 600 to 2,500 feet above the level of the ocean, while the altitude of the land which forms

the water-shed of Lake Champlain and the lower tributaries of the St. Lawrence River rises from 4,000 to 5,000 feet above the level of the sea or tide-water, in the States of Vermont and New York.

The divide which separates the waters of the Gulf of Mexico, from those flowing northeast into the St. Lawrence, do not in some places exceed ten or twenty feet above the level of Lakes Michigan and Superior; in fact, it is said that Lake Michigan, when under the influence of high water and a strong northerly wind, discharges some of its surplus waters into the Illinois River, and thence into the Mississippi and Gulf of Mexico—so low is the divide at the southern terminus.

When we consider the magnitude of these Great Lakes, the largest body of fresh water on the globe, being connected by navigable straits or canals, we may quote with emphasis the words of an English writer: "How little are they aware, in Europe, of the extent of commerce upon these 'Inland Seas,' whose coasts are now lined with flourishing towns and cities; whose waters are plowed with magnificent steamers, and hundreds of vessels crowded with merchandise! Even the Americans themselves are not fully aware of the rising importance of these great lakes, as connected with the Far West."

TRIBUTARIES OF THE GREAT LAKES AND ST. LAWRENCE RIVER.

Unlike the tributaries of the Mississippi, the streams falling into the Great Lakes or the St. Lawrence River are mostly rapid, and navigable only for a short distance from their mouths.

The following are the principal rivers that are navigable for any considerable length:

AMERICAN SIDE.	Miles.
St. Louis River, Minn., Superior to Fond du Lac	20
Fox, or Neenah, Wis., Green Bay to Lake Winnebago*	36
St. Joseph, Mich., St. Joseph to Niles	26

* By means of seventeen locks, overcoming an elevation of 170 feet.

	Miles.
Grand River, Mich., Grand Haven to Grand Rapids	40
Muskegon, Mich., Muskegon to Newaygo	40
Saginaw, Mich., Saginaw Bay to Upper Saginaw	26
Maumee, Ohio, Maumee Bay to Perrysburgh	18
Genesee, N. Y., Charlotte to Rochester	6

CANADIAN SIDE.	Miles.
Thames, Lake St. Clair to Chatham	24
Ottawa, La Chine to Carillon	40
" (By means of locks to Ottawa City)*	70
Richelieu or Sorel, Sorel to Lake Champlain (by locks)	75
Saguenay, Tadusac to Chicoutimi	70
(Thence to Lake St. John, 50 m.)	

LAKE AND RIVER NAVIGATION.

FROM FOND DU LAC, LAKE SUPERIOR, TO THE GULF OF ST. LAWRENCE.

LAKES, RIVERS, Etc.	Length in miles.	Greatest breadth.	Average breadth.	Depth in feet.	El. above sea.
Superior	460	170	85	800	600 feet.
St. Mary's River	60	5	2	10 to 100	...
Michigan	320	85	58	700	576 "
Green Bay	100	25	18	100	576 "
Straits of Mackinac	40	20	10	20 to 200	575 "
Huron	250	100	70	700	574 "
North Channel	150	20	10	50 to 200	574 "
Georgian Bay	140	55	40	500	574 "
St. Clair River	38	1¼	1	20 to 60	...
Lake St. Clair†	25	25	18	10 to 20	568 "
Detroit River	27	3	1	10 to 60	...
Erie	250	70	40	200	564 "
Niagara River	35	3	1	.....	...
Ontario	180	58	40	600	224 "
St. Lawrence River	760	100	2	.....	...
Lake St. Francis, foot Long Sault	....	....	4	.....	142 "
Lake St. Louis, foot Cascade Rapids	....	....	5	.....	58 "
At Montreal	....	....	3	.....	13 "
Lake St. Peter	....	....	12	.....	6 "
Tide-water at Three Rivers	....	....	1	.....	0 "
At Quebec	....	....	1	.....	0 "
Total miles navigation	2,835				

*The navigation for steamers extends 150 miles above Ottawa City, by means of portages and locks.

†The *St. Clair Flats*, which have to be passed by all large steamers and sail vessels, running from Lake Erie to the Upper Lakes, now affords twelve feet of water. A new channel is being cut through over the Flats in a straight line with the first reach of St. Clair River, where range lights will be fixed.

COURSES AND DISTANCES ON LAKE MICHIGAN.

☞ All courses marked thus [*] are magnetic.	Courses.	Miles.
From Chicago to Grose Point	NNW	12
" Chicago to Racine	*N¼W	57
" Chicago to South Manitou Island	*NbyE½E	221
" Chicago to Grand River	*NE¼N	109
" Chicago to Kalamazoo River	*NE½E	90
" Chicago to St. Joseph	EbyN½N	61
" Chicago to New Buffalo	*E½S	45
" Chicago to Michigan City	EbyS	38
" Racine to Michigan City	*SEbyS¼S	82
" Milwaukee to Michigan City	*SEbyS¼S	101
" Manitowoc to Michigan City	*SbyE	168
" Milwaukee to St. Joseph River	*SE½E	92
" Port Washington to St. Joseph River	*SE¼S	109
" Sheboygan to St. Joseph River	SEbyS¼S	127
" Manitowoc to St. Joseph River	*SSE	148
" Kewaunee to St. Joseph River	*SSE½S	169
" Grand River to Milwaukee	W½S	84
" Port Washington to Grand River	*EbyS¼S	83
" Sheboygan to Grand River	*SEbyE½E	87½
" Manitowoc to Grand River	*SE½E	100
" Kewaunee to Grand River	*SEbyS¼S	119
" Sheboygan to the South Manitou Island	NE¼N	123
" Manitowoc to the South Manitou Island	NE½E	97½
" Manitowoc to Grand Point au Sauble	*E½S	55
" Death's Door to Grand Point au Sauble	*SbyE½E	90
" Death's Door to Manitou Islands	*SEbyE Ey	48
" Bailey's Harbor to South Manitou Island	E½S	45
" Twin Rivers to abreast of Beaver Island, leaving the Manitou Islands to the eastward, and the Fox Islands to the westward	NE½E	140
" Big Traverse Lighthouse to Rock Island (entrance to Green Bay, North Channel), leaving the Fox Islands to the northward	*WbyN½N	65
" Big Traverse to Point Waugoshance	NEbyN½N	44
" Skillegolee to Pine River	S½W	20
" Skillegolee to Point Waugoshance Lighthouse	S27°W.	8½

FROM POINT WAUGOSHANCE LIGHTHOUSE TO BEAVER HARBOR, TWENTY-ONE MILES, AS FOLLOWS.

From a point ½ mile south of the Lighthouse, steer WbyS½S 13 miles, to a point ½ mile north of Hog Island Reef; thence west 8 miles to Beaver Harbor.

Hog Island Reef—least water, 6½ feet—is 3½ miles from the south point of Hog Island; 6½ miles SbyW½W from Hat Island; about south from the small island near the east coast

of Hog Island, and SE¼S 4¼ miles from the SW point of Hog Island.

The range line of the NW and NE points of the Big Beaver Island runs EbyS, and passes 1 mile to the northward of Hog Island Reef, and about ½ mile to the southward of a small shoal of 6 feet water, lying 1¾ miles south of the SW point of Hog Island, where Hat Island is just shut in by the SE point of Hog Island.

In going from point Waugoshance to Beaver Harbor, the range of the NW and NE points of Big Beaver Island should not be crossed until Hog Island bears north.

FROM POINT WAUGOSHANCE TO BEAVER HARBOR, LEAVING HOG ISLAND REEF TO STARBOARD, TWENTY-TWO MILES, AS FOLLOWS:

From Point Waugoshance Lighthouse SW¼W 10½ miles, or until Skillegolee Lighthouse bears ESE; thence west 5½ miles; thence WbyN¼N 6 miles. Lighthouse on starboard hand going in.

FROM POINT WAUGOSHANCE LIGHTHOUSE TO CHICAGO, THREE HUNDRED AND TWENTY-THREE MILES, AS FOLLOWS:

From Waugoshance Lighthouse SW¼S 72 miles to a point 6 miles east of the South Manitou Island Lighthouse; thence SW ¼S 123 miles to Sheboygan; thence S¼E 128 miles to Chicago.

FROM WAUGOSHANCE LIGHTHOUSE TO SHEBOYGAN, PASSING NORTH OF THE FOX ISLANDS, ONE HUNDRED AND EIGHTY-SIX AND ONE-EIGHTH MILES, AS FOLLOWS:

Steer SW¾W 25 miles, then around Beaver Island for 2 miles, till the Lighthouse bears NW; thence steer WbyS¾S for 19¼ miles, till the north point of South Fox bears SE 2 miles distant, when steer SW¼S 150 miles for Sheboygan.

FROM WAUGOSHANCE LIGHTHOUSE TO MILWAUKEE, PASSING NORTH OF THE MANITOU ISLANDS, TWO HUNDRED AND FORTY-ONE MILES, AS FOLLOWS:

Steer SW¼W for 61¼ miles, passing 1¼ miles from the south point of South Fox, till the west side of North Manitou bears north, when steer SWbyS¼S 180 miles to Milwaukee. Bound down, keep the highest land on the North Fox closed in with

the southern point of South Fox, till within two miles of this point, to avoid the 13 feet shoal bearing N½W and distant 3½ miles from the most southern extremity of South Fox.

FROM WAUGOSHANCE LIGHTHOUSE TO CHICAGO.

Steer SW½S for 97½ miles, till Point Betsey Lighthouse bears east; thence SSW½S for Chicago.

The Lighthouses at Waugoshance and Skillegolee are 8½ miles apart; and the range line of the two, as referred to the true meridian at Waugoshance, being just S27°W, a good opportunity is afforded to masters of vessels to test the working of their compasses by dropping upon this range, either to the SWbyS½S of Skillegolee about two miles, or to the NEby N½N of Waugoshance Lighthouse about the same distance, and sailing upon the range ½ a mile or so, keeping the Lighthouses covered in both cases.

The White Shoals bear from Point Waugoshance Lighthouse NW½W 4¾ miles. You can pass all round them in 20 to 30 feet water. They can be plainly seen in clear weather.

Simmon's Reef bears from Point Waugoshance Lighthouse NWbyN 10¾ miles; is 1¼ miles long, east and west. You can pass round it from 18 to 24 feet water, and can be seen quite plain in clear weather. It bears from the White Shoals NWby N½N 5¼ miles, and from the NW end of St. Helena WbyN 17¾ miles.

The Indian Payment Shoal bears from Simmon's Reef NEby E½E 7¾ miles, and from the NW end of St. Helena NW¾W11¾ miles. It has from 5 to 11 feet water upon it, and can be passed all round in from 21 to 40 feet water.

The shoal off the NW end of St. Helena bears due west from the island 2 miles, and can be passed on either side in from 25 to 30 feet of water. This shoal has from 8 to 15 feet of water on it.

Gray's Reefs bears from Point Waugoshance Lighthouse west 6 miles. There are 13 patches in all, only one of which has less than 16 feet of water, and that one is near the centre.

Eight of them are pretty close together and the rest scattered. Four of them bear south from Hat Island.

Hog Island Reef bears from Hat Island SbyW¼W 6¾ miles, and from Skillegolee WNW 9¾ miles.

FROM BEAVER HARBOR TO THE MANITOU PASSAGE, SIXTY-THREE AND A HALF MILES, AS FOLLOWS:

Stand out of the harbor SEbyE 2 miles; thence S¼E 8 miles; thence south 10½ miles, so as to fall into the route from Waugoshance; thence SW¼S 43 miles, to a point 6 miles east of the South Manitou Island Lighthouse.

FROM BEAVER HARBOR TO GREEN BAY, BY ROCK ISLAND CHANNEL, EIGHTY-FOUR MILES, AS FOLLOWS:

Stand out of the harbor SEbyE 2 miles; thence S¼E 8 miles; then follow the island round at a distance of 1 mile from the land for 7 miles, until the Lighthouse (revolving light) at the south end of the island bears north; thence W¼S 67 miles to Rock Island Lighthouse.

FROM WAUGOSHANCE LIGHTHOUSE TO THE LIGHTHOUSE (REVOLVING LIGHT) ON THE SOUTH BLUFF OF BEAVER ISLAND, TWENTY-EIGHT AND A QUARTER MILES, AS FOLLOWS:

From Waugoshance Lighthouse SW¼W 25¼ miles; thence along shore to the southward and westward 3 miles, at a distance of 1 mile from the land, until the lighthouse bears north; thence to Green Bay, as above.

DIRECTIONS FOR SAILING NORTH OF THE BEAVER ISLANDS.

FROM MACKINAW TO SEUL CHOIX POINT.

From the middle of Mackinaw Harbor WSW 4½ miles, or until you range the Rabbit's Back Point with Point St. Ignace; thence W¼N to Seul Choix Point.

This route passes 4½ miles to the northward of Point Waugoshance Lighthouse, and 1½ miles to the north of the White Shoals.

Seul Choix Point bears from Gull Island, which is the westermost island of the Beaver group, NbyW¼W 16 miles. The water is deep close to this point. You can approach the point in from 30 to 55 feet water. Rocky bottom.

FROM SEUL CHOIX POINT TO HAT ISLAND, THIRTY MILES, AS FOLLOWS:

From Seul Choix Point EbyS¼S 30 miles; thence on the same course 10 miles, to Point Waugoshance Lighthouse.

This route passes 2½ miles south of the White Shoals, and 1½ miles north of Gray's Reefs.

FROM ST. HELENA ISLAND TO ABREAST OF THE MANITOUS, NORTH ABOUT, AND TO CHICAGO, THREE HUNDRED AND TWENTY-TWO MILES.

From St. Helena, after clearing the shoal which is due west from the island 2 miles, steer due west 40 miles; thence SW¼W 16 miles; thence SbyW¼W, for Chicago, 273 miles.

This route is only 9 miles further than the Sheboygan route, and is far more preferable in the fall of the year. A vessel or propeller, by keeping the west shore aboard, can go with a NW and westerly wind in smooth water, and make her passage with ease; and in case of being driven down in thick weather to the northward and westward of the Beaver Island group, these routes will be found convenient for making the Straits, by keeping to the northward of them all, and come in to the eastward.

Gull Island Shoal bears from Gull Island SbyE½E, from High Island SWbyW, and from the SW point of Beaver Island WNW.

There are two patches of shoal water a little to the southward and eastward of Gull Island Shoal, with 16 and 17 feet water on them. This reef is about 4½ to 5 miles from Gull Island. Between Gull Island and High Island the water is deep, being from 22 to 168 feet, from shore to shore, and is nearly 6 miles wide. Due north carries you through midway. The water between High Island and the Big Beaver is deep, being from 36 to 138 feet. To run through this channel, keep about midway until you are abreast of Trout Island, steering

NNE. This course will carry you clear through, leaving Whisky Island and the shoal which sets off from it SW to port, best aboard, but is only safe for small vessels, as there are a number of patches of rock and sand with from 7 to 13 and 17 feet of water on them; but in case a vessel should get in here in foggy weather, when you are abreast of the NW point of the Big Beaver, haul out NW until Trout Island bears SSW, then haul up NNE, leaving Whisky Island and Squaw Island 2 miles to starboard, until Seul Choix Point bears W¼N; thence as above to Mackinaw.

Potter's Reef bears from Point Patterson EbyN¾N 6¾ miles, and is nearly in range with Point Patterson and Seul Choix Point.

The distance from Squaw Island (which is the most northern island of the Beaver group) to Point Patterson is 9¼ miles, and Seul Choix Point is 14½ miles from Trout Island and 16 miles from Gull Island, leaving a deep channel of from 30 to 180 feet water.

FROM BEAVER HARBOR TO POINT WAUGOSHANCE LIGHTHOUSE, TWENTY MILES AND A HALF.

From the south dock at the entrance of Beaver Harbor east 8 miles, to a point ¾ mile north of Hog Island Reef; thence EbyN¼N12½ miles, to the passage ¼ mile south of Waugoshance Lighthouse, observing that Hog Island Reef lies in the range of Whisky Island and the south point of Garden Island; a range easily recognized, and which will serve to indicate the vicinity of this dangerous reef.

FROM WAUGOSHANCE LIGHTHOUSE TO NORTHPORT AND TRAVERSE CITY, IN TRAVERSE BAY.

Steer SW½S 9¾ miles till Skillegolee Lighthouse bears east, thence SSW 41½ miles, till Northport Point bears NW, when run for the dock. In going in and going out, look out for the shoals in the northern part of the bay. To make Traverse City when SE of Northport Point, as above, steer SbyW 24¼ miles, to the dock at Traverse City.

LIGHTHOUSE IN GRAND TRAVERSE BAY.

The petition to Congress for a Lighthouse at the northern extremity of the peninsula in Grand Traverse Bay has been successful, and an order has been issued for the erection of the building the coming season. Our Representative, Hon. T. W. Ferry, will have the hearty thanks of the dwellers around the bay, and especially of the ship owners and captains, for the interest he has manifested in this matter.

FROM WAUGOSHANCE LIGHTHOUSE TO THE VILLAGE OF LITTLE TRAVERSE.

Steer SW½S for 2 miles, thence S½W 14 miles, till Middle village bears east, giving Skillegolee or Isle Aux Gallets Lighthouse, a good berth, then follow the coast at the distance of ¾ mile off for 15 miles, till the harbor of Little Traverse is made.

NOTE.—The above courses are true, and the distances are in statute miles.

HARBORS AND ANCHORAGES.

LITTLE TRAVERSE

Is an excellent harbor, affording protection in all winds, with good holding ground. In Traverse Bay, the harbors of Northport, New Mission Point, Sutton's Bay, Bowers Harbor, and old Mission Bay, are all good harbors.

CAT-HEAD POINT AND BAY

Afford shelter in southerly winds. Very good holding ground is found under Pyramid Point. Also, Unity Dock affords protection in all winds except N and NE.

GLEN HARBOR,

In the Bay, between Sleeping Bear Point and Pyramid Point, has good shelter from all winds from the west, round by the south to northeast.

A LEE

Can be made under the North Manitou, with generally good holding ground.

THE HOLDING GROUND AROUND THE FOXES

Is very good, and they afford shelter from all winds, except those from the NW and SE.

IN GOING INTO LITTLE TRAVERSE BAY,

You will make a sandy point which forms the harbor; haul close round it and into the bay, and come to in from 2 to 9 fathoms water. Off the point which forms the harbor, you will have from 10 to 17 fathoms water close to. The village cannot be seen until you are nearly up to the point. This bay is one of the prettiest harbors on all the lakes.

NORTH MANITOU ISLAND

Has two wood docks, one on each side of the island; and good holding ground can be found on the east side of the island, near the dock, in from 6 to 10 fathoms. Pickard & Co. have a saw mill here.

SOUTH MANITOU ISLAND

Has two wood docks, one in the bay and one on the SW side of the island. Good holding ground in the bay, with the dock bearing NWbyW, in from 7 to 12 fathoms. The dock runs out EbyS½S. The SE point of the North Manitou Island bears from the dock E½N 6½ miles, and the Lighthouse bears from the dock SEbyS½S 2 miles.

There is also a dock at the North Unity Bay, opposite the Manitou Islands.

DANGERS.

FROM MIDDLE VILLAGE TO THE FOOT OF THE EAST ARM OF GRAND TRAVERSE BAY.

The coast, as far as Little Traverse, can be approached within ½ a mile. There are detached rocks and rocky spots within ½ of a mile from the shore. A 12 feet spit extends 600 feet SbyE from the dock at Little Traverse. There is also a 9 feet spot 1,000 feet south of the most eastern house of this village.

FROM LITTLE TRAVERSE TO BIG ROCK POINT.

The coast can be approached safely within ¼ of a mile, the shallow water being in the indentations of the shore. From Pine River Point, a rocky flat extends ¼ of a mile to the west and north.

DANGEROUS REEFS

Extend to N and NW for almost a mile from Fishermans' Island. From this island to the foot of the east arm of the bay are many detached rocky spots and ledges, and numerous sp.. , extending from the shore, but not less than 12 feet water will be found on any part within ½ a mile from the general direction of the shore, except at the foot of the bay, where 12 feet are found in spots ¾ of a mile from shore.

FROM THE FOOT OF THE EAST ARM TO TRAVERSE CITY.

From the foot of the Bay to the village of Old Mission, the coast can be approached within 1,000 feet everywhere; but ½ a mile south of the village, a flat extends 1,500 feet into the bay. From the point opposite and east of the village, a spit runs out in a SE direction. A dangerous rocky flat extends from Old Mission Point, north and west, for 1¼ miles from the shore. From Old Mission Point to Tucker's Point, several spits extend from the shore, making navigation unsafe within ½ a mile from the coast. From Tucker's Point, a rocky spit runs out south for ½ a mile. A rocky spit extends from the south point of Hog Island, for more than ½ a mile, to the SW, and a smaller one in a NE direction from its northern point. From Bowers harbor to Traverse City, the shore can be approached within ¼ of a mile.

FROM TRAVERSE CITY TO LIGHTHOUSE POINT.

Two miles north of the dock at Traverse City, a dangerous 9 foot spit extends ½ a mile from the shore. The coast from here to Lee's Point, is safe within ½ a mile. From Lee's Point, a spit extends to the south for ¾ of a mile. North of Lee's Point, a flat runs, almost ½ mile from shore, half way to Sutton's Point. From this point, a rocky spit extends ⅝ of a mile to northward. The western shore of Sutton's Bay is shallow within ½ a mile.

The coast from Pishaube's Village to Northport is generally good, but a lookout should be kept for a rocky spit, extending for almost a mile NbyE from the northern end of New Mission Point. There is shoal water for ¼ of a mile to north and east of Bellows Island. Two dangerous shoals, with 6 and 8 feet water on them, lie between Northport Point and Northport. A rocky spit runs out in a SE direction for ½ a mile, from a point ¾ of a mile north of Northport Point; from thence to Lighthouse Point the shore can be safely approached within ½ a mile, but at the Lighthouse point a rocky spit extends ½ a mile to the northward.

FROM THE LIGHTHOUSE POINT TO POINT BETSEY.

Between the Lighthouse and Cat-Head Point, two spits extend over ½ a mile from shore. From Cat-Head to Carp River, the coast can be approached within ½ a mile, but there are two detached 12 feet rocky spots, 4 miles NE½N from the dock at Carp River, and 1⅝ miles from the shore. In Good Harbor Bay are several shoals, with only eight feet water on them. One of these will be found bearing NE½N from the dock at Unity, and distant 4 miles. This shoal is directly on the line joining Carp River and Pyramid Point.

Another 8 feet spot bears from Unity Dock NE¼E, distance 3¾ miles, and is a little inside the line joining Unity Dock and Carp River point. Southeast from this last spot, and ½ a mile distant, is a 10 feet spot. Three miles south of Pyramid Point, a rocky spit runs ½ a mile from shore, and shoal water extends for a mile toward Sleeping Bear. From thence to Point Betsey the shore is bold, and can be approached within ¼ of a mile, except at Platt River Point, where a spit extends to the north having only 6 feet water on it ¾ of a mile from shore.

FOX AND MANITOU ISLANDS.

South Manitou Island can be approached within ¼ of a mile, everywhere except on the south and southwest sides, where shoal water extends ½ a mile from the shore. There is also a rock with only 3 fathoms water on it, SSW½W from the SW point of Manitou Island, distance 2½ miles.

The shore of North Manitou can be safely approached within ¼ of a mile on the north side, and within ½ a mile on the east and west sides; but there extends, in a southerly direction, a rocky spit, more than ¾ of a mile, from the SW side of the island.

From the north point of the South Fox, a spit runs out for a mile, in a northwestern direction, and another from its Southern point, for ½ a mile in a southwest direction.

There are two dangerous rocks with deep water surrounding them; the one with only 13 feet of water upon it, from which the south point of South Fox Island bears NbyE, distant 3⅜ miles; the other, having 16 feet water on it, bears N½E from the same point, distant 7⅜ miles.

North Fox can be approached within ½ a mile, except on its west side, where shoal water extends to ¾ of a mile, with a 9 foot spot ½ a mile from the shore.

GREEN BAY.

FROM POINT WAUGOSHANCE LIGHTHOUSE TO GREEN BAY CITY, ONE HUNDRED AND SEVENTY-NINE MILES.

From Point Waugoshance Lighthouse to abreast of Beaver Island (revolving light) steer SW¾W 25 miles; thence around Beaver Island, keeping about a mile from the shore for three miles, till the Lighthouse bears north; thence W¾S 67 miles, to Rock Island Lighthouse. In running through this channel, keep Buoyer's Bluff, which is 7 miles from Rock Island Lighthouse, just open with Rock Island, to clear the shoal which sets off from the SE end of St. Martin's Island 2 miles, and bears from Rock Island Lighthouse NE½E 5¼ miles.

The shore is very bold on the north and west sides of Rock Island, and the best landing place is to the SW, where the beach begins to form toward the false passage. To make a landing, run close along the island until nearly abreast the beach, when you will have 11 fathoms water, soft bottom. This bay or false channel is open to the NW, and is rock all across to Washington

Island, just beyond the low point which makes out from Rock Island to the SW. From Rock Island Lighthouse, run for Buoyer's Bluff, 7 miles. This Bluff is also very bold, and can be approached within ¼ of a mile. Thence shape your course SW½W, for the westermost point of Chamber's Island, 26 miles; thence SbyW½W 11 miles, so as to pass ¾ of a mile to the eastward of Green Island, and continue the same course 9 miles farther—20 miles in all from Chamber's Island, to pass the point of Pershetico Shoal, which sets off 3¼ miles to the SE from Pershetico Point; when past the shoal or abreast of Pershetico Point, steer SWbyS 31 miles to the buoy off Long Tail Point Lighthouse; leaving this buoy (red) to starboard; Point aux Sauble Bank buoy (black) to port; Grassy Point buoy (red) to starboard. All the rest of the buoys are red, and must be left on the starboard hand. Give them a berth of 40 feet. The greatest depth of water carried out in 1867 was 11 feet on the level. In the middle of the channel the bottom is hard, until after passing Grassy Point, when it is hard, covered with mud. Outside of Grassy Point, it is sandy out of the channel; within Grassy Point, there is mud bottom out of the channel. The depth of water is affected to the extent of from 6 to 18 inches by the wind and varying atmospheric pressure; the changes being of almost daily occurrence.

The courses are magnetic; and due allowance should always be made for set of current in the bay, and also among the islands, according to which way the wind is or has been blowing.

Fishing Island Shoal lies ESE from the east side of Rock Island about 2 miles, and is just above water. A few years ago there was a fishing shanty on this island, but the rise of water drove it off. The water is deep all round it, and there is good anchorage under the SE side of Rock Island, in 5 to 9 fathoms water.

There is also another reef which lies SSE, 3 miles from the SE end of Rock Island, ½ a mile long, with 4 feet water on it.

FROM WASHINGTON HARBOR TO LONG TAIL POINT LIGHTHOUSE, BY THE STRAWBERRY ISLAND CHANNEL.

Run out of the harbor close round Buoyer's Bluff, which is very bold, and at a distance of ¾ of a mile; steer SWbyS 29 miles

to abreast of the point beyond Horse Shoe Island, called Eagle Bluff Point, where a lighthouse has been erected, and shows a bright white light, leaving Plum Island to port in the distance, and the Door Bluff (which is high and deep close to) on the peninsula to port; and as you approach the next high bluff, called the Sister Bluff, you will make two small islands called the Sisters, which you also leave to port, at a distance of 1½ miles, and take notice that there is a reef, with two detached shoals, ½ of a mile apart, on the same range, which bears from these islands SWbyS½S 2½ miles, with 6½ feet water on them. You can run all round them in from 40 to 50 feet water. After passing these islands, keep Horse Shoe Island just open with the next bluff point above it, Fish Creek Bluff, which is 3 miles beyond Eagle Bluff; or in the night, run for the light, keeping it a little on the port bow, leaving a patch of rocks called the Pancake Shoal to starboard, which shoal bears from Horse Shoe Island N½W about 2½ miles. After passing Horse Shoe Island, keep the east shore well aboard, until past the Strawberry Islands and abreast of Hat Island; then shape your course SWbyS 55 miles, to Long Tail Point, or run the shore along from point to point, at a distance of 2 miles, and note that there is a patch of rocks about 7 or 8 miles from Hat Island, and 1½ miles from the shore, called Horse Shoe Bay Reef, and 5½ miles from Egg Harbor.

HORSE SHOE ISLAND AND EAGLE HARBOR.

To go into this harbor, follow the island close round, and haul in to the dock, or make fast to the trees, as the water is very deep close in. When in this harbor you are perfectly land-locked. There is a good wood dock to the southward and eastward of Horse Shoe Island in the bay, and is always supplied with wood of the best quality. The depth of water between Horse Shoe Island and the mainland is from 6 to 10 fathoms, sandy clay.

Fish Creek is 3 miles from the first point above Horse Shoe Island, and is a good harbor. You can carry from 2 to 3 fathoms water, clay bottom; about one cable's length beyond the

dock, there is a spit that sets off from the point on the same side as the dock in going in, which is plainly shown, however, in clear weather.

Egg Harbor has a good wood dock, with 14 feet water alongside; is on the east side of the bay, and runs out west, with an angle north and south from it, to the southward. Wood of the best quality. This bay is large and commodious, with good holding ground in from 3 to 7 and 8 fathoms, clay bottom.

Hat Island is directly opposite Egg Harbor, and bears from the dock NWbyN½N, and is just open with the SW end of Chamber's Island.

BIG STURGEON BAY.

In running up Green Bay, after leaving Hat Island, east channel, run the shore along at a distance of 2 miles; cross Sturgeon Bay, keeping the south shore well aboard, or when Green Island bears NWbyN¼N; run in SEbyS¼S, until Bradley's Dock is abeam; then haul over for the dock. From Bradley's Dock to Graham's Dock, run the shore along in from 12 to 15 feet water.

TO ENTER LITTLE STURGEON BAY.

Run for the south bluff at the entrance to the bay, keeping it well aboard, in 3 to 4 fathoms water; you will carry that water until well up to the saw mill.

TO ENTER FOX RIVER BY THE LEAD AND MARKS.

On approaching the Red Clay Banks, run to the southward and westward, until you bring the three shanties at Duck Creek in a line with the north end of the Red Clay Banks; run on this range, steering WSW, until well past the Lighthouse, and into 12½ to 13 feet water. It will be observed that while running on the above range you will have from 3¼ to 3½ fathoms water, and will carry that water until the Lighthouse bears N½E, when the highest houses in the upper part of Navarino City will be in line with the two notches on the westermost part of Grassy Island; haul up quickly to the eastward, steering about SE, and run along Grassy Island in from 13 to 16 feet water; pass round the point, giving it a good berth, in 12 feet water; range the

island on the south side, and run along it pretty close to in 10, 11, 12 and 13 feet water, until you range the Lighthouse in the same notches as you did the town on the north side of the island; then haul up quickly again to the southward and run into the river, which can be done by forming the best part of the letter S. In making the turn, you will run over a mud bar of 9½ to 10 feet water. When in the river, keep the starboard side best aboard, to clear a flat which sets off and below Devil River. When abreast of Fort Howard, haul over to the docks at Navarino, or come to anywhere in the river in 5½ fathoms water.

When abreast of Grassy Point, in 11 feet water, you can make a straight line for the mouth of the river over the flats, in nothing less than 9½ feet water. Steering about WbyS, will lead you to the first stake outside the river; when you drop into 10 to 15 feet water, haul up river. The courses in these directions are compass courses. The Depot of the Railway terminates at the town of Howard, opposite the city of Navarino.

The new channel across Grassy Island, leading to Fox River will be, when finished, 200 feet wide, and 14 feet deep, from end to end, about a mile and a half. It will save from 3 to 4 miles of sailing over the old route, round the east end of Grassy Island, besides the great advantage of permitting vessels to come in with a wind that would allow them to head up SSW or NNE.

The new channel leaves the old one near the second stake below the mouth of the river, and runs straight in a line about NNE, pointing to the black stake on Sauble Point, and when the range lights are placed, steamers and vessels will be able to run up or down in the night.

BIG BAY DE NOC.

From Louse or Rock Island Lighthouse to Big Bluff NbyE ½E 20 miles; thence NEbyN½N 8½ miles to Garden Bluff; thence NNW¼W 4 miles, to Holbrook & Elkin's mills; come to in 12 to 13 feet water. There is excellent holding ground in

the bay to the northward of the Big Bluff, in from 6 to 7 fathoms water, mud bottom.

From Death's Door, after entering this channel, and past Plum Island, run the shore of Washington Island along at about 1 mile distant, or N½E 8 miles to abreast of Buoyer's Bluff; thence NEbyN 24 miles, to Big Bluff; thence NE½N 8 miles, to Garden Bluff; thence NNW½W 4 miles, to the Mill at Sturgeon River. There is a buoy kept off the mouth of the river as a mark for vessels to load by.

From the NW end of St. Martin's, after passing through the channel, steer NbyE½E to Big Bluff, 12 miles. There is a good harbor on the NE end of Big Summer's Island, with good protection from all winds except NE. Come to in the centre of the harbor in 5 to 7 fathoms, opposite the fishing houses.

SAG HARBOR.

Sag Harbor is a small bay on the south side of Big or Burnt Bluff, about 3 miles from it. It is formed by a sand bar running in a line with the shore. To run in, haul round the bar by the lead and come to in the bay; there is only 6 feet water going in.

OGONTZ BAY.

This bay is formed by Round Island, Isle St. Videl, and a long shoal which sets down from Indian Point, and Sturgeon River, and terminates with three patches of rock, which bear from Middle Bluff NWbyW½W 3½ miles, with 6 to 7 feet water on them. This shoal can be followed close round, in 4 fathoms, from Sturgeon River to the head of Ogontz Bay, and when abreast of Isle St. Videl the soundings will decrease gradually from 3 to 2 fathoms. In returning from Ogontz Bay bound to Point Peninsular, run down the bay SbyW½W until past Round Island; then haul up SWbyW½W 13 miles, giving Round Island a berth of ¾ of a mile. Pass round Point Peninsular at a distance of 1½ miles to clear the shoals off from it. The soundings are very gradual from Round Island to the Point in 3½ to 4 fathoms water, and at the head of Big Bay de Noc and Gar-

den Bay the soundings are very gradual from 4½ fathoms to within ¾ of a mile of the beach.

There is a shoal sets off from Stoney Point, which is a point of low land, east of Sturgeon River 1½ miles, and also a shoal off the next low point north of it ¾ of a mile.

There is a remarkable sand bluff called Jack's Bluff on the east side, at the head of the bay. It can be seen from Big Bluff, and is a good leading mark for the head of the bay.

There is excellent holding ground under Garden Bluff, and a good harbor can be made under Middle Bluff, and the island north of it, in 4½ fathoms, soft bottom. You can run into this harbor from the northward, leaving the island to starboard, in 3 fathoms (sandy) until you drop into soft bottom.

To go in from the southward, haul in close round the bluff and into the bay, leaving the island to port.

SNAIL SHELL HARBOR.

This harbor lays to the southward of Middle Bluff, and is perfectly land-locked. The water is very deep. Vessels or boats make fast to the trees, or lay alongside the beach, which is steep. It is not so good a harbor for vessels as steamers, as the entrance is open to the northward. Big or Burnt Bluff has good anchorage in 5 to 7 fathoms, soft bottom, on the north side, in the bay. Vessels can ride out any gale here. Height of Big Bluff, 227 feet from water level. Course from Big Bluff to Isle St. Videl, NbyW½W 4 miles; from Point Peninsular to Buoyer's Bluff, S½E 18 miles; from the station on Big Bluff to Buoyer's Bluff, S 26°W. The Door Bluff shows out a little to the westward of Buoyer's Bluff on the range.

NOTE.—There is a lighthouse on Point Peninsular, and a beacon light on Sand Point, in Little Bay de Noc.

As the railroad to Marquette is now in operation, masters of vessels will find it to their advantage to run through the north passages, especially coming from the lower lakes. The passage north of the Beaver Islands, in connection with them, will shorten the route materially, and is preferable to the south passage. High Island gives a good lea with a southerly wind

in the north passage. A lea can be made from a south wind under Gull Island, Front Island and Whisky Island, but the ground is not so good as under High Island. The best anchorage is under the east point of the island, in 5 to 7 fathoms, sandy clay. When laying here, should the wind chop round to the NW, you can run out, round the east end of the island, giving the point a good berth, and follow the island close round and come out to the westward, leaving Gull Island to port or to starboard pretty close to. The course from the south side of Gull Island to Rock Island Lighthouse is WSW, but if the wind should be southerly you will have to haul up a point higher, as a southerly wind always sets a stiff current through the passages and along the islands leading into Green Bay.

ST. MARTIN'S ISLAND CHANNEL.

In going through this channel, leave the Gull Islands to starboard and St. Martin's Island to port; run through about mid-channel, and when abreast of the west end of St. Martin's, steer NW¼W 15 miles for Point Peninsular; thence NNW 6 miles to Sand Point, Little Bay de Noc, giving the Point a berth of ½ a mile, and haul round to the docks or come to anchor in 7 fathoms. In passing Peninsular Point, give it a berth of 1½ miles, to clear the shoal that sets down from it S½E. There is a detached shoal to the eastward of the Point about ¾ of a mile with 8 feet water on it. A very good harbor can be made from S to E and NE winds on the west side of Point Peninsular in 5 to 6 fathoms water, soft bottom, with the Point bearing ESE.

NOTE.—The shore is bold on the north and west sides of St. Martin's Island, and the channel is deep from 13 to 20 fathoms. From the SE point of the island for 2 miles, you will find 6 to 7 fathoms water, hard bottom.

There is a detached shoal off the SE end of St. Martin's Island, bearing SbyW 2½ miles distant, which has 8 to 12 feet water on it.

One cable's length from this shoal you will find from 5 to 7 fathoms water, and will carry that water a long distance to the northward.

FROM PLUM ISLAND TO SAND POINT, LITTLE BAY DE NOC.

From Plum Island to a point 3 miles west of Point Peninsular, and in mid-channel, steer N½W 27 miles; thence same course 6 miles to Sand Point.

From Buoyer's Bluff to Sand Point N½W 24 miles. From Rock Island Lighthouse to Sand Point NNW 25 miles.

From Green Island to a point 3 miles west of Point Peninsular NNE½E 49 miles; thence N½W 6 miles to Sand Point. This course brings you close to Chamber's Island.

From the anchorage off Menomonee River to a point 3 miles west of Point Peninsular NE¾N 49½ miles.

POVERTY ISLAND CHANNEL.

There is a good deep channel on both sides of Poverty Island. To enter the south channel keep midway between Poverty and Gull Islands, and after passing Poverty Island haul up for Little Rock Island, keeping Big or Burnt Bluff closed in behind Little Rock Island. On this route you will pass over a shoal with 4 to 5 fathoms water on it. There are several patches of shoal water lying between this shoal and the North Gull or Gravely Island, so that by keeping well to the northward you avoid all danger.

A Lighthouse is to be erected on Poverty Island as a guide for these channels.

To enter Green Bay by the north channel, open Poverty with Big Summer's Island, and run straight in, keeping Poverty best aboard; thence for Little Rock Island, giving it a berth of ¾ of a mile.

The channel between Point Detour and Big Summer's Island is difficult to run, being crooked and shallow, and requires a good pilot, the depth of water being only 10 to 12 feet, and rocky.

FROM CHICAGO TO GREEN BAY BY DEATH'S DOOR.

From Chicago to Pilot Island Lighthouse N½E 245 miles; bring Plum Island Lighthouse to bear NW, and run through the passage, leaving Pilot Island to the starboard ¾ of a mile; and when abreast of Plum Island, steer WNW, until you open

Chamber's Island with the Door Bluff, 5 or 6 miles; thence WSW for the NW point of Chamber's Island, 18 miles; thence as directed for Long Tail Point. In running out through Death's Door, bound to the southward, steer out SE, leaving Plum Island and Pilot Island to port, at the distance of ¾ to 1 mile. Run on this course until you shut in the Ship or Spider Islands with the point of the False Door; thence S½W for Chicago.

A Lighthouse is to be erected on Chamber's Island, as a guide for the west channel.

From Bailey's Harbor to Pilot Island Lighthouse, 18 miles NNE.

The Whale's Back Shoal bears from Death's Door WNW; is a direct line with Cedar River, and about half way across the bay; 6½ feet water on it.

Buoys are to be placed on the Whale's Back Shoal this season and every season hereafter.

NOTE.—At the commencement of a SE wind, blowing fresh, there is always a strong current setting into Green Bay, down along the west shore and among the Beaver Islands.

Good anchorage under the south side of Chamber's Island, in 4 to 5 fathoms water, sandy clay.

LIGHTHOUSES ON LAKE MICHIGAN AND GREEN BAY;

WITH DIRECTIONS FOR HARBORS, ETC.

CHICAGO HARBOR.—The new light at the east end of the North Pier is a fixed white light, and can be seen 15 nautical miles. The best holding ground outside is from ¾ to 1 mile north of the North Pier, 6½ to 7 and 9 fathoms water. The North Channel is now used, and is being dredged from time to time, and no correct depth of water can be at present given; but it is hoped that it will soon be in a better condition than it has been for years past. The anchorage is good in 4 to 5 fathoms as far north as Grose Point.

Port Clinton has a dock and pier; 22 miles north of Chicago.

Taylor's Port, on the western shore of Lake Michigan, about 3 miles south of Port Clinton.

Little Fort or Waukegan light, fixed, visible 10 miles, on the south side of Little Fort River, 15 miles south of Southport, and 12 from Port Clinton. Two open piers, no harbor, and good holding ground all along shore in 4 to 8 fathoms water.

Southport or Kenosha light, fixed, varied by flashes, visible 14 miles, on Warrington Island, north side of harbor. Two open piers outside. Beacon light, fixed, visible 9 miles, on the end of the North Pier. To enter the harbor, range the North Pier, and run in. Least water 10 feet.

Racine, Root River. Light at extreme end of North Harbor Pier at Racine. Fixed, visible 12 miles. 10 miles north of Kenosha. There are two open piers to the southward of the harbor. To run into the harbor, range the North Pier and run in; nothing less than 14 feet water. The reef or middle ground bears from old light on Bluff E¼S 1¾ miles; least water 6½ feet. The whole surface of this reef covers about 2 acres, and is ½ a mile long, north and south, but narrow east and west. East from the harbor carries you clear of the north point of it. The reef bears from Racine Point SbyE, and the point from the harbor NNE. In approaching Racine from the northward and eastward, by paying due attention to the lead, this reef can easily be avoided, as the soundings are gradual; and note that after passing Milwaukee, the color of the water will indicate your position, as there is no muddy water below Racine. The harbor is easy of access in any weather. Anchorage outside, hard sandy bottom, here and there clay.

Milwaukee light, fixed, varied by flashes, visible 14 miles, on north point of Milwaukee Bay. North Cut Beacon light, fixed, visible 8 miles (red), on north pier of the North Cut, with fog Horn. There is excellent holding ground in 5½ to 6 fathoms, under the north point of Milwaukee, in the neighborhood of the old Lighthouse. The reef off the north point sets off about ¾ of a mile to the SE. The reef off the SE point of Milwaukee can be passed on either side. To pass inside run the shore along in 2½ to 3 fathoms water, pretty close to. Least water on this reef 10 feet.

NOTE.—In running across the Lake, from Milwaukee to Grand Haven, the course is E¼N, and the return course WbyS¼S. These courses were run by the "Milwaukee" steamship for three weeks in April, 1860. The compass is more affected going west than east. Also, the courses from and to Chicago are similar, being NE¼N to Grand Haven, and SWbyS¼S to Chicago. The compass being attracted to the eastward, the variation must be allowed to the left, instead of the right hand.

Port Washington light, fixed, visible 9 miles, at Port Washington, 25 miles north of Milwaukee; has a good pier, with wood. This port lies well into the bay, and has often been mistaken for Milwaukee Bay, before the light was on the point at Milwaukee. The anchorage is not good.

Sheboygan light, fixed, visible 11 miles, at Sheboygan River, 25 miles north of Port Washington. The Lighthouse stands on the north bluff. To enter the river, range the north pier, and run in nothing less than 10 feet. There is one open pier, to the southward of the harbor; and Kirkland's large white warehouse stands just at the first turn of the river, on the port side. There is a reef off north bluff with 8 feet water on it. The water is shoal to the southward of the south dock.

Manitowoc light, at the mouth of Manitowoc River, fixed, varied by flashes; visible 11 miles. Open piers. Lumber and firewood. Twenty-two miles north of Sheboygan. Good holding ground in 6 to 7 fathoms water.

Twin Rivers, 7 miles north of Manitowoc. Open piers. Wood and lumber.

Twin River Point. It is now proposed to renew the light on Twin River Point, a light which was always a prominent leading one. Coming from the Manitou Islands, no light was more useful than this for propellers and steamers calling at all the way ports on the west shore.

Kewaunee, 21 miles north of Twin Rivers. Open piers. Wood and lumber.

Bayley's Harbor. This light is to be discontinued, and a Lighthouse to be built on Cannah Island, 3 miles west. Ranges are to be erected for entering Bayley's Harbor. The new light on Cannah Island will be of great service for coasting, and a leading light for North Bay, where ranges will also be stationed. There is good holding ground in any part of the bay and abreast

the old Lighthouse; you will have soft bottom in 6½ fathoms water two cables' length from it. The reef sets off from the Lighthouse ¼ to ¾ of a mile about SSE¾E. Off the first point to the southward of the harbor, west side, a reef sets out in a NE direction, which protects the harbor from southerly winds.

Mud Bay, 2 miles north of Bayley's Harbor, is a good shelter from SE and NW winds. The soundings are gradual, from 2 to 7 fathoms.

North Bay, 4 miles north of Mud Bay, is also a good harbor for any wind except east. The reef which sets off from the south point of the bay in a northerly direction, protects the harbor from southerly winds. The lead will guide you into this bay in 4 to 5 fathoms. Good holding ground in from 3 to 5 fathoms. See ranges above.

Pilot Island light, fixed, varied by flashes, visible 14 miles. This Lighthouse is on Pilot Island, the south entrance to Green Bay, called Death's Door. The old Lighthouse stood on Plum Island. There is good anchorage directly opposite to Plum Island, in the bay of the peninsula, in 7 to 10 fathoms, west side. The water directly opposite Plum Island Lighthouse, close in, is 5 to 15 fathoms, mud, and inshore of that, rock and boulders, but has no shelter. Excellent holding ground between Plum Island and Detroit Island, in 5 to 6 fathoms, mud bottom.

Rock Island light, fixed, visible 14 miles, on Rock Island, north side of entrance to Green Bay.

Washington Harbor, 7 miles west of Rock Island, headquarters for the fishermen. Has a dock on each side of the bay; the water is deep, and the bay is open to the NE. Knowland's dock is on the east side of the bay, and Raney's on the west.

Long Tail Point light, fixed, visible 10 miles, near the mouth of Fox River, head of Green Bay.

Big Swamico River is 5¾ miles north of Long Tail Point. Has lumber mills (Sawyer & Gardner). Vessels load to anchor. Good holding ground in 2½ to 3 fathoms.

Little Swamico River, 3 or 4 miles north of Big Swamico, has lumber mills (Gardner & Co.) Vessels load to anchor in 2½ to 3 fathoms.

Oconto River, about 11 miles north of Little Swamico, has lumber mills (Brewster & Co.) Lumber rafted.

Pensaukee River, 5 miles south of Oconto River. Gardner's Mills. Vessels load to anchor in 2½ fathoms water. Lumber rafted.

Pershetico River, 5 miles to the northward of Oconto River. Vessels load to anchor. Lumber rafted. Pershetico Lumber Company has a dock built out to load from.

The Oconto Bank lies between Oconto Point and Little Swamico, and nearly opposite Pensaukee River. Least water 6½ to 7 feet.

NOTE.—A Lighthouse has been erected on Green Island, and shows a bright white light.

In passing through to the westward, between Green Island and Menomonee River, observe that there is a shoal, ¾ of a mile long, forming an elbow, from the west end of the island, running out WNW. after clearing which you can run out into the bay, SEbyS½S until the east end of Green Island is just open with the west end of Chamber's Island, then shape your course SW byS½S until abreast of Pershetico Point and shoal, 7½ miles, thence up the bay.

Point Peninsular light, on the point of same name, between Little and Big Bay de Noc. Fixed, visible 12 miles.

Escanaba light, at the extreme end of Sand Point, in Little Bay de Noc. Fixed (red), visible 8 miles.

Menomonee River, nearly opposite Green Island, has 4 to 5 feet water over the bar. Mills up river; New York Lumber Co.; T. H. Bently; and Luddington & Co. Good holding ground off Mr. Jacob's house, in 5½ fathoms water. Vessels load outside. Lumber scowed out.

Little Sturgeon Bay. J. B. Gardner & Co. Vessels load inside to the dock. Seven miles from Big Sturgeon Bay.

Beaver Island light, revolving, visible sixteen miles, on the south end of Beaver Island. A leading light for the Straits of Mackinaw and Green Bay. The bottom off this Lighthouse is hard, in 3 to 7 fathoms.

Beaver Island Harbor light, fixed, visible 9 miles, on Whisky Point, at the entrance to Beaver Harbor, on the north side.

The harbor is easy of access. To go in, bring the Lighthouse to bear WNW, and run in, leaving the light to the starboard; you will carry from 9 to 10 fathoms water well into the bay. The wood dock on the south side of the bay is nearly opposite the Lighthouse; has good water alongside in from 10 to 16 feet. The best anchorage in the bay is from 7 to 9 fathoms water, mud. Cable's Dock, at the SE end of the island, has 9 to 12 feet water, with good wood. Three-quarters of a mile south of the dock is good holding ground, in 3½ to 5 fathoms. And all along shore to the northward.

Skillegolee light, fixed; red, visible 19 miles, on Skillegolee Rock, 8½ miles from Point Waugoshance Lighthouse, 16¾ miles from Beaver Harbor Lighthouse, and 5¾ miles from the mainland SE from it; bearing from Beaver Harbor WbyN ¾N. The depth of water from it to the mainland is from 23 to 146 and 263 feet. Skillegolee Fog Horn sounds every 5 minutes in foggy or thick weather.

Point Waugoshance light, fixed, varied by flashes, visible 14 miles, stands on a crib or pier on the outer reef off Point Waugoshance; is 74 feet above the level of the Lake, and is one of the principal leading marks in the Straits. There is a good channel between it and the point in from 15 to 20 feet water. This light can always be trusted to, and is well kept. Point Waugoshance has a Fog Bell, struck by machinery.

South Fox Island light, on the extreme SE end of South Fox Island, revolving red, visible 16 miles.

Grand Traverse light, fixed, visible 11 miles, on the NW point of Traverse Bay, and is a leading mark for the Bay and Straits of Mackinaw.

South Manitou Island light, fixed, visible 14 miles, on the South Manitou Island, 10 miles from the east shore of Lake Michigan. Has a Fog Bell, struck by machinery. Good holding ground, with the dock bearing NWbyW, in from 7 to 9 fathoms water.

Point Betsey light, flash, visible 14 miles, on the point of that name, east side of Lake Michigan, 20 miles from South Manitou Island Lighthouse. This is a prominent light, and is a good leading mark for the Straits.

Betsey River, Town Frankfort, has piers. Ten feet water.

Manistee light. A Lighthouse is to be erected at this port, 16 miles NEbyN from Big Point Au Sable, and S¾W 30 miles from Point Betsey Lighthouse.

Grand Point Au Sable light, on Grand Point Au Sable, 45 miles south of Point Betsey light, east shore of Lake Michigan, fixed, visible 19 miles.

Muskegon light, fixed, visible 10 miles, at the mouth of Muskegon River, 12 miles north of Grand River; from 7½ to 8 feet water over the bar.

Grand River light, fixed, varied by flashes, visible 14 miles, at the mouth of Grand River, 28 miles north of Kalamazoo River. To enter this harbor, range the two stakes on the south bank of the river, and run in. The Lighthouse is on the south side of the river, and the range stakes are to the north of it; these stakes are lighted with lamps at night. A Fog Bell is erected at Grand Haven, on the pier, struck by machinery.

Kalamazoo light, fixed, visible 10 miles, at the mouth of Kalamazoo River, on the north side, about 40 miles north of St. Joseph. This harbor is continually changing. No accurate directions can be given at present for entering the harbor, but vessels can come to and sound the bar, and run in. The channel has always been very narrow, and until the ranges are properly placed, it is not safe to venture in without sounding.

St. Joseph light, fixed, varied by flashes, visible 15 miles, at the mouth of St. Joseph River, about 25 miles north of New Buffalo. Beacon light, fixed, visible 5 miles, on the south pier. This harbor is under improvement. The piers were temporarily repaired last season, and had ten feet of water straight in over the bar. When the piers are thoroughly repaired, the channel will open itself, and will be one of the best, if not the best, harbor on Lake Michigan. It is an easy harbor to make in any weather, and masters of vessels will be rejoiced to know that there is a harbor of refuge under their lea; 14 feet water may be lookep for in a short time. The Lighthouse is on the hill, to the southward of the Liberty Pole. The piers run out NWbyW.

New Buffalo, about 12 miles north of Michigan City. No harbor nor light.

Michigan City light, fixed, visible 11 miles, at the south end of Lake Michigan. Lighthouse on the north side of the harbor. Five feet water over the bar. This harbor is under improvement, and can be made a good harbor.

VARIATIONS OF COMPASS.

On Lake Michigan, from 4° to 5° E.
At the head of Green Bay, 6° 25′ E.

COURSES AND DISTANCES ON THE EAST SHORE OF LAKE MICHIGAN.

☞ All courses marked [*] are magnetic.

	Courses.	Miles.
From Michigan Cito to New Buffalo	*NEbyE	12
" New Buffalo to St. Joseph	*NEbyN½N	26
" St. Joseph to Kalamazoo	NNE	40
" Kalamazoo to Grand River	N¼W	28
" Grand River to Little Point au Sauble	*NbyW¾W	44
" Little Point au Sauble to Big Point au Sauble	N¼E	28
" Big Point au Sauble to Point Betsey	*NbyE½E	48
" Point Betsey to Sleeping Bear	NNE	18

Manistee, about 16 miles from Big Point au Sauble, has six to 7 feet water over the bar, but cannot be trusted to as an average. Vessels load outside. There are two docks at the place.

Black River has two Piers, and is under improvement. About 10 feet water over the bar.

SAILING DIRECTIONS FOR LAKE HURON, ETC.

FROM THE HEAD OF ST. CLAIR RIVER OR FORT GRATIOT LIGHTHOUSE TO DETOUR LIGHTHOUSE, ENTRANCE TO ST. MARY'S RIVER, TWO HUNDRED AND TWENTY-SIX MILES, AS FOLLOWS:

From the head of the River St. Clair NNE 2½ miles, into Lake Huron; thence NbyW 71 miles, to abreast of Point aux Barques Lighthouse, which should bear WbyS 8 miles off;

thence NNW 77½ miles to abreast of Thunder Bay Island Lighthouse, bearing WSW 5 miles; thence NWbyN 75 miles to the mouth of Detour passage; bring Detour light to bear west, 1 mile distant. After running NWbyN from Thunder Bay Island Lighthouse for 27 miles, Presqu'ile light should bear SWbyW, distant 5 miles.

FROM FORT GRATIOT LIGHTHOUSE TO MACKINAW, 241 MILES.

The same as above to Presqu'ile, 178 miles; thence NWbyW ¼W 60 miles, to a point ½ a mile north of Bois Blanc Island Lighthouse; thence W¼N 9½ miles, to Mackinaw Harbor.

FROM PRESQU'ILE TO THE DOCK AT DUNCAN CITY OR SHEBOYGAN BAY, FIFTY-NINE AND ONE-HALF MILES.

From Presqu'ile NWbyW¾W 50 miles; thence west 8 miles, passing ¾ of a mile north of Sheboygan Lighthouse, and 1 mile to the westward of the same; thence south 1½ miles, to the dock at Duncan; and note, that in rounding the Lighthouse point you will carry from 3 to 3½ fathoms water close to, until you range the south side of the dock, when you will suddenly drop into 5 fathoms, where you can let go an anchor or run alongside of the dock.

Spectacle Reef bears from Bois Blanc Lighthouse EbyS 13¾ miles, and due east from the Beacon on the SE point of the same 9 miles. It bears from Sheboygan Lighthouse NEbyE¾E 15 miles, and from Detour Lighthouse SW¼S 17¾ miles.

St. Martin's Reef bears from Bois Blanc Lighthouse NEbyE¼E 15¼ miles, and from Detour Lighthouse WbyS¼S 11½ miles. There is a patch with 13 feet water on it 3¾ miles W¾N from Spectacle Reef, and from Bois Blanc Lighthouse EbyS¼S 9¼ miles. There is also a shoal with 6 to 9 feet water on it NNW ¼W 6¾ miles from Bois Blanc Lighthouse, SWbyW¼W 3 miles from Goose Island, and 7 miles from Mackinaw Harbor on the same range.

The reef off Goose Island sets off SSE¼E 1 mile; rocky, with 1, 2, 3, 4 and 9 feet water on it.

Tobin's Reef lies NWbyW 3 miles from St. Martin's Reef, and has from 6 to 9 feet of water on it.

St. Martin's Reef has from 7 to 11 feet of water on it.

Vessels bound to Mackinaw will find plenty of water, with a 5 to 6 mile channel, clear of these reefs.

The coast from Detour to Point St. Martin is very rocky, with indentations, points and islands, forming several good harbors.

Scammon Harbor is one of the best, with 5 to 6 fathoms water going in. Root Island, at the entrance on the starboard hand, bears from Bois Blanc Lighthouse NEbyN 12 miles.

Marquette Bay is also a good harbor. The entrance bears from Goose Island NbyW½W 2¾ miles. To run into the bay, keep the starboard side close aboard, in 5 to 6 fathoms, haul up to the eastward, and come to in 4 to 5½ fathoms water, mud bottom. The entrance is 1 mile wide, with nothing less than 6 fathoms water, except off Point Brulee on the port side. The shoal off this point has 11 feet of water on it, and drops off suddenly.

There is a patch of rock with 17 feet of water on it between NW end of Round Island and old Mackinaw, bearing from old Mackinaw NEbyE¼E, and from the center of Round Island 3¼ miles WbyS½S.

THE OLD COURSES USUALLY RUN BY VESSELS ON LAKE HURON.

Run out of St. Clair River NNE 2½ miles; thence NbyW 75 miles, to Point aux Barques. This shore can be run along at a distance of 1 to 1½ miles, to abreast the Lighthouse, in 3½ fathoms. The bottom is hard close in as you approach the Lighthouse. From Point aux Barques Lighthouse 2 miles, bearing Wby S, you will have three fathoms water, hard, with boulders and spots of mud. From Point aux Barques, with light bearing WbyS, distant 3 miles, steer NNW 75 miles, to Thunder Bay Island Lighthouse. In case of heavy westerly winds, vessels generally haul well up, in crossing Saginaw Bay, under the high lands of Sauble, which can be approached within 2 miles with safety all along shore. From Thunder Bay to Presqu'ile NWbyN 30 miles; from Presqu'ile to the entrance of the Straits of Michilimackinac NWbyW¼W 50 miles; thence

west to abreast of Sheboygan light; thence NWbyW¼W 16 miles to old Fort Mackinaw.

GEORGIAN BAY AND THE CANADA SIDE OF LAKE HURON.

From Fort Gratiot Lighthouse to Cape Ipperwash, Ontario, NE¼E 25 miles; and note that a reef sets off this point in a northwesterly direction 2 miles, with 6 to 8 feet water on it, rock.

Sauble River is in the bight of the bay to the northward of this reef.

From Fort Gratiot Lighthouse to Goderich, Ontario, NEby N 62 miles.

From Fort Gratiot to Cove Island NbyE 163 miles.

From Fort Gratiot to Pine Brook, Ontario, NbyE¼E 76 miles.

From Fort Gratiot to Cape Hurd, Ontario, NbyE¼E 155 miles.

From Fort Gratiot to Horse Shoe or Lucas Island N¼E 171 miles.

From Point aux Barques, U. S., to Goderich, Ontario, EbyS ¼S 54 miles.

From Thunder Bay Island Lighthouse, U. S., to the Chantry Islands, Ontario, ESE 95 miles.

The Saugeen River is a little to the northward of these Islands, and has from 6 to 7 feet of water over the bar. The coast from this up to Cape Hurd is very rocky, and should not be approached without a pilot in less than 7 fathoms water.

From Thunder Bay Island Lighthouse, U. S., to Cape Hurd, Ontario, EbyN 78 miles.

From Goderich, Ontario, to the Detour Lighthouse, U. S., NW¼N 141 miles, to abreast of Presqu'ile; thence NWbyN 47 miles.

FROM GODERICH, ONTARIO, TO MACKINAW.

From Goderich to Presqu'ile NW¼N 135 miles, to abreast of Presqu'ile, bearing west, 8 miles off; thence NWbyW¼W

65½ miles to Bois Blanc Island Lighthouse; thence W¼N 9½ miles, to Mackinaw Harbor.

From Cove Island, Ontario, to the outer Duck Island WbyN ¼N 53 miles.

From Outer Duck Island, Ontario, to the Detour Lighthouse, U. S., NWbyW¼W 48 miles.

From Sulphur Island (inside the islands) to Clapperton Island, Ontario, E¼S 60 miles.

From Christian Island, south point, to Owen Sound, Ontario, W¼S 29 miles.

From Christian Island to Cabot's Head, Ontario, NWbyW 56 miles.

From Christian Island to Cape Smyth, Manitoulin Island, NW northerly 86 miles.

From Collingwood to Tiny Mills NE¼N 14 miles.

From Collingwood to Lighthouse on Christian Island NNE¼N 18 miles.

From Collingwood to Western Islands NbyW 38 miles.

From Collingwood to French River entrance NNW¼N 100 miles.

From Collingwood to Lonely Island NW¼N 86 miles.

From Collingwood to Cabot's head NW 65 miles.

From Lonely Island, the route is past Cape Smyth (or around George Island to Shebawananing) to Badgely Island 24 miles; from Badgely Island run to the southward of Strawberry Island, and up to Little Currant; from Little Currant to Clapperton Island (passing either north or south of it); and from Clapperton Island to Sulphur Island W¼N 60 miles; thence from Sulphur Island to Bruce Mines; thence through intricate channels to St. Mary's River.

FROM MACKINAW TO COLLINGWOOD, ONTARIO.

From Mackinaw to Bois Blanc Island Lighthouse E¼S 9½ miles; thence ESE 5½ miles, to abreast of the SE point of the same; thence EbyS¼S 135½ miles to Cove Island. Keep to the northward of Cove Island, pretty close to, in 23 feet of water; and after passing the north point of the island where the light stands, haul up for Echo Island, and run along to the eastward, pretty close to the Bear's Rump, which is 7 or 8 miles from the

Lighthouse, leaving two shoals, the White Shingle Island and shoal, and Snake Island, to the northward. The first or outer shoal bears NNW¼W from Cove Island and Lighthouse 1¾ to 2 miles; and the second bears SbyE from White Shingle Island, with 18 feet of water on it. You will carry deep water until you are past Echo Island; leaving it to starboard, run for the Bear's Rump, which is the next island to the eastward, with deep water close to; leaving it and the Flower Pots to starboard also; when past the Bear's Rump, haul up SEbyE¼E for Cabot's Head, about 15 miles; thence SE¼S 60 miles for Collingwood.

From Cabot's Head to Bear's Rump WbyN 15 miles, leaving the Rump to starboard, and the Flower Pots to port; thence the same course to Cove Island Lighthouse 7 miles.

TO RUN THROUGH THE CHANNEL TO THE SOUTHWARD OF COVE ISLAND.

After clearing the west point of the island, which is shoal, keep along the south side of the island pretty close to, leaving Cove Island and several small islands to the northward, and Middle Island on either side, steering due east 23 miles from Middle Island, or until Cabot's Head bears SWbyW 4 or 5 miles distant; thence SE¼S 60 miles to Collingwood Harbor. This route runs you about 3½ miles from Surprise Shoal and 5½ from Cape Croaker.

FROM CABOT'S HEAD TO PENETANGUISHENE.

From Cabot's Head to the Giant's Tomb ESE 60 miles. In running on this route to Penetanguishene, you leave a group of small islands, called the Western Islands, about 1½ to 2 miles to the northward, and Hope Island, close to, to the southward. When past Hope Island, haul up SE¼E for the mainland, leaving the Giant's Tomb Island well to port to clear some rocks which lie off the SE end of the island; follow the shore round until nearly abreast of Pine Point; then haul over to port, keeping the islands best aboard until above the point; then haul up to the SW and run into the bay.

It is necessary to take a pilot on first going into Penetanguishene Harbor. There is plenty of room after passing Pine Point.

FROM ABOT'S HEAD TO PENETANGUISHENE, THROUGH THE CHRISTIAN ISLAND CHANNEL.

From Cabot's Head to Christian Islands ESE¼S 5½ miles. In running through this channel, keep Hope Island to port, Chistian and Beckwith to starboard; and when past Beckwith Island, haul up for the mainland about ESE 6 miles, and run into Penetanguishene as directed above from Hope Island.

FROM COLLINGWOOD TO PENETANGUISHENE, LEAVING THE CHRISTIAN ISLANDS TO THE NORTHWARD.

From Collingwood to Christian Island Lighthouse NNE¼N 18 miles; thence run the main shore from point to point, at a distance of ½ to 1 mile, until abreast of the Giant's Tomb Island; then run in as directed above.

SE from the Lighthouse is a patch of rocks off the mainland about ½ a mile. The depth of water in this channel is from 17 to 18 feet, until well past the Lighthouse. To make a harbor, haul up into the bay to the northward, and come to in 3 fathoms water close in.

THE DUCK ISLANDS, LAKE HURON.

The Duck Islands lie NbyE¼E 43 miles from Thunder Bay Island Lighthouse, U. S., and WbyN¼N 63 miles from Cove Island, Ontario.

There is good holding ground between the Great Duck and Outer Duck Islands. The Outer Duck is to the eastward of the Great Duck, off the south end of it. To make a harbor, bring the passage open between the two islands, bearing NbyW¼W, and haul up on that course, leaving the reef off each Island on each side, in 22 to 30 feet of water. There is 15 feet of water on the end of the Great Duck Shoal, and 11 on the Outer Duck. These two reefs run out about SSE, which makes a good lee. Run well up and past the south end of the Great Duck, and come to; anchor in any part of the bay.

There are two good passages between these islands; one between the Great Duck and Middle Duck, and the other between the West Duck and Middle Duck. These passages can be plainly seen in clear weather.

TO RUN INTO GEORGIAN BAY BY FITZWILLIAM ISLAND CHANNEL.

From the Duck Islands to the south point of Fitzwilliam Island EbyS 60 miles. When abreast the point haul up NE 4 miles, leaving Lucas Island and Yeo Island to starboard (and note that a small island, named James Island, with a reef running SW from it, lays NE from Yeo Island); thence SEbyE 26¼ miles to Cabot's Head, leaving Half Moon Island 3¼ miles to the northward. Nothing less than 30 to 40 feet through this channel. To run through to the southward of Lucas Island, leave Yeo Island and James Island NE of Lucas, to the northward, steering due east for 11 miles; thence SEbyE for Cabot's Head.

Cape Hurd Channel is very difficult, and cannot be run except with a good pilot.

Tober Moray or Collin's Harbor is an excellent one, lying SE southerly from the east end of Cove Island, and is easy of access by daylight.

Mississauga Passage is deep—from 30 to 204 feet water. To run through, open the passage and steer about N¼W, keeping the east side best aboard. The west side, at the entrance, is rocky, and composed of magnetic reefs. To clear the rocks on the east side before entering the channel, keep the NE point of Cockburn Island open with the SW point of the Great Manitoulin Island, and when through, haul up NWbyW 22 miles, for Sulphur Island.

The False Detour Passage is deep, but not quite so straight as the Mississauga Channel. To run through, keep midway, in 54 to 120 feet water. Rocky on both sides. After getting well into the channel, the course is about NNE; when through, steer NW for Sulphur Island 14 miles.

SAGINAW BAY AND THE HIGH LANDS OF SAUBLE.

FROM POINT AUX BARQUES TO SAGINAW RIVER, SIXTY MILES, AS FOLLOWS:

From Point aux Barques to Charity Islands NW¼W 8 miles; thence W¼S 22 miles; thence SWbyS 33 miles, or until the Lighthouse at the entrance to Saginaw River bears S¾W (mag-

netic); you will then be in 12 to 14 feet water; run on this range until the first buoy is made close aboard on the larboard hand; then haul up S¼E (magnetic), keeping the buoys (black) on the larboard hand until all are passed, when you are in the river. Should the buoys not be visible, as is sometimes the case, being carried away or moved, then run for the Lighthouse, on the bearing S¼W (magnetic), until Frazer's Dock (the first one on the starboard hand in the river, and plainly seen from the bar), bears S¼E (magnetic); then haul up and run for the dock until the lead indicates you are over the bar and in the river.

With the wind from the NE the water rises from 7 to 15 inches, and from the south and SW the water lowers from 2 to 8 inches from the common level.

FROM SAGINAW RIVER TO THUNDER BAY ISLAND LIGHTHOUSE.

From Frazer's Dock run out N¾W (magnetic), leaving all the black buoys on the starboard hand; and when clear of the outer buoy No. 1, haul up N¾E (magnetic) until the lead indicates 12 to 14 feet water; then shape your course NEbyN 55 miles, for Point Sauble, leaving the Charity Islands 4 miles to the eastward, and Sandy Point 2¼ miles to the westward (the Charity Island Lighthouse bears from Tawas Bay Lighthouse S½E 12 miles); thence 5 miles on the same course, to abreast of Sauble River; thence N½E 43 miles, to Thunder Bay Island Lighthouse, bearing WSW 4 miles, and proceed up lake as directed before.

FROM POINT AUX BARQUES TO SAUBLE RIVER, AND ALONG SHORE TO THUNDER BAY.

SAUBLE RIVER.—This river is 150 miles long, suitable for navigation, and it is to be hoped, by the aid of government or the State, it will yet be opened to the lake trade. A good harbor of refuge could be made here by extending piers into the lake. The current in spring would make the channel, without dredging, if the piers were run out far enough to overcome the ground swell. It would also be of great advantage to the growing county of Iosco.

From Point aux Barques, with Lighthouse bearing WbyS 4

miles distant, steer NW¾W 40 miles, to Sauble River. There is from 3½ to 4 feet water, over the bar, and it is the principal fishing station on this coast. In approaching the shore, in the neighborhood of Sauble River, the soundings are gradual; you will have 3½ fathoms water at a distance of 1½ miles from the beach, sand. To run along the shore to Thunder Bay, give all the points a berth of 1½ miles; and to touch at any of the different fishing stations, run until abreast of any of them, and haul in due west until you get 2½ fathoms water, hard bottom.

Nearly all along this shore, from Sauble Point to Black River Island, you will find good holding ground in 7 to 10 fathoms water. From Point aux Barques to Tawas Lighthouse WNW¼W 47 miles, to anchorage.

Harris' Mill and Fishing House is 18 miles north of Sauble River. From Harris' to Thunder Bay Island Lighthouse NbyE 27 miles (town of Harrisville).

At Black River Island a harbor can be made with safety for small vessels, by running in due west close to the south end of the island. You will run over a bar of rock with 12 to 13 feet water, and come to, with the island bearing ENE, in 2½ fathoms water.

Thunder Bay River, on the NW side of the bay, is a fine little stream, with from 7 to 8 feet water over the bar; has 7 saw mills, and is a fishing station. The river is 180 feet wide inside. There are two docks at this river, one on each side, for wood and lumber.

Devil River, on the SW side of the bay, has 3 to 4 feet water over the bar. There is a dock and mills at this place. Vessels load outside.

Paxton's Bay, between Sugar Island and Thunder Bay Island, is a good harbor for steamboats, with 2½ fathoms water. It is open to the south, but is protected by a reef running SE from Sugar Island, and a reef setting out west from Thunder Bay Island. Hardly any sea makes in with a south wind, and with other winds it is perfectly smooth. It is worth any one's time to go in and examine this harbor. The Lighthouse-keeper or any of the fishermen are pilots amongst these islands. Mr. Paxton has a large fishing house here, and good boat docks on

each side of the bay. The best anchorage for vessels outside is between Sugar Island and the mainland.

Middle Island, 15 miles from Thunder Bay Island, has good shelter from NE gales. To make a harbor, stand in shore below the island and reef, and work up between it and the mainland, and come to under the SW point of the island, in 7 to 9 fathoms water. There is a good channel between the island and mainland, which can be plainly seen in daylight, and vessels can come in for shelter from the North winds.

The only obstruction in going round the south end of the island, is the shoal off the SE end of it, which can readily be discerned by the color of the water in calm weather, and the breakers in rough.

False Presqu'ile is good shelter from NW to NE winds. Vessels generally come to in 2½ to 3 fathoms water, near the entrance to the harbor. The bottom, further to the eastward, in 5 and 6 fathoms, is hard; and also the whole coast along inside of Middle Island, to Thunder Bay, the water being very clear and the rocks white limestone.

ALPENA HARBOR—TONNAGE DUES.

In accordance with the by-laws of the Harbor Improvement Company of Alpena, tonnage dues have been levied on vessels visiting that port, the proceeds to be devoted to the improvement of the harbor. A circular says:

The public will take notice that Alpena harbor is now open for vessels and steamboats, and that all vessels and steamboats using said harbor, drawing over four feet of water, will be required to pay the tolls or harbor dues prescribed by the by-laws of the Harbor Improvement Company, which rates are hereunto affixed, viz:

All vessels and steamers .....1c per ton.

On exported articles, as follows:

Sawed lumber.....10c per ton
Timber, square or round.....10c per 100 cu. ft
Lath.....3c per M
Shingles.....3c per M
Fence posts.....10c per 100
Telegraph poles.....30c per 100

Wood and bolts	10c per cord
Fish	1c per bbl
Staves and heading	10c per M
All other articles	20c per ton

IMPORTS.

On merchandise	40c per ton
Hay, pressed or bulk	25c per ton
Stone, lime and brick	10c per ton
Machinery	25c per ton
Anchors, chains and boilers	25c per ton
Cattle and horses	25c each

Vessels or steamers using said harbor as port or shelter from storms or for shelter generally, shall not be compelled to pay any tolls on their cargoes, provided they do not break bulk. The harbor dues in schedule on hulls shall be paid by vessels and steamers using said harbor for the purpose of entering and discharging only portions of their cargoes, but they shall not be compelled to pay tolls on the portion of their cargoes not discharged or landed.

THE STRAITS OF MACKINAW AND MICHILIMACKINAC.

FROM DUNCAN DOCK OR SHEBOYGAN BAY TO POINT WAUGOSHANCE LIGHTHOUSE, THIRTY-FIVE MILES, AS FOLLOWS:

From the dock north 1½ miles; thence NWbyW¼W 16 miles, to abreast Old Mackinaw, about ¾ of a mile from the land; and note that this course is the range line from Sheboygan Lighthouse to St. Helena; thence W½S 17½ miles, to Waugoshance Lighthouse, which may be approached to within ½ of a mile. This route passes ½ a mile north of the bold shore at McGulpin's Point, where a Lighthouse is to be erected.

FROM MACKINAW TO POINT WAUGOSHANCE LIGHTHOUSE, THIRTY-TWO MILES AND A HALF, AS FOLLOWS:

From the middle of Mackinaw harbor WbyS¾S 4½ miles, so as to shut in Rabbit's Back Peak, behind Point St. Ignace; thence W½S 19 miles, to Waugoshance Lighthouse, making it ahead and leaving the height of Round Island dead astern. This route passes ½ a mile south of the reefs off Point St. Ignace, sometimes called the Graham Shoals, the most southerly

one being well indicated by the following range lines, viz: a line from Grosse Point to St. Ignace, and a line from the NE side of St. Helena to Point la Barb.

TO MAKE A HARBOR AT ST. HELENA.

From Old Mackinaw NWbyW½W 6 miles, leaving Point la Barb at a distance of 1½ miles to starboard, and the island to port; haul round the NE point of the island, giving it a good berth, and come to in the bay to the northward of the dock, in from 5 to 9 fathoms water, soft bottom. A Lighthouse is to be erected on this island.

TO LEAVE ST. HELENA NORTH ABOUT.

Haul close round the NW end of St. Helena, and steer WbyS½S 3 miles, to clear a shoal which lies due west from the island. This shoal can be passed on either hand, and has from 8 to 15 feet water on it. WSW½S takes you to Point Waugoshance Lighthouse.

FROM MACKINAW TO THE DETOUR PASSAGE, THIRTY-SIX MILES, AS FOLLOWS:

From Mackinaw Harbor east 9½ miles, to a point 2 miles north of Bois Blanc Lighthouse; thence EbyN½N 26½ miles, to a point 1 mile east of Detour Lighthouse; and note that this course leaves St. Martin's reef ½ a mile to the northward and 11½ miles from Detour Lighthouse.

FROM MACKINAW TO DUNCAN DOCK OR SHEBOYGAN BAY, SIXTEEN MILES AND A HALF, AS FOLLOWS:

From the middle of Mackinaw Harbor WbyS½S 1 mile, to shut Bois Blanc Lighthouse in behind Round Island; thence SEbyS½S 6 miles, to clear the Zella Shoal which sets off the west side of Bois Blanc Island; thence SE½S 9½ miles to the dock at Duncan.

SHEBOYGAN RIVER.

This river is about 2 miles west of Duncan Dock, and is a fine little stream. Has two saw mills, and a great quantity of square timber is got out here. There is 6 feet of water over the bar. Vessels can go in and load to that mark, and finish outside. The bar is composed of slabs, sawdust and logs; and

and a very little dredging and other improvements would make it a good place to load.

FROM DUNCAN DOCK TO DETOUR LIGHTHOUSE, THIRTY-FOUR MILES, AS FOLLOWS:

From the dock north 1½ miles; thence NE¾E 32½ miles, to a point 1 mile east of Detour Lighthouse.

Carp River Mills, Carp River, 10 miles north of the NW end of Mackinaw Island. Vessels load to anchor in 2 fathoms water. A harbor can be made in the neighborhood of this river in any kind of weather; Grosse Isle St. Martin, Isle St. Martin, and Point St. Martin, forming a good shelter from southerly and easterly winds. To make a harbor, run round Grosse Isle St. Martin, leaving it to the eastward, and come to, with the island bearing south, in from 4½ to 6 fathoms water, mud bottom. To run up to Carp River Mills, after passing the Graham Shoals, and the range of Rabbit's Back Point with Point St. Ignace, ½ a mile, haul up due north, leaving Grosse Point to port ¾ of a mile, and Grosse Isle St. Martin 1¼ miles to starboard. You will carry 5 fathoms water until you are 1 mile north of the island; and as you approach the river, haul gradually to port until you are abreast of the first low point south of the river, and come to in 2 fathoms water, mud bottom.

East Moran Bay has good holding ground in 3 fathoms water, sandy clay.

West Moran Bay has good holding ground in 2½ to 3 fathoms water, red clay.

SAILING DIRECTIONS FOR LAKE HURON, ACCORDING TO THE LAST SURVEYS.

To enter Saginaw Bay from the southward, run out of St. Clair River, NNE 2½ miles; thence NbyW 60 miles, to abreast of Sandy Beach; when follow the coast around at the distance of two miles, till Point aux Barques and the reef projecting from it is passed, and the mill at Port Austin bears due south. From thence to pass to the northward of Charity Islands, steer

W½S 25 miles, giving the island a good berth of two miles, as there are rocky lumps extending that distance to the northward of the Lighthouse. Having passed the island, steer SW byS for the mouth of Saginaw River, 33 miles.

FROM POINT AUX BARQUES, TO PASS TO THE SOUTHWARD OF THE CHARITY ISLANDS.

When abreast of Port Austin (as above) steer WSW 22½ miles, till Oak Point bears east, and Sandy Point due south; then haul up west for 4¾ miles, till the Lighthouse on Charity Island is in range with the west end of Little Charity Island; thence SW½S for Saginaw River, 27½ miles.

TO ENTER SAGINAW BAY FROM THE NORTH.

Follow down the coast to Sauble Point, and note that there is a shoal extending ¾ of a mile from the shore above Sauble River. When Sauble Point bears NW, distance 4 miles, steer SWbyS for the mouth of Saginaw River, distance 52 miles.

TO MAKE THE DOCK AT FORESTVILLE AND WHITE ROCK.

Bring them to bear due west at a distance of 2 miles, and run in on that course.

TO MAKE THE DOCK AT WILLOW RIVER,

Bring it to bear due south at a distance of 2 miles, and run in on that course.

TO ENTER PORT AUSTIN,

Run the coast along from Point aux Barques at the distance of 3 miles, till the mill chimney bears due south, when you can run for the dock on this course, keeping a lookout for a rocky spot to the NW off the end of the dock.

TO ENTER WILD FOWL BAY.

After crossing the Little Charity Flat from Pigeon Bay, as previously directed, steer due south till Sandy Point bears east. Then steer ESE into the Bay, when haul up for the land, not approaching nearer than a mile to the north shore, as a bank puts off that distance. Excellent holding ground and protection from all winds is found in this secure harbor, in 12 to 14 feet water.

TO MAKE THE MOUTH OF PINE RIVER.

In weathering Point aux Gres, look out for the spit projecting from Rifle River, which extends to a point SW from Point aux Gres, and distant 3 miles. After turning this spit, run west into 10 feet water, which will be found within a mile of the shore.

TO ENTER WILD FOWL BAY FROM SAGINAW RIVER.

Steer NE¼E for Sandy Point, and when midway between Sandy Point and North Island, steer east into the bay.

TO MAKE OTTER BAY, OR TAWAS, FROM THE SOUTH.

After passing Charity Island Lighthouse and getting it to bear SE, steer up north for Tawas Bay. The anchorage is good in all parts of the upper bay, and generally around the shores, except about Charity Islands, where it is rocky. Good holding ground is found under Sauble Point, and protection from all winds but SW and SE; close under the land around Gravely Point there is good holding ground; and along the shores of this bay the water is deep close in on the north side.

TO ENTER THUNDER BAY FROM THE SOUTH.

When abreast of Point aux Barques Light, bearing due west and distant 5 miles, steer NNW for 65 miles. And from Saginaw Bay, when Point Sauble bears NW distant 2 miles, steer NbyE for 40 miles; run the shore along at a distance of 2 miles, till the south point of Thunder Bay bears due west; thence to Thunder Bay River NW¼N 16½ miles. Anchorage outside the bar ½ a mile from shore, in 16 feet water.

TO MAKE DEVIL RIVER,

From the same point, bearing west 5 miles, steer WNW¼N 6¼ miles, or till Scarecrow Island bears due south, ½ mile distant; thence WbyN till abreast of Devil River houses; when run square in and anchor in 12 to 17 feet water.

TO MAKE A HARBOR BETWEEN THUNDER BAY ISLAND AND SUGAR ISLAND.

From the point above mentioned, steer north 11 miles; run in on this course midway between the two islands, and anchor in 14 feet water, abreast the houses (Paxton's) on the port side.

NOTE.—There is a good passage of 9 feet water, nearly straight out from the middle of the bay, NWbyN. (See note below.)

TO ENTER THE HARBOR FROM THE EASTWARD.

Keep round the island, giving the SE point a berth of ¼ of a mile, till you get the opening between the two islands about N and S; when run in as above directed, keeping a lookout for the shoals projecting from each side, which shoals protect the harbor from southerly winds.

NOTE.—This Bay was called McDonald's Bay, now Paxton's.

TO MAKE THUNDER BAY RIVER FROM THE NORTHEAST.

When off the SE point of Thunder Bay Island, as above, steer WSW for 4 miles, or till the north point of Thunder Bay bears due north; thence WNW 9 miles, for the River.

A Lighthouse is to be erected at Thunder Bay River.

TO MAKE DEVIL RIVER FROM THE EASTWARD.

From the SE point of Thunder Bay Island, steer SWbyW¼W 18 miles, till the houses are seen distinctly, when run in and come to, as above directed.

GENERAL REMARKS.

The shores of Thunder Bay are generally good holding ground. Excellent holding ground under the north point, in 3½ to 6 fathoms, and all along the north shore of the Bay. Good protection from all winds except SE. Good anchorage, clay and sand, is found to the north of Gull Island.

NOTE.—McDonald's Bay, between Thunder Bay and Sugar Island, can be entered from the north as well as the south; but it would not be safe for a stranger to try it from the north, as the channel is not quite straight. The holding ground to the SW and south of the islands is not good, being rocky, but under the north point it is good.

There is a channel of 14 feet water between Sugar Island and the main shore. To pass through it from the south, bring north point to bear west; distance ¾ of a mile; and run due north till Gull Island is passed; then haul up NNW for Middle Island.

NOTE.—During the prevalence of easterly gales from north to south the water in the Bay is raised, and in like manner depressed during westerly gales.

DANGERS ON LAKE HURON.

From Fort Gratiot to Point aux Barques Lighthouse, the coast as far as Blue Ledge can be approached within a quarter of a mile. Off Indian Creek and White Rock Point there are rocks and rocky spots within ¼ a mile of the shore, which character continues to Elm Creek, at which place a bad spit extends in a NE direction for ¾ of a mile. There are several dangerous ledges running N and S about a mile from the shore, off Forest Bay; from thence to Point aux Barques Lighthouse. Boulders and rocky spots are found within ¾ of a mile of the shore, from the Light to Point aux Barques (proper).

There are ledges and detached rocky spots, rendering the coast dangerous, within 1½ miles from the shore. There is a 4 foot spot ¾ of a mile east, and a 9 foot spot 1¼ miles NNE of the Lighthouse. Orion Rock, with 6 feet water, lies 1¼ miles NW of Willow Creek wharf. Bad Ledge extends ¾ of a mile from NW to NE from Burnt Cabin Point. Point aux Barques Reef (proper) extends NW 1¾ miles.

From Point aux Barques (proper) to Sauble Point Flat, off Port Austin wharf, ½ a mile to the NW. Shoal ground off Flat Rock Point, extends out ½ a mile, and continues out this distance along the coast to Partridge River. Two shoals 2½ miles from shore, off Partridge River; good water inside of them. Spit from Hat Point extends 1 mile to the northward. There is a shoal spot 1½ miles WNW from Little Oak Point. Foul ground around the Charity Islands, extending 1¼ miles to the northward, and 1¼ miles to the eastward of the Lighthouse. A flat extends for 1 mile to the westward of the Big Charity Island; and there is a rocky spot 1¼ miles SE of Little Charity Island. A sand bank with 10 feet water, extends from Little Charity to the main land, and a sand spit puts out from Sand Point in a NW direction, for 1½ miles, with 1 foot least water

on it. A flat of sand extends 4 miles from shore, near Quannakisse, and continues around the south shore; being at Saginaw River and Ogahkahning River, 2 miles from shore. Sand spit 2 miles SE from Nayahquing Point; also one extending 3 miles east from Potato River; and another 3½ miles EbyS from Saginaw River. There is a flat in Pine River Bay extending out three miles from shore; and a rocky spit 2½ miles SE byS from the mouth of Rifle River; a rocky spit 1 mile east of Point aux Gres; and a two fathom spot ¾ of a mile ESE from Gravely Point; a 7 foot shoal 1 mile SE of White Stone Point; a sand spit ¼ of a mile in a SW and westerly direction from Ottawa Point; a spit extends ½ a mile to southward of Sauble Point.

NOTE.—These remarks take you clear round Saginaw Bay.

FROM SAUBLE POINT TO BLACK RIVER ISLAND.

A 10 foot spot 1 mile from shore, seven miles north of Sauble River. Spit off Sturgeon Point extending ½ a mile ENE. Rocky spots extending out 1½ miles east, off Black River. Foul ground around Black River Island, extending ENE for ¾ of a mile, and from thence to main shore.

THUNDER BAY.

Foul ground around South Point and Islands. Shores shoal from thence to Devil River; 6 foot spot ¾ of a mile to northward of Sulphur Island; 11 foot shoal 1½ miles NE of Partridge Point. Flat in Bay west of White Fish Point; 12 foot spot 1 mile SE of North Point. Foul ground and rocky lumps between Sugar Island and main land. Spits extending SE of Sugar Island and ¼ of a mile SE of Thunder Bay Island.

FROM THUNDER BAY TO STRAITS OF MACKINAW.

Shoal ¾ of a mile SE of Middle Island. Flats ½ a mile from SW point, and ¼ of a mile from NW point of Middle Island. A 10 foot spot ¼ of a mile NW of first point below Presqu'ile Harbor; a 10 foot spot ¾ of a mile SE of Presqu'ile Lighthouse; and a 5 foot spot 1 mile SE from Adam's Point.

NOTE.—In running along shore from Presqu'ile, up or down, it is always better to keep the west shore pretty well aboard, say from 2 to 5 miles; and should a fog close in on you in the

neighborhood of the turning point towards Sheboygan, you have only to keep the lead going, and after running as near as possible your distance from Presqu'ile, which is 50 miles, you may safely haul up to the westward for Sheboygan Lighthouse; after which, shape your course for Old Point Mackinaw, NWbyW½W 16 miles.

See entrance to Straits of Mackinaw.

FROM DETOUR TO FALSE DETOUR.

A 10 foot spot 2½ miles EbyS from Detour Lighthouse. Detached shoal 1 mile from shore, and 12½ miles east of Detour Lighthouse. Spit extending 1½ miles from shore, 2½ miles west of Harbor Island. Shoal spot ½ a mile SW from east point of entrance to False Detour.

CANADIAN SHORE FROM FALSE DETOUR TO ST. CLAIR.

Magnetic reefs in Mississauga Passage. Reefs between this passage and Green Island, and those around the Duck Islands. Reef between Providence and Michael Bay, and off south point of Michael Bay. 11 foot spot in Cove Island Passage NW from Lighthouse, distance 2 miles. Spit extending ½ a mile west from Gat Point on Cove Island. Reefs extending out 3 miles between Cove Island and Cape Hurd. From Cape Hurd to the Chantry Islands the coast is very rocky, and dangerous for strangers, within 1½ miles from the shore. The same character is given to the coast from the Chantry Islands to Point Clark. At Point Clark a reef extends from the shore, which, together with a detached shoal, requires that this point should have a berth of 1½ miles given it. From Point Clark to Goderich the coast is less dangerous, and may be approached safely within ½ a mile. The same is said of the coast from Goderich to Cape Ipperwash. At Cape Ipperwash a dangerous ledge extends to the northward for 1½ miles; and between Cape Ipperwash and Point Harris there are boulders and rocky spots within 1 mile of the shore.

From Point Harris to the head of the St. Clair River the coast is bold and gradually shelving, and can be approached with ½ of a mile with safety.

HARBORS OF REFUGE.

There is an excellent harbor, with protection from all winds, on Drummond Island, 14 miles east of Detour Lighthouse. The Detour, False Detour and Mississauga Passages are good harbors. Excellent anchorage will be found in 16 fathoms, SE of Cove Island Lighthouse. Protection from westerly winds, and fair holding ground, are found midway between the Chantry Islands and the village called Southampton, on the main land. At Inverhuron, south of Point Douglas, is good holding ground and protection from all winds, as far round as NNW. Goderich Harbor is secure from all winds when inside, and the holding ground off Goderich in 3 and 4 fathoms is excellent. The clay banks extending from Goderich to Sauble River makes good holding ground on this part of the coast.

On the east side of Cape Ipperwash, in the bight of the hook, in 4 and 5 fathoms, is excellent holding ground, and protection from all winds except those between NW and NEbyN. From Point Harris to the head of St. Clair River, is generally good holding ground.

TO ENTER GEORGIAN BAY,

From Charity Island Light, bearing SE, distant 3 miles, steer NE 120 miles, till Cove Island Lighthouse bears east, distant 3 miles; when enter the passage on the bearing EbyN.

FROM FORT GRATIOT LIGHTHOUSE TO GODERICH, AND OTHER POINTS ON THE CANADA SHORE.

Steer NEbyN 62 miles, till Goderich Lighthouse and piers are made.

From Goderich to Inverhuron, steer N¼W 23 miles, till Point Clark Lighthouse bears east, distance 2 miles; then haul up NNE 17 miles, till abreast of Inverhuron; thence NEbyN 19 miles, till Chantry Island Lighthouse bears SE, distance 2 miles; thence to the entrance of Georgian Bay NbyW¼W, 59 miles, till Cove Island Lighthouse bears east, giving Gat Point, on the east side of Cove Island, a berth of 1½ miles, and look out for the reefs extending over 3 miles from the Islands, between Cape Hurd and Cove Island. To enter Georgian Bay, run in for

Cove Island Lighthouse on the bearing EbyN, and give the Lighthouse point a berth of ½ a mile.

From Presqu'ile to Chantry Island Lighthouse NWbyW 115 miles. From Cove Island to the entrance of the Straits of Michilimackinac or south channel, WbyN 120 miles.

FROM SAGINAW TO GODERICH.

Run out from Saginaw River and round the Charity Islands, on opposite courses given, from Point aux Barques, until the light at Point aux Barques bears due south; thence ESE 59 miles, to Goderich.

FROM GODERICH TO THE STRAITS OF MACKINAW AND ST. MARY'S RIVER.

Steer NW¼N 140 miles, till Presqu'ile Lighthouse bears SW byW 5 miles off; from thence NWbyN to Detour, and NWby W¼W for Bois Blanc Lighthouse; thence to Mackinaw, as directed before.

FROM COVE ISLAND TO STRAITS OF MICHILIMACKINAC AND ST. MARY'S RIVER.

From Cove Island Lighthouse, bearing EbyN 3 miles off, steer WbyN 122 miles, or till the east end of Bois Blanc Island bears NW¼N and Sheboygan Light W½S; thence steer west for Sheboygan Light until abreast of it, and run up the Strait, as before directed.

To make Detour or St. Mary's River, steer WbyN, as above, 57 miles, till the Great Duck Island bears due north; then haul up NWbyW for the Detour Lighthouse, 56 miles, bring it to bear west and run in.

FROM SOUTHAMPTON TO SAGINAW BAY.

Steer WbyS½S for 107 miles, till Charity Island Lighthouse bears SE, distant 3 miles; thence up the Bay as before directed.

FROM SOUTHAMPTON TO STRAITS OF MICHILIMACKINAC.

Steer NWbyW 113 miles, till Presqu'ile Lighthouse bears SWbyW, distant 5 miles; thence as before directed to the Straits.

The above courses and bearings are true, and the distances in statute miles.

SAW MILLS AT THE DIFFERENT PORTS ON THE SHORE OF LAKE HURON, FROM ST. CLAIR RIVER TO THUNDER BAY.

Burchville—Mill, Toledo firm.

Lexington—Dock and saw mill, 5 miles back west.

Port Sanilac—Mill, Thompson & Ofield.

Forester—Mill, Smith, Kelley & Co.

Richmondville—Mill, Luce & Mason.

Forestville—Mill, J. Buel.

White Rock—Mill, Thompson & Ofield.

Sand Beach Bay—Jenks, Wood & Co., Stafford & Howard.

Sand Beach Bay—Mills, Woods, Carrington & Co.

Port Hope—Mill, Stafford & Heywood.

Huron City—Mill, Hubbard & Co.

New River—Mill, J. S. Donehue.

Port Austin—Mill, Ayres, Leonard & Weswell.

Pinepog—Mill, Ayres & Leonard.

Pigeon River—Mill, F. Crawford.

Saginaw River has a number of saw mills at the different towns up river; also, salt works.

Pine River has a saw mill.

Tawas Bay has two saw mills and a good dock.

Sauble River, Fishermen's headquarters. Piers are being built out, which will make a good harbor.

Harrisville—Mill and dock, Harris & Bros.

Devil River—Mill and dock.

Thunder Bay River—Mills, L. M. Mason & Co.

Thunder Bay River—Lester & Co., Ofield, Campbell & Co.

DISTANCES FROM FORT GRATIOT TO POINT AUX BARQUES ALONG SHORE.

From Gratiot to Burchville	12	miles.
" Burchville to Lexington	6	"
" Lexington to Bark Shanty	12	"
" Bark Shanty to Cherry Creek	5	"
" Cherry Creek to Forestville	12	"
" Forestville to Sand Beach Bay	15	"
" Sand Beach Bay to Point aux Barques	15	"
" Point aux Barques to Huron	3	"
" Huron to New River	3	"
" New River to Port Austin	7	"
" Port Austin to Pinepog	8	"

From Pinepog to Pigeon River.....11 miles.
" Pigeon River to Saginaw River .....38 "
" Saginaw River to Pine River.....22 "
" Pine River to Tawas Mills.....26 "

LIGHTHOUSES AND HARBORS ON LAKE HURON.

Fort Gratiot light, fixed, varied by flashes, visible 14 miles, at the mouth of St. Clair River.

Point aux Barques light, fixed, white light, visible 16 miles, on the eastern side of the entrance to Saginaw Bay, and 71 miles from St. Clair River.

Ottawa Point or Tawas Bay light, fixed, white, varied by red flashes once in three minutes, visible 12 miles. To enter Tawas Bay for a harbor, bring the mill at Tawas City to bear WNW½N, and run on this course until the Lighthouse on Tawas Point bears EbyN½N, then haul up NE½E, and run in on this bearing, and come to in 3½ fathoms water, with the Lighthouse bearing due east. In beating in, the only precaution necessary is to look out for the spit off Tawas Point. This can generally be plainly discerned by the color of the water. The anchorage is good all over the bay, being clay and sand, and is well sheltered from all winds excepting south. These bearings are magnetic, and the variation of compass is 2°05′ E.

From Point aux Barques, with the Lighthouse bearing SW 5½ miles, the course to Tawas Harbor is WbyN¾N. The docks at Tawas City have 8 and 10 feet water alongside at the outer end.

In leaving Tawas Bay, bound to the northward, run out from the anchorage until the dock or mills bear WSW, and run out ESE, until the coast to the northward is well open, or at the distance of 1½ miles from it; thence NE½E 18 miles, to Point Sauble; thence N½E 50 miles, to Thunder Bay Island Lighthouse. In foggy or dark weather, coming from the northward, run the coast along in 3½ to 4 fathoms water, which will lead you into the bay. The spit and point sets off from the Lighthouse 1¾ miles, and at the extreme end drops off suddenly, from 4 to 9 and 23 feet water. From the Lighthouse to dock, 3¾ miles.

Charity Island light, fixed, visible 12 miles—well kept—on Charity Island, at the mouth of Saginaw Bay.

Saginaw Bay light, fixed, visible 10 miles, at the mouth of Saginaw River, Michigan.

Port Austin, 14 miles from Point aux Barques, has two piers, with 11 feet water alongside the north one, and 9 feet on the south pier. To run in, bring the chimney of the saw mill to bear S½E, and run for the end of the north pier. In running for Port Austin from Point aux Barques, keep Point aux Barques light open till the chimney bears S½E. These piers are protected by a reef which makes off from the land in a northwesterly direction from the first point east of them. Vessels load alongside the north pier.

Thunder Bay Island light, revolving, visible 14 miles. This is one of the best kept lights on the lakes, with Fog Bell, struck by machinery.

A Lighthouse is to be erected at Sturgeon Point, Lake Huron, Alpena.

Detour light, fixed, visible 14 miles, at the entrance of Ste. Marie River.

A new Lighthouse is to be erected on the extreme north point of Presqu'ile Peninsula, the old Lighthouse to be taken down, and range light fixed for entering Presqu'ile Harbor.

Bois Blanc light, fixed, visible 14 miles, on the north side of Bois Blanc Island, E¼S 9½ miles from Mackinaw. From the SE end of the Island to the Lighthouse, the shore is very bold. A good harbor can be made from NE to SE and south winds, by hauling round the Lighthouse point and into the bay, with the point bearing N½E, in 6½ to 7 fathoms water, clay bottom. There is a patch of rock NE from the Lighthouse, with 17 feet water on it, ¾ of a mile off. The point is bold, with 14 feet on the extreme end of it.

A Lighthouse is to be erected at Mackinaw Island.

Sheboygan light, fixed, varied by flashes, visible 11 miles, on the main land, opposite Bois Blanc Island, entrance to the Straits of Michilimackinac.

A Lighthouse has been built on McGulpin's Point, and will be lighted early in spring.

The middle ground bears from Sheboygan Lighthouse NEbyE 3¼ miles, with 15 feet water on it.

Zella Shoal, 6 miles from the head of Round Island, sets off from Bois Blanc Island NWbyW¼W, and has 10 feet on the extreme end, 18 in the centre, and 5 and 6 on the inner part, and is 1½ miles long. The water through this strait is deep.

Good holding ground between Point Sauble and Old Fort Mackinaw, pretty close in, from 7 to 8 fathoms, clay; also on the island side, north of Duncan City.

Wendel's dock, between Old Fort Mackinaw and McGulpin's Point, was washed away last fall.

MACKINAW HARBOR.

To come to the docks, run until they bear nearly east and west, or are ranged, and haul alongside. To come to an anchor, run in for the docks toward the centre one, until you drop into 5 fathoms, and let go. The anchoring ground drops off quickly from 10 to 6 fathoms. The reef off the west point can be plainly seen in daylight, and does not extend over ¼ of a mile.

A Lighthouse is to be erected on St. Helena Island.

LIGHTHOUSES AND HARBORS ON THE CANADA SIDE OF LAKE HURON AND GEORGIAN BAY.

Goderich (Ontario) light, fixed, visible 12 miles. This harbor has two piers, with 10 to 12 feet water over the bar. The Lighthouse stands on the cliff or hill, and the two range lights on the north pier.

To run in, range the lights and run up along the pier, and into the harbor.

Point Clark light, revolving, visible 12 miles, stands on Point Clark or Pinebrook, about 22 miles north of Goderich.

The reef off this point sets out about 3 miles, with 12 feet of water on the middle of it.

Chantry Island light, fixed, visible 10 miles, stands on the NW end of the island, near the entrance to Saugeen River, which has 6 to 7 feet water over the bar, and is about 34 miles north of Point Clark.

Cove Island light, fixed, visible 11 miles, on the north point of Cove Island, middle entrance to Georgian Bay.

Griffith Island light, on Griffith Island, 15 miles from Cape Rich, and 7 miles from Cape Croaker.

Christian Island light, on Christian Island, south end, and a leading mark for Penetanguishene from Collingwood.

Nottawasaga Island light, fixed, visible 10 miles, on Nottawasaga Island, 3 miles from the elevator at Collingwood, and is the leading mark for this harbor.

TO ENTER COLLINGWOOD HARBOR—DAY OR NIGHT.

Run within 1,000 feet of the Lighthouse on Nottawasaga Island, to the northward and eastward of it, in 3½ fathoms water; thence for the red light on the east end of the breakwater 2½ miles. Run within 50 or 100 feet of the east end of the breakwater; thence due south, until the red light on the elevator opens up; thence for the dock in range. Vessels drawing over 10 feet should not go south of this range. In going in, leave the red buoys to starboard and black to port.

Fisherman's shoal bears from the east end of the breakwater NNE, distant 120 chains, with 14 to 17 feet water on it.

Nottawasaga Island Lighthouse bears from the east end of the breakwater NW¾N 2½ miles.

SAULT SAINTE MARIE RIVER.

FROM THE ENTRANCE OF STE. MARIE RIVER TO SAILORS' ENCAMPMENT.

From a point 1 mile east of Detour Lighthouse run N½E 2 miles, to a point ¼ of a mile east of Frying Pan Island; thence N by W¼W, toward the west side of Pipe Island, until within ¼ of a mile of it (and observe there is a rocky reef 1½ miles above Frying Pan Island, ⅜ of a mile below Pipe Island, and ¼ of a mile from the mainland on the west, and lying to the west of, and very near to the range line from west side of Frying Pan to west side of Pipe Island; a black spar buoy is kept on this reef of rock); thence NW½N, toward the opening between Lime Island and St. Joseph Island, for 2½ miles, to abreast of a spit putting out

from some small islands near the mainland to the SW; thence NWbyW½W 3 miles to abreast of and to the west of the small island near the foot of Lime Island; and note that whilst this small island is kept open from Lime Island, it is not safe to approach these islands nearer than from ¼ to ½ a mile, on account of a sandy shoal of 6 feet water at about 700 yards west of the small island, and ¼ of a mile SW of the lower end of Lime Island. Above this the shore of Lime Island is bold, and may be approached within less than ¼ of a mile in safety. Having passed Lime Island, get upon the north and south line, which will just clear the west side of it, and run north, leaving Round Island to port, and pass about 2 miles beyond it and abreast of Grosse Point; then change your course NW¾W for about 6¾ miles, through Mud Lake, to the mouth of the channel between Sailors' Encampment Island and St. Joseph's Island. These courses are true; distances statute miles.

TO RUN TO CARTER'S MILLS.

From Pipe Island NW½N 2¾ miles; thence WbyN¼N 4½ miles. Depth of water alongside of dock, 10 feet. You will have nothing less than 25 feet water until well up to the dock.

Just north of Frying Pan Island there is a good dock, with wood and coal, and plenty of water alongside.

When up to the turning point, to enter the channel to the Sailors' Encampment, observe that the dock at St. Joseph's Island should be just open with the bluff below it on the starboard side; then steer over NbyE, keeping on the range until up to the dock. There is a middle ground opposite this dock with 10 feet water on it. You can pass it on either side.

Richardson's Wood Dock is about 3 or 4 miles from Lime Island to the southward of St. Joseph's Island.

After passing the Sailors' Encampment, keep the port side of the river well aboard until you enter Little Mud Lake; run across it N½W. The soundings over this lake are very regular, from 2¾ to 3½ fathoms; and when up to the head, run out NE¼E, or midway between Sugar Island and St. Joseph's Island, until you open a cut across Indian Point, on the west side, and just above the Rapids of East Neebish; keep it open

until the stations A and B, in the cut midway of the Rapids, and on the western shore, come in range; then steer for the station C, on the east or Canada side, until the NE point of Duck Island is fairly opened; then keep the mid-channel through to Lake George. Vessels bound down should keep in the middle of the channel until they come in range with the two stations D and E, in a cut on the west shore, and at the lower end of the Rapids. Keep them in range until you come opposite stations A and B, and then keep in mid-channel as directed for vessels bound up. This channel (the west) has been dredged to 16 feet, and is now safe for any vessel.

RANGE LINE FOR RUNNING THE EAST CHANNEL OF THE NEEBISH.

From the point opposite the Upper Granite Island to two high trees close together, and not far from a lone pine to the westward of the a, and a little above the tripod of the range for the west channel on the Canada side; the starboard side of this channel is close along the island, opposite the rapids, Nby W½W. The rocks can be seen quite plainly in clear weather. It requires a strong breeze to carry a vessel through with safety. Should the wind leave you just above the rapids, you are in a tight place, as the bottom is all rock. Red and black buoys are placed in this channel.

These directions will be of great service to any one unacquainted with the river; but it is necessary to take a pilot for a few times until you are accustomed with the localities.

FROM THE HEAD OF THE RAPIDS TO SAULT STE. MARIE.

From the head of the Rapids steer NNW, keeping the middle of the river until up to North Rock Island; thence NbyW for the entrance of the middle channel, which is staked out on both sides, red to starboard and black to port, with intermediate stakes of triangles and bushes. This channel can be plainly seen in clear weather; and as you approach the new cut, which is also staked out, you bring the range stations on Sugar Island in line; run on the range till up to the last stake to starboard; haul gradually round to the northward until Green Island bears WbyS, thence NNE for the mouth of the river; and observe, as you approach the mouth of the river,

that there is a shoal which sets off from Church's Point, SbyE ¾ of a mile, and generally has a stake on its extreme end; when past the stake haul up for the mouth of the river, which at this point is very narrow, being only ¼ of a mile wide; leaving Squirrel Island to starboard, keep the port side of the river close aboard, until up to Church's Mill; then haul over to the Canada side, steering about north, leaving the sunken rock, which is near the middle of the river, to starboard, and the flat point above the mill to port; and to leave the sunken rock to port, follow the buoys, red to starboard, and black to port, keeping Squirrel Island pretty close aboard; when well over on the Canada side, run that shore along pretty close to, until the church at Garden River bears north, and about the middle of the river; thence W½S, till the marshy point beyond the Indian village bears north; thence NW¾W, to a point due east from the most northern point of Sugar Island. This route runs you to the southward of the middle ground, off Little Lake George; stakes are placed on the middle ground, red and black, as above; the north channel is generally used, as it is the shortest and straightest channel. When the marshy point bears north, and pretty close to, steer WNW for the stake, and leave it close too to port; after which, keep the middle of the river for about 3 miles, or until the high lands on Sugar Island terminate, and the low marshy ground begins; then keep the Canada shore aboard (about 500 feet off), until the course is getting almost west; then steer W½S, leaving a number of sunken rocks to port, until up to Topsail Island, which generally has a red buoy on the shoal, setting off from it; buoys are placed off Topsail Island red, and a black buoy on the shoal opposite it. Should the buoy be gone, run up until the two small islands are in line, at the distance of 500 feet from it; then haul up WNW, to the canal at the Sault Ste. Marie Rapids. The current is strong from Little Lake George to the Sault Ste. Marie Rapids.

STE. MARIE RIVER, ABOVE THE RAPIDS.

After leaving the canal, at the distance of 300 yards, haul up the river, steering WbyS 2¼ miles, or until the first prominent point, called Big Point, bears south; thence SWbyW, till Point

au Par bears NW; then SW¾S, to a point about 500 feet off shore, and due south from the houses above Point au Par, and in the little bay, called Clark's Bay; then haul up for the woody point below the Mission, at Waiska Bay, leaving Round Island and light to port, ½ a mile distant, until Point Iroquois Lighthouse bears NWbyW½W; haul up on this course till the Mission House bears SW (the dock being gone); thence NW½N 25 miles, to White Fish Point.

NOTE.—After leaving the canal and nearly up to the first low point on the Canada side, and nearly opposite Oaks' Barn, U. S., you will run over a bar of rock with 12 to 14 feet water on it; after which the channel is clear until nearly up to Round Island Point, when you run over another bar, with 13 to 14 and 18 feet water on it. The course from the low sandy point beyond Clark's Bay to the woody point below the Mission, is WSW. Opposite Point au Par a shoal makes off from the U. S. side, about two-thirds across the river, under which will be found good anchorage in 5½ fathoms, soft bottom.

From Round Island to Waiska Bay WSW 4½ miles. This is a good harbor; has a wood dock and good holding ground in 5½ fathoms. To go in, haul close round the point and into the bay, and come to in 5 fathoms water, soft bottom. The little island going into Waiska Bay, on the port side, is gone, and is just under water.

FROM ROUND ISLAND TO POINT IROQUOIS.

Haul off from Round Island to the northward and westward, so as to bring the Lighthouse on Round Island in a line with Point Iroquois; then steer for the point or Lighthouse, keeping on this range to clear the middle ground, which you leave to port. The middle ground is in a direct line from Round Island Lighthouse to the Mission Dock. To leave the middle ground on your starboard hand, steer from Round Island WSW 2½ miles; thence run the shore along in 3 fathoms water, passing the dock at the Mission to port; and when abreast of Point Iroquois Lighthouse, haul up NW½N 25 miles, for White Fish Point, leaving Parrisien Island to starboard.

Pendle's Mills is in the bight of the bay, to the westward 8 or 10 miles; and to run to the same, haul round Point Iroquois

at the distance of 1½ miles, giving the island a berth of the same distance; thence WSW 10 miles for the mills. Good water alongside, with wood and lumber.

There is good holding ground under White Fish Point, in from 5 to 7 and 10 fathoms water.

TO LEAVE WHITE FISH BAY—BOUND UP.

Give the point a berth of 1½ miles, and when round it, steer west 20 miles; thence WbyS 95 miles for Marquette.

The coast from White Fish Point to Grand Island is bold, and can be run with safety at a distance of 2 miles.

Grand Morais is about 45 to 50 miles from White Fish Point; has 5 to 6 feet water over the bar. The channel is 15 fathoms wide at the entrance, and is a good harbor inside.

Grand Sauble Point, 8 miles above it, is very remarkable, being 300 feet high, composed of sand, and looks level on the top.

A Lighthouse has been erected on this point.

There is a reef sets off this point about 1½ miles.

The Pictured Rocks, 15 miles west, are also remarkable, being 200 feet high, and of different shapes. From the Cave to Grand Island Channel, 10½ miles.

SAILING DIRECTIONS FOR GRAND ISLAND, ACCORDING TO THE LAST SURVEY.

TO ENTER SOUTH BAY AND WILLIAMS' HARBOR FROM THE EAST.

To enter South Bay when abreast of Chapel Rock, and 1 mile north of it, steer SW about 6 miles, to a point ½ of a mile west of Castle Point; thence same course 4 miles to the Narrows, at Sand Point; and thence SWbyS½S 3½ miles to the head of South Bay, and come to in 6 fathoms water.

TO MAKE WILLIAMS' LANDING.

Steer SW as above, from the point ½ of a mile west of Castle Point, 4½ miles; thence W½N 2 miles, and anchor in 7 to 10 fathoms water 100 feet from the shore. The bank is very bold on the east of the Point at Williams' Landing, and vessels drawing 12 feet can approach within 100 feet of the shore.

TO ENTER THE BAY FROM THE WEST.

To enter South Bay, passing to the north of Wood Island, from Marquette, steer E½S about 32 miles to a point 1 mile north of Wood Island, leaving Point au Sauble 1 mile to the south; thence SSE½E, heading clear of the SW point of Grand Island, to a point ½ a mile NE of the north point of Williams' Island, 3½ miles, or until the north point of Williams' Island ranges with the point of the main land to the SW; thence Sby E½E 3 miles, or until the two lower points of Grand Island are in range; thence EbyS heading for Powell's Point, 1 mile, or until SW point of Grand Island and South Point of Williams' Island are in range, and thence NE½N ½ of a mile to Williams' Landing.

A new town plat has been laid out on the opposite side of Williams' Bay, on the mainland, called Grand Island City and Powell's Point.

TO ENTER SOUTH BAY, PASSING SOUTH OF WOOD ISLAND AND WILLIAMS' ISLAND.

When abreast of Sauble Point, as above, steer EbyS½S 14½ miles, passing midway between Wood Island and Williams' Island, to the point designated above, ½ a mile NE of Williams' Island, and thence as above directed to Williams' Landing.

TO LEAVE SOUTH BAY OR WILLIAMS' LANDING.

Vessels going eastward will reverse the course given for vessels coming from the east, and those going west will reverse the courses given for vessels coming from the west. In South Bay the anchorage is good, and vessels can lie in 8 fathoms water at any point ¼ of a mile from the shore.

TO ENTER GRAND ISLAND HARBOR BY THE LIGHTHOUSE AND RANGES.

A Lighthouse has been erected upon the low sand point projecting from Grand Island into the east entrance to Grand Island Harbor.

Vessels entering the harbor from the east[illegible]n steer straight for the Lighthouse, leaving it on the starboard hand, and pass within 200 yards of it.

The Lighthouse is built of wood, and painted white, and from its tower a fourth order fixed white light will be exhibited at an elevation of 34 feet above the level of the lake.

WESTERN ENTRANCE.

Range lights have also been erected on the mainland, to guide vessels into this harbor through the west channel. The rear light is white—exhibited from the keeper's dwelling—the front light is red, and is exhibited from a small wooden tower. Both structures are painted white, the distance between them being 500 feet; steer on the range until the harbor is well open, then haul up for it.

DANGERS TO BE AVOIDED.

In passing through the Narrows at Sand Point, give the point a wide berth, and avoid the sand spit, which lies to the north and NW of it ½ of a mile, on which there is but 5 feet water, and in passing round the SW point of Grand Island, beware of sand spits which extend nearly ½ a mile from shore, and on which there are but 5 feet water also.

There are numerous rocks and sand spits between the south point of Williams' Island and the main shore to the south of it, on which there are but 8 and 10 feet water, making it dangerous for vessels drawing over 8 feet water, to attempt to pass between Williams' Island and the main shore.

NOTE.—Ranges have been erected for the east and west channels of Grand Island.

FROM MARQUETTE TO PORTAGE ENTRY, SIXTY-FIVE MILES, AS FOLLOWS: INSIDE PASSAGE.

Run out from the dock east-northerly until Granite Island is open with Presqu'ile Bluff (a Lighthouse has been erected on this island, and shows a fixed white light, varied by red flashes of the fourth order of lens, elevated 93 feet above the Lake level); then haul up for the bluff, passing it close to, and leaving two or three small rocky islands to starboard, which are nearly abreast of Presqu'ile Bluff; then shape your course for Granite Island NWbyN, leaving it 2 miles to the northward; when abreast the island, which is 12 miles from

Marquette, keep on the same course 12 miles farther; thence NWbyW 17 miles, to abreast the Huron Islands; where a Lighthouse has been erected on the West Island; thence W½N 10 miles, to Point Abbaye, leaving the Huron Islands to port; thence W½S 14 miles, to Portage Entry. Run past the Lighthouse point and into the bay, and come to in 2½ fathoms water, with the houses at the entry bearing NNW. Ranges are to be placed for running into Portage Entry.

Portage Bay is not a safe place in a heavy NE or E wind; but a good harbor can be made 10 or 12 miles up LeAnse Bay, on the east side, called Kocknawaugon. It is a perfect harbor, and safe from any winds,

To go In.—Haul round the south point of the bay or harbor and run in, giving the point a good berth; run well up to the bay, and come to in 3 to 5 fathoms water, soft bottom.

The Missions are on each side of LeAnse Bay, 2 miles south of this harbor; the Methodist on the east, and the Catholic on the west. Bendrie's saw mill is 2 miles south of the Methodist Mission. Excellent fishing all over LeAnse Bay.

FROM MARQUETTE TO PORTAGE ENTRY—OUTSIDE PASSAGE.

Run out from the dock east-northerly until well clear of the Lighthouse point, and the rocks which lie off from it, about 1 mile; then haul up NNE 5 or 6 miles, until Granite Island bears NW; thence NW½N 9 miles, to abreast of the island, which leave to port close to; thence NW to abreast the Huron Islands; and thence as above. On this route you leave the rocky islands off Presqu'ile to port.

From Portage to Manitou Island Lighthouse NE½E 46 miles, leaving Traverse Island to port 8 miles from Portage Lighthouse. Good anchorage under Traverse Island, and also the next point north of it.

Bete Grise Bay, 15 miles WbyS from Manitou Island, has good shelter from north to west winds, and also under Point Kewawena.

Lake La Belle lies at the SW end of Bete Grise Bay, and is capable of being made into an excellent harbor, by a cut across a narrow neck of land. The copper mines of Eagle Harbor

and the vicinity, are but a short distance from this lake, and the proprietors are making every effort to dredge a channel and build piers, which when completed, would be of incalculable advantage to them for shipping their copper, and also to the mariner as a safe harbor of refuge. This improvement is now going on and piers built. A Lighthouse is to be erected at the entrance of this harbor.

A Lighthouse has been erected on the West Huron Island. Order of lens, three and a half, and will show, at an elevation of 197 feet above the lake level, a fixed white light.

There is a good channel between Manitou Island and Point Kewawena. To run through, give the SE point a good berth, and haul up to the northward and westward, leaving Manitou Island to the eastward.

FROM MANITOU ISLAND TO COPPER HARBOR, WEST BY NORTH FOURTEEN MILES.

To run into Copper Harbor, coming from the eastward, keep along shore until past the point where the Lighthouse stands, and the stakes are ranged; then haul up for them, keeping on the range until past the rocks which are above water, and plain to be seen in daylight; then haul up the bay, steering W½S, until past Potter's Island, and come to anchor or run alongside the dock. The ranges are: a long pole or signal staff behind, and a low tripod in front of the dwelling at Fort Wilkins. The water is deep close round the Lighthouse point, and vessels can make a good harbor from easterly winds by hauling up into the bay to the eastward, closing in the light from a north line, and come to in 3 to 4 fathoms. The land is high all round Point Kewawena. In coming from the eastward, a rocky hill, Mount Houghton, 800 feet high, and 12 miles SW of Point Kewawena, can be seen from 40 to 50 miles, and is a good leading mark.

The harbor is formed by a number of small rocky islands, just above water, extending from Potter's Island towards the Lighthouse, nearly east and west. Deep water going in.

FROM COPPER HARBOR TO AGATE HARBOR, EIGHT AND ONE-HALF MILES.

To enter the north harbor, bring the target or beacon on the main shore (about ⅛ a mile east of the large warehouse) to bear SSE, and run on this course until the houses on the south shore of the south harbor come in range with Agate Point; then haul up E¼N to the anchorage in the middle of the harbor, in 4 to 5 fathoms, mud bottom.

To enter the south harbor, bring the target or beacon to bear SSE, and run for it until the small rocky island to the west of Agate Point is just opened with this point; then haul up for the houses on the north side of the south harbor, and run for them until abreast of Agate Point; then steer for the wharf or dock, or come to in the middle of the harbor in 3½ to 4 fathoms water, mud bottom.

EAGLE HARBOR, FIVE AND ONE-HALF MILES WEST OF AGATE HARBOR.

To enter the harbor by the east channel, bring the Lighthouse to bear WSW¼S, and run for it until the eastern point of the harbor bears due south, and is distant ⅛ of a mile; then steer SW¼S to a point about 160 feet east of the most eastern point of Senter's dock.

To enter the harbor by the west channel, bring the cleft in the rock and signal target in rear in range, when the compass should read SEbyS¼S, and run on this course and range until the bar at the mouth of the harbor is passed; then haul up for the dock, or come to in 3½ fathoms water, sandy bottom.

The reef which lies outside the harbor is three-sixteenths of a mile north of the east point of the harbor at the eastern end, and the same distance from the Lighthouse to the western end of it. The least water is 3 and 4 feet on the east end and north from the point; the least water on the west end is 5 and 6 feet, due north from the middle of the bar; and on the extreme ends east and west, 16 and 18 feet. There is a patch with 12 feet on it, north of the Lighthouse, and west of the middle ground or shoal. In running on the ranges to enter the harbor, you will have from 11 to 16 feet water on the bar, and 18 to 24 feet inside.

OLD RANGE FOR GOING IN BY THE EAST CHANNEL.—Range the southeastern end or angle of Senter's dock, and run for it, bearing SW¼W, until the target opens in the cleft in the rock; thence SW¼S, until in 22 feet water. Vessels not drawing over 8 feet, can run in on this range clear up to the dock.

FROM EAGLE HARBOR TO EAGLE RIVER, SOUTHWEST BY WEST ONE-HALF WEST SEVEN MILES

There is no harbor at Eagle River. To come to the dock, keep a long, low, lead-colored house, with a chimney on the north end of it, in a line with the second window of the hotel just behind the house, and run over the middle ground in 3 fathoms water; when over, you drop into 4 and 5 fathoms, and run for the dock. The dock or pier runs out NW. Or, bring the end of the dock to bear south at the distance of 2 miles, and run for it. In approaching the dock, keep well to the westward, and go in at an angle of 40°, to clear the sand bank that has formed off the end of the pier. There was only 9 feet water at the pier in 1868, and you cannot go to the eastward of the pier at all. In running in at night, bring the Lighthouse to bear SbyE½E, and run for it till over the bar and near the dock; then go in as above. On this range you run over the western spit in three fathoms water, and a little over ¼ a mile from the end of the pier. In going out, bound to the westward, run the shore along for 2 miles, and shape your course for Ontonagon River SWbyW½W 13 miles; thence SW¼S 45 miles.

FROM ONTONAGON TO LA POINT.

From Ontonagon, piers run out 2 or 3 miles NNW, and haul up W¼S 21 miles, to clear the land under the Porcupine Mountains and Lone Rock; thence WbyS¼S 45 miles, to La Point Lighthouse.

This Lighthouse was built in 1858, and the Light on Passage Island discontinued. It stands on a low sandy point, called Chagwaumegon, at the entrance to La Point.

As you approach the Lighthouse you leave Madeline and the Apostle Islands to starboard, and haul up for the sandy point, keeping it well aboard until past the Lighthouse; thence haul

up NW northerly for the town of Bayfield, which has a good dock and a saw mill.

La Point and the Mission is on the east side of the Bay; has a dock and good holding ground in from 3 to 5 fathoms, mud bottom.

Off the SW point of Madeline Island a reef sets off ½ to ¾ of a mile in a southerly direction, and opposite the Lighthouse.

TO RUN THROUGH THE ISLAND PASSAGE TO FOND DU LAC.

From the dock or Bayfield run the main land along, leaving Sugar Island, Cap Island, Oak Island and Raspberry Islands to starboard; keep mid-channel, and when abreast of Cap Island haul off to the NW, leaving York or Sand Islands and Little Fishing Island to port; run out NW 6 or 7 miles from York Island, and 3½ miles from Little Fishing Island; thence SW by W¾W 57 miles, to Minnesota Point Lighthouse, at the entrance to Fond du Lac Bay or Superior City.

TO RUN INTO FOND DU LAC BAY TO SUPERIOR CITY.

Run for the Lighthouse until you bring the two targets on the south bank in range; run on this range until well up to the beach, in 12 feet water, or until the Lighthouse point (sandy) is in a line with a small, low point opposite to it and inside the Bay; then haul up and round the Lighthouse point, pretty close to, leaving two black stakes to port off the low point; run up the bay about 1¼ miles, keeping the starboard shore pretty well aboard until you come to the turning stake; follow them round, leaving them to port, and come to the dock at Superior City, or to an anchor in the bay in 14 feet water. The channel is well staked out, thus: three stakes going in on the port side, with range ahead; one stake off the Lighthouse point to starboard; the rest as described above.

The Apostle Islands are a group lying off the mainland at La Point. The water is deep through these islands, and the shoals are plain to be seen in clear weather. The land is of a good quality, with plenty of timber of all kinds.

A Lighthouse was built on Passage Island, but discontinued in 1858. It will be re-lighted this season. To run through this passage from Ontonagon, steer W½S 51 miles, to Passage

Island Lighthouse; thence WbyN½N 10 miles, to Oak Island Dock, to starboard, leaving Cap Island close to, to port, and run out NW, leaving Raspberry Island to starboard, and York Island to port; then steer as directed for Fond du Lac.

From Passage Island to Chagwaumegon Point Lighthouse SWbyS 17 miles, until the Lighthouse is open with the SW point of Madeline Island; then haul up for it, and run in as directed for Bayfield.

FROM PASSAGE ISLAND LIGHTHOUSE TO ROCK HARBOR, ISLE ROYALE.

Run out from the Lighthouse EbyS 2 miles, and haul up NE ½E 118 miles, to Isle Royale, passing Siskowit Bay close to; bring the Lighthouse at Rock Harbor to bear NW½W, and run for it until well up to the group of islands at the entrance to the harbor; run through, leaving the first small patch of islands to port which lie NE from the Lighthouse, and haul up into the bay to the SW, and come to in 12 to 16 fathoms water, mud bottom, closing in the Lighthouse. There is a good channel on the SW side of this first group of islands next to the Lighthouse point, but is not so straight as the first one mentioned. The group is called Middle Islands, and can be passed on either side.

From Rock Harbor to White Fish Point SEbyE½E 188 miles.

COURSES AND DISTANCES ON LAKE SUPERIOR.

From White Fish Point to Manitou Island WNW 24 miles; thence WbyN½N 100 miles, to Manitou Island Lighthouse. SW ¾ of a mile from the Lighthouse you will find 15 fathoms water, mud bottom.

From White Fish Point to the Carabon Island NW 55 miles.

From Carabon Island to Small Lake Harbor, Ont., NW½N 117 miles. Good holding ground under Carabon Island in 5 to 6 fathoms, clay and sand.

From White Fish Point to the east side of Michipicotton Island NWbyN½N 75 miles; to the Copper Mines on the south side of the island NW½N 73 miles.

From White Fish Point to Michipicotton River, NbyW 60 miles, to Cape Gargantua; thence NbyE 20 miles; thence ENE 7 miles, to the river. This river is navigable for boats 15 miles, to the falls.

From White Fish Point to Montreal River, Ont., NbyE½E 35 miles. This river is 20 fathoms wide, with 5 to 6 feet water over the bar.

From White Fish Point to Cape Thunder, Ont., NWbyW ½W 189 miles, to Blake's Point; thence WbyN½N 24 miles, to Cape Thunder.

From Michipicotton to the Manitou Island Lighthouse WSW 105 miles (from the north side).

From Manitou Island to Stanard's Rock SE½S 20 miles; thence same course to Grand Island, 51 miles.

A day beacon will be erected on Stanard's Rock, built of stone, with a wrought-iron shaft in the center, surmounted by an iron cage.

From Point Kewawena to Granite Island SbyE½E 50 miles.

From Fond du Lac or Minnesota Lighthouse to Isle Royale NEbyE½E 145 miles.

From Eagle Harbor to the outer island of the Apostles WbyS ½S, and to clear all the islands WbyS, 107 miles.

From Ontonagon to Grand Portage or Pigeon River NbyW ½W 72 miles.

From Eagle Harbor to Rock Harbor NNW½W 40 miles.

From White Fish Point to Point Iroquois Lighthouse SE 25 miles. Note the difference in return course.

LIGHTHOUSES ON LAKE SUPERIOR.

Round Island light, fixed, varied by red flashes, visible 12 miles, near the entrance to Sault Ste. Marie River, and 4½ miles from Waiska bay. (Re-lighted.)

Point Iroquois light, fixed, visible 10 miles, on Point Iroquois, 25 miles from White Fish Point.

White Fish Point light, fixed, visible 13 miles, on White Fish Point. Good anchorage under the point in 7 to 9 fathoms.

Grand Island light, fixed, varied by flashes, visible 18 miles, on the north point of Grand Island. This Lighthouse is the highest on the lakes, being 236 feet above the level of the lake. The highest part of the island is 300 feet above the level.

Marquette light, fixed, visible 10 miles, on the north point of Marquette Harbor. There are several small patches of rock close off the point, just awash, and due east of the point. SE from the Lighthouse, in 6½ to 7 fathoms water, you will find soft bottom. Good anchorage in the bay in 3½ fathoms.

Granite Island. A Lighthouse has been built on this island, also one on the West Huron Island.

Portage Entry light, fixed, varied by flashes, visible 13 miles, on Portage Point, near the mouth of Portage River or Entry, western shore of Kewawena Bay. Good holding ground under the point in 2½ to 3½ fathoms. This harbor is under improvement, and will be one of the best on the south shore. The cut is through the sandy point into the river. The pier is on the east side of the cut, with nothing less than 12 feet water; and the other improvements are up the river, by cutting across flat points to straighten the channel. After getting into Portage Lake, the course is NbyW½W, to the turning point below the city; keep the middle of the river after hauling round the point, and run up to the docks.

A Lighthouse is to be built at the entrance to Lac la Belle, and a Lighthouse has been erected on Gull Island, west of Manitou Island.

Manitou Island light, revolving, visible 14 miles, on Manitou Island, 4 miles from Point Kewawena.

Copper Harbor light, fixed, visible 10 miles, at the east end of Copper Harbor.

Rock Harbor light, fixed, visible 14 miles, on the NE end of Isle Royale, on west side of entrance to the harbor, 12 miles from the eastern extremity of the island. There is a passage inside from the bay to the east end of the island, formed by a number of small islands, the whole way to Blake's Point, 12 miles, with three or four passages through into the lake. First-rate holding ground in the bay, SW of the Lighthouse, in 10 to 15 fathoms water, mud bottom. (Light discontinued.)

Eagle Harbor light, fixed, varied by flashes, visible 12 miles, at the west side of Eagle Harbor.

Eagle River light, fixed, visible 11 miles, 7 miles from Eagle Harbor, on the south shore of Lake Superior.

Ontonagon light, fixed, visible 11 miles, at the mouth of Ontonagon River, west side, on the beach.

The piers at Ontonagon are under repair, and it is hoped that steamers will be again able to enter the river, after the spring freshets.

La Point light, fixed, visible 14 miles, on Point Chagwaumegon, opposite the SW end of Madeline Island.

Minnesota Point light, fixed, visible 12 miles, at the head of Lake Superior and mouth of St. Louis River, on the low sandy point.

From Minnesota Point Lighthouse to Buchanan River NE½N 25 miles. Buchanan has a pier with 12 feet water alongside; not safe in bad weather.

Raspberry Island light on Raspberry Island, visible 12 miles.

VARIATION OF THE COMPASS ON LAKE SUPERIOR.

	° ′		° ′
Sault Ste. Marie River....	3 00 E.	White Fish Point.....	4 50 E.
Two Heart River.....	6 22 E	Train Point.....	7 21 E.
Presqu'ile.....	3 50 E.	Huron Islands.....	7 00 E.
LeAnse Bay.....	7 20 E.	Iron River.....	9 52 E.
Point Abbaye.....	7 00 E.	Kewawena Point.....	7 00 E.
Eagle Harbor.....	2 39 E.	Agate Harbor.....	5 20 E.
Eagle River.....	7 54 E.	Misery Bay.....	8 30 E.
Lone Rock.....	9 15 E.	Passage Island, L. H.....	10 15 E.
SW Point Isle Royale....	9 15 E.	Montreal River.....	9 53 E.
Small River.....	11 00 E.	St. Louis River entrance..	11 20 E.
Otter Head, Ontario.....	5 30 E.	State Island, Ontario.....	7 42 E.
Otter Cove, Ontario.....	5 07 E.	Small Lake Harbor, Ont.	4 50 E.
Fort William, Ontario....	11 43 E.	Pie River, Ontario.....	8 22 E.
Cape Gargantua, Ontario,	4 05 E.	Isle St. Ignace, Ontario...	7 00 E.

It will be observed by the above table that the compass is materially affected in short distances; it is therefore necessary to be on the lookout, in dark or foggy weather, in running close along shore.

ST. CLAIR RIVER.

After clearing the flats and into the river, keep the center, and at the turns run from point to point. The channel of the river is plain to be seen in daylight all the way up, except the middle ground off Port Huron.

Algonac is the first town on the American side, and opposite to Hurson's Island, and nearly opposite where the south channel enters the main river. Snicarte River, a little above Algonac, on the Canada side, runs into Bear Creek. From Algonac you can keep either side of the river aboard to Lake Huron.

The island called Oak Island, just below Newport, which is 7 miles from Algonac, has a good channel between it and the Canada shore, with wood docks. A shoal sets down from the island, but is plain to be seen.

From Newport to St. Clair 7 or 8 miles. Off St. Clair City there is a middle ground, with 4 to 5 feet water on the center of it, and directly opposite Sutherland's dock, but nearer to St. Clair side than the Canada. Good channel on both sides.

After passing St. Clair and the point above it, you make Elk Island. A shoal or flat sets down from the island in a line with the Canada side 1½ to 2 miles, and leaves a good channel on both sides. In running up keep one side or the other aboard until well up towards Port Huron, as there is a middle ground off Black River.

To run the American channel, keep all the docks close aboard until up to the ferry, when you are into the rapids.

To run the rapids, keep just inside the eddy and run out into Lake Huron, keeping the starboard shore aboard until up to the Lighthouse.

To run up on the Canada side, run up to abreast the docks at Sarnia; then shape your course for the outer point of low land on the starboard hand, and keep just in the eddy and run out as above.

There is deep water the whole length of the river, from 5 to 7 fathoms, with good holding ground, except in the rapids above Port Huron.

COURSES AND DISTANCES ON LAKE ST. CLAIR.

Run out from the head of Detroit River into Lake St. Clair ENE 3 miles; thence NNE 18 miles, to Point Huron Stake, which leave to port; thence NbyE 5 miles, with New Baltimore right ahead, to the turning stake (red) to starboard; thence to the stakes on the flats; range the first four stakes and run up, leaving all the red stakes to starboard and black to port (if there are any), until in St. Clair River, north channel. (No stakes in this channel since 1860.)

Clinton River Lighthouse bears from the stakes at the entrance of the flats SWbyW½W, and is the leading mark from the stakes bound down.

SAILING DIRECTIONS FOR LAKE ST. CLAIR—TO ENTER ST. CLAIR RIVER BY THE SOUTH PASS OR CHANNEL.

To enter St. Clair River by the South Pass or channel, run out of Detroit River ENE until the two first points north of the Lighthouse are open; thence NE½N 20 miles, till you make the South Pass Lighthouse, when in 15 feet water, bring the Lighthouse and beacon light in range, steer up on this range, passing black buoys to port, and red buoys to starboard, till up to beacon light; thence haul off to the SE and leave red buoys to starboard and black to port, until into the river. There are range lights kept on the starboard hand, opposite the turning point into the river, and are thus: red and white for each bend or reach, first from the beacon light to abreast the point, and then up the river, and *vice versa*. The lights stand in an angular direction, the middle one being red, which form the two ranges. After clearing the flats and into the river, keep the port side best aboard until up to the head of Hurson's Island; then keep in mid-channel until the two log houses on the Canada shore are in range; thence across the river to Algonac, to clear the shoal which makes up river from the head of the island.

The new cut or channel over the St. Clair Flats runs in a line with the first reach of St. Clair River S40°W. Two Lighthouses will be erected on the port side of the cut, to mark the channel. This improvement will be of incalculable benefit to the sailing community, also to merchants and owners of vessels.

From Windmill Point Lighthouse to the River Thames Lighthouse, Ontario, EbyS 25 miles.

Course to the middle channel, NE 17 miles.

All the lights on this lake are fixed, and visible about 9 to 10 miles.

The depth of water on Lake St. Clair is from 2½ to 5 and 7 fathoms, sand and mud.

There is a good channel between Peach Island and the mainland, Ontario.

NOTE.—In all channels where government buoys are laid down, they are thus: red buoys with even numbers must be left to starboard; black buoys with odd numbers to port; buoys with black and white perpendicular stripes, in mid-channel, may be left on either side close to; red to starboard always in going in.

COURSES AND DISTANCES ON LAKE ERIE.

☞ All Courses marked thus [*] are magnetic.

	Courses.	Miles.
From Buffalo to Point Pelee Island	*WbyS½S	200
Buffalo to Marble Head	*SWbyW½W	218
Buffalo to Cleveland	*SWbyW½W 141	172
till Fairport Pier Light bears south 3 miles, thence	*SW½W 31	
Buffalo to Dunkirk	SW½S	35
Dunkirk to Point Pelee	*WbyS½S	166
Erie to Point Pelee	*WbyS	130
Erie to Grand River or Fairport	SWbyW½W	60
Erie to Black River	SWbyW½W	129
Erie to Peninsular of Sandusky	WbyS½S	144
Erie to Middle Island	WbyS½S	140
Erie to Long Point, Ont.	N½W	28
Buffalo to Grand River or Fairport	SWbyW½W	141
Buffalo to Black River	SWbyW½W	207
Buffalo to Middle Island	WSW	213
Buffalo to Long Point, Ont	WbyS½S	64
Cleveland to Sandusky	W½N	14
thence	W½S	37½
Cleveland to Middle Island	WbyN	52
Cleveland to Point Pelee Island Lighthouse, Ont	WNW	55
Cleveland to Rondeau Harbor, Ont	NbyW	54
Cleveland to Point Talbot, Ont	NbyE	79
Cleveland to Port Stanley, Ont	NbyE½E	86
Cleveland to Port Burwell, Ont	NEbyN½N	92

	Courses.	Miles.
Cleveland to Long Point, Ont	NE¼E	110
Fairport to Long Point, Ont	NE easterly	82
Ashtabula to Long Point, Ont	NE¼N	57
Conneaut to Long Point, Ont	NNE¼E	46
Fairport to the Welland Canal	NE¼E easterly	128
Erie to the Welland Canal	NE¼N	65
Long Point, Ont., to Grand River, Ont	NE¼E	32¼
Long Point, Ont., to Welland Canal	NEbyE¼E	46¼

SAILING DIRECTIONS FOR THE HEAD OF LAKE ERIE.

(The Courses and Bearings are Magnetic.)

FROM DETROIT RIVER TO POINT PELEE.

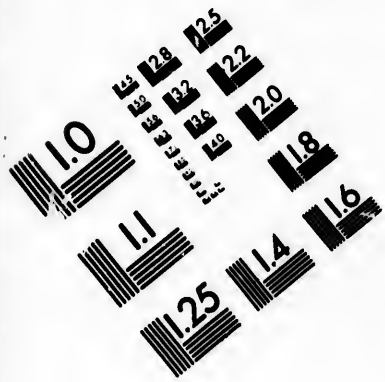
From Bois Blanc Lighthouse S¾W 4 miles; thence EbyS¼S 34½ miles, to Point Pelee, running ½ a mile south of Little's Point, and 3 miles north of a shoal with 8 feet water on it, bearing from Little's Point SEbyS¼S 4 miles, and from the Middle Sister NE 8 miles. This shoal can easily be avoided by keeping well over towards Little's Point, and it is always better to run close along from Little's Point to the river, except in a heavy west wind. (See directions for Detroit River.) Also leaving the middle ground between Point Pelee Island and the point 2 miles to the southward. The middle ground has 12 feet least water. It bears from Point Pelee Island Lighthouse EbyN¾N, and from the extreme end of Point Pelee Shoal WSW¼S.

DETROIT RIVER TO CLEVELAND.

From Bois Blanc Lighthouse S¾W 3¼ miles; thence SEby E¾E 83 miles to Cleveland, running 1½ miles NE of Point Pelee Island Lighthouse, and just clear of the south end of the middle ground.

DETROIT RIVER TO SANDUSKY.

From Bois Blanc Lighthouse S¾W 2½ miles, crossing the range of Little's Point and Bar Point; thence SSE¼E 33 miles, running ½ of a mile east of Middle Sister Island and ½ of a mile east of Strontian Island, to a point ½ of a mile south of South Bass Island; thence SE¾E 9 miles to abreast of Marble



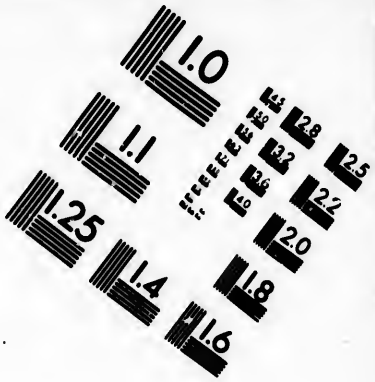
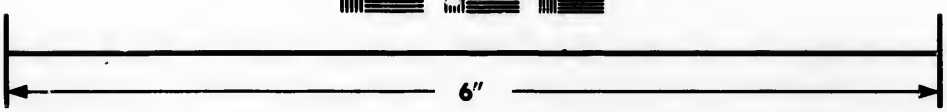


IMAGE EVALUATION TEST TARGET (MT-3)



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(716) 872-4503

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Head Lighthouse; thence SSE 3 miles, to entrance to Sandusky Bay.

In case of heavy weather from the westward, run from Bois Blanc Lighthouse SbyW 3½ miles; thence SE¼S 37½ miles, passing within ¾ of a mile SE of the East Sister Island, and ¼ of a mile of the NE point of Kelly's Island; thence S½W 8½ miles, to entrance to Sandusky Bay, leaving Middle Island 1¾ miles to the NE, and Gull Island and Shoal ¾ of a mile to the NE.

Good anchorage under the island in 4 fathoms water, with the dock bearing north.

Variation of compass at Kelly's Island, 2° 13′ E.

There are two patches of rock NE from the NE end of Kelly's Island, with 6 and 10 feet water on them. The first is 1 mile from the point, and the second, 1¾ miles. 25 to 30 feet water all round them.

DETROIT RIVER TO MAUMEE BAY.

From Bois Blanc Lighthouse S¾W 5 miles; thence SWbyS (on Turtle Island Lighthouse) 21 miles; thence SW¼S 1½ miles, to the west channel.

DETROIT RIVER TO MONROE.

From Bois Blanc Lighthouse S¾W 5½ miles; thence SWbyS (on Turtle Island Lighthouse) 3 miles; thence SW½W 10 miles, to Monroe Piers, passing within ¼ of a mile of Stony Point.

MONROE TO POINT PELEE.

East 42½ miles, passing 2 miles north of Middle Sister, 1¾ miles from the shoal N¼E of North Harbor Island, and ¾ of a mile north of the middle ground between Point Pelee Island and Point Pelee.

Variation of compass, 2° 18′ E.

MONROE TO CLEVELAND—MIDDLE PASSAGE.

ESE¼E 36½ miles, passing ½ a mile north of North Bass Island, and between Middle Island and Point Pelee Island; and note that Middle Island can be passed in 6 to 7 fathoms water within ½ a mile on either side; thence EbyS 53 miles to Cleveland.

MONROE TO SANDUSKY BAY.

SEbyE 40 miles, to abreast of Marble Head Lighthouse; thence SSE 3 miles, to entrance to Sandusky Bay.

MAUMEE BAY TO SANDUSKY BAY.

From west channel NE¼N 1½ miles; thence E¼S 14 miles to ½ mile south of West Sister Lighthouse; thence SEbyE¼E 24½ miles, to abreast of Marble Head; thence SSE 3 miles to entrance to Sandusky Bay.

MAUMEE BAY TO POINT PELEE, ONT.

From west channel NE¼N 1½ miles; thence ENE¼E 29 miles, passing ¼ of a mile south of Middle Sister Island, to strike the route from Monroe to Point Pelee; thence on that route 17 miles, to the turning point of Point Pelee.

MAUMEE BAY RANGES.

Outer range—front red, and rear light white. Middle range—both lights are red. Inner range—front light red, and rear light white. These ranges mark accurately the channel from the bay into the Maumee River. Care must be taken not to mistake the middle ranges, both lights of which are red, for the outer range, which is composed of red and white lights.

DETROIT RIVER.

FROM BAR POINT, LAKE ERIE, TO WINDMILL POINT LIGHTHOUSE, LAKE ST. CLAIR.

In running up the north channel for the entrance to Detroit River, keep the shore along from Little's Point in 3 to 3½ fathoms water until well up to Bar Point, when you may run with safety in 2½ to 2¾ fathoms until Bois Blanc Lighthouse opens; you will then drop into 4 to 4½ fathoms water, with the Lighthouse bearing N¾E. (There is a red buoy kept off Bar Point in 12 feet water.) Haul up for the Lighthouse, keeping it a little to port (and note that at the distance of 2½ miles SW of Bar Point, on the range, you will have Gibraltar light open

with Citron Island), and run up, keeping the low point under the Lighthouse bluff pretty close to; when up to it, take the middle of the river. The starboard or east shore can be run in a straight line with it in 2½ fathoms, if necessary; but as you approach the foot of the Island, haul off to port for the middle of the river; when up to head of Bois Blanc Island, keep it best aboard to clear the flat which sets off Fort Malden, where there is a red buoy; after passing the buoy, steer for the lime kilns on the Canada shore, to clear a flat rock with 5 feet water on it, a little below the lime kilns and SE from Stony Island. There is generally a buoy at the north and south end of this shoal. When abreast the lime kilns, run the shore along pretty close to until nearly up to the rock which lies off 375 feet from the shore, and directly opposite the gate of McDougall's fence, and the large brick building; thence run across the river, steering NNW until you range Mamajuda Lighthouse with Grassy Island Lighthouse; then haul up for Mamajuda, keeping on the range until well up to it; pass it close to and run for Grassy Island Lighthouse, and as you approach it, give it a berth of 200 yards, or just clear the piled work of the Fishery; thence due north until nearly up to the head of Fighting Island, where the White-fishing shanties are; thence take the middle of the river, or haul over to the Canada shore, and run up in the eddy, close in, crossing Sandwich Bay from point to point, and up to Hog Island. There is a middle ground about ½ a mile long, just below the freight depot on the Detroit side, with 7 feet water on it; good channel inside, close to the docks. When up to the head of Hog Island, haul off to port about NE for Windmill Point Lighthouse; and as you approach Peach Island, keep a little more to port to clear the shoal which sets down from it; when past it, haul up again for the Lighthouse; give it a berth, and when well up to it, run out ENE 2 or 3 miles into Lake St. Clair. The depth of water in the channel all the way up is from 3½ to 5 and 6 fathoms water. The shoal off the foot of Hog Island runs down to abreast the Hospital, about ½ a mile, 6 to 8 feet water on it. The east or Canada channel is deep, 22 to 39 feet water. To enter the channel at the south

entrance, keep Bois Blanc Island just open with the mainland, which will lead you in. Keep Fighting Island side well aboard all the way through, and run out into the river above, about NW. The holding ground in the river is good nearly all the way through, except below the lime kilns.

Current in the river, average 2½ mile per hour.
Detroit Latitude..... 42°19'45" N.
Longitude, west of Greenwich..... 83°02'33".
In time..... 5 h., 32 min., 10.2 sec.
Variation of compass..... 2°07' E.

COURSES AND DISTANCES ON THE NORTH SHORE OF LAKE ERIE.

From Buffalo to Point Abino WbyS¾S 11 miles.

From Point Abino to Gravely Bay or Port Colborne WNW 9 miles.

FROM PORT COLBORNE PIER TO GRAND RIVER.

Run out from the pier SWbyW¼W 8½ miles; thence west 9½ miles, or until Mohawk Island light bears NE½E; thence Nby W½W 3 miles, or until you range the west pier; then run in, keeping the west pier well aboard.

FROM GRAND RIVER TO PORT DOVER.

Run out from Grand River SW¼W 6 miles, to clear the reef which lies off Grand River bluff WSW 4 miles; thence W¼S 26¼ miles, to abreast of Port Dover harbor; and note that a reef lies off the east side of the harbor, about 1½ miles SE from it; range the west pier and run in, keeping it best aboard. Lighthouse on the west pier.

From Port Dover to Long Point SEbyS¾S 18 miles.

From Long Point to Port Burwell W¼N 29 miles; thence WNW¼N 11½ miles.

From Port Burwell to Port Stanley W¼N 20 miles.

Cat Fish Creek is 10 miles from Port Burwell; has 7 to 9 feet over the bar, has one pier on the west side with a light on

the end of it, but is no place to run to for refuge, except for small vessels.

Between Long Point Cut and Port Burwell there are two piers, with lumber under the sand hills. Long Point upper gap is closed up and the lightship taken away.

From Long Point to Port Stanley, W½N 29 miles; thence WbyN 30 miles.

From Port Stanley to the Rondeau, SW¾W 43 miles.

FROM RONDEAU TO POINT PELEE.

SW¾W 44 miles; run on this course 4 miles further, until Point Pelee Island Lighthouse bears W½N and Point Pelee NNE¾E; thence NWbyW¾W 44 miles, to the entrance of Detroit River, with Bois Blanc Island Lighthouse bearing N¾E 3½ miles. On this route you leave the middle ground to starboard. The bottom off Point Pelee is sand; and along the east side of the island the bottom is rocky, but can be approached in 4 fathoms with safety. The new Lighthouse on the dummy at Point au Pelee can be passed pretty close to in rounding the point.

LIGHTHOUSES AND HARBORS ON LAKE ERIE—ON BOTH SHORES.

Black Rock light, fixed, visible 10 miles, near the head of Niagara River.

Beacon light, fixed, varied by flashes (every 1'30"), visible 14 miles, on Horse Shoe Reef, at the entrance to Niagara River.

To enter Niagara River, leave Horse Shoe Reef Lighthouse about 400 yards to starboard; then steer direct for the Beacon light at Black Rock, until abreast of the head of Black Rock pier, leaving the red iron can buoys Nos. 2 and 4 to starboard, and the black iron can buoy No. 1 to port.

To enter the river by the Emerald Channel, leave the red wooden can buoys Nos. 2 and 4 on your starboard hand, and the black wooden can buoy to port.

To enter the Tonawanda Channel to the eastward of the Strawberry Islands, leave the black spar buoys Nos. 3 and 5 to port.

To enter the Tonawanda Channel to the westward of the Strawberry Island, leave the red spar buoys Nos. 6 and 8 to starboard, and the black spar buoys Nos. 7 and 9 to port.

Buffalo light, fixed, visible 16 miles, on the end of south pier at Buffalo Creek. Fog Bell, struck by machinery every ten seconds.

TO ENTER BUFFALO HARBOR.

From Point Abino steer EbyN¾N 11 miles, direct for Buffalo Lighthouse, leaving Horse Shoe Reef and Lighthouse to port; run to the eastward 200 yards clear of Buffalo Lighthouse, until you range the north pier; then haul up and run in to the creek or under the breakwater. Depth of water going in 14 feet.

Silver Creek or Cattaraugus light, fixed, visible 9 miles, on the west pier at Silver Creek.

Dunkirk light, fixed, varied by flashes, visible 16 miles, at Dunkirk, on the SE shore of Lake Erie, west of the harbor.

Beacon light, fixed, visible 9 miles, on the pier, west side of the entrance to Dunkirk Harbor. (Buoyed out.)

Portland or Barcelona, 17 miles west of Dunkirk, has a good pier. Light discontinued.

Erie or Presqu'ile light, fixed, visible 16 miles, on the main land, southeasterly from the piers at the entrance to the harbor.

Beacon light, fixed, visible 10 miles, on the east end of the north pier. On the north side of the east entrance to Presqu'ile a shoal extends out from and around the east end of the north pier, with 8, 9 and 12 feet water on it.

To enter the harbor, bound up, run along shore until well up to the Lighthouse on the mainland; and as you approach the south pier, you make a red can buoy, which leave to starboard, and haul in between the piers, and run along the north pier in a line with it, until past the end of it; then keep a little more to the northward, until you range the two beacons on the north

pier; keep on this range till the two beacons on the peninsula, NW of the north pier, are in line, then haul off for the city docks. There was only 8 feet water over the inner bar last year, and the shoal off the mouth of the harbor has made considerably to the southward, nearly closing up the channel.

Conneaut light, fixed, visible 8 miles, on the east pier at the entrance to the river. This harbor has from 7 to 8 feet water over the bar.

Ashtabula light, fixed, varied by flashes (interval of flash 1'30"), visible 11 miles, on the east pier, at the entrance to the river; 8½ feet water over the bar.

Grand River or Fairport light, fixed, visible 16 miles, at Fairport, on the east side of the river, on the hill.

Beacon light, fixed, visible 6 miles, on the east end of the pier. There is a middle ground at the entrance. The channel into Grand River was nearly choked up last season.

Cleveland, Ohio—change of pier light—a fixed white light, varied by red flashes. Interval of flash 15".

Cleveland light, fixed, visible 14 miles, on the end of the east pier.

To run in, range the east pier, and keep midway between them; 12 to 14 feet going in.

Black River light, fixed, visible 14 miles, on the end of the west pier, at the mouth of Black River; 9 feet water and variable.

Vermillion light, fixed, visible 9 miles, on the west pier, at Vermillion Harbor; 9 feet water and variable.

Huron light, fixed, visible 12 miles, at the mouth of Huron River, on the west pier; 10 to 12 feet water.

Cedar Point Beacon light, fixed, visible 10 miles on Cedar Point, east side of the entrance to Sandusky Bay.

Outer Range Beacon light, fixed, visible 5 miles.

Inner Range Beacon light, fixed, red, visible 5 miles.

TO ENTER SANDUSKY BAY, DAY OR NIGHT.

On approaching Cedar Point Lighthouse, run until you bring it to bear SWbyS½S; keep on this course until you make the

outside buoy, and leave it and all the red buoys to starboard (Nos. 2, 4, 6, 8, 10, 12 and 14); No. 14 is the turning stake or point towards Bull's Island, after passing which you will make the black buoys Nos. 1, 3, 5 and 7, leaving them all to port; and after passing No. 7, steer for the city, about S½E 2 miles. You will have nothing less than 11 feet water over the bar.

To enter the harbor in the night, bring the outer range light in line with Cedar Point light, and run on this range until within about 500 to 600 feet of the outer range light; thence turn gradually to the westward until you get the inner (red) and outer lights in range; keep them in range for 1½ miles; thence turn gradually toward the city. The depth of water on the inner bar is from 10½ to 14 feet, sand.

Sandusky or Marble Head light, fixed, visible 12 miles, on Marble Head, north side of Sandusky Bay, and leading mark for the south channel; deep water close to.

Port Clinton light, fixed, visible 10 miles, on the east side of Portage River, at the head of the bay, SE from South Bass Island.

Green Island or Strontian light, fixed, varied by flashes (intervals of flash 2′), visible 12 miles, on the west end of Green Island, 1¼ miles from the west side of South Bass Island.

West Sister light, fixed, visible 14 miles, on the SW end of West Sister Island, and a leading mark for Maumee River.

Turtle Island light, fixed, visible 14 miles, at the entrance of Maumee River.

TO RUN UP MAUMEE RIVER TO TOLEDO.

Haul round Turtle Island Lighthouse until it bears due east, in 13 feet water, ⅛ of a mile distant; thence SE¾S 1½ miles, to abreast of North Cape, which is low and swampy, with scattered bushes on it, in 11 feet water; there is usually a stake on this point, red; thence SW½S 1¼ miles, in 12½ to 13 feet water; thence W½S for the first black stake, run up, leaving all the black stakes to port and red to starboard; when into the river, keep the port side well aboard, until above the middle ground which lies off Manhattan Docks, and some little distance above

it; then haul over to the Toledo side and run up to the docks, or come to in the river. There is a middle ground opposite the upper docks of Toledo.

There are now three ranges for the channel into Maumee Bay, besides the usual black and red stakes. Vessels have to pass through the drawbridge in going up river.

Vessels not drawing over 9 to 10 feet water can come in as follows: bring Turtle Island light to bear due east, and run in S¼W for 2½ miles, into 12½ feet water. This course runs you over the North Cape Bank in 11 feet water, leaving the first red stake to port; thence west for the first black stake or buoys.

TO RUN THE EAST CHANNEL INTO MAUMEE BAY.

Bring Turtle Island Lighthouse to bear due west, and Presqu'ile Point, the east point at the entrance to Maumee River, to bear SWbyW¼W, in 18 feet water, and run over the bar on this course. On this range you will have nothing less than 9 and 10 feet water; when over the bar you have 12½ feet water.

Monroe light, fixed, visible 14 miles, on the north pier, at the entrance to the River Raisin. To run in, range the piers and run up to the docks.

Gibraltar light, fixed, visible 14 miles, on west side of entrance to Detroit River.

Mamajuda light, fixed, visible 8 miles on Mamajuda Shoal, in Detroit River.

Grassy Island light, fixed, visible 8 miles, on Grassy Island, in Detroit River.

LIGHTHOUSES ON THE CANADA SIDE OF LAKE ERIE.

Bois Blanc light, fixed, visible 14 miles, at the entrance to Detroit River, on Bois Blanc Island, opposite Amherstburg; is the leading mark for the east channel. A lightship will be stationed on the shoal SEbyS¼S from Little's Point, during the season of navigation, showing a red light.

Point Pelee Island light, fixed. red, visible 10 miles, on Point Pelee Island; entrance to the north channel to Detroit River. Good shelter from NE to SE and S winds in McCormick's Bay, between the point and Lighthouse, in 5½ fathoms water, mud bottom.

Beacon light, fixed, visible 10 miles, on the shoal off Point Pelee. A new Lighthouse has been built on the dummy on Point Pelee Shoal, and shows a white light, and is an excellent lead for the north channel.

Rondeau light, doubtful, at the entrance to Rondeau Harbor. Good holding ground under the point, in 5 fathoms water, clay bottom. Good shelter from SW, W and NW winds.

Port Stanley light, fixed, visible 9 miles, on the west pier at Port Stanley. The entrance to this harbor is very narrow; the piers run out straight. The depth of water varies from 10 to 12 feet.

Port Burwell light, fixed, visible 9 miles, on the hill, to the eastward of the piers.

Beacon light, fixed, visible 5 miles, on the west pier, red. Depth of water from 10 to 12 feet. To run in, keep the west pier well aboard until inside, then take the middle, or come to the dock.

Long Point light, fixed, visible 14 miles, on Long Point, a leading mark for the lower end of Lake Erie. Good holding ground under the point, between the Lighthouse and Big Bluff, in 4½ to 6 fathoms water, sandy clay.

Port Dover light, fixed, visible 10 miles, at the entrance to the river, on the west pier; 9 feet water.

Grand River light, fixed, visible 12 miles, at the entrance of Grand River and head waters of the Welland Canal; the Lighthouse is on the west pier. This is one of the best harbors on Lake Erie. In running in keep the west pier well aboard, and follow up the pier work until into the river. To come to anchor, run well up past the entrance to the canal, keeping the port side well aboard, and come to in 2½ to 3 fathoms water, mud bottom, or run into the canal.

Mohawk Island light, revolving, visible 16 miles, on Mohawk Island, sometimes called Gull Island, is a good leading mark up

or down the lake. A good harbor can be made under the lee of this island from SW winds, by bringing the light to bear west. Vessels can lie here in the heaviest gales. The reef sets off from the island SE 2½ miles, which forms the lee. The bottom is red clay. Come to in 3½ fathoms. There is a good channel between the island and mainland, with 2½ fathoms water. To run through, bound down, keep midway between Mohawk Bluff and the island, until you drop into 14 feet water; then haul up to the northward and eastward, and follow the island round in 12 to 13 feet water, pretty close to; and when past the island, run out to the eastward, giving Point Selkirk a berth of ½ a mile, or come to under the island, with the Lighthouse bearing west.

Port Colborne or Gravely Bay light, fixed, visible 12 miles, on the west pier, at the entrance to the Welland Canal. This pier has a range light some distance to the northward of the outer light. To run in, range the lights and keep the west pier best aboard, and run up into the basin and make fast on either side.

Sugar Loaf Hill is 2 miles west of the entrance, and is a good leading mark for this harbor.

Point Abino is a good lee from SW to W winds. Vessels generally do not run quite far enough into the bay to lie easy.

REGULATIONS TO BE OBSERVED AT PORT COLBORNE AND PORT DALHOUSIE ELEVATORS.

We are indebted to George C. Finney, Esq., for the following copy of regulations to be observed by vessel masters at Port Colborne and Port Dalhousie Elevators:

1st. Every vessel to be discharged or loaded in rotation, according to date of arrival and reports, at the rate of two lighterages to one through cargo.

2d. No report will be taken from any vessel until she is inside the ferry, and afloat.

3d. Lighterage rates will be as follows: Taking freight from Chicago to Oswego or Kingston, as standard—when 8c United States currency and under, 2½c gold per bushel; over 8c, 2½c; 10c and under 12c, 3c; 12c and under 15c, 3½c; 15c and under 18c, 3½c; 18c and over, 4c. Quantities under 1,500 bushels, 4c.

The foregoing rates do not include elevating at Port Colborne. All charges must be paid before delivery of freight, etc., at Port Dalhousie. These regulations are signed by the General Manager of the Welland Railroad, and dated July 1st, 1868.

LATITUDE AND LONGITUDE.

Name of Place.	Latitude N.	Long. W. of Greenwich.
	° ′ ″	° ′ ″
Buffalo, N. Y.	42 53 05	78 58 15
Erie, Pa	42 09 00	80 08 00
Huron River	41 24 00	82 40 00
South point Turtle Island	41 45 25	83 30 00
Windmill Point Lighthouse	42 21 57	83 05 00
Point Selkirk, Ont.	42 51 00	79 34 00
Long Point, Ont.	42 33 30	80 07 30
South point Bass Island	41 38 20	82 57 30
Middle Sister	41 51 30	83 07 00

COURSES AND DISTANCES ON LAKE ONTARIO.

FROM PORT DALHOUSIE TO THE DUCKS LIGHTHOUSE

EbyN¼N 136 miles; thence NE¼N 22 miles, to Nine Mile Point Lighthouse; thence 4 miles along the shore of Simcoe Island, to abreast of Four Mile Point, with Snake Island red light to port. The channel here is about ¾ of a mile wide; you will have from 3 to 4½ fathoms water. Keep Four Mile Point well aboard, in 4½ fathoms; when clear of the point, steer for Kingston; haul round the west point of the harbor, and come to off the old wooden Lighthouse in 6 fathoms water, soft bottom, or run alongside the docks.

Garden Island is directly opposite Kingston Bay, and is the principal timber port.

FROM PORT DALHOUSIE TO OSWEGO.

Run out of the harbor 2 miles NNE; thence EbyN¼N 80 miles; thence E¼N northerly 106 miles, to Oswego.

To RUN INTO OSWEGO.—When well up to the harbor, haul round the end of the west pier and run in. When the wind is scant, and the current running out strong, it is best to tow in, as the bottom is rocky and an anchor will not hold. Many vessels have been lost by attempting it in heavy weather.

From Oswego to Kingston north 60 miles, leaving the Real Ducks Island to port, Pigeon Island and the Charity Shoals to starboard. also Nine Mile Point Lighthouse, Simcoe Island, and run for Kingston as directed before.

From Oswego to Long Point, Ont., NW½W 41 miles.

From Oswego to Galloo Island N¼E 30 miles; thence to Tibbett's Point NbyE¾E 19 miles.

From False Ducks to Tibbett's Point NEbyE½E 24½ miles.

From Real Ducks to Tibbett's Point NE¾N 19 miles. Good holding ground under the Real Ducks Island in 5 to 7 fathoms, blue clay.

From Genesee River to False Ducks Island NE¼N 65 miles.

From Stoney Island to Oswego, SSW 30 miles.

From Welland Canal to Toronto N½W 29½ miles.

From Welland Canal to Credit River NNW½W 27 miles.

From Niagara to Toronto NWbyN 30 miles.

FROM PORT DALHOUSIE TO GENESEE RIVER EIGHTY-SIX AND ONE-HALF MILES, AS FOLLOWS:

NNE 3 miles; EbyN¾N 40 miles; thence E¾S southerly 17½ miles; thence EbyS¾S 19 miles, to Braddock's Point; thence SE¼E 7 miles, to the piers.

PORT DALHOUSIE HARBOR

Is the entrance to the Welland Canal. This is an easy harbor to make. In beating up towards the harbor, close in, keep out of range of the ends of the piers, as the water shoals quickly inside that range. The piers are 3,000 feet long, 200 feet apart, and run out from the bend southwest of the lock N&S. There is a middle ground opposite the bend in the west pier. Vessels can pass on either side of it. The railroad station is on the east side of the harbor, 12 miles from Niagara River.

LIGHTHOUSES ON BOTH SHORES OF LAKE ONTARIO.

Ogdensburg light, fixed, visible 12 miles, at the mouth of the Oswegatchie, in the St. Lawrence River.

Cross-over Island light, fixed, visible 12 miles, on Cross-over Island, St. Lawrence River.

A new Lighthouse is to be erected on Sister Island, St. Lawrence River.

Sunken Rock light, fixed, visible 9 miles, on Bush or Sunken Rock Island, near Alexander Bay, in St. Lawrence River.

Rock Island light, fixed, visible 9 miles, on Rock or Johnson's Island, in St. Lawrence River.

Tibbett's Point light, fixed, visible 14 miles, on the SE side of the entrance to St. Lawrence River. Galloo Island Lighthouse SSW 19 miles; Charity Shoal Day Beacon SWbyW, distant 8 miles; Pigeon Island W½S 10 miles.

Galloo Island light, fixed, visible 14 miles, on the west point of Galloo Island. Shoal to the NW 1 mile.

Horse Island light, fixed, visible 11 miles, on the west end of Horse Island, and 1½ miles west of Sackett's Harbor.

Stony Point light, revolving (interval of flash 2′), visible 11 miles, on Stony Point, and the leading mark for Sackett's Harbor.

Sackett's Harbor is situated on the SE side of Black River Bay, and WbyN from Point Peninsula, 9 miles distant. The Lighthouse stands on a rock, called Horse Island, at the southwestern point of Black River Bay, 1½ miles west of the harbor. It shows a fixed bright light. To enter this harbor from the lake, run past Stony Point light, and follow the land along, keeping the starboard hand best aboard to clear a middle ground which lays off the south end of Stony Island, nearly mid-channel, haul up for Horse Island Lighthouse, pass it pretty close to, and run round the point and into the Bay of Sackett's. There is a good channel on either side of Great Galloo, Litttle Galloo and Stony Island.

Salmon River, or Port Ontario, 20 miles east of Oswego.

Salmon River, or Port Ontario, is twenty miles NEbyE from Oswego, and north of Mexico Bay; has two good piers, with plenty of water. The Lighthouse is on the North Pier end, is 52 feet high, and shows a white light. The land both north and south of the harbor is very low, and cannot be seen at any great distance.

Oswego light, fixed, visible 14 miles, near the end of the west pier, at the entrance to Oswego Harbor.

Big Sodus Bay light, revolving, visible 13 miles, on Sodus Point, at the west side of Sodus Harbor.

Little Sodus Bay is 16 miles SW of Oswego, has a good harbor, but only 6 feet water going in. The piers run out north and south, 250 feet apart and 1,300 feet long; 30 to 40 feet water inside.

Big Sodus Bay is 32 miles WSW½S of Oswego, and 36 miles E½N from Genesee River—the most capacious harbor on the south shore of Lake Ontario. It is entered from the lake by a channel 470 feet wide, between piers which extend out into 13 feet water. The main light is on the hill to the westward of the harbor, and the beacon light on the west pier head; depth of water going in 9 to 12 feet, inside the bay 20 to 40 feet.

Genesee River light, fixed, visible 14 miles, on the west side of the entrance to Genesee River.

Genesee River is protected by piers running into the lake 2,000 feet NE and SW, and 400 feet apart. To run in between the piers, bring the pier light to bear SSE, and haul up, giving the west pier end a berth of 50 feet, to clear some sunken cribs off the end of the pier.

Beacon light, fixed, visible 6 miles, on the end of the west pier, at the entrance of Genesee River.

Niagara Fort light, fixed, visible 14 miles, on the Mess House of Fort Niagara, at the junction of the Niagara River and Lake Ontario.

To enter this river, bring the light to bear SEbyE, and run up in a line with the dock under the fort until over the bar; thence up river.

Port Dalhousie (Ontario) light, revolving, on the east pier.

Burlington Canal (Ontario) light, fixed, visible 12 miles, on the middle of the south pier, at the entrance to Burlington Bay, Hamilton. Beacon light on the end of south pier.

To enter the bay, open the Beacon light about handspike wide with the main or inner light, and run in between the piers; thence about WSW up to abreast of Hamilton docks, 4½ miles. Depth of water in the bay from 2 to 5, 7, 9 and 12 fathoms.

Oakville (Ontario) light, fixed, visible 10 miles, on the east pier, at the entrance to the harbor, 66 feet high.

Port Credit (Ontario) light, fixed, visible 10 miles, on the east pier, at the entrance to the River Credit. This port resembles Oakville, and is 12 miles SWbyW from Toronto, and 10 miles from Oakville.

TORONTO HARBOR, ONTARIO.

This spacious bay is one of the best harbors on Lake Ontario. It is nearly circular, and formed by the mainland on the north, and a long low narrow spit of land on the east, south and southwest, called the Peninsula or Island. It extends in a southwesterly direction from the highlands, in the township of Scarboro', upon which trees of stunted growth are thickly scattered. Thus is inclosed a beautiful basin, about 2½ miles in diameter, capable of containing a large fleet of vessels.

Gibraltar Point light, fixed, visible 14 miles, on Gibraltar Point, at the SW point of the Peninsula.

Two range lights on the Queen's Dock, the north one red and the south one white. They bear NbyW from Gibraltar Point Lighthouse.

To run into Toronto Bay, give Gibraltar Lighthouse a berth of 1 mile, and run in north for the harbor lights, which keep in range until well up to the wharf; then follow the buoys round, leaving them on the starboard hand, two red buoys to the westward, and two white buoys to the eastward; thence straight up the bay, in line with the wharfs, or come to in any part of the bay, in 18 to 22 feet water. The depth of water between the piers and the buoys is 11 to 12 feet, and is being deepened every year. A sandy shoal stretches into the lake a quarter of a mile, in a SW direction off Gibraltar Point, and continues along the west side of the island, to the entrance of the bay, due north, to the buoys, at an average distance of a quarter of a mile from the island, with 5 to 6 feet water on it, and at the point drops off suddenly to 12 and 20 feet.

DANGER.—There is a large boulder stone, in 5 feet water, nearly midway between the Queen's and Garrison wharfs, and a little to the south of them. To make lee under the island, come to in from 5 to 6 fathoms.

NOTE.—In running up the lake for Toronto harbor, keep 2½ miles from the shore, so as to open Gibraltar light from the projection of the island, where the highest trees are. A channel has formed at the east end of the bay, with 5 or 6 feet water in it, by the force of the sea in heavy gales. It was proposed some few years ago to cut a channel through here, but was given up, supposing it would spoil the western entrance. It will now be proved by this break in the narrow neck of the Peninsula, whether it will have that effect at the western entrance or not.

THE PORT OF LIVERPOOL OR PICKERING, FORMERLY CALLED FRENCHMAN'S BAY.

This port is 26 miles NE½E of Toronto. It is formed by a bay running into the land, and separated from the lake by a sandy and gravely beach, through which is a cut 100 feet wide.

The light is on the east pier, and visible 5 miles.

The harbor itself is well sheltered, being completely land-locked; but from the foulness of the bottom (principally from weeds) an anchor will not hold during a hard blow.

The average depth of water inside the bay is 9 feet 6 inches; at the outer mouth, between the piers, 11 feet 6 inches; and the inner mouth 7 feet 6 inches.

Through the cut into this harbor, a current runs in and out with great regularity, once in about every four minutes.

WHITBY HARBOR.

Six miles to the eastward of Liverpool, and 34 miles NEbyE of Toronto, one of the best and most secure harbors on the north shore. It stands near the center of a deep bay, between Raby Head, on the east, and Scarboro' Heights on the west, and three and a half or four miles north of a line drawn between these two points. The harbor is formed by a strong break-water of crib work, stretching across the head of the bay, by which it is separated from the lake, and forms a large basin, the entrance to which is at its eastern extremity, between piers running south a considerable distance into the lake, 250 feet apart, with 13 to 14 feet water in the channel. The west pier is much longer than the east pier.

A strong tide or current sets in and out of this harbor, which at times is so strong as to turn a vessel's head round, when entering with a light wind. To enter the harbor, run

through between the piers and haul up for the red warehouse, and round to with your head to the SW, in 14 feet water.

DANGER.—Midway between Whitby and Liverpool, there is a shoal in shore, one mile west of the township line.

Whitby light, on the west pier. Good harbor; 13 to 14 feet water going in.

Port Hope light; on the east pier; 9 feet water going in. Will show a white light east and west, and a red light south.

Scotch Bonnet light, flash, showing red and white at intervals, lies to the westward of Nicholson's Island.

Long Point light, revolving, visible 14 miles, on Long Point, 22 miles from the False Ducks' Lighthouse.

False Ducks' light, fixed, visible 12 miles, on False Ducks' Island, 35 miles from Kingston.

OSHAWA.

The Port of Oshawa is 6 miles east of Whitby. It is situated in the bend of a small bay, and consists of a well constructed pier, running out from the mainland into 10 feet water. At the south end of the pier is a storehouse, painted red, and under the angle formed by the roof is placed a large lamp, which serves the purpose of a lighthouse.

This port is well protected from any wind north of E and W, but is exposed to southerly winds. The west side of the Bay of Oshawa is formed by a high clay bank, almost perpendicular towards the lake, on the extreme point of which stand three or four trees.

DANGER.—The east point is called Oshawa Island, bearing south by east from the pier. The water here is very shoal, and a reef of large boulders extends into the lake SE, for 400 yards, which must be given a wide berth. From the point of land about midway between Whitby and Oshawa there is another reef of large boulders running out ESE into the lake.

PORT DARLINGTON

Is 8 miles to the eastward of Oshawa, 50 miles ENE of Toronto, and 29 miles WbyS of Cobourg.

This port has been much improved by extending the piers into 12 feet water, and dredging the land-locked basin within,

where vessels drawing 9 feet or less may lie in safety in any weather. The west pier extends about 50 feet farther south than the east pier, which breaks the rolling sea from the SW. The light is on the east pier, and visible but a short distance.

One and one-half miles west of Darlington, is Raby Head, a high clay bluff point, destitute of trees or bushes.

BOND HEAD OR PORT OF NEWCASTLE.

Between 4 and 5 miles, EbyN of Darlington, is the Port of Bond Head. It consists of a pier run out into 10 feet water; but, from its exposed situation, can only be approached in fine weather, or when the wind is off shore.

DANGER.—Four miles east of this port, there is a large boulder, some distance in the lake, called the Peach Stone, and four miles east of this again, there is a reef of boulders, extending 300 yards into the lake, in a southerly direction off the headland. Course to clear these reefs, bound to Cobourg, E½N, 20 miles, giving the shore a berth of 1 mile; thence NEbyE½E for Port Hope, and ENE¼E for Cobourg.

PORT HOPE

Is 23 miles E½N of Darlington, which is formed by running two rows of piers into 13 feet water, having a basin at their inner or northern extremity. During a SE or SW gale, this port cannot be made by large vessels, drawing over 9 feet water, with safety, owing to the tremendous swell rolling in from the lake; besides which, the piers being only 125 feet apart at the mouth, and the basin very small, there is no room to check the speed of a vessel, or to snub her without danger to herself or others. During a southerly gale, also, the swell in the basin is so great as to cause vessels to lay uneasy. From any wind N of E or W, this is a perfectly safe and snug harbor.

COBOURG.

The Harbor of Cobourg is situated seven miles east of Port Hope, and is formed of pier work. A shifting bar of sand is thrown up during a SW gale, which renders the entrance to it still more dangerous than Port Hope for vessels of deep draught. The harbor is more capacious, and when once entered

more secure than that of Port Hope, having a second or inner basin with plenty of water, where no sea can injure or disturb the vessels lying there. The mouth of the harbor is 130 feet wide, with water varying from 10 to 13 feet. The Lighthouse is on the east pier, 20 feet high, and visible 8 miles.

DANGER.—In entering this port, at night, care must be taken not to run too close to the south end of the west pier, where broken crib work and numerous piles project nearly 100 feet farther into the lake than the end of the east pier.

SHOAL.—Midway between Port Hope and Cobourg there is a dangerous shoal, called Gull Island, which is about two miles long, and one mile from the shore. It is sometimes bare, and has a Lighthouse erected upon it, 45 feet high, showing a bright, fixed white light, and visible 10 to 12 miles. In passing this shoal give it a berth of two miles.

GRAFTON.

This village is about 8 miles east of Cobourg, has a pier run out into 10 feet water.

COLBORNE.

Is a village 8 or 9 miles below Grafton; has a pier for the accommodation of trading craft. Both these ports are exposed to the heavy seas of the lake, and afford no shelter to vessels, except when the wind is off shore.

DANGER.—One mile west of Colborne there is a projecting point, off which is a reef of boulders. In approaching Colborne give the point a good berth.

PRESQU'ILE HARBOR.

The West Bluff of Presqu'ile is 24 miles E¼N of Cobourg, well wooded, and has 90 feet water close in shore. Five miles NEbyE of this point brings you abreast of the Lighthouse, which is 67 feet high, and shows a bright white light, visible 12 to 15 miles. Give the Lighthouse point a berth of half a mile, to clear a shoal that sets off from it, in a southerly direction, haul up NbyE for the lone pine tree, until the inner range lights are in line; then haul up SW, keeping within fifty yards north of the beach of the first range light station, as there is

18 to 22 feet water close to it. When past this point come to, between the two range points, in 18 feet water.

DANGER.—Between the main Lighthouse, on the SE point, and the range light on the NE point, extending in a northeasterly direction, is a shoal ¾ of a mile long, and forms a triangular point, called the Middle Ground, with 4 to 6 feet water on it, which you have to haul round in going into the harbor.

To the north of the Lighthouse built on the NE point, running out from the mainland, there is a low marshy spit, destitute of timber, and easily recognized by a large dead elm tree, bearing north of the Lighthouse. This point is called Elm Tree Point. The channel here is about half a mile wide. WNW of the second range light, there is another small shoal, called Four Acre shoal, nearly half a mile from the shore, with plenty of water all around it. Two miles ESE of the main Lighthouse there is a dangerous rocky shoal in the lake, with 3 to 5 feet water on it. It is to the eastward of the course from the Lighthouse to Scotch Bonnet. SE from this shoal is another small shoal, with 5 feet water on it. These shoals obstruct the entrance to Weller's Bay.

Weller's Bay is capable of being made into a good harbor.

SOUTH BAY POINT.

Good anchorage and shelter can be found inside South Bay Point; to make it, keep the Outer Duck Island to the eastward and the Inner Duck to the northward, and come to off the NE point, or make fast to the dock. In leaving this anchorage, bound for Kingston, if the wind is favorable, a passage can be made by passing through the Upper Gap, between Indian Point on the west and Amherst Island on the east. Steer Nby E, till between Amherst Island and the mainland. Thence EN E, till north of the Brother's Islands. Thence east to Kingston.

Good anchorage can be found on the NE side of the Real Duck Island.

Nine-Mile Point light, fixed, visible 13 miles, on Nine-Mile Point, Simcoe Island, at the entrance to River St. Lawrence.

Snake Island light, fixed, red, visible 7 miles on Snake Island, abreast of Four-Mile Point, and 4½ miles from Kingston, Ontario.

KINGSTON.

Kingston Harbor is one of the best harbors on Lake Ontario. There are three channels by which it may be made from the lake: The Bateau Channel, between Wolf and Long Island and Simcoe Island, leaving Hare Island also to starboard, as you enter. This channel has from 12 to 18 feet water in it. The south channel, between Simcoe Island and Snake Island. This is a good deep channel; run through, giving Simcoe Island a berth of ¼ to ½ of a mile, and when abreast of Four Mile Point haul off for Kingston. The North or Old Ship Channel is the best channel of the three, and has 4 to 10 fathoms water. To run this channel haul off towards Amherst Island, and when Cedar Island (which is close under Fort Henry) is open with Snake Island, steer for Fort Henry, and run up to the harbor; you leave Snake Island to starboard and Salmon Island to port.

Narrows light, at the head of the Narrows, above Brockville.

COURSES AND DISTANCES ON LAKE ONTARIO.

(According to the Chart of Captain Ford, U. S. Navy.)

From Sackett's Harbor to mid-channel between Stony Point and Stony Island SWbyW 12 miles.

From Stony Point to False Ducks WNW 25 miles.

From Fort Tomkins to Real Ducks W¼N 22 miles.

From NE end of Stony Island to the West end of Grenadier Island NNW 11 miles.

From Stony Point to Long Point W¼N 45 miles.

From Stony Point to Burlington Bay and Hamilton 180 miles.

From Stony Point to the Devil's Nose WSW½W 95 miles.

From Stony Island to Fort Niagara WbyS¼S 145 miles.

From Snake Island to Navy Point NEbyE 6 miles.

From Snake Island to Four-Mile Point E 1½ miles.

From Three Sisters to Snake Island, ESE 4½ miles.

From the NE end of Stony Island to middle of Charity Shoal NNW 14 miles.

From Oswego to Real Ducks N 35 miles.

From Oswego to Long Point NW¼W 40 miles.

From Oswego to Bay Quinte NbyW 47 miles.

From Nine-Mile Point east of Oswego to Stony Point NbyE ¼E 21 miles; and from Nine-Mile Point west of Oswego to Stony Point NE¼N 35½ miles.

From Oswego to Thirty-Mile Point W 100 miles.

From Oswego to Big Sodus WSW 9 miles; thence SWbyW ½W 17 miles.

From Oswego to Toronto W¼N 135 miles.

From mid-channel between Point Peninsula and Stony Island to Fifth-Town Point, Upper Gap, Bay Quinte, WNW 26 miles.

From the anchorage at the Real Ducks to Nine-Mile Point, off Simcoe Island, NbyE 18 miles.

From Real Ducks to Upper Gap of the Bay Quinte NNW ¼W 14 miles.

From anchorage at the Real Ducks to south side of False Ducks W 8½ miles.

From False Ducks to Upper Gap N 9 miles.

From mid-channel between the Real and False Ducks to Ship Island, between Snake Island and Salmon Island, NEbyN 22 miles.

From Long Point to the channel between the Scotch Bonnet and Nicholson's Island WNW 17 miles.

From Long Point to Toronto WbyS 100 miles.

From Toronto to Burlington Bay SW 32 miles.

From Toronto to Fort Niagara SEbyS 28½ miles.

From Burlington Bay to Niagara River EbyS 32 miles.

From False Ducks to Long Point WSW 25 miles.

From Genesee River to Presqu'ile N 55 miles.

From Genesee River to mid-channel between Real and False Ducks SW 73 miles.

From Big Sodus to entrance of the channel between the Real and False Ducks NNE 50 miles.

From Devil's Nose to Toronto WbyN¼N 60 miles.

From Niagara River to Presqu'ile NEbyE 75 miles.

From Genesee River to Port Hope NWbyN 58 miles.

From Thirty-Mile Point to Fort Niagara WSW 26 miles.

From Tibbett's Point to Jordan Point WbyN½N 5 miles.

From Tibbett's Point to Pigeon Island W½S 8 miles.

From Gravely Point to Tibbett's Point SW½S 3 miles.

From Grenadier Island to anchorage off the Real Ducks NE by E 11 miles.

From Upper Gap of Bay Quinte to the Three Sister Islands, at the lower end of Amherst Island, ENE 9 miles.

From Duffin's Bay to Niagara SbyW 40 miles.

From Big Sodus to Presqu'ile NWbyN 60 miles.

From Big Sodus to Long Point NbyW 38 miles.

From Nine-Mile Point, west of Oswego, to Braddock's Point W½S 52 miles.

OAKVILLE.

The Port of Oakville is 22 miles W½S from Toronto, and 14 miles NEbyN from Burlington Canal. The piers are 100 feet apart, and run out nearly north and south into the lake.

DANGER.—Between the port and Port Credit there is a shoal, and numerous large boulders, extending a considerable distance out from the shore, which should not be approached nearer than a mile.

WELLINGTON SQUARE AND NELSON.

These small ports are situated between Oakville and the Burlington Canal. Their docks run out into 10 feet water. No protection from east and south or south-east winds.

OAK ORCHARD CREEK

Is 35 miles west of Genesee River, and 52 miles E of Niagara. The entrance to this creek is between two piers, running north and south, into 6 feet 6 inches water, and 160 feet apart. The west pier is 844 feet long, and the east pier is 734 feet; the basin or pond inside has plenty of water, and is well secured from all winds.

VARIATION OF THE COMPASS ON LAKE ONTARIO.

There is little or no variation of the compass at the west end of Lake Ontario. The variation at the east end is from 1° to 2° west, and at Kingston 6° west.

The set of current is hardly perceivable until you pass Long Point and the islands. After that the current increases perceptibly.

TABLE OF DISTANCES FOR THE UPPER LAKES, FROM PORT TO PORT, IN MILES.

WEST SIDE OF LAKE MICHIGAN.

	Miles.		Miles.
Chicago to Grosse Point	12	Death's Door to Chamber's Isl'd.	21
Chicago to Waukegan	35	Chamber's Island to Long Tail Point	54
Chicago to Kenosha	51	Death's Door to Washington Harbor	13
Chicago to Racine	57	Washington Harbor to Louse or Rock Island	7
Chicago to Milwaukee	85	Louse Island to head of Beaver Island	67
Milwaukee to Port Washington	25	Head of Beaver Island to Point Waugoshance	30
Port Washington to Sheboygan	25	Point Waugoshance to Mackinaw	23½
Sheboygan to Manitowoc	30		
Manitowoc to Twin Rivers	7		
Twin Rivers to Kewaunee	22		
Kewaunee to Anheppe	11		
Anheppe to Baley's Harbor	36		
Baley's Harbor to Death's Door	20		

EAST SIDE OF LAKE MICHIGAN AND WEST SIDE OF LAKE HURON.

	Miles.		Miles.
Chicago to Michigan City	38	Grand Traverse light to Skillegolee	37½
Michigan City to New Buffalo	12	Skillegolee to Point Waugoshance	8½
New Buffalo to St. Joseph	26	Pt. Waugoshance to Old Mackinaw	17½
St. Joseph to Kalamazoo	40	Old Mackinaw to Sheboygan light	16
Kalamazoo to Grand River	28	Old Mackinaw to Ft. Mackinaw	12
Grand River to Little Point au Sauble	44	Sheboygan light to Presqu'ile	58
Little Point au Sauble to Big Point au Sauble	28	Presqu'ile to Thunder Bay Island Lighthouse	30
Big Point au Sauble to Point Betsey	48	Thunder Bay light to Point aux Barques	77½
Point Betsey to Sleeping Bear	18	Point aux Barques to St. Clair River	71
Big Point au Sauble to Manistee	16		
Sleeping Bear to Cat Head Point	29		
Cat Head Point to Traverse Bay Lighthouse	4½		

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LAKE SUPERIOR.

	Miles.		Miles.
Sault Ste. Marie to Round Island	8	Copper Harbor to Agate Harb..	8½
Round Island to Point Iroquois,	5½	Agate Harbor to Eagle Harbor.	5½
Point Iroquois to White Fish Point	25	Eagle Harbor to Eagle River...	7
White Fish Point to Marquette.	115	Eagle River to Ontonagon.....	58
White Fish Point to Grand Island	84	Ontonagon to LaPoint	65
Grand Island to Marquette.....	35	LaPoint to Superior City.....	75
Marquette to Portage Entry....	65	Superior City to Rock Harbor, Isle Royale.....	180
Portage Entry to Manitou Island	46	Rock Harbor to White Fish Point.....	188
Manitou Island to Copper Harbor	14	White Fish Point to Manitou Island	124
		Detour Lighthouse to Sault Ste. Marie.....	42

LAKE ERIE.

	Miles.		Miles.
Detroit to Malden.....	19½	Ashtabula to Conneaut.....	18
Malden to Cleveland.....	86	Conneaut to Erie.....	27
Cleveland to Buffalo 174		Erie to Dunkirk	45
Cleveland to Fairport	30	Dunkirk to Buffalo.....	40
Fairport to Ashtabula.....	25	Buffalo to Chippewa	20

CANADA SIDE OF LAKE ERIE.

	Miles.		Miles.
Point au Pelee to Rondeau 44		Long Point to Grand River....82½	
Rondeau to Port Stanley.....43		Grand River to Port Colborne..21	
Port Stanley to Port Burwell....20		Port Colborne to Buffalo.....23	
Port Burwell to Long Point.....40			

LAKE HURON.

	Miles.		Miles.
Mackinaw to Detour.....	36	Cove Island to St. Clair River ..162	
Detour to St. Clair River 226		Goderich to St. Clair River.....	60
Mackinaw to St. Clair River....241		Fort Gratiot light to Detroit....	72
Mackinaw to Collingwood, Ont.230			

DISTANCES BY THE GRAND TRUNK RAILWAY.

Montreal to Quebec.....168 miles
Montreal to Kingston.....172 miles
Montreal to Toronto .....332 miles
Montreal to Stratford .....420 miles
Montreal to Sarnia.....504 miles

A sea mile, according to Bowditch, is 6,120 feet.
A geographical or nautical mile is 6,139.74 feet.
A statute mile is 5,280 feet.

APPENDIX

TO

THOMPSON'S COAST PILOT.

1869.

NEW LAW OF MARINE LIGHTS AND SIGNALS ON THE LAKES.

RULES AND REGULATIONS FOR THE GOVERNMENT OF PILOTS AND MASTERS ON THE LAKES.

BUFFALO, June 24th, 1864.

Editors Commercial Advertiser:

GENTS—I hand you herewith for publication an official copy of "An Act fixing certain rules and regulations for preventing collisions on the water," which has become a law of the United States, to take effect on and after September 1st, and which applies to the Lakes and tributaries. It is taken from the English and French laws, and is the same as that about being adopted by the Canadas and other colonies. It would be well for our Shipmasters to make themselves familiar with the same, and be prepared for the change.

D. P. DOBBINS,
Chairman Ex. Com. Board Lake Underwriters.

AN ACT FIXING CERTAIN RULES AND REGULATIONS FOR PREVENTING COLLISIONS ON THE WATER.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That from and after September 1, 1864, the following rules and regulations for preventing collisions on the water be adopted in the navy and the mercantile marine of the United States: *Provided*, That 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.

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.

ARTICLE 2. The lights mentioned in the following articles, and no others, shall be carried in all weathers between sunset and sunrise.

ARTICLE 3. All steam vessels, when under way, shall carry—

(*a*) At the foremast head, a bright white light, so fixed as to show an 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, viz: 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 throw an 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 an uniform 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.

ARTICLE 4 Steamships, when towing other ships, shall carry two bright white masthead lights vertically, in addition to their side lights, so as to distinguish them from other steamships. Each of these masthead lights shall be of the same construction and character as the masthead lights which other steamships are required to carry.

ARTICLE 5. Sailing ships under way or being towed, shall carry the same lights as steamships under way, with the exception of the white masthead lights, which they shall never carry.

ARTICLE 6. Whenever, as in the 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 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, they shall each be painted outside with the color of the light they respectively contain, and be provided with suitable screens.

ARTICLE 7. Ships, whether steamships or sailing ships, when at anchor in roadsteads or fairways, 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, at a distance of at least one mile.

ARTICLE 8. Sailing pilot vessels shall not carry the lights required for other sailing vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light every fifteen minutes.

ARTICLE 9. Open fishing boats and other open boats shall not be required to carry side lights required for other vessels, but shall, if they do not carry such lights, carry a lantern having a green slide on the 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, so that the green light shall not be seen on the port side, nor the red light on the starboard side. Fishing vessels and open boats when at anchor, or attached to their nets and stationary, shall exhibit a bright white light. Fishing vessels and open boats shall, however, not be prevented from using a flare-up in addition, if considered expedient.

ARTICLE 10. Whenever there is a fog, whether by day or night, the fog signals described below shall be carried and used, and shall be sounded at least every five minutes, viz:

(*a*) Steamships under way shall use a steam whistle placed before the funnel, not less than eight feet from the deck.

(*b*) Sailing ships under way shall use a fog horn.

(*c*) Steamships and sailing ships when not under way shall use a bell.

ARTICLE 11. If two sailing ships 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.

ARTICLE 12. When two sailing ships are crossing so as to involve risk of collision, then, if they have the wind on different sides, the ship with the wind on the port side shall keep out of the way of the ship with the wind on the starboard side, except in the case in which the ship with the wind on the port side is close hauled, and the other ship free, in which case the latter ship 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 ship which is to windward shall keep out of the way of the ship which is to leeward.

ARTICLE 13. If two ships 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.

ARTICLE 14. 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.

ARTICLE 15. If two ships, one of which is a sailing ship and the other a steamship, are proceeding in such direction as to involve risk of collision, the steamship shall keep out of the way of the sailing ship.

ARTICLE 16. Every steamship, when approaching another ship so as to involve risk of collision, shall slacken her speed, or, if necessary, stop and reverse; and every steamship shall, when in a fog, go at a moderate speed.

ARTICLE 17. Every vessel overtaking any other vessel shall keep out of the way of the said last mentioned vessel.

ARTICLE 18. Where, by the above rules, one of two ships is to keep out of the way, the other shall keep her course, subject to the qualifications contained in the following article.

ARTICLE 19. In obeying and construing these rules due regard must be had to all dangers of navigation, and due regard must also be had to any special circumstances which may exist in any particular case rendering a departure from the above rules necessary in order to avoid immediate danger.

ARTICLE 20. 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.

Approved April 29, 1864.

An Act to Regulate the Admeasurement of Tonnage of Ships and Vessels of the United States.

VESSELS, WHEN TO BE MEASURED AND REMEASURED.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That every ship or vessel built within the United States, or that may be owned by a citizen or citizens thereof, on or after the first day of January, eighteen hundred and sixty-five, shall be measured and registered in the manner hereinafter provided; also, every ship or vessel that is now owned by a citizen or citizens of the United States, shall be remeasured and reregistered upon her arrival after said day at a port of entry in the United States, and prior to her departure therefrom, in the same manner as hereinafter described: *Provided*, That any ship or vessel built within the United States, after the passage of this act, may be measured and registered in the manner herein provided.

REGISTER OF VESSELS, WHAT SHALL EXPRESS.

SEC. 2. *And be it further enacted*, That the *register* of every vessel shall express her *length* and *breadth*, together with her *depth*, and the *height under*

the third or spar deck, which shall be ascertained in the following manner: The tonnage-deck, in vessels having three or more decks to the hull, shall be the second deck from below; in all other cases, the upper deck of the hull is to be the tonnage deck. The length from the forepart of the outer planking, on the side of the stem, to the after part of the main stern-post of screw steamers, and to the after part of the rudder-post of all other vessels measured on the top of the tonnage-deck, shall be accounted the vessel's length The breadth of the broadest part on the outside of the vessel shall be accounted the vessel's breadth of beam. A measure from the under side of tonnage-deck plank, amidships, to the ceiling of the hold (average thickness) shall be accounted the depth of hold. If the vessel has a third deck, then the height from the top of the tonnage-deck plank to the under side of the upper-deck plank shall be accounted as the height under the spar-deck. All measurement to be taken in feet and fractions of feet; and all fractions of feet shall be expressed in decimals.

TONNAGE OF VESSEL DERIVED FROM CUBIC CONTENT.

SEC. 3. *And be it further enacted*, That the register tonnage of a vessel shall be her entire internal cubical capacity in tons of one hundred cubic feet each, to be ascertained as follows:

LENGTH, HOW TAKEN, AND NUMBER OF DIVISIONS.

LENGTHS.—Measure the length of the vessel in a straight line along the upper side of the tonnage-deck, from the inside of the inner plank (average thickness), at the side of the stem to the inside of the plank on the stern timbers (average thickness), deducting from this length what is due to the rake of the bow in the thickness of the deck, and what is due to the rake of the stern-timber in the thickness of the deck, and also what is due to the rake of the stern-timber in one-third of the round of the beam; divide the length so taken into the number of equal parts required by the following table according to the class in such table to which the vessel belongs:

TABLE OF CLASSES.

CLASS 1. Vessels of which the tonnage length, according to the above measurement, is fifty feet or under, into six equal parts.

CLASS 2. Vessels of which the tonnage length, according to the above measurement, is above fifty feet, and not exceeding one hundred feet long, into eight equal parts.

CLASS 3. Vessels of which the tonnage length, according to the above measurement, is above one hundred feet long, and not exceeding one hundred and fifty feet long, into ten equal parts.

CLASS 4. Vessels of which the tonnage length, according to the above measurement, is above one hundred and fifty feet, and not exceeding two hundred feet long, into twelve equal parts.

CLASS 5. Vessels of which the tonnage length, according to the above measurement, is above two hundred feet, and not exceeding two hundred and fifty feet long, into fourteen equal parts.

CLASS 6. Vessels of which the tonnage length, according to the above measurement, is above two hundred and fifty feet long, into sixteen equal parts.

METHOD OF FINDING THE AREAS.

TRANSVERSE AREAS.—Then, the hold being sufficiently cleared to admit of the required depths and breadths being properly taken, find the transverse area of such vessel at each point of division of the length as follows: Measure the depth at each point of division from a point at a distance of one-third of the round of the beam below such deck; or, in case of a break, below a line stretched in continuation thereof, to the upper side of the floor-timber, at the inside of the limber-strake, after deducting the average thickness of the ceiling, which is between the bilge-planks and limber-strake; then, if the depth at the midship division of the length does not exceed sixteen feet, divide each depth into four equal parts; then measure the inside horizontal breadth, at each of the three points of division, and also at the upper and lower points of the depth, extending each measurement to the average thickness of that part of the ceiling which is between the points of measurement; number these breadths from above (numbering the upper breadth one, and so on down to the lowest breadth); multiply the second and fourth by four, and the third by two; add these products together, and to the sum add the first breadth and the last, or fifth; multiply the quantity thus obtained by one-third of the common interval between the breadths, and the product shall be deemed the transverse area; but if the midship depth exceed sixteen feet, divide each depth into six equal parts, instead of four, and measure, as before directed, the horizontal breadth at the five points of division, and also at the upper and lower points of the depth; number them from above as before; multiply the second, fourth and sixth by four, and the third and fifth by two; add these products together, and to the sum add the first breadth and the last, or seventh; multiply the quantities thus obtained by one-third of the common interval between the breadths, and the product shall be deemed the transverse area.

METHOD OF ASCERTAINING THE REGISTER TONNAGE OF VESSEL.

COMPUTATION FROM AREAS.—Having thus ascertained the transverse area at each point of division of the length of the vessel, as required above, proceed to ascertain the register tonnage of the vessel in the following manner: Number the areas successively, *one*, *two*, *three*, etc., number one being at the extreme limit of the length at the bow, and the last number at the extreme limit of the length at the stern; then, whether the

length be divided according to table, into six or sixteen parts, as in classes one and six, or any intermediate number, as in classes two, three, four and five, multiply the second, and every even numbered area, by *four*, and the third and every odd numbered area (except the first and last) by *two*; add these products together, and to the sum add the first and last, if they yield anything; multiply the quantities thus obtained by one-third of the common interval between the areas, and the product will be the cubical contents of the space under the tonnage-deck; divide this product by one hundred, and the quotient, being the tonnage under the tonnage-deck, shall be deemed to be the register tonnage of the vessel, subject to the additions hereinafter mentioned.

MEASUREMENT OF THE POOP AND OTHER CLOSED-IN SPACE.

If there be a break, a poop, or any other permanent, closed-in space on the upper decks, on the spar deck, available for cargo or stores, or for the berthing or accommodation of passengers or crew, the tonnage of such space shall be ascertained as follows:

Measure the internal mean length of such space in feet, and divide it into an even number of equal parts of which the distance asunder shall be most nearly equal to those into which the length of the tonnage-deck has been divided; measure at the middle of its height the inside breadths, namely, one at each end and at each of the points of division, numbering them successively, one, two, three, etc.; then to the sum of the end breadths add four times the sum of the even numbered breadths, and twice the sum of the odd numbered breadths, except the first and last, and multiply the whole sum by one-third of the common interval between the breadths; the product will give the mean horizontal area of such space; then measure the mean height between the planks of the decks, and multiply by it the mean horizontal area; divide the product by one hundred, and the quotient shall be deemed to be the tonnage of such space, and shall be added to the tonnage under the tonnage-decks, ascertained as aforesaid.

MEASUREMENT OF THE THIRD OR SPAR-DECK.

If a vessel has a third deck, or spar-deck, the tonnage of the space between it and the tonnage-deck shall be ascertained as follows:

Measure in feet the inside length of the space, at the middle of its height, from the plank at the side of the stem, to the plank on the timbers at the stern, and divide the length into the same number of equal parts into which the length of the tonnage-deck is divided; measure (also at the middle of its height) the inside breadth of the space at each of the points of division, also the breadth of the stem and the breadth at the stern; number them successively, one, two, three, etc., commencing at the stem; multiply the second, and all other even numbered breadths, by four, and the third, and

all the other odd numbered breadths (except the first and last), by two; to the sum of these products add the first and last breadths, multiply the whole sum by one-third of the common interval between the breadths, and the result will give, in superficial feet, the mean horizontal area of such space; measure the mean height between the plank of the two decks, and multiply by it the mean horizontal area, and the product will be the c· ical contents of the space; divide this product by one hundred, and the quotient shall be deemed to be the tonnage of such space, and shall be added to the other tonnage of the vessel, ascertained as aforesaid. And if the vessel has more than three decks, the tonnage of each space between decks, above the tonnage deck, shall be severally ascertained in the manner above described, and shall be added to the tonnage of the vessel, ascertained as aforesaid.

TONNAGE OF OPEN VESSELS, HOW ASCERTAINED.

In ascertaining the tonnage of open vessels, the upper edge of the upper strake is to form the boundary line of measurement, and the depth shall be taken from an athwartship line, extending from upper edge of said strake at each division of the length.

REGISTERED TONNAGE TO BE CARVED ON THE MAIN BEAM.

The register of the vessel shall express the number of decks, the tonnage under the tonnage-deck, that of the between-decks, above the tonnage-deck; also that of the poop or other inclosed spaces above the deck, each separately. In every registered United States ship or vessel the number denoting the total registered tonnage shall be deeply carved or otherwise permanently marked on her main beam, and shall be so continued; and if it at any time cease to be so continued, such vessel shall no longer be recognized as a registered United States vessel.

CHARGE FOR MEASURING AND CERTIFICATE.

SEC. 4. *And be it further enacted*, That the charge for the measurement of tonnage and certifying the same shall not exceed the sum of one dollar and fifty cents for each transverse section under the tonnage-deck; and the sum of three dollars for measuring each between-decks above the tonnage-deck; and the sum of one dollar and fifty cents for each poop, or closed-in space available for cargo or stores, or for the berthing or accommodation of passengers, or officers and crew, above the upper or spar-deck.

ACT NOT TO APPLY TO VESSELS NOT REQUIRED TO BE REGISTERED OR ENROLLED.

SEC. 5. *And be it further enacted*, That the provisions of this act shall not be deemed to apply to any vessel not required by law to be registered or enrolled, or licensed, and all acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

Approved May 6, 1864.

FEES OF CUSTOM HOUSE OFFICERS—IMPORTANT TO BUSINESS MEN.

A copy of the new law to regulate the fees of custom house officers, passed March 3d, has been received by the authorities in this city. The provisions of law are very important to those doing business at the custom house. The following are the amounts of fees allowed: For certificate of registry, $1; certificate of enrollment, including bond on vessel not exceeding 50 tons, $1; under 150 tons, $1.50; over 150 tons, $2 license, $1 to $1.50, according to the tonnage; indorsement or license of charge of master, 50 cents; certificate of manifest, 25 and 50 cents, according to tonnage; receiving certified manifest, and granting permit to unload, etc., 25 cents to $1, according to tonnage; entry of a vessel from a foreign port, 50 cents to $1, and the same fee for clearance of like vessels; receiving manifest of goods, brought into the United States from foreign countries by land vehicles, and permits, 25 cents; passenger baggage arriving by the same means, 25 cents; granting permit to a vessel not belonging to a citizen of the United States, to go from one district to another, $2; entry of goods imported from a foreign country, including official certificate, etc., 50 cents, and for every post entry, 40 cents; permit to load goods not provided for above, 25 cents; official bonds, 25 cents to $1; bill of health, 25 cents; crew list, $1; protection, 50 cents; recording bills of sales, etc., 50 cents each, and certified copies the same; recording certificates for discharging and canceling conveyances, 50 cents.

TABLE OF DISTANCES AT WHICH OBJECTS CAN BE SEEN AT SEA.

According to their respective elevations and the elevation of the eye of the observer.

Heights in feet.	Distances in English miles.	Distances in Nautical miles.	Heights in feet.	Distances in English miles.	Distances in Nautical miles.	Heights in feet.	Distances in English miles.	Distances in Nautical miles.
5	2.958	2.565	70	11.067	9.598	250	20.916	18.14
10	4.184	3.628	75	11.456	9.935	300	22.912	19.87
15	5.128	4.443	80	11.832	10.26	350	24.748	21.46
20	5.916	5.130	85	12.196	10.57	400	26.457	22.94
25	6.614	5.736	90	12.549	10.88	450	28.062	24.33
30	7.245	6.283	95	13.893	11.18	500	29.580	25.65
35	7.826	6.787	100	13.228	11.47	550	31.024	26.90
40	8.366	7.255	110	13.874	12.08	600	32.403	28.10
45	8.874	7.696	120	14.490	12.56	650	33.726	29.25
50	9.354	8.112	130	15.083	13.08	700	35.000	30.28
55	9.811	8.509	140	15.653	13.57	800	37.416	32.45
60	10.248	8.886	150	17.201	14.91	900	39.836	34.54
65	10.665	9.249	200	18.708	16.22	1000	41.832	36.28

RULE.—If the distance at which a light of a given height can be seen by a person on a given level be required, it is only needful to add together the two numbers in the column of distances corresponding to those in the column of heights, which represent respectively the height of the observer's eye and the height of the focal plane above the sea. When the height required to render a light visible at a given distance is required, we must first seek for the number corresponding to the height of the observer's eye, and deduct this from the whole proposed range of the light, and opposite the remainder in the column of distances, seek for the corresponding number in the column of heights. A tower, 100 feet high, will be visible to an observer, whose eye is elevated 15 feet above the water, 16 nautical miles, thus from the table:

EXAMPLE.—15 feet elevation, distance visible, 4.443 nautical miles.

100 " " " " 11.47 " "

15.913 " "

TABLE OF THE ANGLES WHICH EVERY POINT AND QUARTER POINT OF THE COMPASS MAKES WITH THE MERIDIAN.

Pts.	°	′	″	Pts.	°	′	″	Pts.	°	′	″	Pts.	°	′	″
¼	2	48	45	2¼	25	18	45	4¼	47	48	45	6¼	70	18	45
½	5	37	30	2½	28	07	30	4½	50	37	30	6½	73	07	30
¾	8	26	15	2¾	30	56	15	4¾	53	26	15	6¾	75	56	15
1	11	15	00	3	33	45	00	5	56	15	00	7	78	45	00
1¼	14	03	45	3¼	36	33	45	5¼	59	03	45	7¼	81	33	45
1½	16	52	30	3½	39	22	30	5½	61	52	30	7½	84	22	30
1¾	19	41	15	3¾	42	11	15	5¾	64	41	15	7¾	87	11	15
2	22	30	00	4	45	00	00	6	67	30	00	8	90	00	00

THE LAKE COASTING TRADE.

The bill for the regulation of the lake coasting trade, recently passed in the Senate, provides that the master of every vessel enrolled or licensed to engage in foreign and coasting trade on the northern, northeastern and northwestern frontiers of the United States, shall, before the departure of his vessel from a port in one collection district to a port in another collection district, present to the collector duplicate manifests, and obtain

a certificate of clearance; and, in case he shall touch at any intermediate point in the United States and there discharge the cargo taken on board at an American port, not having touched at any foreign port or place, the master shall not be required to report such landing or unloading at the intermediate ports, but shall enter the same on his manifest obtained at the original port of departure, which he shall deliver to the collector of the port where the unloading of the cargo is completed, or if there be no custom house at such port he shall deliver the said manifest to the proper customs officer at the port where he next arrives, in both cases making oath to its correctness, and delivering it within twenty-four hours after arrival; provided, that masters of vessels with cargo and passengers from any foreign port shall obtain a permit and comply with existing laws before landing the same; that merchandise destined for a foreign port shall be reported as now required by law, and that no permit shall be required for unloading a cargo brought from an American port.

Masters of vessels arriving from a port where there is no custom-house, at one where there is a custom-house, are required to deliver to the latter a manifest subscribed on oath, setting forth the cargo, laden at the place of departure, and laden or unladen at intermediate ports. Steam tugs duly enrolled and licensed on the above frontiers, when exclusively employed in towing vessels, shall not be required to report and clear at the custom-house, provided that when said steam tugs shall be employed in towing rafts or other vessels without sail or steam motive power, not required to be enrolled or licensed, they shall be required to report and clear in the same manner as provided in the act for other vessels. Failure to comply with the foregoing requirements subjects a master of an enrolled or licensed vessel engaged in the above named trade to a fine of $100 for each forfeiture or neglect, for which sum the vessel shall also be liable. False swearing or affirmation on the part of a master or owner in filling up the prescribed forms, is made punishable by all the penalties provided for perjury by existing laws.

It is also enacted that vessels departing or arriving from a

port in one district from or at a port in an adjoining district, and between the ports of entry thereof touching at intermediate foreign ports, shall be exempted from the payment of entrance fees.

FOG HORN, AS RECOMMENDED BY COMMITTEE LAKE UNDERWRITERS.

(These Rules, if properly followed, would save a great many collisions, lives and property.)

When a vessel is sailing on the larboard tack, wind abeam or forward of abeam, sound *one* distinct blast from the horn, at sufficient intervals to be understood. When on the starboard tack, wind abeam or forward of abeam, *two* distinct blasts. When the wind is abaft the beam to four points of abeam on starboard side, sound *three* distinct blasts. When further aft on either quarter to dead aft, sound *four* distinct blasts. When abaft the beam on the larboard side to four points of abeam, sound *five* distinct blasts.

NOTES AND REMARKS ON THE BAROMETER.

When the mercury falls in the barometer it announces rain or wind, or in general what is called bad weather; and, on the contrary, when it *rises*, it announces fair weather.

When the mercury falls in frosty weather, either snow or a thaw may be expected; but if it rises in the winter, with a north or east wind, it generally betokens frost.

If the mercury sinks slowly, we may expect rain, which will probably be of some continuance; but if it rises gradually, we may expect fine weather that will be lasting.

When the barometer is fluctuating, rising and falling suddenly, the weather may be expected like it—changeable. When the mercury falls very low, there will be much rain; but if its fall is low and sudden, a high wind frequently follows. When an extraordinary fall of the mercury happens, without any remarkable change near at hand, there is some probability of a storm at a distance.

In very warm weather, the fall of the mercury indicates thunder. The barometer will descend sometimes as an indication of wind only, and sometimes rise when the wind is to the north or east.

A NE wind generally causes the barometer to rise, and it is generally low with a SW wind.

An extraordinary fall of the mercury will sometimes take place in summer previous to heavy showers, attended with thunder; but in spring, autumn and winter, it indicates violent winds.

The mercury is higher in cold than in warm weather, and lower at noon and midnight than at any other period of the day.

The mercury generally falls at the approach of new and full moon, and rises at the quadratures.

Before high tides, there is almost always a great fall of the mercury; this takes place oftener at the full than at the new moon.

The greatest changes of the barometer commonly take place during clear weather with a north wind, and the smallest risings during cloudy, rainy or windy weather, with a south or nearly south wind.

The words generally engraved on the plate of the barometer rather serve to mislead than to inform; for the changes of weather depend rather on the rising and falling of the mercury, than on its standing at any particular height. When the mercury is as high as "fair," and the surface of it is concave (which is the case when it begins to descend), it very often rains; and, on the contrary, when the mercury is opposite "rain," and the surface convex (which is the case when it begins to ascend), fair weather may be expected. These circumstances not being duly attended to, may be said to be the principal cause of many people not having a proper confidence in this instrument.

For sea service, it would be as well to read off the barometer at least three times a day, viz., at 8 A. M., noon, and 8 P. M.; and oftener if bad weather.

In Europe, if the alteration in the quicksilver should be in as great a proportion as six-tenths of an inch to twenty-four

hours, sudden but not lasting changes of weather may be expected. If the alteration should be gradual, probably in the proportion of two or three-tenths to twenty-four hours, the weather indicated will be likely to last.

One-fifth of the variation of the barometer in any climate may be considered as an indication of sudden change.

If wind should follow rain, the wind may be expected to increase.

Rain following wind is likely to lull it, and the wind may be expected to abate.

EXPLANATION OF THE ANEROID BAROMETER.

The graduation and figuring on the dial represents the perpendicular scale of the mercurial barometer. The falling of the barometer is understood to be the passage of the long or steel index from the higher to the lower number of figures, which movement comes under the same atmospheric change in which the mercury passes over part of its scale. The short pointer is simply a register, and is only movable with the fingers, to be placed over the steel index, thus enabling the observer to see more readily any movement of the index.

RULES FOR BAROMETRICAL OBSERVATION.

1st. There is no point at which the barometer must stand to indicate rain or wind.

2d. The judgment must be governed by the rising or falling of the barometer.

3d. The falling of the barometer indicates the approach of a storm, the extent of which will be proportionate to the amount and rapidity of the fall.

4th. Showers.—The barometer falls previously from four to twelve-hundredths of an inch, varying in time, from one to three hours. The greater and more rapid the fall, the more violent will be the shower, accompanied more or less with wind.

5th. Northeasterly storms.—The barometer falls previously from four to eight-tenths of an inch, varying in time from one to four hours, and continues falling until the storm arrives at its crisis, when the barometer begins to rise and continues rising until that part of the storm which comes from the NW passes off.

6th. Southerly storms.—The barometer falls previously from one to four-tenths of an inch, varying in time from six to twelve hours. These storms generally precede unsettled weather; at such times the barometer continues low, and very slight additional depressions are followed by rain.

A southerly storm is perhaps the most difficult to judge of by appearances, as appearances change so frequently without any real change in the atmosphere. During this class of storms, the utmost confidence should be placed in the barometer. After the first indication as above, and the barometer does not rise, but remains stationary, it is strong indication that the storm has not all passed.

The foregoing rules are the result of long and careful observation. It must be remembered that storms occur under different circumstances in different parts of the globe, yet, taking the first three of the above rules as a basis of calculation, a short experience, with the exercise of the judgment, will enable one to determine very correctly concerning approaching changes in the weather.

A LUNAR TIDAL WAVE IN THE NORTH AMERICAN LAKES.

Extract from a paper read by Lieut.-Col. Graham, before the American Association for the Advancement of Science, August, 1860.

"Much has been written at various periods, on the fluctuations in the elevation of the surface waters of the great fresh water lakes of North America. Valuable and interesting memoirs have appeared from time to time in the American Journal of Science and Arts, published monthly at New Haven, Connecticut, within the last thirty years, on this subject, written by the late Brevet Brigadier-General Henry Whiting, of

the United States Army, when a captain, by Major Lachlan, Charles Whittlesey, Esq., and others. The observations contained in their memoirs have, however, been directed chiefly to investigations of the extent of the secular and annual variations in elevation of the surfaces of these lakes.

"The learned Jesuit fathers of the time of Marquette, a period near two centuries ago, and at later periods the Baron de la Hontan, Charlevois, Carver, and others, noticed in their writings the changes of elevation, and some peculiar fluctuations which take place on these inland seas. In the speculations indulged in by some of these writers, a slight lunar tide is sometimes suspected, then again such an influence on the swelling and receding waters is doubted, and their disturbance is attributed to the varying courses and forces of the winds.

"But we have nowhere seen that any systematic course of observation was ever instituted and carried on by these early explorers, or by any of their successors who have mentioned the subject, giving the tidal readings at small enough intervals of time apart, and of long enough duration to develop the problem of a diurnal lunar tidal wave on these lakes. The general idea has undoubtedly been that no such lunar influence was here perceptible.

"In April, 1854, I was stationed at Chicago, by the orders of the Government, and charged with the direction of the harbor improvements on Lake Michigan. In the latter part of August of that year, I caused to be erected at the east or lakeward extremity of the North Harbor pier, a permanent tide-gauge for the purpose of making daily observations of the relative heights and fluctuations of the surface of this lake. The position thus chosen for the observations, projects into the lake, entirely beyond the mouth of the Chicago River, and altogether out of the reach of any influence from the river current, upon the fluctuations of the tide-gauge. It was the fluctuations of the lake surface alone that could affect the readings of the tide-gauge.

"On the first day of September, 1854, a course of observations was commenced on this tide-gauge, and continued at least once a day, until the 31st day of December, inclusive, 1858.

During each of the first three winters a portion of the daily observations was lost, owing to the tide-gauge being frozen fast in its box, but they constituted only a small number in proportion to that embraced in the series. During the subsequent winters, artificial means were resorted to, to prevent this freezing.

"These observations were instituted chiefly for the purpose of ascertaining with accuracy the amount of the annual, and also of the secular variation in the elevation of the lake surface, with a view to regulating the heights of break-waters and piers to be erected for the protection of vessels, and for improving the lake harbors."

After a series of close observations, from 1854 to 1858, Lieut.-Colonel Graham observes:

"The difference of elevation of the lake surface, between the periods of lunar low and lunar high-water at the mean spring tides, is here shown to be two hundred and fifty-four thousandths (254) of a foot, and the time of high water at the full and change of the moon, is shown to be thirty (30) minutes after the time of the moon's meridian transit.

"We therefore, in accordance with custom in like cases, indicate as the establishment for the port of Chicago,

$$\frac{1}{4} \text{ Foot, } 0^{h}\ 30^{m}.$$

"Although this knowledge may be of but small practical advantage to navigators, yet it may serve as a memorandum of a physical phenomenon whose existence has generally heretofore been either denied or doubted.

"We think it probable that, if the effect of unfavorable winds and all other extraneous forces which produce irregular oscillations in the elevation of the lake surface could be fully eliminated, a semi-diurnal lunar spring tide would be shown of as much as one-third of a foot for the periods of highest tides.

"The time of low water and the relative times of duration of the flood and ebb tides are given only approximately. The extreme rise of the tide being so little, the precise time of the change from ebb to flood, and hence the duration of the flow of each, can only be accurately determined by numerous obser-

vations at short intervals, say three to five minutes of time apart, from about an hour before to an hour after the actual time of low water.

"In conclusion, we offer the above observations as solving the problem in question, and as proving the existence of a semi-diurnal lunar tidal wave on Lake Michigan, and consequently on the other great fresh water lakes of North America, whose co-ordinate of altitude is, at its summit, as much as .15 to .25 ($\frac{15}{100}$ to $\frac{25}{100}$) of a foot, United States measure."

REMARKABLE PHENOMENON.

Prof. Mather, who observed the barometer at Fort Wilkins, Copper Harbor, 47° 30′ north lat., during the prevalence of one of these remarkable disturbances which are peculiar to all the Upper lakes, remarks: "As a general thing, fluctuations in the barometer accompanied the fluctuations in the level of the water, but sometimes the water level varied rapidly in the harbor, while no such variation occurred in the barometer at the place of observation. The variation in the level of the water may be caused by varied barometric pressure of the air on the water, either at the place of observation or at some distant point. A local increased pressure of the atmosphere at the place of observation, would lower the water level where there is a wide expanse of water; or a diminished pressure, under the same circumstances, would cause the water to rise above its usual level."

In the summer of 1854, according to the report of Foster and Whitney, made to Congress in 1850, "an extraordinary retrocession of the waters took place at the Sault Ste. Marie. The river here is nearly a mile in width, and the depth of water over the sandstone is about three feet. The phenomenon occurred at noon; the day was calm but cloudy; the water retired suddenly, leaving the bed of the river bare, except for the distance of about twenty rods where the channel is deepest, and remained so for the space of an hour. Persons went out and caught fish in the pools formed in the rocky cavities.

The return of the waters was sudden, and presented a sublime spectacle. They came down like an immense surge, roaring and foaming, and those who had incautiously wandered into the river bed, had barely time to escape being overwhelmed.

RISING AND FALLING OF THE WATERS OF LAKE MICHIGAN.

One of those singular oscillations in the lakes, or "Inland Seas," which have been observed occasionally from the time of the exploration of the Jesuit fathers, was witnessed recently in Lake Michigan. A variety of signs, such as the mirage of the distant shore, unusual depression of the barometer, and a sudden rise of the temperature from a cool, bracing air, to a sultry heat, indicated an unusual commotion in the atmospheric elements. About eleven o'clock A. M., when our attention was first called to the phenomenon, the waters of the lake had risen about thirty-one inches above the ordinary level, and in the course of half an hour they again receded. Throughout the whole day they continued to ebb and flow at intervals of fifteen or twenty minutes, and the current between the outer and inner breakwater, near the Illinois Central Railroad House, was so great at times that a row-boat made little or no headway against it. The extreme variation between high and low water was nearly three feet. The wind all day was off shore (from the southwest), the effect of which was to keep down the waters instead of accumulating them at this point. About eight o'clock in the evening it veered suddenly to the northwest, and blew a violent gale, accompanied by vivid electrical displays. This morning (Monday) we hear of telegraphic lines being prostrated, of persons killed by lightning, etc., while the lake, although agitated, exhibits none of the pulsations of yesterday.

VALUABLE MARITIME SUGGESTIONS.

HOW TO STEER A VESSEL OR STEAMBOAT WHEN THE RUDDER IS LOST OR DISABLED.

Take one of the cable chains and pass it out over the center of the stern, through the rudder port. If there is no port, make a hole through, large enough for the chain to pass. Take a short spar or heavy plank or two, and lash it twenty feet from the end of the chain; clap on guys fifteen feet from the inner end of the planks or spar, to each quarter, with tackles to them leading fore and aft. Keep paying out the guys and chain until the vessel answers to them, by steering, which she will do without any difficulty. The end of the chain hanging down from the after part of the planks or spar will balance them and hold considerable strain in the water. The spar or planks must be heavier according to the size of the chain and vessel.

Another plan is, in case of disabling the rudder going over a bar, or striking rocks close in shore, to lower the stern boat down with the plug-out, clapping on guys as above; but this method would have but little effect until the boat was full of water.

TO TAKE IN A NEW MAST WITHOUT SHEERS.

It often happens that a vessel may have to take in a new mast where there are no sheers to be got, or of sufficient size to do the work. In this case the following directions may be used successfully. Knock out the wedges; take a thick oak plank and lay it on the deck, forward of the mast, securing it to the deck by spiking. Then clap on a tackle to the stay to bowse the mast-head forward; clap on two after guys to the mast-head, and lead them well aft on each side, and make them fast, so that they can be eased away when the mast-head is hauled forward. Clap on tackles, forward and aft, to the lower part of the mast, two or three feet from the deck, and two guys, one on each side, to the stanchions of the bulwarks; make three or four small wedges of iron, sufficiently thick to relieve the saw in passing through the mast. Cut the mast, just level with the oak plank, and when through, bowse the heel of the mast forward on to the plank, securing it well with the guys and

tackles; then bowse the head of the mast forward, so that the tackle from the mast-head will plumb the stump; overhaul the tackle down, and make it fast to the stump; haul it out, put it over the side, clap on to the new mast, hoist it in and step it in the place of the old one. Take the same tackle, shift it to the fore part of the new mast; clap on to the old one (now a derrick) and send it over the side or on the dock, and it is done. The only precaution necessary is to keep the stay and afterguys well taut. The standing rigging needs no slacking until you want to send the old spar over the side. This is a good, safe way of taking in a new mast and getting out an old one, when the lower part of the mast is of no service, or no sheers are at hand.

LEE WAY.

The quantity of lee way to be allowed will depend upon a variety of circumstances, as the mould and trim of a vessel, the quantity of sail carried, her velocity through the water, etc., hence no general rules can be laid down with accuracy that will determine the quantity of lee way in all cases. The following have, however, been usually given by most practical navigators for a full-rigged ship. Our lake vessels, with centerboards, make more lee way in heavy weather than standing-keel vessels, of a greater draught of water.

RULES.—When a ship is close hauled, with all her sails set, the water smooth, and a light breeze of wind, she is then supposed to make little or no lee way.

When top-gallant sails are stowed, allow one point.

When under close reefed top-sails, allow two points.

When one top-sail is stowed, allow two and a half points.

When both top-sails are stowed, allow three and a half points.

When the fore-course is stowed, allow four points.

When under the main-sail only, allow five points.

When under a balance mizzen, allow six points.

When under bare poles, allow seven points.

As these allowances depend entirely upon the quantity of sail set, without regard to any other circumstances, it is evident that they can be considered only as probable conjectures, and may, indeed, serve to make up a day's work. But since the

computation of a ship's way depends much upon the accuracy of this allowance, it would be proper for the officer of the watch to note this on a log slate every four hours. The lee way may be estimated by observing the angle which the wake of the vessel makes with the point right astern, by means of a semi-circle marked on the taffrail, and divided into points and quarter points, by means of which the angle contained between the direction of the wake and the points of the compass directly astern, may be easily ascertained. The lee way thus determined is to be allowed on all courses steered to the right hand, when the port tacks are aboard, but to the left when the starboard tacks are aboard.

HOW TO JUDGE WEATHER BY THE SKY.

The color of the sky, at particular times, affords wonderfully good guidance. Not only sunset presages fair weather, but there are other tints which speak with equal clearness and accuracy. A bright yellow sky in the evening indicates wind; a pale yellow, wet; a neutral gray color constitutes a favorable sign in the evening and an unfavorable one in the morning. They are full of meaning in themselves. If their forms are soft, underlined and feathery, the weather will be fine; if the edges are hard, sharp and definite, it will be foul. Generally speaking, any deep, unusual hues betoken wind and rain; while the more quiet and delicate tints bespeak fair weather. Simple as these maxims are, the British Board of Trade has thought fit to publish them for the use of seafaring men.

RECIPES FOR BLACKING SHIPS' STANDING RIGGING.

To half a barrel of tar add six gallons of whisky, four pounds of litharge, four pounds of lamp black, two pails of boiling beef pickle, or hot salt water; mix well together and apply immediately.

FOR MAKING BLACK VARNISH, No 1.—Two pounds of gum shellac, two pounds of umber, one gallon linseed oil, and a quarter pound of lamp black; boil together for four hours over a slow fire.

FOR MAKING BLACK VARNISH, No. 2.—One gallon spirits turpentine, one pound and four ounces of rosin, one pound and

four ounces lamp black, and one quart of linseed oil; to be boiled on a slow fire for half an hour, then used or laid on cold.

For Making Liquid Blacking.—Four ounces of ivory black, five or six tablespoonfuls of molasses, one and a half ounces oil vitriol, one and a half ounces of sweet oil, and six gills of vinegar. After mixing the ingredients well together, and stirring them frequently, the blacking will be fit for use.

To Make the Best Drying Oil.—Mix one pound of litharge of gold to every six gallons of oil (linseed); boil it over a slow fire, but not too much, lest it prove too thick and be unserviceable.

TO MARK A LEAD LINE.

At two fathoms, black leather, split once; at three fathoms, black, split twice, leaving the lower end out about two inches, which forms three pieces; at five fathoms, a white rag; at seven fathoms, a red rag of bunting; at ten fathoms, a piece of leather, with a hole in it; at thirteen, the same as three; at fifteen the same as five; at seventeen, the same as seven; at twenty fathoms, two knots. Deep sea lead lines are marked the same as far as twenty fathoms; then add one knot for every ten fathoms, and a small strip of leather for every five fathoms.

MARKS AND DEEPS OF THE LEAD LINE.

Mark two, mark three, deep four, mark five, deep six, mark seven, deep eight, and nine, mark ten.

In heaving the lead, if any of the marks are even with the water's edge, the man heaving sings out whatever mark is shown, and if it is a quarter less, he says, quarter less five, or whatever it may be. If a quarter or half over any of the marks or deeps, he sings out accordingly, and a quarter five or a half five, etc.

"To heave the lead the seamen sprung,
And to the watchful pilot sung—
Quarter *less five*."

T. S. T.

Visibility.—The windows of a large house can be counted about 13,000 feet or 2½ miles; men and horses at 1½ miles, as points. A horse can be clearly distinguished at 4,000 feet. The movements of men at 2,600 feet, or ½ a mile. An Arabic mile is when you cannot tell a man from a woman, in clear weather, with good eyes.

VELOCITY OF WIND.—A gentle, pleasant wind has a velocity of ten feet per second; a brisk gale twenty feet per second; a very brisk gale thirty feet per second; a high wind fifty feet per second; a very high wind seventy feet per second; a storm or tempest eighty feet per second; a great storm one hundred feet per second; a hurricane one hundred and twenty feet per second; a violent hurricane, that tears up trees, etc., one hundred and fifty feet per second.

ESTIMATED WEIGHT OF CORDAGE.

WEIGHT OF 100 FATHOMS EACH SIZE.

(Hawser laid Rope will weigh one-sixth less.)

Size.	Manilla Cordage	Tarred Hemp Cordage.	Size.	Manilla Cordage.	Tarred Hemp Cordage.
1¼	40 lbs.	45 lbs.	4½	360 lbs.	465 lbs.
1½	50 "	60 "	4¾	400 "	500 "
1¾	67 "	80 "	5	500 "	650 "
2	83 "	100 "	5½	600 "	750 "
2¼	100 "	125 "	6	720 "	920 "
2½	125 "	150 "	6½	850 "	1,050 "
2¾	150 "	190 "	7	1,000 "	1,250 "
3	180 "	225 "	7½	1,150 "	1,400 "
3¼	210 "	270 "	8	1,300 "	1,600 "
3½	250 "	300 "	8½	1,450 "	1,850 "
3¾	280 "	360 "	9	1,650 "	2,100 "
4	320 "	415 "			

A Table of Minimum Sizes of Chains and weight of Anchors, adapted to the Tonnage of Lake Sail Vessels.

Tonnage	10	20	30	40	60	80	100	120	140	170	200	250	300	350	400
Best Bower Chain	3-8	7-16	1-2	9-16	5-8	11-16	3-4	13-16	7-8	15-16	1	1 1-16	1 1-8	1 3-16	1 1-4
Best Bower Anchor	90	112	168	224	336	392	532	616	700	784	952	1,176	1,400	1,456	1,680
Small Bower Chain	...	...	5-16	3-8	7-16	1-2	9-16	5-8	11-16	3-4	13-16	7-8	15-16	1	1 1-16
Small Bower Anchor	...	...	80	90	112	168	224	336	392	532	616	700	784	952	1,176
Hawser	...	...	...	...	...	...	...	4 1-2	4 3-4	5	5 1-4	5 1-2	5 3-4	6	6 1-4
Kedge Anchor	...	...	...	...	...	...	...	100	125	150	175	200	225	250	275

TABLE—Continued.

Tonnage	450	500	550	600	650	700	760	800	900	1,000	1,100	1,200
Best Bower Chain	1 5-16	1 5-16	1 3-8	1 3-8	1 7-16	1 7-16	1 1-2	1 1-2	1 9-16	1 5-8	1 11-16	1 3-4
Best Bower Anchor	1,904	1,904	2,072	2,072	2,240	2,240	2,352	2,352	2,800	3,360	3,920	4,200
Small Bower Chain	1 1-16	1 1-8	1 1-8	1 3-16	1 3-16	1 1-4	1 1-4	1 5-16	1 3-8	1 7-16	1 1-2	1 9-16
Small Bower Anchor	1,176	1,400	1,400	1,456	1,456	1,680	1,680	1,904	2,072	2,240	2,352	2,800
Hawser	6 1-4	6 1-2	6 1-2	6 3-4	6 3-4	7	7	7 1-4	7 1-4	7 1-2	7 1-2	7 1-2
Kedge Anchor	300	325	350	375	400	425	450	475	475	500	500	525

Length of each Chain to be 75 fathoms; length of Hawser to be 60 fathoms.

Steamboats and Propellers above 200 tons, employed on the Lakes, may have Chains 2-16 smaller than Sail Vessels, and Anchors in proportion.

Steamboats and Propellers above 200 tons, employed wholly on the Rivers, may have Chains 4-16 smaller than Sailing Vessels, and Anchors in proportion.

D. P. DOBBINS, *Secretary.*

EXPLANATION OF NAUTICAL TERMS.

ABACK; the situation of the sails when their surfaces are pressed aft against the mast by the force of the wind.

Abaft, or aft; the sternmost part of the ship. *Carry aft anything;* that is, carry towards the stern. *The mast rakes aft;* that is, hangs towards the stern. *"How cheer ye fore and aft!"* that is, how fares all the ship's company?

Abaft the beam, denotes the relative situation of any object with the ship, when the object is placed in any part of that arc of the horizon which is contained between a line at right angles with the keel, and that point of the compass which is directly opposite to the ship's course. See *Bearing.*

Aboard; the inside of a ship. *"Aboard the main tack!"* the order to draw the lower corner of the mainsail down to the chess-tree.

About; the situation of a ship as soon as she has tacked, or changed her course.

"About ship!" the order to the ship's crew to prepare for tacking.

Abreast; the situation of two or more ships, lying with their sides parallel, and their heads equally advanced; in which case they are abreast of each other.

Adrift; the state of a ship broken from her moorings, and driving about without control.

Afloat; buoyed up by the water from the ground.

Afore; all that part of a ship which lies forward, or near the stem. It also signifies *farther forward.*

After; a phrase applied to any object in the hinder part of the ship, as the *after-hatchway,* the *after-sails,* etc.

Aground; the situation of a ship when her bottom, or any part of it, rests on the ground.

Ahead; anything which is situated on that point of the compass to to which a ship's stem is directed, is said to be *ahead* of her. See *Bearing.*

A-hull; the situation of a ship when all her sails are furled, and her helm is lashed to the lee side; by which she lies nearly with her side to the wind and sea, her head being somewhat inclined to the direction of the wind.

A-lee; the position of the helm when it is put down to the lee side.

All in the wind; the state of a ship's sails when they are parallel to the direction of the wind, so as to shake or shiver.

"*All hands ahoy!*" the call by which all the ship's company is summoned upon deck.

Aloft; up in the tops, at the mast-heads, or anywhere about the higher rigging.

Alongside; side by side, or joined to a ship, wharf, etc.

Along shore; along the coast; a course which is in sight of the shore, and nearly parallel to it.

Aloof; at a distance. *Keep aloof;* that is, keep at a distance.

Amain; the old term for *yield*, used by a man-of-war to an enemy; but it now signifies anything done suddenly, or at once, by a number of men.

Amidships; the middle of a ship, either with regard to her length or breadth.

Anchor; the instrument by which a ship is held. *The anchor is foul;* that is, the cable has got about the fluke of the anchor. *The anchor is a-peak;* that is, directly under the hawse-hole of the ship. *The anchor is a-cock-bill;* that is, hangs up and down the ship's side.

An-end; the position of any mast, etc., when erected perpendicularly on the deck. The top-masts are said to be *an-end* when they are hoisted to their usual station.

A-peak; perpendicular to the anchor, the cable having been drawn so tight as to bring the ship directly over it. The anchor is then said to be *a-peak.*

Ashore; on the shore, as opposed to *aboard.* It also means *aground.*

Astern; any distance behind a ship, as opposed to *ahead.* See *Bearing.*

At anchor; the situation of a ship riding by her anchor.

Athwart; across the line of a ship's course. *Athwart hawse;* the situation of a ship when driven by accident across the fore part of another, whether they touch or are at a short distance from each other; the transverse position of the former being principally understood. *Athwart the fore-foot;* when any object crosses the line of a ship's course, but ahead of her, it is said to be *athwart the fore-foot. Athwart-ships;* reaching, or in a direction, across the ship from one side to the other.

Atrip; when applied to the anchor, it means that the anchor is drawn out of the ground, and hangs in a perpendicular direction, by the cable or buoy-rope. The topsails are said to be *atrip* when they are hoisted up to the mast head, or to their utmost extent.

"*Avast!*" a term used for *Stop! or Stay!* as "*Avast heaving!*" do not heave any more.

Aweigh; the same as *atrip*, when applied to the anchor.

Awning; a shelter or screen of canvas, spread over the decks of a ship, to keep off the heat of the sun. *Spread the awning;* extend it so as to cover the deck. *Furl the awning;* that is, roll it up.

To Back the Anchor; to carry out a small anchor ahead of the large

one, in order to support it in bad ground, and to prevent it from loosening or coming home.

To back astern, in rowing, is to impel the boat with her stern foremost, by means of the oars.

To back the sails; to arrange them in a situation which will occasion the ship to move astern.

To bagpipe the mizzen; to lay it aback, by bringing the sheet to the mizzen shrouds.

To balance; to contract a sail into a narrower compass, by folding up a part at one corner. Balancing is peculiar only to the mizzen of a ship, and the mainsail of those vessels wherein it is extended by a boom.

Bale—Bale the boat; that is, throw the water out of her.

Ballast is either pigs of iron, stones, or gravel, which last is called *shingle ballast;* and its use is to bring the ship down to her bearings in the water, which her provisions and stores will not do. *Trim the ballast;* that is, spread it about, and lay it even. *The ballast shoots;* that is, it shifts, or runs over from one side of the hold to the other.

Bare poles; when a ship has no sail set, she is under *bare poles*.

Barge, a caravel-built boat, that rows with ten or twelve oars.

Batten, a thin piece of wood. *Batten down the hatches*, is to lay battens upon the tarpaulins, which are over the hatches, in bad weather, and nail them down, that they may not be washed off.

Beacon, a post or stake erected over a shoal or sand-bank, as a warning to seamen to keep at a distance; also, a signal placed at the top of hills, etc.

Beams, strong pieces of timber, stretching across a ship, side to side, to support the decks, and retain the sides at their proper distance.

"*Bear a hand!*" make haste, dispatch.

Bearing signifies the point of the compass which any two or more places bear from each other, or how any place bears from the ship by the compass; or it may be said to bear on the beam, abaft the beam, on the bow, the head, or stern, etc.

Bearings of a ship, are that line which is formed by the water upon her sides when she is at anchor, with her proportion of ballast and stores on board. *To bear to*, is to sail into a harbor, etc. *Bear round up*, that is, put her right before the wind. *Bring your guns to bear*, is to point them to the object.

To bear in with the land, is when a ship sails towards the shore.

To bear off, to thrust or keep off from the ship's side, etc., any weight, when hoisting.

Bearing up, or bearing away, the act of changing the course of a ship, in order to make her run before the wind, after she has sailed some time with a side wind, or close-hauled. It is generally performed to arrive at some port under the lee, or to avoid some imminent danger, occasioned by a violent storm, leak, or enemy in sight.

Beating to windward, the making a progress against the direction of the wind, by steering alternately close-hauled on the starboard and port tacks.

To becalm, to intercept the current of the wind, in its passage to a ship by any contiguous object, as a shore above her sails, a high sea behind, etc., and thus one sail is said to becalm another.

Before the beam, denotes an arc of the horizon comprehended between the line of the beam, which is at right angles to the keel, and that point of the compass on which the ship stems. See *Bearing*.

Belay, to make fast any running rope, as, *Belay the main brace*, or, make it fast.

Bend, to apply to, and fasten; as, *Bend the sails*—apply them to the yards and fasten them. *Unbend the sails*, that is, cast them off, and take them from the yards. *Her sails are unbent*, she has none fixed. *Bend the cable*, make it fast to the anchor.

Beneaped. See *Neaped*.

Berth; a place; as *the ship's berth;* the place where she is moored.—*An officer's berth;* his place in the ship to eat or sleep in.—*Berth the ship's company;* that is, allot to them their places to mess in. *Berth the hammocks;* point out where each man's hammock is to hang.

Between decks, the space contained between any two decks of a ship.

Bight of a rope; the double part of a rope when it is folded.—*Bight;* a narrow inlet of the sea.

Bilge; to break.—*The ship is bilged;* that is, her planks are broken in by violence.

Bilge-water is that which, by reason of the flatness of the ship's bottom, lies on her floor, and cannot go to the well of the pump.

Binnacle; a kind of box to contain the compasses in upon deck.

Bitts; very large pieces of timber in the fore part of a ship, round which the cables are fastened when the ship is at anchor.—*After-bitts;* a smaller kind of bitts upon the quarter-deck, for belaying the running rigging to.

To bitt the cable, is to confine the cable to the bitts, by one turn under the cross-piece, and another turn round the bitt-head. In this position it may be either kept fixed, or it may be veered away.

Bitter; the turn of the cable round the bitts.—*Bitterend;* that part of the cable which stays within board, round about the bitts, when the ship is at anchor.

Block; a piece of wood, with running sheaves or wheels in it, through which the running rigging is passed, to add to the purchase.

Board; to board a ship, is to enter it in a hostile manner, to enter a ship.

Board; to make a *board* is making a stretch upon any tack, when a ship is working upon a wind. *To board it up;* that is to turn to windward. —*The ship has made a stern board;* that is, when she loses ground in working upon a wind.

Boatswain; the officer who has charge of all the cordage, rigging, anchors, etc.

Bold-shore; a steep coast, permitting the close approach of shipping.

Bolt-rope; the rope which goes round a sail, and to which the canvas is sewed. The side ropes are called *leach-ropes;* that at the top, the *head-rope;* and that at the bottom, the *foot-rope.*

Bonnet of a sail is an additional piece of canvas, put to the sail in moderate weather, to hold more wind.—*Lace on the bonnet;* that is, fasten it to the sail.—*Shake off the bonnet;* take it off.

Boot-topping; cleaning the upper part of a ship's bottom, or that part which lies immediately under the surface of the water, and daubing it over with tallow, or with a mixture of tallow, snlphur, rosin, etc.

Both sheets aft; the situation of a ship sailing right before the wind.

Bow-grace; a frame of old rope or junk, laid out at the bows, stems, and sides of ships, to prevent them from being injured by flakes of ice.

Bow-lines; lines made fast to the sides of the sails, to haul them forward when upon a wind, which, being hauled taut, enable the ship to come nearer to the wind.

To bowse; to pull upon any body with a tackle, in order to remove it.

Bowsprit; a large mast or piece of timber which stands out from the bows of a ship.

Boxhauling; a particular method of veering a ship, when the swell of the sea renders tacking impracticable.

Boxing; an operation somewhat similar to boxhauling. It is performed by laying the head sails aback, to receive the greatest force of the wind in a line perpendicular to their surfaces, in order to turn the ship's head into the line of her course, after she has inclined to the windward of it.

Braces; the ropes by which the yards are turned about, to form the sails to the wind.

To brace the yards; to move the yards, by means of the braces, to any direction required.—*To brace about;* to brace the yards round for the contrary tack.—*To brace sharp;* to brace the yards to a position in which they will make the smallest possible angle with the keel, for the ship to have headway.—*To brace to;* to ease off the lee braces, and round in the weather braces, to assist the motion of the ship's head in tacking.

Brails; a name peculiar only to certain ropes belonging to the mizzen, used to truss it up to the mast; but it is likewise applied to all the ropes which are employed in hauling up the bottoms, lower corners, and skirts of the other great sails.—*To brail up,* to haul up a sail by means of the brails, for the more ready furling it when necessary.

To break bulk, to begin to unload a ship.

To break sheer. When a ship at anchor is forced, by the wind or current, from that position in which she keeps her anchor most free of herself, and

most firm in the ground, so as to endanger the tripping of her anchor, she is said to *to break her sheer.*

Breaming, burning off the filth from a ship's bottom.

Breast-fast, a rope employed to confine a ship sideways to a wharf, or to some other ship.

To bring by the lee.—See *To broach to.*

To bring to, to check the course of a ship when she is advancing, by arranging the sails in such a manner that they shall counteract each other, and prevent her from either retreating or advancing.—See *To lie to.*

To broach to, to incline suddenly to windward of the ship's course, so as to present her side to the wind, and endanger her oversetting. The difference between *broaching to* and *bringing by the lee* may be thus defined: Suppose a ship, under great sail, is steering south, having the wind at NNW; then west is the weather side and east the lee side. If, by any accident, her head turns round to the westward, so that her sails are all taken aback on the weather-side, she is said to *broach to.* If, on the contrary, her head declines so far eastward as to lay her sails aback on that side which was the lee-side, it is called *bringing by the lee.*

Broadside, a discharge of all the guns on one side of a ship, both above and below.

Broken-backed, the state of a ship which is so loosened in her frame as to drop at each end.

By the board, over the ship's side.

By the head, the state of a ship when she is so unequally loaded as to draw more water forward than aft.

By the wind, the course of a ship as near as possible to the direction of the wind, which is generally within six points of it.

Bunt-lines, ropes fastened to the foot-rope of square-sails, to draw them up to the middle of the yards for furling.

Buoy, a floating conical cask, moored upon shoals, to show where the danger is; it is also attached to anchors, to show where they lie, in case the cable breaks.

CAP, a strong, thick block of wood, having two large holes through it, the one square, the other round; used to confine the two masts together.

Capsize, overturn.—*The boat is capsized*, that is, overset.—*Capsize the coil of rope*, that is, turn it over.

Capstan, an instrument by which the anchor is weighed out of the ground; used also for setting up the shrouds, and other work where a great purchase is required.

To careen, to incline a ship on one side so low down by shifting the cargo or stores on one side, that her bottom on the other side may be cleansed by breaming.

To carry away, to break; as *A ship has carried away her bowsprit*, that is, has broken it off.

Casting, the motion of falling off, so as to bring the direction of the wind on either side of the ship, after it has blown some time right ahead. It is particularly applied to a ship about to weigh anchor.

Cat-heads, the timbers on a ship's bows, with sheaves in them, by which the anchor is hoisted, after it has been hove up by the cable.

To cat the anchor, is to hook the cat-block to the ring of the anchor, and haul it up close to the cat-head.

Cat's-paw, is a light air of wind perceived at a distance in a calm, sweeping the surface of the sea very lightly, and dying away before it reaches the ship.

Caulking, is filling the seams of a ship with oakum.

Center. This word is applied to that squadron of a fleet, in a line of battle, which occupies the middle of a line; and to that column, in the order of sailing, which is between the weather and lee columns.

Chains, a place built on the sides of the ship, projecting out, and at which the shrouds are fastened, for the purpose of giving them a greater angle than they could have if fastened to the ship's side, and of course giving them a greater power to secure the mast.

Chain-plates, are plates of iron fastened to the ship's sides under the chains, and to these plates the dead-eyes are fastened.

Chapeling, the act of turning a ship round in a light breeze of wind, when she is close-hauled, so that she will lie the same way she did before. This is usually occasioned by negligence in steering, or by a sudden change of wind.

Chase, a vessel pursued by some other.—*Chaser*, the vessel pursuing.

Cheerily, a phrase implying *heartily, quickly, cheerfully*.

To claw off, to turn to windward from a lee shore, to escape shipwreck, etc.

Clear is variously applied. The weather is said to be *clear* when it is fair and open; the sea coast is *clear* when the navigation is not interrupted by rocks, etc. It is applied to cordage, cables, etc., when they are disentangled, so as to be ready for immediate service. In all these senses, it is opposed to *foul*.—*To clear the anchor*, is to get the cable off the flukes, and to disencumber it of ropes, ready for dropping.—*Clear hawse*, when the cables are directed to their anchors without lying athwart the stem. *To clear the hawse*, is to untwist the cables when they are entangled by having either a cross, an elbow, or a round turn.

Clew-lines are ropes which come down from the yards to the lower corners of the sails, and by which the corners or clews of the sails are hauled up.

Clew of a sail, the lower corners of square-sails, but the aftermost only of stay-sails, the lower corner being called the *tack*.

To clew up, to haul up the clews of a sail to its yard by means of the clew-lines, etc.

Clinched, made fast, as the cable is to the ring of the anchor.

Close-hauled, that trim of the ship's sails, when she endeavors to make a progress in the nearest direction possible toward that point of the compass from which the wind blows.

To club-haul, a method of tacking a ship when it is expected she will miss stays on a lee shore.

Coasting, the act of making a progress along the sea coast of any country.

To coil a rope, a cable, etc., to lay it round in a ring, one turn or fake over another.

To come home. The anchor is said to *come home* when it loosens from the ground by the effort of the cable, and approaches the place where the ship floated, at the length of her moorings.

Coming to, denotes the approach of a ship's head to the direction of the wind.

Course, the point of the compass upon which the ship sails.—*Courses*, a ship's lower sails; as, the foresail is the *fore-course*, the mainsail the *main-course*, etc.—*The ship is under her courses*—that is, has no sail set but the mainsail, foresail, and mizzen.

Coxswain, the person who steers the boat.

Crank.—*The ship is crank*, that is, she has not a sufficient cargo or ballast to render her capable of bearing sail, without being exposed to the danger of oversetting.

Crow-foot, is a number of small lines, spread from the fore parts of the tops, by means of a piece of wood through which they pass, and, being hauled taut upon the stays, they prevent the foot of the topsails catching under the top rim; they are also used to suspend the awnings.

Con, to direct. *To con a ship*, is to direct the man at the helm how to steer.

To cut and run, to cut the cable, and make sail instantly, without waiting to weigh anchor.

DAVIT, a long beam of timber, used as a crane, whereby to hoist the flukes of the anchor to the top of the bow, without injuring the planks of the ship's sides as it ascends. There is always a davit, of a smaller kind, fixed to the long-boat to weigh the anchor by the buoy-rope.

To deaden a ship's way, to impede her progress through the water.

Dead eyes, blocks of wood through which the laniards of the shrouds are reeved.

Dead-lights, a kind of window shutter for the windows in the stern of a ship, used in very bad weather only.

Dead-water, the eddy of water, which appears like whirlpools, closing in with the ship's stern as she sails on.

Dead-wind, the wind right against the ship, or blowing from the very point to which she wants to go.

Dismasted, the state of a ship that has lost her masts.

Dog-vane, a small vane with feathers and cork, and placed on the ship's quarter, for the men at gun and helm to see the course of the wind by.

Dog-watch, the watches from four to six, and from six to eight in the evening.

Doubling, the act of sailing round, or passing beyond a cape or point of land. *Doubling upon*, the act of inclosing any part of a hostile fleet between two fires, or of cannonading it on both sides.

Douse, to lower suddenly, or slacken; to strike or haul down; as, *Douse the top-gallant-sails*, that is, lower them.

Down-haul, the rope by which any sail is hauled down, as the jib down-haul.

To drag the anchor, to trail it along the bottom, after it is loosened from the ground.

To draw, when a sail is inflated by the wind, so as to advance the vessel in her course, the sail is said to *draw*, and so, *To keep all drawing*, is to inflate all the sails.

Drift, the angle which the line of a ship's motion makes with the nearest meridian, when she drives with her side to the wind and waves, and is not governed by the power of the helm. It also implies the distance which the ship drives on that line.

Driver, a large sail set upon the mizzen-yards in light winds. *Drives—The ship drives*, that is, her anchor comes through the ground.

Drop, used sometimes to denote the depth of a sail; as, *The fore-top-sail drops twelve yards.*

To drop anchor, used synonymously with *to anchor*. *To drop astern*, the retrograde motion of a ship.

Dunnage, a quantity of loose wood, etc., laid at the bottom of a ship, to keep the goods from being damaged.

EARINGS, small ropes used to fasten the upper corners of sails to the yards.

To ease, to ease away, or *to ease off*—to slacken gradually; thus they say, *Ease the bow-line, ease the sheet.*

"*Ease the ship!*" the command given by the pilot to the steersman, to put the helm hard a-lee, when the ship is expected to plunge her fore part deep in the water when close-hauled.

To edge away, to decline gradually from the shore, or from the line of the course which the ship formerly held, in order to go more large.

To edge in with, to advance gradually towards the shore, or any other object.

Elbow in the hawse, is when a ship, being moored, has gone round, upon the shifting of the tides, twice the wrong way, so as to lay the cables one over the other. Having gone once wrong, she makes a *cross* in the hawse; and going three times wrong, she makes a *round turn*.

End for end, a term used when a rope runs all out of a block, and is unreeved; or, in coming to an anchor, if the stoppers are not well put on, and the cable runs all out, it is said to have gone out *end for end.*

End on, when a ship advances to a shore, rock, etc., without an apparent possibility of preventing her, she is said to go *end on* for the shore, etc.

Engagement, action or fight.

Ensign, the flag worn at the stern of a ship.

Entering-port, a large port in the side of three-deckers, leading into the middle deck, to save the trouble of going up the ship's side to get on board.

Even keel, when the keel is parallel with the horizon, a ship is said to be upon an *even keel.*

FAIR, a general term for the disposition of the wind, when favorable to a ship's course.

Fair way, the channel of a narrow bay, river or haven, in which ships usually advance in their passage up and down.

Fuck, or *fake*, one circle of any rope or cable coiled.

Fag-end, the end of any rope which is become untwisted by frequent use; to prevent which, the ends of ropes are wound round with pieces of twine, which operation is called *whipping.*

To fall aboard of, to strike or encounter another ship, when one or both are in motion. *To fall astern*, the motion of a ship with her stern foremost. *To fall calm*, to become in a state of rest by a total cessation of the wind. *To fall down*, to sail or be towed down a river nearer towards its mouth.

Falling off, denotes the motion of the ship's head from the direction of the wind. It is used in opposition to *coming to.*

"*Full not off, or nothing off!*" the command of the steersman to keep the ship near the wind.

Fathom, a measure of six feet.

To fetch away, to be shaken or agitated from one side to another, so as to loosen anything which before was fixed.

Fid, a square bar of wood or iron, with shoulders at one end, used to support the weight of the topmast, when erected at the head of a lower mast.—*Fid for splicing*, a large piece of wood, of a conical figure, used to extend the strands and layers of cables in splicing.

To fill, to brace the sails so as to receive the wind in them, and advance the ship in her course, after they have been either shivering or braced aback.

Fish, a large piece of wood.—*Fish the mast*, apply a large piece of wood to it to strengthen it.

Fish-hook, a large hook, by which the anchor is received and brought to the cat-head; and the tackle which is used for this purpose is called the *fish-tackle.*

To fish the anchor, to draw up the flukes of the anchor towards the top of the bow, in order to stow it, after having been catted.

Flag, a general name for colors worn and used by ships of war.

Flat-aft, the situation of the sails when their surfaces are pressed aft against the mast by the force of the wind.

To flat in, to draw in the aftermost lower corner, or clew, of a sail towards the middle of the ship, to give the sail a greater power to turn the vessel.—*To flat in forward*, to draw in the fore-sheet, jib-sheet, and fore-staysail-sheet, towards the middle of the ship.

Flaw, a sudden breeze or gust of wind.

Floating, the state of being buoyed up by the water from the ground.

Flood-tide, the state of a tide when it flows or rises.

Flowing-sheets, the position of the sheets of the principal sails when they are loosened from the wind so as to receive it into their cavities more nearly perpendicular than when close-hauled, but more obliquely than when the ship sails before the wind. A ship going two or three points large has *flowing-sheets*.

Fore, that part of a ship's frame and machinery that lies near the stem.—*Fore and aft*, throughout the whole ship's length; lengthwise of the ship.

Fore-reach, to shoot ahead, or go past another vessel.

To force over, to force a ship violently over a shoal by a great quantity of sail.

Forward, toward the fore part of a ship.

Foul is used in opposition both to *clear* and *fair*. As opposed to *clear*, we say, *foul weather*, *foul bottom*, *foul ground*, *foul anchor*, *foul hawse*. As opposed to *fair*, we say, *foul wind*.

To founder, to sink at sea by filling with water.

To free. Pumping is said *to free* a ship, when it discharges more water than leaks into her.

To freshen. When a gale increases, it is said to *freshen*.—*To freshen the hawse*, to veer out or heave in a little cable, to let another part of it endure the stress of the hawse-hole. It is also applied to the act of renewing the service round the cable at the hawse-hole.

Freshen the ballast, divide or separate it.

Fresh way. When a ship increases her velocity, she is said to get *fresh way*.

Full, the situation of the sails when they are kept distended by the wind.

Full and by, the situation of a ship, with regard to the wind, when close-hauled, and sailing so as neither to steer too nigh the direction, nor to deviate to leeward.

To furl, to wrap or to roll a sail close up to the yard or stay to which it belongs, and to wind a cord around it to keep it fast.

GAUGE OF THE SHIP, her depth of water, or what water she draws.

To gain the wind, to arrive on the weather side, or to windward of some ship or fleet in sight, when both are sailing as near the wind as possible.

Gammon the bowsprit, secure it by turns of a strong rope passed round it, and into the cutwater, to prevent it from having too much motion.

Gangway, that part of a ship's side, both within and without, by which persons enter and depart.

Garboard streak, the first range or streak of planks laid in a ship's bottom next the keel.

Gasket, the rope which is passed round the sail, to bind it to the yard, when it is furled.

To gather. A ship is said to *gather* on another as she comes nearer to her.

Gimbleting, the action of turning the anchor round by the stock, so that the motion of the stock appears similar to that of the handle of a gimblet, when employed to turn the wire.

Girt. The ship is *girt* with her cables when she is too tight moored.

To give chase to, to pursue a ship or fleet.

Goose wings of a sail, the clews or lower corners of a ship's mainsail or foresail, when the middle part is furled or tied up to the yard.

Grappling-iron, a thing in the nature of an anchor, with four or six flukes to it.

Grave, to burn off the filth from a ship's bottom.

Gripe of a ship, that thin part of her which is under the counter, and to which the stern-post joins.—*The ship gripes*, that is, turns her head too much to the wind.

Grommet, a piece of rope laid into a circular form, and used for large boats' oars instead of rowlocks, and also for many other purposes.

Grounding, the laying the ship ashore, in order to repair her. It is also applied to running aground accidentally.

Ground tackle, everything belonging to a ship's anchors, and which are necessary for anchoring or mooring; such as cables, hawsers, tow-lines, warps, buoy-ropes, etc.

Ground tier, that is, the tier of water casks which is lowest in the hold, and is among the shingle ballast.

Growing, stretching out; applied to the direction of the cable from the ship toward the anchors; as, *The cable grows on the starboard bow.*

Gunwale, the upper edge of a ship's side.

Gun-room, a division of the lower deck abaft, inclosed with net-work, for the use of the gunner and his stores.

Gybing, the act of shifting any boom-sail from one side of the mast to the other.

HAIL, to call to another ship.

Halliards, the ropes by which the sails are hoisted; as, the *top-sail halliards*, or *jib-halliards*, etc.

Handing, the same as furling.

Hard a-weather, put the tiller quite up to windward.

Haul, pull.

To haul the wind, to direct the ship's course nearer to the point from which the wind blows.

Hawse-holes, the holes in the bows of the ship through which the cables pass.—*Freshen hawse*, veer out more cable.—*Clap a service in the hawse;* put somewhat round the cable at the hawse-hole to prevent its chafing.—*To clear hawse*, is to untwist the cables where a ship is moored, and has got a foul hawse.—*Athwart hawse*, is to be across or before another ship's head.

Hawser, a small kind of cable.

Head-fast, a rope employed to confine the head of a ship to a wharf or to some other ship.

Headmost, the situation of any ship or ships which are the most advanced in a fleet.—*Head-sails*, all the sails which belong to the foremast and bowsprit.

Head sea. When the waves meet the head of a ship in her course, they are called a *head-sea.* It is likewise applied to a single wave coming in that direction.

Head to wind, the situation of a ship when her head is turned to the point from which the wind blows, as it must be when tacking.

Head-way, the motion of advancing, used in opposition to *stern-way.*

To heave, to turn about a capstan, or other machine of the like kind, by means of bars, handspikes, etc.—*To heave ahead*, to advance the ship by heaving in the cable or other rope fastened to an anchor at some distance before her.—*To heave a-peak*, to heave in the cable till the anchor is a-peak. *To heave astern*, to move a ship backwards by an operation similar to that of heaving ahead.—*To heave down*, to careen.—*To heave in the cable*, to draw the cable into the ship, by turning the capstan.—*To heave in stays*, to bring a ship's head to the wind, by a management of the sails and rudder, in order to get on the other tack.—*To heave out*, to unfurl or loose a sail; more particularly applied to the staysails; thus we say, loose the topsails, and *heave out* the staysails.—*To heave short*, to draw so much of the cable into the ship as that she will be almost perpendicularly over her anchor.—*To heave tight or taut*, to turn the capstan round till the rope or cable becomes straightened.—*To heave the lead*, to throw the lead overboard, in order to find the depth of water.—*To heave the log*, to throw the log overboard, in order to find the velocity of the ship.—*Heave the capstan*, that is, turn it round with the bars.—*Heave handsomely*, heave gently or leisurely. *Heave hearty*, heave strong and quick.

Heave of the sea, is the power that the swell of the sea has upon a ship in driving her out, or faster on, in her course, and for which allowance is made in the day's work.

Heel or *incline.—She heels to port*, that is, inclines or lays down upon her larboard or left side.

Helm, the instrument by which the ship is steered, and includes both the wheel and the tiller as one general term.—*Helm's a-lee*, that is, the tiller is quite down to leeward.

High and dry, the situation of a ship when so far run aground as to be seen dry upon the strand.

Hitch, to make fast.

Hoist, to haul, sway, or lift up.

Hold, is the space between the lower deck and the bottom of the ship, where her cargo, etc., lie.

To stow the hold, is to place the things in it.

To hold its own, is applied to the relative situation of two ships when neither advances upon the other; each is then said *to hold its own*. It is likewise said of a ship, which, by means of contrary winds, cannot make a progress towards her destined port, but which, however, keeps nearly the distance she had already run.

Home implies the proper situation of any object; as, *To haul home the topsail-sheets*, is to extend the bottom of the topsail to the lower yard, by means of the sheets. In stowing a hold, a cask, etc., is said *to be home*, when it lies close to some other object.

Hulk, a ship without masts or rigging; also a vessel employed in the removal of masts into or out of ships by means of sheers, from whence it is called a *sheer hulk*.

Horse, a rope reaching from the middle of a yard to its arms or extremities, for the men to stand on when they are loosing, reefing, or furling a sail.

Hull of the ship, the body of it.—*To lay a-hull* is to lay to with only a small sail, in a gale of wind.—*To hull a vessel*, is to fire a shot into any part of her hull.

Hull down, is when a ship is so far off that you can only see her masts.—*To hull a ship*, to fire cannon balls into her hull within the point-blank range.—*Hull to*, the situation of a ship when she lies with all her sails furled, as in *trying*.

IN STAYS. See *To heave in stays*.

JAMMING, the act of inclosing any object between two bodies, so as to render it immovable.

Jeer-blocks, the blocks through which jeers are reeved.

Jeers, the ropes by which the lower yards are suspended.

Jib, the foremost sail of a ship, set upon a boom which runs out upon the bowsprit.

Jib-boom, a spar that runs out upon the bowsprit.

Jolly-boat, a small boat.

Junk, old cable, or old rope.

Jury-mast, a temporary or occasional mast, erected in a ship in the place of one which has been carried away by accident, etc.

KEDGE, a small anchor with an iron stock.

Keel, the principal piece of timber in a ship, which is usually first laid on the blocks in building.

Keel-haul, to drag a person backwards and forwards under a ship's keel for certain offenses.

Keckled, any part of a cable covered over with old ropes, to prevent its surface from rubbing against the ship's bow or fore-foot.

To keep away, to alter the ship's course to one rather more large, for a little time, to avoid some ship, danger, etc.—"*Keep away!*" is likewise said to the steersman who is apt to go to windward of the ship's course.—*To keep full*, to keep the sails distended by the wind.—*To keep hold of the land*, to steer near to or in sight of the land.—*To keep off*, to sail off, or keep at a distance from the shore.—*To keep the land aboard*, the same as *to keep hold of the land*.—*To keep the luff*, to continue close to the wind. *To keep the wind*, the same as *to keep the luff*.

Kelson, a piece of timber forming the interior of the keel, being laid on the middle of the floor timbers immediately over the keel, and serving to unite the former to the latter.

Kentledge, pigs of iron for ballast, laid upon the floor, near the kelson, fore and aft.

Kenk, a sort of twist or turn in a cable or rope.

Knippers, a large kind of plaited rope, which, being twisted round the messenger and cable in weighing, binds them together.

Knot, a division of the log-line, answering, in the calculation of the ship's velocity, to one mile.

Kumatage, a bright appearance in the horizon, under the sun or moon, arising from the reflected light of those bodies from the small rippling waves on the surface of the water.

TO LABOR, to roll or pitch heavily in a turbulent sea.

Laden in bulk, freighted with a cargo not packed, but lying loose, as corn, salt, etc.

Laid up, the situation of a ship when moored in a harbor, for want of employ.

Landfall, the first land discovered after a sea voyage. Thus a *good landfall* implies the land expected or desired; a *bad landfall*, the reverse.

Land-locked, the situation of a ship surrounded with land, so as to exclude the prospect of the sea, unless over some intervening land.

Lanlards of the shrouds, are the small ropes at the ends of them, by which they are hove taut or tight.

Larboard, the left side of a ship, looking towards the head.—*Port tack*, the situation of a ship when sailing with the wind blowing upon her port side.

Lash, to bind.

"*Launch ho!*" signifies that the object is high enough, and must be suddenly lowered.

Laying the land. A ship which increases her distance from the coast, so as to make it appear lower and smaller, is said *to lay the land.*

Leading wind, a fair wind for a ship's course.

Leak, a chink or breach in the sides or bottom of a ship, through which the water enters into the hull.

Lee, that part of the hemisphere to which the wind is directed, to distinguish it from the other part, which is called *to windward.*—*Lee gage.* A ship or fleet to leeward of another is said to have the *lee gage.*—*Lee lurches*, the sudden and violent rolls which a ship often takes to leeward, in a high sea, particularly when a large wave strikes her on the weather side. *Lee quarter*, that quarter of a ship which is on the lee side.—*Lee shore*, that shore upon which the wind blows.—*Lee side*, that half of a ship, lengthwise, which lies between a line drawn through the middle of her length and the side which is farthest from the point of wind.—*To leeward*, toward that part of the horizon to which the wind blows.—*Leeward ship*, a ship that falls much to leeward of her course, when sailing close-hauled.—*Leeward tide*, a tide that sets to leeward.

Lee-way, the lateral movement of a ship to leeward of her course; or the angle which the line of her way makes with a line in the direction of her keel.

To lie along, to be pressed down sideways by a weight of sail in a fresh wind.

Leeches, the borders or edges of a sail.

To lie to, to retard a ship in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immovable with respect to her progressive motion or headway.

Lifts, the ropes which come to the ends of the yards from the mast-heads, and by which they are suspended when lowered down.

Limbers, or *limber holes*, square holes cut through the lower part of a ship's floor timbers, very near the keel; forming a channel for water, and communicating with the pump-well throughout the whole length of the floor.

List, incline.—*The ship has a list to port*, that is, she heels to the larboard.

Log, and *log-line*, by which the ship's path is measured, and her rate of going ascertained.

Log-board, on which are marked the transactions of the ship, which from thence are copied into the log-book every 24 hours.

A long sea, a uniform motion of long waves.

Look out, a watchful attention to some important object or event that is expected to arise. Thus persons on board of a ship are occasionally stationed to *look out* for signals, other ships, for land, etc.

To loom, to appear above the surface either of the sea or the land, or to appear larger than the real dimensions, and indistinctly; as a distant object, a ship at sea, or a mountain. The ship *looms* large, or the land *looms* high.

To loose, to unfurl or cast loose any sail.

To lower, to ease down gradually.

"*Luff!*" the order to the steersman to put the helm towards the lee side of the ship, in order to sail nearer to the wind.

MAST, the upright timber on which the yards and sails are set.

Masted, having all her masts complete.

Mend the service, put on more service.

Messenger, a small kind of cable, which being brought to the capstan and the cable by which the ship rides made fast to it, it purchases the anchor.

To middle a rope, to double it into two equal parts.

Midships. See *Amidships.*

Mirage, an optical phenomenon, arising from an irregular refraction or reflection of the light near the horizon, by which it often happens, near the sea coast, that a ship, seen at a distance, appears as if painted in the sky, and not supported by the water. Sometimes the image of the ship is inverted. A similar effect is observed in sandy deserts, as in Egypt, where the blue light of the sky is reflected upwards from the heated sands, which makes the whole plain at a distance appear like a large lake, and the elevated villages appear like islands in this lake.

To miss stays, a ship is said to *miss stays* when her head will not fly up into the direction of the wind, in order to get her on the other tack.

Mizzenmast, the mast which stands abaft, and from which its rigging and sails are named; as of the sails, *mizzen*, *mizzen-topsail*, etc., and so also are the other sails, etc., named from the other masts.

Moor is to secure a ship with two anchors. *Mooring*, securing a ship in a particular station by chains or cables, which are either fastened to an adjacent shore or to anchors at the bottom. *Mooring service*, when a ship is moored, and rides at one cable's length, the mooring service is that which is at the first splice.

Mouse, a kind of ball or knob, wrought upon the collar of the stays.

Muster, to assemble.

To make a board, to run a certain distance upon one tack, in beating to windward. *To make foul water*, to muddy the water by running in shallow places, so that the ship's keel disturbs the mud at the bottom. *To make sail*, to increase the quantity of sail already set, either by unreefing or by setting others. *To make stern-way*, to retreat or move with the stern foremost. *To make the land*, to discover it from afar. *To make water*, to leak.

To man the yard, etc., to place men on the yard, in the tops, down the ladder, etc., to execute any necessary duties.

NARROWS, a small passage between two lands.

Neap tides, the tides in the first and last quarter of the moon, which are not either so high, so low, or so rapid as spring tides. A ship is said *to be neaped* when she has not water enough to take her off the ground, or over the bar, etc.

"*Near!*" or "*No near!*" an order to the steersman not to keep the ship so close to the wind.

Nippers, certain pieces of cordage used to fasten the messenger to the cable in heaving up the anchor.

"*Nothing off!*" a term used by the man at the gun to the steersman, directing him not to go from the wind.

Nun buoy, the kind of buoy used by ships of war.

OAKUM, old rope untwisted and pulled open.

Off and on, when a ship is beating to windward, so that by one board she approaches towards the shore, and by the other stands out to sea, she is said to stand *off and on* shore.

Offing, to seaward from the land. *A ship is in the offing*, that is, she is to seaward, at a distance from the land. *She stands for the offing*, that is, towards the sea.

Offward, from the shore, as, when a ship lies aground, and leans towards the sea, she is said to heel *offward*.

On board, within the ship; as, *He is come on board.*

On the beam, any distance from the ship on a line with the beams, or at right angles with the keel. See *Bearing*.

On the bow, an arc of the horizon, comprehending about four points of the compass on each side of that point to which the ship's head is directed. Thus they say, *The ship in sight bears three points on the starboard bow;* that is, three points towards the right hand, from that part of the horizon which is right ahead. See *Bearing*.

On the quarter, an arc of the horizon, comprehending about four points of the compass on each side of that point to which the ship's stern is directed. See *On the bow*.

Open, the situation of a place exposed to the wind and sea. It is also expressed of any distant object to which the sight or passage is not intercepted.

Open hawse, when the cables of a ship at her moorings lead straight to their respective anchors, without crossing, she is said to ride with an *open hawse*.

Orlop, the deck on which the cables are stowed.

Overboard, out of a ship; as, *He fell overboard*, meaning he fell out of, or from the ship.

Overgrown sea, is expressed of the ocean when the surges and billows rise extremely high.

Overhaul, to clear away and disentangle any rope; also, to come up with the chase; as, *We overhaul her*, that is, we gain ground on her.

Over-rake, when a ship at anchor is exposed to a head sea, the waves of which break in upon her, the waves are said to *over-rake* her.

Overset, a ship is *overset* when her keel turns upwards.

Out of trim, the state of a ship when she is not properly balanced for the purposes of navigation.

PARCEL A ROPE, is to put a quantity of old canvas upon it before the service is put on. *Parcel a seam*, is to lay a narrow piece of canvas over it after it is caulked, before it is payed.

Parliament heel, the situation of a ship when she is made to stoop a little to one side, so as to clean the upper part of her bottom on the other side. See *Boot-topping*,

Parting, being driven from the anchors, by the breaking of the cable.

Pawl, a short bar of wood or iron fixed close to the capstan or windlass of a ship, to prevent those engines from rolling back, or giving way, when they are charged with any great effort.

To pawl the capstan, to fix the pawls so as to prevent the capstan from recoiling during any pause of heaving.

To pay, to daub or cover the surface of any body with pitch, tar, etc., in order to secure it from the injuries of the weather.

To pay away, or pay out, to slacken a cable or other rope, so as to let it run out for some particular purpose.

To pay off, to move a ship's head to leeward.

To peak the mizzen, to put up the mizzen-yard perpendicular by the mast.

Peak. To ride a stay-peak, is when the cable and the fore-stay form a line. *To ride a short peak*, is when the cable is so much in as to destroy the line formed by the stay-peak. *To ride with the yards a-peak*, is to have them topped up by contrary lifts, so as to represent St. Andrew's cross.

Pennant, the long narrow flag worn at the mast-head by all ships of the navy. *Brace pennants* are those ropes which secure the brace-blocks to the yard-arms, and are in general double, so that, in case of one being shot away, the other may secure the yard in its proper position.

Broad pennant, a broad flag, terminating in a point, used to distinguish the chief of a squadron.

Pitching, the movement of a ship, by which she plunges her head and after part alternately into the hollow of the sea.

Point-blank, the direction of a gun when leveled horizontally.

Points, a number of plaited ropes made fast to the sails for the purpose of reefing.

Poop, the highest and aftermost deck of a ship.

Pooping, the shock of a high and heavy sea upon the stern and quarter of a ship, when she scuds before the wind in a tempest.

Port, a name given, on some occasions, to the larboard side of the ship; as *The ship heels to port*, *Top the yards to port*, etc.; also, a harbor or haven.

Ports, the holes in the ship's sides from which the guns are fired.

"*Port the helm!*" the order to put the helm over to the larboard side.

Port-last, the gunwale.

Press of sail, all the sail that a ship can set or carry.

Preventer, an additional rope employed at times to support any other, when the latter suffers an unusual strain, particularly when blowing fresh, or in a gale of wind.

Pudding and dolphin, a large and lesser pad made of ropes, and put round the mast under the lower yards.

Purchase, any sort of mechanical power employed in raising or moving heavy bodies.

QUARTERS, the respective stations of the officers and people in time of action.—*Quartering*, distributing the men into different places.—*Quarter-bill*, the list of the ship's company, with their stations for action noticed.

Quarter-wind is when the wind blows in from that part of the horizon situated on the quarter of the ship. See *On the quarter*.

Quoil.—See *To coil the cable*, etc.

TO RAISE, to elevate any distant object at sea by approaching it; thus to *raise the land* is used in opposition to *lay the land*.

To rake, to cannonade a ship at the stern or head, so that the balls scour the whole length of the decks.

Range of cable, a sufficient length of cable drawn upon deck before the anchor is cast loose, to admit of its sinking to the bottom without any check.

Ratlines, the small ropes fastened to the shrouds, by which the men go aloft.

Reach, the distance between any two points on the banks of a river, wherein the current flows in an uninterrupted course.

"*Ready about!*" a command of the boatswain to the crew, and implies that all hands are to be attentive, and at their stations for taking.

Rear, the last division of a squadron, or the last squadron of a fleet. It is applied likewise to the last ship of a line, squadron, or division.

Reef, part of a sail, from one row of eyelet-holes to another. It is applied likewise to a chain of rocks lying near the surface of the water.

Reefing, the operation of reducing a sail by taking in one or more of the reefs.

To reeve, to pass the end of a rope through any hole, as the channel of a block, the cavity of a thimble, etc.

Rendering, the giving way or yielding to the efforts of some mechanical power. It is used in opposition to *jamming* or *sticking*.

Ribs of a ship, a figurative expression for the timbers.

Ride at anchor, is when a ship is held by her anchors, and is not driven by wind or tide.—*To ride athwart*, is to ride with the ship's side to the tide. —*To ride hawse fallen*, is when the water breaks into the hawse in a rough sea.

Rigging, a general name given to all the ropes employed to support the masts, to extend or reduce the sails, or to arrange them to the disposition of the wind.

Righting, restoring the ship to an upright position, either after she has been laid on a careen, or after she has been pressed down on her side by the wind.

To right the helm, is to bring it into midships, after it has been pushed either to starboard or larboard.

Rigging out a boom, the running out a pole at the end of a yard, to extend the foot of a sail.

To rig the capstan, to fix the bars in their respective holes.

Road, a place near the land where ships may anchor, but which is not sheltered.

Robands, or *rope bands*, short, flat pieces of plaited rope, having an eye worked at one end. They are used in pairs to tie the upper edges of the square-sails to their respective yards.

Rolling, the motion by which a ship rocks from side to side like a cradle.

Rough tree, a name applied to any mast, yard, or boom, placed in merchant ships, as a rail or fence above the vessel's side, from the quarter-deck to the forecastle.

Rounding in, the pulling upon any rope which passes through one or more blocks in a direction nearly horizontal; as, *Round in the weather-braces.*

Rounding, old ropes fastened on the cable, near the anchor, to keep it from chafing.

Round turn, the situation of the two cables of a ship when moored, after they have been several times crossed by the swinging of the ship.

Rounding up, similar to *rounding in*, except that it was applied to ropes and blocks which act in a perpendicular direction.

Rousing, pulling up a cable or rope without the assistance of tackles.

To row, to move a boat with oars.

Rowlock, the niche in a boat's side, in which the oars are used.

Rudder, the machine by which the ship is steered.

Run, the aftermost part of a ship's bottom, where it grows extremely narrow as the stern approaches the stern-post.—*Run* is also the distance sailed by a ship; and is likewise used by sailors to imply the agreement to work a single passage from one place to another.

To run out a warp, to carry the end of a rope out from a ship, in a boat, and fasten it to some distant object, so that by it the ship may be removed by pulling on it.

TO SAG TO LEEWARD, to make considerable lee-way.

Sailing trim is expressed of a ship when in the best state for sailing.

She sands or *sends*, when the ship's head or stern falls deep in the trough of the sea.

Scanting, the variation of the wind, by which it becomes unfavorable, to a ship's making great progress, as it deviates from being large, and obliges the vessel to steer close-hauled, or nearly so.

Scud, to go right before the wind; and going in this direction without any sail set, is called *spooning*.

Scuttling, cutting large holes through the bottom or sides of a ship, either to sink her, or to unlade her expeditiously when stranded.

Sea, a large wave is so called. Thus they say a *heavy sea*. It implies likewise, the agitation of the ocean; as, a *great sea*. It expresses the direction of the waves; as, a *head sea*. *A long sea* means a uniform and steady motion of long and extensive waves; a *short sea*, an the contrary, is when they run irregularly, broken, and interrupted.

Sea-boat, a vessel that bears the sea firmly, without straining her masts, etc.

Sea-clothes, jackets, trousers, etc.

Sea-mark, a point or object on shore conspicuously seen at sea.

Sea-room, a sufficient room distance from the coast or any dangerous rocks, etc., so that a ship may perform all nautical operations without danger of shipwreck.

Seize, to bind or make fast.

Serve, to wind something about a rope to prevent it from chafing or fretting. The *service* is the thing so wound about the rope.

Setting, the act of observing the situation of any distant object by the compass.

To set sail, to unfurl and expand the sails to the wind, in order to give motion to the ship.

To set up, to increase the tension of the shrouds, back-stays, etc., by tackles, laniards, etc.

Settle, to lower; as, *Settle the topsail halliards;* lower them.

To settle the land, to lower in appearance. It is synonymous with *to lay the land*.

Shank, the beam or shaft of an anchor.

Shank-painter, the rope by which the shank of the anchor is held up to the ship's side; it is also made fast to a piece of iron chain, in which the shank of the anchor lodges.

To shape a course, to direct or appoint the track of a ship, in order to prosecute a voyage.

Sheer. The *sheer* of a ship is the curve that is between the head and the stern upon her side.—*The ship sheers about;* that is, she goes in and out.

To sheer off, to remove to a greater distance.

Sheers are spars lashed together, and raised up, for the purpose of getting out or in a mast.

Sheet, a rope fastened to one or both of the lower corners of a sail, in order to extend and retain it in a particular situation. When a ship sails with a side wind, the lower corners of the main and fore-sails are fastened by a *tack* and a *sheet*, the former being to windward, and the latter to leeward. The tack is never used with a stern wind, whereas the sail is never spread without the assistance of one or both of the sheets. The staysails and studdingsails have only one tack and one sheet each. The staysail-tacks are fastened forward, and the sheets drawn aft, but the studdingsail-tacks draw the outer corner of the sail to the extremity of the boom, while the sheet is employed to extend the inner corner.

To sheet home, to haul the sheets of a sail home to the block on the yard-arm.

To shift the helm, to alter its position from right to left, or from left to right.

To ship, to take any person, goods, or thing on board. It also implies to fix any thing in its proper place; as, *To ship the oars*, to fix them in their rowlocks.

Ship-shape, in a seamanlike manner; as, *That mast is not rigged ship-shape; Put her about ship-shape*, etc.

Shivering, the state of a sail when fluttering in the wind.

Shoal, shallow.

Shoe of the anchor, a small block of wood, convex on the back, and having a hole sufficiently large to contain the point of the anchor-fluke on the fore side: it is used to prevent the anchor from tearing the planks on the ship's bow, when ascending or descending.

To shoot ahead, to advance forward.

Shore, a general name for the seacoast of any country.

To shorten sail, used in opposition to *make sail*.

Shrouds, a range of large ropes extended from the mast-heads to the right and left sides of a ship, to support the masts, and enable them to carry sail.

Sinnett, a small plaited rope made from rope-yarns.

Slack-water, the interval between the flux and reflux of the tide, when no motion is perceptible in the water.

Slatch is applied to the period of a transitory breeze.

To slip the cable, to let it run quite out, when there is not time to weigh the anchor.

To slue, to turn any cylindrical piece of timber about its axis, without removing it; thus, *to slue a mast* or *boom*, is to turn it in its cap or boom-iron. Also, to turn any package or cask round.

Sound, to try the depth of water.

Sounding-line, a line to sound with, which is marked in the following manner:—Black leather at 2 and 3 fathoms; white at 5; red at 7; black at 10; white at 13 (some seamen use black at 10 and 13); white at 15 as at 5; red at 17 as at 7; two knots at 10 fathoms, and an additional knot at every ten fathoms, with a single knot midway between each 10 fathoms, to mark the line at every 5 fathoms.

To spill the mizzen, to let go the sheet and peak it up.

To spill, to discharge the wind out of the cavity or belly of a sail, when it is drawn up in the brails, in order to furl or reef it.

Spilling-lines are ropes contrived to keep the sails from being blown away, when they are clewed up in blowing weather.

Splice, to make two ends of ropes fast together by untwisting them, and then putting the strands of one piece with the strands of the other.

Split, the state of a sail rent by the violence of the wind.

Spoon-drift, a sort of showery sprinkling of the sea water swept from the surface of the waves in a tempest, and flying like a vapor before the wind.

Spray, the sprinkling of a sea, driven occasionally from the top of a wave, and not continual as a spoon-drift.

To spring a mast, yard, etc., to crack a mast, yard, etc., by means of straining in blowing weather, so that it is rendered unsafe for use.—*To spring a leak.* When a leak first commences, a ship is said *to spring a leak*. *To spring the luff.* A ship is said *to spring her luff*, when she yields to the effort of the helm, by sailing nearer to the wind than before.

Spring-stays are rather smaller than the stays, and placed above them, and intended to answer the purpose of the stay, if it should be shot away, etc.

Spring-tides are the tides at new and full moon, which flow highest and ebb lowest.

Spurling-line is a line that goes round a small barrel abaft the barrel of the wheel, and, coming to the front beam of the poop-deck, moves the tell-tale with the turning of the wheel, and keeps it always in such a position as to show the position of the tiller.

Spur-shoes are large pieces of timber which come abaft the pump-well.

Squall, a sudden, violent blast of wind.

Square. This term is applied to yards that are very long, as *taunt* is to high masts.

To square the yards, to brace the yards so that they may hang at right angles with the keel.

To stand on, to continue advancing.—*To stand in*, to advance towards the shore.—*To stand off*, to recede from the shore.

Starboard, the right-hand side of a ship, when looking forward.—*Starboard tack.* A ship is said to be on the *starboard tack* when sailing with the wind blowing upon her starboard side.

"*Starboard the helm!*" an order to push the helm to the starboard side.

To stay a ship, to arrange the sails and move the rudder so as to bring the ship's head to the direction of the wind, in order to get her on the other tack.

Stays, large ropes coming from the mast-head down before the masts, to prevent them from springing, when the ship is sending deep.

"*Steady!*" the order to the helmsman to keep the ship in the direction she is going at that instant.

Steering, the art of directing the ship's way by the movement of the helm.

Steerage-way, such degree of progressive motion of a ship as will give effect to the motion of the helm.

Stem, a circular piece of timber, into which the two sides of a ship are united at the fore end; the lower end is scarfed to the keel, and the bowsprit rests on the upper end.

To stem the tide. When a ship is sailing against the tide, at such a rate as enables her to overcome its power, she is said *to stem the tide.*

Steeve, turning up.—*The bowsprit steeves too much*, that is, it is too upright.

Sternfast, a rope confining a ship by her stern to any other ship or to a wharf.

Sternmost, the farthest astern, opposed to *headmost.*

Stern-way, the motion by which a ship falls back with her stern foremost.

Stiff, the condition of a ship when she will carry a great quantity of sail without hazard of oversetting. It is used in opposition to *crank.*

Stoppers, a large kind of ropes, which, being fastened to the cable in different places abaft the bitts, are an additional security to the ship at anchor.

To stow, to arrange and dispose a ship's cargo.

Strand, one of the twists or divisions of which a rope is composed. It also implies the sea beach.

Stranded. This term, speaking of a cable or rope, signifies that one of its strands is broken; applied to a vessel, it means that she is run aground and is lost.

To stream the buoy, to let it fall from the ship's side into the water, previously to casting anchor.

"*Stretch out!*" a term used to men in a boat when they should pull strong.

To strike, to lower or let down anything; used emphatically to denote the lowering of colors in token of surrender to a victorious enemy.

To strike sounding, to touch ground when endeavoring to find the depth of water.

Suet, or *sewed*. When a ship is on shore, and the water leaves her she is said to be *sued;* if the water leaves her two feet, she *sues* or is *sued* two feet.

Surf, the swell of the sea that breaks upon the shore or on any rock.

To surge the capstan, to slacken the rope heaved round upon it.

Sway away, hoist.

Swell, the fluctuating motion of the sea, either during or after a storm.

Sweeping, the act of dragging the bight or loose part of a rope along the surface of the ground, in a harbor or road, in order to drag up something lost.

Swinging, the act of a ship's turning round her anchor at the change of wind or tide.

TO TACK, to turn a ship about from one tack to another, by bringing her head to wind.

Tafferel, the uppermost part of a ship's stern.

Taking in, the act of furling the sails, used in opposition to *setting*.

Taking aback.—See *Aback.*

Tamkin, or *tomkin; tampion*, or *tompion*, the bung or piece of wood, by by which the mouth of a cannon is filled to keep out wet.

Tarpaulin, a cloth of canvas covered with some tar or some other composition, so as to make it water-proof.

Taut, improperly, though very generally, used for *tight.*

Taunt, high, or tall; particularly applied to masts of extraordinary length.

Tell-tale, an instrument which traverses upon an index in front of the poop-deck, to show the position of the tiller.

Tending, the turning or swinging of a ship round her anchor in a tideway at the beginning of ebb and flood.

Thwart.—See *Athwart.*

Thwart-ships.—See *Athwart-ships.*

"*Thus!*" an order to the helmsman to keep the ship in her present situation, when sailing with a scant wind.

To tide, to work in or out of a river, harbor, or channel, by favor of the tide, anchoring whenever it becomes adverse.

Tide it up, to go with the tide against the wind.

Tide-way, that part of the river in which the tide ebbs and flows strongly.

Tier, a row; as, a *tier* of guns, a *tier* of casks, a *tier* of ships, etc.—*Tier of a cable*, a range of the fakes or windings of a cable which are laid within one another, in a horizontal position.—*Cable tier*, the space in the midst of a cable when it is coiled; also the place in which it is coiled.

Tiller, a large piece of wood, or a beam, put into the head of the rudder, and by means of which the rudder is moved.

Topping, pulling one of the ends of a yard higher than the other.

Tort, or *taut*, signifies *tight*.

To tow, to draw a ship in the water by a rope, fixed to a boat or other ship which is rowing or sailing on.

Tow-line, a small hawser or rope, used to remove a ship from one part of a harbor to another.

Transoms, certain beams or timbers extended across the stern-post of a ship to strengthen her after-part, and to give it the figure most suitable to the service for which she is calculated.

Traverse, to go backwards and forwards.

Treenails or *trunnels*, long wooden pins employed to connect the planks of the ship's side and bottom to the corresponding timbers.

Trice, *trice up*, to haul up and fasten.

Trim, the state or disposition by which a ship is best calculated for the purposes of navigation.—*To trim the hold*, to arrange the cargo regularly.—

To trim the sails, to dispose the sails in the best arrangement for the course which a ship is steering.

To trip the anchor, to loosen the anchor from the ground, either by design or accident.

Trough of the sea, the hollow between two waves.

Truck, a round piece of wood put upon the top of flag-staves, with sheaves on each side for the halliards of the flags to reeve in.

Trysail, a small sail used by cutters and brigs in blowing weather.

Turning to windward, that operation in sailing, whereby a ship endeavors to advance against the wind.

TO UNBALLAST, to discharge the ballast out of a ship.

To unbend, to take the sails off from their yards and stays; to cast loose the anchor from the cable; to untie two ropes.

To unbitt, to remove the turns of a cable from off the bitts.

Underfoot, is expressed of an anchor that is directly under the ship.

Under sail, or *under way*. When a ship is sailing, she is said to be *under way*.

Under the lee of the shore, is to be close under the shore which lies to windward of the ship.

Unfurl, cast loose the gasket of the sail.

To unmoor, to reduce a ship to the state of riding at single anchor, after she has been moored.

To unreeve, to draw a rope from out of a block, timber, etc.

To unrig, to deprive the ship of her rigging.

Uvrou, the piece of wood by which the legs of the crofoot are extended.

VAN, the foremost division of a fleet in one line. It is likewise applied to the foremost ship of a division.

Vane, a small kind of flag worn at each mast-head.

To veer, or *wear the ship*, to change a ship's course from one tack to the other, by turning her stern to windward.

Veer, to let out; as, *Veer away the cable.*

Veer, shift.—*The wind veers*, that is, it shifts, changes.

To veer and haul, to pull tight and slacken alternately.

Viol, or *voyal*, a block through which the messenger passes in weighing the anchor. A large messenger is called a *viol.*

WAKE, the path or track impressed on the water by the ship's passing through it, leaving a smoothness in the sea behind it. A ship is said to come into the *wake* of another, when she follows her in the same track, and this is chiefly done in bringing ships to, or in forming the line of battle.

Wales are strong timbers that go round a ship a little above her water-line.

Warp, a small rope employed occasionally to remove a ship from one place to another.

To warp, to remove a ship by means of a warp.

Waist, that part of a ship contained between the quarter-deck and the fore-castle.

Water-line, the line made by the water's edge when a ship has her full proportion of stores, etc., on board.

Water-borne, the state of a ship, when there is barely a sufficient depth of water to float her off from the ground.

Water-logged, the state of a ship become heavy and inactive on the sea, from the great quantity of water leaked into her.

Water-tight, the state of a ship when not leaky.

Weather.—*To weather* anything is to get to windward of it.—Synonymous with *windward.*

Weather-beaten, shattered by a storm.—*Weather-bit*, a turn of the cable about the end of the windlass.—*Weather-gage.* When a fleet or ship is to windward of another, she is said to have the *weather-gage* of her.—*Weather quarter*, that quarter of the ship which is on the windward side.—*Weather side*, the side upon which the wind blows.

To weigh anchor, to heave up an anchor from the bottom.

To wind a ship, to change her position, bringing her head where her stern was.

Wind-road. When a ship is at anchor, and the wind, being against the tide, is so strong as to overcome its power, and keep the ship to leeward of her anchor, she is said to be *wind-road.*

Wind's eye, the point from which the wind blows.

To windward, toward that part of the horizon from which the wind blows.

Windward tide, a tide that sets to windward.

To work a ship, to direct the movements of a ship by adapting the sails and managing the rudder according to the course the ship has to make.

To work to windward, to make a progress against the direction of the wind.

Wooled, to bind round with ropes.

YARDS, the spars upon which the sails are spread.

Yawing, the motion of a ship when she deviates from her course to the right or left.

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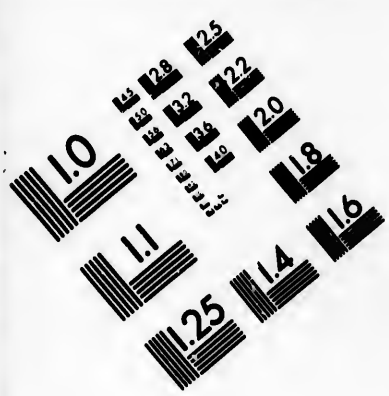

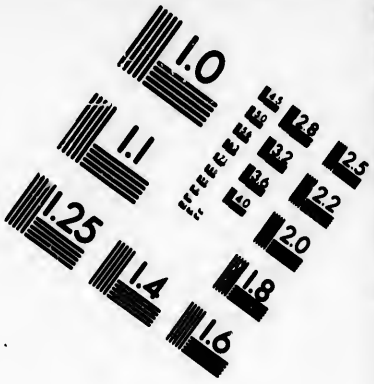

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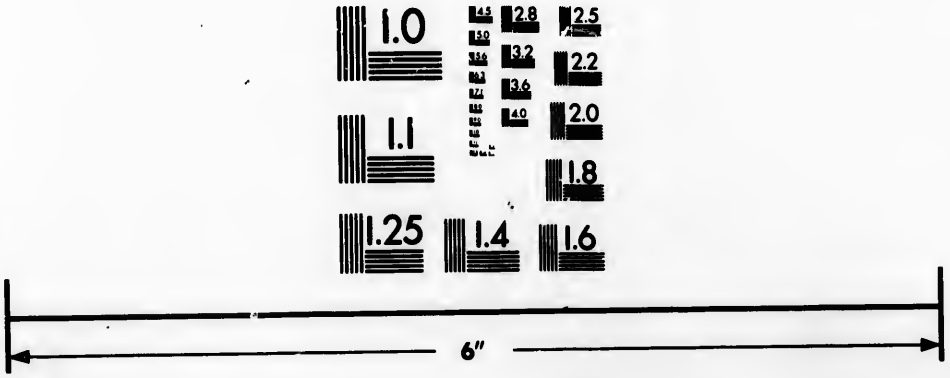

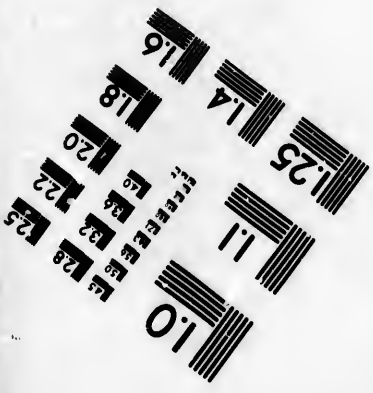

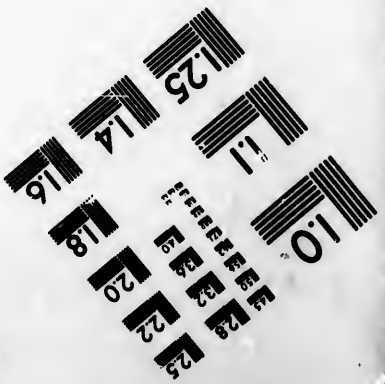

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