E. Cuthbert Woods

The Liverpool Nautical Research Society

TRANSACTIONS

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THE LIVERPOOL NAUTICAL RESEARCH SOCIETY

"*All delight is in masts and oars and trim ships to cross the stormy sea.*"—ODYSSEY.

TRANSACTIONS, VOL. V. 1949-50

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The authors of papers alone are responsible for the statements and opinions in their several contributions

THE LIVERPOOL NAUTICAL RESEARCH SOCIETY

(Founded 1938)

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The objects of the Society are :—

1. To encourage interest in the history of shipping (particularly local shipping) by collecting and collating material relating thereto ;
2. To undertake an historical survey of Liverpool vessels, their builders, owners and masters ;
3. To disseminate such information by publications or by any other available means ;
4. To co-operate in every suitable way with other organisations in Liverpool or elsewhere having similar or cognate objects ;
5. To encourage the making and collection of scale ship models, and their exhibition.

The annual subscription of ten shillings entitles members to attend meetings of the Society, to read papers before it, to take part in any excursions that may be arranged and to receive the annual " Transactions," and " News, Notes and Queries," issued from time to time.

For further particulars, apply to the Hon. Secretary.

Libraries and Research

By Eveline B. Saxton, M.A.

Though the title of this paper has been given as "Libraries and Research," it will actually deal with only one subject of research, namely Shipping, and with only one Library, the Liverpool Reference Library, but as Liverpool is a seaport with a long shipping tradition, it is a subject probably as well represented there as in any public library in the country. It should perhaps be mentioned that in addition to the stock in the Reference Library in William Brown Street, all that is most modern in Shipping is to be found in the Commercial Reference Library on the Exchange Flags.

Later the resources of the Library on the shipping and allied subjects of the Merseyside area will be examined, but first a survey will be made of the resources on shipping in general.

General histories of course are present in great abundance: naval histories; histories of the great shipping lines; histories of famous ships like the *Great Eastern*; biographies of naval and merchant seamen, log-books and accounts of ships' voyages; reminiscences of merchants and masters: these are the obvious histories, and as they are fully catalogued in the catalogues available for readers, they present no difficulties. But those engaged in shipping research soon turn to those less obvious: to old newspapers and directories; to Parliamentary and State Papers. The old Liverpool newspapers, which date from 1756, consist only of four pages, one of which is devoted almost entirely to shipping in one form or another. From the back pages of directories a surprising amount of information can be gleaned. Taking at random the Liverpool directory of 1818, we find all we want to know about the Pilot boats: their numbers, their names, and their first and second masters; extracts from the Acts of Parliament on the docks, piers and lights; dockage rates; graving dock rules, bye-laws relative to the ferry-boats and their boatmen; the times and charges for conveyance by canal; details of traders to London (the cheese ships, sailing every fourteen days, are specially mentioned); Dublin packets, Belfast traders, Isle of Man packets, and the traders to Glasgow, Leith, Bristol, Carlisle, Whitehaven, Workington, Milnthorp and Kendal, Ulverston, and Lancaster; and a list of all vessels cleared out from the port for the East Indies from 1813.

The vast store of information on shipping contained in the Parliamentary and State Papers, and the evidence of the constant governmental preoccupation from early times with this our greatest trade will be a revelation to many, and the Corporation Town Books or Minutes often yield unexpected information. The following incident occurs in the Liverpool Town Books for 1565. A Commission was issued to the Mayor and Alderman in the Queen's name to enquire into the town's position in regard to its population and resources, probably in view of its use as a base for Ireland. To meet the Commissioners were summoned by Proclamation, " all owners of ships, vessels or boats, and also all masters, mariners, and fishermen of Liverpool and of any town, creek, or landing place between Warrington and the water next Preston called Ribble, with the Constables of Formby and North Meols," all of whom were to " present themselves personally before the Commissioners " upon a given day, when they would understand further of the Queen's pleasure. The part of the evidence relating to Liverpool consisted of an interesting presentment made by the Mayor and Bailiffs, which showed that " the sum and number of the householders and cottages the 12th of November, 1565, is 138, whereof be owners, masters, mariners and fishers with their barks great and small as to wit, etc." Then follows a list of the vessels of which Liverpool could boast at this time, giving their owners, captains, and number of crew.

Here is a Marine Order also issued in Queen Elizabeth's reign, and published in the Calendar of State Papers: Domestic series. " That no mariners serve in foreign men-of-war, as they become pirates and leave their country; that no violence be permitted in the ports, and no unnecessary hanging about them; that all merchant ships be allowed to leave before men-of-war; and that if men-of-war chase each other into a port, the first comer go out a tide before the other."

In 1762 was issued a Government document entitled " A case and memorial concerning the navigation of the River Mersey," which complained of the construction of coups or " fishyards " (large conical baskets, joined together in rows, for the purpose of catching fish) and cheverons (piles of wood driven into the bed of the river so as to enclose a triangular space, with the object of guarding the banks of the river from the encroachment of the tides), both of which were impeding the navigation of the upper part of the river.

As for Parliamentary Papers, here are a few items taken at random from the early indexes.

1819. List of the ships and cargoes seized under the Navigation Laws.

1842. Return relating to vessels which have been re-measured since the passing of the Act for the New Measurement of Shipping.

1843. The number of transports and packets which have foundered or not been heard of since 1816, with their names and tonnage.

1847. The number and tonnage of Colonial built vessels registered at each Port of the United Kingdom since 1841, distinguishing each Colony.

1847. Comparative statement of the profit and loss of a Prussian and British ship of equal burthen, both built at Dantzic and employed in the same trade, but subject to the difference of cost incidental to the navigation laws of their respective countries.

1852. Proceedings of the Courts Martial held at Portsmouth for the trial of the surviving officers and crew of Her Majesty's late steamship *Birkenhead* for her loss off the South Coast of Africa.

Interesting shipping items occasionally turn up among old documents. The following was found among some old Liverpool deeds acquired a few years ago. It is dated 14th September, 1601, and is a certificate given by Sir Henry Docwra of Londonderry to the master of the barque *The Gift of God*, of Liverpool (owner, Henry Mullenax) for certain timber for frames sent over by the Mayor of Chester. The Norris of Speke Papers of the late 17th and early 18th centuries are full of information on the shipping trade of the Norris Family—they dealt largely in tobacco, but there is much information on the London cheesemongers and their ships, and there is some account of Sir William Norris's embassy to the Great Mogul in 1702, and of the ships that accompanied him.

Perhaps next in importance to shipping histories are the shipping lists. All will be familiar with the Navy List and Lloyd's Register, the Mercantile Navy List and the British Corporation Register of Shipping, the Directory of Shipowners and Shipbuilding, and the Bureau Veritas. Less well-known are the Norske Veritas, the American Bureau of Shipping List of Merchant Vessels ; the Saporta Guide to Greek tonnage ; the Germanischer Lloyd Internationales Register, and the Registro Italiano Navale. There are several lists that have long ceased publication, but are of historic interest, such as the Glasgow Association of Underwriters and Brokers List of Shipping, represented in the Liverpool Library by the edition of 1821, the Liverpool Register of Shipping of which prior to unfortunate events in 1941, the Library possessed copies for 1835 and 1841, the Liverpool Underwriters' List of Iron Vessels, published in the 1860's, Clayton's Annual Register of Shipping for Great Britain and the Islands of Jersey, Guernsey, Alderney, etc., the Canadian Department of Marine List of Shipping, and Rhodes' Directory of Passenger Steamers, published from 1900 to 1914.

Into this category of shipping lists come Talbot-Booth's Merchant Ships and Ships of the Royal Navy ; Bowen's Merchant ships of the World ; Brassey's Naval Annual ; the British Code List and Signal Letters of British Ships ; and the lists of Flags and Funnels, notably those published by Lloyd's and the Liverpool Journal of Commerce.

Books on Ship-building are present in abundance. One of the most interesting of these is Chapman's " Treatise on Ship-building," of which Mr. J. Scott Russell says in his " Modern system of naval architecture " (itself a very fine book published in three large folio volumes in 1865) : " Chapman, the Swede, wrote the great treatise of Naval Architecture of the past century, in which he explained principles, propounded maxims, and engraved examples, establishing with certainty, how merchant ships and ships of war might be built, stable, easy, seaworthy, staunch and strong ; yet, in my youth, his great work, containing exquisite drawings of a series of model forms of admirable qualities and refined beauty, was not in the hands of more than six of the merchant ship-builders of England. Somewhat later, an attempt was made to introduce Chapman's methods of ship-building into the Royal School of Naval Architecture in the English Admiralty; and no sooner had it become evident that this new light would throw into the shade the false glare of ignorant empiricism, than the power of the state was invoked to shut out the light, to break up the school, and disperse its followers. To the eternal disgrace of the English Admiralty, the pupils of that short-lived school were branded with heresy—and excluded from the employments, emoluments and promotion, to which their expensive education and their own ability had justly entitled them. . . It was to these very men, when grown old, that the Admiralty of England was later obliged to come and beg for help, when, in the prospect of war, she had to tax all her resources for the conversion of her antiquated fleet of sailing ships into the screw steam fleet of more recent times. Then these persecuted pupils of a despised and broken-up school created the steam fleet of England." Chapman's book was first published in Latin in 1768, under the title "Architectura Navalis Mercantoria," and after being successively translated into Swedish and French, was translated into English in 1820. This is the edition now in the Reference Library, the early edition having been destroyed during the war.

Of local interest is the " Treatise on naval architecture founded upon philosophical and rational principles," by Captain William Hutchinson, the Liverpool Dock Master, of whom more later. The Library possesses the 1794 edition. Other interesting old books are J. Charnock's " History of Marine Architecture, 1800-1802, the Shipwright's Vade Mecum of 1822, J. Fincham's " Outline of Ship-building," 1825, Admiral El Paris's " Souvenirs of Marine " (designs of vessels of all times and countries), 1882-6. There is a Spanish book on the naval architecture of wooden vessles, published in 1920. There are many papers on Shipbuilding in the Parliamentary Papers : in the early days largely concerned with the supply of timber for ships. Books on ship model-making are well represented.

There is, of course, every kind of book concerned with the history and theory of navigation, including ancient and modern maps and charts. The Admiralty charts are of course a a necessity. Several editions of Grenville Collins' "Great Britain's Coasting Pilot" are in the Reference Library. This was first published in 1693, with the sub-title of "A new and exact survey of the Sea-Coast of England and Scotland," and though by no means without imperfections, it remained a standard work for many years to come. During 1736-7 Samuel Fearon and John Eyes made their survey, published under the title of "The Sea-coast of England and Wales": the charts for this district are "Chart of the sea-coast from the Point of Linus to Chester Bar"; and "Chart of the sea-coast from Formby Point to ye Harbour of Wyer." In 1748 Lewis Morris published his well-known plan of the harbours, bars, bays and roads in St. George's Channel, covering Anglesey, Carnarvonshire, Merionethshire, Cardiganshire and Pembrokeshire. Then there are such aids to navigation as tide-tables and nautical almanacs, reaching back into the 18th century.

Dictionaries of nautical terms include, in addition to Paasch's well-known "From keel to truck" and Smyth's Sailors' Word-book, Falconer's "The old wooden walls"; Dabovich's "Nautical-technical dictionary for the Navy: English, French, German and Italian," published 1883-1910; "The Dictionary of Naval Equivalents," covering English, French, Italian, Spanish, Russian, Swedish, Danish, Dutch, German, published by the Admiralty Naval Staff, Intelligence Division, 1922-1924; Ansted's "Dictionary of Sea Terms," 1933; Bradshaw's "English-French naval terms," 1932; Witcomb and Tiret's "Dictionnaire des termes de marine"; and De Kerchove's "International marine dictionary, with equivalents in French and German," 1948.

The section of the Liverpool Reference Library concerned with local shipping material contains, in addition to the charts of Collins and Fearon and Eyes above-mentioned, Burdett's Charts of the Harbour of Liverpool, 1771 and 1781; Laurie and Whittle's Chart of the West Coast of England from the Point of Lynus in Angelsea to Formby Point in Lancashire, 1794; Evans' Chart of Liverpool and Chester rivers, 1816; Denham's Chart of Liverpool Bay, surveyed in 1834-1838 and published in his "Sailing Directions"; Lord's Chart of the Approaches to Liverpool, 1852; besides a number of charts of lesser importance. From 1852 charts were made by direction of the Trustees of the Liverpool Docks, and later by order of the Mersey Docks and Harbour Board, first by William

Lord, followed by Murray T. Parks and Graham H. Hills. The charts are now regularly revised by the Surveyor of the Mersey Docks and Harbour Board. Much information on local sea-marks and lighthouses is to be found on the early charts ; and this is supplemented by views and descriptions gathered from various sources. There are many reports on the Conservancy of the river ; commencing with the Case and Memorial of 1762 mentioned earlier, and including the reports of the Acting Conservators from 1843.

Holden's Tide-tables for Liverpool, which date from 1796, and are still published, are particularly interesting, for they are based on the observations of the tides, wind and the weather made by Captain William Hutchinson, the author of the Treatise on Naval Architecture, from 1768 to 1793. The manuscript of these observations is in the Liverpool Reference Library, and is considered one of its chief treasures. It is endorsed : " Journal of observations on the moon's age, solar time of high water, heights of the tides in feet and inches, the tides' successive differences in minutes, the velocity of the winds calculated in miles per hour after Smeaton, the state of the barometer at noon, and of Fahrenheit's thermometer at eight in the morning, the quantity of rain, and remarks on the weather, taken at the Old Dock Gates, Liverpool. The first eleven pages in Volume I were cut out to give to Mr. Richard Holden to make out the 3,000 observations mentioned in the Preface to his Tide-tables."

Though the Nautical Almanac and Brown's Nautical Almanac provide most of the information of this nature required, various Liverpool almanacs have at times been published in addition to Holden's. These include the Royal Miniature Liverpool Almanack and Tide-table, of which the 1826 edition is in the Library ; Brown's Liverpool Commercial Almanack and Tide-table, published 1840-1842, and continued as Smith's Liverpool Seamen's Almanack and Tide-table up to 1845 ; and the small contemporary Liverpool Almanack of Jefferson's, published in Glasgow, which gives the sunrise and sunset at Liverpool, the phases of the moon and Liverpool tide-tables with tidal constants.

The reports of the Liverpool University Tidal Institute, now combined with the reports of the Liverpool Observatory, must be included in this section.

Views and descriptions of the Mersey and its shipping, of the Ferries, the Landing-stage and the Docks, provide infinite opportunities for research, stretching as they do back into the eighteenth century. The Dock Acts, which go back to 1709, and the reports of inquiries, minutes of evidence, memorials and plans bear witness to the public-spirited enterprise of the citizens of former days, both before and after the formation of the Mersey Docks and Harbour Board.

In addition to the general histories of local shipping, such as Maginnis's " Atlantic Ferry," and Kennedy's " History of Steam Navigation," the histories of separate local companies and individual ships have naturally been acquired whenever possible, and it has been for many years the practise of the Library to collect not only newspaper cuttings and magazine articles relating to shipping and shipping personalities, but also views of ships, which now number many hundreds. Views and accounts of local ships are also indexed in books and magazines.

The Slave Trade and Privateering form a section in the Local Catalogue of their own, and include in addition to books and pamphlets, a number of manuscript log-books and ships' account books.

The First and Subsequent Cheshire Lighthouses

By John S. Rees

The first proposal that has been found to erect lighthouses in Cheshire was in 1664. According to the Liverpool Town Records, in that year a Bill was in readiness to be promoted in Parliament for building lighthouses within the range of the Redd Channel. The measure was strongly opposed by the merchants, shipowners and seamen of Liverpool. No decision in the matter appears to have been taken for some years. Where was the Redd Channel ? The fact that ultimately the first lighthouses erected in Cheshire were in the area of what is now known as the Rock Channel creates a tendency to imagine that it was in that vicinity the lighthouses proposed in 1664 were to have been built, and that the Redd Channel was an earlier name for a part of the Rock Channel. On the other hand, at that period there was a very good entrance into Hyle Lake from the westward or River Dee end, which enabled vessels to reach shelter in the Lake earlier than would have been the case if they had sailed past Hyle Banks round to the eastern entrance. It therefore may well be that the Redd Channel was in the region of the Red Stones at Hilbre Point, described by Collins in his chart of 1689 as the Red Rock, and that the purpose of the proposed lighthouses was to assist vessels entering the Lake through the western passage-way.

In 1671 a Mr. Reading is mentioned in connection with a project then before Parliament for building lighthouses, who may or may not have been responsible for the proposal in 1664. Where in Cheshire Reading intended to build his lighthouses is not disclosed. The Corporation of Liverpool, on the grounds that the lighthouses would be of no value to mariners but a danger if relied upon, as well as an unnecessary expense to them, requested one of the Liverpool members of Parliament, Sir Gilbert Ireland, to attend the House and represent their views.

With regard to the danger they feared, in the early days of lighthouses the illuminant was obtained from a fire burning in an open grate on top of the structure, and apprehension may have been felt that wreckers might light fires to mislead ships. The opposition to the Bill appears to have been effective, as it was approaching a century later that lighthouses were first established on the Cheshire Coast, when, under the authority of the Liverpool Dock Act, 1762, two were erected at Mockbeggar (Leasowe) and two at Hoylake, known as the Sea Lights and Lake Lights respectively.

In January, 1763, a committee appointed by the Liverpool Corporation to arrange for the building of two brick lighthouses near Hoyle Lake, invited tenders for erecting the same. The contractors were to make 500,000 good bricks of the common size, out of the land near the place where each lighthouse was to stand, the trespass of getting the clay and making the bricks on such land to be paid for by the committee.

With respect to the condition laid down by the Corporation that the clay to make the bricks was to be taken from land near to the site of the proposed lighthouses, Dr. Hume in *Ancient Meols*, 1863, under the heading Geology, in a diagram shows the Leasowe Lighthouse, the land surface and what he calls the " beds," in the section in which the lighthouse stands. The section is shown as presenting the following appearances :

Peat bed about 1 ft. thick
Drift sand 2 ft. deep
Forest bed 1 ft. thick, then
Boulder clay.

Hume also says that beneath the bed of the Wallasey Pool and, as far as one and a half miles seaward of Leasowe Lighthouse, boulder clay was found.

The information at our disposal concerning the erection of these lighthouses is so limited and incomplete, that much room is left for speculation. The invitation to the contractors said the two brick lighthouses were to be built *near* Hoyle Lake, not *at* Hoyle Lake. Only the Upper Lighthouse *at* Hoyle Lake was constructed of brick ; the Lower light being a wooden movable apparatus. It is believed that the two brick lighthouses mentioned in the Corporation's invitation to tender were the Mockbeggar (Leasowe) Lighthouses.

The purpose of the Lake Lights was, when in line, to form leading lights for vessels entering the Hoyle Lake from the eastward. Close to the entrance to the Lake the N.E. Spit of Hoyle was situated, and it was moving to the eastward and thus affecting the channel into the Lake, so to have set up the Lower Light as a permanent structure would have been foolish, and the time came when on a number of occasions it was necessary to shift its position to conform to the channel.

Hoyle Lake, as a most important haven of refuge would be household words, especially with the seafaring community, while Mockbeggar was probably little known at the time. The Liverpool Town Records of February, 1763, referring to the position of the Upper Mockbeggar Lighthouse, says it had the disadvantage of being situated (away) from the neighbourhood or supply of provisions, and for that inconvenience the keeper received extra pay. So that to say the lighthouses were to be *near* Hoyle Lake would be more comprehensible than to say at Mockbeggar. Further, the Mockbeggar Lights were the more important, the key lights and prerequisites of the Holye Lake Lights, so first things first.

Above the entrance to the Upper Mockbeggar Lighthouse (Sea Light), on the date tablet, W.M.G. 1763 was inscribed (where it may be seen to-day) commemorating the then Mayor of Liverpool, William Gregson.

In the margin of Williamson's chart of 1766, excellent sketches of the first four Cheshire lighthouses are shown. According to this chart the Upper Sea Light at Mockbeggar (Leasowe) was 101 ft. high, a white brick tower, and the Lower or seaward lighthouse 80 ft. high, a black and white brick tower. Hume says that in the year 1771 Mackenzie described the Sea Lights as follows :—" There are two lighthouses *on the shore* to direct ships through the Horse Channel; one of which is movable, and stands near Mockbeggar, the other on the top of Bidston Hill."

Murdock Mackenzie, an admiralty surveyor of some repute, made a survey of the Mersey channels in 1761, and published a chart of the Chester-Liverpool area of the coast in 1776. The lighthouse on Bidston Hill was, of course, *not on the shore*, and the lighthouse that was on the shore, the original Upper Mockbeggar Lighthouse, was not a movable one, neither was the original Lower or seaward lighthouse. A letter written by the Chairman of the Pilot Committee to the Mayor of Liverpool on the 7th January, 1771, reveals that the Lower lighthouse was undermined by the sea in 1770. It was to replace it that the one on Bidston Hill was erected.

Mr. E. Cuthbert Woods, F.R.H.S., in *Some History of the Coastwise Lights of Lancashire and Cheshire*," 1943, offers an explanation for Mackenzie's error. He says: "He (Mackenzie) I imagine, is the originator of this oft-repeated fallacy, which may have arisen from his reading an entry in the Corporation Records, which states that in June, 1764, 'William Hough, of Liverpool, hosier, Lord of the Manor of Great Meols, sold to the Corporation of Liverpool part of the land called Clarel, on which they had already built a lighthouse, with a roadway for carts, etc., from this lighthouse over the vendor's grounds, towards another moving lighthouse, in a wooden frame, so as to move from place to place on the land of Sir John Stanley in Hoyle.' " Mr. Woods continues, "This statement is not clear, probably an 'a' has been omitted before 'moving' and it should read, 'towards another, *a* moving lighthouse. . . .' "

Hume also believed that the Outer (Lower) Mockbeggar Lighthouse was a movable one, similar to the one at Hoyle Lake, but his version, in parts, concerning these lighthouses is somewhat inaccurate, so should be accepted with caution.

Joseph Boult, F.R.I.G.A., writing in 1865, then takes up the theme, and exercising his powers of imagination to the full, says that probably *all* the structures would in the first instance be of timber, both for the sake of their speedy completion for use and a means of verifying the eligibleness of the respective sites, and considers his views confirmed by Mackenzie in his description of the Lights in 1771.

An Order made on the 17th June, 1766, by the Corporation when revising the salaries of the keepers at the four lighthouses appears to have an indirect bearing on the question of the character of the Lower Mockbeggar Lighthouse. Referring to the keepers of the two Hoylake Lights the Order says:— "who both inhabit in the brick lighthouse 70 ft. high at Highlake, and jointly tend that and the lower wooden lighthouse." The wooden structure had, of course, no living accommodation for the keeper. But in the same Order, adjusting the salaries of the keepers of the Upper and Lower Mockbeggar Lighthouses nothing is said about both men living in the brick lighthouse, from which it may reasonably be inferred that living accommodation had been provided in the Lower lighthouse, which could hardly have been the case had it been a similar structure to the Lower Hoylake Lighthouse.

The precise site of the Lower Mockbeggar Lighthouse is uncertain. According to Chapman's plan of 1813-28 it was 600 yards seaward of the Upper Lighthouse, but this is questionable. Hume when referring to this estimated distance says :—" This is improbable as it would fix the site of it about 200 yards to seaward of the coastline of 1771, and it existed only from 1763 to 1771, within which period there is no reason to believe that so large a destruction of the land took place." In other words, it had been accepted that when this lighthouse was built in 1763 its site was above high-water mark. Chapman's plan shows that in 1771 the Upper Lighthouse was about 400 yards above high-water mark, which places the site of the Lower lighthouse 200 yards seaward of this mark; so on that basis between 1763 and 1771, only eight years, the sea must have encroached upon the land about 200 yards, which is improbable, as it is believed that during this period the invasion of the sea progressed at a slow pace.

Another point worthy of notice is the statement by one historian, without giving any reason for the assertion that the present Leasowe Lighthouse is one that was rebuilt in 1824. On the 22nd September, 1813, a report was addressed to the proprietors of Lands under the Level of High Water Mark in the Wallasey-Leasowe district, by William Chapman, whose plan or map has already been mentioned, who had investigated the subject of the encroachment of the sea upon the land in that area. Chapman says that, in 1813, Leasowe Lighthouse was only 210 yards from the shore, whereas in 1792 it was 315 yards. The land upon which the lighthouse stood was, in 1813, 6½ ft. below high water level of the highest spring tide, and the sea was prevented from reaching it by a bank of only 22 yards in thickness from seaward inwards. He urged that immediate steps should be taken to arrest the encroachment of the sea.

In a letter dated the 23rd February, 1828, signed by Robert Stevenson and Alexander Nimmo, and sent to the Mayor of Liverpool, on this same subject of sea encroachment, they said that the situation had deteriorated and the lighthouse was seriously menaced. The letter goes on, " The Dock Trust of Liverpool are materially interested in this, as in the event of the Leasowe being inundated the lighthouse would be in great danger and must be abandoned as the former seaward lights have been. This erection would not, it is probable, be replaced in a new situation more landward for less than £1,500."

From this evidence it must be perfectly obvious that if the lighthouse had been rebuilt in 1824 (only four years before) it would have been on a site well removed from the danger which threatened the structure from 1813 and before. Further, in August 1791, a mark was painted on the walls of the lighthouse as the level of high-water spring tides, and this standard mark was still used as the basis of certain calculations in 1828. The lighthouse had always been a prominent feature in relation to the sea encroachment observations, and had it been rebuilt the fact could hardly have escaped some official comment.

On the 15th July, 1908 its light was finally extinguished. To-day, this one hundred-and-eighty-year-old edifice still stands, but in a derelict state, just landward of the Wallasey Embankment.

Let us now consider the two Hyle Lake Lighthouses erected in 1763. In the margin of Williamson's chart of 1766, the Upper Lighthouse is shown as a 69 ft. brick tower, painted red, and the lower lighthouse as a movable wooden structure 25 ft. high. Denham in his Sailing Directions, published in 1840, describes the Hoylake Lighthouses as " Two white buildings situated obliquely to the line of Hoylake coast line, three-quarters of a mile eastward of Hilbre Point, at the northern extremity of Cheshire. The one nearest high-water mark is a rounded gable of a dwelling-house with its lantern 47 ft. above half-tide level, ranging 7½ miles. The buildings lie S.W.¾W. one-fifth of a mile apart." When the wooden lighthouse was superseded by a brick structure is not known, but it was between 1782 and 1795. This is made clear by the following facts :—It was announced in the press on the 7th February, 1782, that " some evil disposed person wilfully broke seven panes in the Lower Light of the *wooden* lighthouse at Hoylake with stones."

In the *Hoylake and West Kirby Advertiser* of the 20th May, 1949, the reproduction of a picture of a Hoylake Lighthouse as the gable end of a dwellinghouse appeared. Mr. Ernest Newton, managing director of the Royal Hotel, Hoylake, in a note to the *Advertiser* referring to this illustration, said that " it is similar to one which appeared under the heading of ' Caution ' on a notice served by the trustees of the Mersey Docks and Harbour on the Royal Hotel in March, 1795. A reproduction of the notice (asking for the hotel blinds to be drawn at night so that the lighted rooms might not be taken for the lighthouse light) may be seen in the Locker Room Bar of the Royal Hotel, once known as the Hoyle Lake Hotel."

The wooden lighthouse may have been functioning in 1786. In a communication dated 6th July, 1786, the Pilot Committee informed the Trustees of the Liverpool Docks that " The master pilots considered that there is no necessity to alter the position of the Hoylake Lighthouse," and it is not unreasonable to assume that the reference was to the movable wooden lighthouse.

In the annals of Liverpool in Gore's Directory, it says:— " 1765. The Hoylake Lighthouse burnt, July 15." No confirmation of this has been found. On the other hand, on the 2nd October, 1765, in the Liverpool Town Books it is recorded that " William Welding be allowed the sum of sixty pounds towards the loss he sustained by the accidental burning down of one of the Lighthouses in Cheshire."

The names of the lightmen at the Hoylake Lighthouses in 1765 are known and Welding is not one of them, but he was appointed lightman at the Upper Mockbeggar Lighthouse sometime between April 1764 and June 1766, so it may well be that the fire took place at the Mockbeggar Lighthouse.

The Dock Board, in 1865, built two new Hoylake Lighthouses and removed the old ones. The Upper Lighthouse was in operation until 15th May, 1886, and the Lower one until 15th July, 1908.

In 1909 the Dock Board sold the Upper Lighthouse to Captain Wheeler, the then Superintendent of Pilotage, where he lived for a number of years. During the last World War the premises were used as an observation post by the

Observer Corps. The Lower Lighthouse was partly demolished and the lower portion forms the entrance to the Winter Gardens Cinema.

Now we come to the Bidston Lighthouse, built in 1771, which, as previously pointed out, took the place of the Lower Leasowe Lighthouse undermined by the sea in 1770. It was an octagonal tower 55 ft. high, with an external gallery running round the upper storey. Its site was a few yards to the southward of the existing lighthouse. After just over a hundred years of service it was replaced in 1872 by the building which stands on Bidston Hill to-day.

Nothing could have been less contemplated when the Leasowe Lighthouses were built in 1763 than the possibility that one of them would have to be replaced so soon. As the necessity was brought about by the encroachment of the sea, further chances in that respect were not taken, and the new lighthouse was erected on the top of Bidston Hill, 244 ft. above half-tide level. In 1773 the position and elevation of this lighthouse were criticised by John Phillips, of Liverpool (designer of the famous first Smalls Lighthouse, off the Pembroke coast), who disapproved of the lighthouse being built on Bidston Hill. He also took exception to its distance from the sea.

However, Bidston Lighthouse continued to function until the 9th October, 1913, which was some years after the lights from the two Hoylake Lighthouses and the Leasowe Lighthouse had been extinguished.

In 1821 the pilots urged the Corporation to build a lighthouse to supersede the Rock Perch. The perch erected in 1683 to mark the Black Rock and to direct ships into and out of the River Mersey, had in its day fulfilled a most useful purpose, limited however to the hours of daylight. In consequence of this lack of guidance at night-time it was an offence for a pilot to attempt to round the Rock after dark.

In 1824 John Binnie, one of the most famous lighthouse engineers, who was associated with Robert Stevenson in the building of the Bell Rock Lighthouse, was consulted by the Corporation on the question of this proposed new lighthouse. His report shows that " the perch stood on a part of the rock that was about 10 feet above the level of low water of a high spring tide," so that at high water of a spring tide there would be from the base of the perch to the level of the tide about 20 ft. of water.

He considered that the most suitable site for the lighthouse, so far as the foundations were concerned, " would be about 40 or 50 yards inward from the spot where the Perch now stands . . . The building would also be more out of the line of the ships' courses to and from the Mersey and less liable to be injured by them . . . That as tremendous seas break on the Rock such a building should be made that is capable, not only of resisting the heaviest seas that are likely to beat against it, but the impulse of the largest ships that frequent the Port of Liverpool, some of which in spite of the most dextrous management and utmost care, will in all probability, sooner or later, strike against it. A large base will therefore be necessary and a height not only sufficient to show the light at the distance of 9 or 10 miles, but to place the gallery out of the way of ships, and the lantern out of danger of having its glass broken by the sea, whereby the light would be in danger of being extinguished." He was of the opinion that the base should be at least 30 ft. in diameter, and that the floor of the lantern should be not less than 28½ ft. above high water of the highest spring tide.

At this time the Corporation had approached the Government to build a fort on the Black Rock, and the question had arisen as to whether the two schemes could be combined, and if so, should it be a fort-cum-lighthouse or a lighthouse-cum-fort. However, the idea was abandoned and it was decided to erect a conventional lighthouse.

In 1821 tenders were invited by the Council for the construction of the lighthouse. The foundation stone was laid by the Mayor, Harold Littledale, on the 8th June, 1827, but almost three years elapsed before the building was completed. Its dimensions materially exceeded those recommended by Binnie as the minimum. The tower, with a base 35 ft. in diameter, erected on the site of the old Perch, was surrounded by the tide from two hours flood till four hours ebb. The lantern was elevated 77 ft. above half-tide.[1]

1 Denham

The notice to Mariners[1] announced that " The Light will be exhibited on the night of Monday the 1st of March next . . . The Light will be distinguished and known to Mariners as a Revolving Coloured Light, making a revolution every three minutes, exhibiting two brilliant white lights, and one red light, in due succession . . .The lights can be seen in clear weather at the distance of 9 or 10 leagues . . . In thick or foggy weather, either by day or night, a Bell will be kept constantly ringing, to prevent vessels running foul of the Lighthouse."

1 Gore's *General Advertiser*, 11th February, 1830

THE SOUTH AMERICAN MEAT TRADE

By CAPTAIN H. F. PETTIT
(Cargo Superintendent, Houlder Brothers and Co., Ltd.)

I am principally concerned with the handling and carriage of meat in refrigerated vessels, but before dealing with this the following historical outline may be of interest.

About 1870 the population of these Islands had increased to such an extent that home-produced meat was insufficient, even when eked out by the importation of live cattle.

In 1874 the first shipments of frozen meat were imported from the U.S.A. In 1880 we commenced receiving beef and mutton from Australia, and mutton from New Zealand. This meat was carried in sailing ships. Cold air (passed over ice boxes) was first used as a refrigerant, then refrigerated holds were used, cooled by brine pipes. The first shipments of frozen beef and mutton from Argentina were received in 1883. This was largely due to the large U.S.A. packing houses (e.g., Swifts and Armours) establishing freezing works in the Argentine.

From then on the quality of South American beef improved—as, in fact, did all the meat consumed in Great Britain, due to keen competition. Prize cattle from home were shipped out to South America to improve the breed of the cattle there.

About the time of the 1914-18 World War, Brazil and Uraguay also began to export meat to Great Britain. In 1932 shipments from various sources were so large, that Imperial Preferences were introduced. The resulting import tax on South American meat tended to regulate supplies from there with the result that many refrigerated ships were sailing home with empty spaces. However, these spaces were eventually filled with Brazilian fruit (Oranges and Bananas).

We now come to the difference between CHILLED and FROZEN meat.

FROZEN MEAT (which comprises beef, mutton and offal) is carried at a temperature of about 14° F., and has to be thawed out before use. The blood cells burst and blood runs out of the meat, with a consequent deterioration of appearance and quality. It is packed into the ship's chambers on 3 in. x 3 in. dunnage, carefully placed in position. Provided that the meat is stowed with due regard to air circulation and that there is no crushing, the more meat that can be got into the space the better. It stows at roughly 90 to 100 cubic feet per ton and can be stowed for long periods without much danger of deterioration.

CHILLED MEAT, however, is carried at temperatures of 28-29° F. and the temperature must be carefully controlled to the half degree without variation. Chilled meat must be in the markets for use within 28 days of being killed. If it has to be kept longer than this the storage temperature must be lowered and the meat " Frozen down," with a resulting loss in price. More elaborate stowage is necessary for Chilled Meat. It is hung on galvanised chains and hooks from overhead rails in the ship's chambers and is never laid down from the time it is killed until it is discharged. Chilled meat stows at 120 cubic feet per ton and compares very favourably with home killed.

During the first World War and the last War, chilled meat imports were stopped and all the meat imported was frozen in order to save valuable shipping space. Then, later, it was shipped boneless, and the sheep were cut in half and telescoped. The stowage factor dropped to about 70 to 80 cubic feet per ton.

Freezing Works Procedure

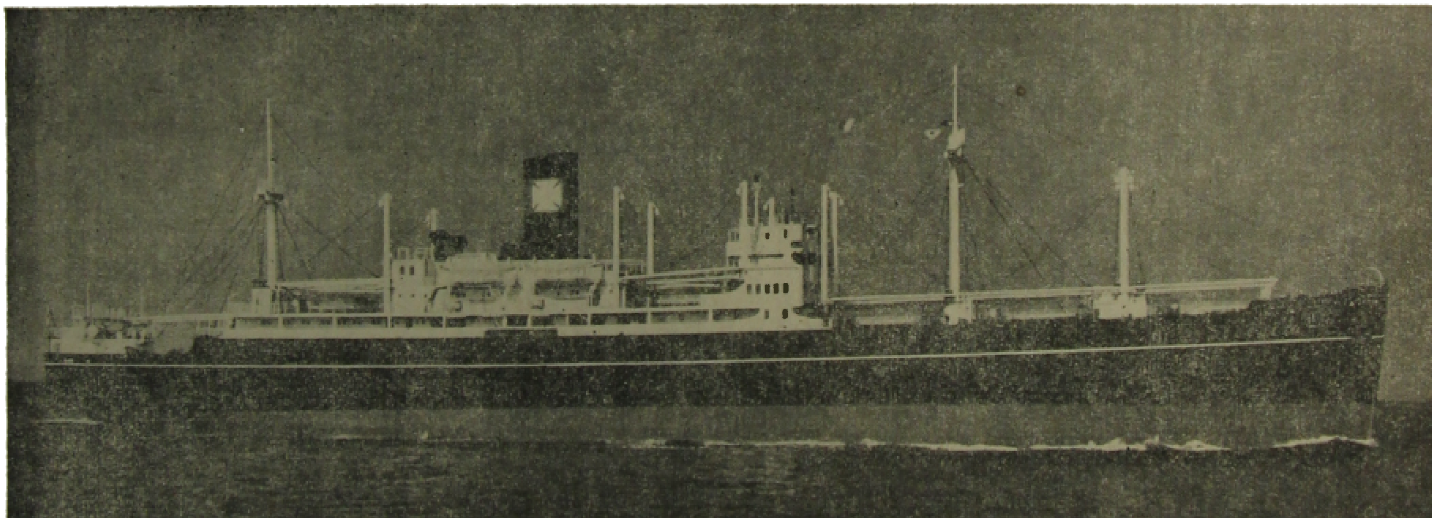
There are many meat works in South America—especially in the River Plate. They are large, square white buildings that can be seen for miles. They are usually situated near the ports and have their own quay facilities. Their names are well known in this country—Swifts, Armour, Wilson, Anglo, Smithfield and Argentine. In normal times only prime cattle, two years old, are killed for export as Frozen and Chilled Meat. Older or poorer quality cattle are used for tinned meat. The animals are mostly sent to the works by rail—not driven for long distances, as this would mean their arrival in poor condition. They are allowed to rest for 24 hours before killing.

The cattle are driven to the top of the building, where they are knocked down, slaughtered and hung up by their hind legs on travelling rails. The carcase is kept moving along the rails by gravity, and as it is moving, it is skinned, cleaned and washed. The hides, offal, etc., are sent down shoots to other parts of the factory while the carcase is cut into four quarters (two fores and two hinds) which travel downwards to the cooling rooms. They are covered with two clothes—one stockinette and one hessian—and are ready for shipment next day. Some works kill 5,000 to 10,000 cattle a day.

Shipment of Meat

The British Lines operating in the South American Meat Trade are the Royal Mail, Blue Star, Donaldsons and Houlders. Sixty per cent of the world's refrigerated tonnage is British. The Houlder Line commenced operating with sailing vessels in 1852, and was in the frozen meat trade practically from its inception. It was in the River Plate Trade when it opened up. It now operates some of the largest and most up-to-date refrigerated vessels in the world—*Hornby Grange, Rippingham Grange, Condesa, Duquesa.*

They are fitted to carry any refrigerated cargo—meat, butter, eggs and fruit (bananas and oranges from Brazil). 'Tween decks with a height of six feet enable the holds to be divided up into 40 to 50 separate compartments. The steel hull and decks are cased with timber, lined with silicate of cotton or cork, and varnished for cleanliness. Overhead and along the sides, pipes or grids are fitted, together with rails to hang meat. The grids carry cool brine from the engine room to cool the chambers. The more modern ships are fitted with cold air refrigeration. Air is blown through coils of brine pipes to cool it and then through ducts or tunnels into the chambers. The foul air is extracted from the chambers. Most expensive gear is carried by these ships. In addition to the thousands of feet of 3 in. x 3 in. dunnage, 60,000 to 100,000 meat hooks and 20,000 chains form part of their normal equipment. The refrigerating engine room is separate from the main engine room. Carbon dioxide gas is compressed by the engines until it is turned into liquid. This liquid CO_2 is allowed to vapourise in coils of pipes which are immersed in large tanks. These tanks contain brine (salt water and calcium chloride) which will not freeze in spite of the intense cold produced by the expansion of the liquid CO_2. The brine is pumped through to pipes in the chambers and the flow of the brine, and in consequence the temperature of the chambers,



The *Duquesa*, Houlder Brothers & Co. Ltd.

is regulated by valves. There are at least four thermometers in each chamber and readings are taken every four hours. A high standard of efficiency is required from Officers and Refrigerating Engineers. One of their problems can be appreciated when it is realised that a refrigerated vessel will have approximately 15 miles of brine pipes, with the resulting risk of leakage due to working of the ship.

Before loading, the holds are washed by hand, particular attention being paid to the bilges. The scuppers are sealed by brine and the chambers cooled and deodourised. They are then inspected by Lloyd's, who must issue a certificate before any meat is loaded. The principal enemy in the chambers is mould ; this has to be carefully searched for, and removed

LOADING

The ship is made fast to the wharf at the meat works. Approximately 10 to 15 minutes after the ship has come alongside, platforms are erected near the various hatchways together with tents from quay to ship, covering the hatchways completely. Overhead rails are fitted under the tents and the meat, still hanging, is pushed to the ship. The meat, which is never allowed to lay down, is weighed automatically at two points as it passes along the rails. At the hatchway the meat is hooked on to slings (10 tails and hooks)—one piece to each tail. The meat is then lifted off the rails and lowered into the holds. It is then carried—one man, one piece—and hung on the ship's rails. As soon as the meat is loaded great responsibility falls on the chief and chief refrigerating engineers. When a hatch is full it is sealed, but the hatchways are so designed that each deck is insulated from the hatch, and each can be sealed in turn until the ship is full. The ships are designed so that any space, top or bottom, can be discharged first with a minimum of trouble. The cargo has to be planned before loading, space being allocated to various shippers with separate chambers for meat, fruit, eggs and butter.

During loading and discharging, particular attention must be given to the stability of the ship. Chilled meat hanging raises the centre of gravity considerably, and often the meat loaded first is discharged first in order to beat the time factor of 28 days.

Pre-war, refrigerated vessels from South America ran with regularity to a fixed time-table. Average cargoes were 4,800 tons of frozen or 4,000 tons of chilled meat. The cargo was loaded in eight days, including the time spent in moving the vessel to five different meat works.

The discharging time was five to six days. Vessels were always berthed at the same discharging berths at London and Liverpool, where ample supplies of rail and road refrigerated vans were available to transport the meat to its destination all over the country. In London the discharging berth was fitted with overhead rails similar to those in use at the meat works in the Plate, thus allowing the meat to hang and to be handled with more care. It is intended to equip Liverpool with a similar berth in the future. On completion of discharge the chambers are very carefully cleaned and de-odourised, as it is possible to carry fruit one passage and meat on another in the same space.

Bananas are shipped green. They are stowed in the ship and cold air blown through the chambers, the temperature being kept at 55° F. The air-flow is adjusted to give a complete change of air in the chamber every four hours as the fruit gives off gas which ripens it. After landing the bananas are hung in the warm, still air of the ripening rooms for a week to ten days.

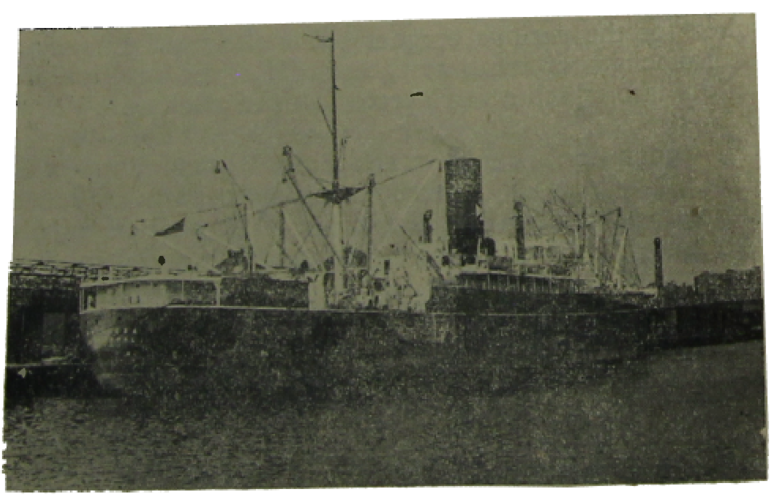
Eggs have to be carried at a temperature of 35° to 40° F. and oranges at 39° to 40°F. The different temperatures required for the various cargoes show the need for accurate control of chamber temperatures and for the multiplicity of chambers into which a refrigerated ship is divided.

In conclusion, a few remarks on Patagonia may be of interest. A wild, rocky country, similar to parts of Scotland, Patagonia rears no cattle, only sheep. The pasture is of poor quality but produces excellent quality sheep and lambs. The sheep ranches are unusually large, one single ranch may have a quarter of a million sheep at a density of one sheep per acre. The sheep are driven to the works in droves of 20,000 driven by three or four men, each with two horses and two dogs.

My own firm were the first to erect a meat works in Patagonia nearly fifty years ago. The works were pre-fabricated in Great Britain and erected in Patagonia under the supervision of one of Houlder Brothers' senior Chief Engineers, Mr. Flower. The fuel used at the works was entirely wood.

Incidentally, the poor quality pasture is only found in Patagonia. Other South American countries are very fertile, yielding two crops of alfalfa a year, thus enabling the fine South American cattle to be bred from the best of British stock (carried out as deck cargo) without any additional feed.

The *Marquesa*, Houlder Brothers & Co. Ltd.



The *Princesa*, Houlder Brothers & Co. Ltd.

Tugboats

By Captain Alan Henderson

(*Harbour Master's Department, Mersey Docks and Harbour Board*)

HISTORY

In 1736 George II of Great Britain, France and Ireland granted a patent for a period of 14 years to one Jonathan Hulls for his New Machine. According to the description, the invention was intended for " Carrying Vessels or Ships out of or into any Harbour, Port or River, against Wind and Tide, or in a Calm."

This was the first steam tug ever conceived ; and it is worthy of note that Jonathan Hulls laid no claim to inventing the motive power, being content to claim honour only for first applying it in such a fashion as stated in the granted Patent. Whether or not the craft was successful is difficult to say. Considering the arrangement of transmitting the power from the single cylinder unit to the stern paddle was via two rope belts, I would be inclined to doubt its efficiency as claimed by the inventor.

As most of us are aware, a number of experimental craft motivated by steam were constructed and tried out in various ways in the 75 years following this alleged invention, and not until 1801, when the *Charlotte Dundas* was built for towing barges in the Forth and Clyde Canal, can we specifically state that tugs were in operation. Historians are of the opinion that the *Charlotte Dundas* was the first tug ever built.

We are aware from many sources, of course, that the *Elizabeth* of Port Glasgow was the first steamer to visit the Mersey in 1812 and that the *Princess Charlotte*, constructed by Mottershead and Hayes in 1816, was the first steamer built in Liverpool, but I can find no specific mention at that time of any tugs being built on the Mersey. The year 1821 seems to be the first mention of a Liverpool-built tug which was latterly known as the *Hero*. The *Druid* was built in 1823 and was 64 tons gross. Whether or not these vessels were actually built as tugs or as small paddle steamers and utilised for towing, I cannot say. It seems quite probable they were built as general utility vessels and used for whichever purpose was required of them. Latterly, of course, they were adapted solely for towing. The adaptation necessary would be slight and purely academic, considering there would appear to be no specific difference in construction at that time. At any rate, it is generally agreed that all these early vessels were solely for estuarial work, the corroborative facts being that they were obviously best suited for that purpose owing to construction and size ; and, further, there were so few steam vessels underwritten before 1835 that it is reasonable to assume they did not undertake excursions where loss was anticipated.

From 1820 until the early 1830's the existing vessels plying for hire were probably individually owned and operated. There may have been arrangements and agreements between persons but even that is doubtful since these vessels are believed to have changed hands and names at intervals, making it difficult to trace their absolute origin.

Until the adoption of steam generally and the consequent acceptance of the time factor as being important, these tugs probably barely paid their way. The reason for this, of course, was lowly paid labour, it being cheaper to manhandle craft into dock even though it took considerably longer, than to employ a tug. The qualifying *time factor* eventually altered this outlook and tugs survived to flourish and indeed become a lucrative enterprise.

The sparseness of early knowledge regarding these tugs on the Mersey may be measured from the fact that in 1835 only eleven steamships were mentioned in Lloyd's Register. There were undoubtedly many more, but through lack of registration many may be mere myths. In making this statement it is agreed that Lloyd's registered only those ships which were underwritten by them.

We now take a considerable stride forward and having established that tugs would be a necessity, and therefore a good proposition in a growing Port, we find a group of interested parties comprising shipowners and merchants using the Port of Liverpool, forming an association with the object of forming a tug company. The object was duly brought about and in 1836 The Liverpool Steam Tug Company was founded. It is on record that Messrs. Clover, Kendal, Sharp and Willis were directors and that Mr. Bibby was manager. Their first purchase as a company was the wooden paddle tug *Eleanor*, built at Liverpool in 1833, of 59 tons burden. John Eccles was appointed Captain and business was commenced in Chapel Street.

Within a year the fleet was composed of five tugs ranging up to 100 h.p., and with this fleet the business of towing vessels from the Mersey to the N.W. Lightship was their chief source of revenue. The charges made for this service were from £3 to £4 between the Dock and Rock Light, and £7 to £12 from Rock Light to the Nor' West Ship.

From all accounts the company was able to rent a piece of land at Wallasey within the precincts of the Pool where they established a yard for building and repairing their own vessels, a not inconsiderable item when one considers the fleet were wooden paddle vessels. In 1850 or thereabouts the company abandoned its yard at Wallasey and acquired a site at Queen's Dock, where it continued to form an integral part of the constitution of the firm.

Expansion took place fairly rapidly. In 1848 the tug *Liver* was built. This vessel marked one of the first milestones, for though she was still a paddle tug she was their first iron boat.

Whether the work they now began to undertake was wholly of their own choice or whether it was necessary to serve in varying capacities to further their real business interests, which was towage in the Mersey, I am unable to give an opinion. Suffice to say they extended the scope of their business to the point where they towed from the Mersey to the Skerries for a charge of £31. They allowed their tug *Dreadnought* to be hired in 1850 by a Telegraph Company for the purpose of cable-laying between Donaghadee and Port Patrick.

Up to the turn of the century the Company's tugs were instrumental in the salvage of over 100 vessels. It seems unnecessary to quote the personal risks taken and the courage displayed by the crews.

An additional service rendered by these tugs, first to the Liverpool Corporation and later to the Mersey Docks Board, was in the capacity of lifeboats in the estuary. The first example was when the tug *Eleanor* rescued passengers and crew from the packet ship *General Gascoyne* wrecked on Burbo Bank in 1837. An agreement was later reached between the Company and the Dock Committee to receive and keep a lifeboat on one of their craft, to be at the disposal of the said Committee in case of need.

Captain Roberts, a good servant of the company, eventually lost his life taking a new lifeboat to the assistance of a vessel on Hoyle Bank. The boat capsized and only four members of the crew survived.

The company subsequently gave up having boats of their own, but agreed to tow out the Mersey Dock Board Boat. It is common knowledge, of course, that this hazardous work was eventually taken over by the National Lifeboat Institute.

Another aspect of their service to Mersey Shipping was their salvage work with ship and cargo. To them falls the honour of being the first organised salvage firm in Great Britain. They did actually build camels of wood at one time, but they fell into disuse with the introduction of the iron ship. Salvage work so far as these tugs were concerned ceased prior to 1900, the work being taken over by recognised Salvage Associations.

I am informed they were the first to run excursions on the river, a round trip from Princes Pier costing 1/6 per head.

What must strike anyone perusing the history of Mersey Tugs is the complete willingness to serve under all sorts of trying conditions. In fact, if a motto were required, "I serve willingly and well" would be most appropriate.

There were other Tug Companies in Liverpool besides The Liverpool Steam Tug Company, but a complete dossier of all their activities is not within the scope of this paper. Each one contributed some important improvement or amendment that compose the composite Mersey Tug and a few examples are given.

John Prendiville founded his firm in 1854. One notable tug which he acquired in 1856 was the *Toward Castle*. Besides being notable for having been one of the first iron tugs to ply the Mersey, it was a remarkable boat owing to the fact that it had a working pressure of 40 lbs. per sq. in.—at that time the highest in the Mercantile Marine.

To Prendiville also goes credit for the first step towards the modern tug as we know it to-day. In his tug *Knight Templar* he departed from the orthodox and constructed her only 100 feet overall, yet at the same time managed to install the then immense pressure of 200 lbs. per sq. in. This increased pressure allowed work to be done that had hitherto only been possible by tugs twice her size. This was the initial step towards recognizing that size and weight alone did not necessarily mean power. The improvement in pressure was not an improvement in engines, but in boilers.

Mr. Becket-Hill, a partner in Allan Bros., founded in 1877 the " Liverpool Screw Towing and Lighterage Co.," or more affectionately, " Cock Tugs."

This dynamic gentleman left his mark in no uncertain fashion on Mersey Tugs. His first tug, the *Bantam Cock*, 70 feet long and developing 300 i.h.p., was the first boat built for use in Liverpool that had a screw propeller. Before this tug was completed, Becket-Hill, the visionary, had Laird Bros., of Birkenhead, construct a twin screw tug. She was launched the *Storm Cock*, and was the first of her kind ever completed in Great Britain. When his twin screws were queried, he merely replied he was " making assurance doubly sure."

By his fearless enterprise, there is no doubt Mr. Becket-Hill was instrumental in calling a halt to the wasteful continuance of paddle construction at this time. Waste which was latterly proven in actual tests, horse power for horse power, between a paddle tug and a screw tug. With the launching of *Storm Cock* an era closed ; no more paddle tugs were ever built in Liverpool.

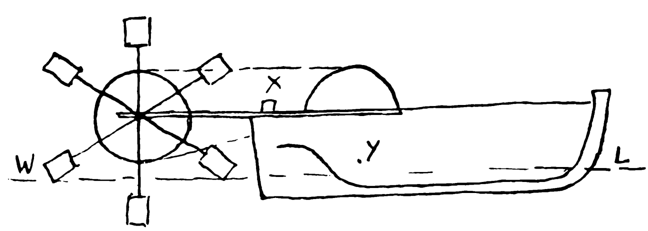
There were others : Alexandra Towing Company, for example, started roughly about the same time as the Liverpool Screw Towing. Both firms being the leading exponents in Merseyside of the art to-day . . . but it is not intended to go any further here regarding their history, which from these days progressed evenly and with less event, and whose individual fortunes have no doubt been covered more ably elsewhere. It is considered the samples chosen are fair samples, indicative of the whole.

Evolution

Fashions and methods change, both in the way of illustration and the manner of presentation. Regarding the former, I would say they are intended, here at any rate, to indicate rather than purely illustrate ; and with the latter I am content if the purport is understood, regardless of possible technical flaws.

Illustration (I) is of the first conception of a steam tug. A stern wheeler, so-called for want of a better name to apply to the sextet of shovel-shaped parts comprising the wheel, and driven by two rope belts, it is extremely doubtful whether it was in any way successful. When one considers the very low power of engine, plus the need to keep the belt ropes sufficiently tight in order to transmit the power to the wheel, add to this the weight of the vessel towed, and the question of success becomes one of even greater doubt.

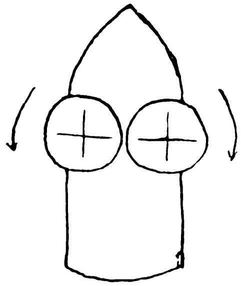
Fortunately, this in itself is one of little consequence ; the importance lying, not so much in what it was able to accomplish, but in that it was conceived at all.



I

In this, Hull's conception of 1736, point " X " is the point of tow and " Y " the possible Longitudinal centre of Gravity.

The very fact that Hulls was granted a patent from the Reigning Monarch, as stated earlier, rather indicates that it was indeed the first paddle effect thought of, though I have a private theory, unsubstantiated I agree, that a similar type of propulsion had been tried by using horses either in a circular fashion or on some type of treadmill. I put this forward as a reasonable theory, especially when considering the utiliterian purposes for which a horse was then used. It probably took the shape of two wheels placed horizontally and side by side on deck. Illustration (Ia) shows in plan how it might have appeared.



Ia

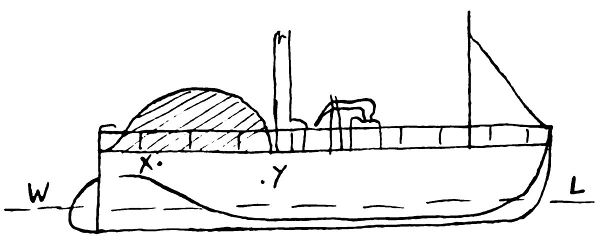
Illustration II is, of course, the original tug of 1801. We are not particularly concerned over the fact that it was the first steam vessel so engined. What interests us is that this tug was undeniably a success. Because it was subsequently, and this very shortly after being built, to be laid up and eventually broken up, in no way detracts from its efficiency. The tragedy was, the medium in which the tug worked had not advanced sufficiently to cope with the new medium thus introduced. The canal construction was insufficient to withstand the disturbance created by the paddle wheel.

Famous for so many reasons besides the important one to us of its being a tug, the vessel was built of wood by Hart, at Grangemouth Dock Yard to the order of Lord Dundas of Kerse, who named it after his daughter Charlotte. It was fitted with a 10 h.p. engine, with a single horizontal, double-acting cylinder, 22 in. in diameter and a stroke of 4 ft. The piston rod was controlled in slides or guides and the connecting rod acted directly on a crank on the paddle wheel shaft. This arrangement, which was unique at the time, represented a tremendous step forward in steamboat engineering and was patented.

There was neither need nor opportunity for concealment in her day, so the engine occupied the port side of the deck, while the boiler was placed alongside on the starboard side. Condenser and pump were alone below deck.

This steam unit drove a single paddle wheel placed aft, which fitted into a recess of 4 feet wide and 12 feet deep. The effect thus produced gave the craft a double stern ; a rudder was fitted on each.

Concerning the capabilities of the tug, they are summed up as follows :—Two loaded barges each carrying 70 tons were towed on the canal a distance of twenty miles in six hours. This was considered satisfactory.



II

Again in the illustration, point "X" is the point of tow and "Y" the probable Longitudinal Centre of Gravity.

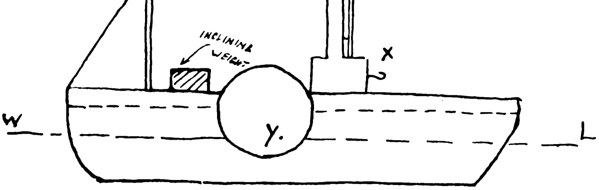
This distribution of "X" and "Y" is of no great concern when discussing this tug, or for that matter the previous conception, as in both cases manœuvrability as we know it was dwarfed by the urgent need of propulsion. Besides, in both cases the vessel towing was nearly, if not quite, the same size as the vessel towed, which meant the manœuvring qualities of the tug relative to its charge were judged purely on the mechanical advantage by way of steam power which the tug possessed. Also, the lower the power of the tug, relative to the duties it is required to perform, the less important the position of the Longitudinal Centre of Gravity becomes.

The next step chosen to mark the advance in the science of tug-boat building and the art of tug-boat handling is contained in Illustration III, depicted by the paddle Tug *Monarch*, first steam tug owned and built for Messrs. Watkins of London. The ingenuity displayed in her construction no doubt had a profound effect on constructors as far North as Clyde, as far West as Mersey and as far East as the Tyne, for she was without doubt a remarkable product of her time.

Built of wood in 1833 and intended for river work, she was fitted with a really ingenious contraption to make her manœuvrable. Already at this stage we see the question of manœuvring qualities becoming equally important, if not actually superseding the need for power which up to date still lacked concentration. Power was still governed by size alone.

The *Monarch* was fitted with side-paddle wheels which were considered a big step beyond the stern paddle wheel, as indeed they were. The paddles were interdependent and it was not possible to work them separately. This obvious disability was overcome by providing an arrangement for inclining the tug through an arc of ten degrees from the upright either side, thereby enabling one paddle to be lifted either wholly or partially out of the water. There seems no reason to doubt that this produced the effect sought by the constructors. The actual arrangement consisted of an iron tank filled with scrap iron and mounted on rails placed athwartships which could be pushed from one side of the deck to the other at will.

The tug was 96 feet in length, 19 feet in breadth and 8½ feet in depth.



III

Observing the Illustration III, " X " is the point of tow and "Y" the probable Longitudinal Centre of Gravity. The vertical centre of gravity, important to her stability would, of course, alter with the action of the iron tank arrangement on deck. No doubt, however, the architects of the day made suitable arrangements to offset any adverse effect thus created.

Among others, one of the important features of wood paddle tug construction was the fact that, owing to the lightness of scantling and the necessity for using wood since other materials were not available, centres of buoyancy were high and therefore drafts were inclined to be on the shallow side. At this period materials for construction were not being outstripped in engineering discovery, for all that was required to propel these paddle tugs was sufficient immersion of the float on the paddle wheel. Thus wood, for all its component lightness, was sufficient.

This state of affairs was eminently satisfactory when we consider the treacherous banks and shoals inhabiting most of our rivers and estuaries and the poor quality of surveying in those days. Two and three foot drafts were considered adequate, as indeed they were, even should we decide to overlook the considerable safety factor such drafts allowed.

Since the craft these tugs were called upon to tow were of a type small enough to require the assistance of one tug only or were in the nature of a string of barges where the tug was merely required to tow from a leading position, the finer points of towing as we know them to-day did not forcibly arise. With regard to the relative positions of the Towing hook or bollard and the longitudinal centre of gravity it was considered unimportant, if indeed it was worthy of consideration at all. Such an outlook, out of sheer necessity, died an impromptu death with the introduction of iron hulls and concentrated power. But at the time, there is little doubt no thought was given to anything but the vertical centre of gravity. So long as that ensured solid, stable conditions, little else was considered outside the means of motivity.

Another very important thing to remember when discussing craft of this era, was the lack of official guidance so common to-day. For example, Lloyd's in 1834 gave only general terms and slight reference to the building of wood vessels.

There was little direction laid down beyond a description of the kind of timber to be used and only the scantlings of the principal parts were given.

However, time marched on and we find James Smith taking out a patent for a screw propeller. His ideas were incorporated in a craft in 1836. In America it was known that Robert Stevens, as early as 1804, had experimented with single and twin screw vessels.

When discussing screws, we are reminded that wooden tugs were not the ideal hulls for screw work. There was the inherent weakness at the stern. The draft was such, owing to the comparative lightness of the material, that it made a large slip unavoidable and of course wasteful. Full utilisation of the power could not be used or transmitted to the screw without loss. Lack of proper guidance, as previously stated, regarding scantlings, etc., meant that the problem of strong stern frames suitable for screws was more in the hands of individuals, rather than in the more useful tables governing such matters drawn up by a board of experts for the benefit of all.

The introduction of iron boats around 1850 certainly made the screw a more feasible proposition and once again the material of hull construction was equal to the advance in engineering. Where before, the wooden hull and the paddle were of equal virtue, this virtue was now embodied in the iron hull and screw propeller.

One of the less understanding features, and in consequence therefore more debatable, was the long transition period before the screw finally ousted the paddle. It is estimated that this took nearly 30 years. Then, as though to make up for lost time and recover leeway, a triple screw tug was built of iron in 1875 for river work. This somewhat unusual vessel was fitted with twin screws aft and a single screw for'ard at the fore-foot. Each screw was entirely independent and could be worked singly or collectively. Dimensions of this tug were as follows :—
Length 80 ft., Beam 18 ft., Mean draft, 2.8 ft.

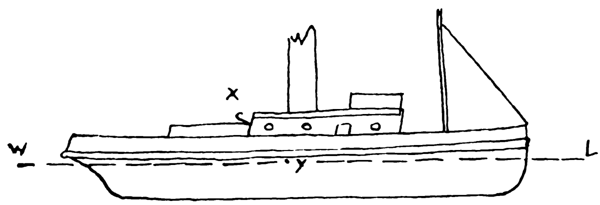
With a vessel of this size having such a relatively small draft, I allow myself one comment. Either there was colossal waste of power or else the screws must have been extremely small. But it was evolution and the old trial and error principle which was doubtless employed has still a very definite place in Science to-day.

With the clear establishment of the screw tug—although from a general interest point of view I would state the Admiralty built or had built at Barclay Curle's yard on Clydeside, a paddle tug as late as 1894 for service in Portsmouth Harbour—the finer points of towing began to manifest themselves in their construction.

Ships were getting bigger, longer and heavier and needed more and more attention and assistance from tugs to ensure their safety in narrow estuarial waters and docks.

Where before if a tug remained upright she was considered a good vessel, there now appeared refinements of balance, which is the hallmark of a good boat. Consideration was given to the weight and disposition of the heavy component parts. The towing hook, which by now was definitely a hook and not a bollard, was placed nearer amidships and the longitudinal centre of gravity became something more than a mere name in theory. With the increase in power, the necessity to control heavier ships and still retain sufficient manœuverability, the towing hook gradually became closer to the longitudinal centre of gravity of the tug.

Such refinements meant little to the *Charlotte Dundas* of 1801, or the *Monarch* of 1833, since they towed principally from a leading position on vessels hardly greater in proportion than themselves and with such small horse power as to make it necessary to turn on a slack tow line. This is in direct contrast to the modern tug which tows and turns at full power; an impossibility if the towing hook is too far astern of the centre of gravity as in the earlier tugs.



IV

Illustration IV gives a good indication of the type of craft evolved and used successfully at Liverpool at the end of the 19th Century, when the modal vessel using the Port was probably about 3,000 tons.

This type of tug, of which there are numerous examples, might well have been built in any number of shipyards. Laird Bros. of Birkenhead built one in 1903, named the *North Cock*, described as a sturdy vessel, 96 ft. long, 22 ft. beam, with compound engines capable of developing 700 h.p., giving her a light speed of about 12.0 knots. Jones and Sons, also of Birkenhead, built in 1901 a tug named *Morpeth*, practically the same except for her breadth which was two feet less and her depth which was nine inches less. Both of these tugs ply for hire to-day and although their lack of weight and concentrated power limits their ability, they still perform their duties faithfully and well.

You will readily realize that the life of a tug, taking everything into consideration, is a comparatively long one. Because it is so, there are numerous occasions when these older, less powerful units are called on to do work that normally falls to a heavier, more powerful tug, if the latter are elsewhere employed. Also, where on many occasions four tugs are handling a ship, they may be called on to make up the fourth tug.

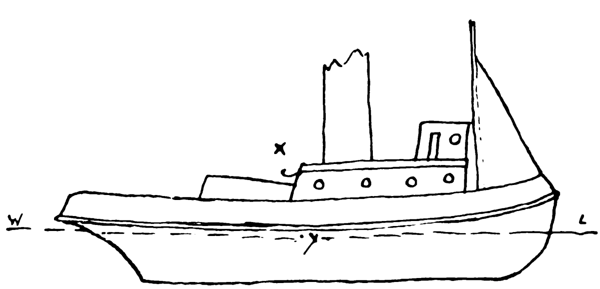
It is on such occasions that adverse criticism is directed at the smaller, less powerful tug. A more thoughtful approach to the matter would be more beneficial and less wearing in all directions. The predominant evil in this disposition of three modern tugs and one of the 1900 vintage is not the obvious one of lack of power, but the less apparent one of lack of balance. Particularly is this so when working in confined dock areas such as Liverpool. I seriously suggest to all persons so interested to consider balance at all times before power alone.

When all is said and done, neglecting wind and other extraneous mediums, in a still, enclosed dock area the only medium to be overcome is the inertia of the water, and so long as the power of the tug is sufficient (may I emphasise that word " sufficient ") to overcome that inertia, then that tug will successfully undertake the task. It will of course take longer to complete and it is here that the danger lies, for in any marine activity of this nature there arises fatigue. The quicker a job can be done with safety, the better chance it has of being accident-free. But this point of safety and fatigue is much more important than mere disparaging talk concerning lack of power in a tug.

The modern ship has greatly increased in size, weight and construction. It is obviously essential to increase the weight and power of the tugs expected to handle such ships with safety. Not, as I have just suggested because the smaller tugs are unable to handle modern heavy ships, but because the heavier, more powerful tug can do the work faster with safety and thereby reduce fatigue and consequent accidents. They are also, owing to their power and weight relative to the object they are required to tow, capable of overcoming other factors besides inertia ; wind and tide are examples.

In discussing the sixth and last phase of tug evolution we come to the modern tug. The improvements in this craft are embodied in its construction. Underwater form agrees with the latest findings of naval architects. The boxlike appearance of the older tug has gone and we are treated to refinements in shape such as the greatest beam width being about one-third the distance from for'ard, allowing a graceful taper towards the stern. The principle embodied being that discovered by a German when he proved it was easier to draw a wedge blunt end first through water.

In this Illustration V, which is the last depicting the chosen phases, " X " is the point of tow and " Y " the probable centre of gravity.



V

This is a composite modern Mersey tug. There are few if any drastic differences between the various types in use to-day. All of them without exception are, out of necessity, a compromise ; easily understood when it is remembered the Mersey tug has to do considerable estuarial as well as harbour work. This automatically means the tug must have sufficient length to be a useful unit in rough river weather, and short enough so that its use is not restricted in docks. All modern tugs are so designed to suit local conditions.

Their best length appears to be about 95 feet, with a breadth of 22 feet or thereabouts and a draft of 12 feet.

Evolution to-day is contained more in the finer points which are of equal importance, though obviously less spectacular as the change from paddle to screw propulsion.

The first and principal difference between this tug of to-day and the previous one we examined ;—i.e., the tug of 1900, lies in the increase in power and weight. We have progressed from the compound engine developing about 700 i.h.p. to the triple expansion job developing over 1,000 i.h.p. With this increase in power is a 50 per cent increase in weight, resulting in a better balanced boat. You will remember, of course, the necessity for balance as the weight and power are increased. You will remember also, I hope, that with certain obvious exceptions balance should be considered before power alone.

Observing the position of the L.C.G. of the tug and the towing hook it will be seen that the modern tug should be capable of towing to port or starboard with a minimum of effort and a tight tow-rope.

The modern Mersey tug is single screw. When deciding on whether a tug should have a single or twin screw, assuming the tug is for general and not specific use, the single screw is considered more efficient, neglecting the question of cost, if the draft of the vessel is sufficient to incorporate a single screw capable of absorbing the designed power. When draft is insufficient to cover a screw of a suitable diameter, then twin screws should be incorporated. Such refinements are the product of advancement in thought which proceeds apace with the evolution of tugs in all other directions.

A final refinement to complete our picture is the question of blades on the screw of the tug. How many and how placed? It seems to be largely a matter of preference. Some persons claim better results with a three-bladed propeller, others with four. One person states that the broad blades, resulting in carrying all the surface on three instead of four blades, tends to increase efficiency and manœuvrability. Another says a four-bladed propeller is better balanced, less subject to cavitation and just as efficient. In circles that matter I understand the four received a greater support than the three-bladed propeller. The dimensions of the propeller are, of course, largely governed by revs per minute and speed. A coarse pitch is considered best.

Of course the whole matter when it comes to such fine points is, always was and forever will be, one of experience.

Tug "*Carlgarth*," Rea Towing Company Limited