

**FORWOOD  
WILLIAM  
BOWER**

REMINISCENCES OF A  
LIVERPOOL SHIPOWNER,  
1850-1920

William Forwood

**Reminiscences of a Liverpool  
Shipowner, 1850-1920**

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# William Bower Forwood Reminiscences of a Liverpool Shipowner, 1850-1920

## PREFACE

The following sketches were contributed to the Liverpool Press (*Liverpool Daily Post*, *Liverpool Courier*, *Journal of Commerce*), and they are now published at the request of many friends. Advantage has been taken of the opportunity for revision, and to add further reminiscences.

A chapter has also been added descriptive of the part played by the British merchant seaman in the war; and another, published in 1917, portraying the attitude and work of the British shipowner during the war.

To do adequate justice to the history of our shipping during the past sixty years would occupy several volumes. In the following pages all that has been attempted has been to outline the principal events in the fewest possible words, in the hope that they may serve for future reference; and also keep alive that interest in our mercantile fleet which is so essential to the prosperity of our Country and the welfare of our people.

Bromborough Hall, Cheshire,  
*August, 1920.*

## Chapter I

# THE PASSING OF THE SAILING-SHIP

The old sailing-ship, with all the romance which surrounds it, must long linger in the affectionate regard of all British people as the creator of our great overseas trade and the builder-up of our commercial prosperity. The sailing-ship was the mistress of the seas for centuries. She founded our maritime supremacy, was the conveyor of the first fruits of our manufacturing industry to the ends of the world, and enabled us to train a race of sailors unequalled for their skill, courage, and patriotism, who in times of national peril have protected our homes and safeguarded the freedom of the world.

Liverpool owes her greatness as a city and her position as the first port in the world to her shipping. Possessing the only deep-water haven on the West Coast, she naturally became the port of shipment for the manufactures of Lancashire and Yorkshire directly our export trade began to develop. The beginnings of the shipping trade were small, for in 1751 there were only 220 vessels belonging to the port. The opening up of the American trade in 1756 gave a great impetus to shipping. It was destined, however, to receive a serious check by the world-wide war which started in 1756, and was waged almost continuously for sixty years.

The first of this long series of wars known as the Seven Years' War (1756-1761) was followed by twelve years of peace, and it was during this time that our trade with America made its greatest headway. The War of Independence with America, which broke out in 1773, proved most disastrous to Liverpool. It paralysed our trade and there was dire distress in the town. It is recorded: "Our docks are a mournful sight, full of gallant ships laid up and useless." This unhappy war lasted seven years.

But perhaps the most terrible period for our shipping was in 1810, when America, feeling herself "crushed between the upper and the nether millstone of Napoleon's mastery on land and England's supremacy by sea," declared war and threw her strength into privateering. The result to the trade of Liverpool was most disastrous. The number of ships entering the port fell from 6,729 in 1810 to 4,599 in 1812. When, in 1815, peace was again brought about, there was a most rapid recovery in business in every direction.

Our British arms which had been victorious in the great war on the continent of Europe had also made our country supreme at sea; foreign shipping had almost disappeared, and our shipping trade reaped an enormous advantage, our tonnage rapidly increasing.

The period from 1815-1860 may be termed the halcyon days of the British ship, and the period from 1850-1880 witnessed the "passing" of the sailing-ship. With the "passing" of the sailing-ship we have lost many interesting and attractive features. The attitude of the shipowner has entirely changed. His quiet, leisurely occupation has gone, and with it much that was picturesque and gave pleasure and enjoyment. With the advent of the steamer a new era opened up, characterised by the hustle of increased activity. Speed is the criterion aimed at, calling for constant and strenuous work.

The shipowner of the olden days had time to take a deep personal interest in the upkeep of his ship. He strolled down from his office almost daily to the dock where she was lying. Of the sixty-four shares into which the ownership was divided he probably owned at least one-half; this gave him a very real concern in his ship's welfare. He watched and supervised her construction with the same solicitude as he would the building of his own house. And when completed and she took up her loading berth in the Prince's or Salthouse Dock, all fresh painted, the rigging tarred down, the ratlines all taut and evenly spaced, every rope and hawser carefully coiled down and in its place, it was excusable if the owner viewed his ship with some pride. A large poster displayed in the ship's rigging announced the port for which she was taking cargo and the date of sailing – a date which was never kept. She remained in dock week after week while her cargo gradually trickled down.

This long delay involved a loss of interest and earning power, and also a serious loss of interest to the owners of cargo shipped by her. Mr. Donald Currie, when he left the Cunard Company, made up an ownery for five or six ships for the Calcutta trade, and was anxious that Jardine, Skilmer & Co., of Calcutta, should take the agency at that port. But they had suffered so much from the delay of their cargoes that they made it a condition of their acceptance that Mr. Currie should strictly adhere to his advertised dates of sailing; and certainly he had no cause to regret it, for practically Jardines loaded his ships with their own goods, and Mr. Currie's fleet rapidly increased. This was the beginning of fixed days of sailing from Liverpool, which are now almost universal.

Although the pleasure of a shipowner was more personal and greater in the days gone by, it was accompanied by much anxiety, and the risks were greater than those of to-day. A wooden ship was liable to decay, and the periodical surveys by Lloyd's were times of much concern. They might expose some defect which might involve the stripping and rebuilding of the part affected. The highest class at Lloyd's A1 for thirteen years, soon ran out, and the continuation of the class always involved many repairs.

The preparation of a captain's instructions prior to the commencement of a voyage entailed much thought; every contingency had to be provided for; there were no "cables" by which subsequent instructions could be sent, or the owner consulted.

Cargoes at the loading ports were uncertain, and the change of ports in ballast had to be provided for. The most carefully-worded instructions often failed to provide for the very contingency which happened, or more frequently the captain did some stupid thing. The owner was in dread lest his ship should find no homeward cargo and have to shift ports, or lest she be damaged or dismasted, and put into some remote port not contemplated in his instructions. He had visions of heavy repair bills and bottomry bonds.

Sailing-ship owning was profitable to those who possessed high-class ships, but I cannot recall many fortunes made out of soft wood ships, the cost of their maintenance and repair being so heavy.

In a brief résumé of the history of the sailing-vessel it is not necessary to pass in review the early steps taken in the evolution of a ship, for shipowning did not assume a position of any importance before the year 1600, when, during the reign of Queen Elizabeth, the East India Company was founded.

The East India Company's first ships were vessels of from 300 tons to 600 tons. They were all heavily armed, and only conveyed the cargoes belonging to the Company. The "John" Company was highly successful, and at the close of the eighteenth century had not only a large fleet of ships, but also possessed a large portion of the continent of India. The ships of the Company were remarkable vessels; they were frigate built, large carriers, and stately looking, but badly designed, very slow, required a large quantity of ballast, and their cost was about £40 per ton. Improvement in design and equipment was very slow; there existed no incentive to improvement; the profit made was derived mainly from the cargoes they carried; and it has been said that the improvements made in British shipping from the reign of Queen Elizabeth to the Victorian era were so gradual as to be perceptible only when measured by centuries.

When we speak of the ships of the sixteenth, seventeenth, and eighteenth centuries, we cannot but be surprised to find how slight were the improvements made during these three hundred years. During the latter half of the eighteenth century the finest ships were constructed in France, and at that period the best ships in the British navy were those captured from the French.

The treaty of peace between the United States of America and Great Britain, signed in 1814, marks the beginning of a new era in the history of shipping. The progress, however, for some years was slow; design and construction were hindered by our obsolete tonnage laws, which encouraged the building of a very undesirable type of ship. Meanwhile America was going ahead. Not only did she produce more ships, but they were well designed and equipped, and it was the general opinion that the American ship was superior to the British ship. When, in 1832, the monopoly of the East

India Company came to an end, and the commerce of the Orient was thrown open to all British ships, there was at once an effort made to establish British shipping on a broader and more substantial basis. The opening of the China and East India trades gave rise to that competition which had been so long dormant, and without which there can be little incentive to improvement.

The American trade gave the first and great impetus to shipowning in Liverpool. The famous New York packets, the pioneer Black Ball Line, were established in 1816. This Line consisted at first of vessels of from 300 to 500 tons register. These little ships with their full bodies and bluff bows made wonderful passages, averaging 23 days outwards and 43 days homewards. They were for many years the only means of communication between this country and the United States. The "Dramatic" Line was started in 1836, with vessels of about 700 tons, and it is noteworthy that the "Sheridan," of 895 tons, built the following year for this Line, was found to be too large for the Liverpool trade; but the trade rapidly grew and the packet ships gradually increased in tonnage. In 1846 the "New World" was built, of 1,400 tons. As a child I recollect being taken down to the dock to see this ship, as being the largest sailing-ship in the world; and many still living will remember the "Isaac Webb," the "Albert Gallatin," the "Guy Mannering," and the "Dreadnought." The ships of the "Black Ball" Line and the "Dramatic" Line were grand ships, and made many wonderful passages.

There are three outstanding events which greatly contributed to the improvement of British shipping, and may be said to mark the beginning of our great maritime position – the establishment, in 1834, of Lloyd's Register; the founding, in 1846, of the Marine Department of the Board of Trade; and, in 1849, repeal of the Navigation Laws. These laws, devised originally for the protection of British shipping, and to secure for it a certain monopoly of the carrying trade, had become antiquated, and a hindrance to its development. It was not, however, until we found the commerce of the world was largely being carried by American ships, which were faster and better built, that an agitation was started to abolish those laws.

There was considerable opposition to their repeal, and the first result was not encouraging; there was a decrease in the tonnage of British ships entering our ports, and a large increase in foreign tonnage, especially of American; and although this created a feeling of despondency, and gave rise to the fear that we had lost for ever our premier position in the overseas carrying trade, it really proved a great stimulus to enterprise, and renewed exertion, and not many years elapsed before we had regained, and more than regained, our position in the shipping world.

To America belongs the credit of introducing the clipper ship, which was specially designed to make rapid passages. The discovery of gold in California created a great rush, and there was a gigantic movement of human beings by land and by sea. The land journey across America was long and hazardous, and this gave rise to a large emigration by sea, and the necessity for providing a class of ship which would be able to make rapid passages. This the old-fashioned frigate-built ship was unable to do.

The era of the clipper ship may be said to date from 1848, when gold was first discovered in California. The building of these ships in America proceeded rapidly, and in four years one hundred and sixty were built. They were the swiftest ships the world had ever seen, making the voyage from New York to San Francisco in from 100 to 120 days. They were remarkable for their fine lines, lofty spars, and great sail-carrying capacity.

The discovery of gold in California in 1848 was quickly followed by the discovery of gold in Australia in 1851, and a rush of emigration immediately set in, which had to be carried by sailing-ships. The regular traders were small vessels with very limited passenger accommodation; so shipowners very quickly turned their attention to the clipper ships built in New England and in New Brunswick, which had been so successful in the Californian trade.

The first clipper ship constructed for the Australian trade was the "Marco Polo," of 1,622 tons. She was built in 1851, at St. John's, for James Baines & Co., of Liverpool, and she was the pioneer of the famous Australian Black Ball Line. The "Marco Polo" was a handsome ship, built with a

considerable rise of floor and a very fine after end, and carrying a large spread of canvas. She made some remarkable passages under the command of Captain Forbes, who did not hesitate to shorten the distance his ship had to travel by sailing on the great circle, and going very far south. The “Marco Polo” may be said to have set the pace in the Australian trade. She was quickly followed by such renowned ships as the “Lightning,” the “James Baines,” the “Sovereign of the Seas,” and the passages of these ships created as much public interest as those of our Atlantic greyhounds do to-day. We had also the White Star Line of Australian clippers, which owned the “Red Jacket,” the “Blue Jacket,” and the “Chariot of Fame.” The “Red Jacket” made the record passage of 64 days to Melbourne, and was one of the most famous of the American built clippers.

Although America can claim to have introduced the clipper ship, our English shipbuilders were not much behindhand. The tea trade with China offered great rewards for speed, and the ship landing the first cargo of the new teas earned a very handsome premium. The competition was, therefore, very keen. These tea clippers were very beautiful vessels of about 800 to 1,000 tons, of quite an original type; and, unlike the American clipper, they relied for their speed more upon the symmetry of their lines than upon their large sail area. They had less beam and less freeboard than the American clipper, and as their voyages necessitated a good deal of windward work, this was made their strong point of sailing, and probably they will never be excelled in this. The names of the “Falcon,” the “Fiery Cross,” the “Lord of the Isles,” will still dwell in the memory of many.

In 1865 a memorable race took place between ten celebrated tea clippers, and the evenness of their performances was remarkable. The times of the passages of the first five, from the anchorage in China to Deal, varied from 99 to 101 days, and the prize, 10s per ton, was divided between the “Taeping” and the “Ariel” – the one arriving first at Deal, and the other being the first to dock in London. There were similar races every year, which always aroused great interest.

The greatest development in sailing-ships was brought about by the substitution of iron for wood in their construction. The iron ship, among other advantages, could be of larger size, was more durable, and less costly in maintenance; and in 1863 a notable further improvement was made when, in the Liverpool ship “Seaforth,” steel lower masts, topmasts, and topsail yards, and also standing rigging of steel wire were introduced, and about the same time double topsail yards were adopted.

We are apt to make light of the great increase in American shipping since the late war, and think that the competition of America will not last and will not be serious. We should, however, not forget how large a proportion of the world’s carrying trade by sea was done by America prior to her civil war in 1863, and the excellence of her ships. The tariffs she imposed after this war killed her shipping and made shipbuilding, except for her coastwise trade, impossible. The result of the late war has been to make the cost of shipbuilding nearly as great in this country as in America, and she will certainly make a serious bid for her share of the trade.

With the passing of the old sailing-ship we have lost much that was picturesque and much that appealed to sentiment. The river Mersey at the top of high water filled with sailing craft of all kinds, from the great Australian clipper down to the Dutch galliot or the British sloop with her brown sails, presented a panorama which has no equal to-day, and called forth thoughts of adventure and perils by the sea which a great Atlantic liner or even the modest coasting steamer fail to suggest, although they may speak to us in the spirit of the times – of that security and speed which has brought the very ends of the earth together.

This short sketch of the old sailing-ship days would be incomplete without alluding to the position of the sailor, which was far from satisfactory. His life was hard and very rough. He usually lived in the forecabin, which was close and damp. The chain cables passed through it to the chain lockers below, the hawse-pipes had often ill-fitting wooden plugs, and when the ship plunged into a head sea the forecabin was flooded. There was no place for the men to dry their clothes, and no privacy. Their food was salt tack, and it was no wonder that they enjoyed their noggin of rum. These were, however, days before we had the luxury of preserved provisions or ice-houses. But the old

British tar came of a hardy, good humoured race. I have seen them when off Cape Horn take marling-spikes aloft to knock the ice off the topsail, and merrily singing one of their chanties while they tied in a close reef.

The pay of a sailor was small – £3 a month for an A.B.; and when they returned home from a voyage they were pounced upon by the boarding-house keepers, who did not let them out of their clutches while they had any money left. The neighbourhood of our Sailors' Home was a perfect hell, a scene of debauchery from morn to night. The sailor had no chance, and when he sailed again he had no money to buy any decent or warm clothes. Thanks to such philanthropists as the late Samuel Smith, Alexander Balfour, and Monsignor Nugent, this reproach to Liverpool was, after a great and long fight, removed, and the interests of the sailor are to-day safeguarded in every way by the Board of Trade, and greater interest is exhibited in his welfare by the shipowner. While thus recording the conditions of a seaman's life we must not forget that the conditions of life generally were much harder and rougher than those of to-day, and the sailor had many compensating advantages when at sea. It was while he was in port that he required safeguarding.

## **Chapter II**

### **THE ERA OF THE STEAMSHIP**

With the “passing” of the sailing-ship much of the poetry and romance of the sea disappeared. The era of the steamship is more prosaic, but it brought with it a recognition of the spirit of the times that the expanding trade of the world and the march of civilisation, demanded speed and regularity in our sea services for their development, and what we have lost in romance we have more than made good by the wider distribution of the world’s products which the facilities for travel and the rapid conveyance of our merchandise have made available. All parts of the world have been brought within easy reach of the traveller, and our trade routes have been increased and expanded. We have opened up new markets for our exports, and new sources for the supply of food. Our people are now largely fed by supplies of perishable food which reach us from the far distant Antipodes. It is, indeed, difficult to say what might have happened if we were still dependent upon the old sailing-ship. The advent of the steamship was most fortuitous. Just as in our means of conveyance by land, new means and forms of transport have been developed with our increasing population, so it would appear that, as the growth of our population and the spread of civilisation have demanded it, improved facilities for travel by sea have been opened up.

The passing of the sailing-ship made very slow progress in the beginning, for although steamers entered the Atlantic and the East India trades about 1840, the old-fashioned wooden paddle steamer was not a serious competitor except in the conveyance of passengers and mails. It took thirty or forty years to develop improvements in the design of steamers and to effect the evolution of the marine engine, and the progress made was gradual. The high-pressure engine, the compound engine, the turbine, and now the geared turbine were all steps in the direction of securing the economy and efficiency necessary to make the steamer an effective competitor in the conveyance of heavy or bulky cargoes; but once this point was reached, the sailing-vessel was doomed except in the small coasting trades. The opening of the Suez Canal also gave the steamer a great advantage, and perhaps did more than anything else to destroy the position of the sailing-ship in the long trades. It will be interesting to watch the effect which dear coals and cost of sailing may have in reviving the fortunes of the sailing-ship.

Steamers are now mostly owned by public companies, which we regret to say are largely centred in London, and are represented in Liverpool by managers. A steamer somehow fails to arouse the same enthusiasm as the old sailing-ship; much of the old romance and sentiment has gone. The managers have so many steamers to look after that their work becomes more or less mechanical; they cannot take the same personal interest in them. The manager of one large fleet boasted that he never went down to the dock to see his steamers – this he considered was the business of his marine superintendent.

The shareholders in a limited liability company in the same way have not the same close touch with their property that the owner of a sixty-fourth share had in the old sailing-ship. The one was personal, the other is remote. The subscription lists of our nautical charities prove this. The Bluecoat School and the Seamen’s Orphanage do not appeal to them as they appealed to the Bryan Blundells, the MacIvers, the Brocklebanks, Allans, Beazleys, and Ismays and the general public of fifty years ago.

We cannot dwell upon the many early efforts to apply the steam engine to the propulsion of a ship. The first steam vessel to cross the Atlantic was the “Savannah,” a vessel 130 feet in length and 26 feet broad. She was built in New York in 1818; she was an auxiliary vessel, her paddle wheels being taken off and placed on deck when the wind was fair. She sailed from Savannah on the 24th May, 1819, and arrived at Liverpool on the 20th June. The first vessel to steam all the way across

the Atlantic was the “Royal William,” built at Quebec in 1831. She was 830 tons, with side-lever engines of 200 horse power. She sailed from Quebec to London on the 4th of August, 1833, and after a stormy passage arrived in the Thames on the 11th September.

A more serious attempt to bridge the Atlantic was made in June, 1838, when a second “Royal William” of 720 tons was built at Liverpool, and her paddle engines of 400 horse power were made by Fawcett, Preston & Co., of Liverpool. She made several successful passages, and was our first passenger steamer. The Transatlantic Steamship Company, which had chartered the “Royal William” afterwards built the “Liverpool,” of 1,150 tons, and 464 horse power. She made several voyages, averaging 17 days out and 15 days home.

Mr. Maginnis in his very useful and excellent work “The Atlantic Ferry,” claims for the “Sirius” the honour of inaugurating the Atlantic steamship service. She was owned by the British & American Steam Navigation Company, of which Mr. John Laird was the Chairman. She was 703 tons, and sailed on the 5th April, 1838, making the passage in 16½ days, maintaining an average of 8½ knots, on a consumption of 24 tons. About the same time the “Great Western,” of 1,340 tons, sailed from Bristol, making the outward passage in 13½ days.

The British & American Steamship Company encouraged by the successful voyage made by the “Sirius,” built, in 1839, two sister ships, the “British Queen” and the “President.” They were 1,863 tons gross register, and 700 horse power. The “British Queen” sailed from Portsmouth, July 12th, 1840, and the “President” on July 17th, 1840. The “President,” after sailing from New York, on March 11th, 1841, with a small number of passengers, was never again heard of, and in consequence of this disaster the British & American Steamship Company ceased to exist.

We cannot omit from our brief review of the early history of the steamship, an allusion to the “Great Britain,” the first large iron steamer. She was 3,270 tons, and was launched at Bristol in 1843. For very many years she was our largest ship, and considered to be one of the wonders of the day. She was placed in the Liverpool and New York trade, and sailed on the 26th July, 1845, on her first voyage. I remember seeing her pass down the Channel off Seaforth. Her six masts greatly impressed my child intelligence. She was wrecked the same night on the Irish Coast, but she was afterwards got off, and had a very varied and chequered career, and underwent many changes. Her six masts were reduced to four, then to three. She had new engines, and was placed by Gibbs, Bright & Co., in the Australian trade. Then she was converted into a full rigged sailing-ship, and in 1883 was condemned at the Falkland Islands as no longer seaworthy, and remained there for many years as a coal hulk.

It cannot be said that these early endeavours to establish a steamship trade were very encouraging, and the great scientist of that day, Dr. Lardner, stated that he had no hesitation in saying that the project announced in the newspapers of making a voyage directly from New York to Liverpool was perfectly chimerical. They might as well talk of making a voyage from New York to the moon.

All the more honour to those pioneers who had the courage and the prescience to go ahead; and to Mr. Samuel Cunard and his partners the steamship trade must be for ever deeply indebted, for to them we owe the first serious and successful effort to establish a steamship service across the Atlantic. They built, in 1840, the “Britannia,” “Acadia,” “Columbia,” and “Caledonia,” – the first ships of the now celebrated Cunard Line.

The Inman Line was founded in 1850, the Guion Line in 1866, and the White Star Line, which now shares the great Atlantic trade with the Cunard Company, was established in 1870.

The evolution from sail to steam involved changes in the design of the hull of a ship. At first it was considered that to turn a sailing-ship into a steamer it was simply necessary to fit a hull designed for a sailing-vessel with a steam engine. It was soon, however, discovered that the fine lines and deep keel required to carry sail were not required in a steamship, and in course of time full-bodied hulls with square bilges without keels were adopted.

An iron steamer is but a rectangular girder or tank with the ends sharpened, the co-efficient of fineness varying from 62 to 78 degrees, according to the speed or deadweight capacity required. In

1860 Sir Edward Harland, with a view to easy propulsion, introduced steamers into the Mediterranean trade with a length of ten times their beam. These were so successful that when he built the fleet for the White Star Line he carried out the same principle, thereby also securing steady sea boats. He also introduced central passenger saloons and cabins, which speedily made the White Star ships very popular. Cabin accommodation placed in the centre of the ship has now become general. Some further modifications in design have taken place; ships have, relatively, now less length and more beam, and the cabin accommodation is built up citadel fashion in the middle of the ship.

The most notable evolution has, however, been in size and speed. The "Britannia," built in 1840, was 1,200 tons, with 8½ knots speed. She was followed by the "Great Britain," in 1843, 3,270 tons; she was, however, too large for the times, and did no good. The "Great Eastern," built in 1855, was of 18,915 tons, and 12 knots speed, and was also a failure, although if she had been given sufficient power she would probably have hastened the era of large and fast vessels.

The demand for speed was for some years the governing feature in the design of steamers in the Atlantic trade, and to a smaller extent in the Eastern trades, in which the carrying of coal for long voyages has also to be considered. The increase in power required to obtain high speeds necessitated the adoption of twin screws, and with the still higher powers required by the "Mauretania," "Olympic," etc. (60,000 h.p.), four propellers are found necessary.

In the Atlantic trade, the "Arizona," built by John Elder & Co. for the Guion Line, was the first of the "Atlantic greyhounds." She was quickly followed by the "Alaska" and the "Oregon," the latter being built in 1882, with a speed of 19 knots. She was the fastest ship of her time, and became the property of the Cunard Company. She was again eclipsed by the Cunard ships "Umbria" and "Etruria," in 1885, with a speed of 19½ knots. In 1888 the "City of Paris" and "City of New York" had attained a speed exceeding 20 knots. For some years no improvement in speed was obtained until the advent of the "Campania" and "Lucania," in 1893, with a tonnage of 12,900 and a speed of 22 knots.

Although steamers thus gradually increased in size and power, the "Oceanic," built in 1899 for the White Star Line, may, I think, claim to be the pioneer of the great Atlantic liners. She was 16,900 tons and 704 feet long, and 21 knots speed. She was quickly followed by the "Lusitania" and "Mauretania," built for the Cunard in 1907, with a tonnage of 33,000, and a speed of 24½ knots. They were again eclipsed in size by the "Olympic," "Aquitania," and the "Imperator," all about 50,000 tons; but the "Mauretania" still holds the blue riband of the Atlantic for speed. It is scarcely safe to say that the last big ship has been built; size is only limited by commercial considerations and the depth of water available in our harbours, as an iron ship, being a girder, her length is limited by the depth which can be given to the girder. The cost of construction may, however, limit the size of ships, at all events, for some years.

## Chapter III

# THE EVOLUTION OF THE MARINE ENGINE

The steamship as a practical proposition developed slowly, being retarded by the dilatory evolution of the marine engine. The first serious effort to apply steam power to vessels of any size dates back to only 1838-1840, years which witnessed the establishment of the Royal Mail, the Peninsular and Oriental, and the Cunard Steamship Companies. Their first vessels were steamers of 1,200 tons, having a speed of eight or nine knots. Such vessels were not formidable competitors of the old packet ships, except in the passenger trades; their average passage across the Atlantic, occupying from thirteen to seventeen days, not being a great improvement upon the passages of the sailing-packets. The ships of the Dramatic Line averaged 20½ days, and those of the Black Ball Line 21 days.

The advantage of the greater regularity in the passages of the steamer was, however, obvious, and greatly stimulated invention. The improvements in the paddle engine were slow. We were a long time getting away from the side-lever engine, working at a low pressure. The “*Britannia*,” built in 1840, was 1,200 tons; her engines indicated 740 horse-power, giving a speed of 8½ knots. The “*Scotia*,” the finest paddle steamer ever built, and the last of the great paddle boats, was built in 1860, and had the same type of side-lever engine, but her tonnage was 3,871, with an indicated horse-power of 4,800, giving her a speed of 13 knots. The most rapid passage made by the “*Britannia*” was 14 days 8 hours; the most rapid made by the “*Scotia*” was 8 days 15 hours.

The screw propeller was invented in 1836, but for a long time it was thought to be inferior to the paddle as a means of propulsion, and there was some difficulty in applying the power to the screw shaft. The side lever in various forms was tried, but proved a failure. The “*Great Britain*,” 3,270 tons, launched in 1843, had engines which worked upward on to a crank shaft, and the power was brought down by endless chains to the screw shaft. This did not prove satisfactory. Then we had oscillating engines working a large geared wheel fitted with wooden teeth to increase the revolutions of the propeller. Then came the direct-acting engines with inverted cylinders, which for years were almost the universal type of engine, and were a very efficient form of low pressure engine.

The compound engine revolutionised the steamship trade, ensuring such economy of fuel as to permit of long voyages being successfully undertaken. The compound engine developed into the triple expansion engine; the object being to get the last ounce of power out of the steam by first using it in a high pressure cylinder at 180 lbs., then passing it into a larger cylinder, using it expansively, and finally passing it into a still larger cylinder at about 8 lbs. pressure, and again allowing it to expand. The triple expansion engine came into general use in 1886.

The turbine, invented by Sir Charles Parsons in 1897, has effected a revolution in the engines of large size. The principle is simply to allow steam at a high pressure to impinge upon blades fitted to a rotor which it revolves on the principle of the syren. The steam is afterwards used expansively in a second rotor working directly upon the screw shaft. The advantage of a turbine engine is its simplicity – few working parts and a saving in weight and space; its disadvantage is that a separate turbine has to be employed to obtain sternway. Recently, geared turbines have been introduced which are lighter, slightly more economical in fuel, and are sweeter running machines.

It is noteworthy that whereas gears were necessary in olden times with engines working at a low pressure to speed up the propeller shaft, with turbines gears are used to reduce the revolutions.

Meantime, greater boiler efficiency was being obtained. The “*Britannia*” worked with a pressure of 12 lbs. This was gradually increased to 30 lbs. in boilers constructed in 1868, and this was practically the range of pressure during the period of single-expansion engines. The salt water used in these boilers caused them to become quickly salted up, which not only diminished their efficiency but shortened their lives, and it was not until the compound engine was invented by John Elder that

cylindrical boilers, working at a pressure starting at 60 lbs. and increasing to 190 lbs., were introduced. These proved a great success. By the use of fresh feed water and replenishing it from the condensers, salting was prevented and the life of a boiler greatly increased.

No further great improvement in the boiler has taken place. The water-tube boiler is still in an experimental stage, and attention is now being directed to oil fuel, which will reduce the engine-room staff, ensure greater cleanliness and quicker despatch.

The result of these improvements in marine engines and boilers has been to reduce the consumption of coal from 4 lbs. per indicated horse-power to 1.4 lbs., which cannot be considered otherwise than a great achievement. The future high cost of coal is sure to stimulate invention, and we may at no distant date expect developments in internal combustion engines adapting them to high powers which may open up a new and great era for mechanically-propelled vessels, and again entirely change the world's outlook. We have also always before us the probability of further discoveries in electricity; the recent developments in wireless telegraphy teach us that we are only on the threshold of discoveries which will bring this mighty but mysterious power more and more into the service of man.

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